El Dorado Hydroelectric Project

FERC Project No. 184

Water Quality Monitoring Plan

April 2018
Version 4.0

REVISION HISTORY

Page	Description	Date
1	Updated introduction to describe monitoring completed and plan modifications	1/30/18
4	Removed Carpenter Creek and Mill Creek monitoring sites (WQ-7 and WQ-8; WQ-13 and WQ-14) from list of sample locations	4/12/18
4	Updated project area description and identified what sites are monitored every 3 years and what sites are monitored every 6 years	4/12/18
5	Added description of meter calibration to compensate for barometric pressure; replaced total and fecal coliform with E.coli	1/30/18
7	Changed to clarify that reports would be posted on EID's website rather than provided on CD; changed total and fecal coliform to E./coli; changed monitoring frequency to every three years	1/30/18
7	Added statement that monitoring will be performed in 2018 and future monitoring is scheduled to occur every three years at sample sites WQ1 – WQ6 and every six years at the tributary sample sites WQ9 – WQ 12 and WQ15 – WQ20. Added statement that E. coli monitoring will be conducted at sample sites WQ1 – WQ6 and WQ11 – WQ 12	4/12/18

In 2007, the El Dorado Irrigation District (EID or District) developed a water quality monitoring plan (Plan; EID 2007) to satisfy the water quality monitoring requirements as required by conditions of the Federal Energy Regulatory Commission (FERC) license for the El Dorado Hydroelectric Project (Project 184)[1]. Since that time, EID has conducted water quality monitoring in accordance with the Plan in 2008, 2010, 2012, 2014, and 2016 (EID, 2009; EID, 2011; EID, 2013; EID, 2015; EID 2017). The results of these monitoring efforts indicate that water quality objectives are being met, beneficial uses are being protected, and project operations do not adversely affect water quality. This updated Plan, prepared in January 2018, and updated in April 2018, incorporates the following modifications, which were developed in consultation with the U.S. Forest Service (FS), California State Water Resources Control Board (SWRCB), and the Project No. 184 Ecological Resources Committee (ERC):

1. Utilize Escherichia coli (E. coli) as the bacterial indicator in lieu of fecal and total coliform
2. Discontinue monitoring at Carpenter Creek and Mill Creek; monitor all water quality parameters, except E. coli, at the remaining El Dorado Canal tributary locations once every six years; conduct E. coli monitoring at Alder Creek every six years, in coordination with other tributary water quality monitoring
3. Relocate the monitoring site for the South Fork American River upstream of Kyburz Diversion Dam (WQ5)
4. Change frequency of monitoring from every other year to every three years

1.0 Background

The major part of the project area of the Project lies within the South Fork American River portion of the Sacramento River Basin. According to the Central Valley Region Basin Plan (CVRWQCB 1998), the designated beneficial uses for this basin include municipal water supply, power supply, contact recreation, non-contact recreation, canoeing and rafting, warm water fish habitat, coldwater fish habitat, coldwater fish spawning, and wildlife habitat. The designated beneficial uses for Lake Aloha, Silver Lake, and Caples Lake include municipal water supply, irrigation, stock watering, industrial process supply, power production, contact recreation, non-contact recreation, warm water and coldwater fish habitat, coldwater fish spawning, and wildlife habitat. Echo Lake and Echo Creek lie within the Lahontan Basin. The designated beneficial uses of these facilities include municipal water supply, groundwater recharge, navigation, recreation, commercial and sport fishing, coldwater fisheries, wild trout, and fish spawning (LRWQCB 1995).

Management of Project 184 has the potential to affect water quality in the basin and the ability to meet the standards that have been established for each basin. This monitoring plan has been designed to provide information regarding overall water quality in the vicinity of Project 184 (Project), identify potential water quality problems related to the Project, and where the Project

[1] Section 7 of the El Dorado Hydroelectric Project Relicensing Settlement Agreement, U.S. Forest Service 4(e) License Condition No. 37, and the California State Water Resources Control Board Section 401 Clean Water Act Water Quality Certification Condition No. 15

can control such factors, and develop resource measures for the protection, mitigation and enhancement of water quality.

