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List of Acronyms

BMI	benthic macroinvertebrates
BLM	Bureau of Land Management
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CFP	California Fully Protected Species
CFR	Code of Federal Regulations
°C	degrees Celsius
cfs	cubic feet per second
CNDDDB	California Natural Diversity Database
Commission	Federal Energy Regulatory Commission
CSC	California Species of Special Concern
DPS	distinct population segment
EPA STORET	Environmental Protection Agency STORage and RETrieval
ESA	Endangered Species Act
°F	degrees Fahrenheit
FC	Federally Candidate
FE	Federally Endangered
FERC	Federal Energy Regulatory Commission
FPD	Federally Proposed for Delisting
FPE	Federally Proposed Endangered
FPT	Federally Proposed Threatened
FT	Federally Threatened
FYLF	foothill yellow-legged frog
IFIM	Instream Flow Incremental Methodology
msl	mean sea level
MYLF	mountain yellow-legged frog
Project	Kaweah Project
RM	river mile
SCE	Southern California Edison Company
SE	State Endangered
ST	State Threatened

List of Acronyms (continued)

USFWS	U.S. Fish and Wildlife Service
Watershed	Kaweah River Watershed
WPT	western pond turtle

3.5 FISH AND AQUATIC RESOURCES

This section describes fish and aquatic resources in Kaweah River Watershed (Watershed), including the streams (bypass reaches) associated with 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)(iv). In addition, this section describes rare, threatened, and endangered aquatic resources associated with the Project. The FERC content requirements for this information are specified in 18 CFR Chapter I § 5.6 (d)(3)(vii). A description of terrestrial resources associated with the Project, including rare, threatened and endangered terrestrial species is included in Section 3.6 Botanical and Wildlife Resources.

3.5.1 Information Sources

The information presented in this section was developed by reviewing data and reports available from Southern California Edison Company (SCE) and from various resource agency files and websites, including:

- Aquatic Species and Habitat Study (SCE 2007);
- Benthic Macroinvertebrates below Hydropower Dams (Rehn 2009);
- Bureau of Land Management (BLM) Designated Sensitive Species;
- California Department of Fish and Wildlife (CDFW) website (www.wildlife.ca.gov);
- CDFW California Wildlife website (www.dfg.ca.gov/biogeodata);
- CDFW California Natural Diversity Database (CNDDDB);
- Early Water Temperature Data Collection SCE 2014-2015;
- FERC website (www.ferc.gov);
- Fish Population and Water Temperature Studies – 1986 and 1987 (FERC 1991);
- Impact study of the Kaweah No. 3 Hydroelectric Facility on Sequoia National Park (Jordan/Avent et al. 1983, as cited in SCE 2007); and
- Periodic point measurements of water temperature data at various locations available from Environmental Protection Agency STOrage and RETrieval (EPA STORET) on-line databases.

3.5.2 Overview of Aquatic Resources

The following provides an overview of the water temperature, aquatic habitat, fish community, benthic macroinvertebrates (BMI), algae, and amphibians and aquatic reptiles that occur in the Watershed. This subsection also provides detailed information on special-status aquatic species known to occur or potentially occurring in the Watershed. The Watershed boundary, FERC Project facilities, and associated river reaches are shown in Maps 3.2-1 to 3.2-3.

3.5.2.1 Water Temperature

The distribution of aquatic species is directly related to water temperature. Water temperature in the Kaweah River and in the East Fork Kaweah River varies with elevation and season. Water temperature is cold in the upper elevation portions of the Watershed and transitions to warm, particularly in the summer, in the lower elevation portions of the Watershed where the Project is located.

The sources for water temperature data in the Watershed include periodic point measurement water temperature data at various locations recorded in the EPA STORET on-line databases (see Appendix 3.4-B, Table B-3 and Map 3.4-1); water temperature studies conducted in 1989 in the Kaweah River and East Fork Kaweah rivers in the vicinity of the Kaweah No. 1 and No. 2 diversions (FERC 1991); and recent water temperature data loggers installed in July 2014 and currently being operated by SCE at seven locations in the vicinity of the Project (Table 3.5-1; Map 3.4-2). Two air temperature stations were also installed as part of SCE's recent study – one on the Kaweah River near the Kaweah No. 2 Diversion Dam, and the other on the East Fork Kaweah River near the Kaweah No. 1 Diversion Dam (Map 3.4-1).

Kaweah River

In the Kaweah River upstream of the Project (i.e., Marble or Middle fork of the Kaweah River), water temperature during the summer was generally below 70 degrees Fahrenheit (°F) (21 degrees Celsius [°C]) (see Appendix 3.4-B, Table B-3 and Map 3.4-1) (and much cooler in the winter). Water temperature studies conducted in 1989 (in the vicinity of the Kaweah No. 1 and No. 2 diversions) (FERC 1991) found that water temperatures were relatively warm during the summer $\geq 70^{\circ}\text{F}$ (21°C). The highest water temperatures were observed during the late summer low-flow period when air temperatures were warmest (FERC 1991). The warm temperatures occurred naturally during the late summer when water diversion for power generation was not occurring due to low inflows. As fall air temperatures cooled, river water temperatures also decreased.

Recent temperature data (2014/2015) in the vicinity of the Project show that at the upstream boundary of the Project, near river mile (RM) 8.8 (1,390 feet above mean sea level [msl]) monthly average water temperatures (2014) exceeded 70°F during July, August, and September (Figures 3.5-1 and 3.5-2). Farther downstream, average monthly water temperature exceeded 73°F in the bypass reaches (Figure 3.5-2). Figure 3.5-1 shows the temporal distribution of water temperature between late July 2014 and April 2015. Water temperatures in the bypass reaches did not fall below 70°F until late September. The warm summer temperature period (2014) corresponded to a time when air temperatures were high, stream flows were very low, and no generation was occurring (Figure 3.5-1).

East Fork Kaweah River

Water temperature in the East Fork Kaweah River is naturally cooler than water temperature in the Kaweah River due to the river originating at a higher elevation in the Watershed (Figure 3.5-1). As shown in Figure 3.5-2, at the upstream temperature monitoring location located above the Kaweah No.1 Diversion Dam (2,600 feet above msl) average monthly water temperature was between about 65°F and 70°F during the summer (2014). However, the downstream sampling station (1,300 feet above msl), located near the confluence of the East Fork Kaweah River and Kaweah River, followed a similar water temperature pattern to that in the Kaweah River in the vicinity of the confluence in which mean monthly water temperatures were 70°F, or greater, July, August, and September and did not fall below 70°F until late September (Figures 3.5-2 and 3.5-3).

