AQ 2 – WATER QUALITY/WATER TEMPERATURE TECHNICAL MEMORANDUM

KERN RIVER NO. 1 HYDROELECTRIC PROJECT
FERC PROJECT NO. 1930

PREPARED FOR:

SOUTHERN CALIFORNIA EDISON®
Energy for What's Ahead℠

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°C	degrees Celsius
°F	degrees Fahrenheit
µg/L	micrograms per liter
µS/cm	microsiemens per centimeter
AQ 2 ITM	AQ 2 – Water Quality/Water Temperature Interim Technical Memorandum
AQ 2 TSP	AQ 2 – Water Quality/Water Temperature Technical Study Plan
Cal EPA	California Environmental Protection Agency
CCC	Criterion Continuous Concentration
cfs	cubic feet per second
cm	centimeter

COC	contaminant of concern
CRWQCB	California Regional Water Quality Control Board
CTR	California Toxics Rule
DO	dissolved oxygen
EPA	Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
g	gram
IRIS	Integrated Risk Information System
ISB	Isabella Dam
ISR	Initial Study Report
MCL	maximum concentration levels
MDL	Method Detection Limit
MET	Meteorological Station
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliters
mm	millimeters
MPN	most probable number
MPSL	Marine Pollution Studies Laboratory
MRL	method reporting limit
ng/L	nanograms per liter
NS	no standard available
NTR	National Toxics Rule
NTU	Nephelometric Turbidity Units
OEHHA	Office of Environmental Health Hazard Assessment
ppt	parts per trillion
Project	Kern River No. 1 Hydroelectric Project, FERC Project No. 1930
QA/QC	quality assurance/quality control
RL	reporting limit
RM	river mile
SCE	Southern California Edison
SPD	Study Plan Determination
SWRCB	State Water Resources Control Board
TDS	Total dissolved solids
TKN	Total Kjeldahl nitrogen
USGS	U.S. Geological Survey

1.0 INTRODUCTION

This AQ 2 – Water Quality/Water Temperature Technical Memorandum (AQ 2 TM) provides the methods and findings from the 2024 (Year 1) and 2025 (Year 2) water quality and water temperature sampling completed in support of Southern California Edison's (SCE) Kern River No. 1 Hydroelectric Project (Project) relicensing, Federal Energy Regulatory Commission (FERC) Project No. 1930. The AQ 2 – Technical Study Plan (AQ 2 TSP) was included in SCE's Revised Study Plan filed on February 13, 2024 (SCE 2024). In its March 14, 2024, Study Plan Determination (SPD), FERC approved the AQ 2 TSP without modifications (FERC 2024). The SPD required SCE to sample water quality and water temperature in 2024 and 2025. An initial interim technical memorandum (AQ 2 ITM) describing 2024 data collection and results was included in the Initial Study Report filed with FERC on March 12, 2025, and an updated AQ 2 ITM was provided in the Draft License Application (DLA) filed on December 18, 2025.

Data reported in this final AQ 2 TM were collected from May 15 to October 15, 2024, and May 15 to October 15, 2025, pursuant to the FERC-approved study plan.

2.0 STUDY OBJECTIVES

The objectives of the study, as outlined in AQ 2 TSP (SCE 2024), included the following:

- Collect seasonal water quality data (physical, chemical, and bacterial) and water temperature data in the Democrat Dam Impoundment and bypass reach.[1]
- Compare water quality and water temperature conditions to the objectives/criteria of the Basin Plan (California Regional Water Quality Control Board [CRWQCB] 2018) and other water quality standards.
- Test edible sized sport fish captured in the Democrat Dam Impoundment (AQ 3 – Fish Population Study) for concentrations of both total and methylmercury.

3.0 STUDY AREA

- The AQ 2 study area included the Democrat Dam Impoundment, bypass reach, and tailrace (Table 3-1 and Map 3-1).
- Sampling was not conducted at locations where access was unsafe (e.g., where there is very steep terrain).

4.0 METHODS

This section describes the water quality and water temperature sampling methodology for seasonal *in-situ* field measurements, seasonal water quality grab sampling, bacterial sampling, continuous (i.e., 15-minute interval) water temperature sampling with

[1] The bypass reach is the 10.2-mile-long section of the Kern River downstream of Democrat Dam where Project operations result in the diversion of a portion of the water from the river.

dataloggers, laboratory analysis, and methylmercury fish tissue sampling. Study implementation followed the methods described in the AQ 2 TSP (SCE 2024), except for the minor variances described in Section 4.1.

4.1 STUDY PLAN VARIANCES

There was one general variance related to the AQ 2 TSP study methods. In addition, there were four small variances in 2024 and three small variances in 2025 to the AQ 2 TSP study methods approved in FERC's SPD (FERC 2024).

- General AQ 2 TSP variance:
  - For some analytes, the laboratories used Standard Methods analyses rather than Environmental Protection Agency (EPA) methods analyses specified in the AQ 2 TSP; however, EPA recognizes the Standard Methods analyses as equivalent (Table 4-1).
- 2024 AQ 2 TSP variances:
  - Grab samples were collected once at KR 55.6 (in the spring) (as specified in Table AQ 2-1 in the TSP) and once at KR 55.2 (in the fall) (as specified in the TSP text),[2] due to TSP discrepancies. These sites are very near each other and the study results demonstrated that water quality at each site was very similar. In 2025, grab samples were collected in the spring and fall from both sites.
  - The AQ 2 TSP schedule for bacterial sampling required sampling to occur over five relatively evenly spaced dates in July 2024. Due to the Borel Fire, which began on July 24, 2024, in the immediate vicinity of the study area, four samplings occurred before the fire in July 2024 and the fifth sampling occurred on August 13, 2024, when the area was reopened and safe for access. This exceeded the 30-day sampling window specified in the Basin Plan.
  - AQ 2 TSP had inconsistencies between sampling parameters in the text and Table AQ 2-2 for seasonal *in-situ* field measurement (turbidity, alkalinity, and salinity). As a result, *in-situ* measurements of turbidity were not collected in 2024. Turbidity data were collected in 2025 during *in-situ* water quality measurements in the spring and fall and at other opportunistic times in the Project area [i.e., during temperature logger installation (May), August temperature logger downloads, and temperature logger removals (October)] to collect more information about turbidity. Alkalinity test kits were used in the field to measure alkalinity, and salinity was calculated from specific conductance measurements.

[2] KR 55.6 = Kern River upstream of Democrat Dam Impoundment; KR 55.2 = Democrat Dam Impoundment, downstream of rafting take-out (see Table 3-1 and Map 3-1).

  - In 2024, water grab samples were analyzed for total mercury, but not methylmercury. In 2025, water grab samples were analyzed for total mercury and methylmercury.

- 2025 AQ 2 TSP variances:

  - AQ 2 TSP specified total and fecal coliform analyses and did not require analysis for *Escherichia coli* (*E. coli*); however, the State Water Resources Control Board (SWRCB 2019) generally requires *E. coli* sampling for recreation contact bacterial analysis. In 2025, *E. coli* was included in the analysis (presence/absence).

  - AQ 2 TSP did not require hardness (as $CaCO_3$) as a seasonal water quality parameter. Criteria for several water quality parameters are, however, hardness dependent (cadmium, copper, lead, and nickel) (there was no detection of these parameters in 2024). Hardness was analyzed in water quality grab samples in 2025 to support the laboratory analysis of cadmium, copper, lead, and nickel required by the TSP.

  - Two water temperature loggers were vandalized in May 2025 at water temperature monitoring location KR 44.0 (Kern River upstream of Kern River No. 1 Powerhouse). As a result, data from May 15 to June 2, 2025, at this site are not available (Table 5-16 and Table 5-18).

4.2 WATER QUALITY SAMPLING LOCATIONS

- Water quality and water temperature sampling locations are identified in Table 3-1 and Map 3-1.[3]

- Exact sampling locations were determined in the field based on sampling suitability (i.e., well-mixed and deep enough for representative sampling) and accessibility.

- Sampling locations were documented using hand-held global positioning system units.

- Sediment management related issues and their potential effects on water quality were addressed in the LAND 2 – Erosion and Sedimentation Technical Study Memorandum.

4.3 SEASONAL *IN-SITU* FIELD MEASUREMENTS

- *In-situ* water quality measurements of dissolved oxygen (DO) (milligrams per liter [mg/L] and percent saturation), pH, turbidity (nephelometric units [NTU]), specific

[3] In the AQ 2 Interim Technical Study Memorandum submitted in March 2025, the Kern River sampling station near Lucas Creek was incorrectly described as KR 50.28 – the correct sampling site name and location is KR 50.3.

conductance[4] (microsiemens/centimeter [µS/cm]), salinity (ppt), alkalinity (mg/L), and water temperature (degrees Celsius [°C]) were collected in the impoundment, tailrace, and bypass reach (Table 3-1).

- Samples were collected once during the spring runoff (June), and once during the late summer/early fall base-flow period (October) in 2024 and 2025.
- At stream locations, measurements were made approximately 0.1 meter beneath the surface in flowing, well-mixed riffle or run areas.[5]
- *In-situ* samples were collected using a YSI Pro Digital Sampling System multi-parameter water quality meter.
- Pre- and post-sampling calibration of the YSI was conducted following the manufacturer's instructions.

4.4 Seasonal Water Quality Grab Samples

- Water quality grab samples were collected in the Kern River just upstream of Democrat Dam Impoundment, in the Democrat Dam Impoundment, in the tailrace, and at several sites in the bypass reach (Table 3-1 and Map 3-1).
  - In 2024 and 2025, samples were collected once during the spring runoff (high flow) and once during the late summer/early fall base-flow period (low flow) period, in coordination with the *in-situ* water quality measurements to screen for potential water quality issues (Table 4-1).
  - At stream locations, grab samples were taken approximately 0.1 meter beneath the surface in flowing, well-mixed riffle or run areas.
  - At the impoundment location, grab samples were collected from near the surface (1 meter depth) and at mid-column depth.
- Samples were collected consistently with EPA protocols for each analyte (see Section 4.7, Laboratory Analysis) and consistent with general water quality sampling methods (e.g., National Field Manual for the Collection of Water-Quality Data).
  - The sampling team employed a strict quality assurance/quality control (QA/QC) program. Equipment (bottles/samplers) was cleaned and thoroughly rinsed in the field prior to sampling at each location. The Kemmerer water sampler used for impoundment mid-column samples was filled and rinsed three times before sampling. Sampling bottles were clean and sterile from the laboratory and

[4] Specific conductance is a measurement of conductivity that compensates for water temperature and is the preferred method for measuring electrical conductivity in water quality studies (USGS 2019)

[5] *In-situ* measurements at KR 55.2 (impoundment) were taken at water surface (i.e., 0.1 meter below surface) and at mid-column depth, based on impoundment water levels at the time of sampling.

remained sealed until sample collection. Specific collection of equipment blanks was not necessary for these samples. Laboratory blanks were performed for all samples. Field replicates and field blanks were also collected but data were not presented unless there was an exceedance reported.

- Water quality samples were decanted into laboratory-supplied sample containers and analyzed at a State-certified water quality laboratory.
- The sample containers were labeled with the date and time that the samples were collected along with the sampling site or identification label.
- The sample containers were preserved (as appropriate), stored on ice, and delivered to a State-certified water quality laboratory for analyses in accordance with maximum holding periods.
- A chain-of-custody record was maintained with the samples.

4.5 BACTERIAL SAMPLING

- Surface water bacteria samples for total and fecal coliform were collected downstream of the following day-use recreation areas in the Project area: the Democrat Dam Impoundment downstream of the rafting take-out, and the Kern River downstream of the Upper Richbar, Lower Richbar, and Live Oak day use areas (Table 3-1 and Map 3-1). In 2024, samples were collected on four relatively evenly spaced days in July. The final, fifth sampling was disrupted due to the Borel Fire but occurred as soon as practicable in August following fire containment. The sampling was repeated in July 2025, on five relatively evenly spaced days in July, and the analysis included *E. coli* presence/absence in conjunction with total and fecal coliform.
- Field staff avoided collecting surface “scum” by plunging the open bottle (sterilized) mouth quickly downward below the water surface and avoiding contact with or disturbance of the streambed. Bottles were filled with the opening pointed slightly upward into the current and the bottles were removed with the opening pointed upward toward the water surface and tightly capped, allowing about 2.5 to 5 centimeters (cm) of headspace for proper mixing.

4.6 WATER TEMPERATURE

- Continuous water temperature data were collected at seven locations in the Project area (Table 3-1) from May 15 to October 15, 2024, and from May 15 to October 15, 2025. Sampling locations included upstream of the Democrat Dam Impoundment, five sites in the bypass reach, and in the tailrace.
  - Each water temperature monitoring station was equipped with two HOBO Tidbit MX TEMP 5000 temperature loggers set to record data at 15-minute intervals.

  - In 2024, the data were downloaded at least once every two months between June and October except for sites that were inaccessible during the Borel Fire and associated National Forest closure. In 2025, following vandalism at KR 44.0, the download frequency was increased to every two to three weeks to limit potential data gaps.

- Meteorological station data[6] (relative humidity, windspeed, solar radiation, air temperature) were collected from nearby existing weather stations: Isabella Dam;[7] (ISB) and Arvin-Edison – San Joaquin Valley – Station 125.[8]

- Temperature and meteorological data, including a depiction of seasonal patterns and daily averages, minimums, and maximums, as a function of time and location in the study area and aquatic species requirements (e.g., Moyle 2002) were summarized.

4.7 LABORATORY ANALYSIS

- Water quality grab samples collected during the field program were processed by several State-certified laboratories approved by the State Water Resources Control Board for chemical and bacterial analysis.
  - Zalco Laboratories Inc. (Zalco) in Bakersfield, CA completed general parameters and dissolved metals analysis.
    - BSK Associates in Fresno, California was subcontracted by Zalco for several tests.
  - Pace Analytical completed the bacterial analysis.
  - Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories (MPSL) in Moss Landing, California, completed fish tissue and water sample methylmercury analysis.

- The parameters analyzed by the laboratories are provided in Table 4-1 and described in Appendix A.

- The laboratories reported each parameter with the laboratory method detection limit and reporting limit. The laboratories attempted to attain reporting detection limits that are at or below the applicable regulatory criteria.

- Results from the water quality sampling were compared with the water quality objectives/criteria identified in the Tulare Lake Basin Plan (CRWQCB 2018) and with other relevant water quality standards, including the EPA numeric aquatic life

[6] Relative humidity, windspeed, and solar radiation only available from Arvin-Edison – San Joaquin Valley – Station 125 station.
[7] Isabella Dam; ISB: CA Dept of Water Resources https://cdec.water.ca.gov/dynamicapp/staMeta?station_id=ISB.
[8] Arvin-Edison – San Joaquin Valley – Station 125 California Irrigation Management Information System (CIMIS).

and human health criteria (65 FR 31682, EPA 2023), the National Toxics Rule (NTR) (Federal Register FR 57 60848, EPA 1992), and the California Toxics Rule (CTR) (Federal Register, 65 FR 31682, EPA 2000).

