Appendix 7C
Surface Water Quality Analysis for Electrical Conductivity at Proposed Intakes

Line items and numbers identified or noted as "No Action Alternative" represent the "Existing Conditions/No Project/No Action Condition" (described in Chapter 2 Alternatives Analysis). Table numbering may not be consecutive for all appendixes.

This page intentionally left blank.

APPENDIX 7C
Surface Water Quality Analysis for Electrical Conductivity at Proposed Intakes

7C.1 Overview and Description

7C.1.1 Introduction

This appendix describes the surface water quality analysis for electrical conductivity (EC) at the intakes for Sites Reservoir Project (Project) alternatives, also referred to as the "EC Mass Balance Approach".

The EC Mass Balance Approach was used for detailed evaluation of alternatives for the Project Draft Environmental Impact Report/ Environmental Impact Statement (DEIR/EIS). This approach was used to evaluate surface water quality conditions, in the Primary Study Area (PSA), specifically EC at the intakes for the alternatives. The analysis was formulated using the limited EC field measurements available for various tributaries (sources) and locations along the Sacramento River. The analysis was formulated to indicate trends in EC changes, due to the alternatives, assuming worst-case EC conditions. The results of the analysis were used as a surrogate indicator of the changes in other conserved water quality constituents.

7C.1.2 Objective

The objective of the water quality analysis described in this appendix is to simulate the worst-case conditions for assessing the maximum potential impact for the alternatives. The analysis includes estimation of the worst-case concentrations for various sources along the Sacramento River, estimation of source water contribution at locations of interest along the Sacramento River, and finally, an estimation of the worst-case concentrations at locations of interest along the Sacramento River. The analysis calculates a simple mass balance using the source concentrations and the percent source volumes. The analysis was limited to the three intake locations along the Sacramento River, namely Tehama-Colusa Canal Intake, Glenn-Colusa Canal Intake, and the Delevan Pipeline Intake.

7C.1.3 Assumptions

Limited EC measurements were available for the key sources of flow along the Sacramento River. The measurements were from grab samples at variable time intervals over a 12-year period between 1998 and 2010. Figures 7C-1 through 7C-14 show the EC observations plotted versus corresponding flows for each observation. The flow data used are based on the daily hydrology inputs developed for the Upper Sacramento River Daily Operations Model (USRDOM) based on the flow gages on the tributaries.

The grey trend lines and equations shown on the plots represent a linear regression between EC and flow for each plot. These regressions were used to judge whether or not there was any meaningful relationship between flow and EC for these locations. Because of limited strength of the regressions, these regressions were not used in the analysis. Instead, combinations of worst-case assumptions, often irrespective of flow conditions, were used to "envelop" most of the EC observations.

The red lines on the scatter plots represent the assumed relationships for each source. Table 7C-1 shows these assumed worst-case assumptions for each source of flow. Using the observed data for each source,

background EC values were assumed. In addition, if the flow dependency of the EC was evident, a linear relationship was assumed. Both the assumed background EC and the flow versus EC relationships were formulated such that resulting EC represents the worst-case condition (less than 20 percent exceedance of the limited EC measurements) for a given flow at the source.

7C.1.4 Approach

The computational approach for analyzing conditions at the three intakes includes determining the source concentrations from the equations listed in Table 7C-1, determining source water contributions at a given location along the Sacramento River, and estimating the concentration at that location by summing the products of each source concentration and the percent volume fraction of the source. This approach assumes that water quality constituent estimated conserves mass.

This approach was used in two steps as shown in the Figure 7C-15.

The first step was to verify the worst-case calibration of the assumed equations in Table 7C-1 using the available observed EC data at various locations along the Sacramento River. The source water contributions at the calibration locations were determined based on the daily flow results from the USRDOM hind-cast simulation, which simulates the daily flow conditions along the Sacramento River with historical flows and demands forced at the boundaries.

In verifying the worst-case calibration of the flow versus EC relationships for the source flows along the Sacramento River, the estimated worst-case EC values were compared to the observed data for various stations along the Sacramento River. Figures 7C-16(a,b) through 7C-25(a,b) show the plots prepared in verifying the calibration for several locations along the Sacramento River. Each set of two figures includes a scatter plot of observed versus the estimated worst-case EC results (a) and a plot of EC residuals (estimated worst-case EC minus observed EC) (b) with respect to the flows at that location. The goal of the calibration was to achieve at least 75 percent of the residuals that are greater than or equal to zero. This ensures that the EC results represent the worst-case condition. Table 7C-2 shows the summary of the number of EC observations and the number of residuals less than and greater than zero at each location.

Once the verification of the worst-case calibration was achieved, the second step involves using the equations listed in Table 7C-1 (result of the verification) along with the source water contributions for the alternatives in estimating the water quality concentrations for impact analysis. For the impact analysis, the EC results are summarized by water year type at each intake location.

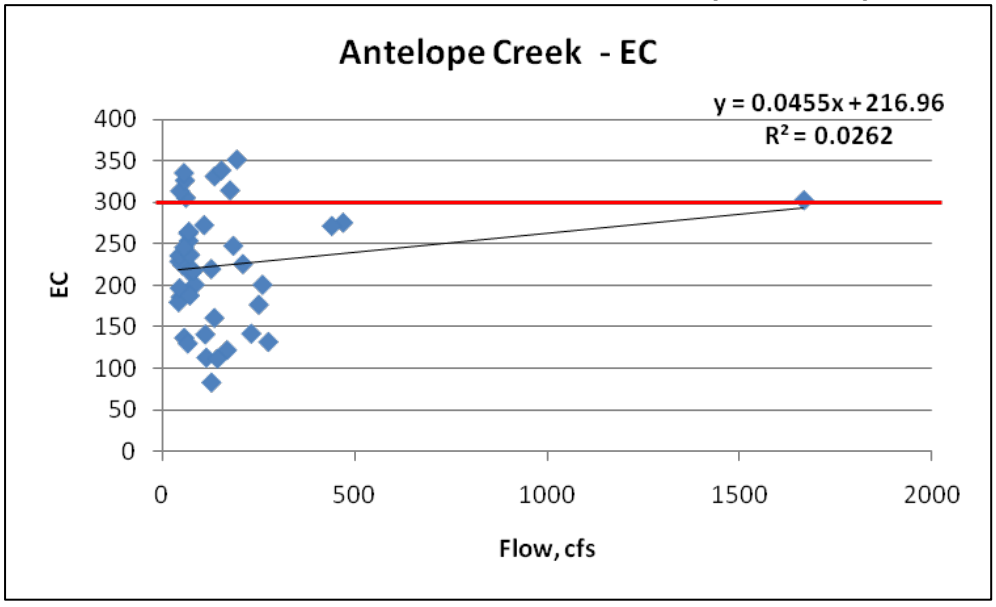
7C.1.5 Limitations

The goal of this analysis is to estimate the worst-case EC conditions in the Sacramento River to determine the maximum potential impact of diverting flows at the intakes. The intent was not to develop a calibrated model capable of predicting EC. Therefore, for the worst-case estimates, several assumptions are made. The analysis assumes that EC is conservative. In estimating the source water contributions at locations along the Sacramento River, any travel time that may take for the source flow to reach the location of the interest is ignored. The in-reservoir sources of EC, such as leaching from soils or local runoff, were not considered and the mass balance calculation did not consider evaporative or other losses. Due to these limitations, this analysis should be used only for indicating water quality trends due to changes in blending conditions.

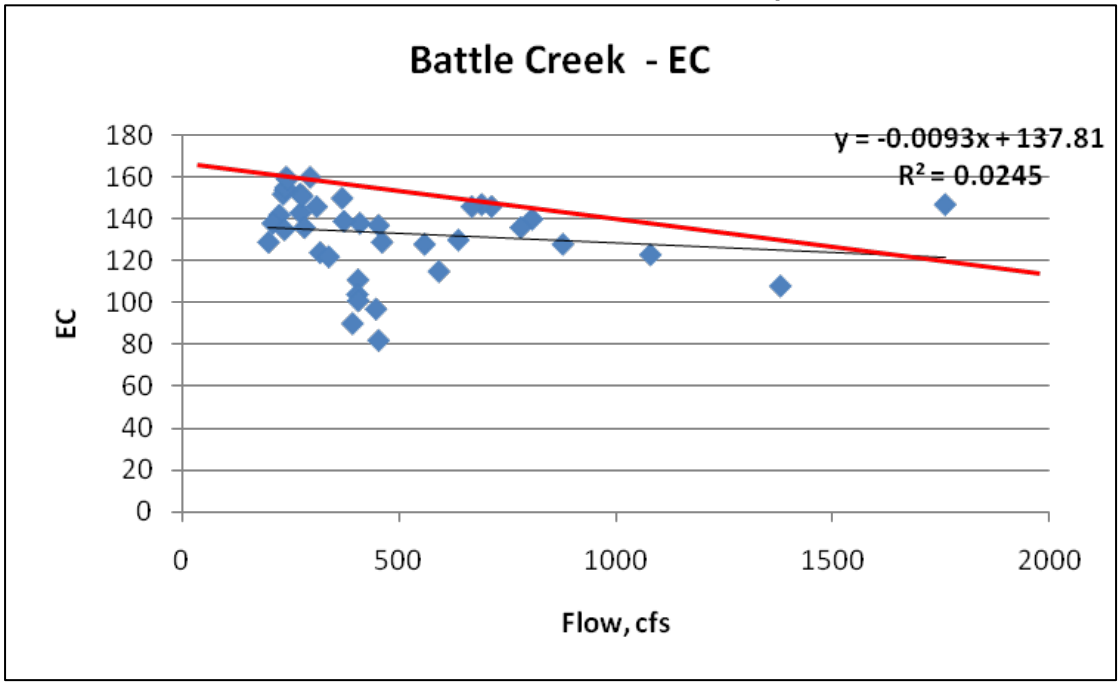
Table 7C-1
Flow Versus EC Relationship for Various Source Flows Along the Sacramento River

Flow Source	Base EC	Flow vs. EC Relationship	
		Slope	Intercept
Sacramento River downstream of Keswick Dam	100	0	130
Clear Creek	100	0	100
Cow Creek	100	0	175
Cottonwood Creek	225	-0.00896	339.6
Battle Creek	100	-0.0334	169.9
Paynes Creek	165	-0.422	249
Red Bank Creek	100	0	475
Antelope Creek	100	0	300
Mill Creek	150	-0.0627	237.9
Elder Creek	100	0	380
Thomes Creek	150	-0.162	371.6
Deer Creek	100	0	165
Big Chico Creek	125	-0.182	230.5
Stony Creek	325	-0.053	401.5
Ungaged Flows	100	0	250

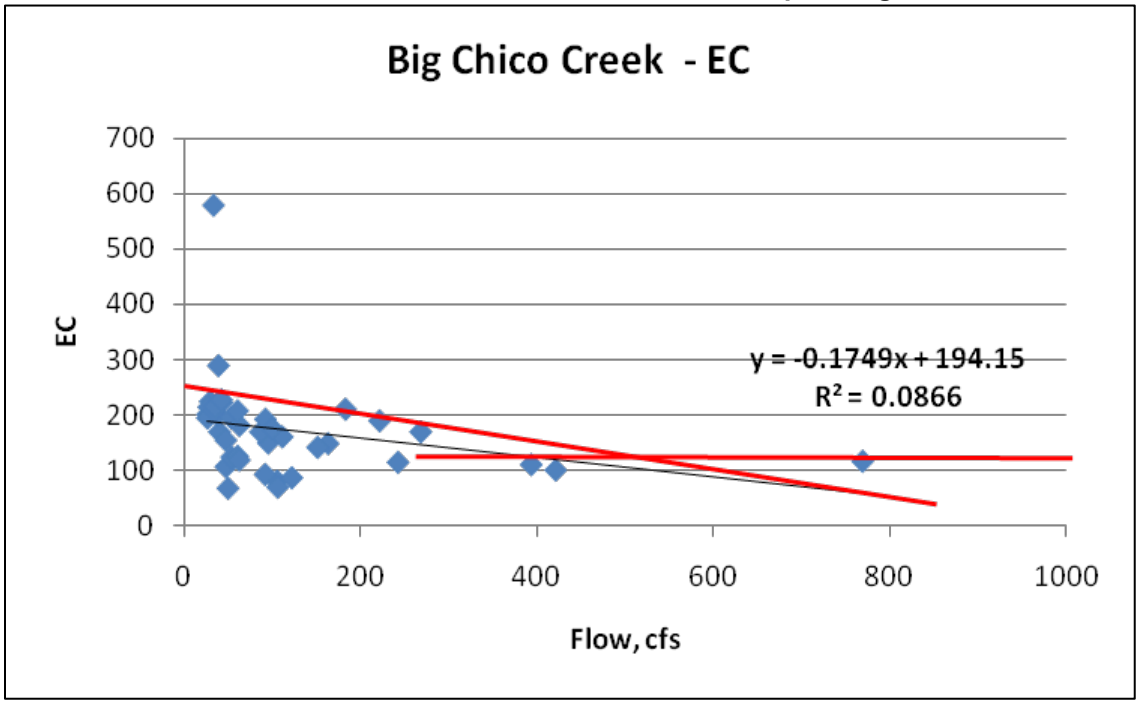
7C-1 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Antelope Creek



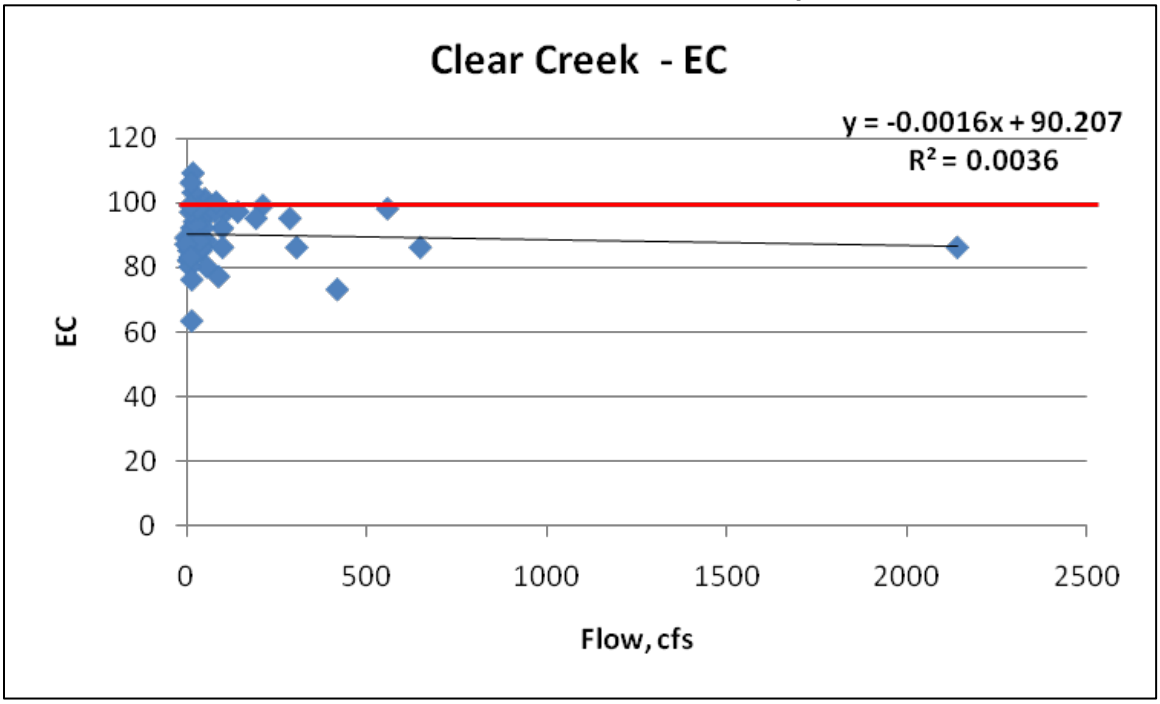
7C-2 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Battle Creek



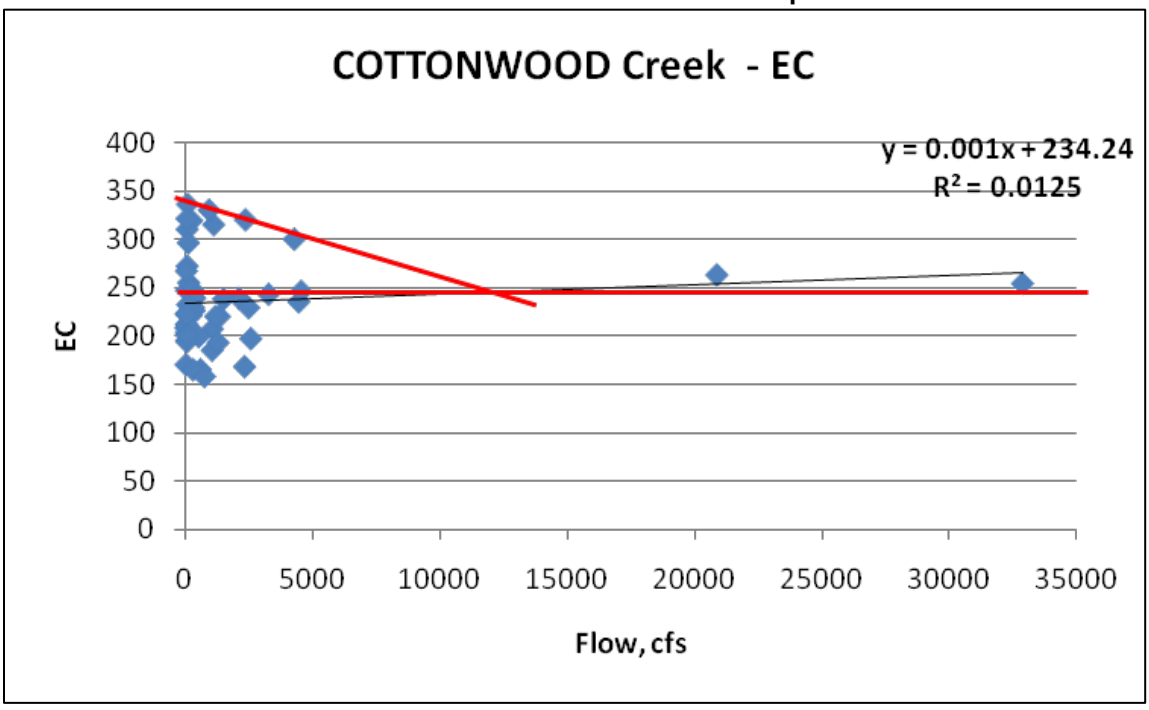
7C-3 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Big Chico Creek



