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List of Acronyms

CEDEN	California Environmental Data Exchange Network
CFR	Code of Federal Regulations
Commission	Federal Energy Regulatory Commission
CSD	Community Services District
CTR	California Toxics Rule
CWA	Clean Water Act
DWR	California Department of Water Resources
EPA	United States Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
FR	Federal Register
NPS	National Park Service
NRR	Natural Resources Report
NTR	National Toxics Rule
NWIS	National Water Information System
RMA	Resources Management Agency
RWQCB	Regional Water Quality Control Board
SEKI	Sequoia and Kings Canyon National Parks
SSRWMG	Southern Sierra Regional Water Management Group
STORET	United States Environmental Protection Agency's Storage and Retrieval Data Warehouse
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

3.4 WATER QUALITY

This section describes water quality in the vicinity of the Kaweah Project (Project). The Federal Energy Regulatory Commission's (FERC or Commission) content requirements for this section are specified in Title 18 of the Code of Federal Regulations (CFR) Chapter I § 5.6(d)(3)(iii). The FERC regulations require information on water resources, including water use (quantity) and water quality of waters affected by the Project. This section specifically addresses the water quality components of the FERC regulations. Information on water use and hydrology is addressed in Section 3.3 Water Use and Hydrology.

The information presented in this section provides an overview of the existing physical and chemical water quality conditions in the vicinity of the Kaweah Project. Water quality information presented in this section was derived from existing published reports and publicly available databases.

3.4.1 Information Sources

This section was prepared utilizing the following information sources:

- Water quality standards
 - California Toxics Rule (CTR) “Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California” (Federal Register, 65 FR 31682, EPA 2000);
 - National Toxics Rule (NTR) Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants” (Federal Register, 57 FR 60848, EPA 1992); and
 - *Water Quality Control Plan for the Tulare Lake Basin* (Basin Plan) (RWQCB 2004).
- Previously published study reports and data¹
 - The U.S. Geological Survey's (USGS) National Water Information System (NWIS) (USGS 2015) and U.S. Environmental Protection Agency's (USEPA) storage and retrieval (STORET) (EPA 2015) online databases provided water quality information that was collected by the USGS and other agencies (California Department of Water Resources [DWR], California Environmental Data Exchange Network [CEDEN], and the National Park Service [NPS]).

¹ Note, water quality data upstream of the Project in the Sequoia National Park (SNP) have recently been summarized in Day and Conklin (2013).

- Three Rivers Community Services District (TRCSD) has bacteria test results for 2014 for total coliform and *Escherichia coli* (E. coli) at several locations along the Kaweah River² (Three Rivers CSD 2014).

3.4.2 Applicable Federally-approved Water Quality Standards and Objectives

The State of California has responsibility for maintaining water quality standards through implementation of the Federal Clean Water Act (CWA). The RWQCB has established water quality objectives for specific beneficial water uses in the Basin Plan. The water quality objectives include both numeric and narrative standards for surface water that are based on criteria that protect both human health and aquatic life. If water quality is maintained at levels consistent with these objectives, beneficial uses are considered to be protected. Applicable water quality objectives and standards in the Basin Plan are provided in Table 3.4-1).

The Basin Plan for chemical constituents provides numeric water quality objectives that are derived from various sources. These objectives include references to maximum contaminant levels (MCLs) that are provided in Title 22 of the California Code of Regulations which sets standards for waters designated for domestic or municipal use. Additional, and often more stringent criteria are provided by the California Toxics Rule (CTR) “Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California” (Federal Register, 65 FR 31682, EPA 2000) and the National Toxics Rule (NTR) Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants” (Federal Register, 57 FR 60848, EPA 1992) to protect aquatic life, and human health. The CTR and NTR pertinent toxicity standards are provided in Table 3.4-1.

3.4.3 Summary of Existing Water Quality Information

The USGS, CEDEN, DWR, NPS, and TRCSD water quality measurements are provided in Appendix 3.4-A Table 1; Appendix 3.4-B Tables 1-3; and Appendix 3.4-C Table 1, respectively. Historic water quality sampling locations, identified by agency, are shown on Map 3.4-1. Map 3.4-1a shows the measurement locations in the bypass reaches, in the Kaweah River Watershed (Watershed) downstream of the bypass reaches associated with the Project, and in the Watershed upstream of the Project. Map 3.4-1b shows the measurement locations in the vicinity of the Project (the locations on the bypass reaches and in the Watershed downstream of the bypass reaches).

Existing information sources indicate that the physical and water chemistry conditions in the streams and rivers associated with the Project (bypass reaches) are of high quality and conform to regulatory water quality objectives and standards. No persistent, widespread water quality issues were found. There is no agriculture or water treatment plants that discharge into the bypass reaches. Several grazing allotments are present in the vicinity of the bypass reaches. Similarly, physical and water chemistry conditions in

² The TRCSD monitors surface water quality at various locations along the bypass reaches associated with the Project and in the surrounding watershed (RMA 2009; SSRWMG 2014).

the Watershed upstream of the bypass reaches are of high quality. The following summarizes historical water quality data.

Review of the water quality data from sample locations in the bypass reaches and on the Kaweah River downstream of the Project indicates that generally all of the constituents analyzed have complied with current regulatory standards, with the exception of two pH measurements in 2002 at the upstream end of the Kaweah River Bypass Reach downstream from the Kaweah No. 2 Diversion Dam and at the downstream end of the bypass reach immediately upstream of Kaweah No. 2 Powerhouse (Appendix 3.4-B Table 1). In addition, surface water measurements by the TRCSD exceeded regulatory standards for fecal coliform in 2014 downstream of the Kaweah River Bypass Reach near the North Fork Kaweah River confluence (Appendix 3.4-C).

Water quality samples in the Watershed upstream of the Project and on other tributaries to the Kaweah River have also generally complied with current regulatory standards, based on data collected by the USGS, DWR, CEDEN, and NPS, with a few exceptions. Samples at several locations upstream of the Project or on tributaries to the Kaweah River have not complied with regulatory standards for pH, alkalinity, and fecal coliform in the 1980s and more recently in 2014 (Appendix 3.4-A and Appendix 3.4-B). However, measurements of pH and alkalinity in the bypass reaches and overall Watershed, although not consistent with Basin Plan objectives, are typical of most west-slope Sierra Nevada streams and rivers.

3.4.4 References

California Regional Water Quality Control Board Central Valley Region (RWQCB).

2004. Water Quality Control Plan for the Tulare Lake Basin Second Edition.

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Day, J. P., and M. Conklin. 2013. A natural resource condition assessment for Sequoia and Kings Canyon National Parks: Appendix 6 - water quality. Natural Resource Report NPS/SEKI/NRR—2013/665.6. National Park Service, Fort Collins, Colorado.

Resource Management Agency (RMA), 2009. Draft Three Rivers Community Plan 2009 Draft. 89 pp.

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- _____. 2015. USEPA Storage and Retrieval (STORET) online database. Available at: <http://watersgeo.epa.gov/mwm/>
- United States Geological Survey (USGS). 2015. National Water Information System: Web Interface. Available at: <http://waterdata.usgs.gov/nwis/qw>.

TABLES

Table 3.4-1. Applicable Water Quality Objectives and Standards.

Analyte	Units	State and Federal Criteria		
		Basin Plan ¹	CA Toxic Rule ²	National Toxics Rule ³
In-Situ Measurements				
Oxygen, dissolved	mg/L	5.0/7.0 ¹⁴	NS	NS
Secchi Depth	Meter	NS	NS	NS
pH	unitless	6.5 - 8.3	NS	6.5 – 9.0
Water Temperature	Fahrenheit	NS	NS	NS
Specific Conductance	uS/cm	NS	NS	NS
General Parameters and Metals				
Alkalinity (as CaCO ₃)	mg/L	NS	NS	>20 ⁵
Aluminum	mg/L	0.2	NS	NS
Ammonia as NH ₃	mg/L	0.025 ⁶	NS	NS
Antimony	µg/L	6	14	14
Arsenic – Total	µg/L	10	150/340 ⁹	150/340 ⁹
Benzene	µg/L	1	1.2	1.2
Beryllium	µg/L	4	NS	NS
Bicarbonate (as CaCO ₃)		NS	NS	NS
Boron – Total		NS	NS	NS
Cadmium	µg/L	5	Hardness Dependent ^{9,10}	Hardness Dependent ^{9,10}
Calcium		NS	NS	NS
Carbonate (as CaCO ₃)		NS	NS	>20 ⁵
Chemical Oxygen Demand		NS	NS	NS
Chloride	mg/L	250 ⁴	NS	NS
Chlorophyll-a		NS	NS	NS
Chromium - Total	µg/L	50	NS	NS
Cobalt		NS	NS	NS
Color		NS ^{4,7}	NS	NS
Copper – Total	mg/L	1 ⁴	1.3 ¹² and Hardness Dependent ^{9,10}	1.3 ¹² and Hardness Dependent ^{9,10}
Cryptosporidium		NS	NS	NS
Cyanide	µg/L	150	5.2/22 ⁹	5.2/22 ⁹
Ethyl-benzene	µg/L	300	3,100	3,100
Fecal Coliform (3x5)	MPN/ 100 mL	200/400 ¹⁷	NS	NS
Fecal Streptococci		NS	NS	NS
Fluoride	mg/L	2	NS	NS

Table 3.4-1. Applicable Water Quality Objectives and Standards (continued).