- Appendix C provides calculations methods used for certain Water Quality Criteria.

4.8 METHYLMERCURY FISH TISSUE SAMPLING

- Edible-sized sport fish were captured in the Democrat Dam Impoundment as part of the AQ 3 – Fish Population Technical Study and their fish tissue was tested for concentrations of total mercury and methylmercury.

- Electrofishing was used to capture 29 edible-sized sport fish to analyze total and methylmercury fish tissue concentrations.

  – Three days of sampling were conducted to meet target capture numbers during the fish population study because numbers of edible sized fish of some species were low (e.g., <5 fish per species). See AQ 3 – Fish Population Interim Technical Memorandum for details on collection procedures.

  – Fish samples were submitted to MPSL for fish tissue analysis. The results of the fish tissue analyses were summarized and include the fish identification number, date and time collected, total length or fork length, weight, and total and methylmercury concentrations. Average total mercury and methylmercury concentrations by species were also calculated. The mercury concentrations are also presented relative to fish weight in graphical format and compared to appropriate California Environmental Protection Agency (Cal EPA) Office of Environmental Health Hazard Assessment (OEHHA) and/or EPA screening value guidelines.

4.9 REPORTING

- Study methods and results are documented in this AQ 2 TM. The AQ 2 ITM that reported on the 2024 sampling was provided to relicensing stakeholders on March 11, 2025, for a 90-day review. An updated AQ 2 ITM was provided as part of the DLA that was filed with FERC on December 18, 2025. This final AQ 2 TM presents data collected both in 2024 and 2025.

- Upon request, data will be provided to resource agencies and interested stakeholders in an Excel spreadsheet (electronic format).

5.0 RESULTS SUMMARY

Results for the Water Quality/Water Temperature Study are provided below for both sampling years (2024 and 2025). The Basin Plan (CRWQCB 2018) includes water quality objectives/criteria (Table 4-1) for the protection of beneficial uses in the study area (Table 5-1), including: (1) power generation; (2) water contact recreation; (3) water non-contact recreation; (4) warm freshwater habitat; (5) cold freshwater habitat; (6) wildlife habitat; and (7) rare, threatened, or endangered species.

5.1 SEASONAL *IN-SITU* FIELD MEASUREMENTS

Seasonal *in-situ* field measurement results are presented in Table 5-2 for the 2024 spring runoff sampling (June 26–27, 2024) and the late summer/early fall base flow period (October 9–10, 2024) and in Table 5-3 for the 2025 spring runoff sampling (June 3-5, 2025) and the late summer/early fall base flow period (September 30, 2025). Results were generally consistent between sampling years. River flow as measured at U.S. Geological Survey (USGS) gage 11192500[9] during spring sampling was 1,970 cubic feet per second (cfs) (June 27, 2024) and 1,060 cfs (June 4, 2025); river flow during fall sampling was 310 cfs (October 10, 2024) and 140 cfs (September 30, 2025). Each parameter is discussed below.

5.1.1 Water Temperature

The Basin Plan objective for water temperature states that elevated temperature wastes shall not cause the temperature of waters designated COLD or WARM to increase by more than 5 degrees Fahrenheit (°F) (2.78°C) above natural receiving water temperature (CRWQCB 2018). In 2024, water temperatures ranged from 18.9 to 20.5°C during the spring *in-situ* sampling and from 19.8 to 20.4°C during the fall sampling in the Project area. In 2025, water temperatures ranged from 16.5 to 18.9°C during the spring *in-situ* sampling and from 20.5 to 21.9°C during the fall sampling in the Project area. Water temperatures exhibited very little temporal or spatial fluctuation throughout the Project area (i.e., above Democrat Dam Impoundment, within the bypass reach, and below the powerhouse) (Table 5-2 and Table 5-3). Continuous water temperature data collected from May 15 to October 15 in 2024 and 2025 are discussed in Section 5.4 below.

5.1.2 Dissolved Oxygen

The Basin Plan DO water quality objective for the Kern River from Lake Isabella to the Kern River No. 1 Powerhouse is a minimum of 8.0 mg/L, which is consistent with EPA criterion (CRWQCB 2018, EPA 1986). *In-situ* measurements of DO ranged from 8.58 to 9.12 mg/L during the spring and fall sampling periods in 2024 and from 8.33 to 9.33 mg/L during the spring and fall sampling periods in 2025 (Table 5-2 and Table 5-3), which is consistent with Basin Plan criteria. Percent saturation was greater than 90 percent for all measurements.

5.1.3 Conductivity (measured as Specific Conductance)

The Basin Plan water quality objective for conductivity is a maximum of 300 µS/cm for the Kern River from Lake Isabella to the Kern River No. 1 Powerhouse. In 2024, specific conductance (i.e., temperature-compensated conductivity) ranged from 92 to 93 µS/cm in the spring sampling and 140 to 143 µS/cm in the fall sampling (Table 5-2). In 2025, it

[9] SCE gage # 409, located at Democrat Springs.

ranged from 108 to 117 µS/cm in the spring sampling and 132 to 146 µS/cm in the fall sampling. All specific conductance measurements met the Basin Plan criterion.

5.1.4 pH

The Basin Plan water quality objective for pH states that "the pH of water shall not be depressed below 6.5, raised above 8.3, or changed at any time more than 0.3 units from normal ambient pH" (CRWQCB 2018). The national EPA pH criterion is 6.5 to 9 for chronic exposure in fresh water (EPA 2023). In 2024, pH ranged from 7.96 to 8.17 during spring and fall sampling (Table 5-2), which is within the range specified in the Basin Plan. In 2025, excluding one sample, pH ranged from 7.88 to 8.29 during spring and fall sampling (Table 5-3). One pH measurement on September 30, 2025, at KR 50.3 was 8.34, just 0.04 units over the Basin Plan objective, but well within national EPA pH criterion.

5.1.5 Alkalinity

There are no alkalinity criteria in the Basin Plan. The NTR states a total alkalinity continuous concentration "of 20 mg/L is a minimum value except where alkalinity is naturally lower, in which case the criterion cannot be lower than 25 percent of the natural level" (EPA 2023). Alkalinity was >20 mg/L in the Project area in 2024 and 2025, ranging from 40 to 44 mg/L in 2024 (Table 5-2) and 32 to 45 mg/L in 2025 (Table 5-3).

5.1.6 Salinity

Salinity is normally estimated indirectly by measuring specific conductance (see Section 5.1.3). There are no salinity criteria in the Basin Plan water quality objectives. To estimate salinity, electrical conductivity samples were converted to salinity using the following equation: salinity ppt = 0.4665 * (conductivity [µS/cm] *1.0878) (Dohrman 2023). Salinity values during the spring runoff and fall sampling period in 2024 ranged from 0.034 to 0.055 ppt (Table 5-2) and from 0.038 to 0.057 ppt in 2025 (Table 5-3). Freshwater usually has a salinity value of <0.5 ppt (Wetzel 2001).

5.1.7 Turbidity

The Basin Plan states the "waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses." Additionally, "increases in turbidity attributable to controllable water quality factors shall not exceed the following limits: where natural turbidity is between 0 and 5 NTUs, increases shall not exceed 1 NTU. Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent. Where natural turbidity is equal to or between 50 and 100 NTUs, increases shall not exceed 10 NTUs. Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent" (CRWQCB 2018). There are no turbidity criteria in the CTR or in the EPA's national water quality criteria.

Turbidity measurements were obtained in 2025. Turbidity varied throughout the sampling season. Measurements were taken during the spring (June 3–5) and fall (September 30) *in-situ* sampling periods, as well as incidentally on May 4–5, August 14, and October 22, at water temperature monitoring locations during logger installation, download, and removal. Overall, turbidity ranged from 1.20 to 14.75 NTU. The lowest turbidity measurements occurred during June and August, ranging from 1.20 to 3.09 NTU. Turbidity in May and September was more elevated, ranging from 2.40 to 8.20 NTU. Turbidity was highest in October with values ranging from 7.50 NTU to 14.75 NTU. Turbidity measurements from the 2025 *in*-situ and incidental samplings are shown in Table 5-4. As noted above in Section 4.1, Study Plan Variances, turbidity data were not collected in 2024 due to study plan text/table inconsistencies.

There was a slight tendency for turbidity to increase from upstream to downstream in the Project area (Table 5-4). This tendency was not related to Project operations as it was likely the result of natural increases in turbidity within the steeper / higher gradient sediment transport reach of the river from upstream of Democrat Dam to downstream of the Kern No. 1 Powerhouse. Inflowing turbidity to the study area was represented by values measured at KR 55.6, the upstream most sampling location in the Project area. Measured turbidity at this location in May, June, and August was between 1.26 and 2.56 NTUs. Turbidity in the 10.2-mile-long river reach downstream of Democrat Dam ranged from 1.31 to 8.0 NTU. In September and October, inflowing turbidity was 5.96 to 7.50 NTU, and turbidity downstream of Democrat Dam ranged from 4.98 to 14.75 NTU. The Basin Plan states that increases in turbidity should be attributable to controllable water quality factors. The Project consists of concrete diversions and lined flowlines and is unlikely to alter turbidity as a result of normal operations; however, the bypass river reach is a narrow, steep (1.4 to 3.5 percent gradient), high energy section of river that naturally erodes and transports sediment and increases turbidity. Sediment management related issues and their potential effects on water quality are addressed in the LAND 2 – Erosion and Sedimentation Technical Study Memorandum.

5.2 SEASONAL WATER QUALITY GRAB SAMPLES

Results of the 2024 water quality grab sampling are presented in Table 5-5 (spring) and Table 5-6 (fall). Results of the 2025 water quality grab sampling are presented in Table 5-7 (spring) and Table 5-8 (fall). Sampling occurred concurrently with the *in-situ* field measurements in both sampling years. Table 5-9 and Table 5-10 provide the results for ammonia sampling in 2024 and 2025, respectively, which has criteria based on temperature and pH and was calculated on a location-by-location basis. Table 5-11 and 5-12 contain calculated criteria and results for cadmium, copper, lead, and nickel, which have hardness-based criteria.

All water quality sampling parameters and dissolved and total metal concentrations met Basin Plan water quality objectives and CTR and EPA water quality criteria.

5.3 BACTERIAL SAMPLING

The Basin Plan water quality objective for bacteria states that, "in water designated REC-1, the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 milliliters (mL), nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 mL" (CRWQCB 2018). The results of total coliform and fecal coliform sampling are detailed in Table 5-13 for 2024 and Table 5-14 for 2025. The threshold for fecal coliform was not exceeded during the sampling periods. Neither the Basin Plan nor the EPA have criteria for total coliform.

Although not required by AQ 2 TSP, the SWRCB's updated water quality control plan for inland surface waters (SWRCB 2019) includes *E. coli* sampling for recreation contact bacterial analysis. In 2025, *E. coli* was included in the analysis, and presence/absence testing was used to align with the TSP sampling effort and schedules. *E. coli* was "present" for all samples at all four sampling sites in 2025 (Table 5-14).

5.4 CONTINUOUS WATER TEMPERATURE DATA AND METEOROLOGICAL DATA

Continuous water temperature monitoring occurred from May 15 to October 15 in 2024 and 2025. In both years, water temperature loggers were installed prior to May 15 and maintained through October 15. Between October 12, 2024, and October 15, 2024, temperature loggers at KR 50.3 and KR 54.2 were dewatered during low flows that SCE temporarily provided in the bypass reach to evaluate the feasibility of fish sampling.[10] In 2025, temperature loggers were vandalized at KR 44.0, resulting in a data gap from May 15 to June 2, 2025, at this monitoring location.

Average, maximum, and minimum monthly water temperature data for each sampling location are provided in Table 5-15 (2024) and Table 5-16 (2025). Average monthly water temperature ranged from approximately 17°C in May to 23°C in August of both sampling years. Table 5-17 (2024) and Table 5-18 (2025) provide daily average, daily minimum, and daily maximum water temperature data. Figures 5-1 through 5-8 display average daily water temperature data at each site along with corresponding flow data from the Project area. Average daily temperature ranged from 15.7°C (May 14) to 24.4°C (August 6) during the 2024 monitoring period and from 15.5°C (May 17) to 24.8°C (September 4 and September 5) during the 2025 monitoring period. Overall, water temperature was warmest in the months of August and September in the Project area. Generally, the maximum daily average and maximum instantaneous water temperature occurred in late July to mid-September when flows were lower following spring runoff and air temperatures were highest.

There was very little change in water temperature from upstream to downstream in the Project area. The Kern River from upstream of Democrat Dam Impoundment downstream to the Kern No. 1 Powerhouse (i.e., within the Project area) generally exhibited a <1°C water temperature difference (Figure 5-1 and Figure 5-2). The maximum downstream change in average daily water temperature in the bypass reach compared to inflowing water was 1.6°C for several days in early May and 1.7°C on June 10, 2025, at site KR 44.0. Some natural warming of flows in the downstream direction is expected due to warm air temperatures and solar radiation. The water temperature data indicate that the Project has little effect on water temperature.

[10] Fish population sampling as part of AQ 3 study did not occur until December of 2025.

Table 5-19 shows preferred temperature ranges for fish species collected in the bypass reach during the AQ 3 – Fish Population Study completed in December of 2025. Most species collected (e.g., Sacramento sucker, hardhead, smallmouth bass, largemouth bass, brown bullhead, and white catfish) are cool or warmwater fish species with wide temperature tolerances. The water temperatures observed in the bypass reach (e.g., 20°C to 25°C) are suitable for these species (Moyle 2002) and too warm for cold water species like rainbow trout. Rainbow trout, which are stocked in the Project area, prefer colder water (i.e., 15 to 18°C). It is likely that rainbow trout that are not harvested by anglers can rear and grow during the cooler seasons (fall, winter, spring) but are unlikely to be able to grow and survive during the summer season.

Air temperatures (2024 and 2025) for the study (May 15 to October 15) retrieved from the ISB meteorological station near Lake Isabella Dam (upstream of the Project area) and from Arvin-Edison Station 125 (downstream of the Project area) are shown in Figure 5-10, along with relative humidity. In 2024, daily air temperatures ranged from 46°F (7.7°C) to 113°F (41°C) with a mean air temperature around 80°F (27°C) for the monitoring period. In 2025, air temperatures were generally cooler and ranged from 42°F (5.5°C) to 108°F (42°C) with a mean air temperature around 78°F (25.5 °C).

Other MET parameters (relative humidity, wind speed, solar radiation) were retrieved from Arvin-Edison San Joaquin Valley Station 125, though the station is not in Kern Canyon. Data from this station showed relative humidity near the Project was on average in the 30 percent range (Figure 5-10), wind speeds averaged approximately 4 miles per hour, and solar radiation ranged from 192 to 760 Langley/day through the 2024 and 2025 monitoring periods.