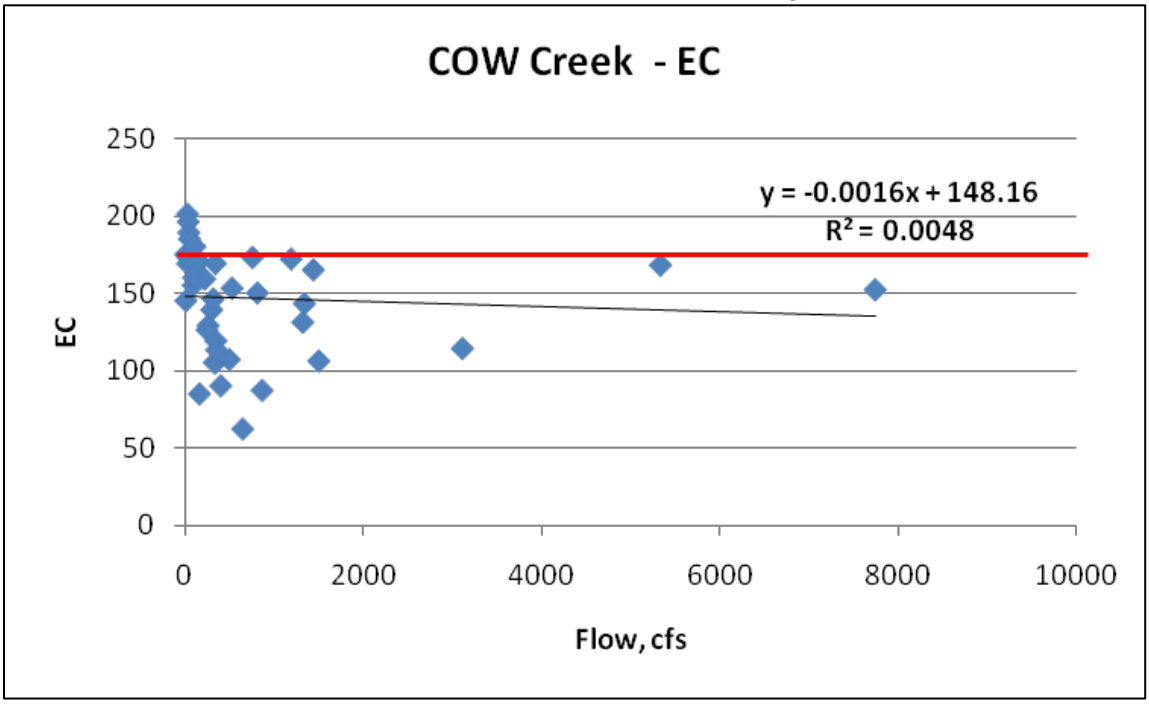
7C-4 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Clear Creek



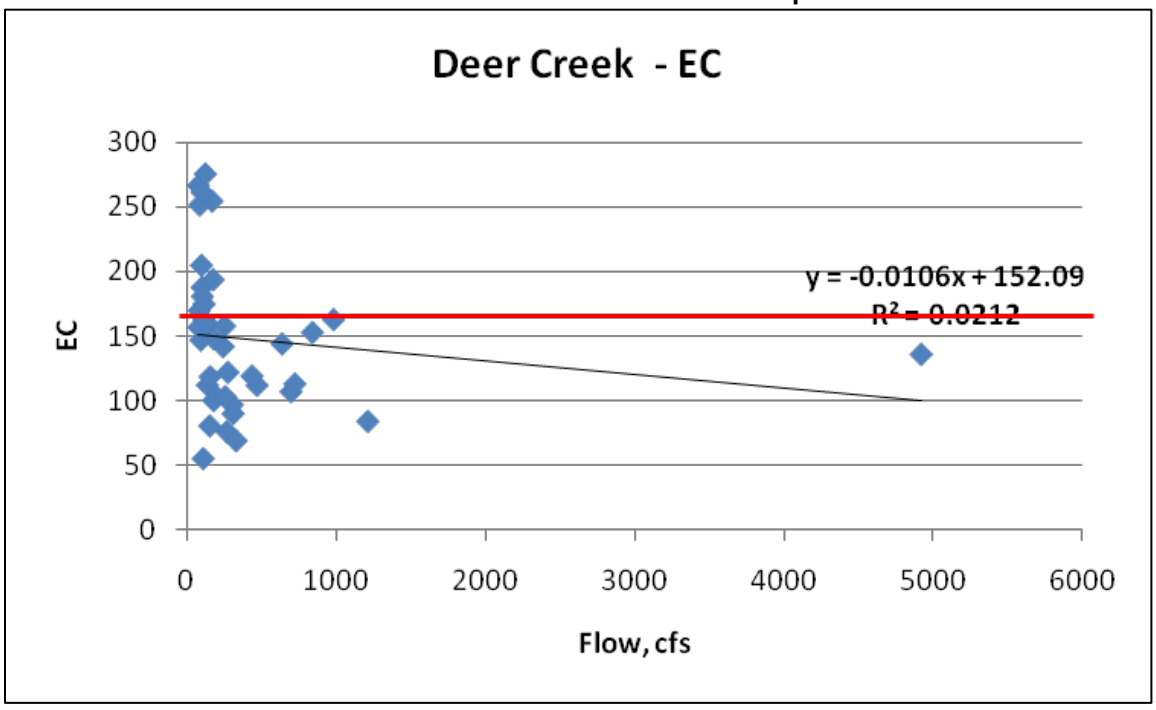
7C-5 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Cottonwood Creek



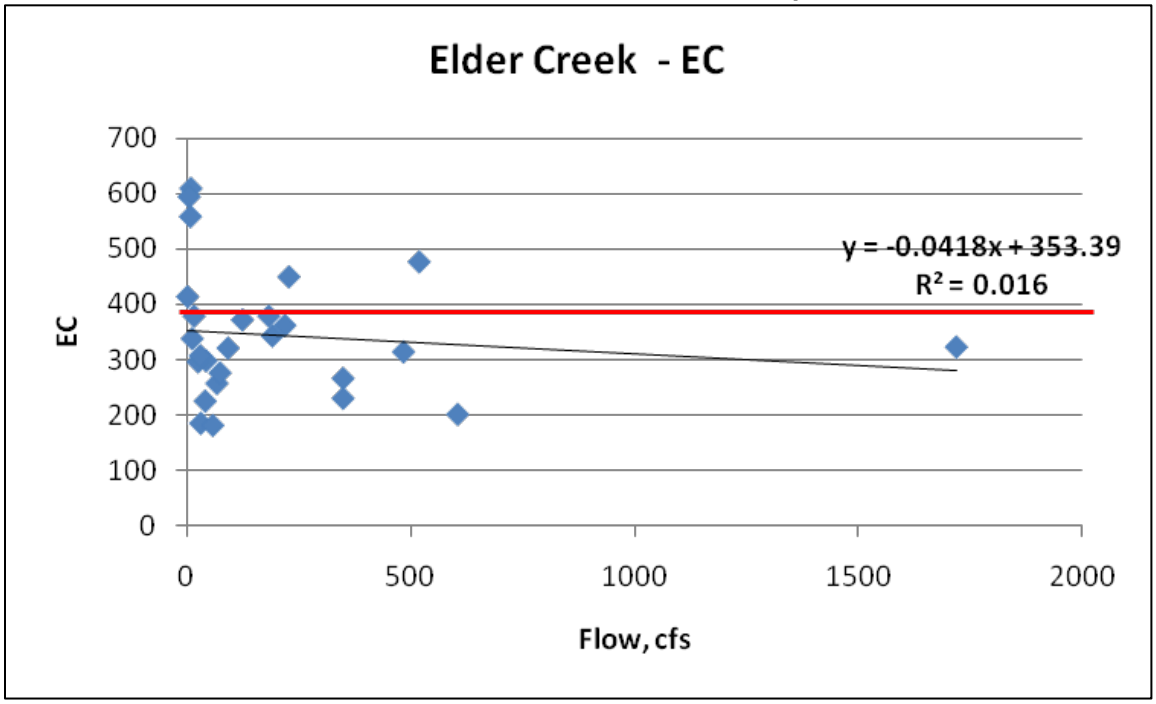
7C-6 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Cow Creek



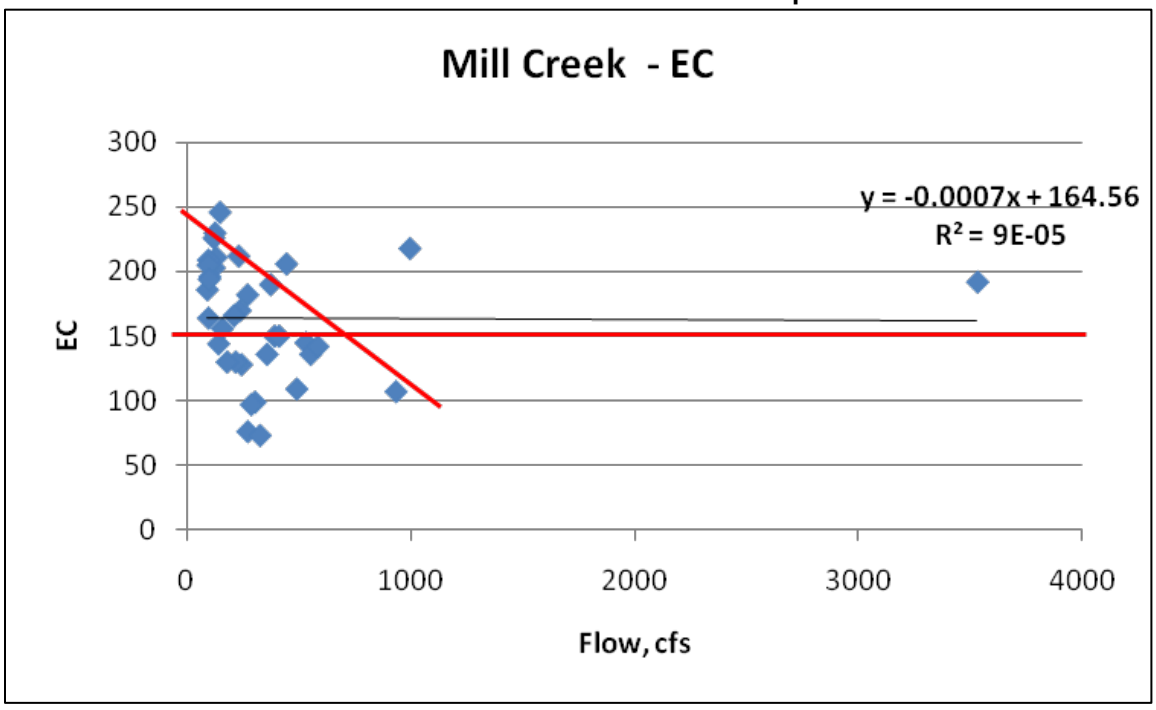
7C-7 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Deer Creek



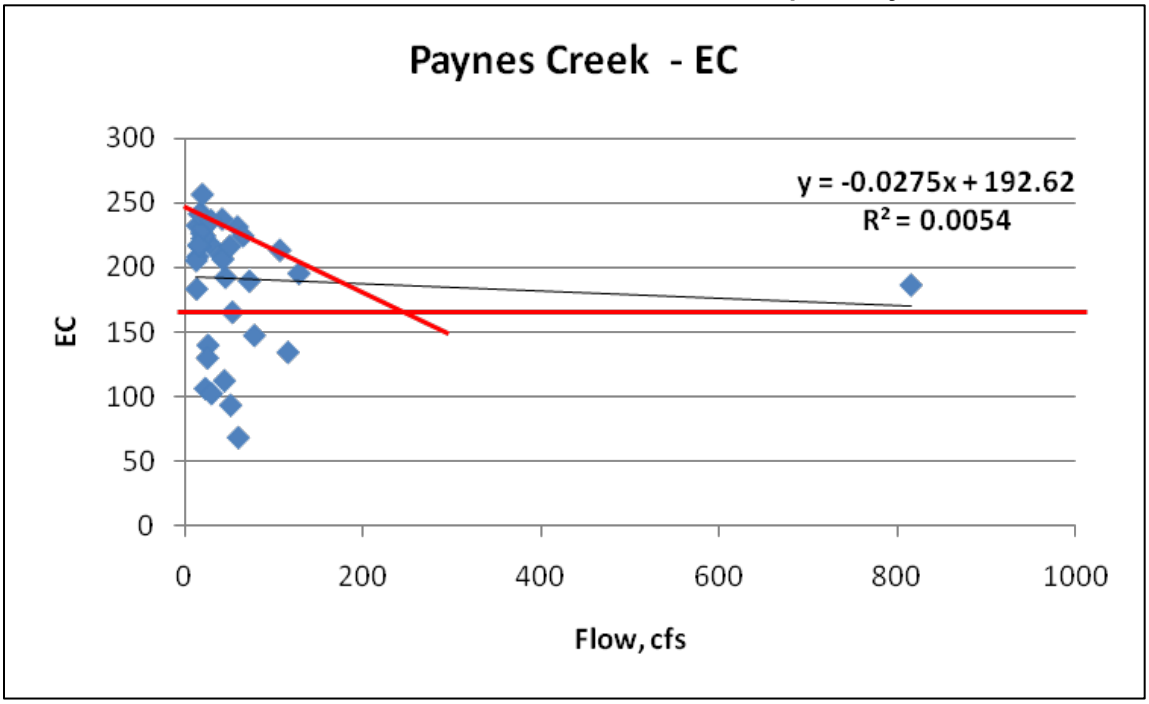
7C-8 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Elder Creek



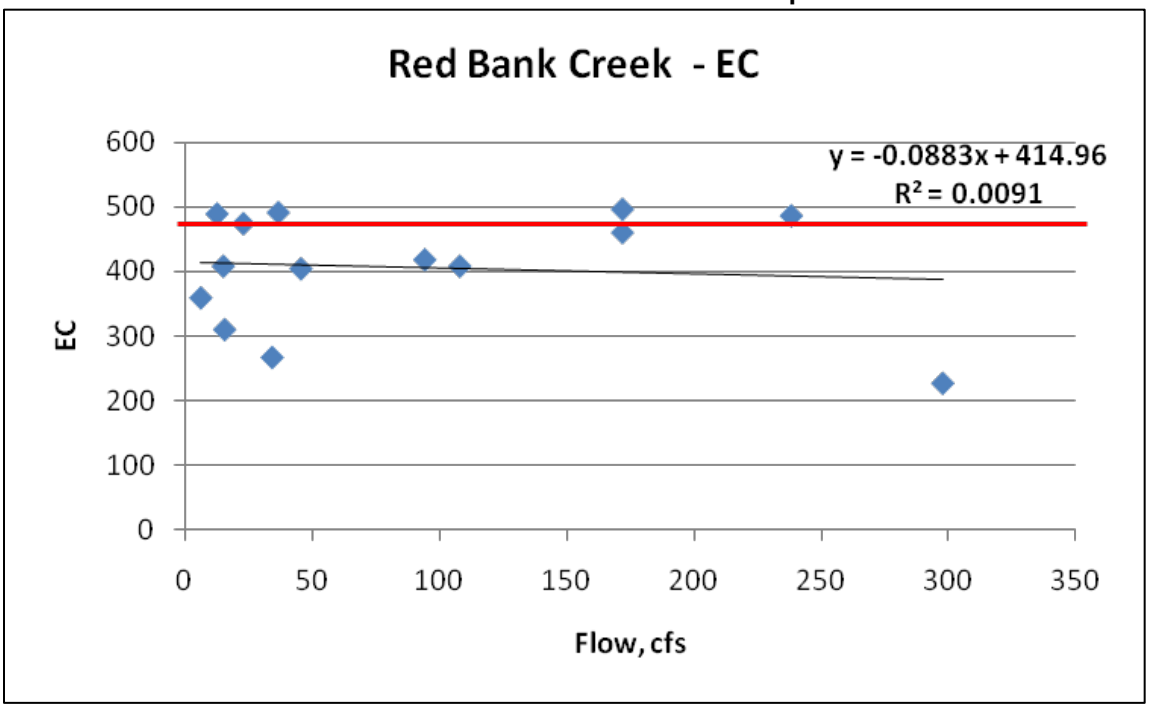
7C-9 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Mill Creek



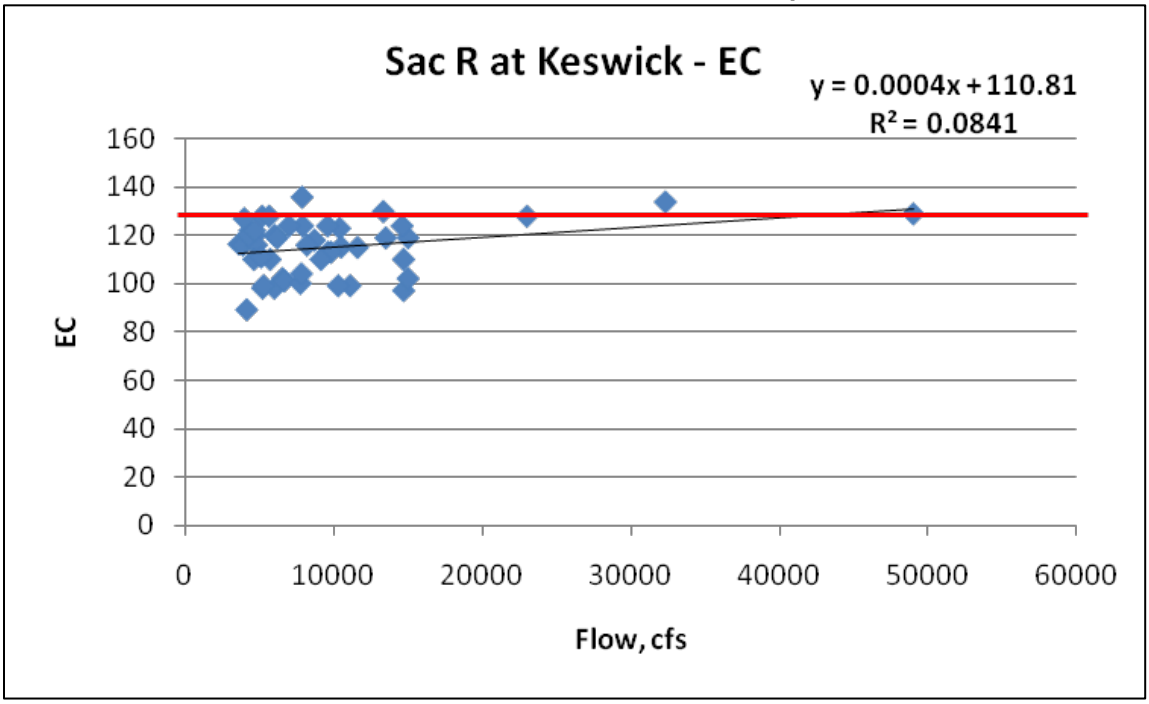
7C-10 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Paynes Creek