Analyte	Units	State and Federal Criteria		
		Basin Plan ¹	CA Toxic Rule ²	National Toxics Rule ³
General Parameters and Metals (continued)				
Foaming Agents	mg/L	0.5 ⁴	NS	NS
Giardia		NS	NS	NS
Hardness (as CaCO ₃)		NS	NS	>20 ⁵
Iron – Total	mg/L	0.3 ⁴	NS	NS
Lead – Total	µg/L	15	Hardness Dependent ^{9,10}	Hardness Dependent ^{9,10}
Magnesium		NS	NS	NS
Manganese – Total	µg/L	50 ⁴	NS	NS
Mercury – Total	µg/L	2	0.05	0.77/1.4 ⁹
Methyl mercury	mg/Kg fish	NS		0.3 ¹⁸
Methyl-tertiary-butyl Ether (MtBE)	µg/L	5 ⁴	NS	NS
Nickel	µg/L	100	610 ¹² ; 4,600 ¹³ and Hardness Dependent ^{9,10}	610 ¹² ; 4,600 ¹³ and Hardness Dependent ^{9,10}
Nitrate (NO ₃)	mg/L	45	NS	NS
Nitrite (as nitrogen)	mg/L	1	NS	NS
Nitrogen- Total Kjeldahl (TKN)		NS	NS	NS
Odor		NS ^{4,7}	NS	NS
Organic Carbon		NS	NS	NS
Ortho-phosphate (o-PO ₄ -P)		NS	NS	NS
Phosphorus		NS	NS	NS
Potassium		NS	NS	NS
Selenium	µg/L	50	5 ⁹	Confirm no 5/20 5 ⁹
Silica		NS	NS	NS
Silver	µg/L	100 ⁴	Hardness Dependent ^{9,10}	Hardness Dependent ^{9,10}
Sodium		NS	NS	NS
Sulfate (SO ₄)	mg/L	250 ⁴	NS	NS
Thallium	µg/L	2	1.7 ¹² , 6.3 ¹³	1.7 ¹² , 6.3 ¹³
Toluene	µg/L	150	6800 ¹² , 200000 ¹³	6800 ¹² , 200000 ¹³
Total Coliform (3x5, 6 hr hold)		NS	NS	NS
Total Dissolved Solids	mg/L	500 ⁴	NS	250000 ⁷
Total Petroleum Hydrocarbons (as gasoline and as diesel)		NS	NS	Narr ¹⁸
Total Suspended Solids		NS	NS	NS

Table 3.4-1. Applicable Water Quality Objectives and Standards (continued).

Analyte	Units	State and Federal Criteria		
		Basin Plan ¹	CA Toxic Rule ²	National Toxics Rule ³
General Parameters and Metals (continued)				
Turbidity	NTU	Narr ⁸	Narr ⁸	NS
Xylenes – Total	µg/L	1750	NS	NS
Zinc – Total	mg/L	5 ⁴	Hardness Dependent ⁹	Hardness Dependent ⁹

¹ The Basin Plan for the Tulare Basin relies on California primary and secondary Maximum Concentration Level objectives as criteria for water quality to be used as a municipal & domestic supply for human consumption (database current as of 5/22/15).

² California Toxics Rules are based primarily on USEPA standards developed under the Clean Water Act for human consumption of water and aquatic organisms with an adult risk for carcinogens estimated to be one in one million as contained in the Integrated Risk Information System (IRIS) as of October 1, 1996.

³ The National Toxics Rules are based on USEPA standards developed under the Clean Water Act for human consumption of water and aquatic organisms with an adult risk for carcinogens estimated to be one in one million as contained in the IRIS as of October 1, 1996. These criteria are to be applied to all states not complying with the Clean Water Act section 303(c)(2)(B).

⁴ The criteria listed are secondary Maximum Concentration Levels for California drinking water quality objectives that do not necessarily indicate a toxic amount of contaminate. Rather these standards dictate water quality objectives designed to preserve taste, odor, or appearance of drinking water.

⁵ 20 mg/L or more as CaCO₃ for freshwater aquatic life except where natural concentrations are less (USEPA's 1976 'Red Book'). The 'Red Book' also recommends that natural alkalinity not be reduced by more than 25%.

⁶ Taste and odor threshold.

⁷ Water shall be free of discoloration that causes nuisance or adversely affects beneficial uses. Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses. (Sacramento and San Joaquin River Basin Plan, Chapter III: Water Quality Objectives, pgs. 5 and 7, 6 September 2002).

⁸ Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits: where natural turbidity is between 0 and 5 NTU's, increases shall not exceed 1 NTU. Where natural turbidity is between 5 and 50 NTU's, increases shall not exceed 20%. Where natural turbidity is between 50 and 100 NTU's, increases shall not exceed 10 NTU's. Finally, where natural turbidity is greater than 100 NTU's, increases shall not exceed 10%.

⁹ Freshwater Aquatic Life Protection, continuous concentration (4-day average)/maximum concentration (1-hour average).

¹⁰ Criteria is expressed as a function of hardness and decreases as hardness decreases. The actual criteria is calculated based in the hardness (as CaCO₃) of the sample water.

¹¹ California primary maximum contaminant level (MCL) for inorganic mercury.

¹² CTR and NTR human health (30-day average); Drinking Water Sources (consumption of water an aquatic organisms).

¹³ CTR human health (30-day average); Other Waters (aquatic organism consumption only).

¹⁴ For water designated as WARM (5.0 mg/l) and COLD or SPWN (7.0 mg/l).

¹⁵ Instantaneous maximum.

¹⁶ This value is an Ambient Water Quality Criteria (AWQC) for methylmercury and was published by the U.S. EPA in a document titled Water Quality Criterion for the Protection of Human Health: Methylmercury – Final (EPA – 823-R-01-001, January 2001). This AWQC replaces the AWQC for total mercury published in 1980 and partially updated in 1997.

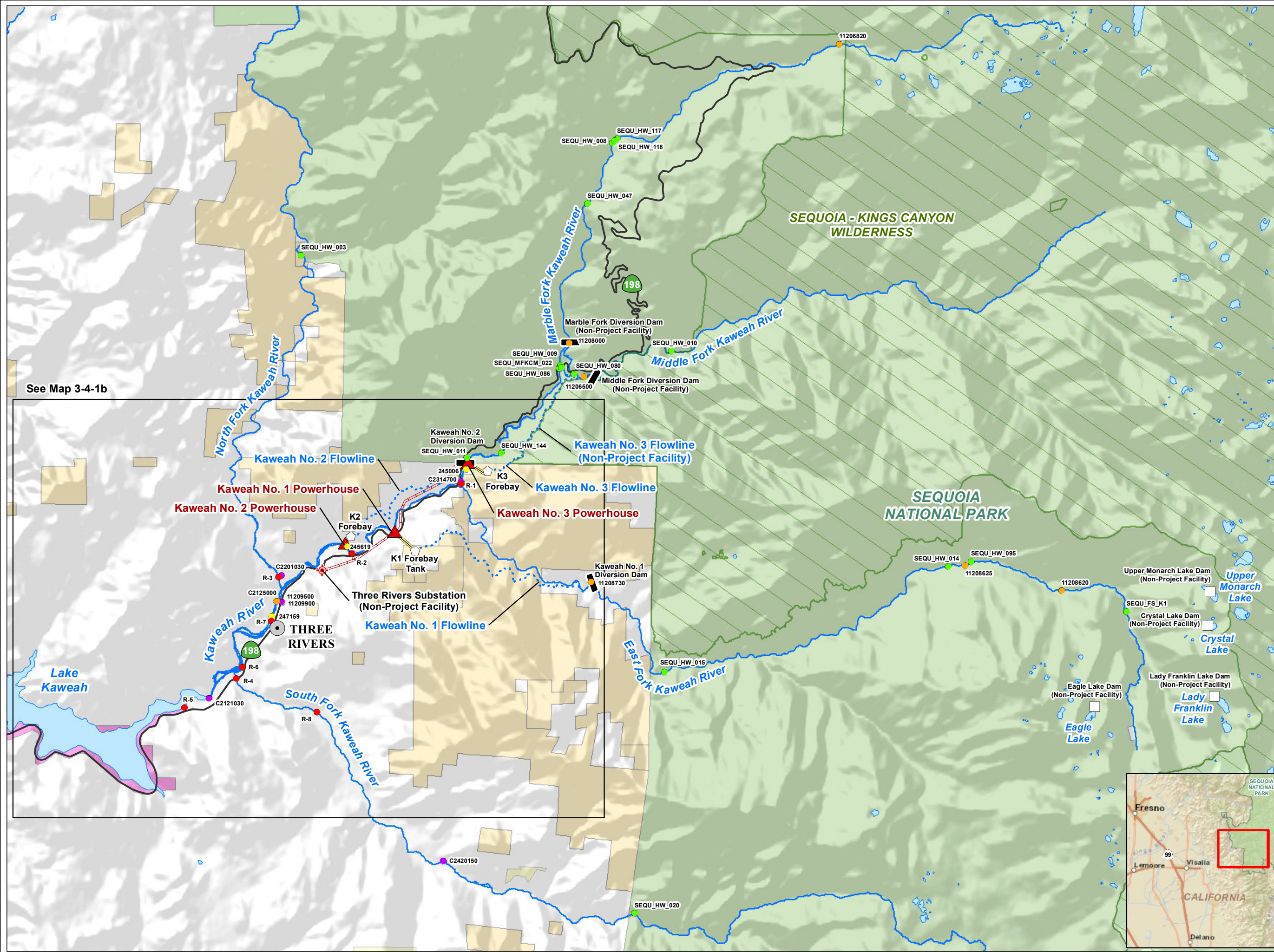
¹⁷ In all waters designated for REC-1, the E. coli concentration, based on a minimum of not less than 5 samples equally spaced over a 30-day period, shall not exceed a geometric mean of 200/100 ml and shall not exceed 400/100 ml in any single sample.