3.5.2.2 Aquatic Habitat

River Channel

The Kaweah River from Kaweah No. 2 Diversion Dam downstream has a relatively steep gradient, 3%, and the habitat is dominated by pools (73%) and runs and step pools (23%). Pools were deep, with an average depth greater than four feet (SCE 2007). Overall, the river reach is dominated by bedrock and large to small boulders.

Detailed habitat mapping data is not available in the East Fork Kaweah River downstream of the Kaweah No. 1 Diversion Dam. However, the river channel is narrower and steeper than the Kaweah River (5% gradient versus 3%) and based on a helicopter reconnaissance flight and aerial photography interpretation conducted in 2014/2015, the channel is similarly dominated by pool habitat and bedrock and boulder substrate. Additional information related to gradient and general channel geomorphology in both the Kaweah and East Fork Kaweah rivers is provided in Section 3.8 Geomorphology.

Upstream Fish Passage Barriers

In addition to the Project diversions that create upstream fish passage barriers (Kaweah No. 2 Diversion, Kaweah No. 1 Diversion), there are numerous natural barriers to upstream fish movement. Field surveys and habitat mapping (SCE 2007) in the Kaweah River identified two medium severity barriers (not passable at low flows) downstream of the Kaweah No. 2 Diversion; and two impassable barriers (at any flow) and several high severity barriers (potentially impassable even at high flows) upstream of the Kaweah No. 2 Diversion (between the Kaweah No. 2 Diversion and the Middle and Marble forks of the Kaweah River confluence). Numerous natural barriers exist upstream of the Project in the Marble and Middle forks of the Kaweah River in addition to several man-made barriers (Marble Fork Diversion, Marble Fork Siphon, and Middle Fork Diversion).

Ground surveys for fish barriers have not been conducted on the East Fork Kaweah River. The Kaweah No. 1 Diversion creates an upstream barrier to fish movement.

Helicopter reconnaissance surveys in the East Fork Kaweah River upstream and downstream of the Kaweah No. 1 Diversion indicate that many natural barriers to upstream fish passage exist. The river reach is very steep (5%) and many large chutes and drops exist in the channel.

Instream Flow Habitat Modeling

An Instream Flow Incremental Methodology (IFIM) study was conducted on the East Fork and Kaweah rivers by SCE (Table 3.5-2) (FERC 1991). The study used methods acceptable at the time, however, a detailed review of the study (habitat suitability criteria, number of cross-sections, hydraulic modeling, habitat weight factors, etc.) would be required to determine its present applicability. The instream flow modeling was used to develop habitat area versus flow relationships. The study only developed relationships for rainbow trout (*Onchorynchus mykiss*). Because rainbow trout are relatively rare and various other species are present in the lower elevation bypass reaches due to high temperature in these streams, the relationships may have limited applicability.

3.5.2.3 Fish Community

The bypass reaches associated with the Project are located within the Sacramento-San Joaquin Province and the Central Valley subprovince (Moyle 2002). These river reaches support primarily warmwater fishes (pikeminnow-hardhead-sucker assemblage; Moyle 2002) with trout present in some areas. The warmwater fish assemblage is characteristic of lower elevation west slope Sierra river habitat that exhibits low summer/fall streamflows and high water temperatures ($\geq 70^{\circ}\text{F}$) (FERC 1991). The species assemblage either requires temperatures $\geq 70^{\circ}\text{F}$ for a large portion of the year and/or is tolerant of high temperatures. Conversely, trout require coldwater habitat that seldom exceeds 70°F (Hokanson et al. 1977; Moyle 2002). Coldwater habitat is present only upstream of the Kaweah No. 2 Diversion on the Kaweah River (and immediately downstream and upstream of the Kaweah No. 1 Diversion on the East Fork Kaweah River).

The dominant warmwater fishery that exists in the bypass reaches associated with the Project is composed of Sacramento sucker (*Catostomus occidentalis*), California roach (likely Central California roach [*Lavinia symmetricus symmetricus*]), Sacramento pikeminnow (*Ptychocheilus grandis*), sculpin (*Cottus* spp.) (likely prickly sculpin [*Cottus asper*] found in lower elevation streams and/or riffle sculpin [*Cottus gulosus*] found in higher elevation streams), and smallmouth bass (*Micropterus dolomieu*) (FERC 1991). A potential exists for hardhead (*Mylopharodon conocephalus*) to occur in the river reaches, although none have been positively identified to date (FERC 1991; SCE 2007). Other species that have the potential to occur within the Watershed include speckled dace (*Rhinichthys osculus*), tule perch (*Hysterocarpus traskii*), and Sacramento perch (*Archoplites interruptus*). Introduced species such as green sunfish (*Lepomis cyanellus*) are also likely present (Moyle 2002). In the coldwater immediately downstream of Kaweah No. 1 Diversion on the East Fork Kaweah River, both rainbow trout and brown trout (*Salmo trutta*) are present (FERC 1991; SCE 2007). There are no anadromous,

catadromous, or migratory fish in the Project vicinity (note: some seasonal movement of species may occur). Table 3.5-3 describes known fish species and potential fish species in the vicinity of the Project by location.

Kaweah River

Recent fish sampling data on the Kaweah River indicate that the fish population is dominated by warmwater fishes (Table 3.5-4) (SCE 2007). Historical sampling indicated that a relatively high percent of trout (43% near the Kaweah No. 2 Diversion) were present historically (FERC 1991) (Table 3.5-4). However, this sampling occurred at a time when trout were being stocked in the reach (FERC 1991). Water temperature data then and now indicate that the river is too warm to support a self-sustaining trout population. Trout may seasonally (e.g., during the winter) move downstream into the reach, but warm summer temperatures would typically result in mortality of these fish.

East Fork Kaweah River

Historical sampling data immediately above and below the Kaweah No. 1 Diversion indicate that the fish population was dominated by rainbow trout (FERC 1991). Current data does not exist, but based on the historical water temperature data, it is expected that presently trout would be the dominate species in the upstream reach near the diversion, and that lower in the East Fork Kaweah River, the species assemblage would be dominated by warmwater fishes similar to what occurs presently below the Kaweah No. 2 Diversion on the Kaweah River.

