Grassland Bypass Project
Interim Baseline Monitoring Program

Monthly Data Report

June 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

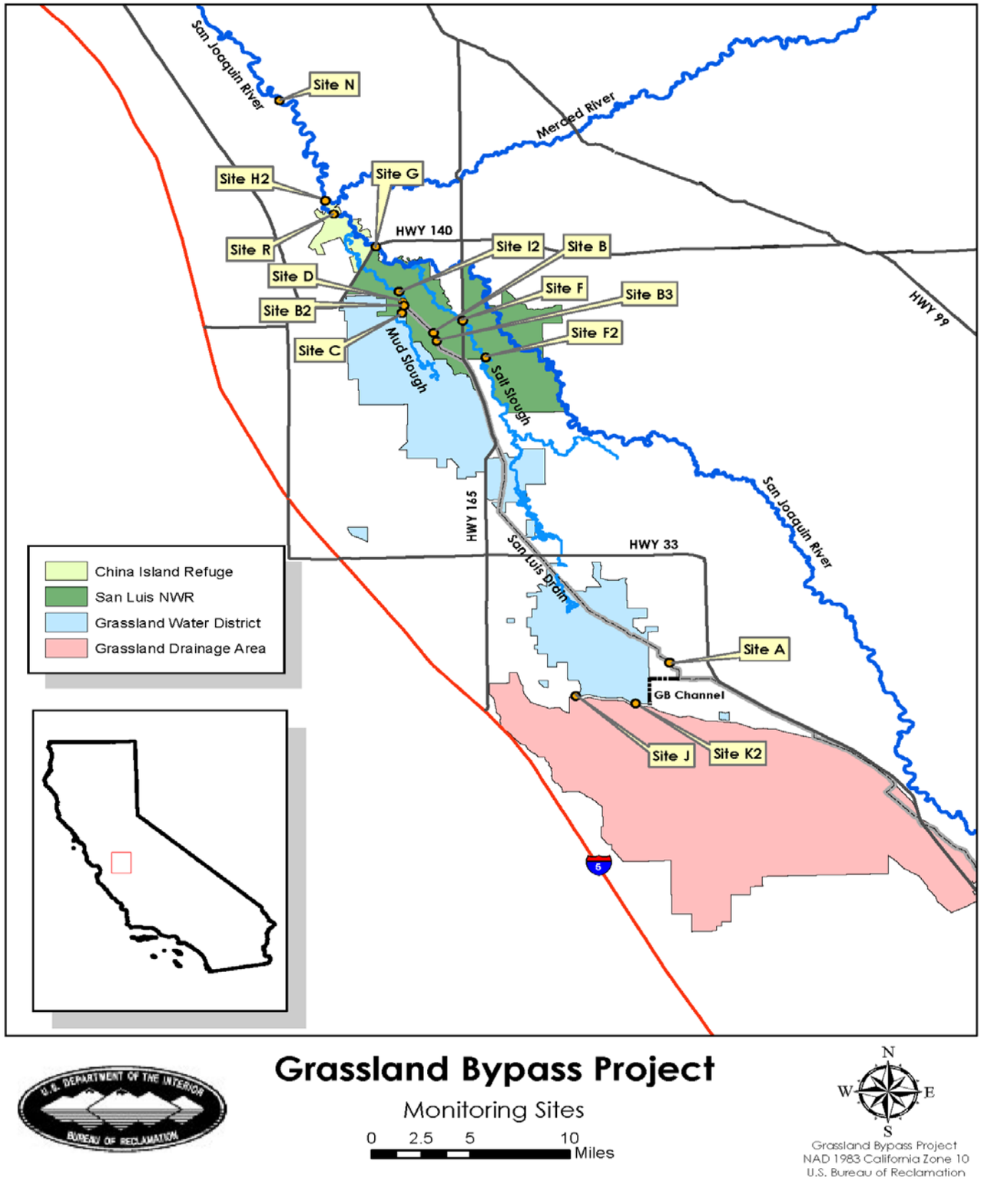
San Luis & Delta-Mendota Water Authority