¹⁸ From Compilation of Water Quality Goals – TPH-diesel: taste and odor threshold and USEPA SNARL = 100 ug/L. TPH-gasoline: taste and odor threshold and proposed USEPA SNARL = 5 mg/L.

NS - no standard available

Sources: EPA 1976, 1992, 1996, 2000, 2001, and 2007.


MAPS



See Map 3-4-1b

- Facilities**
- Powerhouse
 - Diversion
 - Dam
 - Utility
 - Forebay
 - Flowline
 - Penstock
 - Transmission Line
- Other Features**
- City/Town
 - Highway/Road
 - Watercourse
 - Water Body
- Land Jurisdiction***
- Bureau of Land Management
 - National Park Service
 - U.S. Army Corps of Engineers
 - Private (Blank)
- *SOURCE: BLM 2012

- Land Management**
- National Wilderness Area
- Water Quality Sample Locations**
- CEDEN
 - California Dept. of Water Resources
 - National Park Service Water Resources Division
 - USGS
 - TRCSD




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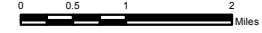
Eastern Hydro Generation

Map 3.4-1a

Water Quality Sample Locations in the Kaweah Watershed



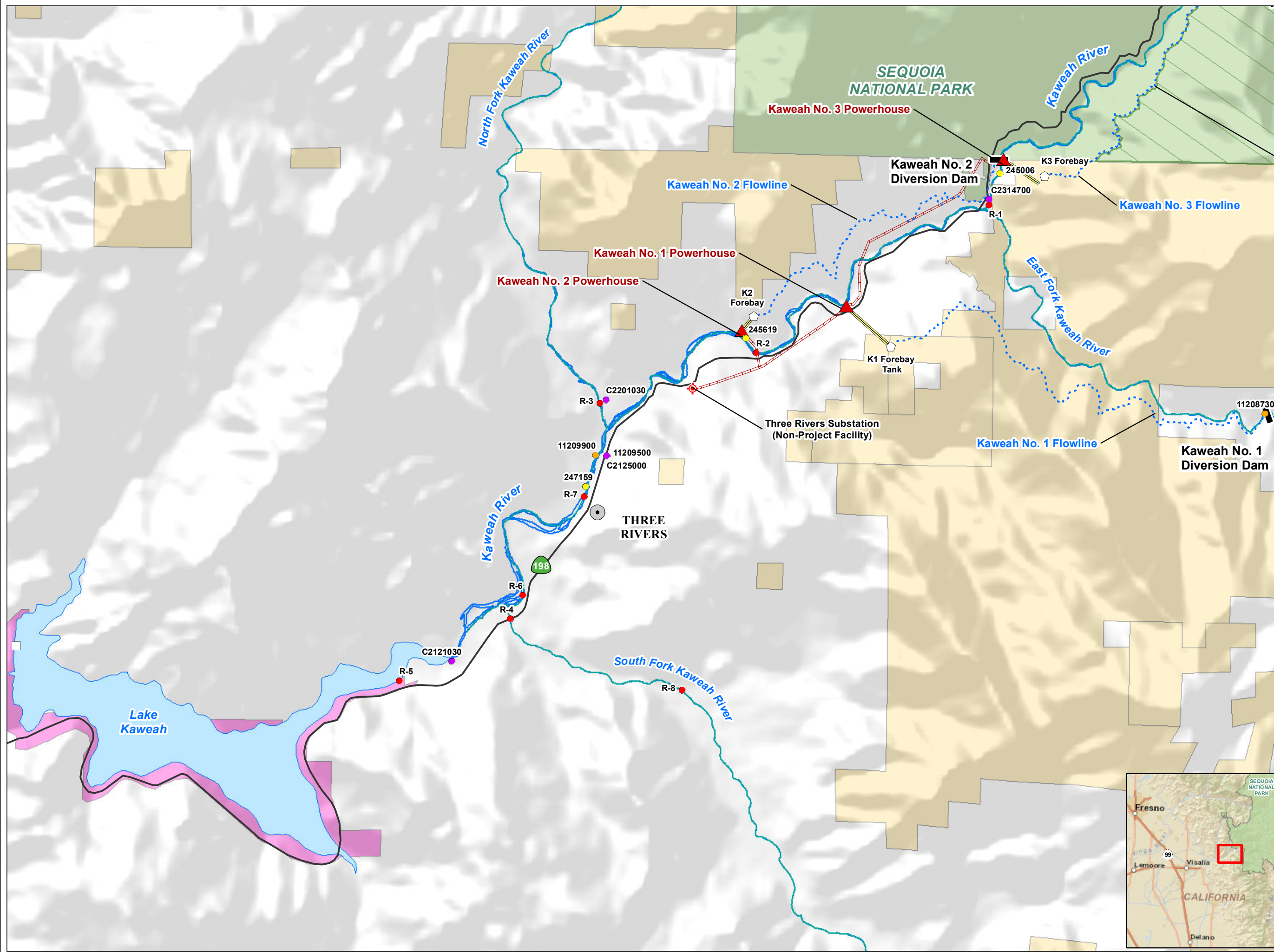
Date: 8/5/2015



0 0.5 1 2 Miles


Projection: UTM Zone 11
Datum: NAD 83

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- Facilities**
- Powerhouse
 - Diversion
 - Dam
 - Utility
 - Forebay
 - Flowline
 - Penstock
 - Transmission Line
- Other Features**
- City/Town
 - Highway/Road
 - Watercourse
 - Water Body
- Land Jurisdiction***
- Bureau of Land Management
 - National Park Service
 - U.S. Army Corps of Engineers
 - Private (Blank)
- Land Management**
- National Wilderness Area
- Water Quality Sample Locations**
- CEDEN
 - California Dept. of Water Resources
 - National Park Service Water Resources Division
 - USGS
 - TRCSD

*SOURCE: BLM 2012




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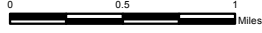
Eastern Hydro Generation

Map 3.4-1b

Water Quality Sample Locations in the Vicinity of the Kaweah Project



Date: 8/5/2015



Projection: UTM Zone 11
Datum: NAD 83

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APPENDIX 3.4-A

**Summary of USGS Surface Water Measurements at Sampling Stations in the
Vicinity of the Kaweah Project and in the Kaweah Watershed**