3.5.2.4 Benthic Macroinvertebrates

BMI inhabit the sediment or live on the bottom substrates of rivers and streams. Generally, aquatic invertebrate fauna of the Sierra Nevada is numerous, diverse, and includes many endemic species (Erman 1996). The status or health of BMI communities is typically measured and compared in a relative sense using various metrics (species richness, diversity, abundance, pollution tolerance of individuals, etc.) that are combined or used individually as numerical indices (Rehn 2009). The relative value of metrics at one site are compared to metrics at another site.

BMI surveys were conducted by SCE (2007) on the Kaweah River, and the Marble and Middle forks of the Kaweah River. The study compared the 2007 findings to those from the 1983 study by Jordan/Avent et al. (1983). Data collected from the 2007 BMI surveys were analyzed following the methods described in *Measuring the Health of California Streams and Rivers* (Harrington & Born 2000, as cited in SCE 2007). Study selected indicator species included mayflies (*Baetis* sp.), caddisflies (*Hydropsyche* sp.), blackflies (*Simulium* sp.) and non-biting midges (several families of *Chironomidae*). Non-insect invertebrates were also briefly reviewed.

A total of 95 BMI taxa were sampled in the August 2006 surveys (SCE 2007). These included seven species of ticks and mites (*Acari*), one taxa of segmented worms

(*Annelida*), one taxa of round worms (*Nematoda*) and one taxa of flatworms (*Turbellaria*). The remaining 85 taxa were insects (SCE 2007).

The BMI indices did not detect macroinvertebrate community differences in the river reaches. Macroinvertebrate abundance varied substantially among sites surveyed in the study, but no trends were evident in their abundance with regard to Project facilities. While the prior Jordan/Avent et al. (1983) study that was conducted upstream of the Project did find some potential differences (reduced diversity, but increased abundance in some reaches), they also noted that the macroinvertebrate fauna was in “good condition”, with high production and abundance and good diversity, and that “there are no obvious invertebrate indicators of seriously disturbed conditions” (see SCE 2007).

3.5.2.5 Algae

Algae sampling was conducted twice (Jordan/Avent et al. 1983; SCE 2007) in the vicinity of the Project. Jordan/Avent et al. (1983) sampled upstream of the Project in the Kaweah River, and the Marble and Middle forks of the Kaweah river. At the time high concentrations of algae were observed. The SCE (2007) study included sampling locations that overlapped the Jordan/Avent et al. (1983) sampling and also additional sampling near the Kaweah No. 2 Diversion. In the SCE (2007) study algae cover was light, typically less than 25%, in all sampling locations and there were no instances of “nuisance” algae in the sampling areas (dense growths). Didymo (*Didymosphenia geminata*), a well know nuisance algae, was not observed and Cladophora (sp.) which can produce heavy coverages of algae was observed only at one sampling location and abundance was low at that location.

3.5.2.6 Amphibians and Aquatic Reptiles

Based on an inventory from CNDDB and CDFW there are at least six amphibian and aquatic reptiles present or potentially present within the vicinity of the Project: foothill yellow-legged frogs (FYLF) (*Rana boylei*), northern pacific tree frog (*Pseudacris regilla*), western pond turtle (WPT) (*Actinemys marmorata*), California toad (*Bufo boreas halophilus*), bullfrog (*Rana catesbeiana*), and Sierra newt (*Taricha torosa sierra*). Other species may also be present. Detailed studies related to amphibian and aquatic reptiles in the Project vicinity were not found.

3.5.2.7 Special-Status Aquatic Species

For the purpose of this report, special-status aquatic species are defined as aquatic species granted status by federal and state agencies. Federally listed species granted status by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) include federally threatened (FT), federally endangered (FE), federally proposed threatened (FPT), federally proposed endangered (FPE), federal candidate (FC), or federally listed species proposed for delisting (FPD).

State-listed aquatic species, which are granted status by the CDFW under the California Endangered Species Act (CESA), include State threatened (ST), State endangered (SE),

California Fully Protected Species (CFP), and California Species of Special Concern (CSC).

Special-status aquatic species (CDFW 2015a; USFWS 2015) within or potentially present in the Project vicinity include:

- hardhead (potential) – CSC;
- western pond turtle – CSC; and
- foothill yellow-legged frog – CSC.

Special-status aquatic species (CDFW 2015a; USFWS 2015) within the Watershed, but that are likely not present in the Project vicinity due to elevational habitat requirements include:

- mountain yellow-legged frog (MYLF) (*Rana muscosa*) (northern distinct population segment [DPS]) – FE ; and
- Mount Lyell salamander (*Hydromantes platycephalus*) – CSC.

There are no species that are managed by the National Marine Fisheries Service nor has essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act been designated in the vicinity of the Project.

Hardhead could potentially exist within the bypass reaches associated with the Project as suitable habitat for hardhead occurs in the Project vicinity. The Kaweah River from Lake Kaweah upstream to the Kaweah No. 1 Powerhouse is designated as a Central Valley drainage hardhead/pikeminnow stream and a CNDDDB rare natural community (CDFW 2015b). However, to date there have been no positive identifications of hardhead. Hardhead are typically found in undisturbed larger middle- and low-elevation streams. The hardhead elevation range is 32-4,757 feet above msl. Most streams in which they occur have summer temperatures in excess of 20°C. Hardhead prefer clear, deep (>3 feet) pools with sand-gravel-boulder substrates and slow water velocities (<0.8 feet per second). They tend to be absent from streams where introduced species, especially centrarchids, predominate.

WPT are a purely aquatic species and are known to occur within the Watershed. Two CNDDDB occurrences were recorded for WPT in the Watershed, one on the north side of Lake Kaweah at Greasy Creek, approximately six miles downstream of the Kaweah No. 2 Powerhouse, and one on the North Fork above Yucca Creek (Map 3.5-2; CDFW 2015b). WPT are associated with permanent or nearly permanent water in a wide variety of habitat types (CDFW 2015c). Their elevation range extends from near sea level to 4,691 feet above msl (Jennings and Hayes 1994).