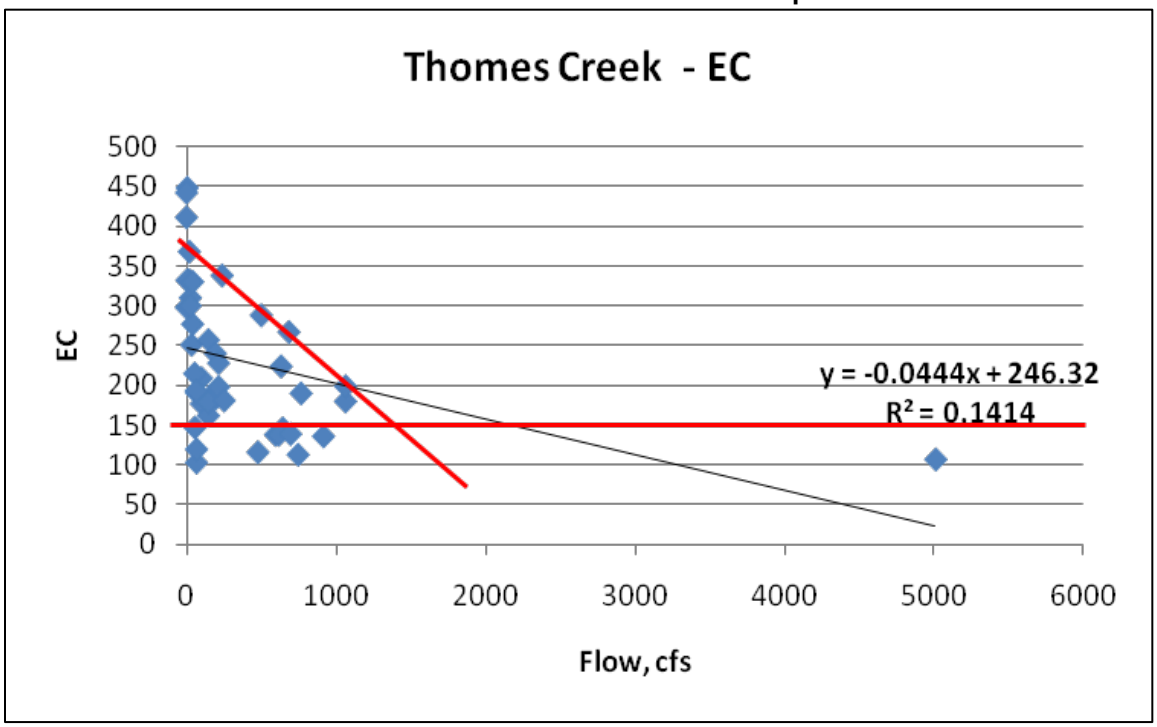
7C-11 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Red Bank Creek



7C-12 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Sacramento River



7C-13 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Thomes Creek



7C-14 USRDOM Hind-Cast Flow Versus Observed EC Relationship for Stony Creek

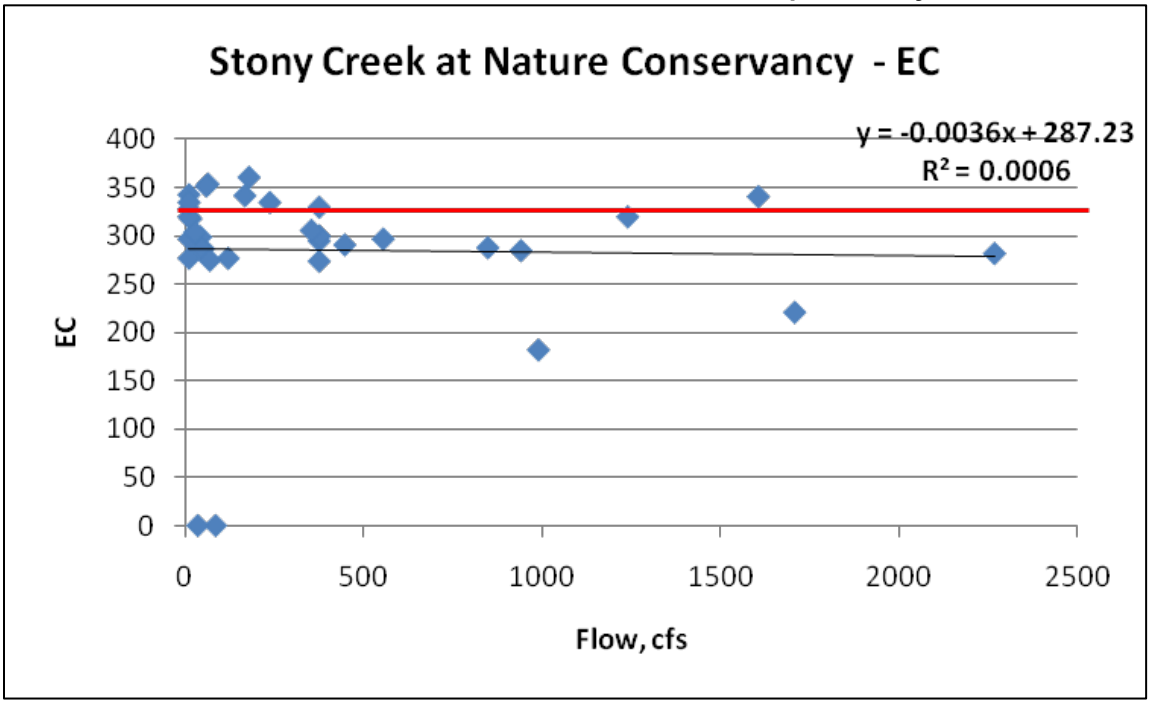
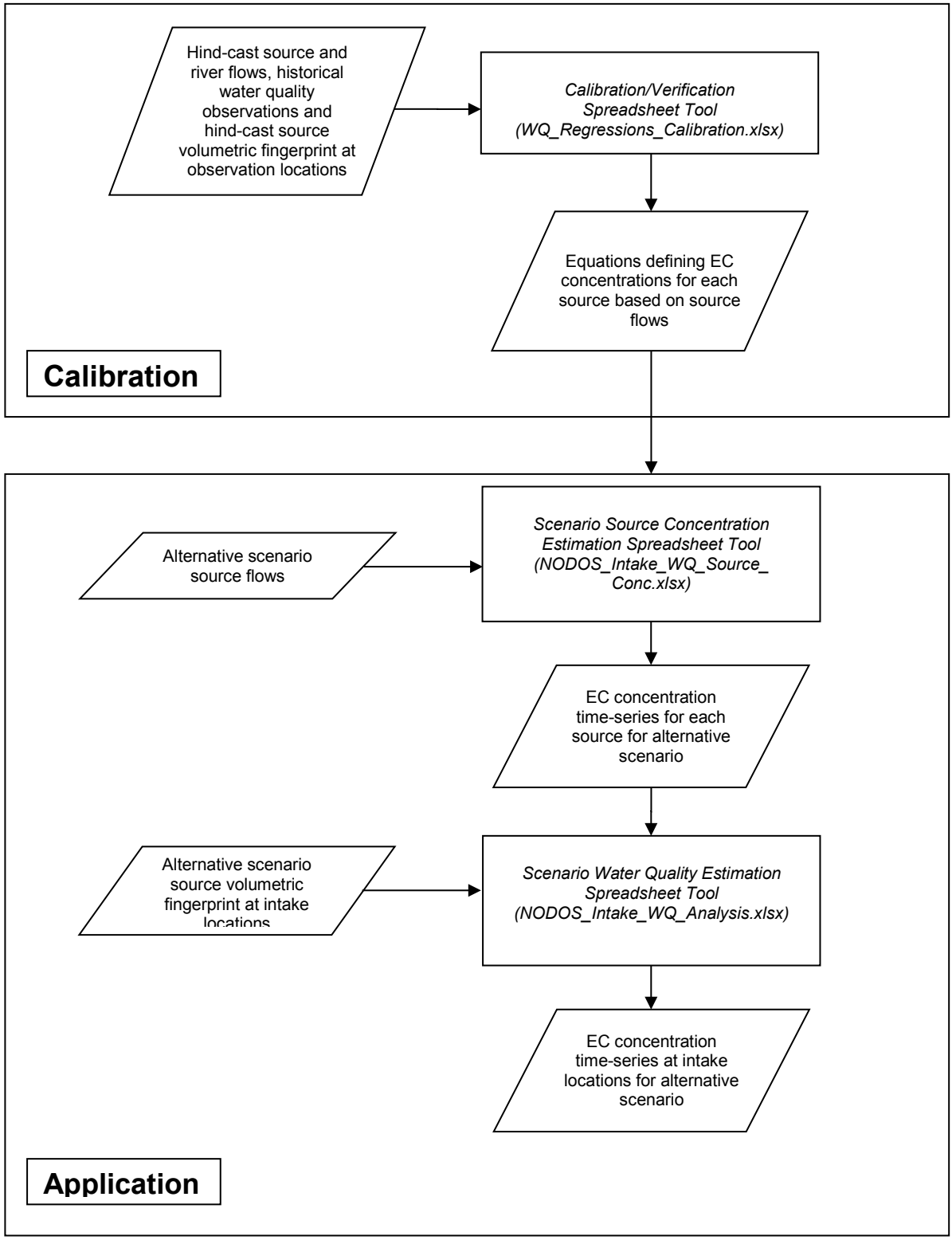


Table 7C-2
Number of Observations with EC Residuals Greater than or Less than Zero at the Water Quality Measurement Locations

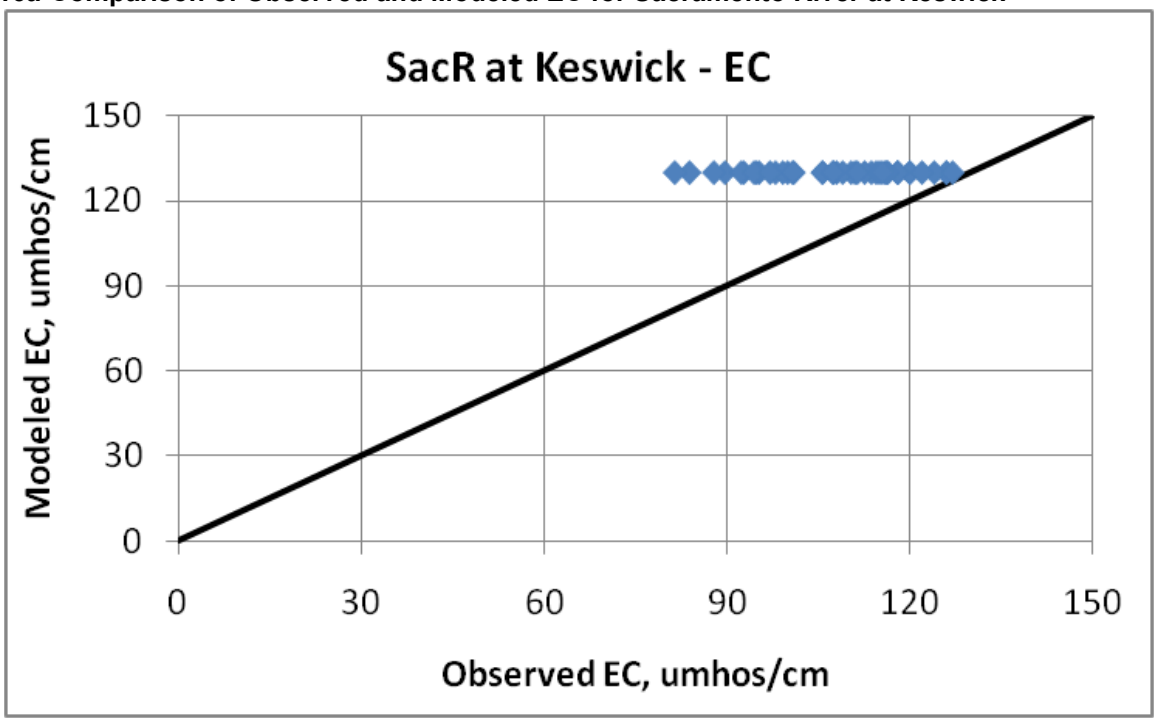
WQ Station		Total Number of Observations (#)	Residual (Mod - Obs) > 0		Residual (Mod - Obs) < 0	
Identifier	Location		#	%	#	%
A2101000	Sacramento River downstream of Keswick Dam	42	42	100	0	0
A281500	Sacramento River at Balls Ferry	43	43	100	0	0
A0278500	Sacramento River at Bend Bridge	42	41	98	1	2
A03112500	Tehama Colusa Canal downstream of Stony Creek*	65	49	75	16	25
A0275890	Sacramento River downstream of Sycamore Launch downstream of Red Bluff	71	69	97	2	3
A0270000	Sacramento River at Vina	43	41	95	2	5
A0311900	Glenn Colusa Canal at Intake	64	60	94	4	6
A0263000	Sacramento River at Hamilton City	53	50	94	3	6
A0245000	Sacramento River opposite Moulton Weir	100	95	95	5	5
A0242000	Sacramento River at Colusa	46	39	85	7	15

* Tehama-Colusa Canal downstream of Stony Creek observed EC data were compared to the simulated EC for Sacramento River Tehama-Colusa intake.

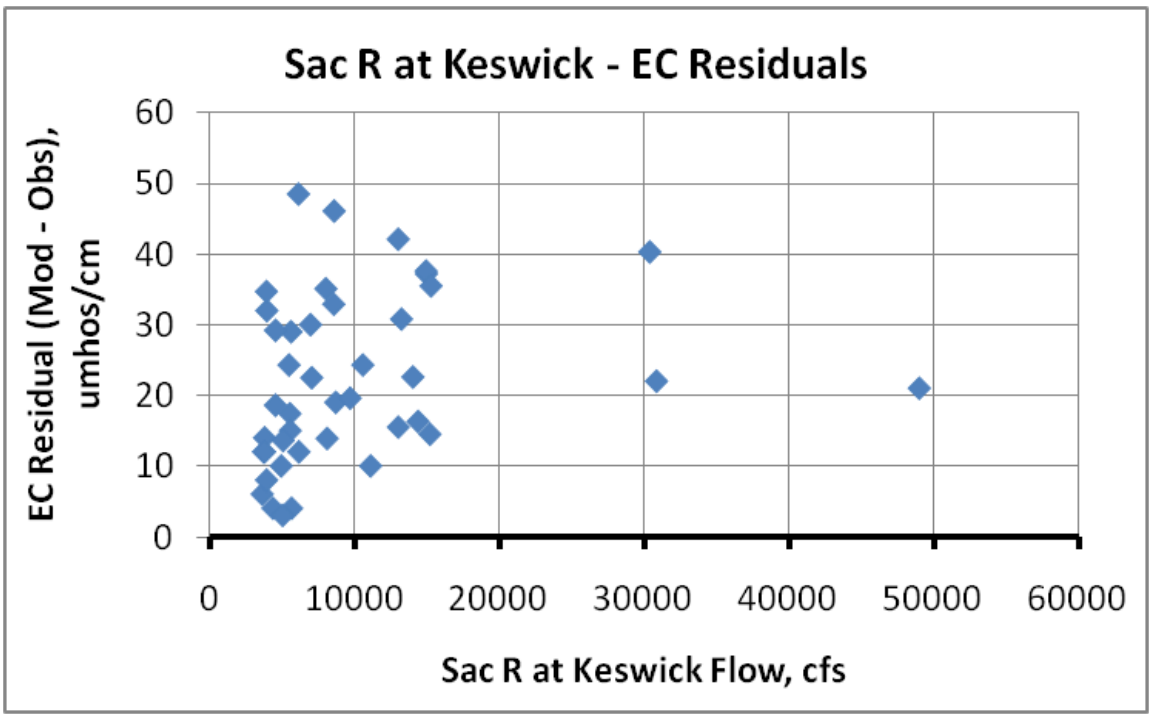
7C-15 Information Flow for the EC Mass Balance Approach Applied to the Alternatives