Appendix 3.4-A Table 1. USGS Water Quality Monitoring in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Sample Date	Temperature (deg C)	Discharge, cubic feet per second	pH, water, unfiltered, field, standard units	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams	Dissolved oxygen, water, unfiltered, milligrams per liter	General Parameters																		Trace Elements			Bacteria	
							Ammonia, water, filtered, milligrams per liter as NH4	Calcium, water, filtered, milligrams per liter	Chloride, water, filtered, milligrams per liter	Fluoride, water, filtered, milligrams per liter	Hardness, water, milligrams per liter as calcium carbonate	Magnesium, water, filtered, milligrams per liter	Nitrate, water, filtered, milligrams per liter	Nitrite, water, filtered, milligrams per liter as nitrogen	Orthophosphate, water, filtered, milligrams per liter	Phosphorus, water, filtered, milligrams per liter as phosphorus	Potassium, water, filtered, milligrams per liter	Silica, water, filtered, milligrams per liter as SiO2	Sodium, water, filtered, milligrams per liter	Sulfate, water, filtered, milligrams per liter	Dissolved solids, water, filtered, sum of constituents, milligrams per liter	Suspended sediment concentration, milligrams per liter	Organic carbon, water, filtered, milligrams per liter	Alkalinity, water, filtered, infection, milligrams per liter as calcium carbonate	Boron, water, filtered, micrograms per liter	Iron, water, filtered, micrograms per liter	Manganese, water, filtered, micrograms per liter	Total coliforms, M	Fecal coliforms, M
Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200
Station 11208730 EF Kaweah R nr Three Rivers CA																													
7/25/1968	18	3.4	7.5	98	52	8.4	0	15	1	0.1	41	1	0.8	0.181	0		1.1	12	3	5	65					0	0		
8/2/1968	20.6	3.8																				1							
8/26/1968	27.2	0.4																				1							
8/26/1968	16	16																				1							
8/26/1968	16	16	7.7	111	60	8.9	1.2	17	0.7	0.1	48	1.2	0.2	0.045	0.03		1.2	12	3.9	5	71				60	10		400	
9/30/1968	12.6	0.68																				1							
9/30/1968	15	10	7.5	121	66	9.9	0.01	18	1.3	0	50	1.3	0.7	0.158	0.07		1.6	13	5	6	80				0	0		88	
10/31/1968	10	20	7.7	102	56	9		14	1.5	0.1	40	1.3	0.3	0.068			1.1	15	4.7	3	69	2			0	10		210	
12/11/1968	5	31																				9							
1/14/1969	6	88	7.3	58	32	12.2	0.01	7.3	0.6	0.2	20	0.5	0.1	0.023	0.07		0.9	14	3.4	3	46	14			30	40		14	
1/20/1969	6	433																				50							
5/1/1969	7	516																				24							
5/29/1969	10	1170	6.6	33	16	12.3	0	4.6	0.3	0	13	0.4	0.2	0.045	0.03		0.6	7.7	1.3	2	25	83			40	20			
6/19/1969	12	745	6.8	35	17	11.5	0.03	4.5	0.5	0.1	12	0.4	0.1	0.023	0.04		0.5	9.3	1.4	2	27	14			20	20		14	
7/30/1969	18	266	6.5	46	24	10.2	0.04	6.5	0.4	0	18	0.5	0		0		0.6	9.1	1.2	1	31	2			0	30		20	
8/26/1969	15	79	7.4	73	37	8.9	0.04	10	0.4	0	28	0.8	0.1	0.023	0.03		0.8	13	2.6	3	49	2			0	10		18	
10/15/1969	10	38																				1							
10/15/1969	8.5	38	7.8	90	48	11.9	0.03	12	1.3	0.1	34	1	0.1	0.023	0.07		1	17	4	3	63				0	20			
12/9/1969	3.5	28	7.5	93	47		0	12	1.4	0.1	34	1.1	0.1	0.023	0.06		1	18	4.9	3	65				30	40		17	
1/19/1970	6	181	6.9	54	28		0.03	6.5	0.8	0.2	20	0.8	0.2	0.045	0.05		0.9	15	3.2	2	43	6			0	40		10	
3/10/1970	4	101	7.9	73	38	11.9	0	8.4	1.6	0	28	1.8	0		0.08		1	20	4.4	3	60	1			0	60		14	
4/22/1970	3	104	7.5	67	34	12.7	0	9.4	0.6	0	26	0.7	0		0.06		0.7	14	3.1	2	48	3			0	10		10	
5/18/1970	7	615																				19							

Appendix 3.4-A Table 1. USGS Water Quality Monitoring in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Sample Date	Temperature (deg C)	Discharge, cubic feet per second	pH, water, unfiltered, field, standard units	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams	Dissolved oxygen, water, unfiltered, milligrams per liter	General Parameters																			Trace Elements			Bacteria				
							Ammonia, water, filtered, milligrams per liter as NH4	Calcium, water, filtered, milligrams per liter	Chloride, water, filtered, milligrams per liter	Fluoride, water, filtered, milligrams per liter	Hardness, water, milligrams per liter as calcium carbonate	Magnesium, water, filtered, milligrams per liter	Nitrate, water, filtered, milligrams per liter	Nitrite, water, filtered, milligrams per liter as nitrogen	Orthophosphate, water, filtered, milligrams per liter	Phosphorus, water, filtered, milligrams per liter as phosphorus	Potassium, water, filtered, milligrams per liter	Silica, water, filtered, milligrams per liter as SiO2	Sodium, water, filtered, milligrams per liter	Sulfate, water, filtered, milligrams per liter	Dissolved solids, water, filtered, sum of constituents, milligrams per liter	Suspended sediment concentration, milligrams per liter	Organic carbon, water, filtered, milligrams per liter	Alkalinity, water, filtered, infection, milligrams per liter as calcium carbonate	Boron, water, filtered, micrograms per liter	Iron, water, filtered, micrograms per liter	Manganese, water, filtered, micrograms per liter	Total coliforms, M	Fecal coliforms, M				
Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200				
5/18/1970	9.5	532	6.6	38	18	10.5	0	5.8	0.4	0	16	0.3	0.2	0.045	0.06		0.5	6.6	1.2	4	28								70	0		180	
7/1/1970	14	118	7.1	59	28		0.04	8.7	0.4	0.2	24	0.5	0		0.12		0.6	8.7	2	3	38	1							0	40			
8/4/1970	19	33	7.1	91	46	8.7	0.04	13	0.7	0.2	36	0.9	0		0.14		1	12	3.2	4	58	2							80	0			
8/28/1970	19.5	21	7.2	111	59	9.2	0.04	16	1	0	45	1.2	0		0		1.1	13	4.5	3	69								40	10			
8/28/1970	19.5	21																				1											
9/22/1970	14.5	15																				0										400	
9/22/1970	14	15	7.3	114	61	9.5	0.06	16	1.1	0.1	45	1.2	0.3	0.068	0.03		1.3	12	4.5	5	71								30	0			
11/2/1970	9	15	7.6	117	62	10.9	0	17	1.8	0.2	47	1.1	0	0	0.05		1.2	16	5	4	77								0			88	
11/2/1970	9	16																				0										210	
12/14/1970	3	30	7.4	90	44	12.7	0.01	10	1.2	0.2	30	1.1	0.1	0.02	0.12		1	17	4.4	3	60								190	20			
12/14/1970	3	30																				0										14	
12/14/1970	3	30																															
12/18/1970	1.5	30																				2											
2/2/1971	4	53	7.4	79	40		0.15	11	1	0.2	28		0	0	0.01		0.9	16	4.1	3	56	2							130	10			
3/17/1971	4	57	7.3	76	40	12	0.06	11	1.3	0	32	1	0		0.03		1.4	18	4.5	3.5	61								130	30		14	
3/17/1971	4	57																				2										20	
5/3/1971	7	170																				2										18	
5/4/1971	5.5	154	7.3	60	36	11.9	0.17	8.9	1.2	0	26	1			0		0.7	13	2.5	2	48								10	30			
6/22/1971	16	300	7.8		27	9.6	0	6.1	2.5	0	17	0.4			0		0.5	7.8	4.3	2.5	38								10	60			
6/22/1971	16	300																				9										17	
7/21/1971	18.5	65	8	70	44	8.5	0.1	11	0.4	0.2	30	0.7			0		0.7	11	2.4	3	51								0	10		10	
7/21/1971	18.5	65																					5									14	
9/22/1971	15.5	15	7.7	119	67	9.3	0.13	17	1.4	0.4	46	0.8			0.09		1.2	14	4.5	3.5	76								30	10		10	
9/22/1971	14.5	15																				3											

