

STUDY DESCRIPTION WR-1

Water Quality Study

August 5, 2026

This Study Description is developed to inform information gaps identified by Calaveras County Water District (CCWD) for the relicensing of its North Fork Stanislaus River Hydroelectric Project (Project).¹

This Water Quality Study (Study) is intended to address all pertinent water quality parameters except for water temperature, which is addressed in relicensing study WR-2, *Water Temperature Model of Project-Affected Reaches and in New Spicer Meadow Reservoir*.

STUDY AREA

The Study Area includes the following reservoirs/impoundments and river reaches:

- Reservoirs/Impoundments
 - New Spicer Meadow Reservoir
- River Reaches
 - North Fork Stanislaus River (NFSR) downstream of the North Fork Diversion Dam to the confluence of Highland Creek
 - Highland Creek and NFSR downstream of New Spicer Meadow Dam to McKays Point Diversion Dam
 - NFSR from McKays Point Diversion Dam to confluence with Collierville Powerhouse Tailrace
 - Beaver Creek downstream of beaver Creek Diversion Dam
 - Stanislaus River upstream and within Collierville Powerhouse Tailrace

STUDY METHODS

The Study will be performed in six steps: 1) collect water quality samples; 2) collect dissolved oxygen data; 3) collect bacteria samples; 4) perform laboratory analyses; 5) quality assurance/quality control (QA/QC) review; and 6) reporting. Each of these steps is described below.

¹ In addition to the details provided in this study description, study implementation will also follow the "*Concepts and Practices Applicable to All Relicensing Studies*" developed by CCWD.

Step 1: Collect Water Quality Samples

Water quality parameters are listed in Table 1.²

Table 1. Water quality sampling parameters and laboratory methods (USEPA 2017).

Parameter/Constituent	Methods
<i>In Situ</i>	
Temperature	<i>Field (in situ)</i>
Dissolved oxygen	<i>Field (in situ)</i>
pH	<i>Field (in situ)</i>
Specific conductance	<i>Field (in situ)</i>
Secchi disk	<i>Field (in situ)</i>
General Chemistry	
Total organic carbon	EPA 415.1
Dissolved organic carbon	EPA 415.1 D
Total alkalinity	EPA 310.1
Turbidity	EPA 180.1
Calcium	EPA 200.7
Hardness	EPA 130.1
Total dissolved solids	EPA 160.1
Total suspended solids	EPA 160.2
Nutrients and Productivity	
Nitrate+Nitrite-N	EPA 300.0
Total ammonia-N	EPA 350.3
Total Kjeldahl nitrogen	EPA 351.3
Orthophosphate	EPA 365.3
Total phosphorous	EPA 365.3
Chlorophyll-a	EPA 445.0
Metals	
Arsenic (total and dissolved)	EPA 200.8
Cadmium (total and dissolved)	EPA 200.8
Chromium, Total (total and dissolved)	EPA 200.8
Copper (total and dissolved)	EPA 200.8
Iron (total and dissolved)	EPA 200.8
Lead (total and dissolved)	EPA 200.8
Mercury (total)	EPA 200.8
Methylmercury (total and dissolved)	EPA 200.8

² Neither CCWD nor the Project operator conduct cloud seeding (i.e., inject silver iodide or dry ice into the atmosphere) in the basin.

Table 1. (Continued).

Parameter/Constituent	Methods
Metals (continued)	
Nickel (total and dissolved)	EPA 200.8
Selenium (total)	EPA 200.8
Silver (total and dissolved)	EPA 200.8
Zinc (total and dissolved)	EPA 200.8

Samples in stream reaches will be collected from flowing water just below the surface. In New Spicer Meadow Reservoir, samples will be collected at two depths: within the hypolimnion and just below the surface in the epilimnion. In the event the reservoir is mixed at the time of sampling, samples will be collected from just below the surface and approximately 5 feet from the bottom (Table 2). Samples will be collected from the locations listed in Table 2 once in the fall. Sampling will occur when New Spicer and Collierville powerhouses are operational.

Table 2. Water quality sample locations.