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

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
Jun-01-2014	2	23.8	7,230	5,350			30
Jun-02-2014	2	22.4	6,990	5,172			32
Jun-03-2014	1	22.2	7,010	5,189			13
Jun-04-2014	1	23.9	6,730	4,982			15
Jun-05-2014	2	25.1	6,450	4,771			21
Jun-06-2014	0	24.1	7,180	5,312			6
Jun-07-2014	0	24.9	7,290	5,391			1
Jun-08-2014	1	26.6	7,430	5,495			9
Jun-09-2014	4	27.6	8,040	5,946	119		56
Jun-10-2014	4	26.2	7,880	5,832			58
Jun-11-2014	7	24.1	7,170	5,306			94
Jun-12-2014	10	22.8	6,180	4,570			117
Jun-13-2014	2	22.5	6,100	4,512			24
Jun-14-2014	6	23.4	6,540	4,842			74
Jun-15-2014	6	23.3	6,350	4,696			77
Jun-16-2014	8	21.5	6,030	4,463	241		93
Jun-17-2014	10	21.4	5,920	4,379			119
Jun-18-2014	11	22.7	5,350	3,963			121
Jun-19-2014	10	24.2	4,970	3,681			96
Jun-20-2014	17	24.6	5,380	3,983			179
Jun-21-2014	18	23.2	6,670	4,933			237
Jun-22-2014	12	23.3	7,870	5,824			192
Jun-23-2014	13	23.9	7,280	5,384	157		189
Jun-24-2014	11	24.3	7,890	5,839			176
Jun-25-2014	10	23.7	8,390	6,206			169
Jun-26-2014	11	24.2	7,820	5,789			175
Jun-27-2014	15	23.9	6,940	5,137			211
Jun-28-2014	11	24.5	7,760	5,739			163
Jun-29-2014	6	25.5	8,440	6,244			104
Jun-30-2014	7	27.3	8,710	6,443	100		115

Notes:
See Table 19 for explanation of footnotes and agency abbreviations.
Preliminary Results

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	NA	2,970	5,991
Cumulative Total	3,360						22,070	36,786

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
Jun-01-2014	5	24.8	8,140		16.0	12.3	0.3
Jun-02-2014	5	23.2	8,410		16.0	16.6	0.4
Jun-03-2014	3	22.4	8,500		16.0	15.7	0.3
Jun-04-2014	3	25.1	8,660		16.0	18.4	0.3
Jun-05-2014	4	27.9	8,750		17.0	6.1	0.1
Jun-06-2014	2	25.9	8,800		16.0	5.3	0.1
Jun-07-2014	1	26.9	8,860		16.0	4.7	0.0
Jun-08-2014	3	28.6	8,930		16.0	4.6	0.1
Jun-09-2014	1	30.3	9,050	55	16.0	6.1	0.0
Jun-10-2014	0	27.9	9,080		15.0	8.0	0.0
Jun-11-2014	0	26.1	9,130		15.0	10.9	0.0
Jun-12-2014	1	23.4	9,460		14.0	13.5	0.1
Jun-13-2014	7	22.0	9,150		15.0	12.6	0.5
Jun-14-2014	6	24.1	8,790		15.0	11.2	0.4
Jun-15-2014	5	22.4	8,510		13.0	11.7	0.3
Jun-16-2014	6	21.5	8,390	62	13.0	11.1	0.3
Jun-17-2014	6	20.1	8,240		13.0	10.9	0.3
Jun-18-2014	8	23.7	7,630		14.0	11.2	0.5
Jun-19-2014	10	25.8	7,210		13.0	12.3	0.7
Jun-20-2014	9	25.3	7,470		17.0	11.9	0.6
Jun-21-2014	13	24.7	8,720		18.0	14.4	1.0
Jun-22-2014	19	23.9	8,660		14.0	28.9	3.0
Jun-23-2014	12	24.9	7,570	56	12.0	36.9	2.3
Jun-24-2014	12	26.8	7,230		12.0	36.7	2.5
Jun-25-2014	10	25.1	6,690		11.0	37.4	2.1
Jun-26-2014	10	24.5	6,150		9.8	33.6	1.8
Jun-27-2014	10	24.9	5,840		11.0	35.5	1.9
Jun-28-2014	14	25.3	6,340		13.0	32.1	2.4
Jun-29-2014	12	26.7	7,380		17.0	21.4	1.3
Jun-30-2014	7	30.7	8,710	65	17.0	16.1	0.6