Appendix 3.4-A Table 1. USGS Water Quality Monitoring in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Sample Date	Temperature (deg C)	Discharge, cubic feet per second	pH, water, unfiltered, field, standard units	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams	Dissolved oxygen, water, unfiltered, milligrams per liter	General Parameters																		Trace Elements			Bacteria																				
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Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200																			
Station 11209900 Kaweah R a Three Rivers CA																																																
11/4/1963		81	7.8	121	63				5.8			47																									0											
8/10/1977	27	20	8	115		8.4																															0.57											
9/27/1977	18	19	7.1	132		9.5																																0.54										
Station 11208620 EF Kaweah R bl Mosquito C nr Hammond CA																																																
7/26/1968	10	14	7.5	135	74	8.5	0.09	24	0.6	0.1	64	1.1	1	0.226	0.04		0.5	7.3	1.6	7	79																0	0										
8/2/1968	10	10																				1																										
8/27/1968	12	9.6	7.7	152	80	7.9	0	27	0.8	0.1	73	1.3	0.1	0.023	0.01		0.7	8.3	2.1	11	90	10																40	10				24					
10/1/1968	7	4.4	7.8	182	104	9.8		31	0.8	0.1	85	1.8	0.8	0.181			0.9	27	2.8	8	124	6																			0	0				4		
10/15/1968	8	8																				1																										
10/29/1968	6	5.4																				1																										
12/7/1968	2	7.4																				2																										
1/18/1969	2	10																				1																										
3/25/1969	4	17																				11																										
4/22/1969	4	96																				24																										
5/21/1969	5	280																				32																										
6/18/1969	7	205																				9																										
7/29/1969	10	116																				3																										
8/25/1969	15	41																				2																										
10/14/1969	5	9.4	7.9	149	84	10.8	0.01	27	0.6	0.2	73	1.3	0		0		0.6	8.8	2	6	88	2																			0	20						
12/8/1969	1	8.9	7.9	168	92		0	30	0.8	0.1	82	1.6	0.1	0.023	0.04		0.7	9.2	2.4	7	97	2																			30	10						
1/20/1970	4	23	7.4	126	70		0.09	22	0.5	0.2	60	1.2	0.5	0.113	0.02		0.8	8	1.8	7	76	3																										
3/11/1970	2	12	7.7	145	78	10.3	0	25	1.2	0	68	1.3	0.1	0.023	0.06		0.7	9.3	2.2	9	87	1																										
4/28/1970	1	31	7.9	123	68	10.9	0.01	22	0.4	0	59	1	0		0.19		0.5	7.9	1.8	5	72	2																										

Appendix 3.4-A Table 1. USGS Water Quality Monitoring in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Sample Date	Temperature (deg C)	Discharge, cubic feet per second	pH, water, unfiltered, field, standard units	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams	Dissolved oxygen, water, unfiltered, milligrams per liter	General Parameters																			Trace Elements			Bacteria	
							Ammonia, water, filtered, milligrams per liter as NH4	Calcium, water, filtered, milligrams per liter	Chloride, water, filtered, milligrams per liter	Fluoride, water, filtered, milligrams per liter	Hardness, water, milligrams per liter as calcium carbonate	Magnesium, water, filtered, milligrams per liter	Nitrate, water, filtered, milligrams per liter	Nitrite, water, filtered, milligrams per liter as nitrogen	Orthophosphate, water, filtered, milligrams per liter	Phosphorus, water, filtered, milligrams per liter as phosphorus	Potassium, water, filtered, milligrams per liter	Silica, water, filtered, milligrams per liter as SiO2	Sodium, water, filtered, milligrams per liter	Sulfate, water, filtered, milligrams per liter	Dissolved solids, water, filtered, sum of constituents, milligrams per liter	Suspended sediment concentration, milligrams per liter	Organic carbon, water, filtered, milligrams per liter	Alkalinity, water, filtered, infection, milligrams per liter as calcium carbonate	Boron, water, filtered, micrograms per liter	Iron, water, filtered, micrograms per liter	Manganese, water, filtered, micrograms per liter	Total coliforms, M	Fecal coliforms, M	
Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200
5/20/1970	5	144	6.9	68	32	9.8	0	12	0.6	0	32	0.4	0.7	0.158	0.1		0.4	5	1	5	41					30	0		2	
5/20/1970	5	140																				10								
6/30/1970	6	62	7.6	77	38		0.04	13	0.4	0.2	35	0.6	0.2	0.045	0.07		0.4	5	1.1	5	45					0	20		8	2
6/30/1970	6	60																				0								
8/3/1970	13	18	7.2	124	65	8.6	0.01	21	0.3	0.2	56	1	0.1	0.023	0.01		0.6	7.3	1.7	6	70	1				70	0		56	
8/28/1970	12.5	9.9	7.4	150	83			26	0.6	0.1	70	1.3					0.7	9.6	2.2	5	87	1				90	10			
8/29/1970	12			150			0.01						0.2	0.045	0														118	13
8/29/1970	13		8.3	152			0.22						0.1	0.023	0														13	1
8/29/1970	14.5		8	151		7.8	0.18						0		0														111	3
8/30/1970	12.5		8.3	154		8.8	0						0.2	0.045	0.12														107	10
8/30/1970	12.5		8.3	152		8.2	0						0.1	0.023	0														50	1
8/30/1970	14.5		8.3	156		7.6	0						0.8	0.181	0.17														73	1
8/31/1970	11.5			156			0						0.2	0.045	1.3														98	9
8/31/1970	11.5			153			0						0.2	0.045	0														121	3
9/21/1970	11	5.6	7.6	197	112	8.6	0	36	0.7	0.1	96	1.6	0.1	0.023	0.01		0.8	7.5	2.4	8	112					50	0		140	
9/21/1970	11	5.6																				1								
11/2/1970	5.5	5.4	8	190	104	10.2	0.03	33	1	0	90	1.7	0.1	0.02	0.03		0.8	9.7	2.8	8	108	0				0	0		15	
12/29/1970	0.5	7.7	7.6	163	88	10.2	0	26	0.6	0.1	71	1.5	0.2	0.05	0.01		0.7	8.7	2.5	8	91					140	0		6	
12/29/1970	0.5	7.7																												
2/1/1971	4	13	7.7	141	72	11.2	0.13	25	0.8	0.1	62		0.4	0.09	0.01		0.6	8.2	2.6	7	79					90	0			
2/1/1971	4	13																				1								
3/16/1971	5	22	7.6	133	68	9.7	0.15	25	0.7	0	68	1.4	0.885	0.2	0		0.9	9.5	2.4	6.3	81					0	20		8	
3/16/1971	5.5	22																				1								
5/11/1971	7	43	8.3	116	70	9.6	0.17	20	0.9	0	56	1.5			0.03		0.7	8.8	1.6	6	75					0	20		24	

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Sample Date	Temperature (deg C)	Discharge, cubic feet per second	pH, water, unfiltered, field, standard units	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams	Dissolved oxygen, water, unfiltered, milligrams per liter	General Parameters																				Trace Elements			Bacteria		
							Ammonia, water, filtered, milligrams per liter as NH4	Calcium, water, filtered, milligrams per liter	Chloride, water, filtered, milligrams per liter	Fluoride, water, filtered, milligrams per liter	Hardness, water, milligrams per liter as calcium carbonate	Magnesium, water, filtered, milligrams per liter	Nitrate, water, filtered, milligrams per liter	Nitrite, water, filtered, milligrams per liter as nitrogen	Orthophosphate, water, filtered, milligrams per liter	Phosphorus, water, filtered, milligrams per liter as phosphorus	Potassium, water, filtered, milligrams per liter	Silica, water, filtered, milligrams per liter as SiO2	Sodium, water, filtered, milligrams per liter	Sulfate, water, filtered, milligrams per liter	Dissolved solids, water, filtered, sum of constituents, milligrams per liter	Suspended sediment concentration, milligrams per liter	Organic carbon, water, filtered, milligrams per liter	Alkalinity, water, filtered, infection, milligrams per liter as calcium carbonate	Boron, water, filtered, micrograms per liter	Iron, water, filtered, micrograms per liter	Manganese, water, filtered, micrograms per liter	Total coliforms, M	Fecal coliforms, M			
Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200		
5/11/1971	7	43																				1										
6/24/1971	8	86	7.8	65	31	9.6	0	11	2	0	30	0.5		0.03		0.4	5.2	0.8	4.5	40						10	10					
6/24/1971	8	86																				9										
7/7/1971	8		7.2	85	39	9.1	0.08				40			0.03																		
8/9/1971	14.5		6.7	135	58	8	0.14				58			0.15																		
9/7/1971	8		7.1	130	76	9	0.01				80			0.06																		
9/21/1971	8	6.7																				2										
9/28/1971	4.5		7.4	185	85	9.7	0.03				90			0.03																		
10/27/1971	5.5		7	170	84	9.7					90																					
10/27/1971	5.5						0.17							0.15																		
1/5/1972	0		7.4	175	80	11.2																										
1/5/1972	0						0.05							0																		
3/1/1972	2		7.4	150	72	11					72																					
3/1/1972	2						0.1							0.03																		
5/1/1972	7		7.1	88	42	8.7					46																					
5/1/1972	7						0.01							0																		
6/21/1972	7.5	20	6.2	95	41	9.5					45																					
6/21/1972	7.5		8.1	95	53		0.13	16	0.4	0	43	0.8		0		0.3	6	0.9	5.3	56					20	30						
7/25/1972	15		6.8	150	68	7.9					74																					
7/25/1972	15						0.06							0.03																		
9/6/1972	13		8.2	125	64	8.6					62																					
9/6/1972	13						1.7							0.03																		
10/17/1972	7		7.7	180	90	10					90																					
10/17/1972	7						0.05							0																		