There are three historical database occurrences of FYLF in the Watershed (Map 3.5-2). One occurrence each on the South Fork Kaweah River (approximately six miles south of FERC Project facilities), the North Fork Kaweah River (approximately three miles west of FERC Project facilities), and the East Fork Kaweah River near Kaweah No. 1 Diversion

Dam. All sightings were recorded in 1970 (CDFW 2015b). A sensitive wildlife species document (SCE 1989) cites "Graber, Pers. Comm. 1989" indicating that inventories in the Sequoia National Park have shown that FYLF have been extirpated from the park (e.g., possibly as a result of introduced species such as bullfrogs and centrarchid fishes) and that a historic sighting was recorded in 1966 near Hospital Rock (about one and one half miles upstream of the Middle Fork Diversion). FYLF are found in or near rocky streams in a variety of habitats, including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow types (CDFW 2015c). Their elevation range extends from near sea level to 6,364 feet above msl in the Sierra Nevada (Jennings and Hayes 1994).

MYLF occur throughout the higher elevations of the Watershed above the Project (Map 3.5-2). Their elevation range extends from approximately 4,500 feet above msl to about 12,000 feet above msl in the Sierra Nevada (Jennings and Hayes 1994; CDFG 2011). This elevation range is outside of the Project elevation range (e.g., <2,600 feet above msl). There are 19 occurrences documented in the Watershed, which date from August of 1891 through 2001. All occurrences are within the known elevation range for the species except one CNDDDB entry (CDFW 2015a) from 1941 near the confluence of Marble and Middle Fork Kaweah rivers that seems to be errant (Map 3.5-2). The database entry specifies a location and elevation (4,000 feet above msl), but the location identified only has 2,000 feet above msl. MYLF are managed as part of the Northern DPS, which was listed by the USFWS as endangered under the ESA on 6/30/2014 (USFWS 2015). Proposed critical habitat for MYLF is present within the upper elevations of the Marble Fork Kaweah River above the Project and the headwaters of the East Fork and South Fork Kaweah rivers (Map 3.5-2). This species is highly aquatic and is known to travel up to two miles; however, there are no known occurrences of this species within the Project vicinity. MYLF live in high mountain lakes, ponds, marshes and streams at elevations below 12,106 feet above msl. Occupied lentic sites vary widely in habitat conditions, and include lakes in the forested montane zone with conifer-shaded shorelines and abundant downed logs, to lakes above timberline in the alpine zone with exposed rocky shorelines and fringing meadows. In areas where lakes are rare, at lower elevations along the west slope of the Sierra Nevada <6,561 feet above msl, frogs primarily occupy low to high-gradient streams ranging from chaparral to montane zones (CDFG 2011).

Mount Lyell salamander have been observed in the upper reaches of both the Middle and Marble forks of the Kaweah River. Their elevation range extends from approximately 4,133 feet above msl to about 11,942 feet above msl (Jennings and Hayes 1994). This elevation range is outside of the Project elevation range (e.g., <2,600 feet above msl). There are two known occurrences in the Watershed, one approximately 0.9 mile west of Big Bird Lake and one at Silliman's Gap (Map 3.5-2). Throughout their range, populations of Mount Lyell salamander are discontinuously distributed in isolated patches of suitable habitat. Usually common where they occur, individuals are active on the surface only when free water in the form of seeps, drips, or spray is available (CDFW 2015c). This species occurs in massive rock areas in mixed conifer, red fir, lodgepole pine, and subalpine habitats.

3.5.3 References

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TABLES

Table 3.5-1. Kaweah River Drainage Water Temperature Monitoring Locations (2014-2015).

Temperature Monitoring Location	River Mile
Kaweah River	
Three Rivers	2.4
Downstream of Kaweah No. 2 PH	4.8
Downstream of Kaweah No. 1 PH	6.5
Downstream of the Conf. with East Fork Kaweah River	8.3
Near Kaweah No. 3 PH	8.8
East Fork Kaweah River	
Upstream of the Conf. with Kaweah River	0.1
Upstream of Kaweah No. 1 Diversion	4.8

Table 3.5-2. Weighted Usable Area in Relation to Stream Discharge (cfs) for Rainbow Trout in the Kaweah and East Fork Kaweah River.

Kaweah River Below Kaweah No. 2 Diversion				East Fork Kaweah River Below Kaweah No. 1 Diversion			
Flow (cfs)	Weighted Useable Area (sq. ft per 1,000 ft)			Flow (cfs)	Weighted Useable Area (sq. ft per 1,000 ft)		
	Adult	Juvenile	Juvenile		Adult	Juvenile	Fry
1	2800	890	300	1	3940	1500	1500
5	3169	1119	668	2	4242	1832	1160
10	3500	1354	1119	4	4943	2504	797
11	3530	1390	1185	5	5273	2650	650
15	3806	1551	1503	6	5516	2818	518
20	4122	1672	1164	8	6065	3003	412
25	4386	1676	961	10	6588	3069	381
30	4635	1642	899	12	7120	3040	354
35	4825	1593	898	14	7644	2965	330
40	4958	1540	778	16	8154	2871	301
45	5024	1503	704	18	8669	2778	277
50	5055	1469	661	20	9192	2680	259
55	5089	1440	621	22	9679	2601	252
60	5107	1416	564	24	10120	2520	277
65	5117	1398	527	28	10793	2358	324
70	5106	1387	511	32	11181	2239	375
75	5114	1275	526	36	11309	2126	377
80	5162	1361	537	40	11220	2004	373
85	5202	1347	511	44	11124	1926	362
90	5266	1341	542	50	10947	1824	262
95	5313	1342	542				
100	5359	1346	544				

(Source: FERC 1991)

Table 3.5-3. Known (X) and Potential (O) Fish Species by Location.

Species	Bypass Reaches		Other Reaches	
	Kaweah River	East Fork Kaweah River	Middle Fork Kaweah River	Marble Fork Kaweah River
Rainbow trout	X	X	X	X
California roach	X	X	X	X
Riffle sculpin	O	O	O	O
prickly sculpin	O	O	O	O
Sacramento Sucker	X	O	X	X
Hardhead	O	O	O	O
Sacramento pikeminnow	X	O	O	O
Speckled dace	O	O	O	O
Tule perch	O	O	O	O
Brown trout	X	O	X	X
Small mouth bass	O	O	O	O
Green sunfish	O	O	O	O

Table 3.5-4. Historic Fish Populations Sampling Data in the Project Vicinity and Upstream of the Project (FERC 1991; SCE 2007).