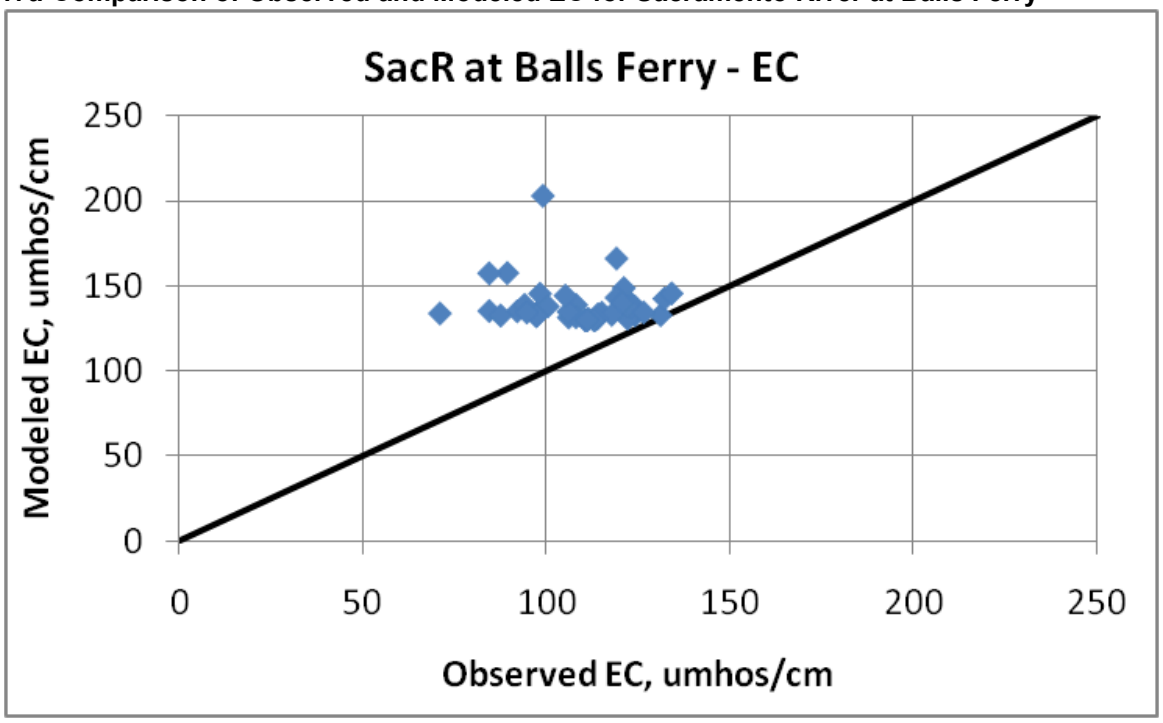
7C-16a Comparison of Observed and Modeled EC for Sacramento River at Keswick



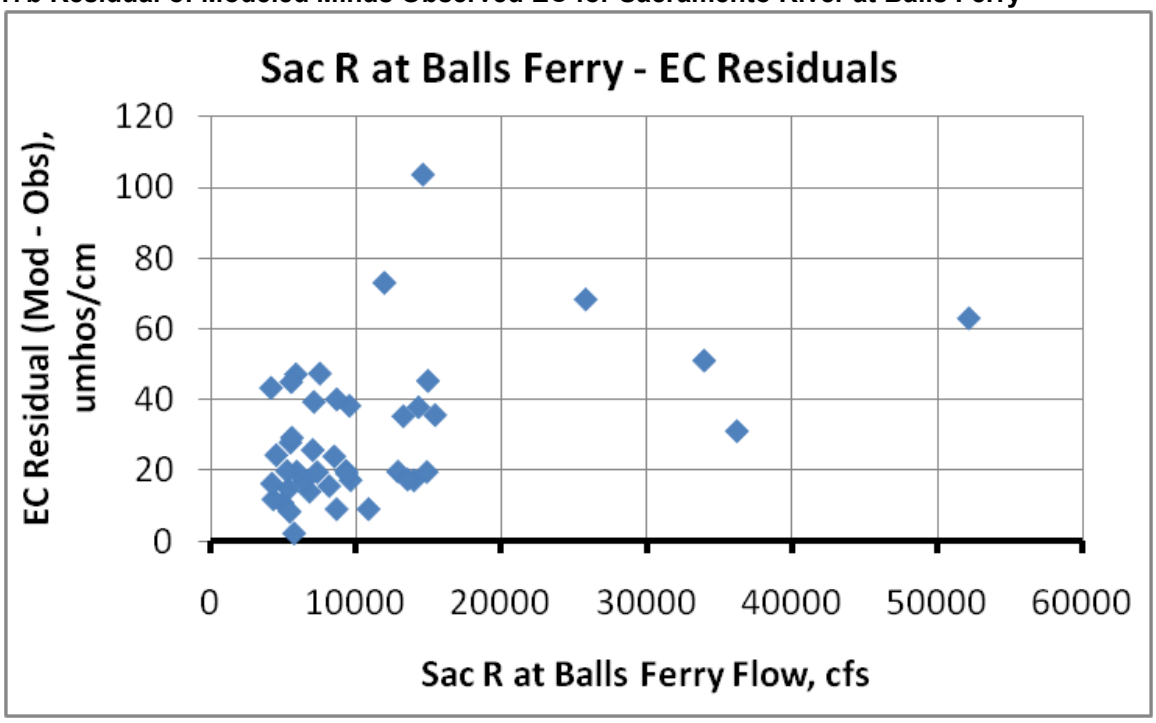
7C-16b Residual of Modeled Minus Observed EC for Sacramento River at Keswick



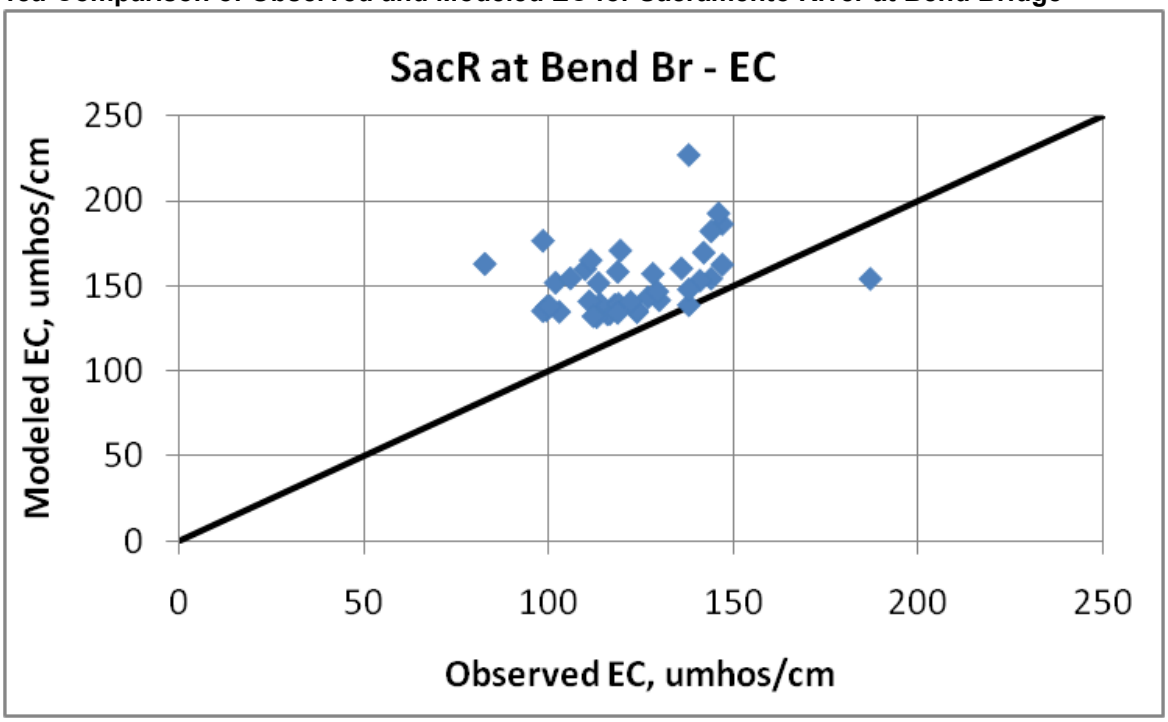
7C-17a Comparison of Observed and Modeled EC for Sacramento River at Balls Ferry



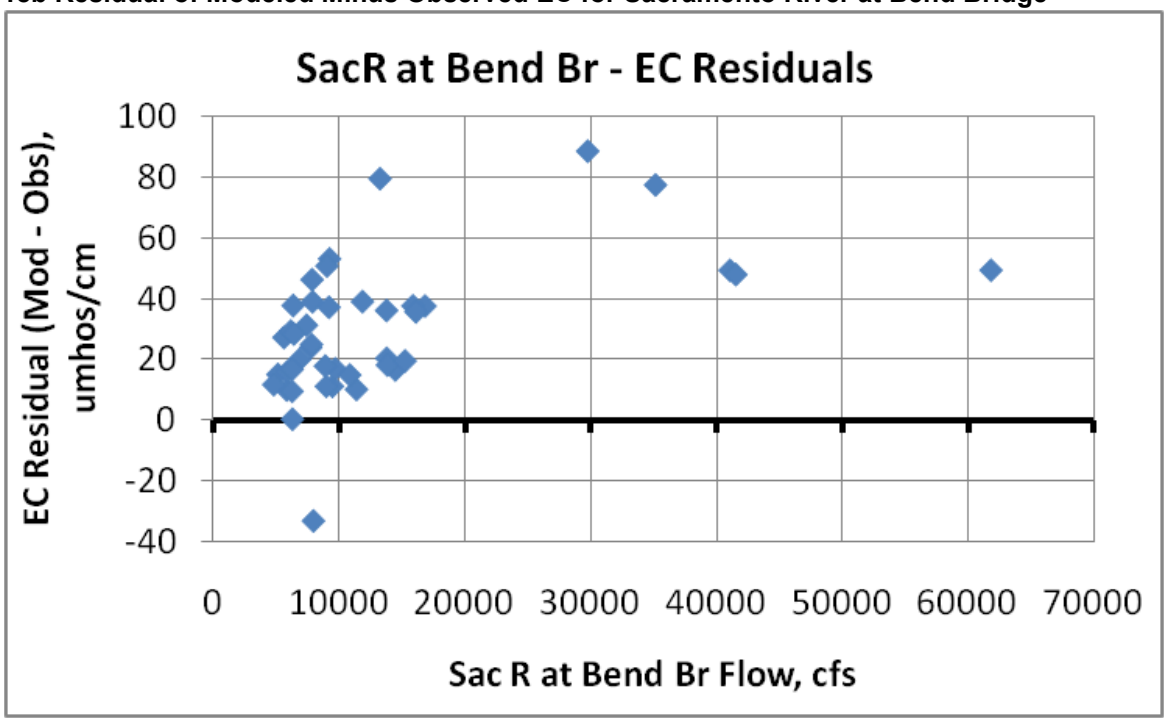
7C-17b Residual of Modeled Minus Observed EC for Sacramento River at Balls Ferry



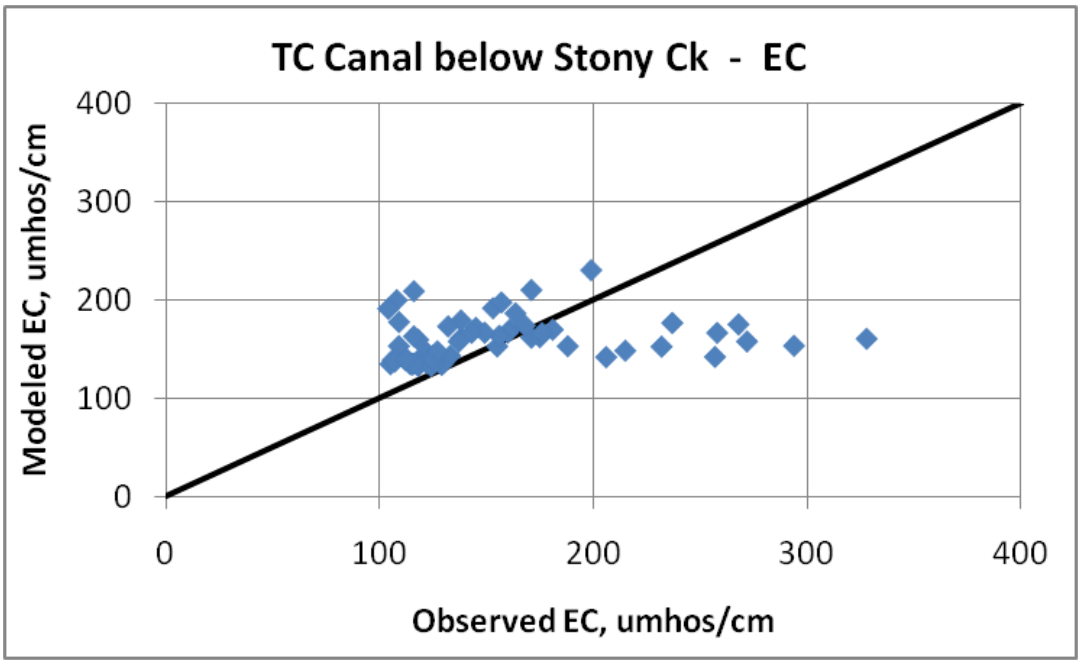
7C-18a Comparison of Observed and Modeled EC for Sacramento River at Bend Bridge



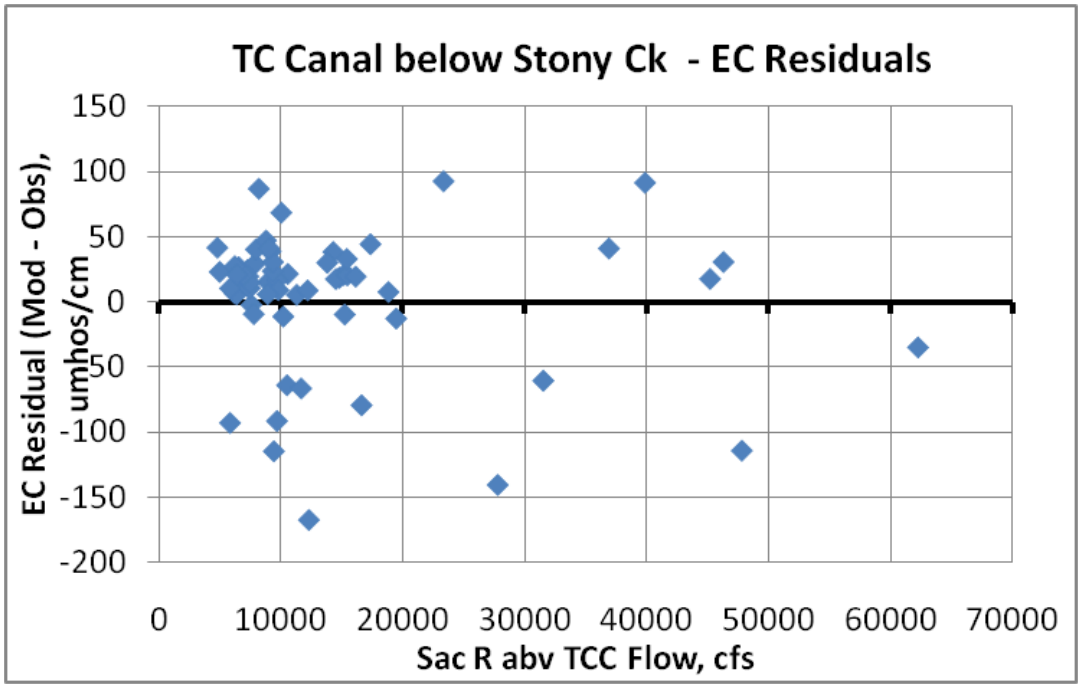
7C-18b Residual of Modeled Minus Observed EC for Sacramento River at Bend Bridge



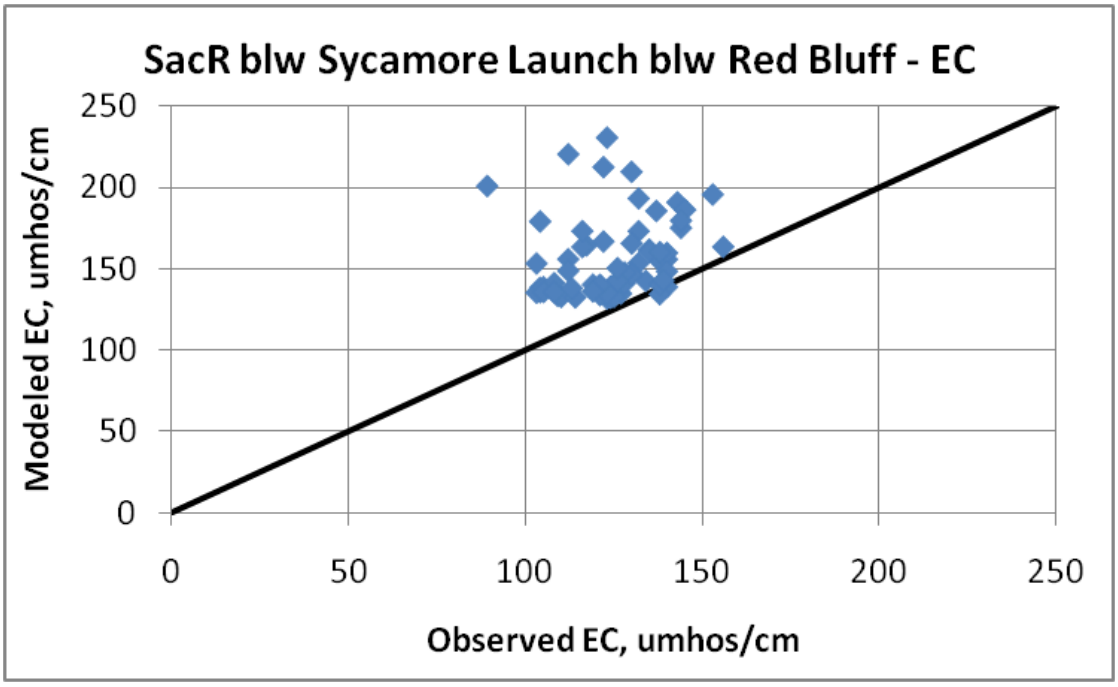
7C-19a Comparison of Observed EC at TC Canal Below Stony Creek with Modeled EC for Sacramento River at TC Canal Intake