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
Cumulative Load Totals	4,440						251	611

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
Apr-04-2014	14.7	8.5	6,480	18.9		13	13	
Apr-11-2014	10.5	8.5	6,380	23.8	17.0	19	12	21
Apr-18-2014	10.2	8.4	6,450	21.0	22.5	13	12	
Apr-30-2014	15.7	8.9	7,060	23.9	13.7	23	14	
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

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	0.160	< 0.050

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.

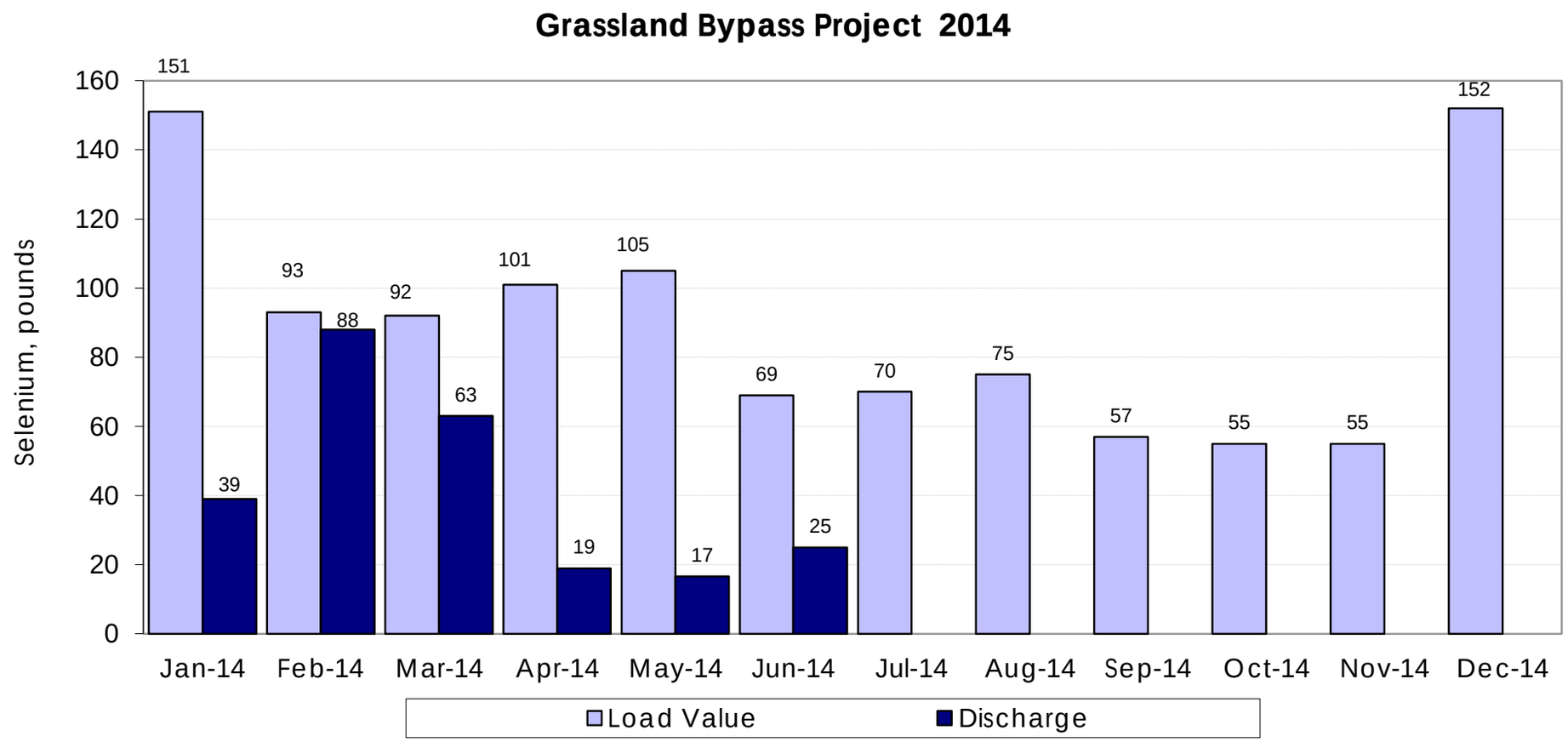


Table 3a. Water monitoring in Mud Slough (north) below San Luis Drain Discharge Station D

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	USGS	USGS	USGS
UNITS	cfs	°C	µS/cm
Jun-01-2014	0	23.5	8,010
Jun-02-2014	0	23.0	8,280
Jun-03-2014	0	22.9	8,420
Jun-04-2014	0	23.7	8,410
Jun-05-2014	0	25.0	8,590
Jun-06-2014	0	25.0	8,640
Jun-07-2014	0	25.6	8,710
Jun-08-2014	0	26.3	8,760
Jun-09-2014	0	27.0	8,820
Jun-10-2014	0	25.8	9,040
Jun-11-2014	0	25.6	9,150
Jun-12-2014	0	24.6	8,910
Jun-13-2014	0	23.9	8,710
Jun-14-2014	0	24.3	8,550
Jun-15-2014	0	24.3	8,430
Jun-16-2014	0	22.8	8,340
Jun-17-2014	0	22.5	8,040
Jun-18-2014	8	22.8	7,530
Jun-19-2014	9	23.3	7,120
Jun-20-2014	9	24.1	7,240
Jun-21-2014	11	24.4	8,340
Jun-22-2014	16	24.5	8,520
Jun-23-2014	10	25.0	7,440