Site Name	FERC 1991			SCE 2007		
	Trout (#/mile)	Other (#/mile)	% Trout	Trout (#/mile)	Other (#/mile)	% Trout
Marble Fork Kaweah River						
Abv Marble Fork Diversion (Ab Mbl F Div)	--	--	--	42	0	100
Below Marble Fork Diversion (Bl Mbl F Div)	--	--	--	254	1585	0.138
Middle Fork Kaweah River						
Above Middle Fork Diversion (Ab MF Div)	--	--	--	70	0	100
Below Middle Fork Diversion (Bl MF Div)	--	--	--	224	0	100
Kaweah River						
Below Marble Fork Confluence (KR Bl MF Conf)	--	--	--	271	2857	0.086
Near Tunnel Rock (KR Nr T Rock)	--	--	--	375	6130	0.057
Upstream of Ash Mtn (KR Up S Ash Mt)	--	--	--	120	5736	0.02
Above Kaweah No. 2 Diversion (KR Ab Div 2)	--	--	--	102	4991	0.02
Below Kaweah No. 2 Diversion (KR Bl Div 2)	1225	1626	0.429	61	2784	0.02
Below EF Kaweah R Confluence (KR Bl EF Conf)	437	18258	0.023	--	--	--
Below Kaweah No. 1 PH (KR Bl PH 1)	83	14520	0.005	--	--	--
Kaweah (KR)	0	5452	0	--	--	--
East Fork Kaweah River						
Above Kaweah No. 1 Diversion (EF Ab Div)	2031	53	0.974	--	--	--
Below Kaweah No. 1 Diversion (EF Bl Div)	961	814	0.541	--	--	--

FIGURES

Figure 3.5-1. Kaweah River Diurnal Water Temperature (top) and Daily Average Air and Water Temperature (bottom) (July 2014 through April 2015).

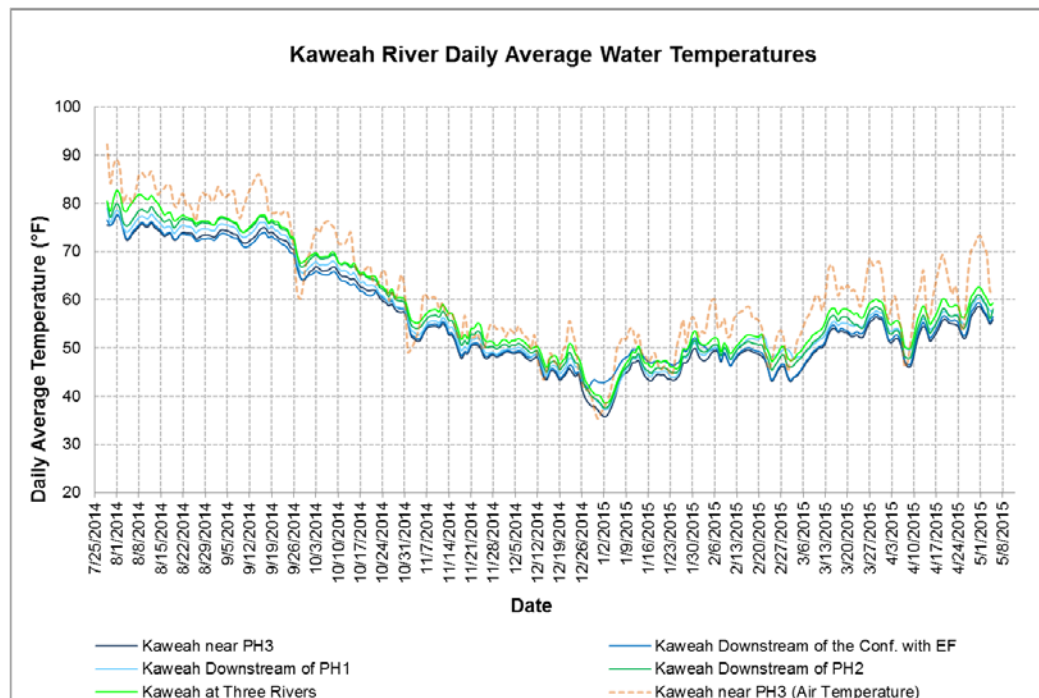
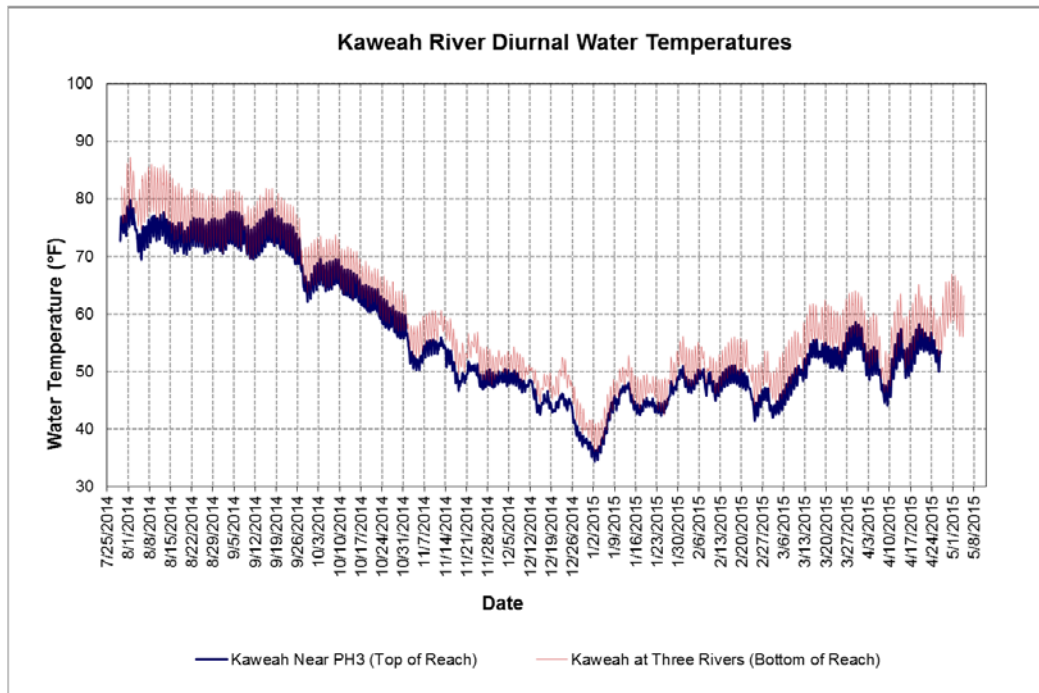


Figure 3.5-2. Longitudinal Trends in 2014-2015 Average Monthly Water Temperature along the East Fork Kaweah River (top) and Kaweah River (bottom).