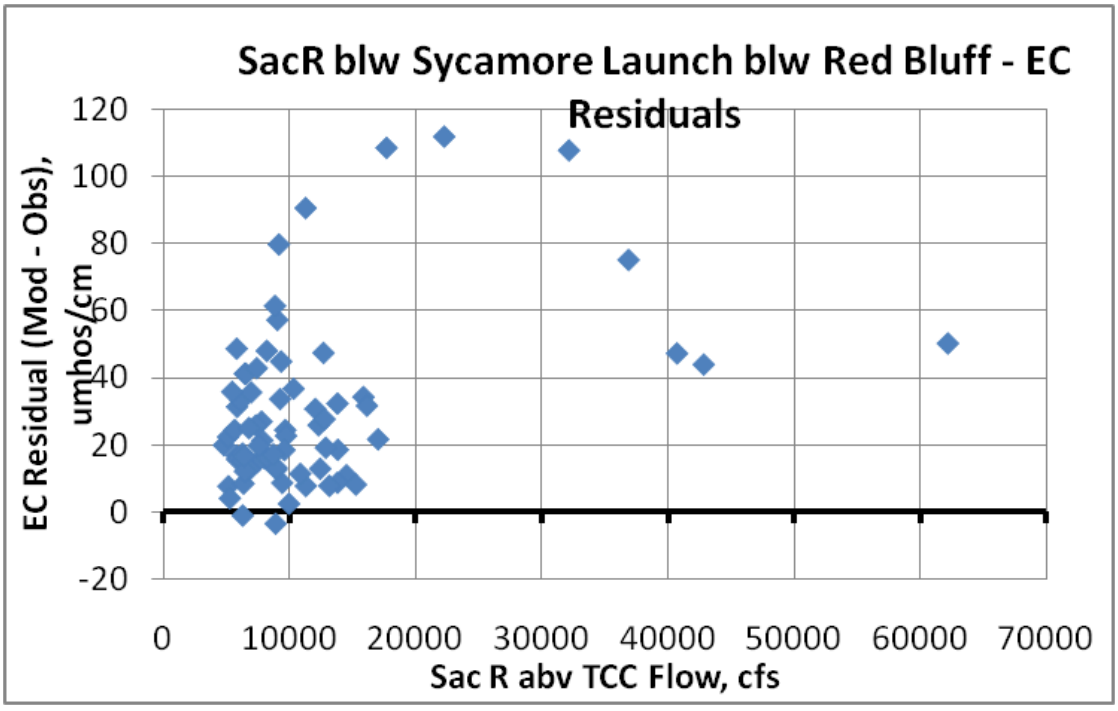
7C-19b Residual of Modeled Minus Observed EC at TC Canal Below Stony Creek with Modeled EC for Sacramento River at TC Canal Intake



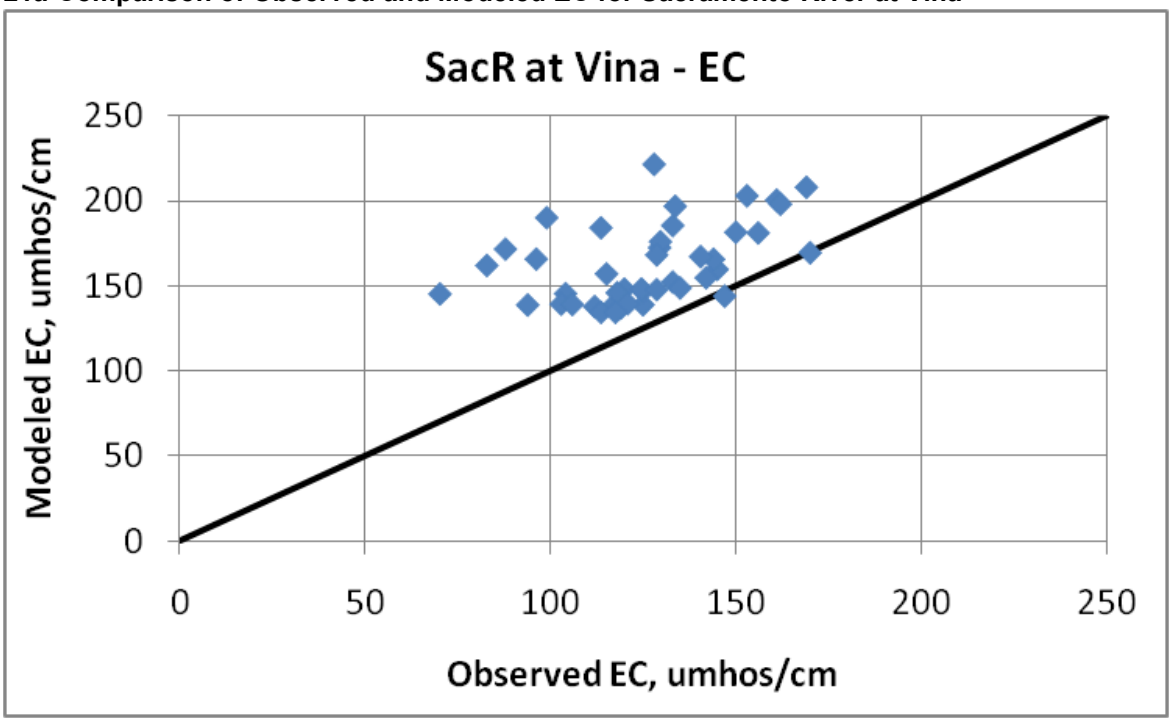
7C-20a Comparison of Observed and Modeled EC for Sacramento River at Sycamore Launch Below Red Bluff



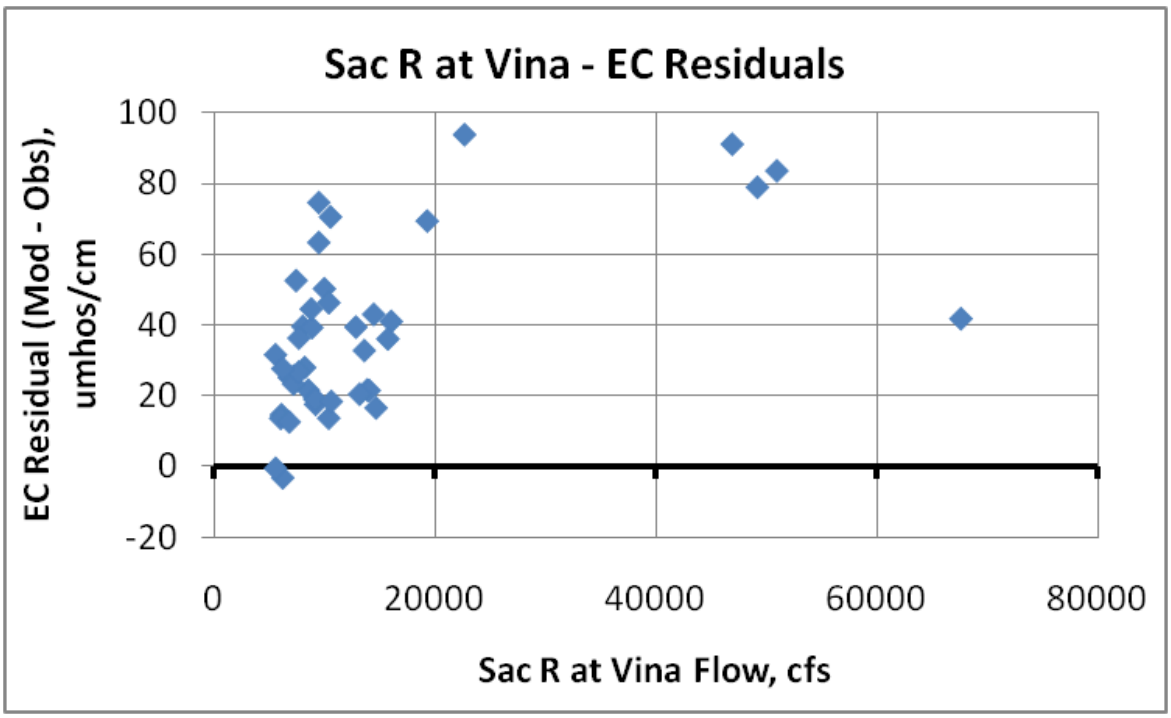
7C-20b Residual of Modeled Minus Observed EC for Sacramento River at Sycamore Launch Below Red Bluff



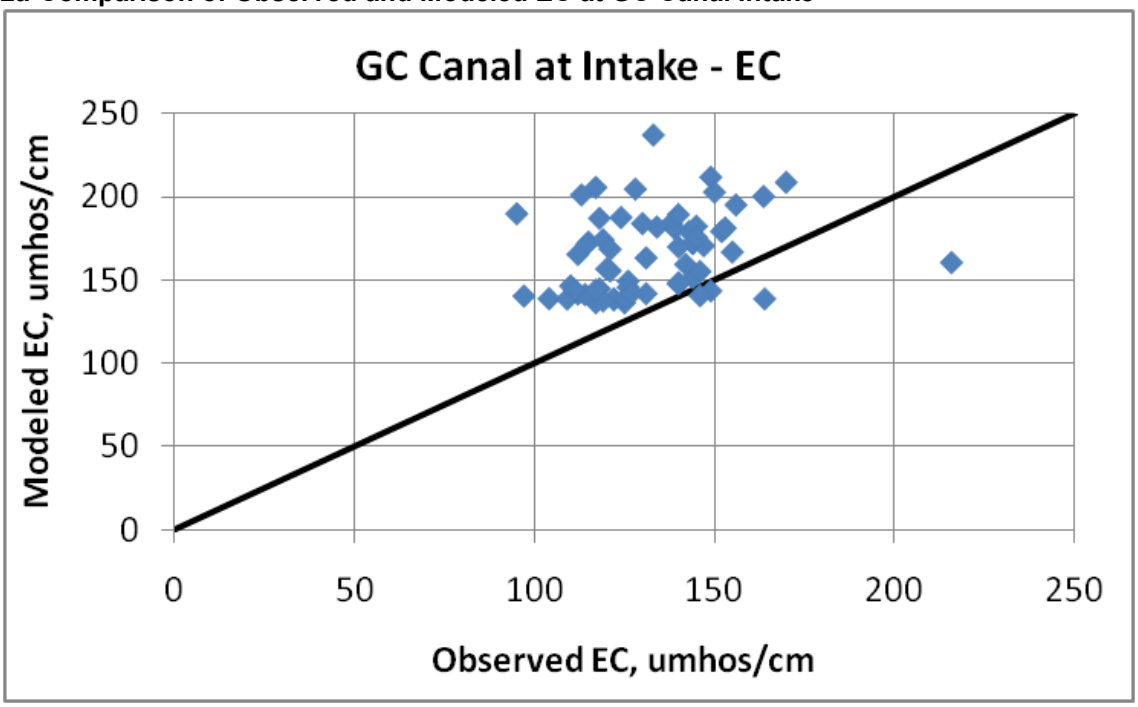
7C-21a Comparison of Observed and Modeled EC for Sacramento River at Vina



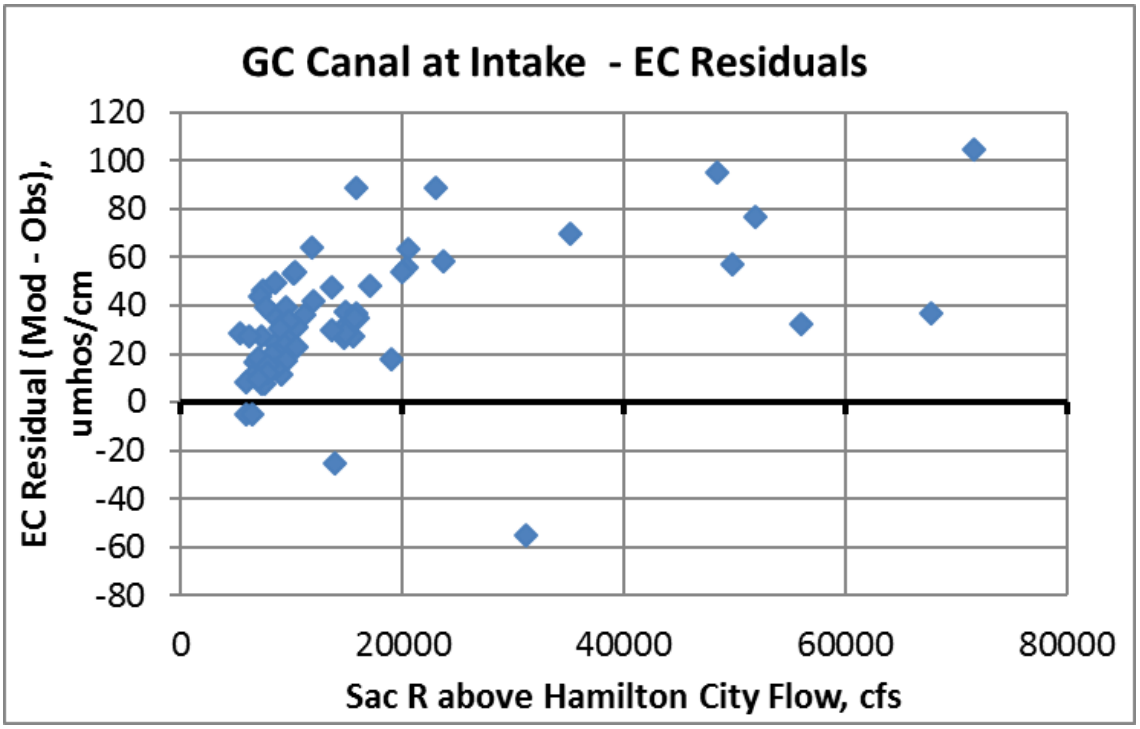
7C-21b Residual of Modeled Minus Observed EC for Sacramento River at Vina



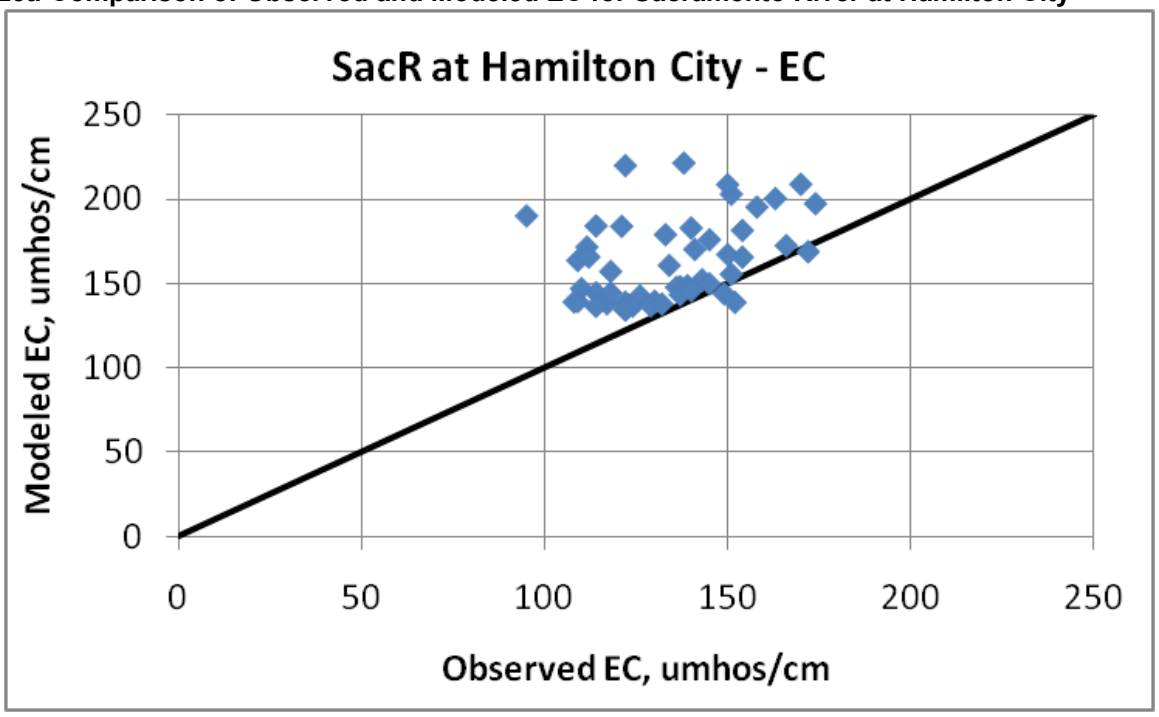
7C-22a Comparison of Observed and Modeled EC at GC Canal Intake



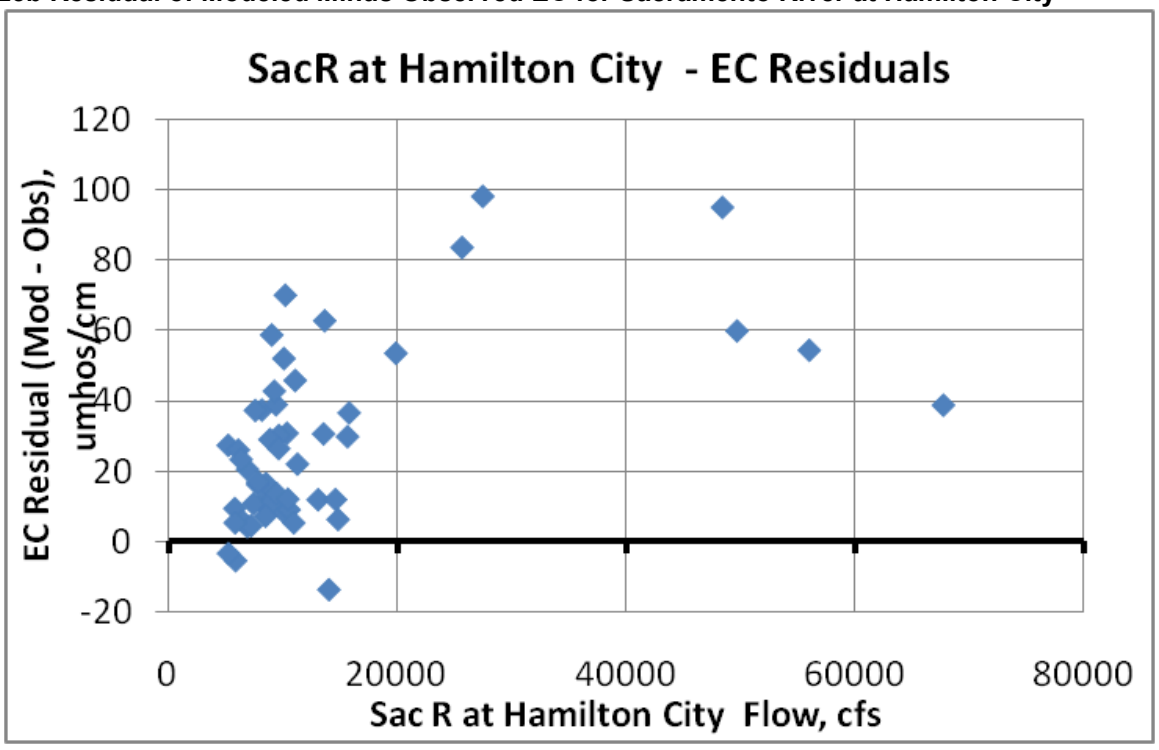
7C-22b Residual of Modeled Minus Observed EC at GC Canal Intake