Jun-24-2014	11	25.8	7,060
Jun-25-2014	10	26.0	6,540
Jun-26-2014	9	25.8	6,030
Jun-27-2014	9	26.0	5,730
Jun-28-2014	13	26.4	6,100
Jun-29-2014	11	26.2	7,000
Jun-30-2014	8	26.8	8,250

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			
August			
September			
October			
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
Apr-04-2014	10.9	8.0	3,830	18.6		1.7	4.9	
Apr-11-2014	10.1	8.0	3,590	23.5	41.0	2.2	3.9	9.3
Apr-18-2014	7.7	8.1	4,360	21.5	50.3	3.2	5.4	
Apr-30-2014	16.3	8.6	7,040	24.5	28.4	20 U	13.0	
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

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

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
Apr-04-2014	18.7	3,160		8.1	2.9	<0.4	
Apr-11-2014	8.4	2,850	52	7.9	2.3	<0.4	7.5
Apr-18-2014	10.0	3,090	59	8.1	2.7	<0.4	
Apr-30-2014	11.6	4,140	30	8.2	3.9	0.5	
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							

Notes:

> No samples collected May 8-23 due to lack of sufficent flow

> May 30 very little flow during sample collection

> No samples collected June 8-23 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**
Apr-04-2014						
Apr-11-2014						
Apr-18-2014						
Apr-30-2014						
May-08-2014						
May-16-2014						
May-23-2014						
May-30-2014						
Jun-06-2014						
Jun-13-2014						
Jun-20-2014						
Jun-26-2014						