5.5 Laboratory Analysis Procedures and QA/QC

A detailed summary of the QA/QC review of the seasonal water quality grab sampling reports received from the various labs can be found in Appendix B. The QA/QC review of the reports indicated that all samples were acceptable (i.e., hold times, preservation, containers were appropriate).

5.6 Methylmercury and Total Mercury Fish Tissue Sampling

During the 2024 Fish Population Study, SCE collected 29 edible-sized sport fish from the Democrat Dam Impoundment for total mercury and methylmercury fish tissue analysis. The catch represented six species, including 10 largemouth bass, three black crappie, five bluegill sunfish, one channel catfish, one white catfish, and nine brown bullhead. Fish ranged in size from 151–545 millimeters (fork length or total length, depending on the species).[11] OEHHA issues fish consumption advisories when methylmercury concentrations in fish exceed a Guidance Tissue Level of 0.08 mg/kg (OEHHA 2005).

[11] Fork length was measured for species with a forked caudal fin (i.e., bluegill sunfish, black crappie, and largemouth bass). Total length was measured for species without a forked caudal fin (i.e., brown bullhead, channel catfish, and white catfish).

Table 5-20 provides total mercury and methylmercury results for each individual fish, along with sample dates, times collected, weight, total and fork length (as applicable).

All 29 of the fish tissue samples were equal to or exceeded the reference methylmercury concentration of 0.08 mg/kg (Figure 5-11 and Table 5-20). Concentrations were higher in larger fish. The highest concentrations of methylmercury (up to 0.57 mg/kg) were measured in largemouth bass. The lowest concentrations were measured in black crappie and bluegill sunfish (as low as 0.08 mg/kg). The highest average concentration of methylmercury by species was in largemouth bass (0.29 mg/kg), followed by channel catfish (0.24 mg/kg, single sample), brown bullhead (0.20 mg/kg), and white catfish (0.19 mg/kg, single sample). Black crappie and bluegill sunfish had the lowest average methylmercury concentration by species (0.14 mg/kg). Concentrations were positively related to fish size, with larger fish (particularly largemouth bass and catfish) exhibiting the highest methylmercury levels (Figure 5-11 and Figure 5-12). The lowest concentration was found in the smallest black crappie sampled (160-millimeter fork length), at 0.08 mg/kg.

6.0 STUDY SPECIFIC CONSULTATION

A copy of the AQ 2 ITM that reported on the 2024 sampling was provided to relicensing stakeholders on March 12, 2025, for a 90-day review. SCE presented the results of the 2024 water quality/water temperature study in the Initial Study Report (ISR) and at the ISR meeting held on March 19, 2025. No comments on the AQ 2 ITM were received.

7.0 REFERENCES

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TABLES

Table 3-1. Water Quality and Water Temperature Sampling Locations

Site Name/ID and Description	Sampling Location River Mile (RM)	Coordinates	Seasonal In-situ Field Measurements	Seasonal Water Quality Grab Samples/ Temperature Monitoring Locations	Bacterial Sampling
KR 55.6 (Kern River above Democrat Dam)	RM 55.6	35.531954, -118.658381	X	X[1]	–
KR 55.2 (Kern River impoundment below rafting take-out)	RM 55.2	35.531481, -118.664900	X	–[1]	X
KR 54.36 (Kern River between Democrat Dam and Instream Flow Release)	RM 54.36	35.523707, -188.675464	X	X	–
KR 54.2 (Kern River below Instream Flow Release)	RM 54.2	35.22709, -118.675759	X	X	–
KR 53.84 (Kern River near USGS gage 11192500; below Democrat Dam)	RM 53.84	35.20211, -118.680249	X	X	–
KR 50.3 (Kern River near Lucas Creek)	RM 50.3	35.483765, -118.711885	X	X	–
KR 48.7 (Kern River below Upper Richbar Day Use Area)	RM 48.7	35.476250, -118.724036	X	–	X
KR 48.4 (Kern River below Lower Richbar Day Use Area)	RM 48.4	35.475149, -118.728459	X	–	X
KR 47.78 (Kern River below Live Oak Day Use Area)	RM 47.78	34.479729, -118.733570	X	–	X
KRTR 43.94 (Kern River No. 1 Powerhouse Tailrace)	RM 43.94	34.460697, -118.779644	X	X	–
KR 44.0 (Kern River upstream of Kern River No. 1 Powerhouse)	RM 44.0	35.461124, -118.778816	X	X	–

Notes: [1] As described in Section 4.1 above (Study Plan Variances), grab samples were taken at KR 55.6 during the spring and at KR 55.2 (within the impoundment at water surface and mid-column) during the fall of 2024 due to TSP discrepancies. In 2025, grab samples were collected at KR 55.6 and KR 55.2 (water surface and mid-column) in the spring and in the fall. Continuous water temperature data were only recorded at KR 55.6 in 2024 and 2025 as required by AQ 2 TSP.

Key: RM = river mile

Table 4-1. Summary of Water Quality Analytical Tests, Including Laboratory Methods and Detection Limits, and Chemical Water Quality Objectives

Analyte	Units[1]	Analysis Method[2]	MDL	RL	Water Quality Criteria			Sample Container	Hold Time	Preservative/ Comment
					Basin Plan[3]	CTR[4]	EPA Criteria[5]			
***In-Situ* Measurements**										
Water Temperature	Celsius (°C)	Water Quality Meter	Not Applicable	Not Applicable	≤ +5°F[6]	NS	NS	Not Applicable	Not Applicable	None
Dissolved Oxygen (DO)	mg/L	Water Quality Meter	Not Applicable	Not Applicable	5.0–7.0[7]	NS	3.0 - 8.0[8]	Not Applicable	Not Applicable	None
Specific Conductance	µS/cm at 25°C	Water Quality Meter	Not Applicable	Not Applicable	300	NS	NS	Not Applicable	Not Applicable	None
pH	unitless	Water Quality Meter	Not Applicable	Not Applicable	6.5–8.3[9]	NS	6.5 – 9.0	Not Applicable	Not Applicable	None
Alkalinity	mg/L	Alkalinity Test Kit	Not Applicable	10	NS	NS	>20[12]	Not Applicable	Not Applicable	None
Salinity	PPT	Calculated	Not Applicable	Not Applicable	NS	NS	NS	Not Applicable	Not Applicable	None
Turbidity	NTU	Water Quality Meter	Not Applicable	Not Applicable	Depends on Turbidity Baseline	NS	NS	Not Applicable	Not Applicable	None
General Parameters										
Nitrate	mg/L	EPA 300.0	0.01	0.1	10	NS	NS	500mL plastic	48 hours	H_2SO_4, maintain at ≤6°C
Nitrite	mg/L	EPA 300.0	6.7	150	1	NS	NS	500mL plastic	48 hours	H_2SO_4, maintain at ≤6°C
Ammonia as N	mg/L	SM 4500 / EPA 350.1	0.33	0.8	0.025	NS	Depends on pH & temperature	500mL plastic	28 days	H_2SO_4, maintain at ≤6°C
TKN	mg/L	SM 4500 / EPA 351.2	0.30	0.1	NS	NS	NS	500mL plastic	28 days	H_2SO_4, maintain at ≤6°C
Total Phosphorus	µg/L	SM 4500	0.0022	0.1	NS	NS	NS	500mL plastic	28 days	H_2SO_4, maintain at ≤6°C
Ortho-phosphate	mg/L	SM 4500-P E	0.016	0.3	NS	NS	NS	500mL amber glass	48 hours	Maintain at ≤6°C
Total Dissolved Solids	mg/L	SM 2540C	5.0	10	500[10]	NS	NS	500mL plastic	7 days	Maintain at ≤6°C
Total Suspended Solids	mg/L	SM 2540D	2.0	2.5	NS	NS	NS	500mL plastic	7 days	Maintain at ≤6°C
Total Alkalinity	mg/L	SM 2320B	10.0	10	NS	NS	>20[12]	250mL plastic	14 days	Maintain at ≤6°C
Hardness	mg/L	EPA 200.7	2.0	2.0	NS	NS	ND	250mL plastic	14 days	Maintain at ≤6°C
Metals-Dissolved										
Arsenic	µg/L	EPA 200.7	0.005	0.02	10[11]	150/340[13]	150/340[13], 0.018[14], 0.14[15]	125mL plastic	48 hours	Maintain at ≤6°C
Cadmium	µg/L	EPA 200.7	7	10	5[11]	2.2/4.3[13, 16]	0.72/1.8[13, 16]	125mL plastic	48 hours	Maintain at ≤6°C
Copper	µg/L	EPA 200.7	16	50	1,300[11]	9.0/13[13, 16], 1,300[14]	9.0/13[13, 16, 17]	125mL plastic	48 hours	Maintain at ≤6°C
Iron	µg/L	EPA 200.7	0.031	0.1	300[11]	NS	1,000[18], 300[19]	125mL plastic	48 hours	Maintain at ≤6°C
Lead	µg/L	EPA 200.7	0.01	0.05	15[11]	2.5/65[13, 16]	2.5/65[13, 16]	125mL plastic	48 hours	Maintain at ≤6°C
Manganese	µg/L	EPA 200.7	0.003	0.03	50[11]	NS	50[20]	125mL plastic	48 hours	Maintain at ≤6°C
Nickel	µg/L	EPA 200.7	0.001	0.01	100[11]	52/470[13, 16], 610[14], 4,600[15]	52/470[13, 16], 610[14], 4,600[15]	125mL plastic	48 hours	Maintain at ≤6°C
Chromium-Total	µg/L	EPA 200.7	2	10	50[11]	NS	100[10]	125mL plastic	48 hours	Maintain at ≤6°C

Analyte	Units[1]	Analysis Method[2]	MDL	RL	Water Quality Criteria			Sample Container	Hold Time	Preservative/ Comment
					Basin Plan[3]	CTR[4]	EPA Criteria[5]			
Metals-Total										
Total Mercury	ng/L	EPA 245.1	0.13	0.40	2,000	50[14], 51[15]	770/1,400[13]	125mL plastic	48 hours	Maintain at ≤6°C
Methylmercury (Water)	ng/L	EPA 1630	0.02	0.49	NS	NS	NS	125mL plastic	48 hours	Maintain at ≤6°C
Bacteria										
Total Coliform	MPN/100 mL	EPA SM9223B	Not Applicable	1	NS	NS	NS	100 mL plastic	24 hours	Maintain at ≤6°C
Fecal Coliform	MPN/100 mL	EPA SM9223B	Not Applicable	1	200/100 mL[21]	NS	126	100 mL plastic	24 hours	Maintain at ≤6°C
E. coli [20]	MPN/100 mL	EPA SM9223B	Not Applicable	1	100/100 mL[22]	NS	NS	100 mL plastic	8 Hours	8 hours

Notes
[1] Units follow listed criterion standards. If standards were not available, laboratory supplied units were used. (Note: µg/L-ppb and mg/L=ppm)
[2] Analysis methods are periodically updated by the EPA. The analyses method used by laboratories are reflected in this table. Analytes that were analyzed using differing methods than identified in the AQ-2 TSP included nitrate/nitrite, ammonia, total phosphorus, ortho-phosphate, TDS, TSS, total alkalinity, all dissolved metals, total mercury, and bacteria testing. SM/EPA analysis methods used by the laboratories are equivalent to those identified in the AQ-2 TSP.
[3] The Water Quality Control Plan for the Tulare Lake Basin Third Edition relies on California primary and secondary Maximum Concentration Level objectives as criteria for water quality to be used as a municipal and domestic supply for human consumption.
[4] CTR criteria are based primarily on EPA 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.
[5] Federal water quality criteria are from the EPA's website unless otherwise noted in the footnotes.
Aquatic Life Criteria: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table.
Human Health Criteria: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table.
[6] Elevated temperature wastes shall not cause the temperature of waters designated COLD or WARM to increase by more than 5°F above natural receiving water temperature.
[7] 5.0 mg/L for waters designated WARM, 7.0 mg/L for waters designated COLD or SPWN.
[8] The 1-day minimum warmwater criteria are 5.0 mg/L for early life stages, which includes all embryonic and larval stages and all juveniles forms to 30 days following hatching, and 3.0 mg/L for other life stages. The 1-day minimum coldwater criteria are 8.0 mg/L to achieve required intergravel DO concentrations for early life stages, 5.0 mg/L for early life stages exposed directly to the water column, and 4.0 mg/L for other life stages (EPA's 1986 “Gold Book”).
[9] pH shall not be depressed below 6.5, raised above 8.3, or changed at any time more than 0.3 units from normal ambient pH.
[10] The criteria listed are secondary Maximum Concentration Levels (MCLs) for California drinking water quality objectives that do not necessarily indicate a toxic amount of contamination. Rather these standards dictate water quality objectives designed to preserve taste, odor, or appearance of drinking water.
[11] The criteria listed are primary MCLs listed to address health concerns. Updated November 2024
[12] The criterion continuous concentration (CCC) of 20 mg/L is a minimum value except where alkalinity is naturally lower, in which case the criterion cannot be lower than 25 percent of the natural level.
[13] Freshwater aquatic life protection, continuous concentration (4-day average)/maximum concentration (1-hour average).
[14] Human health criterion (30-day average) for drinking water sources (consumption of water and aquatic organisms).
[15] Human health criterion (30-day average) for other waters (consumption of aquatic organisms only).
[16] Criterion is hardness dependent which is expressed as a function of hardness and decreases as hardness decreases. The actual criteria are calculated based on the hardness (as $CaCO_3$) of the sample water. Values displayed above correspond to a total hardness of 100mg/L.
[17] Criteria values are from the EPA's 2004 National Recommended Water Quality Criteria.
[18] Criterion for freshwater aquatic life protection (EPA's 1986 “Gold Book”).
[19] Criterion for domestic water supplies (EPA's 1986 “Gold Book”).
[20] *E. coli* data were not required in the TSP and therefore were not collected in 2024; however, as noted during the ISR meeting, SCE collected supplemental *E. coli* data in 2025.
[21] Geometric mean of five samples - criterion for domestic water supplies (EPA's 1986 “Gold Book”).
[22] Six-week rolling geometric mean of 100/100 mL and a statistical threshold value of 320/100 mL not to be exceeded by more than 10 percent of the samples collected in a calendar month. Presence/Absence analysis was used to align with current TSP sampling effort/schedule.

Key:
°C = degrees celsius
µg/L = micrograms per liter
µS/cm = microsiemens per centimeter
CTR = California Toxics Rule
DO = dissolved oxygen
EPA = Environmental Protection Agency
MDL= Method Detection Limit: The minimum measured concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results.
mg/L = milligrams per liter
mL = milliliters
MPN = Most probable number of bacterial colonies per 100 mL of water.