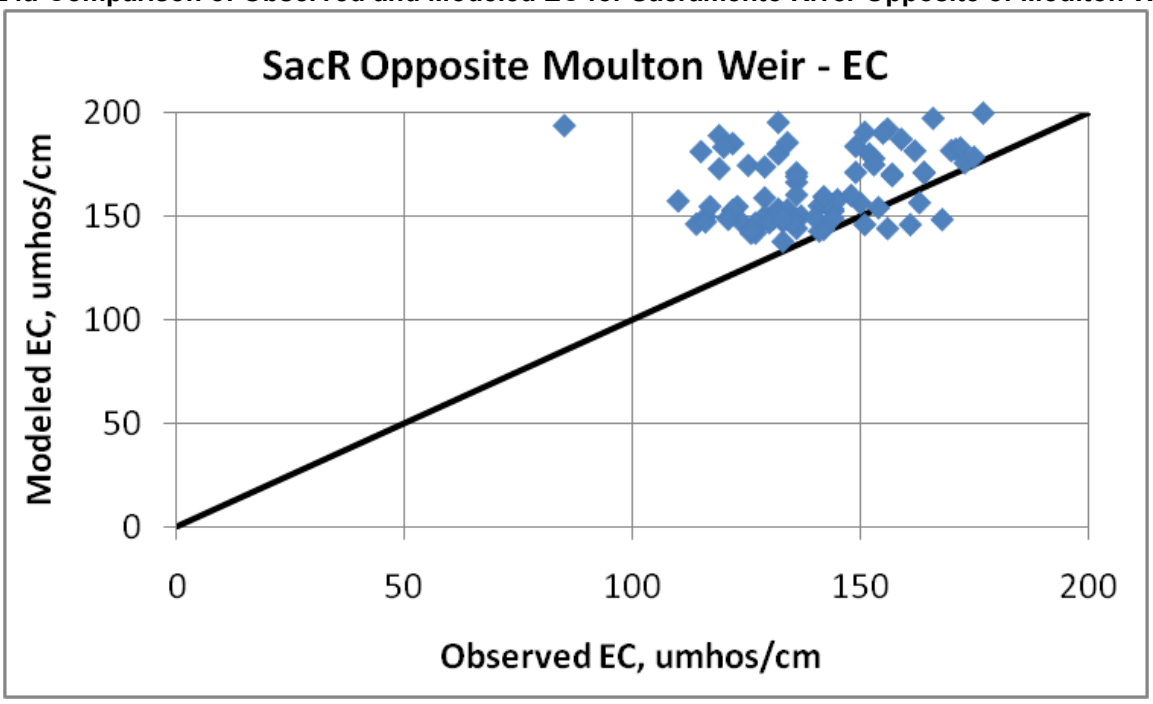
7C-23a Comparison of Observed and Modeled EC for Sacramento River at Hamilton City



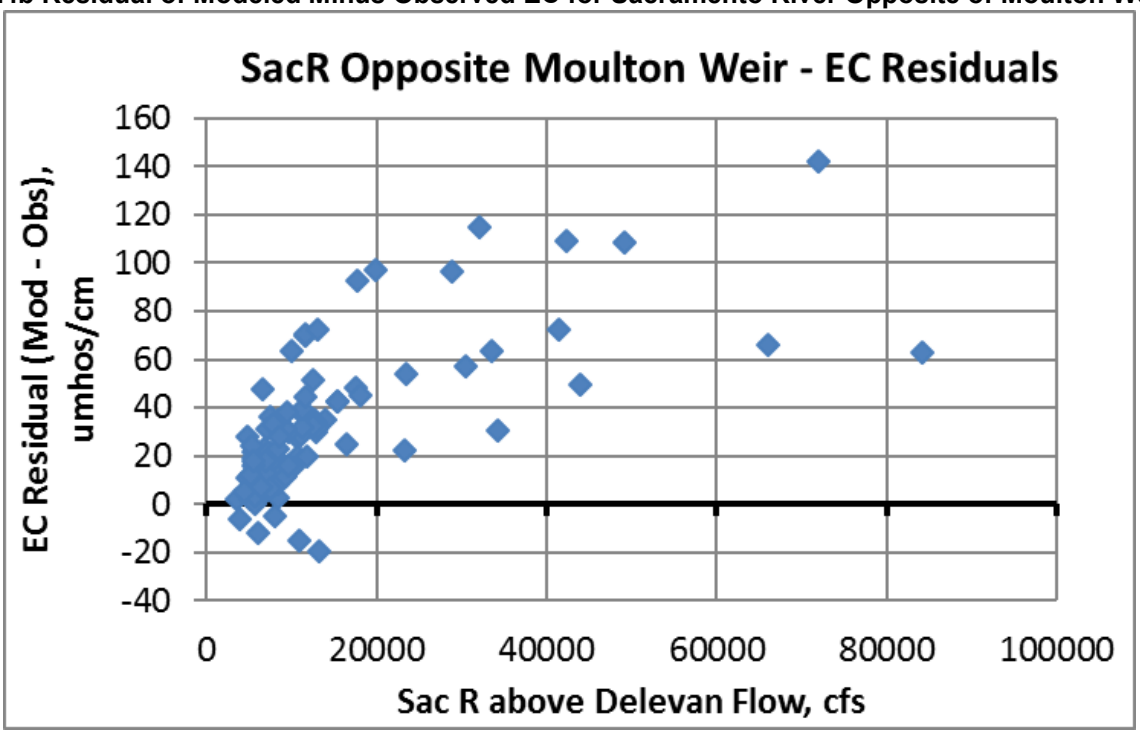
7C-23b Residual of Modeled Minus Observed EC for Sacramento River at Hamilton City



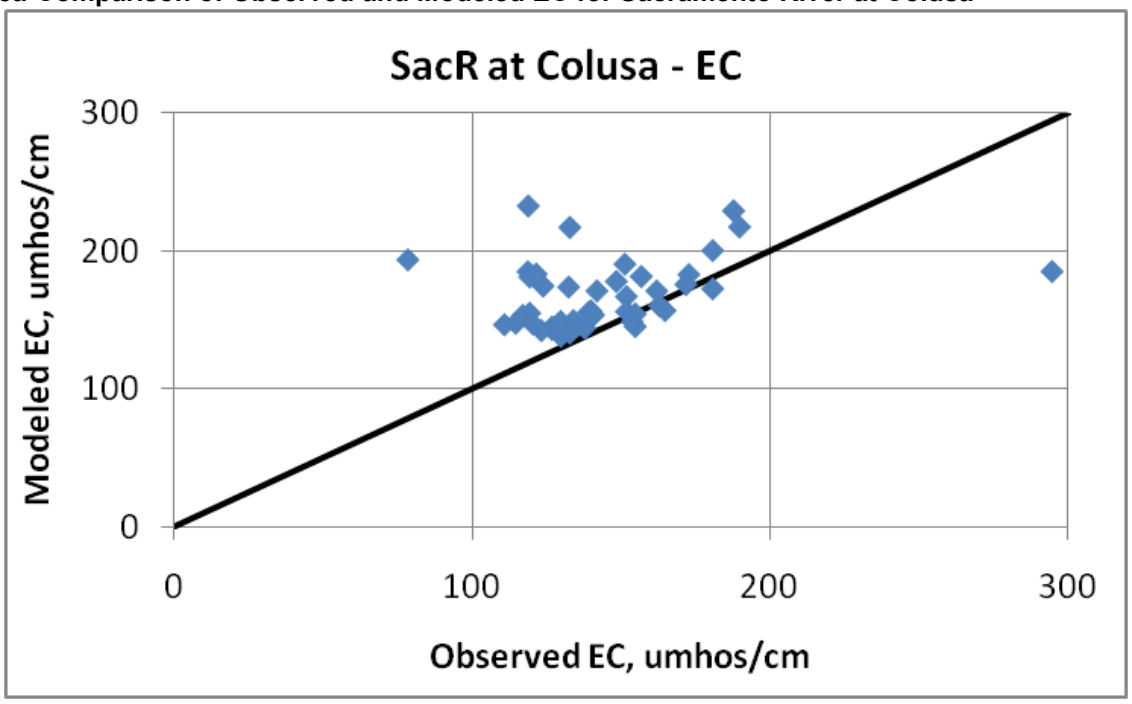
7C-24a Comparison of Observed and Modeled EC for Sacramento River Opposite of Moulton Weir



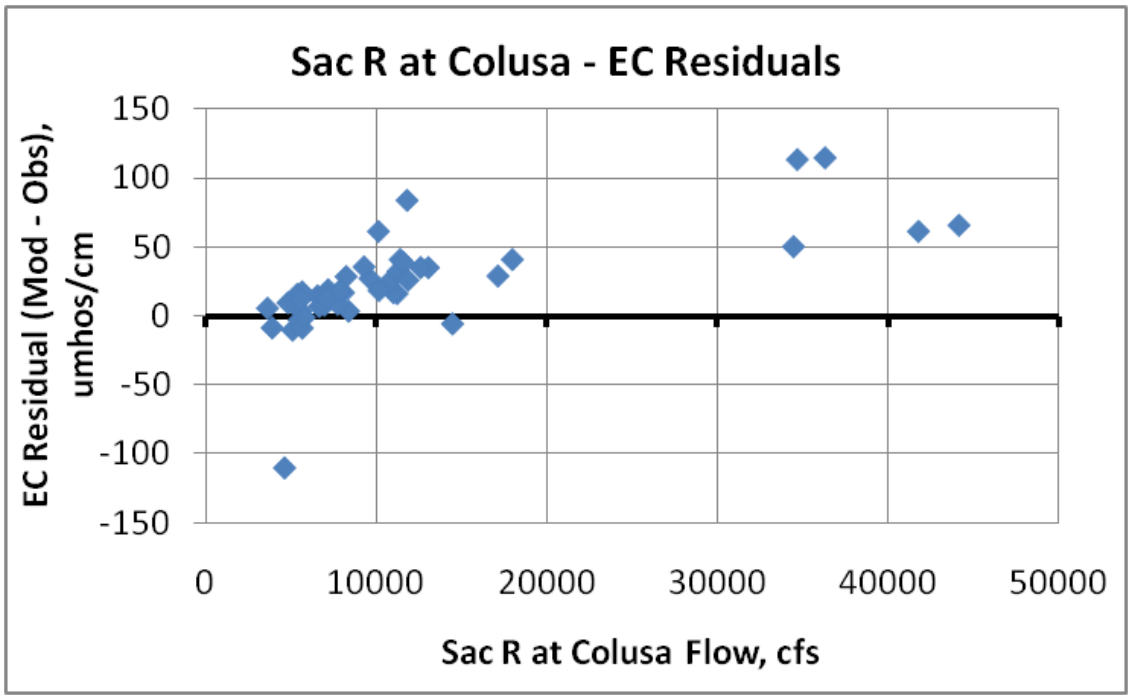
7C-24b Residual of Modeled Minus Observed EC for Sacramento River Opposite of Moulton Weir



7C-25a Comparison of Observed and Modeled EC for Sacramento River at Colusa



7C-25b Residual of Modeled Minus Observed EC for Sacramento River at Colusa



7C.2 Results

This section includes the results from the EC Mass Balance Approach used in the detailed evaluation of the alternatives for the DEIR/EIS.

7C.2.1 Introduction

The EC Mass Balance Approach results included in this appendix are used in Chapter 7 Surface Water Quality.

For each parameter and location shown in Table 7C-3, Summary Tables reports are provided. In the Summary Tables reports, for each parameter and location shown below, summary tables of EC Mass Balance Approach results by month are included. The tables include long-term average, and averages by water year type (SWRCB 40-30-30 Index). The tables also include the absolute and relative differences between alternatives.

7C.2.2 Locations and Parameters

The locations and the parameters for the results included in this appendix are tabulated below in Table 7C-3. Maps showing these locations are included in Appendix 6B.

Other analyses were used to estimate EC conditions. The Delta Modeling using the DSM2 model, referred to in Chapter 7, for evaluating EC for locations in the Sacramento-San Joaquin Delta is included in Appendix 7D.

Table 7C-3
EC Mass Balance Approach Results Locations and Parameters

	Report Title	Time-Step	Parameter
1	Sacramento River at Tehama Colusa Canal Intake	Monthly	EC*
2	Sacramento River at Glenn Colusa Canal Intake	Monthly	EC*
3	Sacramento River at Delevan Pipeline Intake	Monthly	EC*
4	Sacramento River below Delevan Pipeline	Monthly	EC*

*The analysis was formulated to indicate trends, due to the various alternatives, assuming worst-case EC conditions

7C.2.3 Comparisons

Summary Tables reports are provided for the following comparisons:

- Alternative A compared to No Action Alternative
- Alternative B compared to No Action Alternative
- Alternative C compared to No Action Alternative
- Alternative D compared to No Action Alternative

This page intentionally left blank.

Appendix 7C
Surface Water Quality Analysis for Electrical Conductivity at Proposed Intakes
Summary Tables and Bar Charts

Line items and numbers identified or noted as "No Action Alternative" represent the "Existing Conditions/No Project/No Action Condition" (described in Chapter 2 Alternatives Analysis). Table numbering may not be consecutive for all appendixes.

This page intentionally left blank.

Alternative A Compared to No Action Alternative

This page intentionally left blank.

Table WQ - 3a

Sacramento River at Tehama Colusa Canal Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	140	150	164	178	180	178	169	154	140	134	134	137
Alternative A	140	150	162	175	178	179	171	153	139	134	134	137
Difference	0	0	-1	-3	-3	0	2	0	0	0	0	0
Percent Difference[3]	0.0%	0.2%	-0.9%	-1.9%	-1.5%	0.1%	1.2%	-0.3%	-0.1%	0.0%	0.0%	0.0%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	139	145	161	187	183	179	180	161	144	135	134	135
Alternative A	138	146	160	183	182	180	181	159	143	135	134	135
Difference	0	1	-1	-4	-1	0	1	-2	-1	0	0	0
Percent Difference	-0.1%	0.9%	-0.7%	-2.1%	-0.5%	0.1%	0.3%	-1.4%	-0.4%	0.0%	0.0%	0.1%
Above Normal (15%)												
No Action Alternative	140	152	163	182	181	178	171	154	138	133	134	136
Alternative A	140	152	160	179	177	178	173	154	138	133	134	136
Difference	0	0	-3	-3	-3	0	2	-1	0	0	0	0
Percent Difference	-0.2%	-0.3%	-1.6%	-1.7%	-1.9%	0.3%	1.1%	-0.5%	-0.1%	0.0%	0.0%	0.1%
Below Normal (17%)												
No Action Alternative	141	149	160	175	181	181	172	155	140	133	134	137
Alternative A	140	150	158	171	178	182	174	154	140	133	134	137
Difference	0	1	-2	-3	-3	1	2	0	0	0	0	0
Percent Difference	-0.3%	0.4%	-1.5%	-1.9%	-1.4%	0.3%	1.2%	-0.3%	-0.1%	0.1%	0.1%	0.2%
Dry (22%)												
No Action Alternative	142	154	171	172	180	177	158	146	137	133	134	141
Alternative A	141	154	171	168	175	177	161	147	137	133	135	140
Difference	0	-1	0	-3	-5	0	3	1	0	0	0	-1
Percent Difference	-0.2%	-0.5%	-0.2%	-2.0%	-3.0%	0.0%	1.9%	1.0%	0.1%	0.0%	0.1%	-0.4%
Critical (15%)												
No Action Alternative	140	151	166	168	176	176	155	146	137	134	134	139
Alternative A	140	151	165	165	174	176	159	147	137	134	134	139
Difference	1	0	-1	-3	-2	0	4	1	0	0	0	0
Percent Difference	0.6%	0.1%	-0.6%	-1.5%	-1.2%	-0.2%	2.5%	0.8%	0.1%	0.0%	-0.3%	-0.2%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 3b

Sacramento River at Glenn Colusa Canal Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	143	155	172	189	194	193	185	168	147	137	136	140
Alternative A	143	156	172	187	193	194	188	168	146	137	136	140
Difference	0	0	-1	-2	-1	2	3	0	0	0	0	0
Percent Difference[3]	0.0%	0.3%	-0.5%	-1.1%	-0.6%	0.8%	1.8%	-0.1%	-0.3%	0.0%	0.0%	0.0%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	142	150	170	200	198	194	198	181	155	140	137	138
Alternative A	142	151	170	198	198	195	199	179	153	140	137	138
Difference	0	2	0	-3	0	1	1	-2	-1	0	0	0
Percent Difference	-0.1%	1.1%	-0.1%	-1.3%	0.2%	0.4%	0.5%	-1.3%	-0.8%	-0.2%	0.1%	0.1%
Above Normal (15%)												
No Action Alternative	143	158	171	193	195	193	189	170	145	136	136	138
Alternative A	143	158	169	192	192	195	192	169	144	136	136	138
Difference	0	0	-2	-1	-2	2	3	-1	0	0	0	0
Percent Difference	-0.1%	-0.2%	-1.3%	-0.7%	-1.2%	1.0%	1.6%	-0.4%	-0.3%	0.0%	0.0%	0.2%
Below Normal (17%)												
No Action Alternative	145	155	168	184	194	195	189	170	147	136	136	139
Alternative A	145	155	166	182	193	198	192	170	147	136	136	140
Difference	0	1	-2	-3	-1	2	3	0	0	0	0	0
Percent Difference	-0.2%	0.5%	-1.0%	-1.4%	-0.3%	1.2%	1.8%	0.1%	-0.3%	0.1%	0.1%	0.3%
Dry (22%)												
No Action Alternative	145	161	180	182	192	191	172	155	141	135	136	144
Alternative A	145	160	180	180	187	192	176	157	141	135	136	143
Difference	0	-1	0	-2	-4	1	5	2	0	0	0	-1
Percent Difference	-0.3%	-0.5%	0.2%	-1.2%	-2.2%	0.8%	2.8%	1.4%	0.1%	0.0%	0.1%	-0.4%
Critical (15%)												
No Action Alternative	143	156	175	177	189	190	167	154	140	135	136	142
Alternative A	144	156	175	175	188	192	172	156	141	135	136	142
Difference	1	0	-1	-2	0	2	5	2	0	0	-1	0
Percent Difference	0.8%	0.1%	-0.5%	-1.0%	-0.1%	0.9%	3.2%	1.1%	0.1%	0.0%	-0.4%	-0.2%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 3c