Notes:
Samples collected only when site is flooded
Site was dry from January through May (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
Jun-01-2014	37	24.2	1,320
Jun-02-2014	33	24.4	1,460
Jun-03-2014	31	22.5	1,590
Jun-04-2014	23	24.6	1,740
Jun-05-2014	21	26.0	1,740
Jun-06-2014	27	26.3	1,720
Jun-07-2014	25	26.6	1,520
Jun-08-2014	22	27.2	1,580
Jun-09-2014	32	28.0	1,580
Jun-10-2014	42	27.2	1,250
Jun-11-2014	40	25.4	1,180
Jun-12-2014	41	25.2	1,290
Jun-13-2014	32	24.2	1,400
Jun-14-2014	29	24.1	1,400
Jun-15-2014	29	23.5	1,340
Jun-16-2014	39	21.8	1,260
Jun-17-2014	36	21.3	1,200
Jun-18-2014	35	22.0	1,180
Jun-19-2014	36	24.0	1,230
Jun-20-2014	32	25.1	1,360
Jun-21-2014	34	24.9	1,340
Jun-22-2014	30	23.5	1,270
Jun-23-2014	29	25.1	1,340
Jun-24-2014	33	26.5	1,240
Jun-25-2014	29	25.8	1,230
Jun-26-2014	26	25.0	1,310
Jun-27-2014	33	25.2	1,290
Jun-28-2014	32	26.0	1,240
Jun-29-2014	35	26.4	1,190
Jun-30-2014	33	27.3	1,120

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			
August			
September			
October			
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
Apr-04-2014	10.1	7.7	1,780	16.2		<0.4	0.9	
Apr-11-2014	8.4	7.7	1,890	21.8	82.0	0.4	1.1	7.9
Apr-18-2014	8.6	7.5	1,880	19.6	82.4	0.6	0.9	
Apr-30-2014	11.5	7.6	1,810	22.9	37.1	<0.4	0.8	
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

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	0.050 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

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
Apr-04-2014	<20			
Apr-11-2014	<20			
Apr-18-2014	<20			
Apr-30-2014	<20			
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			

Notes:
Samples only collected when flow is passing site
April, May, and June: 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
Apr-04-2014	<20			
Apr-11-2014	<20			
Apr-18-2014	<20			
Apr-30-2014	<20			
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			

Notes:
Samples only collected when flow is passing site

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
Jun-01-2014	53	24.4	2,390
Jun-02-2014	50	24.6	2,370
Jun-03-2014	46	25.1	2,660
Jun-04-2014	44	25.0	2,730
Jun-05-2014	37	26.4	3,220
Jun-06-2014	35	26.1	3,930
Jun-07-2014	39	26.9	3,880
Jun-08-2014	35	27.5	3,340
Jun-09-2014	33	28.1	3,720
Jun-10-2014	37	27.2	3,740
Jun-11-2014	39	26.5	2,470
Jun-12-2014	39	25.6	2,190
Jun-13-2014	38	24.2	2,170
Jun-14-2014	37	23.8	3,420
Jun-15-2014	38	24.1	3,590
Jun-16-2014	37	24.0	3,310
Jun-17-2014	39	22.9	2,830
Jun-18-2014	39	22.0	2,660
Jun-19-2014	39	23.9	3,010
Jun-20-2014	38	25.2	3,040
Jun-21-2014	34	25.0	3,180
Jun-22-2014	36	23.6	3,590
Jun-23-2014	35	25.6	4,670
Jun-24-2014	33	27.1	4,060
Jun-25-2014	34	26.1	3,670
Jun-26-2014	32	25.2	3,560
Jun-27-2014	33	25.1	3,390
Jun-28-2014	33	26.0	3,190
Jun-29-2014	35	26.2	3,180
Jun-30-2014	36	28.1	2,700

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			
August			
September			
October			
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
Apr-04-2014	11.9	8.0	2,680	17.6		0.6	2.0	
Apr-11-2014	9.4	7.9	2,440	22.9	95.0	0.9	1.8	7.4
Apr-18-2014	8.8	7.9	3,060	21.2	66.1	0.7	1.9	
Apr-30-2014	16.4	8.2	2,660	25.3	40.6	1.0	3.5	
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