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Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200	
5/8/1973	5													0																
6/19/1973														0																
9/24/1973	10													0.09																
Station 11208625 EF Kaweah R a Seq Natl P Bndry nr Hammond CA																														
8/2/1968	14	10																												
8/27/1968	15	6.9	7.7	138	74	8.7	0	24	0.3	0.1	65	1.2	0.1	0.023	0		0.7	9.5	2.4	7	81	1					40	10		60
10/1/1968	8	5.7	7.7	162	90	9.9	0	26	0.8	0.1	72	1.6	0.7	0.158	0.05		1	11	3.3	7	96	2					20	0		44
10/29/1968	6	6.5																				1								
10/29/1968	6.2	6.4	7.9	169	98	10.7	0.02	30	0.8	0.1	82	1.6	0.3	0.068	0.08		0.8	11	3.3	5	101						0	0		27
3/26/1969	2	30																				14								
5/29/1969	9	528	6.8	49	23	11.4	0.05	8.2	0.3	0	22	0.4	0.4	0.09	0.03		0.5	5.4	0.9	3	30	88					10	10		1
7/30/1969	10	155	6.5	56	28	10.8	0.04	9.1	0.2	0.1	24	0.5	0.1	0.023	0		0.4	5.4	0.5	3	33	4					0	20		7
8/25/1969	13	39																				4								
8/25/1969	13	40	7.5	85	44	9.9	0.04	14	0.2	0	38	0.8	0.1	0.023	0.04		0.5	7.2	1.3	4	50						0	0		26
10/15/1969	5	13	7.9	125	70	11.7	0.05	22	0.7	0.1	60	1.2	0.1	0.023	0.56		0.7	10	2.3	5	76	2					0	20		
12/8/1969	1	9.2	7.6	138	74	12.5	0	23	0.8	0.1	64	1.4	0.1	0.023	0.05		0.8	11	2.8	6	82	1					10	40		2
1/19/1970	3	39	7.1	86	43			14	1.8	0.2	38	0.9	0				0.7	9.7	2	5	55	7					0	20		7
3/9/1970	2	22	7.5	112	62	11.1	0.18	19	1.2	0	52	1	0		0.45		0.8	11	2.4	6	73	1					0	40		2
4/21/1970	1	39	7.6	97	50		0	16	0.4	0	44	0.8	0.3	0.068	0.02		0.5	10	2	5	60	1					0	10		1
5/19/1970	8	232	6.8	57	26	10.2	0	9.9	0.3	0	26	0.4	0.5	0.113	0.05		0.4	5.7	1	4	35	13					0	10		3
6/29/1970	11	69																				0								
6/29/1970	11	67	7	69	34		0.04	12	0.4	0.2	32	0.5	0.2	0.045	0.07		0.4	6.2	1.2	4	42						0	20		
8/4/1970	12	20	7.5	113	60		0.01	19	0.4	0.1	52	1	0.2	0.045	0		0.7	8.6	1.9	5	67	1					80	0		74
8/29/1970	12	12	7.1	135	74		0.04	23	0.6	0.1	62	1.2	0		0		0.8	10	2.3	5	79	0					40	10		22

Appendix 3.4-A Table 1. USGS Water Quality Monitoring in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Sample Date	Temperature (deg C)	Discharge, cubic feet per second	pH, water, unfiltered, field, standard units	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams	Dissolved oxygen, water, unfiltered, milligrams per liter	General Parameters																				Trace Elements			Bacteria	
							Ammonia, water, filtered, milligrams per liter as NH4	Calcium, water, filtered, milligrams per liter	Chloride, water, filtered, milligrams per liter	Fluoride, water, filtered, milligrams per liter	Hardness, water, milligrams per liter as calcium carbonate	Magnesium, water, filtered, milligrams per liter	Nitrate, water, filtered, milligrams per liter	Nitrite, water, filtered, milligrams per liter as nitrogen	Orthophosphate, water, filtered, milligrams per liter	Phosphorus, water, filtered, milligrams per liter as phosphorus	Potassium, water, filtered, milligrams per liter	Silica, water, filtered, milligrams per liter as SiO2	Sodium, water, filtered, milligrams per liter	Sulfate, water, filtered, milligrams per liter	Dissolved solids, water, filtered, sum of constituents, milligrams per liter	Suspended sediment concentration, milligrams per liter	Organic carbon, water, filtered, milligrams per liter	Alkalinity, water, filtered, infection, milligrams per liter as calcium carbonate	Boron, water, filtered, micrograms per liter	Iron, water, filtered, micrograms per liter	Manganese, water, filtered, micrograms per liter	Total coliforms, M	Fecal coliforms, M		
Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200		
9/22/1970	8	7.2	7.9	147	82	10	0.03	25	0.7	0	68	1.4	0		0.01		0.8	8.3	2.7	6	85				50	0		100			
9/22/1970	8	9.2																				1									
11/2/1970	5	7.4	7.8	164	88	10.9	0.06	28	1	0.2	76	1.5	0.1	0.02	0.03		0.8	11	3	7	96	0			0	0		13			
12/15/1970	1	12																													
12/15/1970	1	12	7.5	136	72	12.2	0.04	21	0.6	0.1	58	1.3	0.3	0.07	0.01		0.7	11	2.5	7	79				120	20		25			
12/15/1970	1	12																				0									
2/2/1971	2	22	7.5	109	56	13.1	0.13	19	0.8	0.2	48		0.3	0.07	0.01		0.8	10	2.6	5	66				110	10					
2/2/1971	2	22																				2									
4/2/1971	3	45	7.8	100	56	11.9	0.1	17	0.8	0	46	0.9	0.885	0.2	0		0.9	10	2.2	4.3	65	2			10	20		2			
5/12/1971	5	60	7.7	90	51	10.9	0.23	15	1	0	42	1.2			0		0.6	10	1.6	3.8	59	1			10	20		16			
6/24/1971	14	118	8	60	31	9.3	0	9.3	1.5	0	26	0.7			0		0.4	6	1	5.8	40				0	20		0			
6/24/1971	14	118																				8									
7/20/1971	13.5	36																				2									
7/20/1971	13.5	36	8.4	84	53	8.9	0.06	14	0.9	0.3	38	0.7			0.03		0.1	7.9	1.4	1.3	53				10	10		180			
9/21/1971	9	8.4	7.8	152	89	9.6	0.17	26	1.1	0.3	69	1			0.09		0.7	11	2.7	5.5	93				30	10		4300			
9/21/1971	9	8.4																				1									
Station 11209500 NF Kaweah R a Kaweah CA																															
6/12/1980	12.8		7.2	46		9.9		6.2	0.5	0	19	0.9					0.011	0.7	13	2.4	0.2	39				0	30	M			
7/10/1980	17		7.6	89		9		13	1	0.2	39	1.7					0.005	1	19	4	1.1	66				50	M				
8/6/1980	23.5	37	8	121		7.6		16	1.5	0.2	49	2.1					0.014	1.2	21	4.8	1.1	85				20	M				
9/10/1980	23	27	8.1	157		7.7		19	3.4	0.1	58	2.5					0.002	1.5	21	5.2	7.3	95				10	M				
10/8/1980	20.9	14	8.1	151		8.2		22	2.8	0.1	68	3.1					0.007	1.9	21	5.8	2.6	108				80	M				
Station 11206500 MF Kaweah R nr Potwish Camp (river flow only) CA																															
6/12/1980	11.5	700	7.3	18		10.6		2.1	0.3	0	7	0.4					0.01	0.4	6.2	1	0.5	16				M	10	M			