Sacramento River at Delevan Pipeline Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	148	161	182	204	207	201	196	176	155	142	142	149
Alternative A	148	161	183	204	207	204	201	176	154	141	141	149
Difference	0	1	1	-1	0	2	5	0	-2	-1	0	0
Percent Difference[3]	0.1%	0.5%	0.5%	-0.4%	0.0%	1.1%	2.6%	-0.1%	-1.0%	-0.5%	-0.3%	0.0%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	149	158	182	223	217	206	209	190	165	147	144	147
Alternative A	149	160	184	222	218	208	210	188	163	146	144	147
Difference	0	2	2	-1	2	1	2	-2	-2	-1	0	0
Percent Difference	0.0%	1.6%	1.2%	-0.4%	0.8%	0.7%	0.8%	-1.2%	-1.5%	-0.8%	0.0%	0.2%
Above Normal (15%)												
No Action Alternative	146	161	179	209	210	201	201	179	153	139	140	147
Alternative A	146	161	178	209	209	204	206	178	151	138	140	147
Difference	0	0	-1	1	-2	3	5	-1	-2	0	0	1
Percent Difference	-0.1%	0.2%	-0.6%	0.3%	-0.8%	1.3%	2.2%	-0.5%	-1.4%	-0.3%	-0.3%	0.4%
Below Normal (17%)												
No Action Alternative	150	161	176	199	205	202	196	181	159	143	141	148
Alternative A	150	162	177	197	206	205	201	181	157	142	140	149
Difference	0	1	0	-2	1	3	5	0	-2	-1	0	1
Percent Difference	0.1%	0.5%	0.2%	-1.0%	0.6%	1.6%	2.6%	-0.1%	-1.1%	-0.7%	-0.3%	0.4%
Dry (22%)												
No Action Alternative	150	167	192	194	202	198	185	164	147	139	142	155
Alternative A	149	166	195	194	199	200	194	166	146	138	142	154
Difference	-1	-1	3	0	-3	2	9	2	-1	-1	0	-1
Percent Difference	-0.4%	-0.7%	1.8%	-0.2%	-1.6%	1.0%	5.0%	1.5%	-0.6%	-0.5%	-0.2%	-0.6%
Critical (15%)												
No Action Alternative	145	158	182	185	195	197	179	160	146	138	140	151
Alternative A	147	159	181	183	196	200	186	162	145	138	139	150
Difference	1	0	-1	-2	1	3	8	2	0	0	-1	-1
Percent Difference	1.0%	0.3%	-0.3%	-1.1%	0.5%	1.6%	4.2%	1.0%	-0.3%	-0.3%	-0.8%	-0.5%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 3d

Sacramento River below Delevan Pipeline, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	148	161	182	204	207	201	196	176	155	142	142	149
Alternative A	154	165	183	204	207	204	201	178	155	144	145	154
Difference	5	4	2	-1	0	2	5	1	0	2	4	5
Percent Difference[3]	3.7%	2.7%	0.8%	-0.4%	0.0%	1.2%	2.6%	0.7%	-0.1%	1.6%	2.5%	3.1%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	149	158	182	223	217	206	209	190	165	147	144	147
Alternative A	154	165	184	222	218	208	210	188	163	148	146	150
Difference	5	7	3	-1	2	1	2	-2	-2	1	2	4
Percent Difference	3.4%	4.5%	1.5%	-0.4%	0.8%	0.7%	0.8%	-1.2%	-1.4%	0.5%	1.3%	2.5%
Above Normal (15%)												
No Action Alternative	146	161	179	209	210	201	201	179	153	139	140	147
Alternative A	152	165	179	209	209	204	206	178	152	143	145	152
Difference	6	4	0	1	-2	3	5	-1	-1	4	5	6
Percent Difference	4.1%	2.7%	-0.1%	0.3%	-0.8%	1.3%	2.2%	-0.5%	-0.5%	2.6%	3.3%	4.0%
Below Normal (17%)												
No Action Alternative	150	161	176	199	205	202	196	181	159	143	141	148
Alternative A	155	164	177	197	206	205	201	181	158	145	144	153
Difference	5	3	1	-2	1	3	5	0	-1	2	3	5
Percent Difference	3.3%	1.6%	0.3%	-1.0%	0.6%	1.6%	2.5%	0.0%	-0.5%	1.5%	2.3%	3.1%
Dry (22%)												
No Action Alternative	150	167	192	194	202	198	185	164	147	139	142	155
Alternative A	152	169	195	194	199	200	194	170	149	141	147	158
Difference	3	1	3	0	-3	2	9	6	2	3	5	3
Percent Difference	1.9%	0.8%	1.8%	-0.2%	-1.5%	1.1%	4.7%	3.8%	1.1%	1.9%	3.2%	2.1%
Critical (15%)												
No Action Alternative	145	158	182	185	195	197	179	160	146	138	140	151
Alternative A	154	162	182	183	196	200	187	166	148	141	144	156
Difference	8	4	1	-2	1	4	8	5	3	3	4	6
Percent Difference	5.7%	2.5%	0.3%	-1.1%	0.5%	1.9%	4.7%	3.3%	1.8%	1.9%	3.0%	3.9%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Alternative B Compared to No Action Alternative

This page intentionally left blank.

Table WQ - 5a

Sacramento River at Tehama Colusa Canal Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	140	150	164	178	180	178	169	154	140	134	134	137
Alternative B	140	150	163	175	178	179	171	153	139	134	134	137
Difference	0	0	-1	-3	-3	0	2	0	0	0	0	0
Percent Difference[3]	0.0%	0.1%	-0.6%	-1.8%	-1.4%	0.2%	1.2%	-0.2%	-0.1%	0.0%	0.0%	-0.2%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	139	145	161	187	183	179	180	161	144	135	134	135
Alternative B	138	146	160	184	182	179	181	159	143	135	134	135
Difference	0	1	-1	-3	-1	0	0	-2	-1	0	0	0
Percent Difference	-0.1%	0.7%	-0.4%	-1.5%	-0.4%	0.1%	0.2%	-1.4%	-0.4%	-0.1%	0.0%	0.0%
Above Normal (15%)												
No Action Alternative	140	152	163	182	181	178	171	154	138	133	134	136
Alternative B	140	152	161	179	178	178	173	154	138	133	134	136
Difference	0	-1	-2	-3	-3	0	2	-1	0	0	0	0
Percent Difference	-0.3%	-0.4%	-1.1%	-1.7%	-1.8%	0.1%	0.9%	-0.3%	-0.2%	0.0%	0.0%	0.1%
Below Normal (17%)												
No Action Alternative	141	149	160	175	181	181	172	155	140	133	134	137
Alternative B	140	150	158	171	178	183	174	154	140	133	134	137
Difference	0	0	-2	-3	-3	1	2	-1	0	0	0	0
Percent Difference	-0.3%	0.3%	-1.1%	-1.9%	-1.6%	0.8%	1.4%	-0.4%	-0.1%	0.0%	0.0%	0.1%
Dry (22%)												
No Action Alternative	142	154	171	172	180	177	158	146	137	133	134	141
Alternative B	142	154	171	168	175	177	161	147	137	133	134	140
Difference	0	-1	0	-4	-6	0	3	2	0	0	0	-1
Percent Difference	0.0%	-0.3%	-0.3%	-2.2%	-3.1%	0.0%	1.8%	1.1%	0.2%	0.0%	-0.1%	-0.5%
Critical (15%)												
No Action Alternative	140	151	166	168	176	176	155	146	137	134	134	139
Alternative B	140	151	165	165	174	177	158	148	137	134	134	138
Difference	1	0	-1	-3	-2	0	4	2	0	0	0	-1
Percent Difference	0.7%	0.3%	-0.4%	-1.7%	-1.2%	0.2%	2.4%	1.1%	0.1%	0.0%	-0.2%	-0.7%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 5b

Sacramento River at Glenn Colusa Canal Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	143	155	172	189	194	193	185	168	147	137	136	140
Alternative B	143	156	172	187	193	195	188	168	146	137	136	140
Difference	0	0	0	-2	-1	3	4	0	0	0	0	0
Percent Difference[3]	0.0%	0.2%	-0.2%	-1.0%	-0.4%	1.3%	1.9%	0.2%	-0.2%	0.0%	0.0%	-0.2%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	142	150	170	200	198	194	198	181	155	140	137	138
Alternative B	142	151	170	199	199	196	200	180	154	140	137	138
Difference	0	1	0	-1	1	2	2	-2	-1	0	0	0
Percent Difference	-0.1%	0.8%	0.2%	-0.6%	0.5%	1.1%	0.9%	-0.9%	-0.5%	-0.1%	0.1%	0.0%
Above Normal (15%)												
No Action Alternative	143	158	171	193	195	193	189	170	145	136	136	138
Alternative B	143	158	170	192	193	195	192	170	144	136	136	138
Difference	-1	-1	-1	-1	-2	3	3	0	0	0	0	0
Percent Difference	-0.4%	-0.4%	-0.8%	-0.7%	-0.9%	1.3%	1.6%	0.1%	-0.3%	0.0%	0.0%	0.2%
Below Normal (17%)												
No Action Alternative	145	155	168	184	194	195	189	170	147	136	136	139
Alternative B	145	155	167	182	193	200	193	170	147	136	136	139
Difference	0	1	-1	-2	-1	4	4	0	0	0	0	0
Percent Difference	-0.2%	0.4%	-0.6%	-1.3%	-0.3%	2.2%	2.2%	0.1%	-0.2%	0.0%	0.1%	0.1%
Dry (22%)												
No Action Alternative	145	161	180	182	192	191	172	155	141	135	136	144
Alternative B	145	161	180	180	187	193	176	157	141	135	136	143
Difference	0	0	0	-2	-4	2	5	2	0	0	0	-1
Percent Difference	0.0%	-0.3%	0.2%	-1.4%	-2.2%	1.1%	2.7%	1.6%	0.3%	0.0%	-0.1%	-0.5%
Critical (15%)												
No Action Alternative	143	156	175	177	189	190	167	154	140	135	136	142
Alternative B	144	156	175	174	188	193	172	157	141	135	136	141
Difference	1	1	0	-2	0	2	5	2	0	0	0	-1
Percent Difference	0.8%	0.3%	-0.1%	-1.3%	-0.1%	1.2%	3.1%	1.4%	0.2%	0.1%	-0.3%	-0.9%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 5c

Sacramento River at Delevan Pipeline Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	148	161	182	204	207	201	196	176	155	142	142	149
Alternative B	148	161	184	204	208	205	202	177	154	141	141	149
Difference	0	1	2	0	1	4	6	1	-1	-1	0	0
Percent Difference[3]	0.1%	0.4%	0.9%	-0.1%	0.3%	2.0%	3.0%	0.5%	-0.4%	-0.4%	-0.2%	-0.2%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	149	158	182	223	217	206	209	190	165	147	144	147
Alternative B	149	160	185	224	219	210	212	189	164	146	145	147
Difference	0	2	3	1	3	4	3	-1	-1	-1	0	0
Percent Difference	0.0%	1.1%	1.7%	0.4%	1.2%	1.9%	1.3%	-0.6%	-0.8%	-0.6%	0.2%	-0.1%
Above Normal (15%)												
No Action Alternative	146	161	179	209	210	201	201	179	153	139	140	147
Alternative B	146	161	179	209	210	205	207	179	152	139	140	147
Difference	-1	0	0	1	-1	4	5	1	-1	0	0	0
Percent Difference	-0.4%	-0.1%	0.0%	0.4%	-0.3%	2.0%	2.5%	0.3%	-0.6%	-0.3%	-0.3%	0.3%
Below Normal (17%)												
No Action Alternative	150	161	176	199	205	202	196	181	159	143	141	148
Alternative B	150	162	178	197	207	208	202	181	158	142	140	148
Difference	0	1	1	-1	2	6	6	0	-1	-1	0	0
Percent Difference	0.0%	0.7%	0.7%	-0.7%	0.8%	2.9%	3.2%	0.2%	-0.5%	-0.5%	-0.3%	0.1%
Dry (22%)												
No Action Alternative	150	167	192	194	202	198	185	164	147	139	142	155
Alternative B	149	167	196	194	199	201	195	167	147	138	141	153
Difference	0	-1	4	-1	-3	3	10	3	0	0	-1	-1
Percent Difference	-0.1%	-0.3%	1.9%	-0.3%	-1.5%	1.5%	5.2%	2.0%	-0.1%	-0.3%	-0.4%	-0.8%
Critical (15%)												
No Action Alternative	145	158	182	185	195	197	179	160	146	138	140	151
Alternative B	147	159	182	183	195	200	187	163	146	138	139	150
Difference	1	1	0	-2	1	4	8	3	0	0	-1	-1
Percent Difference	1.0%	0.5%	0.0%	-1.2%	0.4%	1.9%	4.5%	1.7%	0.2%	-0.1%	-0.5%	-0.6%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 5d

Sacramento River below Delevan Pipeline, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	148	161	182	204	207	201	196	176	155	142	142	149
Alternative B	152	164	184	204	208	205	200	178	156	144	145	152
Difference	4	3	2	0	1	4	5	2	1	3	3	3
Percent Difference[3]	2.5%	2.0%	1.1%	-0.1%	0.3%	2.0%	2.4%	1.0%	0.8%	1.8%	1.9%	1.8%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	149	158	182	223	217	206	209	190	165	147	144	147
Alternative B	153	163	185	224	219	210	211	189	164	147	146	149
Difference	4	5	3	1	3	4	2	-1	-1	0	2	2
Percent Difference	2.4%	3.2%	1.8%	0.4%	1.2%	1.9%	1.0%	-0.6%	-0.7%	0.1%	1.1%	1.7%
Above Normal (15%)												
No Action Alternative	146	161	179	209	210	201	201	179	153	139	140	147
Alternative B	150	164	179	209	209	205	205	179	153	142	144	150
Difference	3	3	0	1	-1	4	4	0	0	3	4	4
Percent Difference	2.2%	1.6%	0.1%	0.4%	-0.3%	2.0%	1.9%	0.0%	0.1%	2.4%	2.6%	2.5%
Below Normal (17%)												
No Action Alternative	150	161	176	199	205	202	196	181	159	143	141	148
Alternative B	154	164	178	197	207	208	201	181	159	145	144	152
Difference	4	3	1	-1	2	6	5	0	0	2	3	4
Percent Difference	2.6%	1.6%	0.7%	-0.7%	0.8%	2.9%	2.6%	0.2%	0.1%	1.6%	2.1%	2.5%
Dry (22%)												
No Action Alternative	150	167	192	194	202	198	185	164	147	139	142	155
Alternative B	152	169	196	194	199	201	192	169	151	142	145	156
Difference	3	2	4	-1	-3	3	7	6	4	4	3	2
Percent Difference	1.8%	0.9%	2.0%	-0.3%	-1.5%	1.5%	3.5%	3.5%	2.5%	2.5%	2.2%	1.2%
Critical (15%)												
No Action Alternative	145	158	182	185	195	197	179	160	146	138	140	151
Alternative B	150	161	183	183	196	201	186	166	151	143	143	153
Difference	5	3	1	-2	1	4	7	6	5	5	3	2
Percent Difference	3.6%	2.0%	0.5%	-1.1%	0.5%	2.0%	4.2%	3.8%	3.8%	3.6%	2.2%	1.3%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Alternative C Compared to No Action Alternative

This page intentionally left blank.

Table WQ - 7a

Sacramento River at Tehama Colusa Canal Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	140	150	164	178	180	178	169	154	140	134	134	137
Alternative C	140	150	162	175	178	179	171	153	139	134	134	137
Difference	0	0	-1	-3	-3	0	2	0	0	0	0	0
Percent Difference[3]	0.1%	0.2%	-0.8%	-1.7%	-1.4%	0.1%	1.2%	-0.2%	-0.1%	0.0%	0.0%	-0.1%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	139	145	161	187	183	179	180	161	144	135	134	135
Alternative C	139	145	160	183	182	179	181	159	143	135	134	135
Difference	0	1	-1	-4	-1	0	0	-2	-1	0	0	0
Percent Difference	-0.1%	0.3%	-0.6%	-1.9%	-0.4%	0.0%	0.3%	-1.3%	-0.4%	-0.1%	0.0%	0.0%
Above Normal (15%)												
No Action Alternative	140	152	163	182	181	178	171	154	138	133	134	136
Alternative C	140	152	160	179	177	178	173	154	138	133	134	136
Difference	0	0	-2	-3	-3	0	2	-1	0	0	0	0
Percent Difference	-0.2%	-0.3%	-1.5%	-1.7%	-1.9%	0.2%	1.0%	-0.5%	-0.2%	0.0%	0.0%	0.1%
Below Normal (17%)												
No Action Alternative	141	149	160	175	181	181	172	155	140	133	134	137
Alternative C	140	150	158	172	178	182	174	154	140	133	134	137
Difference	0	1	-2	-3	-3	1	2	-1	0	0	0	0
Percent Difference	-0.2%	0.5%	-1.4%	-1.6%	-1.5%	0.5%	1.3%	-0.3%	-0.2%	0.0%	0.1%	0.1%
Dry (22%)												
No Action Alternative	142	154	171	172	180	177	158	146	137	133	134	141
Alternative C	142	154	171	169	175	177	161	147	137	133	134	140
Difference	0	0	0	-3	-5	0	3	1	0	0	0	-1
Percent Difference	0.1%	-0.3%	-0.2%	-1.9%	-2.9%	0.0%	1.8%	0.9%	0.1%	0.0%	0.0%	-0.6%
Critical (15%)												
No Action Alternative	140	151	166	168	176	176	155	146	137	134	134	139
Alternative C	141	152	165	166	174	176	159	148	137	134	134	139
Difference	2	1	-1	-2	-2	-1	4	2	0	0	0	0
Percent Difference	1.1%	0.6%	-0.5%	-1.5%	-1.2%	-0.3%	2.5%	1.2%	0.1%	0.0%	-0.3%	-0.2%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 7b