MRL= Method Reporting Limit: The lowest concentration of a substance that can be reliably reported under current laboratory operating conditions.
NS = no standard available
NTU = Nephelometric Turbidity Units
ppt = parts per trillion
RL = reporting limit
TKN = total Kjeldahl nitrogen

Table 5-1. Water Quality Control Plan for the Tulare Lake Basin Beneficial Uses in the Project Study Area

Beneficial Use	Definition
Hydropower Generation (POW)	Beneficial uses of waters used for hydroelectric power generation.
Water Contact Recreation (REC-1)	Beneficial uses of waters used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.
Non-contact Water Recreation (REC-2)	Beneficial uses of waters used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.
Warm Freshwater Habitat (WARM)	Beneficial uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Cold Freshwater Habitat (COLD)	Beneficial uses of waters that support cold water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.
Wildlife Habitat (WILD)	Beneficial uses of waters that support wildlife habitats including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.
Rare, Threatened, or Endangered Species (RARE)	Beneficial uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

Table 5-2. Summary of *In-Situ* Sample Results for the 2024 Sampling Year

Site ID	Site Description	Date	Time of Day	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Specific Conductance (µS/cm at 25°C)	pH	Alkalinity (mg/L)	Salinity (ppt)[1]
Spring Runoff										
KR 55.6	Kern River above Democrat Dam	6/27/2024	0830	18.9	8.68	94	92	7.97	40	0.0348
KR 55.2	Kern River below rafting take-out	6/27/2024	0845	19.0	8.73	94	92	7.97	40	0.0348
KR 54.36	Kern River between Democrat Dam and Instream Flow Release	6/27/2024	940	19.0	9.10	98	92	7.96	40	0.0348
KR 54.2	Kern River below Instream Flow Release	6/27/2024	1000	19.1	9.06	98	92	8.01	40	0.0348
KR 53.84	Kern River near USGS gage 11192500; below Democrat Dam	6/27/2024	1030	19.2	8.99	92	93	8.00	40	0.0352
KR 50.3	Kern River near Lucas Creek	6/27/2024	1110	19.5	8.93	97	92	8.04	40	0.0348
KR 48.7	Kern River below Upper Richbar Day Use Area	6/27/2024	1130	19.6	8.94	98	92	8.12	40	0.0348
KR 48.4	Kern River below Lower Richbar Day Use Area	6/27/2024	1145	19.6	8.96	98	92	8.14	40	0.0348
KR 47.78	Kern River below Live Oak Day Use Area	6/27/2024	1200	19.7	8.93	98	92	8.12	40	0.0348
KRTR 43.94	Kern River No. 1 Powerhouse Tailrace	6/26/2024	1220	20.5	9.06	100	93	8.17	40	0.0352
KR 44.0	Kern River upstream of Kern River No. 1 Powerhouse	6/26/2024	1300	19.3	8.84	97	93	8.00	40	0.0352
Late Summer/Early Fall Base-Flow Period										
KR 55.6	Kern River above Democrat Dam	10/10/2024	1030	20.0	8.72	95	143	7.95	43	0.0562
KR 55.2	Kern River below rafting take-out	10/10/2024	1110	20.1	8.89	98	142	7.99	43	0.0558
KR 54.36	Kern River between Democrat Dam and Instream Flow Release	10/9/2024	1200	20.1	8.63	95	141	7.95	43	0.0554
KR 54.2	Kern River below Instream Flow Release	10/9/2024	1215	20.2	8.58	95	141	7.95	44	0.0554
KR 53.84	Kern River near USGS gage 11192500; below Democrat Dam	10/9/2024	1300	20.3	8.67	96	142	7.99	44	0.0558
KR 50.3	Kern River near Lucas Creek	10/10/2024	0935	19.8	8.90	97	141	7.97	43	0.0554
KR 48.7	Kern River below Upper Richbar Day Use Area	10/10/2024	1150	20.2	8.79	97	140	7.98	44	0.0550
KR 48.4	Kern River below Lower Richbar Day Use Area	10/10/2024	1200	20.4	8.95	99	142	8.00	44	0.0558
KR 47.78	Kern River below Live Oak Day Use Area	10/10/2024	1215	20.4	8.89	99	142	8.10	43	0.0558
KRTR 43.94	Kern River No. 1 Powerhouse Tailrace	10/9/2024	1030	20.3	8.95	99	142	7.89	43	0.0558
KR 44.0	Kern River upstream of Kern River No. 1 Powerhouse	10/9/2024	1015	20.1	9.12	100	140	8.00	43	0.0550

Notes:
[1] Salinity was calculated by converting conductivity measurements (Dohrman 2023)
Key: °C = degrees Celsius
µS/cm = microsiemens per centimeter
mg/L = milligrams per liter
pH = potential of hydrogen
ppt = parts per trillion
USGS = U.S. Geological Survey

Table 5-3. Summary of *In-Situ* Sample Results for the 2025 Sampling Year

Site ID	Site Description	Date	Time of Day	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Specific Conductance (µS/cm at 25 °C)	pH	Alkalinity (mg/L)	Salinity (PPT)[1]
Spring Runoff										
KR 55.6	Kern River above Democrat Dam	6/4/2025	1000	16.7	8.56	95	109	8.16	38	0.0419
KR 55.2	Kern River below rafting take-out (surface; impoundment)	6/4/2025	0940	16.6	8.70	96	109	8.06	46	0.0419
KR 55.2	Kern River below rafting take-out (mid-column; impoundment)	6/4/2025	0945	16.5	9.15	101	109	7.98	43	0.0419
KR 54.36	Kern River between Democrat Dam and Instream Flow Release	6/5/2025	0850	16.6	9.33	103	108	8.03	36	0.0414
KR 54.2	Kern River below Instream Flow Release	6/5/2025	0900	16.7	9.16	101	109	8.02	34	0.0419
KR 53.84	Kern River near USGS gage 11192500; below Democrat Dam	6/5/2025	0830	16.7	9.11	100	110	7.88	45	0.0423
KR 50.3	Kern River near Lucas Creek	6/4/2025	1230	17.8	8.91	100	110	8.18	32	0.0423
KR 48.7	Kern River below Upper Richbar Day Use Area	6/4/2025	1240	17.9	9.27	103	110	8.18	40	0.0423
KR 48.4	Kern River below Lower Richbar Day Use Area	6/4/2025	1245	17.9	9.33	104	100	8.23	40	0.0381
KR 47.78	Kern River below Live Oak Day Use Area	6/4/2025	1255	18.0	9.32	104	110	8.25	40	0.0423
KRTR 43.94	Kern River No. 1 Powerhouse Tailrace	6/3/2025	1140	16.7	9.12	97	112	8.00	40	0.0431
KR 44.0	Kern River upstream of Kern River No. 1 Powerhouse	6/3/2025	1200	18.9	8.75	97	117	8.13	40	0.0452
Late Summer/Early Fall Base-Flow Period										
KR 55.6	Kern River above Democrat Dam	9/30/2025	1250	21.2	8.60	103	133	8.18	42	0.0520
KR 55.2	Kern River below rafting take-out (surface; impoundment)	9/30/2025	1215	21.0	8.63	103	132	8.18	43	0.0515
KR 55.2	Kern River below rafting take-out (mid-column; impoundment)	9/30/2025	1220	21.0	8.66	104	133	8.18	42	0.0520
KR 54.36	Kern River between Democrat Dam and Instream Flow Release	9/30/2025	1615	21.5	8.33	101	144	8.09	43	0.0567
KR 54.2	Kern River below Instream Flow Release	9/30/2025	1630	21.5	8.34	101	134	7.91	44	0.0524
KR 53.84	Kern River near USGS gage 11192500; below Democrat Dam	9/30/2025	1335	21.9	8.61	104	144	7.96	42	0.0567
KR 50.3	Kern River near Lucas Creek	9/30/2025	1415	21.8	8.62	104	145	8.34	42	0.0571
KR 48.7	Kern River below Upper Richbar Day Use Area	9/30/2025	1700	21.9	8.76	102	144	8.20	43	0.0567
KR 48.4	Kern River below Lower Richbar Day Use Area	9/30/2025	1710	21.8	8.82	103	142	8.12	43	0.0558
KR 47.78	Kern River below Live Oak Day Use Area	9/30/2025	1715	21.8	8.75	102	142	8.29	44	0.0558
KRTR 43.94	Kern River No. 1 Powerhouse Tailrace	9/30/2025	0940	20.9	8.91	103	143	7.99	43	0.0562
KR 44.0	Kern River upstream of Kern River No. 1 Powerhouse	9/30/2025	0915	20.5	8.98	103	146	7.92	43	0.0575

Notes:
[1] Salinity was calculated by converting conductivity measurements (Dohrman 2023)

Key:
°C = degrees Celsius
µS/cm = microsiemens per centimeter
mg/L = milligrams per liter
pH = potential of hydrogen
ppt = parts per trillion
USGS = U.S. Geological Survey

Table 5-4. Summary of 2025 Turbidity Sampling Results

Site ID[2]	Site Description	Turbidity (NTU)				
		Sampling Period[1]				
		Water Temperature Logger Installation (May 4-5, 2025)	Spring *In-situ* Sampling (June 3-5, 2025)	Water Temperature Logger Download (Mid-Season) (August 14, 2025)	Fall *In-situ* Sampling (September 30, 2025)	Water Temperature Logger Removal (October 22, 2025)
KR 55.6	Kern River above Democrat Dam (representative of natural turbidity)	2.40	1.26	2.56	5.96	7.50
KR 55.2	Kern River below rafting take-out (surface; impoundment)	-	1.31	-	5.09	-
KR 55.2	Kern River below rafting take-out (mid-column; impoundment)	-	1.47	-	4.98	-
KR 54.36	Kern River between Democrat Dam and Instream Flow Release	4.80	1.20	2.60	4.96	9.60
KR 54.2	Kern River below Instream Flow Release	4.50	1.29	2.40	5.45	9.10
KR 53.84	Kern River near USGS gage 11192500; below Democrat Dam	4.20	1.38	2.60	5.54	10.10
KR 50.3	Kern River near Lucas Creek	5.05	2.16	2.50	7.03	10.00
KR 48.7	Kern River below Upper Richbar Day Use Area	-	2.15	-	4.99	-
KR 48.4	Kern River below Lower Richbar Day Use Area	-	2.55	-	5.05	-
KR 47.78	Kern River below Live Oak Day Use Area	-	2.30	-	5.65	-
KRTR 43.94	Kern River No. 1 Powerhouse Tailrace	4.50	2.65	N/A[3]	8.20	10.65
KR 44.0	Kern River upstream of Kern River No. 1 Powerhouse	8.00	3.09	2.50	7.95	14.75

Notes:
[1] Turbidity was recorded during the 2025 spring and fall *in-situ* field measurement periods and incidentally at water temperature monitoring locations in May, August, and October.
[2] Turbidity was only recorded at water temperature monitoring locations during the incidental sampling.
[3] Flowing water was not present in tailrace at the time of sampling.

Table 5-5. Summary of Seasonal Grab Sample Results Collected During the Spring 2024 Sampling Event

Water Quality Parameters	Units	MDL	RL	Water Quality Criteria	Site ID, Lab Sample ID, Date, Time and Analytical Results							
					KR 55.6 Kern River above Democrat Dam (surface)	KR 55.2 Kern River above Democrat Dam (mid-column)	KR 54.36 Kern River between Democrat Dam and Instream Flow Release	KR 54.2 Kern River below Instream Flow Release	KR 53.84 Kern River near USGS Gage 11192500	KR 50.3 Kern River near Lucas Creek	KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	KR 44.0 Kern River upstream of Kern No. 1 Powerhouse
					2406585-02	–	2406585-01	2406585-05	2406585-03	2406585-04	2406558-01	2406558-02
					6/27/2024	–	6/27/2024	6/27/2024	6/27/2024	6/27/2024	6/26/2024	6/26/2024
					0830	–	0940	1000	1030	1110	1220	1300
General Parameters												
Nitrate as N	mg/L	0.01	0.10	10[2]	0.35	–	0.15	0.30	0.46	0.28	0.15	0.40
Nitrite as N	mg/L	6.7	150	1[2]	ND	–	ND	ND	ND	ND	ND	ND
Ammonia as N	mg/L	0.33	0.80	0.025[3]	ND	–	ND	ND	ND	ND	ND	ND
TKN	mg/L	0.30	0.80	NS	0.39	–	ND	ND	ND	0.35	0.32	0.61
Total Phosphorus	µg/L	0.0022	0.10	NS	ND	–	ND	ND	ND	ND	ND	ND
Ortho-phosphate	mg/L	0.016	0.30	NS	ND	–	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	5.0	10.0	500[2]	94.0	–	80.0	69.0	89.0	86.0	ND	49.0
Total Suspended Solids	mg/L	2.0	2.5	NS	56.0	–	6.7	6.2	7.9	8.7	9.1	7.4
Total Alkalinity (as $CaCO_3$)	mg/L	10.0	10.0	>20[4]	38.0	–	38.0	38.0	37.0	38.0	36.0	36.0
Metals - Dissolved												
Arsenic	µg/L	0.005	0.020	10[2]	ND	–	ND	ND	ND	ND	ND	ND
Cadmium	µg/L	7.0	10.0	Hardness dependent[5]	ND	–	ND	ND	ND	ND	ND	ND
Copper	µg/L	16	50.0	Hardness dependent[5]	ND	–	ND	ND	ND	ND	ND	ND
Iron	µg/L	0.031	0.10	300[2]	0.10	–	0.10	ND	0.10	ND	ND	0.10
Lead	µg/L	0.01	0.05	Hardness dependent[5]	ND	–	ND	ND	ND	ND	ND	ND
Manganese	µg/L	0.0030	0.030	50[2]	0.056	–	0.056	0.055	0.054	0.057	0.061	0.069
Nickel	µg/L	0.0010	0.010	Hardness dependent[5]	ND	–	ND	ND	ND	ND	ND	ND
Chromium-Total	µg/L	2.00	10.0	50[2]	ND	–	ND	ND	ND	ND	ND	ND
Metals-Total												
Total Mercury	ng/L	0.08	0.20	1,400[6]	ND	–	ND	ND	ND	ND	ND	ND

Notes: [1] KR 55.2 was not sampled in the spring.
[2] Water quality objective from the 2018 Water Quality Control Plan for the Tulare Lake Basin Third Edition.
[3] Basin Plan water quality objective is 0.025 mg/L. EPA criterion is pH, temperature, and life cycle dependent. See Table 5-9 for EPA criteria and results.
[4] EPA criterion. The CCC of 20 mg/L is a minimum value except where alkalinity is naturally lower, in which case the criterion cannot be lower than 25 percent of the natural level.
[5] Criterion is hardness dependent which is expressed as a function of hardness and decreases as hardness decreases. Actual criterion is calculated based on the hardness (as $CaCO_3$) of the sample water. Hardness was not directly analyzed in 2024 but all values were ND.
[6] EPA maximum concentration (1-hour average) criterion for freshwater aquatic life protection. Basin Plan water quality objective is less stringent (2,000 ng/L).