2.0 Study Plan Objectives

1. Characterize water quality under current Project operations by directly monitoring water quality.

2. Determine if water quality objectives of Basin Plans (and other applicable water quality criteria) are met and assess whether designated beneficial uses of Basin Plans are protected. This will ultimately be determined by the SWRCB 401 consultation process.

3. Identify any project-controllable resource measures for the protection, mitigation, and enhancement of water quality.

3.0 Project Area and Sampling Locations

Project No. 184 is located on the South Fork of the American River (SFAR) and its tributaries, and on Echo Creek, a tributary to the Upper Truckee River, in the Counties of El Dorado, Alpine, and Amador, California. Project No. 184 includes four storage reservoirs (Lake Aloha, Echo Lake, Silver Lake, and Caples Lake), a diversion dam near Kyburz and several smaller diversions on tributaries to the SFAR, water conveyance facilities consisting of canals, flumes, siphons, and tunnels, the El Dorado Forebay reservoir, power penstock, and powerhouse.

The following sampling locations shall be monitored every three years beginning in 2018:

WQ1	Echo Creek below Echo Lake Dam
WQ2	Pyramid Creek below Lake Aloha Dam
WQ3	Caples Creek below Caples Lake Dam
WQ4	Silver Fork American River below Silver Lake Dam
WQ5	South Fork American River upstream of Kyburz Diversion Dam and downstream of the confluence with the Silver Fork American River
WQ6	South Fork American River downstream of Kyburz Diversion Dam

The following sample locations shall be monitored every six years beginning in 2018:

WQ9	No Name Creek above No Name Creek Diversion Dam
WQ10	No Name Creek below No Name Creek Diversion Dam
WQ11	Alder Creek above of Alder Creek Diversion Dam
WQ12	Alder Creek below of Alder Creek Diversion Dam
WQ15	Bull Creek above Bull Creek Diversion Dam
WQ16	Bull Creek below Bull Creek Diversion Dam
WQ17	Ogilby Creek above Ogilby Creek Diversion Dam
WQ18	Ogilby Creek below Ogilby Creek Diversion Dam
WQ19	Esmeralda Creek above Esmeralda Creek Diversion Dam
WQ20	Esmeralda Creek below Esmeralda Creek Diversion Dam

Water quality sampling locations are located, to the extent feasible, with water temperature monitoring and/or gaging stations that currently exist as part of the Project or have been required for installation as part of the relicensing agreement. The monitoring locations are provided in Figure 1.

4.0 Data Collection

4.1 Sample In situ Field Parameters

Basic water quality parameters, including temperature, dissolved oxygen, conductivity, and pH will be measured at all general sampling locations using a water analyzer or equivalent multi-sensor probe. This information will be stored in the probe until all sites have been sampled. At that time, all information will be downloaded into a Project database. Probes will be calibrated prior to each field visit according to manufacturer specifications. Additionally, the probe will be calibrated to track changes in the barometric pressure prior to sampling to adjust for changes in elevation. For example, the YSI556 multifunction probe requires venting of the probe to the atmosphere during transport in order to adjust to local barometric pressure conditions. Immediately following sample collection the sampler will document local influences (stream clarity, weather, and other pertinent notes) and take a photo of the sample site to document conditions at the time of sampling. Equipment performance standards will be updated based on a review of current available technology that is economically achievable.

4.2 Laboratory Parameters

For those parameters that cannot be measured while in the field, water samples will be collected using a swing sampler or similar instrument and taken to a certified laboratory for analysis. Those parameters to be analyzed in a laboratory include turbidity, total suspended sediments, alkalinity, hardness (as calcium carbonate), nitrate (measured as nitrate plus nitrite), copper, aluminum, and E.coli (see Appendix A).

The laboratory will provide for each parameter sample, the laboratory's current method detection limit, reporting limit, and practical quantification limit as appropriate. The lab will attempt to obtain, and report detection limits at or below the adjusted maximum regulatory criteria in the Clean Water Act and Environmental Protection Agency standards.