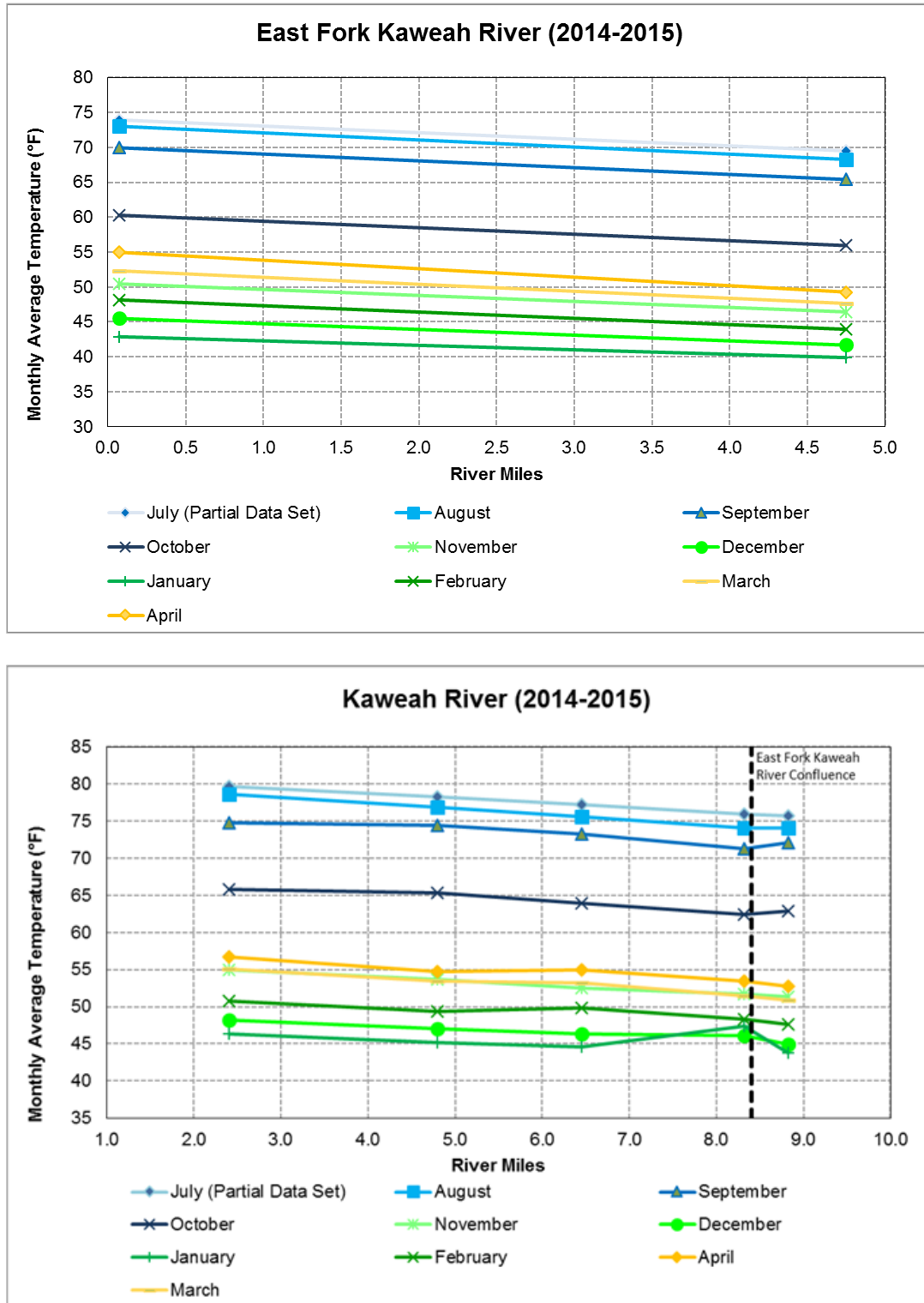
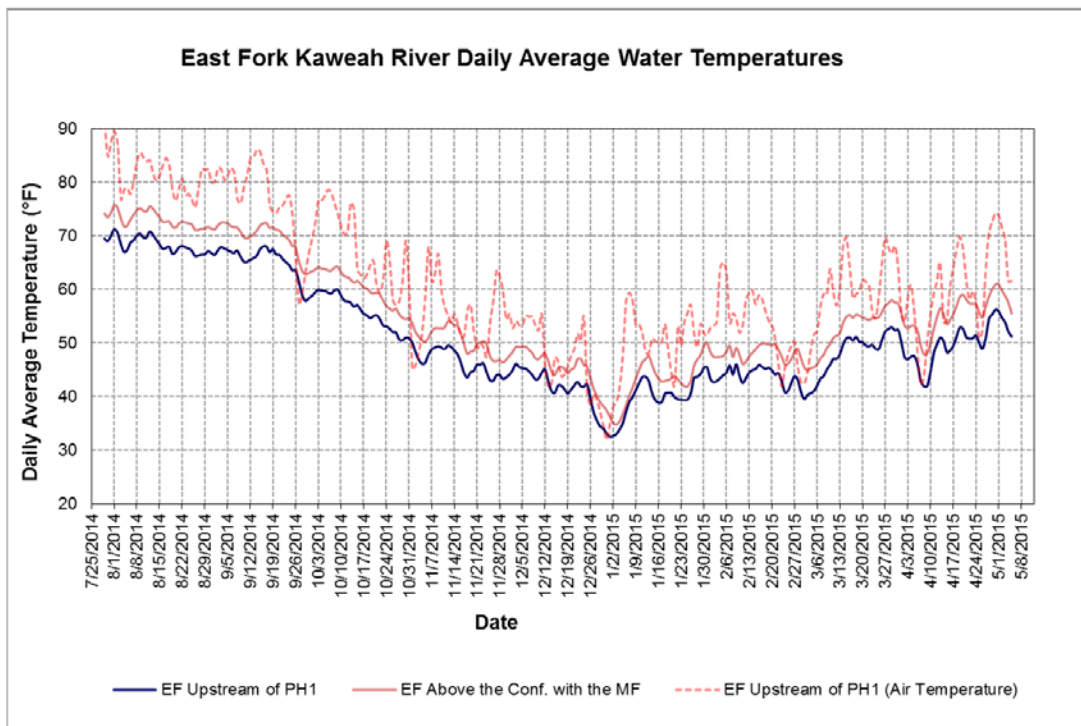