Appendix 3.4-A Table 1. USGS Water Quality Monitoring in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Sample Date	Temperature (deg C)	Discharge, cubic feet per second	pH, water, unfiltered, field, standard units	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams	Dissolved oxygen, water, unfiltered, milligrams per liter	General Parameters																				Trace Elements			Bacteria				
							Ammonia, water, filtered, milligrams per liter as NH4	Calcium, water, filtered, milligrams per liter	Chloride, water, filtered, milligrams per liter	Fluoride, water, filtered, milligrams per liter	Hardness, water, milligrams per liter as calcium carbonate	Magnesium, water, filtered, milligrams per liter	Nitrate, water, filtered, milligrams per liter	Nitrite, water, filtered, milligrams per liter as nitrogen	Orthophosphate, water, filtered, milligrams per liter	Phosphorus, water, filtered, milligrams per liter as phosphorus	Potassium, water, filtered, milligrams per liter	Silica, water, filtered, milligrams per liter as SiO2	Sodium, water, filtered, milligrams per liter	Sulfate, water, filtered, milligrams per liter	Dissolved solids, water, filtered, sum of constituents, milligrams per liter	Suspended sediment concentration, milligrams per liter	Organic carbon, water, filtered, milligrams per liter	Alkalinity, water, filtered, infection, milligrams per liter as calcium carbonate	Boron, water, filtered, micrograms per liter	Iron, water, filtered, micrograms per liter	Manganese, water, filtered, micrograms per liter	Total coliforms, M	Fecal coliforms, M					
Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200					
7/10/1980	12.5	435	7.3	19		10		2.1	0.2	0.1	7	0.4							0.003	0.4	6.1	1.3	1.4	18					20	M				
8/6/1980	17.5	155	7.1	23		9		2.4	0.3	0.3	7	0.3							0.01	0.5	6.4	1.3	0.3	17					< 10	M				
9/11/1980	14	6.6	7	48		8.9		4.8	0.9	0.1	14	0.6							0.001	1.1	12	2.7	6.1	38					< 10	M				
10/8/1980	13.6	28	7.1	60		9.3		6.4	1.5	0.1	20	1							0	1.2	14	3.8	0.8	47					10	M				
Station 11206820 Marble Fork Kaweah R ab Horse C nr Lodgepole CA																																		
12/20/2012			6.9					1.17	0.35		3.34	0.099							0.234	4.53	0.83	0.62	10			1.33	3							
1/17/2013	1.7		6.9					0.988	0.21		2.81	0.084							0.194	4.43	0.86	0.58	9			0.95	3							
2/14/2013	1.5		6.8					0.926	0.15		2.65	0.081							0.195	4.5	0.7	0.57	9			1.05	3							
3/13/2013			6.8					0.772	0.11		2.19	0.063							0.179	4.2	0.51	0.42	8			1.45	2.7							
4/3/2013	5		6.8					0.753	0.09		2.14	0.063							0.167	3.89	0.54	0.34	8			1.26	2.5							
4/18/2013	2		6.7					0.698	0.08		1.99	0.061							0.156	3.6	0.46	0.33	7			1.23	2.4							
5/2/2013	9		6.5					0.579	0.06		1.66	0.051							0.14	2.74	0.37	0.25	6			1.04	1.8							
5/9/2013	6		6.6					0.666	0.08		1.91	0.059							0.147	3.23	0.46	0.26	6			1.28	2.3							
5/16/2013	3		6.6					0.531	0.06		1.52	0.048							0.124	2.55	0.36	0.24	5			0.92	1.9							
5/22/2013			6.6					0.564	0.05		1.61	0.05							0.124	2.72	0.35	0.23	5			0.82	2							
6/6/2013	11		6.6					0.647	0.04		1.84	0.054							0.138	2.73	0.38	0.27	6			0.69	2.5							
6/20/2013	12		6.8					1.3	0.06		3.81	0.139							0.186	3.76	0.68	0.39	9			0.69	3.6							
7/11/2013			6.7					1.57	0.14		4.45	0.13							0.277	5.27	1.04	0.49	13			0.53	6							
7/29/2013	14.5		7.1					1.83	0.17		5.17	0.149							0.358	5.96	1.16	0.67	15			0.59	6.9							
8/22/2013	12		7.3					2.35	0.21		6.64	0.19							0.454	6.88	1.7	0.84	18			0.53	8.7							
9/10/2013	11		7.2					2.29	0.2		6.45	0.18							0.443	7.26	1.63	0.91	19			0.58	9.3							
10/22/2013	4		7.1					2.17	0.34		6.12	0.174							0.449	6.66	1.58	0.87	18			0.62	8.5							
11/19/2013	3		6.9					2.23	0.48		6.31	0.18							0.409	6.07	1.52	0.88	17			0.23	7.4							
12/17/2013	5		6.8					1.95	0.57		5.52	0.158							0.376	5.14	1.3	0.89	16			0.49	5.6							

Appendix 3.4-A Table 1. USGS Water Quality Monitoring in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Sample Date	Temperature (deg C)	Discharge, cubic feet per second	pH, water, unfiltered, field, standard units	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams	Dissolved oxygen, water, unfiltered, milligrams per liter	General Parameters																	Trace Elements			Bacteria				
							Ammonia, water, filtered, milligrams per liter as NH4	Calcium, water, filtered, milligrams per liter	Chloride, water, filtered, milligrams per liter	Fluoride, water, filtered, milligrams per liter	Hardness, water, milligrams per liter as calcium carbonate	Magnesium, water, filtered, milligrams per liter	Nitrate, water, filtered, milligrams per liter	Nitrite, water, filtered, milligrams per liter as nitrogen	Orthophosphate, water, filtered, milligrams per liter	Phosphorus, water, filtered, milligrams per liter as phosphorus	Potassium, water, filtered, milligrams per liter	Silica, water, filtered, milligrams per liter as SiO2	Sodium, water, filtered, milligrams per liter	Sulfate, water, filtered, milligrams per liter	Dissolved solids, water, filtered, sum of constituents, milligrams per liter	Suspended sediment concentration, milligrams per liter	Organic carbon, water, filtered, milligrams per liter	Alkalinity, water, filtered, infection, milligrams per liter as calcium carbonate	Boron, water, filtered, micrograms per liter	Iron, water, filtered, micrograms per liter	Manganese, water, filtered, micrograms per liter	Total coliforms, M	Fecal coliforms, M		
Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200		
1/16/2014			6.8					1.94	0.38			5.51	0.162						0.329	6.02	1.45	0.91	16		0.37	6.9					
2/11/2014	1		6.5					1.18	0.32			3.35	0.096						0.224	4.93	1.03	0.94	11		1.3	2.6					
3/11/2014	8		6.9					1	0.23			2.82	0.077						0.23	5.02	0.81	0.61	10		1.68	2.7					
4/1/2014	0		6.1					0.782	0.16			2.22	0.065						0.168	4.14	0.65	0.49	8		1.41	2.5					
4/15/2014	6		6.4					0.64	0.13			1.8	0.049						0.175	3.46	0.48	0.37	7		1.6	2					
5/1/2014	9		6.6					0.576	0.09			1.64	0.05						0.161	3.31	0.44	0.31	6		1.39	2					
5/7/2014	5		6.2					0.566	0.1			1.62	0.051						0.136	3.06	0.4	0.3	6		1.34	2					
5/13/2014	9		6.3					0.531	0.12			1.51	0.045						0.133	2.87	0.36	0.29	5		1.31	1.6					
5/22/2014			6.8					0.562	0.1			1.61	0.049						0.131	2.78	0.38	0.27	6		1.61	2.2					
6/3/2014	9		6.3					0.604	0.1			1.71	0.049						0.136	2.54	0.37	0.26	5		1.02	2.1					
6/23/2014	12		6.4					1	0.13			2.81	0.075						0.178	4.02	0.69	0.41	9		0.52	3.7					
7/17/2014	15.5		7.1					1.59	0.15			4.47	0.123						0.314	5.25	1.06	0.66	13		0.44	6.3					
7/29/2014	10		6.9					1.86	0.19			5.24	0.146						0.369	5.7	1.25	0.71	15		0.46	7.1					
8/20/2014																															
8/21/2014	12		7.1					2.1	0.24			5.92	0.164						0.36	5.37	1.43	0.74	15		0.6	7.6					
9/10/2014	10		7.1					2.41	0.27			6.83	0.198						0.461	7.18	1.84	1	18		0.63	7.2					
10/14/2014	7							2.36	0.33			6.71	0.199						0.469	7.21	1.76	1.02			0.23						
11/13/2014	6							1.7	0.45			4.78	0.131						0.313	5.07	1.11	0.69			1.39						
12/13/2014	0.5							1.05	0.41			2.96	0.083						0.206	4.58	0.84	0.66			1.5						
1/13/2015	1							1.08	0.24			3.06	0.088						0.198	5.1	0.87	0.62			0.93						
2/17/2015																										1.52					
3/17/2015	5							0.76	0.11			2.14	0.059						0.153	3.93	0.72	0.35									
3/31/2015	7																														
6/12/1980	10	445	7.2	15		10.8		2	0.7	0		7	0.4						0.006	0.4	6.3	1.1	1	17					M	20	