Key:
µg/L = micrograms per liter
MDL= Method Detection Limit
mg/L = milligrams per liter
ND = Analyte was not detected above the MDL and is therefore considered a non-detect.
ng/L = nanograms per liter
NS = No standard
RL = Reporting Limit: The lowest concentration of a substance that can be reliably reported under current laboratory operating conditions.
TKN = total Kjeldahl nitrogen

Table 5-6. Summary of Seasonal Grab Sample Results Collected During the Fall 2024 Sampling Event

Water Quality Parameters	Units	MDL	RL	Water Quality Criteria	Site ID, Lab Sample ID, Date, Time and Analytical Results							
					KR 55.2 Kern River above Democrat Dam (surface)	KR 55.2 Kern River above Democrat Dam (mid-column)	KR 54.36 Kern River between Democrat Dam and Instream Flow Release	KR 54.2 Kern River below Instream Flow Release	KR 53.84 Kern River near USGS Gage 11192500	KR 50.3 Kern River near Lucas Creek	KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	KR 44.0 Kern River upstream of Kern No. 1 Powerhouse
					2410283-02 AHJ3577	2410283-03 AHJ3577	2410259-03 AHJ3600	2410259-02 AHJ3600	2410259-05 AHJ3600	2410283-01 AHJ3577	2410259-01 AHJ3600	2410259-04 AHJ3600
					10/10/2024	10/10/2024	10/9/2024	10/9/2024	10/9/2024	10/10/2024	10/9/2024	10/9/2024
					1035	1100	1200	1215	1300	1000	1030	1015
General Parameters												
Nitrate as N	mg/L	0.01	0.10	10[1]	0.15	0.18	0.13	0.26	0.22	0.15	0.12	0.20
Nitrite as N	mg/L	6.7	150	1[1]	ND	ND	ND	ND	ND	ND	ND	ND
Ammonia as N	mg/L	0.33	0.80	0.025[2]	ND	ND	ND	ND	ND	ND	ND	ND
TKN	mg/L	0.30	0.10	NS	ND	ND	ND	ND	ND	ND	1.4	ND
Total Phosphorus	ug/L	0.0022	0.10	NS	ND	ND	ND	ND	ND	ND	ND	ND
Ortho-phosphate	mg/L	0.016	0.30	NS	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	5.0	10.0	500[1]	88.0	79.0	65.0	70.0	100.0	86.0	74.0	68.0
Total Suspended Solids	mg/L	2.0	2.5	NS	2.8	ND	2.9	2.8	2.8	ND	3.6	2.7
Total Alkalinity	mg/L	10.0	10.0	>20[3]	59.0	56.0	56.0	56.0	54.0	60.0	58.0	57.0
Metals - Dissolved												
Arsenic	µg/L	0.005	0.020	10[1]	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	µg/L	7.0	10.0	Hardness dependent[4]	ND	ND	ND	ND	ND	ND	ND	ND
Copper	µg/L	16	50.0	Hardness dependent[4]	ND	ND	ND	ND	ND	ND	ND	ND
Iron	µg/L	0.031	0.10	300[1]	ND	ND	ND	ND	ND	ND	0.48	ND
Lead	µg/L	0.01	0.05	Hardness dependent[4]	ND	ND	ND	ND	ND	ND	ND	ND
Manganese	µg/L	0.0030	0.030	50[1]	0.069	0.068	0.078	0.075	0.060	0.047	0.080	0.073
Nickel	µg/L	0.0010	0.010	Hardness dependent[4]	ND	ND	ND	ND	ND	ND	ND	ND
Chromium-Total	µg/L	2.00	10.0	50[1]	ND	ND	ND	ND	ND	ND	ND	ND
Metals-Total												
Total Mercury	ng/L	0.08	0.20	1,400[5]	ND	ND	ND	ND	ND	ND	ND	ND

Notes: [1] Water quality objective from the 2018 Water Quality Control Plan for the Tulare Lake Basin Third Edition.
[2] Basin Plan water quality objective is 0.025 mg/L. EPA criterion is pH, temperature, and life cycle dependent. See Table 5-9 for EPA criteria and results.
[3] EPA criterion. The CCC of 20 mg/L is a minimum value except where alkalinity is naturally lower, in which case the criterion cannot be lower than 25 percent of the natural level.
[4] Criterion is hardness dependent which is expressed as a function of hardness and decreases as hardness decreases. Actual criterion is calculated based on the hardness (as $CaCO_3$) of the sample water. Hardness was not directly analyzed in 2024 but all values were ND.
[5] EPA maximum concentration (1-hour average) criterion for freshwater aquatic life protection. Basin Plan water quality objective is less stringent (2,000 ng/L).

Key: µg/L = micrograms per liter
MDL= method detection limit
mg/L = milligrams per liter
ND = Analyte was not detected above the MDL and is therefore considered a non-detect.
ng/L = nanograms per liter
NS = No standard
RL = Reporting Limit: The lowest concentration of a substance that can be reliably reported under current laboratory operating conditions.
TKN = total Kjeldahl nitrogen

Table 5-7. Summary of Seasonal Grab Sample Results Collected During the Spring 2025 Sampling Event

Water Quality Parameters	Units	MDL	RL	Water Quality Criteria	Site ID, Lab Sample ID, Date, Time and Analytical Results								
					KR 55.2[1] Kern River below rafting take-out (surface)	KR 55.2[1] Kern River below rafting take-out (mid-column)	KR 55.6[1] Kern River above Democrat Dam	KR 54.36 Kern River between Democrat Dam and Instream Flow Release	KR 54.2 Kern River below Instream Flow Release	KR 53.84 Kern River near USGS Gage 11192500	KR 50.3 Kern River near Lucas Creek	KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	KR 44.0 Kern River upstream of Kern No. 1 Powerhouse
					2506102-03	2506102-01	2506102-04	2506125-02	2506125-01	2506125-03	2506102-06	2506076-03	506076-02
					6/4/2025	6/4/2025	6/4/2025	6/5/2025	6/5/2025	6/5/2025	6/4/2025	6/3/2025	6/3/2025
					0940	0945	0930	0845	0855	0825	1230	1140	1150
General Parameters													
Nitrate as N	mg/L	0.01	0.10	10[2]	0.09	0.12	0.19	0.34	ND	ND	0.14	0.16	0.19
Nitrite as N	mg/L	6.7	150	1[2]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ammonia as N	mg/L	0.33	0.80	0.025[3]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Kjeldahl Nitrogen (TKN)	mg/L	0.30	0.80	NS	0.12	0.05	0.21	0.06	0.08	0.08	0.08	0.06	0.77
Total Phosphorus	ug/L	0.0022	0.10	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ortho-phosphate	mg/L	0.016	0.30	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	5.0	10.0	500[2]	73	70	84	75	78	88	96	86	100
Total Suspended Solids	mg/L	2.0	2.5	NS	ND	5.6	ND	3.0	2.6	ND	3.8	ND	4.8
Total Alkalinity (as CaCO3)	mg/L	10.0	10.0	>20[4]	46	43	44	36	34	45	32	40	34
Hardness (as CaCO3)	mg/L	2.0	2.0	NS	35	32	35	32	35	35	35	35	38
Metals - Dissolved													
Arsenic	µg/L	0.005	0.020	10[2]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	µg/L	7.0	10.0	Hardness dependent[5]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	µg/L	16	50.0	Hardness dependent[5]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron	µg/L	0.031	0.10	300[2]	0.12	0.11	0.11	ND	0.12	0.12	0.13	0.15	0.15
Lead	µg/L	0.01	0.05	Hardness dependent[5]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese	µg/L	0.0030	0.030	50[2]	ND	0.031	ND	0.030	0.032	0.031	0.039	0.047	0.051
Nickel	µg/L	0.0010	0.010	Hardness dependent[5]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium-Total	µg/L	2.00	10.0	50[2]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals-Total													
Mercury	ng/L	0.08	0.20	1,400[6]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylmercury[7]	ng/L	0.020	0.049	NS	0.072	0.059	0.057	0.073	0.066	0.065	0.075	0.078	0.084

Notes: [1] Grab samples taken at KR55.2 and KR 55.6 to address variance discussed in Section 4.1. Impoundment grab samples (KR 55.2) taken at water surface and mid-column.
[2] Water quality objective from the 2018 Water Quality Control Plan for the Tulare Lake Basin Third Edition.
[3] Basin Plan water quality objective is 0.025 mg/L. EPA criterion is pH, temperature, and life cycle dependent. See Table 5-10 for EPA criteria and results.
[4] EPA criterion. The CCC of 20 mg/L is a minimum value except where alkalinity is naturally lower, in which case the criterion cannot be lower than 25 percent of the natural level.
[5] Criterion is hardness dependent which is expressed as a function of hardness and decreases as hardness decreases. Actual criterion is calculated based on the hardness (as $CaCO_3$) of the sample water. See Table 5-11 for criteria and results.
[6] EPA maximum concentration (1-hour average) criterion for freshwater aquatic life protection. Basin Plan water quality objective is less stringent (2,000 ng/L).
[7] All methylmercury water samples (spring and fall) were batch run in the fall of 2025 by MPSL.

Key: µg/L = micrograms per liter
MDL= method detection limit
mg/L = milligrams per liter
ND = Analyte was not detected above the MDL and is therefore considered a non-detect.

ng/L = nanograms per liter
NS = No standard
RL = Reporting Limit: The lowest concentration of a substance that can be reliably reported under current laboratory operating conditions.
TKN = total Kjeldahl nitrogen

Table 5-8. Summary of Seasonal Grab Sample Results Collected During the Fall 2025 Sampling Event

Water Quality Parameters	Units	MDL	RL	Water Quality Criteria	Site ID, Lab Sample ID, Date, Time and Analytical Results								
					KR 55.2[1] Kern River below rafting take-out (surface)	KR 55.2[1] Kern River below rafting take-out (mid-column)	KR 55.6[1] Kern River above Democrat Dam	KR 54.36 Kern River between Democrat Dam and Instream Flow Release	KR 54.2 Kern River below Instream Flow Release	KR 53.84 Kern River near USGS Gage 11192500	KR 50.3 Kern River near Lucas Creek	KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	KR 44.0 Kern River upstream of Kern No. 1 Powerhouse
					2510049-06	2510049-07	2510049-08	2510049-01	2510049-02	2510049-09	2510049-10	2510049-05	2510049-03
					10/1/2025	10/1/2025	10/1/2025	9/30/2025	9/30/2025	10/1/2025	10/1/2025	10/1/2025	10/1/2025
					1200	1200	1240	1615	1630	1330	1415	0935	0915
General Parameters													
Nitrate as N	mg/L	0.01	0.10	10[2]	0.26	0.23	0.19	0.18	0.33	0.32	0.78	0.28	0.28
Nitrite as N	mg/L	6.7	150	1[2]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ammonia as N	mg/L	0.33	0.80	0.025[3]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Kjeldahl Nitrogen (TKN)	mg/L	0.30	0.10	NS	0.28	0.33	0.26	0.23	0.56	0.21	0.32	0.37	0.23
Total Phosphorus	ug/L	0.0022	0.10	NS	0.12	0.11	0.13	0.14	0.13	0.12	0.12	0.10	0.15
Ortho-phosphate	mg/L	0.016	0.30	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Dissolved Solids	mg/L	5.0	10.0	500[2]	77	65	75	92	92	92	84	96	81
Total Suspended Solids	mg/L	2.0	2.5	NS	11.0	12.0	11.0	9.6	9.6	8.3	12.0	20.0	14.0
Total Alkalinity (as CaCO3)	mg/L	10.0	10.0	>20[4]	55	57	58	51	56	57	58	60	58
Hardness (as CaCO3)	mg/L	2.0	2.0	NS	44	44	44	44	44	44	44	44	44
Metals - Dissolved													
Arsenic	µg/L	0.005	0.020	10[2]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	µg/L	7.0	10.0	Hardness dependent[5]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	µg/L	16	50.0	Hardness dependent[5]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron	µg/L	0.031	0.10	300[2]	0.11	0.11	0.11	ND	ND	ND	0.10	ND	0.11
Lead	µg/L	0.01	0.05	Hardness dependent[5]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Manganese	µg/L	0.0030	0.030	50[2]	0.098	0.099	0.10	0.074	0.082	0.085	0.089	0.110	0.094
Nickel	µg/L	0.0010	0.010	Hardness dependent[5]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium-Total	µg/L	2.00	10.0	50[2]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals-Total													
Mercury	ng/L	0.08	0.20	1,400[6]	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylmercury[7]	ng/L	0.020	0.049	NS	0.110	0.140	0.130	0.130	0.140	0.120	0.140	0.170	0.160

Notes: [1] Grab samples taken at KR55.2 and KR 55.6 to address variance discussed in Section 4.1. Impoundment grab samples (KR 55.2) taken at water surface and mid-column.
[2] Water quality objective from the 2018 Water Quality Control Plan for the Tulare Lake Basin Third Edition.
[3] Basin Plan water quality objective is 0.025 mg/L. EPA criterion is pH, temperature, and life cycle dependent. See Table 5-10 for EPA criteria and results.
[4] EPA criterion. The CCC of 20 mg/L is a minimum value except where alkalinity is naturally lower, in which case the criterion cannot be lower than 25 percent of the natural level.
[5] Criterion is hardness dependent which is expressed as a function of hardness and decreases as hardness decreases. Actual criterion is calculated based on the hardness (as $CaCO_3$) of the sample water. See Table 5-12 for criteria and results.
[6] EPA maximum concentration (1-hour average) criterion for freshwater aquatic life protection. Basin Plan water quality objective is less stringent (2,000 ng/L).
[7] All methylmercury water samples (spring and fall) were batch run in the fall of 2025 by MPSL.