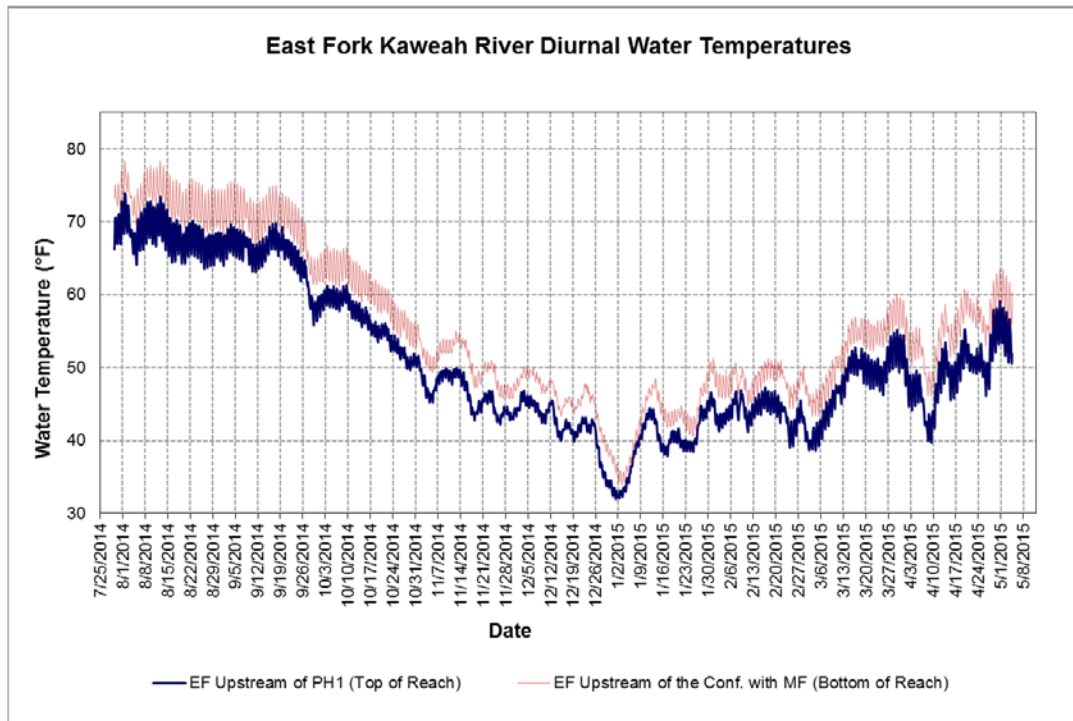
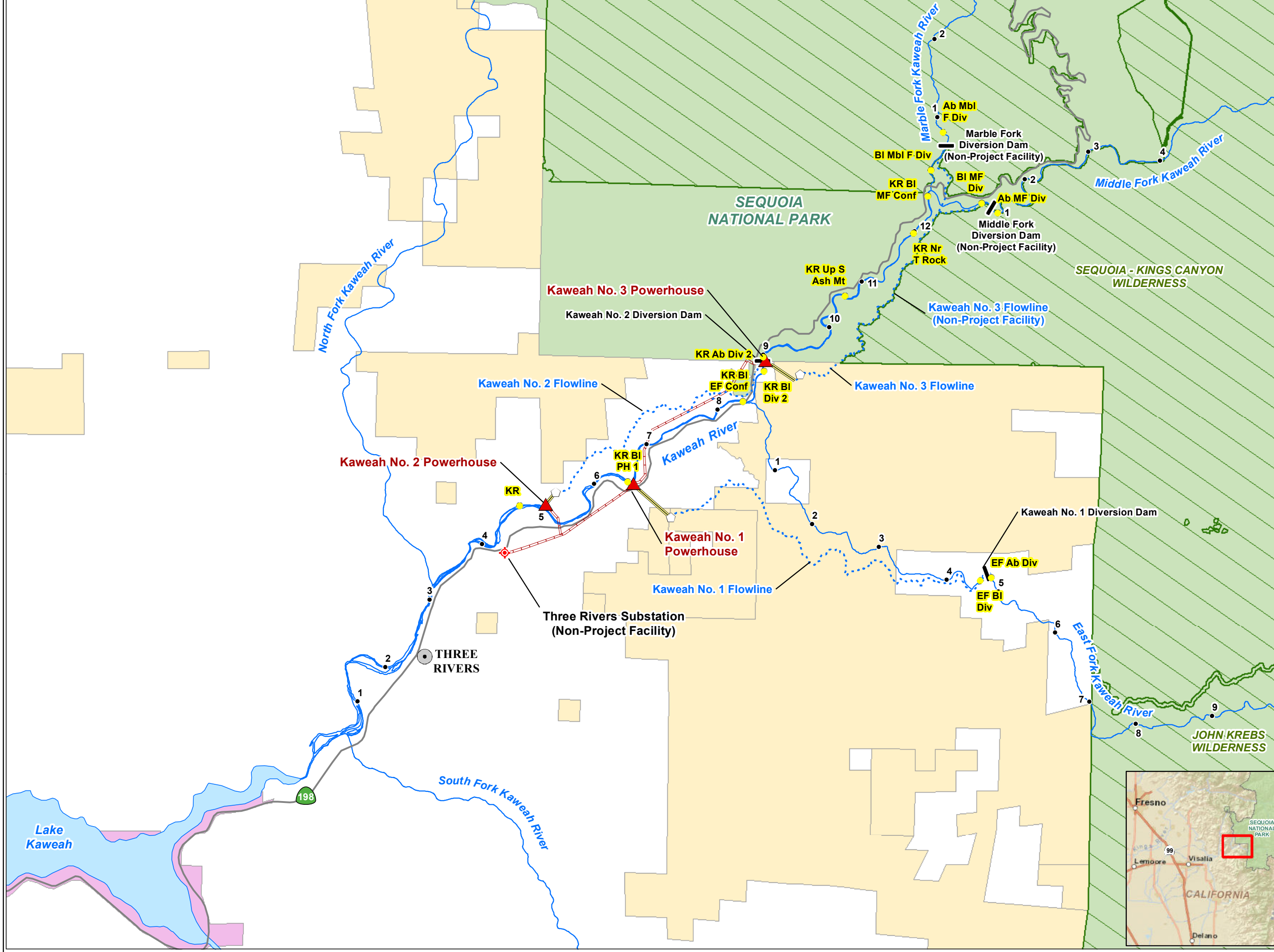