4.3 Sample Handling

All samples will be taken from the riverbank in flowing water (sampler upstream) at each sample location. The date and time that each sample is collected, sampling site, jar number, and other pertinent information will be recorded in the field for each sample. The grab sample jar will be labeled, preserved, stored, and delivered to a State certified water quality laboratory and the contents analyzed using laboratory methods adequately sensitive to detect parameters at or below regulatory criteria levels. Where applicable, samples will be stored per laboratory standard operating procedures. Compliance with laboratory-approved storage procedures and with

maximum holding periods allowed by lab method(s) will be documented, and a chain-of-custody record will be maintained for each sample jar.

Because of the short laboratory holding times of certain parameters, EID and the laboratory will initiate special procedures to ensure that information is not lost due to expiration of the holding times. Constituents with short holding times include certain nutrients (e.g., Nitrate/Nitrite have 48-hour unpreserved holding times) and TSS (7-day holding time). In these instances, the laboratory will be directed either to analyze for the specific parameters immediately upon arrival or to chemically preserve the samples for later analysis. Chemical preservation will only be performed in circumstances where the preservation does not influence the detection limit of the analytical technique. If necessary, preservatives may also be placed into the sample jars prior to collecting the samples. If this preparation occurs, then the samplers will be notified of the jar constituents and any special handling instructions prior to entering the field.

4.4 QA/QC

All samples will be collected, handled and delivered to the lab consistent with specific EPA methods or other approved sampling/handling protocols including but not limited to Standard Methods for the Examination of Water and Wastewater (1998). Appropriate QA/QC methods and documentation will be followed. Field QA/QC methods may vary somewhat by chemical parameters, but certain methods will be uniformly applied to all field sampling. Clean sampling techniques will be applied throughout the sampling effort. All sample bottles will be prepared by a California state-certified laboratory (ELAP). The laboratory will prepare all sample bottles and, where necessary, place the appropriate amount and type of preservative in sample bottles. All field crew members collecting samples will wear gloves to prevent possible sample contamination. The labeled samples will be placed in closed, lightproof coolers filled with ice. Samples will be delivered to the laboratory daily during sampling trips. Iced samples will be delivered to the laboratory within the specified holding time. Quality control in the field will be assured by accurate and thoroughly completed sample labels, field sheets, chain of custody, and sample log forms. Sample labels will include sample identification code, date, time, stream name, sampling location, collector's name, sample type and preservative if applicable. During situations where sampling becomes a safety hazard and accessibility is absent, EID will notify the ERC upon completion of the sampling.

5.0 Reporting

The data collected under the monitoring protocols identified in this plan will be electronically compiled and distributed annually by January 31, to the FS, ERC, and SWRCB. EID will provide annual data updates to the ERC during the annual update meeting, which occurs prior to March 15. A draft annual water quality report will be circulated to the ERC for review and consideration at least two weeks prior to the annual meeting. Based on the results of the annual meeting, EID shall submit an annual report to FS, ERC, SWRCB, and FERC by June 30 of each year. The report shall summarize the results of any ongoing monitoring or study efforts, any changes to be implemented under the license, and a summary of any unresolved issues and

proposed actions to resolve each issue. All ERC members and FS and SWRCB shall have 30 days to review and comment on the draft annual report prior to its submittal to FERC. The final annual report shall be distributed to FS, ERC, and SWRCB after submission to FERC.

The annual report will include the issues addressed, objectives, study area including sampling locations, methods, laboratory reports and QA/QC, analysis, and results. A summary of results will be provided in tabloid format that shall include specific method detection limits for each parameters and analytical data reported. The report will also include relevant graphs depicting the seasonal relationship between DO, temperature, pH, and other parameters as necessary at all locations. Additional graphs will be provided to more clearly demonstrate any changes in specific water quality parameters over time or longitudinal movement of flow through the system. Discussion appropriate to results and supportive of analyses and conclusions will be provided. All reports will be prepared in a format so that they can easily be reviewed by the ERC and filed with the Federal Energy Regulatory Commission (FERC) after approval. E-mail updates of all reporting information will be provided to the ERC and reports will be posted on EID's website. Additionally, EID will coordinate with other agencies to share water quality data or additional important information, where feasible.