Location	River Mile	Sample Depth
New Spicer Meadow Reservoir; near Intake	18.4	Surface
		Bottom
Highland Creek below New Spicer Meadow Reservoir Dam	5.6	Surface
North Fork Stanislaus River below North Fork Diversion Dam	32.6	Surface
North Fork Stanislaus River above McKays Point Diversion Dam	9.0	Surface
North Fork Stanislaus River below McKays Point Diversion Dam	7.9	Surface
Beaver Creek below Beaver Creek Diversion Dam	3.4	Surface
Stanislaus River above Collierville Powerhouse Tailrace	1.0	Surface
Stanislaus River in the Collierville Powerhouse Tailrace	0.5	Surface

In Situ Sampling

A multi-parameter water quality meter (e.g., HydroLab, YSI, or similar instrument) will be used to collect the *in situ* measurements. Pre- and post-sampling calibration checks of the water quality meter following the manufacturer instructions will be conducted on-site for each day of sampling. Any calibration variances will be noted on the field data sheet and in the data summary, and recalibration or repair done, as necessary. CCWD will note relevant conditions during each sampling event on the field data sheet (e.g., air temperature; flow, if available at a nearby gage; description of sampling location; floating material; evidence of oil and grease; and activities in the vicinity of the sampling site that could cause short-or long-term alterations to water quality, such as dredging).

Laboratory Samples

Each sample to be delivered to a laboratory will be collected into laboratory-supplied clean containers. Water samples to be analyzed for metals will be taken using “clean hands” methods consistent with the United States Environmental Protection Agency’s (EPA’s) Method 1669 sampling protocol *Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria* (EPA 1995).

All sample containers will be labeled with the date and time that the sample is collected, sampling site or identification label, and handled in a manner consistent with appropriate chain-of-custody protocols. The sample container will be preserved as appropriate, stored and delivered to a State of California-certified water quality laboratory for analyses in accordance with maximum holding periods for each parameter. A chain-of-custody record will be maintained at all times.

As part of the field QA program, one field blank and one equipment rinsate will be collected and submitted to the laboratory for each day of sampling. A field blank is a sample of analyte-free water poured into the container in the field, preserved and shipped to the laboratory with samples. A field blank assesses the contamination from field conditions during sampling. A rinsate is a sample of analyte-free water poured over or through decontaminated field sampling equipment prior to the collection of samples and assesses the adequacy of the decontamination processes. One duplicate sample will also be collected to confirm the laboratory’s QA process.

Secchi Depth Readings in Reservoirs

Prior to collecting reservoir samples, a Secchi disk will be slowly lowered into the water on the shady side of the boat until it is no longer visible, and the depth recorded. Then, the Secchi disc will be slowly raised until it just becomes visible once again and this depth will be recorded a second time. The average of the two depths will be considered the Secchi depth and recorded.

Step 2: Dissolved Oxygen Monitoring

CCWD will measure continuous dissolved oxygen (DO) concentration and water temperature. While DO is the parameter of interest in this Study, water temperature is often tied to DO results. Note that a separate *Water Temperature Modeling Study* (Study WR-2) has been proposed.

Continuous DO monitors will be installed at three locations: 1) Highland Creek downstream of the New Spicer Meadow Powerhouse (Highland Creek RM 5.6); 2) North Fork Stanislaus River downstream of McKays Point Diversion Dam (RM 7.9); and 3) Collierville Powerhouse Tailrace (RM 0.5).

Continuous DO monitors will be deployed once flows have stabilized (i.e., no spill) and left in through the fall prior to site access being restricted due to weather and road closures. The loggers will be downloaded and inspected/maintained monthly during the deployment periods.

DO monitoring will generally follow the United States Geological Survey (USGS) published method for the operation of continuous water quality stations (Wagner et al. 2006). DO concentrations will be measured at 1-hour intervals using an Onset sonde or similar device.

Each DO monitor will be contained in a durable protective housing that permits the active flow of water in and around the unit. The DO monitors will be installed in flowing water, and the housing and cable will be disguised as much as possible while ensuring the ability to retrieve the unit. A GPS coordinate will be recorded at each installation point, along with any waypoints that may prove valuable for future retrieval. Photographs of the sampling site, including installation configuration, will be taken. Prior to installation, each recorder will be numbered and calibrated to manufacturer's recommended specifications.