Figure 3.5-3. East Fork Kaweah River Diurnal Water Temperature (top) and Daily Average Air and Water Temperature (bottom) (July 2014 through April 2015).




MAPS



- Facilities**
- Powerhouse
 - Diversion
 - Utility
 - Forebay
 - Flowline
 - Penstock
 - Transmission Line
- Other Features**
- Major City/Town
 - Highway
 - Watercourse
 - Water Body
 - River Mile
- Land Jurisdiction***
- Bureau of Land Management
 - U.S. Army Corps of Engineers
 - National Park Service
 - Private
- Land Management**
- National Wilderness Area
- Aquatics**
- Fish Sampling Location

*SOURCE: BLM 2012




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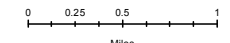
Eastern Hydro Generation

Map 3.5-1

Kaweah Project
Fish Sampling Locations



Date: 8/11/2015



0 0.25 0.5 1
Miles

Projection: UTM Zone 11
Datum: NAD 83

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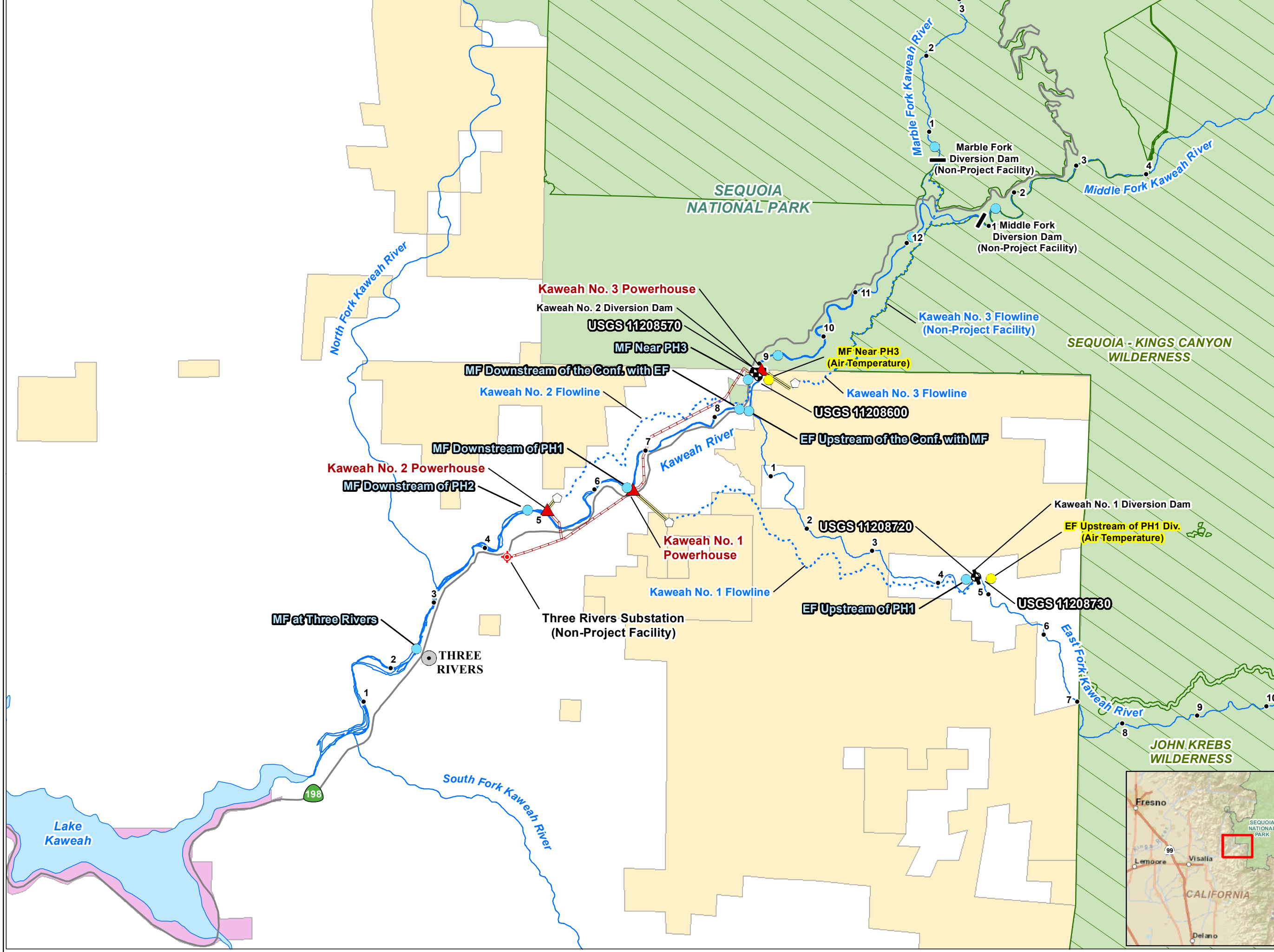
CONFIDENTIAL

MAP

Map 3.5-2. Kaweah Project Special-Status Aquatic Species & Proposed Critical Habitat.


This map contains information about the specific location(s) of special-status biological resources which is considered "confidential". Pursuant to 18 CFR § 385.1112, this map has been removed from this document. Confidential information will not be made available to the public or posted on the Internet.

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- ### Facilities
- Powerhouse
 - Diversion
 - Utility
 - Forebay
 - Flowline
 - Penstock
 - Transmission Line
- ### Other Features
- Major City/Town
 - Highway
 - Watercourse
 - Water Body
 - Flow Gage Locations
 - Water Temperature Monitoring Locations
 - Air Temperature Monitoring Locations
 - River Mile
- ### Land Jurisdiction*
- Bureau of Land Management
 - U.S. Army Corps of Engineers
 - National Park Service
 - Private
- *SOURCE: BLM 2012

- ### Land Management
- National Wilderness Area




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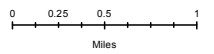
Eastern Hydro Generation

Map 3.5-3

Kaweah Project
Temperature Monitoring and
Flow Gage Locations



Date: 8/11/2015



Miles

Projection: UTM Zone 11
Datum: NAD 83

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