6.0 Schedule

Water quality sampling to evaluate changes in water quality associated with changes in the stream flow regime will be completed in the first, third, and fifth years following ERC approval of this plan. If additional sampling is needed after the fifth year, frequency will be determined cooperatively between the SWRCB, USFS, the ERC, and EID. Once sufficient data is obtained to indicate lack of a water quality issue, some parameters and/or sampling locations may be removed from the monitoring program. Water quality monitoring was conducted in 2008, 2010, 2012, 2014, and 2016. Monitoring will be performed in 2018 and future monitoring is scheduled to occur every three years at sample sites WQ1 – WQ6 and every six years at the tributary sample sites WQ9 – WQ 12 and WQ15 – WQ20.

Water quality data will be collected eight times per year. All samples other than E.coli will be collected once each during March, May, June, July, August, September, first storm of the season, and December. E.coli samples will be collected May through September. E.coli samples will be collected no less than five times within a thirty-day period and will capture days with high recreational periods. E. coli monitoring will be conducted at sample sites WQ1 – WQ6 and WQ11 – WQ 12.

Each round of sampling will occur over a two to three day period due to the number of locations, distance between locations, sample location accessibility, and laboratory's ability to process the samples. To the extent practicable, sampling will be conducted concurrent with other monitoring efforts (e.g., water temperature). The sampling schedule will be established at the beginning of each sampling year to maintain consistency.

7.0 Literature Cited

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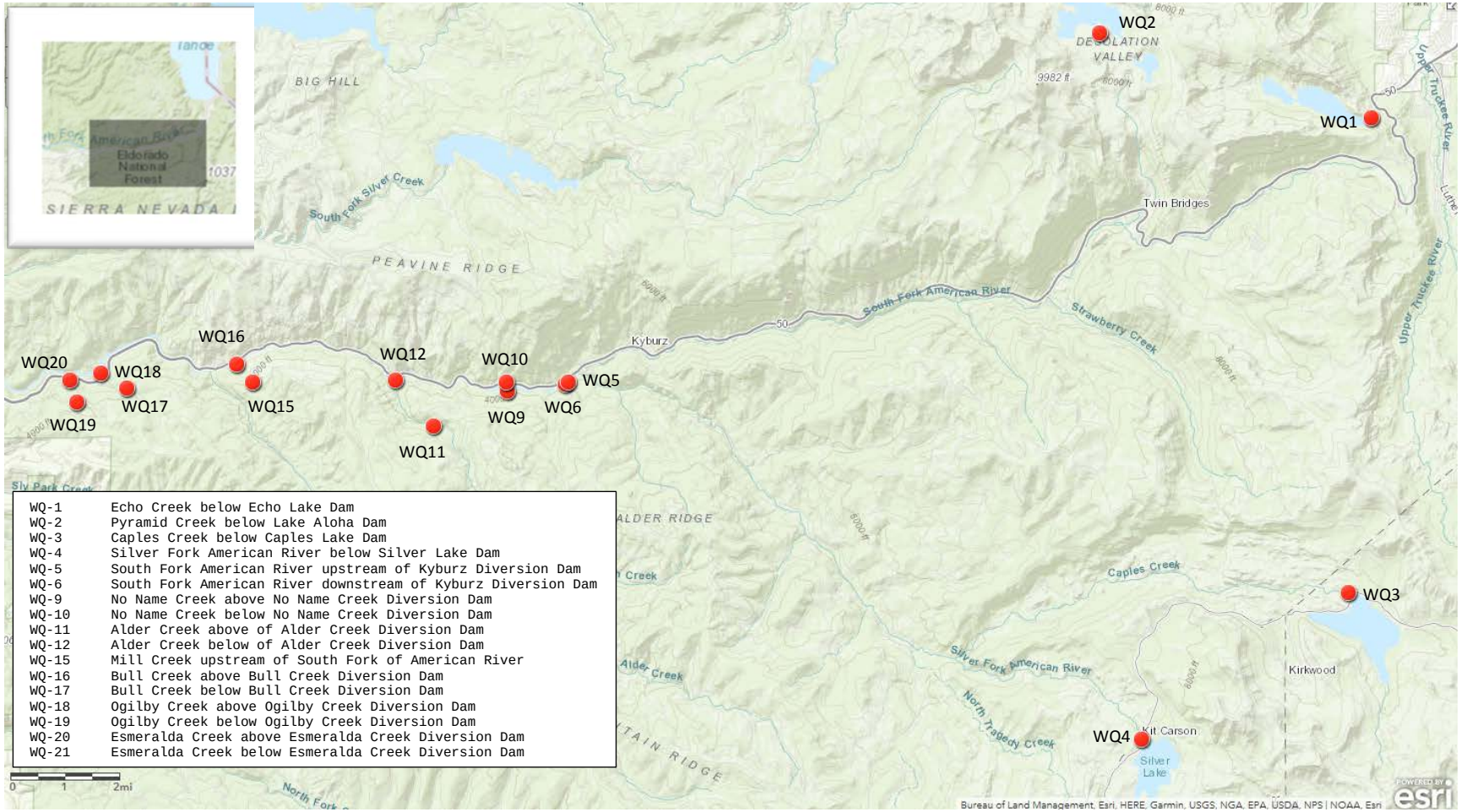
APPENDIX A
Analytical Parameters