Key: µg/L = micrograms per liter
MDL= method detection limit
mg/L = milligrams per liter
ND = Analyte was not detected above the MDL and is therefore considered a non-detect.

ng/L = nanograms per liter
NS = No standard
RL = Reporting Limit: The lowest concentration of a substance that can be reliably reported under current laboratory operating conditions.
TKN = total Kjeldahl nitrogen

Table 5-9. Calculated Ammonia Concentration Criteria for the Spring and Fall 2024 Sampling Events

Site ID	Date	pH	Temperature (°C)	Basin Plan Waste Discharge Exceedance Criteria (mg/L)	EPA Ammonia Chronic Criteria[1] (mg/L)	EPA Ammonia Acute Criteria[1] (mg/L)	Ammonia Concentration[2] (mg/L)
Spring Sampling							
KR 55.6 Kern River above Democrat Dam (surface)	6/27/2024	7.97	18.9	0.025	0.87	4.53	ND
KR 54.36 Kern River between Democrat Dam and Instream Flow Release	6/27/2024	7.96	19.0	0.025	0.88	4.57	ND
KR 54.2 Kern River below Instream Flow Release	6/27/2024	8.01	19.1	0.025	0.81	4.13	ND
KR 53.84 Kern River near USGS Gage 11192500	6/27/2024	8.00	19.2	0.025	0.82	4.17	ND
KR 50.3 Kern River near Lucas Creek	6/27/2024	8.04	19.5	0.025	0.76	3.77	ND
KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	6/26/2024	8.17	20.5	0.025	0.58	2.70	ND
KR 44.0 Kern River upstream of Kern No. 1 Powerhouse	6/26/2024	8.00	19.3	0.025	0.81	4.14	ND

Site ID	Date	pH	Temperature (°C)	Basin Plan Waste Discharge Exceedance Criteria (mg/L)	EPA Ammonia Chronic Criteria[1] (mg/L)	EPA Ammonia Acute Criteria[1] (mg/L)	Ammonia Concentration[2] (mg/L)
Fall Sampling							
KR 55.6 Kern River above Democrat Dam (surface)	10/10/2024	7.95	20.0	0.025	0.83	4.29	ND
KR 54.36 Kern River between Democrat Dam and Instream Flow Release	10/9/2024	7.95	20.1	0.025	0.83	4.25	ND
KR 54.2 Kern River below Instream Flow Release	10/9/2024	7.95	20.2	0.025	0.82	4.22	ND
KR 53.84 Kern River near USGS Gage 11192500	10/9/2024	7.99	20.3	0.025	0.77	3.88	ND
KR 50.3 Kern River near Lucas Creek	10/10/2024	7.97	19.8	0.025	0.82	4.20	ND
KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	10/9/2024	7.89	20.3	0.025	0.89	4.67	ND
KR 44.0 Kern River upstream of Kern No. 1 Powerhouse	10/9/2024	8.00	20.1	0.025	0.77	3.87	ND

Notes: [1] Ammonia criterion calculated using guidelines from the EPA's 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, which is based on ambient pH and temperature conditions.
[2] ND: Analyte was not detected above the method detection limit (MDL) and is therefore considered a non-detect. The MDL for ammonia is 0.015 mg/L.

Key: °C = degrees Celsius
EPA = Environmental Protection Agency
mg/L = milligrams per liter
USGS = U.S. Geological Survey

Table 5-10. Calculated Ammonia Concentration Criteria for the Spring and Fall 2025 Sampling Events

Site ID	Date	pH	Temperature (°C)	Basin Plan Waste Discharge Exceedance Criteria (mg/L)	EPA Ammonia Chronic Criteria[1] (mg/L)	EPA Ammonia Acute Criteria[1] (mg/L)	Ammonia Concentration[2] (mg/L)
Spring Sampling							
KR 55.6 Kern River above Democrat Dam	6/4/2025	8.16	16.7	0.025	0.75	3.78	ND
KR 55.2 Kern River below rafting take-out (surface)	6/4/2025	8.06	16.6	0.025	0.89	4.62	ND
KR 55.2 Kern River below rafting take-out (mid-column)	6/4/2025	7.98	16.5	0.025	1.00	5.42	ND
KR 54.36 Kern River between Democrat Dam and Instream Flow Release	6/5/2025	8.03	16.6	0.025	0.93	4.89	ND
KR 54.2 Kern River below Instream Flow Release	6/5/2025	8.02	16.7	0.025	0.93	4.94	ND
KR 53.84 Kern River near USGS Gage 11192500	6/5/2025	7.88	16.7	0.025	1.13	6.42	ND
KR 50.3 Kern River near Lucas Creek	6/4/2025	8.18	17.8	0.025	0.68	3.32	ND
KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	6/3/2025	8.00	16.7	0.025	0.96	5.13	ND
KR 44.0 Kern River upstream of Kern No. 1 Powerhouse	6/3/2025	8.13	18.9	0.025	0.69	3.34	ND

Site ID	Date	pH	Temperature (°C)	Basin Plan Waste Discharge Exceedance Criteria (mg/L)	EPA Ammonia Chronic Criteria[1] (mg/L)	EPA Ammonia Acute Criteria[1] (mg/L)	Ammonia Concentration[2] (mg/L)
Fall Sampling							
KR 55.6 Kern River above Democrat Dam	9/30/2025	8.18	21.2	0.025	0.55	2.50	ND
KR 55.2 Kern River below rafting take-out (surface)	9/30/2025	8.18	21.0	1.025	0.55	2.54	ND
KR 55.2 Kern River below rafting take-out (mid-column)	9/30/2025	8.18	21.0	2.025	0.55	2.54	ND
KR 54.36 Kern River between Democrat Dam and Instream Flow Release	9/30/2025	8.09	21.5	0.025	0.62	2.90	ND
KR 54.2 Kern River below Instream Flow Release	9/30/2025	7.91	21.5	0.025	0.80	4.08	ND
KR 53.84 Kern River near USGS Gage 11192500	9/30/2025	7.96	21.9	0.025	0.73	3.60	ND
KR 50.3 Kern River near Lucas Creek	9/30/2025	8.34	21.8	0.025	0.41	1.74	ND
KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	9/30/2025	7.99	20.9	0.025	0.74	3.69	ND
KR 44.0 Kern River upstream of Kern No. 1 Powerhouse	9/30/2025	7.92	20.5	0.025	0.84	4.35	ND

Notes: [1] Ammonia criterion calculated using guidelines from the EPA's 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, which is based on ambient pH and temperature conditions.
[2] ND: Analyte was not detected above the method detection limit (MDL) and is therefore considered a non-detect. The MDL for ammonia is 0.015 mg/L.

Key: °C = degrees Celsius
EPA = Environmental Protection Agency
mg/L = milligrams per liter
USGS = U.S. Geological Survey

Table 5-11. Hardness-based Water Quality Criteria for Cadmium, Copper, Lead, and Nickel for the Spring 2025 Sampling

Sample Location	KR 55.2 Kern River below rafting take-out (surface)	KR 55.2 Kern River below rafting take-out (mid-column)	KR 55.6 Kern River above Democrat Dam	KR 54.36 Kern River between Democrat Dam and Instream Flow Release	KR 54.2 Kern River below Instream Flow Release	KR 53.84 Kern River near USGS Gage 11192500	KR 50.3 Kern River near Lucas Creek	KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	KR 44.0 Kern River upstream of Kern No. 1 Powerhouse
Lab Sample ID	2510049-06	2510049-07	2510049-08	2510049-01	2510049-02	2510049-09	2510049-10	2510049-05	2510049-03
Date Sampled	10/1/2025	10/1/2025	10/1/2025	9/30/2025	9/30/2025	10/1/2025	10/1/2025	10/1/2025	10/1/2025
Time Sampled	1200	1200	1240	1615	1630	1330	1415	0935	0915
Hardness (CaCO3) (mg/L)	35	32	35	32	35	35	35	35	38
Cadmium (Cd)									
Laboratory Result (µg/L)	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Maximum Criterion (µg/L)	0.67	0.62	0.67	0.62	0.67	0.67	0.67	0.67	0.73
Continuous Criterion (µg/L)	0.33	0.30	0.33	0.30	0.33	0.33	0.33	0.33	0.35
Copper (Cu)									
Laboratory Result (µg/L)	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Maximum Criterion (µg/L)	5.00	4.59	5.00	4.59	5.00	5.00	5.00	5.00	5.40
Continuous Criterion (µg/L)	3.65	3.38	3.65	3.38	3.65	3.65	3.65	3.65	3.92
Lead (Pb)									
Laboratory Result (µg/L)	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Maximum Criterion (µg/L)	20.25	18.32	20.25	18.32	20.25	20.25	20.25	20.25	22.20
Continuous Criterion (µg/L)	0.79	0.71	0.79	0.71	0.79	0.79	0.79	0.79	0.87
Nickel (Ni)									
Laboratory Result (µg/L)	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Maximum Criterion (µg/L)	192.64	178.58	192.64	178.58	192.64	192.64	192.64	192.64	206.52
Continuous Criterion (µg/L)	21.40	19.83	21.40	19.83	21.40	21.40	21.40	21.40	22.94

Notes:
<MDL: Analyte was not detected above the method detection limit (MDL) and is therefore considered a non-detect. The MDL for cadmium is 0.031 µg/L, the MDL for lead is 0.026 µg/L, and the MDL for nickel is 0.117 µg/L.

Table 5-12. Hardness-based Water Quality Criteria for Cadmium, Copper, Lead, and Nickel for the Fall 2025 Sampling

Sample Location	KR 55.2 Kern River below rafting take-out (surface)	KR 55.2 Kern River below rafting take-out (mid-column)	KR 55.6 Kern River above Democrat Dam	KR 54.36 Kern River between Democrat Dam and Instream Flow Release	KR 54.2 Kern River below Instream Flow Release	KR 53.84 Kern River near USGS Gage 11192500	KR 50.3 Kern River near Lucas Creek	KRTR 43.94 Kern River No. 1 Powerhouse Tailrace	KR 44.0 Kern River upstream of Kern No. 1 Powerhouse
Lab Sample ID	2510049-06	2510049-07	2510049-08	2510049-01	2510049-02	2510049-09	2510049-10	2510049-05	2510049-03
Date Sampled	10/1/2025	10/1/2025	10/1/2025	9/30/2025	9/30/2025	10/1/2025	10/1/2025	10/1/2025	10/1/2025
Time Sampled	1200	1200	1240	1615	1630	1330	1415	0935	0915
Hardness (CaCO3) (mg/L)	44	44	44	44	44	44	44	44	44
Cadmium (Cd)									
Laboratory Result (µg/L)	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Maximum Criterion (µg/L)	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Continuous Criterion (µg/L)	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Copper (Cu)									
Laboratory Result (µg/L)	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Maximum Criterion (µg/L)	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20
Continuous Criterion (µg/L)	4.44	4.44	4.44	4.44	4.44	4.44	4.44	4.44	4.44
Lead (Pb)									
Laboratory Result (µg/L)	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Maximum Criterion (µg/L)	26.14	26.14	26.14	26.14	26.14	26.14	26.14	26.14	26.14
Continuous Criterion (µg/L)	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
Nickel (Ni)									
Laboratory Result (µg/L)	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
Maximum Criterion (µg/L)	233.79	233.79	233.79	233.79	233.79	233.79	233.79	233.79	233.79
Continuous Criterion (µg/L)	25.97	25.97	25.97	25.97	25.97	25.97	25.97	25.97	25.97

Notes:
<MDL: Analyte was not detected above the method detection limit (MDL) and is therefore considered a non-detect. The MDL for cadmium is 0.031 µg/L, the MDL for lead is 0.026 µg/L, and the MDL for nickel is 0.117 µg/L.

Table 5-13. Summary of Analytical Results for Bacterial Sampling in 2024

Sample Location	Test[1]	Sample Dates					
		7/2/2024	7/9/2024	7/18/2024	7/24/2024	8/13/2024[1]	Geometric Mean
KR 55.2	*Total Coliform (MPN/100mL)*	23.0	33.0	7.8	4.5	<1.8	8.6
	Fecal Coliform (MPN/100mL)	23.0	33.0	2.0	4.5	<1.8	6.6
KR 48.7	*Total Coliform (MPN/100mL)*	23.0	23.0	7.8	2.0	<1.8	6.8
	Fecal Coliform (MPN/100mL)	23.0	23.0	7.8	2.0	<1.8	6.8
KR 48.4	*Total Coliform (MPN/100mL)*	23.0	23.0	7.8	4.5	2.0	8.2
	Fecal Coliform (MPN/100mL)	<1.8	23.0	2.0	4.5	<1.8	3.7
KR 47.78	*Total Coliform (MPN/100mL)*	>1600	33.0	49.0	7.8	<1.8	32.5
	Fecal Coliform (MPN/100mL)	>1600	33.0	22.0	7.8	<1.8	27.7

Notes: [1] Sampling delayed until August due to the Borel Fire.
Key: mL = milliliter
MPN = Most probable number of bacterial colonies per 100 mL of water.

Table 5-14. Summary of Analytical Results for Bacterial Sampling in 2025

Sample Location	Test[1]	Sample Dates					Geometric Mean
		7/3/2025 7/8/2025 (*E. coli*)	7/10/2025	7/17/2025	7/24/2025	7/31/2025	
KR 55.2	*Total Coliform (MPN/100mL)*	350.0	23.0	130	280	1600	215.9
	Fecal Coliform (MPN/100mL)	350.0	4.5	7.8	7.8	7.8	15.0
	E. coli (Presence/Absence)	Present	Present	Present	Present	Present	N/A
KR 48.7	*Total Coliform (MPN/100mL)*	920.0	33.0	240	210.0	1600	300.4
	Fecal Coliform (MPN/100mL)	920.0	4.5	33	9.3	17	29.3
	E. coli (Presence/Absence)	Present	Present	Present	Present	Present	N/A
KR 48.4	*Total Coliform (MPN/100mL)*	920.0	49.0	240	220	1600.0	328.2
	Fecal Coliform (MPN/100mL)	920.0	23.0	23.0	17	12	39.8
	E. coli (Presence/Absence)	Present	Present	Present	Present	Present	N/A
KR 47.78	*Total Coliform (MPN/100mL)*	1600	33.0	240.0	1600	1600	503.8
	Fecal Coliform (MPN/100mL)	240	1.8	1.8	13	4.5	8.5
	E. coli (Presence/Absence)	Present	Present	Present	Present	Present	N/A

Notes: [1] Presence/Absence SM-9223B test for *E.coli* included in 2025 sampling only.
Key: mL = milliliter
MPN = Most probable number of bacterial colonies per 100 mL of water.