Sacramento River at Glenn Colusa Canal Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	143	155	172	189	194	193	185	168	147	137	136	140
Alternative C	144	156	172	187	193	195	188	168	146	137	136	140
Difference	0	0	-1	-2	-1	2	3	0	0	0	0	0
Percent Difference[3]	0.2%	0.3%	-0.4%	-1.0%	-0.5%	0.9%	1.8%	0.0%	-0.3%	-0.1%	-0.1%	-0.1%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	142	150	170	200	198	194	198	181	155	140	137	138
Alternative C	142	150	170	198	199	195	199	179	153	140	137	138
Difference	0	1	0	-2	1	1	1	-2	-1	0	0	0
Percent Difference	0.0%	0.4%	-0.1%	-1.0%	0.4%	0.6%	0.6%	-1.1%	-0.8%	-0.2%	0.1%	0.0%
Above Normal (15%)												
No Action Alternative	143	158	171	193	195	193	189	170	145	136	136	138
Alternative C	143	158	169	192	192	195	192	170	144	136	136	138
Difference	0	0	-2	-1	-2	2	3	0	-1	0	0	0
Percent Difference	-0.2%	-0.2%	-1.2%	-0.7%	-1.1%	1.2%	1.6%	-0.3%	-0.4%	0.0%	0.0%	0.2%
Below Normal (17%)												
No Action Alternative	145	155	168	184	194	195	189	170	147	136	136	139
Alternative C	145	156	166	182	193	198	193	170	147	136	136	139
Difference	0	1	-2	-2	-1	3	4	0	-1	0	0	0
Percent Difference	-0.1%	0.6%	-0.9%	-1.1%	-0.3%	1.4%	2.0%	-0.1%	-0.4%	0.0%	0.1%	0.2%
Dry (22%)												
No Action Alternative	145	161	180	182	192	191	172	155	141	135	136	144
Alternative C	145	161	180	180	188	192	176	157	141	135	136	143
Difference	0	0	0	-2	-4	2	5	2	0	0	0	-1
Percent Difference	0.0%	-0.2%	0.2%	-1.0%	-2.0%	0.9%	2.7%	1.3%	0.2%	0.1%	0.0%	-0.7%
Critical (15%)												
No Action Alternative	143	156	175	177	189	190	167	154	140	135	136	142
Alternative C	145	157	175	175	189	192	172	157	141	135	136	142
Difference	2	1	-1	-2	0	1	5	2	0	0	-1	0
Percent Difference	1.4%	0.8%	-0.4%	-1.0%	0.0%	0.7%	3.2%	1.5%	0.2%	0.0%	-0.5%	-0.2%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 7c

Sacramento River at Delevan Pipeline Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	148	161	182	204	207	201	196	176	155	142	142	149
Alternative C	148	161	183	204	207	204	201	177	154	141	141	149
Difference	0	1	1	-1	0	3	5	0	-2	-1	-1	0
Percent Difference[3]	0.3%	0.5%	0.5%	-0.3%	0.2%	1.4%	2.7%	0.1%	-1.0%	-0.6%	-0.4%	-0.2%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	149	158	182	223	217	206	209	190	165	147	144	147
Alternative C	149	159	184	223	219	208	211	188	163	146	145	147
Difference	0	1	2	0	2	2	2	-2	-2	-1	0	0
Percent Difference	0.0%	0.6%	1.2%	-0.1%	1.0%	0.9%	0.9%	-1.0%	-1.5%	-0.8%	0.1%	0.0%
Above Normal (15%)												
No Action Alternative	146	161	179	209	210	201	201	179	153	139	140	147
Alternative C	146	161	178	209	209	204	206	178	151	138	140	147
Difference	0	0	-1	1	-1	3	5	-1	-2	-1	-1	0
Percent Difference	-0.2%	0.0%	-0.8%	0.4%	-0.6%	1.7%	2.3%	-0.4%	-1.3%	-0.5%	-0.4%	0.3%
Below Normal (17%)												
No Action Alternative	150	161	176	199	205	202	196	181	159	143	141	148
Alternative C	150	163	177	197	207	205	201	180	157	142	140	148
Difference	0	2	1	-1	2	4	6	-1	-2	-1	-1	0
Percent Difference	0.2%	1.0%	0.3%	-0.7%	0.9%	1.9%	2.8%	-0.3%	-1.2%	-0.9%	-0.4%	0.1%
Dry (22%)												
No Action Alternative	150	167	192	194	202	198	185	164	147	139	142	155
Alternative C	149	167	195	194	199	201	194	166	146	138	141	153
Difference	0	-1	3	0	-3	2	9	2	-1	-1	-1	-2
Percent Difference	-0.1%	-0.3%	1.8%	-0.1%	-1.4%	1.2%	5.0%	1.4%	-0.6%	-0.4%	-0.7%	-1.3%
Critical (15%)												
No Action Alternative	145	158	182	185	195	197	179	160	146	138	140	151
Alternative C	148	160	181	183	196	200	186	163	145	138	139	150
Difference	3	2	0	-2	1	3	7	3	0	0	-1	-1
Percent Difference	1.7%	1.1%	-0.2%	-1.0%	0.6%	1.4%	4.2%	1.6%	-0.2%	-0.3%	-0.8%	-0.5%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 7d

Sacramento River below Delevan Pipeline, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	148	161	182	204	207	201	196	176	155	142	142	149
Alternative C	155	166	184	204	208	204	201	178	155	144	146	154
Difference	7	5	2	-1	1	3	5	2	0	2	4	5
Percent Difference[3]	4.5%	3.1%	1.0%	-0.3%	0.3%	1.4%	2.8%	0.9%	0.1%	1.5%	2.8%	3.1%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	149	158	182	223	217	206	209	190	165	147	144	147
Alternative C	154	163	184	223	219	208	211	188	163	147	146	150
Difference	5	5	3	0	2	2	2	-2	-2	0	2	3
Percent Difference	3.5%	3.4%	1.5%	-0.1%	1.0%	0.9%	0.9%	-1.0%	-1.4%	0.2%	1.4%	2.4%
Above Normal (15%)												
No Action Alternative	146	161	179	209	210	201	201	179	153	139	140	147
Alternative C	152	166	179	209	209	204	206	178	152	142	145	153
Difference	6	5	0	1	-1	3	5	-1	-1	3	5	6
Percent Difference	4.1%	3.0%	-0.1%	0.4%	-0.6%	1.7%	2.3%	-0.4%	-0.6%	2.2%	3.4%	4.1%
Below Normal (17%)												
No Action Alternative	150	161	176	199	205	202	196	181	159	143	141	148
Alternative C	156	166	177	197	207	205	201	180	158	145	144	153
Difference	6	5	1	-1	2	4	5	0	-1	2	4	5
Percent Difference	3.9%	2.9%	0.5%	-0.7%	1.0%	1.8%	2.8%	-0.2%	-0.7%	1.2%	2.7%	3.2%
Dry (22%)												
No Action Alternative	150	167	192	194	202	198	185	164	147	139	142	155
Alternative C	154	170	196	194	199	201	194	170	150	142	147	157
Difference	5	2	4	0	-3	3	9	7	3	3	5	3
Percent Difference	3.2%	1.4%	2.0%	-0.1%	-1.4%	1.3%	4.8%	4.0%	2.2%	2.2%	3.4%	1.8%
Critical (15%)												
No Action Alternative	145	158	182	185	195	197	179	160	146	138	140	151
Alternative C	157	165	183	183	196	200	187	167	149	141	146	157
Difference	12	7	1	-2	2	3	8	6	3	3	5	6
Percent Difference	8.0%	4.3%	0.7%	-0.9%	0.9%	1.8%	4.7%	4.0%	2.2%	2.4%	3.8%	4.1%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Alternative D Compared to No Action Alternative

This page intentionally left blank.

Table WQ - 9a

Sacramento River at Tehama Colusa Canal Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	140	150	164	178	180	178	169	154	140	134	134	137
Alternative D	140	150	162	175	178	179	170	153	140	134	134	137
Difference	0	0	-2	-3	-3	1	2	0	0	0	0	0
Percent Difference[3]	-0.1%	0.1%	-1.0%	-1.8%	-1.6%	0.3%	1.0%	-0.3%	0.0%	0.1%	0.0%	-0.1%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	139	145	161	187	183	179	180	161	144	135	134	135
Alternative D	138	146	159	184	182	180	180	159	143	135	134	135
Difference	0	1	-2	-3	-1	1	0	-2	0	0	0	0
Percent Difference	-0.2%	0.8%	-1.0%	-1.7%	-0.6%	0.3%	0.1%	-1.3%	-0.2%	0.0%	0.0%	0.0%
Above Normal (15%)												
No Action Alternative	140	152	163	182	181	178	171	154	138	133	134	136
Alternative D	140	152	161	179	177	179	173	154	138	133	134	135
Difference	0	0	-2	-3	-3	1	1	-1	0	0	0	0
Percent Difference	-0.3%	-0.2%	-1.3%	-1.7%	-1.9%	0.4%	0.9%	-0.4%	-0.1%	0.1%	0.0%	-0.1%
Below Normal (17%)												
No Action Alternative	141	149	160	175	181	181	172	155	140	133	134	137
Alternative D	140	149	158	171	178	182	174	154	140	133	134	137
Difference	0	0	-2	-4	-3	1	2	-1	0	0	0	0
Percent Difference	-0.3%	0.1%	-1.4%	-2.1%	-1.7%	0.4%	1.1%	-0.4%	0.0%	0.1%	0.1%	0.1%
Dry (22%)												
No Action Alternative	142	154	171	172	180	177	158	146	137	133	134	141
Alternative D	141	153	170	168	175	177	161	147	137	133	134	140
Difference	0	-1	-1	-4	-6	0	2	1	0	0	0	0
Percent Difference	0.0%	-0.7%	-0.5%	-2.2%	-3.2%	0.1%	1.5%	0.9%	0.3%	0.2%	0.0%	-0.3%
Critical (15%)												
No Action Alternative	140	151	166	168	176	176	155	146	137	134	134	139
Alternative D	140	151	165	166	174	177	158	147	137	134	134	139
Difference	1	0	-1	-2	-2	0	3	1	0	0	0	0
Percent Difference	0.6%	0.2%	-0.5%	-1.4%	-1.2%	0.2%	2.0%	0.8%	0.2%	0.1%	-0.2%	-0.3%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 9b

Sacramento River at Glenn Colusa Canal Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	143	155	172	189	194	193	185	168	147	137	136	140
Alternative D	143	155	170	185	190	190	181	163	145	137	136	140
Difference	0	0	-2	-4	-4	-3	-3	-4	-1	0	0	0
Percent Difference[3]	-0.1%	-0.1%	-1.2%	-2.1%	-2.2%	-1.3%	-1.8%	-2.6%	-0.8%	0.0%	0.0%	-0.1%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	142	150	170	200	198	194	198	181	155	140	137	138
Alternative D	142	151	168	197	196	192	192	174	152	140	137	138
Difference	0	1	-2	-4	-2	-2	-6	-7	-2	0	0	0
Percent Difference	-0.3%	0.7%	-1.1%	-1.9%	-1.1%	-1.1%	-2.9%	-4.1%	-1.4%	-0.2%	0.1%	0.0%
Above Normal (15%)												
No Action Alternative	143	158	171	193	195	193	189	170	145	136	136	138
Alternative D	143	158	168	189	189	190	186	165	143	136	136	138
Difference	0	-1	-2	-4	-6	-3	-3	-5	-1	0	0	0
Percent Difference	-0.2%	-0.3%	-1.4%	-2.2%	-3.0%	-1.4%	-1.7%	-3.1%	-0.8%	0.0%	0.0%	0.0%
Below Normal (17%)												
No Action Alternative	145	155	168	184	194	195	189	170	147	136	136	139
Alternative D	144	154	164	179	189	191	181	163	145	136	136	139
Difference	-1	-1	-4	-5	-5	-5	-8	-7	-2	0	0	0
Percent Difference	-0.7%	-0.7%	-2.2%	-2.9%	-2.6%	-2.4%	-4.0%	-4.0%	-1.2%	-0.1%	0.1%	0.2%
Dry (22%)												
No Action Alternative	145	161	180	182	192	191	172	155	141	135	136	144
Alternative D	145	160	178	178	184	188	171	154	141	135	136	144
Difference	0	-2	-2	-4	-7	-3	-1	-1	0	0	0	0
Percent Difference	0.0%	-0.9%	-0.9%	-2.2%	-3.8%	-1.5%	-0.4%	-0.7%	-0.1%	0.2%	0.1%	-0.2%
Critical (15%)												
No Action Alternative	143	156	175	177	189	190	167	154	140	135	136	142
Alternative D	144	156	174	174	186	189	169	155	140	135	136	142
Difference	1	0	-1	-3	-2	-1	2	0	0	0	0	0
Percent Difference	0.8%	0.0%	-0.8%	-1.4%	-1.2%	-0.6%	1.2%	0.1%	0.1%	0.1%	-0.3%	-0.3%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 9c

Sacramento River at Delevan Pipeline Intake, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	148	161	182	204	207	201	196	176	155	142	142	149
Alternative D	148	161	182	202	204	200	195	172	154	141	141	149
Difference	0	0	0	-3	-3	-1	-1	-4	-2	0	0	0
Percent Difference[3]	0.0%	0.0%	-0.2%	-1.4%	-1.4%	-0.7%	-0.4%	-2.3%	-1.0%	-0.3%	-0.2%	0.0%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	149	158	182	223	217	206	209	190	165	147	144	147
Alternative D	149	160	182	221	216	205	205	183	163	146	145	147
Difference	0	2	1	-2	-1	-1	-4	-7	-3	-1	0	0
Percent Difference	-0.1%	1.2%	0.4%	-1.0%	-0.3%	-0.5%	-2.0%	-3.6%	-1.6%	-0.5%	0.2%	0.1%
Above Normal (15%)												
No Action Alternative	146	161	179	209	210	201	201	179	153	139	140	147
Alternative D	146	161	178	206	205	200	201	174	151	138	140	147
Difference	0	0	-1	-2	-5	-1	0	-5	-2	0	0	0
Percent Difference	-0.3%	-0.2%	-0.6%	-1.1%	-2.4%	-0.6%	-0.2%	-2.7%	-1.1%	-0.3%	-0.3%	0.2%
Below Normal (17%)												
No Action Alternative	150	161	176	199	205	202	196	181	159	143	141	148
Alternative D	149	160	174	194	202	198	191	174	156	142	140	149
Difference	-1	-1	-2	-5	-3	-3	-5	-7	-3	-1	0	0
Percent Difference	-0.6%	-0.8%	-1.4%	-2.5%	-1.5%	-1.7%	-2.7%	-3.8%	-1.6%	-0.6%	-0.2%	0.3%
Dry (22%)												
No Action Alternative	150	167	192	194	202	198	185	164	147	139	142	155
Alternative D	149	166	193	192	195	196	188	163	146	139	141	154
Difference	0	-2	2	-2	-6	-2	3	-1	-1	0	-1	-1
Percent Difference	-0.1%	-1.1%	0.9%	-1.2%	-3.2%	-1.3%	1.7%	-0.4%	-0.5%	-0.1%	-0.4%	-0.4%
Critical (15%)												
No Action Alternative	145	158	182	185	195	197	179	160	146	138	140	151
Alternative D	147	158	180	182	193	197	184	161	146	138	139	150
Difference	1	0	-1	-3	-1	0	5	0	0	0	-1	0
Percent Difference	1.0%	0.1%	-0.7%	-1.5%	-0.6%	0.2%	2.7%	0.1%	0.1%	0.0%	-0.6%	-0.2%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average

Table WQ - 9d

Sacramento River below Delevan Pipeline, Monthly Average EC

Long-term Average and Average by Water Year Type

Analysis Period	Monthly Average EC (µmhos/cm)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Long-term												
Full Simulation Period[1]												
No Action Alternative	148	161	182	204	207	201	196	176	155	142	142	149
Alternative D	152	164	182	202	204	200	195	173	156	144	145	152
Difference	4	3	0	-3	-3	-1	-1	-4	1	3	3	3
Percent Difference[3]	2.9%	1.9%	0.0%	-1.4%	-1.4%	-0.6%	-0.3%	-2.0%	0.4%	2.0%	2.0%	2.3%
Water Year Types[2]												
Wet (32%)												
No Action Alternative	149	158	182	223	217	206	209	190	165	147	144	147
Alternative D	153	164	183	221	216	205	205	183	163	148	147	150
Difference	4	6	1	-2	-1	-1	-4	-7	-2	1	2	3
Percent Difference	2.8%	4.0%	0.6%	-1.0%	-0.3%	-0.5%	-2.0%	-3.6%	-1.4%	0.6%	1.5%	2.2%
Above Normal (15%)												
No Action Alternative	146	161	179	209	210	201	201	179	153	139	140	147
Alternative D	150	163	178	206	205	200	201	174	153	142	143	151
Difference	3	2	-1	-2	-5	-1	0	-5	0	3	3	4
Percent Difference	2.4%	1.4%	-0.3%	-1.1%	-2.4%	-0.6%	-0.1%	-2.7%	-0.2%	2.4%	2.3%	3.0%
Below Normal (17%)												
No Action Alternative	150	161	176	199	205	202	196	181	159	143	141	148
Alternative D	153	161	174	194	202	198	191	174	157	145	144	152
Difference	3	0	-2	-5	-3	-4	-5	-7	-1	3	3	3
Percent Difference	1.7%	0.2%	-1.3%	-2.5%	-1.4%	-1.7%	-2.7%	-3.8%	-0.9%	1.8%	2.3%	2.3%
Dry (22%)												
No Action Alternative	150	167	192	194	202	198	185	164	147	139	142	155
Alternative D	154	168	194	192	195	196	188	163	151	143	146	158
Difference	4	1	2	-2	-6	-2	3	0	4	5	4	3
Percent Difference	2.6%	0.5%	1.0%	-1.2%	-3.2%	-1.1%	1.7%	-0.3%	2.8%	3.4%	2.7%	2.1%
Critical (15%)												
No Action Alternative	145	158	182	185	195	197	179	160	146	138	140	151
Alternative D	152	161	181	182	194	198	184	163	151	142	143	154
Difference	7	3	-1	-3	-1	1	5	3	5	4	3	3
Percent Difference	4.7%	1.9%	-0.3%	-1.5%	-0.5%	0.5%	3.1%	1.6%	3.4%	2.8%	1.9%	2.2%

1 Based on the 82-year simulation period

2 As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999)

3 Relative difference of the monthly average