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

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 (Stati

PARAMETER	Flow	Temperature	Specific Conductance
DATA SOURCE	USGS	USGS	USGS
UNITS	cfs	°C	µS/cm
Jun-01-2014		24.1	1,680
Jun-02-2014		24.3	1,920
Jun-03-2014		23.8	1,960
Jun-04-2014		25.2	2,600
Jun-05-2014		25.7	2,930
Jun-06-2014		26.2	1,890
Jun-07-2014		26.6	2,610
Jun-08-2014		27.0	1,850
Jun-09-2014		28.1	1,810
Jun-10-2014		27.3	2,090
Jun-11-2014		26.6	1,640
Jun-12-2014		25.8	1,640
Jun-13-2014		24.2	1,920
Jun-14-2014		24.0	2,240
Jun-15-2014		24.0	2,420
Jun-16-2014		23.4	2,350
Jun-17-2014		22.7	1,800
Jun-18-2014		23.0	1,850
Jun-19-2014		24.7	1,870
Jun-20-2014		25.4	1,940
Jun-21-2014		24.9	2,060
Jun-22-2014		24.7	2,070
Jun-23-2014		25.8	2,180
Jun-24-2014		26.6	2,140
Jun-25-2014		25.8	1,960
Jun-26-2014		25.6	2,110
Jun-27-2014		26.0	2,250
Jun-28-2014		26.2	1,940
Jun-29-2014		26.5	1,710
Jun-30-2014		28.0	1,820

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			
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
Jun-01-2014	124	24.1	1,880	0.7
Jun-02-2014	142	25.4	1,680	0.6
Jun-03-2014	123	24.7	1,560	0.4
Jun-04-2014	105	25.3	1,790	0.5
Jun-05-2014	103	26.0	1,600	0.8
Jun-06-2014	86	25.6	1,580	0.59
Jun-07-2014	85	25.7	1,720	0.6
Jun-08-2014	107	26.5	2,220	0.6
Jun-09-2014	98	27.0	1,940	0.5
Jun-10-2014	98	26.8	1,790	0.5
Jun-11-2014	111	26.2	1,760	0.5
Jun-12-2014	105	25.5	1,650	0.5
Jun-13-2014	105	24.1	1,450	0.5
Jun-14-2014	115	24.1	1,370	< 0.4
Jun-15-2014	108	24.1	1,460	0.5
Jun-16-2014	94	24.7	1,970	0.5
Jun-17-2014	96	23.7	1,930	0.6
Jun-18-2014	109	23.0	1,960	0.4
Jun-19-2014	106	23.7	1,830	0.4
Jun-20-2014	104	24.8	1,820	0.6
Jun-21-2014	100	24.6	1,930	0.6
Jun-22-2014	100	23.3	1,860	0.6
Jun-23-2014	106	25.1	2,050	0.7
Jun-24-2014	96	25.9	2,590	0.9
Jun-25-2014	85	25.5	2,530	1.3
Jun-26-2014	86	24.4	2,130	1.3
Jun-27-2014	89	24.2	1,890	1.3
Jun-28-2014	88	25.1	2,030	1.6
Jun-29-2014	86	25.6	2,240	2.0
Jun-30-2014	87	26.8	2,240	1.7

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				
August				
September				
October				
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
Apr-04-2014	11.8	8.0	2,010	16.8		0.4	1.3	
Apr-11-2014	10.1	8.0	1,820	22.5	28.8	0.6	1.1	5.9
Apr-18-2014	8.8	7.8	2,220	20.2	32.3	0.4	1.2	
Apr-30-2014	14.8	8.3	1,030	27.7	22.9	<0.4	0.7	
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

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
3/17/2014	18	< 0.8	1.3	0.5	< 0.4
3/19/2014	18	< 0.8	1.5	0.5	< 0.4
3/21/2014	18	< 0.8	1.7	0.4	< 0.4
6/9/2014	16	< 0.8	7.2	< 0.4	< 0.4
6/11/2014	15	< 0.8	3.3	< 0.4	< 0.4
6/13/2014	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
3/17/2014	87 **	61	79	60	6.0
3/19/2014	< 5.0 T,V **	69 T,V	62 T,V	62 T,V	5.8 T,V
3/21/2014	46	64	59	58	6.0
6/9/2014	50 T	58 T	31 T	24 T	<0.5 T
6/11/2014	51 T	49	16 T	110	23.0
6/13/2014	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 (10^6cell/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