Appendix 3.4-A Table 1. USGS Water Quality Monitoring in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Sample Date	Temperature (deg C)	Discharge, cubic feet per second	pH, water, unfiltered, field, standard units	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees	Bicarbonate, water, unfiltered, fixed endpoint (pH 4.5) titration, field, milligrams	Dissolved oxygen, water, unfiltered, milligrams per liter	General Parameters																			Trace Elements			Bacteria	
							Ammonia, water, filtered, milligrams per liter as NH4	Calcium, water, filtered, milligrams per liter	Chloride, water, filtered, milligrams per liter	Fluoride, water, filtered, milligrams per liter	Hardness, water, milligrams per liter as calcium carbonate	Magnesium, water, filtered, milligrams per liter	Nitrate, water, filtered, milligrams per liter	Nitrite, water, filtered, milligrams per liter as nitrogen	Orthophosphate, water, filtered, milligrams per liter	Phosphorus, water, filtered, milligrams per liter as phosphorus	Potassium, water, filtered, milligrams per liter	Silica, water, filtered, milligrams per liter as SiO2	Sodium, water, filtered, milligrams per liter	Sulfate, water, filtered, milligrams per liter	Dissolved solids, water, filtered, sum of constituents, milligrams per liter	Suspended sediment concentration, milligrams per liter	Organic carbon, water, filtered, milligrams per liter	Alkalinity, water, filtered, infection, milligrams per liter as calcium carbonate	Boron, water, filtered, micrograms per liter	Iron, water, filtered, micrograms per liter	Manganese, water, filtered, micrograms per liter	Total coliforms, M	Fecal coliforms, M	
Applicable Water Quality Objective or Standard	NS	NS	6.5-8.5	NS	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	250	2	NS	NS	45	1	NS	NS	NS	NS	NS	250	500	NS	NS	>20	NS	300	50	NS	200	
Station 11208000 Marble F Kaweah R (R only) a Potwisha Camp CA																														
7/10/1980	10.5	243	7.1	19		10.1		1.9	0.1	0.1	6	0.4				0	0.3	5.7	1	0.9	16						20	M		
8/6/1980	17	65	7.2	30		8.6		3.2	0.5	0.2	10	0.6				0.01	0.4	6.6	1.1	2	20						10	M		
9/10/1980	15	1.6	7.5	68		9.1		8.6	0.6	0.1	28	1.7				0.001	1	14	2.4	3.3	47						< 10	M		
10/8/1980	15.2		7.6	109		9.3		13	0.7	0	44	2.8				0	1.2	17	3.2	0.8	71						< 10	M		

See Table 4-2 for the sources of the applicable water quality standards and objectives.

NS = no standard

APPENDIX 3.4-B

Summary of Water Quality Data Collected by the National Park Service Water Resources Division in the Vicinity of the Kaweah Project and in the Kaweah Watershed (data obtained from the EPA STORET Database)

Appendix 3.4-B Table 1. Water Quality Data Collected by the California Environmental Data Exchange Network (CEDEN) in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Station ID	Activity Start	Temperature, deg C	pH	Specific Conductance, uS/cm	Dissolved Oxygen, ug/l	General Parameters			Bacteria		
						Ammonia as N, mg/l	Kjeldahl nitrogen, mg/L	Secchi Depth, m	E. coli, MPN/100ml	Fecal Coliform, MPN/100 ml	Total Coliform, MPN/100 ml
Applicable Water Quality Objective or Standard		NS	6.5-8.5	NS	Meet or exceed 5.0 for WARM; 7.0 for COLD	1.5	NS	NS	NS	100	NS
Kaweah River - Ash Mountain											
245006	4/16/2002 13:47	7.8							2	2	110
245006	6/11/2002 11:30	13.4	8.3	21.5	10.65				8		50
245006	9/9/2002 12:50	20.3	8.3	91.7	9.09	0.0234					
245006	12/17/2002 11:25	5.8	8.6	38.7	10.2	ND	0.17				
245006	3/25/2003 12:00	9.6	8	43.3	11.28	0.0044	0.12				
Kaweah River - Dinely Rd.											
245619	4/16/2002 13:19	8.3	7.8	35.9	11.4				30	2	
245619	6/11/2002 12:00	15.2	8.3	31.5	10.6				4	4	50
245619	9/9/2002 12:15	19.8	8.3	107.4	8.56	0.0052	0.15				
245619	12/17/2002 12:00	7.5	8.6	46	10.09	0.0053	0.37				
245619	3/25/2003 12:21	30	8.2	53	11.1	0.0096	0.11				
Kaweah River - North Fork											
247159	4/16/2002 12:54	9.1	8	38	11.54				23	23	70
247159	6/11/2002 12:25	16.2		34.7	10.52				4	4	22
247159	9/9/2002 11:50	20.6	8.3	112.1	9.25	0.0041	0.14		4	13	30
247159	12/17/2002 13:00					0.011	0.3				
247159	12/17/2002 13:00	12.9	8.3	58.7	10.7	0.0216	0.12		13	50	80

NS: No standard; ND: no detection

Appendix 3.4-B Table 2. Water Quality Data Collected by the Department of Water Resources in the Vicinity of the Kaweah Project (Measurements that exceed the applicable water quality objective or standard are highlighted in green).

Station ID	Activity Start	General Parameters		
		pH	Temperature, water, deg C	Specific conductance, uS/cm
Applicable Water Quality Objective or Standard		6.8-8.5	NS	NS
KAWEAH R A THREE RIVERS				
C2125000	5/6/1998 14:45	7.2	10	62
C2125000	5/14/2003 10:30	7.3	12	47
C2125000	10/22/2003 10:15	7.9	17	135
KAWEAH R AB LK KAWEAH				
C2121030	5/6/1998 12:00	7.5	18	105
C2121030	5/14/2003 12:00	7.2	14	59
C2121030	10/22/2003 14:15	8.1	20	143
KAWEAH R MF BL NO 2 IT NR THREE R				
C2314700	5/6/1998 14:00	7	10	53
C2314700	5/13/2003 15:30	7.3	13	45
C2314700	10/22/2003 8:15	7.5	16	117
KAWEAH R SF AB GROUSE C				
C2420150	5/6/1998 13:15	7.2	10	66
C2420150	5/14/2003 9:00	7.3	9	52
C2420150	10/22/2003 11:30	7.9	16	180
KAWEAH R,NF,NR MOUTH				
C2201030	5/6/1998 15:30	7.7	0.1	84
C2201030	5/13/2003 16:30	7.6	16	71
C2201030	10/22/2003 9:30	7.6	16	193

NS: No standard

APPENDIX 3.4-C

**Summary of Water Quality Data Collected by Three Rivers Community Services
District in the Vicinity of the Kaweah Project**

Appendix 3.4-C Table 1. Water Quality Data Collected by Three Rivers Community Services District in the Vicinity of the Kaweah Project (measurements that exceed the applicable water quality objective or standard are highlighted in green).

Month	Date	Sampling Location and Parameter Sampled															
		R1 - Buckeye/ Gateway		R2 - Dinely Bridge		R3 - North Fork (airport bridge)		R4 - South Fork (198 bridge)		R5 - Slick Rock		R6 - Main Fork		R7 - Hwy 198/ NF Bridge		R8 - South Fork/District Boundary	
		Total Coliform ¹	Fecal Coliform ¹	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform	Total Coliform	Fecal Coliform
Jan	1/27/14	>200.5	<1.1	>200.5	4.4	>200.5	200.5	>200.5	15.0	>200.5	16.8	>200.5	8.4	>200.5	17.4	>200.5	16.8
Feb	2/24/14	>200.5	3.1	>200.5	2.0	>200.5	47.8	>200.5	56.0	>200.5	19.2	>200.5	28.8	>200.5	17.8	>200.5	56.0
Mar	3/24/14	2.1	1.1	17.8	11.4	94.5	200.5	144.5	36.4	30.6	3.1	>200.5	13.7	>200.5	19.7	>200.5	32.4
Apr	4/21/14	69.7	6.4	>200.5	9.0	>200.5	25.4	>200.5	27.1	>200.5	11.1	>200.5	8.7	>200.5	15.0	>200.5	8.7
May	5/26/14	>200.5	9.9	>200.5	16.4	>200.5	40.6	>200.5	45.3	>200.5	23.8	>200.5	28.8	>200.5	19.2	>200.5	47.8
Jun	6/23/14	149.5	1.0	144.5	8.7	>200.5	53.1	>200.5	30.6	>200.5	21.7	>200.5	12.4	>200.5	9.9	>200.5	17.8
Jul	7/28/14	>200.5	22.2	>200.5	25.4	>200.5	45.3	>200.5	118.4	>200.5	13.7	>200.5	17.8	>200.5	47.8	>200.5	12.7
Aug	8/25/14	165.0	9.9	>200.5	12.4	>200.5	27.1	>200.5	109.1	>200.5	12.2	>200.5	13.7	>200.5	22.2	>200.5	9.4
Sept	9/22/14	>200.5	20.7	>200.5	3.1	>200.5	11.1	>200.5	73.8	>200.5	12.4	>200.5	8.7	>200.5	3.0	>200.5	62.4
Oct	10/27/14	>200.5	36.4	>200.5	25.4	>200.5	73.8	>200.5	69.7	>200.5	15.0	>200.5	12.4	>200.5	22.2	>200.5	114.2
Nov	11/24/14	>200.5	25.4	>200.5	155.2	>200.5	53.1	>200.5	101.3	>200.5	62.4	>200.5	78.2	>200.5	62.4	>200.5	118.2
Dec	12/22/14	129.8	2.0	>200.5	22.2	>200.5	17.8	>200.5	144.5	>200.5	69.7	>200.5	38.4	>200.5	28.8	>200.5	165.2

¹ Applicable Water Quality Objective or Standard: Fecal coliform: 200 MPN/100 ml; Total coliform: no standard; green shading indicates that the water quality objective is exceeded