During each visit, CCWD will download data and inspect the loggers. Should a recorder need to be repaired or replaced because it is missing or has failed, CCWD will be able to do so immediately to reduce the potential for additional data loss. Any recorder that fails to download will be returned to the manufacturer for possible data recovery.

Step 3: Bacteria Sampling

CCWD will measure total coliform, fecal coliform, and *Escherichia coli* (i.e., *E. coli*) concentrations at one location at New Spicer Meadow Reservoir along the shoreline in the area near the boat ramp and campground.

In accordance with bacteria sampling protocols, bacteria samples will be collected on five different days within a 30-day period which spans the Independence Day or Labor Day holiday weekends (CVRWQCB 1998).

Step 4: Perform Laboratory Analyses

All laboratory analyses will be conducted using EPA Standard Methods or the equivalent sufficiently sensitive method to detect and report at levels necessary for evaluation against State and federal water quality standards. A State of California-certified laboratory will prepare and analyze water samples for the parameters listed in Table 1. Surface water samples collected adjacent to recreation sites will be analyzed for total coliform, fecal coliform, and *Escherichia coli*.

Step 5: QA/QC Review

Data will be verified and/or validated as appropriate. Following the field sampling and laboratory analyses, which includes the laboratories' own QA/QC analysis, CCWD will subject all data to QA/QC procedures including, but not limited to: spot-checks for transcription; review of electronic data submissions for completeness; comparison of results to field blank and rinsate results; and, identification of any data that seem inconsistent. If any inconsistencies are found, CCWD will consult with the laboratory to identify any potential sources of error before concluding that the data is correct.

All verified chemical detections, including data whose results are “J” qualified³ will be used for this assessment. Should the laboratory need to re-extract samples and re-run the sample under different calibration conditions, the data identified by the laboratory, as the most certain, will be used. If field-sampling conditions, as measured by the field blank and the rinsate sample results, indicate that samples have been corrupted, CCWD will identify the data accordingly.

REPORTING

CCWD will compile the study data into a summary report as well as include the complete laboratory results packages.⁴

SCHEDULE

CCWD anticipates the schedule for Study completion as follows:

Step 1: Water Quality Sampling	September – October 2027
Step 2: Dissolved Oxygen Monitoring	May – October 2027
Step 3: Bacteria Sampling	June – September 2027
Step 4: Laboratory Analysis	July – November 2027
Step 5: QA/QC Review	July – November 2027
Reporting	November – December 2027

REFERENCES

- California Regional Water Quality Control Board Central Valley Region (CVRWQCB). 2019. Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin, Fifth Edition. Revised February 2019, with approved amendments. Available online: https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr_201902.pdf. Accessed June 22, 2026.
- U.S. Environmental Protection Agency (EPA). 2017. Clean Water Act Analytical Methods. Office of Water, U.S. Environmental Protection Agency, Washington, DC. Available at: <https://www.epa.gov/cwa-methods>. Accessed June 22, 2026.
- EPA. 1996. Method 1669: Sampling ambient water for trace metals at United States Environmental Protection Agency water quality criteria levels. United States Environmental Protection Agency, Washington, D.C. Available at https://www.epa.gov/sites/default/files/2015-10/documents/method_1669_1996.pdf. Accessed June 22, 2026.

³ Results with a “J” qualifier are results where the chemical was detected, but there is uncertainty in the quantity. The quantity is above the method detection limit, but below the reporting limit.

⁴ In addition to the details provided in this section, reporting will also follow the “*Concepts and Practices Applicable to All Relicensing Studies*” developed by CCWD.

Wagner, R.J., R.W. Boulger, Jr., C.J. Oblinger, and B.A. Smith. 2006. Guidelines and standard procedures for continuous water-quality monitors—Station operation, record computation, and data reporting: U.S. Geological Survey Techniques and Methods 1–D3, 51 p. + 8 attachments. Available at <https://pubs.usgs.gov/tm/2006/tm1D3/>. Accessed June 22, 2026.

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