Table 5-15. Kern River Monthly Mean, Minimum, and Maximum Water Temperature (°C) By Site in 2024

Site ID		May	June	July	August	September	October
KR 55.6 Above Democrat Dam	**Mean (°C)**	16.4	18.8	21.6	23.1	21.7	20.7
	Min	14.1	15.9	19.0	21.2	19.5	19.3
	Max	19.1	22.0	24.6	24.9	23.7	21.6
KR 54.36 Bypass Reach	**Mean (°C)**	16.5	19.0	21.7	23.2	21.7	20.7
	Min	14.6	16.1	19.0	21.2	19.8	19.2
	Max	19.1	22.0	24.6	24.9	23.7	21.7
KR 54.2[1] Bypass Reach	**Mean (°C)**	16.5	19.0	21.8	23.2	21.7	21.0
	Min	14.6	16.1	19.0	21.2	19.8	20.2
	Max	19.1	22.0	24.6	24.9	23.7	21.3
KR 53.84 Bypass Reach	**Mean (°C)**	16.6	19.0	21.8	23.1	21.6	20.9
	Min	14.6	16.1	19.0	21.2	19.5	20.2
	Max	19.0	22.0	24.5	24.8	23.6	21.6
KR 50.3[1] Bypass Reach	**Mean (°C)**	17.0	19.3	22.1	23.3	21.8	21.1
	Min	14.9	16.5	19.2	21.4	19.2	19.5
	Max	19.1	22.1	24.5	24.9	23.9	22.6
KR 44.0 Bypass Reach	**Mean (°C)**	17.7	20.0	22.6	23.6	22.2	21.1
	Min	16.0	17.4	19.7	22.1	19.8	19.2
	Max	19.3	22.1	24.5	24.9	24.9	22.6
KRTR 43.94 Powerhouse Tailrace	**Mean (°C)**	16.8	19.4	21.8	23.3	21.9	20.9
	Min	14.8	16.7	19.2	21.4	20.0	19.4
	Max	19.0	22.1	24.6	24.9	23.8	21.8

Notes: [1] The data loggers at sites KR 54.2 and KR 50.3 were dewatered from October 12 through October 15, 2024, during a flow decrease. Data from these dates were omitted from analysis.

Table 5-16. Kern River Monthly Mean, Minimum, and Maximum Water Temperature (°C) By Site in 2025

Site ID		May	June	July	August	September	October
KR 55.6 Above Democrat Dam	**Mean (°C)**	16.7	18.7	21.1	22.7	22.5	19.9
	Min	15.5	17.5	20.0	21.8	21.7	17.9
	Max	18.1	20.1	22.0	23.2	23.5	21.5
KR 54.36 Bypass Reach	**Mean (°C)**	16.8	18.8	21.2	22.8	23.1	19.9
	Min	15.7	17.6	20.1	21.9	22.1	17.7
	Max	18.3	20.3	22.1	23.3	24.2	21.5
KR 54.2 Bypass Reach	**Mean (°C)**	16.9	18.9	21.2	22.8	22.6	19.9
	Min	15.7	17.7	20.1	21.9	21.8	17.7
	Max	18.3	20.3	22.1	23.3	23.7	21.5
KR 53.84 Bypass Reach	**Mean (°C)**	16.9	18.9	21.2	22.8	22.6	19.8
	Min	15.8	17.7	20.1	21.9	21.7	17.6
	Max	18.3	20.3	22.2	23.3	23.7	21.5
KR 50.3 Bypass Reach	**Mean (°C)**	17.3	19.2	21.5	23.0	22.8	19.6
	Min	16.0	18.1	20.4	22.0	21.7	17.2
	Max	18.8	20.7	22.4	23.7	24.1	21.4
KR 44.0[1] Bypass Reach	**Mean (°C)**	N/A	20.0	22.1	23.5	23.3	19.6
	Min	N/A	18.7	20.8	22.3	22.1	16.9
	Max	N/A	21.4	22.9	24.3	24.8	21.6
KRTR 43.94 Powerhouse Tailrace	**Mean (°C)**	16.9	18.9	21.2	23.4	22.9	20.1
	Min	15.8	17.8	20.2	22.3	21.9	17.9
	Max	18.4	20.4	22.2	24.2	23.8	21.6

Notes: [1] The data loggers at KR 44.0 were vandalized; data from this site is not available from May 15 to June 2.

Table 5-17. Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C) By Site (May 15 to October 15, 2024)

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
5/15/2024	15.7	16.7	14.5	15.9	16.7	14.6	15.9	16.7	14.7	15.9	16.7	14.7	16.4	17.1	15.4	17.3	17.9	16.8	16.0	17.0	14.8
5/16/2024	16.0	17.5	14.6	16.2	17.5	14.7	16.2	17.5	14.7	16.2	17.5	14.7	16.7	17.6	15.4	17.5	18.5	16.7	16.2	17.6	14.9
5/17/2024	16.1	17.5	14.7	16.3	17.6	14.9	16.3	17.5	14.9	16.4	17.5	14.9	16.9	17.6	15.5	17.8	18.4	17.2	16.5	17.6	15.0
5/18/2024	16.2	17.8	14.5	16.3	17.8	14.6	16.3	17.8	14.6	16.4	17.8	14.7	16.8	17.8	15.4	17.7	18.3	17.0	16.6	17.9	15.1
5/19/2024	16.3	17.8	14.8	16.5	17.8	15.0	16.5	17.8	15.0	16.6	17.8	15.0	17.1	17.8	16.0	18.0	18.7	17.5	16.9	17.9	15.6
5/20/2024	16.0	17.4	14.7	16.1	17.4	14.7	16.1	17.4	14.7	16.1	17.4	14.7	16.6	17.7	15.1	17.3	17.8	16.4	16.5	17.6	15.2
5/21/2024	16.1	17.6	14.6	16.1	17.6	14.7	16.1	17.6	14.7	16.1	17.6	14.6	16.4	17.6	14.9	17.0	17.7	16.0	16.4	17.6	15.1
5/22/2024	16.3	17.4	15.2	16.4	17.3	15.2	16.4	17.3	15.2	16.5	17.3	15.2	16.8	17.6	15.7	17.5	18.3	16.8	16.9	17.6	16.0
5/23/2024	16.0	17.5	14.6	16.2	17.5	14.6	16.2	17.5	14.6	16.2	17.4	14.6	16.6	17.5	15.0	17.2	17.9	16.5	16.5	17.6	15.1
5/24/2024	16.1	17.6	14.7	16.2	17.6	14.8	16.2	17.6	14.8	16.2	17.5	14.7	16.6	17.4	15.1	17.2	17.7	16.4	16.5	17.6	15.3
5/25/2024	15.9	17.1	14.4	16.0	17.2	14.6	16.0	17.1	14.6	16.0	17.1	14.6	16.3	17.1	15.2	17.1	17.9	16.3	16.4	17.3	15.2
5/26/2024	16.4	18.1	14.7	16.5	18.0	15.0	16.5	18.0	15.0	16.5	17.9	15.1	16.9	17.8	15.9	17.6	19.0	16.6	16.6	18.0	15.3
5/27/2024	17.1	18.5	15.7	17.2	18.4	15.8	17.2	18.4	15.8	17.2	18.4	15.8	17.6	18.4	16.4	18.3	19.2	17.6	17.4	18.5	16.2
5/28/2024	17.1	18.4	15.7	17.3	18.4	15.8	17.3	18.4	15.8	17.3	18.3	15.8	17.7	18.4	16.6	18.5	19.2	18.1	17.7	18.5	16.6
5/29/2024	16.9	18.4	15.3	17.0	18.5	15.4	17.0	18.5	15.4	17.1	18.4	15.4	17.5	18.5	15.8	18.2	18.6	17.5	17.5	18.5	16.2
5/30/2024	17.1	18.9	15.6	17.2	18.9	15.7	17.2	18.9	15.7	17.2	18.8	15.7	17.5	18.9	16.0	18.2	19.0	17.0	17.6	18.9	16.3
5/31/2024	17.5	19.1	16.1	17.6	19.1	16.2	17.6	19.1	16.2	17.6	19.0	16.2	18.0	19.1	16.6	18.6	19.3	17.7	18.1	19.0	17.0
6/1/2024	17.4	18.8	15.9	17.6	18.8	16.1	17.5	18.7	16.1	17.6	18.7	16.1	18.0	18.9	16.8	18.9	19.5	18.2	18.0	18.9	16.9
6/2/2024	17.3	18.6	16.0	17.5	18.7	16.1	17.5	18.7	16.1	17.6	18.6	16.2	18.1	18.7	17.1	18.8	19.6	18.4	17.9	18.8	16.7
6/3/2024	17.3	18.4	16.1	17.4	18.5	16.2	17.4	18.5	16.2	17.4	18.5	16.1	17.7	18.7	16.5	18.4	19.0	17.4	17.9	18.7	16.8
6/4/2024	17.9	19.6	16.4	18.0	19.7	16.4	18.0	19.7	16.4	18.0	19.7	16.4	18.4	19.8	16.8	18.9	20.0	17.9	18.5	19.8	17.3
6/5/2024	18.3	20.1	17.0	18.4	20.1	17.1	18.4	20.1	17.1	18.5	20.1	17.1	18.9	20.3	17.5	19.7	20.4	18.6	19.0	20.2	17.8
6/6/2024	18.4	19.9	17.2	18.6	20.0	17.3	18.6	20.0	17.3	18.6	20.0	17.3	19.1	20.2	17.7	19.9	20.6	18.7	19.1	20.3	17.8
6/7/2024	18.3	19.4	17.3	18.5	19.8	17.4	18.5	19.8	17.4	18.5	19.8	17.4	19.0	19.9	17.8	19.9	20.6	18.9	19.0	20.0	17.9
6/8/2024	18.1	19.2	17.0	18.3	19.6	16.8	18.3	19.6	16.8	18.3	19.5	16.8	18.6	19.7	17.1	19.3	20.2	18.1	18.8	19.8	17.6
6/9/2024	18.0	19.1	16.9	18.3	19.7	16.7	18.3	19.7	16.7	18.3	19.7	16.8	18.7	19.8	17.3	19.5	20.0	18.7	18.6	19.8	17.1
6/10/2024	18.4	20.2	17.2	18.5	20.3	16.9	18.5	20.3	16.9	18.5	20.2	16.9	18.8	20.4	17.1	19.3	20.6	17.8	18.8	20.4	17.2
6/11/2024	18.7	20.7	17.2	18.8	20.7	17.3	18.8	20.7	17.3	18.8	20.6	17.4	19.2	20.8	17.7	19.9	21.0	18.7	19.2	20.7	17.8
6/12/2024	18.7	20.6	17.3	18.9	20.6	17.4	18.9	20.6	17.4	18.9	20.5	17.4	19.3	20.7	17.8	20.1	21.1	18.8	19.3	20.6	17.9
6/13/2024	18.8	20.1	17.4	18.9	20.2	17.5	18.9	20.2	17.5	18.9	20.2	17.5	19.3	20.4	18.0	20.1	20.9	19.1	19.5	20.4	18.3
6/14/2024	18.8	20.5	17.4	18.9	20.6	17.5	18.9	20.6	17.5	18.9	20.5	17.5	19.3	20.7	17.9	19.9	20.8	18.7	19.5	20.6	18.1
6/15/2024	18.4	19.8	17.2	18.6	19.8	17.2	18.6	19.8	17.2	18.6	19.8	17.2	18.9	20.1	17.5	19.6	20.8	18.5	19.0	20.5	17.7
6/16/2024	18.3	19.9	17.0	18.4	19.8	17.0	18.4	19.9	16.9	18.4	19.8	16.9	18.7	19.9	17.2	19.2	19.9	18.2	18.5	19.9	17.2
6/17/2024	18.5	19.9	17.5	18.6	19.9	17.5	18.6	19.9	17.5	18.6	19.9	17.4	18.8	20.0	17.5	19.3	20.0	18.0	18.9	20.0	17.7
6/18/2024	18.7	20.3	17.2	18.8	20.3	17.2	18.8	20.3	17.2	18.7	20.2	17.2	18.9	20.3	17.3	19.3	20.3	18.0	19.1	20.2	17.7
6/19/2024	19.0	20.4	17.9	19.1	20.4	18.0	19.1	20.4	18.0	19.1	20.3	18.0	19.3	20.5	18.2	19.7	20.5	18.6	19.5	20.4	18.4
6/20/2024	19.1	20.7	17.7	19.2	20.8	17.7	19.2	20.7	17.7	19.2	20.7	17.7	19.4	20.8	17.8	19.8	20.8	18.5	19.6	20.7	18.2