Constituent	Units	Detection Limit	Method	Rationale
Temperature	°C	-	Water Analyzer	Indicator of water quality
Dissolved Oxygen	mg/L	0.1	Water Analyzer	Indicator of water quality
Conductivity	µmhos/cm	1	Water Analyzer	Indicator of water quality
pH	Units	-	Water Analyzer	Indicator of water quality
Turbidity	NTU	0.2	Water Analyzer	Indicator of water quality
Total Suspended Sediments	mg/L	1.0	EPA 160.2	Indicator of water quality
Alkalinity	mg/L	5.0	SM 2320 B/ EPA 310.1	Indicator of water quality
Hardness (Calcium Carbonate)	mg/L	1.0	SM 2340C	Indicator of water quality
Nitrate (Nitrate plus Nitrite)	mg/L	0.05	EPA 300.0	Indicator of nutrient loading
Copper	µg/L	1.0	EPA 200.8	Toxic to aquatic species
Aluminum	mg/L	0.05	EPA 200.8	Toxic to aquatic species
E. coli	MPN or cfu	1.0	SM9223	Indicator of water quality

MPN = Most Probable Number
cfu = colony forming units
SM = Standard Methods 20th Edition
EPA = Environmental Protection Agency
mg/L = milligrams per liter
µg/L = micrograms per liter

Note: Methods may be changed based on future approved EPA and Standard Method updates.



WQ-1	Echo Creek below Echo Lake Dam
WQ-2	Pyramid Creek below Lake Aloha Dam
WQ-3	Caples Creek below Caples Lake Dam
WQ-4	Silver Fork American River below Silver Lake Dam
WQ-5	South Fork American River upstream of Kyburz Diversion Dam
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WQ-9	No Name Creek above No Name Creek Diversion Dam
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WQ-11	Alder Creek above of Alder Creek Diversion Dam
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WQ-15	Mill Creek upstream of South Fork of American River
WQ-16	Bull Creek above Bull Creek Diversion Dam
WQ-17	Bull Creek below Bull Creek Diversion Dam
WQ-18	Ogilby Creek above Ogilby Creek Diversion Dam
WQ-19	Ogilby Creek below Ogilby Creek Diversion Dam
WQ-20	Esmeralda Creek above Esmeralda Creek Diversion Dam
WQ-21	Esmeralda Creek below Esmeralda Creek Diversion Dam

Figure 1. Water Quality Monitoring Locations