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
6/21/2024	19.4	21.0	18.1	19.5	21.1	18.1	19.5	21.1	18.1	19.5	21.0	18.1	19.8	21.2	18.2	20.2	21.3	18.9	19.8	21.1	18.5
6/22/2024	19.7	21.5	18.3	19.8	21.4	18.4	19.8	21.5	18.4	19.8	21.4	18.3	20.1	21.6	18.6	20.6	21.6	19.4	20.1	21.4	18.8
6/23/2024	19.8	21.3	18.7	20.0	21.3	18.8	20.0	21.3	18.8	20.0	21.2	18.8	20.4	21.5	19.2	21.1	21.9	19.9	20.5	21.4	19.5
6/24/2024	19.8	21.1	18.9	20.0	21.2	18.9	19.9	21.1	18.9	20.0	21.1	18.9	20.4	21.4	19.2	21.1	21.9	19.8	20.7	21.6	19.5
6/25/2024	20.1	21.5	19.0	20.2	21.6	19.0	20.2	21.6	19.0	20.2	21.5	19.0	20.6	21.7	19.3	21.2	22.0	20.0	20.8	21.8	19.7
6/26/2024	19.9	21.1	18.9	20.0	21.1	18.9	20.0	21.1	18.9	20.0	21.0	18.9	20.4	21.5	19.2	21.1	22.0	19.9	20.5	21.6	19.6
6/27/2024	19.8	21.2	18.8	19.9	21.3	18.8	19.9	21.4	18.8	19.9	21.4	18.9	20.3	21.5	19.0	20.8	21.7	19.5	20.0	21.4	19.0
6/28/2024	20.0	21.4	18.9	20.1	21.5	18.8	20.1	21.5	18.8	20.1	21.5	18.8	20.3	21.6	19.0	20.8	21.8	19.5	20.1	21.6	19.0
6/29/2024	20.3	22.0	18.8	20.4	22.0	18.8	20.4	22.0	18.8	20.4	22.0	18.8	20.7	22.1	19.2	21.1	22.1	20.0	20.5	22.1	19.0
6/30/2024	20.2	21.7	19.0	20.3	21.7	19.0	20.3	21.7	19.0	20.3	21.7	19.0	20.7	21.8	19.2	21.3	22.1	20.1	20.4	21.7	19.2
7/1/2024	20.4	22.0	19.0	20.5	22.0	19.0	20.5	22.0	19.0	20.5	22.0	19.0	20.8	22.2	19.2	21.4	22.4	19.7	20.6	22.1	19.2
7/2/2024	20.7	22.5	19.3	20.8	22.6	19.3	20.8	22.6	19.3	20.8	22.6	19.2	21.2	22.8	19.4	21.7	23.0	20.2	20.9	22.6	19.4
7/3/2024	20.8	22.2	19.6	20.9	22.2	19.6	20.9	22.2	19.6	20.9	22.2	19.6	21.3	22.4	19.9	21.9	22.9	20.7	21.0	22.3	19.8
7/4/2024	20.7	22.1	19.5	20.9	22.1	19.6	20.9	22.2	19.6	20.9	22.1	19.6	21.2	22.3	19.9	21.9	22.6	20.7	21.0	22.2	19.7
7/5/2024	21.0	22.4	19.7	21.1	22.5	19.7	21.1	22.5	19.7	21.1	22.5	19.7	21.5	22.7	20.0	22.1	23.0	20.9	21.2	22.6	19.8
7/6/2024	21.0	22.9	19.6	21.1	23.1	19.6	21.1	23.1	19.6	21.1	23.1	19.6	21.5	23.3	19.9	22.1	23.4	20.7	21.2	23.1	19.8
7/7/2024	21.1	22.7	19.7	21.2	22.8	19.7	21.2	22.8	19.7	21.2	22.7	19.7	21.6	22.9	20.0	22.3	23.4	21.0	21.3	22.8	19.9
7/8/2024	21.1	22.4	20.0	21.3	22.5	20.1	21.3	22.5	20.1	21.3	22.4	20.1	21.7	22.6	20.4	22.3	23.2	21.1	21.3	22.5	20.2
7/9/2024	21.2	22.9	20.1	21.4	23.0	20.1	21.4	23.0	20.1	21.4	23.0	20.1	21.7	23.1	20.3	22.3	23.3	20.9	21.5	23.0	20.2
7/10/2024	21.1	22.8	19.8	21.2	23.0	19.8	21.2	23.0	19.8	21.2	23.0	19.8	21.6	23.1	20.0	22.2	23.3	20.7	21.3	23.0	20.0
7/11/2024	21.3	22.9	20.1	21.4	23.1	20.1	21.4	23.1	20.1	21.4	23.1	20.1	21.7	23.2	20.2	22.3	23.3	20.9	21.5	23.1	20.2
7/12/2024	21.2	22.6	20.1	21.3	22.8	20.1	21.3	22.8	20.1	21.3	22.7	20.1	21.6	22.9	20.3	22.1	23.3	20.9	21.4	22.8	20.2
7/13/2024	21.4	22.7	20.3	21.5	22.9	20.3	21.5	22.9	20.3	21.5	22.9	20.2	21.8	23.0	20.5	22.4	23.2	21.3	21.6	22.9	20.4
7/14/2024	21.3	22.5	20.6	21.4	22.6	20.6	21.5	22.6	20.6	21.5	22.6	20.6	21.9	22.8	20.8	22.6	23.4	21.3	21.6	22.6	20.7
7/15/2024	21.6	22.8	20.6	21.7	22.9	20.7	21.7	22.9	20.7	21.7	22.9	20.7	22.0	23.1	20.9	22.5	23.4	21.4	21.7	22.9	20.8
7/16/2024	21.8	23.6	20.6	21.9	23.7	20.6	21.9	23.7	20.6	21.9	23.7	20.6	22.2	23.8	20.8	22.7	23.9	21.4	22.0	23.7	20.7
7/17/2024	21.7	23.3	20.4	21.7	23.3	20.4	21.7	23.3	20.4	21.7	23.3	20.4	22.1	23.4	20.7	22.6	23.9	21.2	21.9	23.4	20.6
7/18/2024	21.8	23.4	20.5	21.9	23.5	20.5	21.9	23.5	20.5	21.9	23.4	20.5	22.2	23.5	20.7	22.7	23.6	21.2	21.9	23.5	20.6
7/19/2024	21.8	23.7	20.5	21.9	23.7	20.5	21.9	23.7	20.5	21.9	23.7	20.4	22.2	23.8	20.5	22.6	23.9	21.1	22.0	23.7	20.6
7/20/2024	21.9	23.6	20.7	22.0	23.7	20.7	22.1	23.7	20.7	22.0	23.6	20.6	22.4	23.8	20.8	23.0	23.9	21.5	22.1	23.7	20.8
7/21/2024	22.0	23.7	20.7	22.1	23.7	20.7	22.1	23.7	20.7	22.1	23.6	20.7	22.4	23.8	21.0	23.0	23.9	21.8	22.2	23.7	20.9
7/22/2024	22.3	24.3	20.9	22.4	24.3	20.9	22.4	24.3	20.9	22.4	24.3	20.9	22.7	24.4	21.1	23.2	24.5	21.8	22.5	24.4	21.0
7/23/2024	22.3	23.8	21.1	22.4	23.8	21.2	22.4	23.8	21.2	22.4	23.8	21.2	22.8	24.0	21.4	23.5	24.5	22.2	22.5	23.9	21.3
7/24/2024	22.5	23.8	21.5	22.6	23.9	21.5	22.7	23.9	21.5	22.7	23.9	21.5	23.1	24.1	21.8	23.8	24.5	22.6	22.8	23.9	21.7
7/25/2024	22.6	24.2	21.3	22.7	24.2	21.3	22.7	24.2	21.3	22.7	24.2	21.3	22.9	24.3	21.5	23.5	24.4	22.2	22.7	24.2	21.4
7/26/2024	22.5	23.9	21.4	22.7	23.9	21.4	22.7	23.9	21.4	22.7	23.8	21.4	23.1	24.2	21.7	23.7	24.5	22.8	22.8	24.0	21.5
7/27/2024	22.1	23.3	20.8	22.2	23.2	20.8	22.2	23.2	20.7	22.2	23.2	20.7	22.4	23.5	20.9	22.9	23.8	21.8	22.3	23.5	20.9
7/28/2024	22.0	23.1	20.8	22.1	23.1	20.7	22.1	23.1	20.7	22.1	23.1	20.7	22.3	23.3	20.9	22.7	23.4	21.8	22.2	23.2	20.9

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
7/29/2024	22.4	24.0	20.9	22.4	23.9	20.8	22.4	23.9	20.8	22.4	23.8	20.8	22.5	23.8	21.0	22.8	23.7	21.9	22.4	23.9	21.0
7/30/2024	22.5	24.2	21.1	22.6	24.2	21.0	22.6	24.2	21.0	22.6	24.1	21.0	22.8	24.1	21.1	23.2	23.7	22.2	22.7	24.2	21.2
7/31/2024	22.8	24.6	21.1	22.8	24.6	21.1	22.8	24.6	21.1	22.8	24.5	21.1	23.0	24.5	21.1	23.3	24.3	21.8	22.9	24.6	21.2
8/1/2024	22.9	24.3	21.6	22.9	24.3	21.6	22.9	24.3	21.6	22.9	24.2	21.6	23.2	24.3	21.8	23.6	24.3	22.6	23.0	24.3	21.8
8/2/2024	22.8	23.7	22.1	22.9	23.6	22.1	22.9	23.6	22.1	22.8	23.6	22.1	23.1	24.1	22.4	23.6	24.3	22.9	23.0	23.9	22.3
8/3/2024	23.2	24.8	21.8	23.3	24.7	21.9	23.3	24.7	21.9	23.3	24.6	22.0	23.5	24.7	22.4	23.9	24.5	23.3	23.3	24.8	22.0
8/4/2024	23.3	24.7	21.8	23.4	24.6	21.9	23.4	24.7	21.8	23.4	24.6	21.9	23.7	24.7	22.3	24.2	24.6	23.6	23.5	24.7	22.0
8/5/2024	23.5	24.8	22.3	23.6	24.8	22.3	23.6	24.8	22.3	23.5	24.7	22.3	23.9	24.8	22.5	24.3	24.9	23.5	23.6	24.8	22.4
8/6/2024	23.5	24.9	22.3	23.6	24.9	22.2	23.6	24.9	22.2	23.6	24.8	22.3	23.9	24.9	22.5	24.4	24.9	23.6	23.7	24.9	22.4
8/7/2024	23.5	24.7	22.3	23.6	24.7	22.4	23.6	24.7	22.3	23.6	24.7	22.3	23.9	24.8	22.7	24.3	24.7	23.6	23.7	24.8	22.5
8/8/2024	23.4	24.6	22.4	23.5	24.6	22.3	23.5	24.6	22.3	23.5	24.6	22.3	23.8	24.6	22.6	24.2	24.7	23.5	23.6	24.7	22.5
8/9/2024	23.4	24.7	22.2	23.4	24.6	22.1	23.4	24.6	22.1	23.4	24.6	22.1	23.6	24.5	22.3	24.0	24.5	23.2	23.5	24.7	22.3
8/10/2024	23.5	24.9	22.2	23.6	24.8	22.2	23.6	24.8	22.2	23.5	24.8	22.2	23.8	24.7	22.6	24.1	24.6	23.5	23.6	24.9	22.4
8/11/2024	23.5	24.7	22.1	23.5	24.6	22.1	23.5	24.6	22.1	23.5	24.6	22.1	23.8	24.5	22.5	24.1	24.5	23.6	23.6	24.7	22.3
8/12/2024	23.5	24.7	22.4	23.6	24.7	22.3	23.6	24.7	22.3	23.6	24.6	22.3	23.8	24.6	22.6	24.1	24.6	23.5	23.7	24.7	22.5
8/13/2024	23.5	24.6	22.5	23.5	24.6	22.4	23.5	24.6	22.4	23.5	24.5	22.4	23.7	24.5	22.5	24.0	24.4	23.2	23.6	24.7	22.6
8/14/2024	23.3	24.4	22.2	23.3	24.4	22.2	23.3	24.3	22.2	23.3	24.3	22.2	23.5	24.2	22.3	23.7	24.2	23.0	23.4	24.4	22.3
8/15/2024	23.2	24.4	22.3	23.3	24.4	22.2	23.3	24.4	22.2	23.3	24.3	22.1	23.4	24.2	22.2	23.6	24.2	22.9	23.4	24.4	22.3
8/16/2024	23.3	24.6	22.2	23.3	24.5	22.1	23.3	24.5	22.1	23.3	24.5	22.1	23.5	24.3	22.1	23.7	24.3	22.9	23.4	24.6	22.2
8/17/2024	23.3	24.5	22.1	23.4	24.4	22.1	23.4	24.4	22.1	23.3	24.3	22.1	23.5	24.2	22.3	23.7	24.2	23.2	23.5	24.4	22.3
8/18/2024	23.4	24.6	22.3	23.5	24.5	22.3	23.5	24.5	22.3	23.5	24.4	22.3	23.6	24.3	22.6	23.9	24.6	23.3	23.6	24.5	22.5
8/19/2024	23.4	24.6	22.3	23.5	24.5	22.2	23.5	24.5	22.2	23.5	24.4	22.3	23.6	24.3	22.4	23.9	24.4	23.3	23.6	24.6	22.4
8/20/2024	23.4	24.5	22.3	23.5	24.4	22.2	23.5	24.4	22.2	23.4	24.3	22.2	23.6	24.3	22.4	23.9	24.3	23.3	23.6	24.5	22.4
8/21/2024	23.3	24.3	22.2	23.3	24.2	22.2	23.3	24.2	22.2	23.3	24.1	22.1	23.4	24.2	22.3	23.7	24.1	23.3	23.4	24.4	22.3
8/22/2024	23.1	24.2	22.1	23.1	24.1	22.0	23.1	24.1	22.0	23.1	24.0	22.0	23.2	23.8	22.0	23.4	23.9	22.8	23.2	24.2	22.2
8/23/2024	22.8	23.6	21.9	22.7	23.5	21.8	22.7	23.5	21.8	22.7	23.5	21.8	22.8	23.6	21.8	23.0	23.5	22.4	22.9	23.9	22.0
8/24/2024	22.5	23.3	21.7	22.5	23.3	21.6	22.5	23.2	21.6	22.5	23.2	21.6	22.6	23.1	21.6	22.7	23.1	22.3	22.7	23.4	21.7
8/25/2024	22.4	23.5	21.4	22.4	23.3	21.3	22.4	23.3	21.3	22.4	23.2	21.3	22.4	23.1	21.4	22.6	23.1	22.1	22.5	23.4	21.4
8/26/2024	22.6	23.7	21.5	22.6	23.6	21.4	22.6	23.6	21.4	22.6	23.5	21.5	22.7	23.4	21.5	22.8	23.4	22.2	22.7	23.7	21.6
8/27/2024	22.5	23.7	21.4	22.6	23.6	21.4	22.6	23.6	21.4	22.6	23.5	21.4	22.8	23.5	21.5	23.0	23.6	22.5	22.7	23.6	21.6
8/28/2024	22.6	23.6	21.5	22.6	23.6	21.4	22.6	23.6	21.4	22.6	23.5	21.4	22.8	23.5	21.5	23.1	23.6	22.5	22.7	23.6	21.6
8/29/2024	22.5	23.5	21.3	22.5	23.4	21.3	22.5	23.4	21.3	22.5	23.3	21.3	22.7	23.4	21.6	23.1	23.6	22.6	22.6	23.6	21.5
8/30/2024	22.5	23.6	21.2	22.5	23.5	21.2	22.5	23.5	21.2	22.5	23.4	21.2	22.6	23.3	21.5	22.9	23.5	22.4	22.6	23.5	21.4
8/31/2024	22.6	23.6	21.5	22.7	23.6	21.5	22.7	23.5	21.5	22.6	23.5	21.5	22.9	23.5	21.9	23.3	24.0	22.7	22.8	23.6	21.6
9/1/2024	22.7	23.7	21.5	22.8	23.6	21.6	22.8	23.6	21.6	22.7	23.5	21.6	23.0	23.6	22.1	23.5	24.2	22.8	22.9	23.7	21.7
9/2/2024	22.9	23.7	21.7	23.0	23.7	21.8	23.0	23.7	21.8	22.9	23.6	21.9	23.2	23.7	22.6	23.6	24.4	23.1	23.1	23.8	21.9
9/3/2024	22.9	23.7	21.6	23.0	23.7	21.8	23.0	23.7	21.8	22.9	23.5	22.0	23.3	23.8	22.6	23.7	24.6	23.0	23.0	23.8	22.0
9/4/2024	23.0	23.7	21.8	23.1	23.6	22.0	23.1	23.6	22.0	23.0	23.5	22.1	23.4	23.9	22.7	23.8	24.9	23.1	23.2	23.7	22.1

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
9/5/2024	22.9	23.7	21.7	23.0	23.7	21.8	23.0	23.7	21.8	22.9	23.5	21.9	23.2	23.7	22.5	23.6	24.5	22.9	23.1	23.7	22.0
9/6/2024	23.0	23.6	22.0	23.1	23.6	22.1	23.1	23.6	22.1	23.1	23.5	22.3	23.4	23.9	22.9	23.8	24.7	23.2	23.2	23.7	22.2
9/7/2024	22.8	23.4	21.8	22.9	23.4	21.9	22.9	23.4	22.0	22.8	23.2	22.1	23.1	23.7	22.6	23.6	24.5	22.8	23.0	23.5	22.1
9/8/2024	22.8	23.5	21.7	22.9	23.5	21.9	22.9	23.5	21.9	22.8	23.3	22.0	23.1	23.7	22.4	23.5	24.4	22.7	23.0	23.6	22.0
9/9/2024	22.9	23.5	21.7	22.9	23.5	22.0	22.9	23.5	22.0	22.9	23.3	22.1	23.1	23.9	22.4	23.4	24.3	22.6	23.0	23.6	22.1
9/10/2024	22.7	23.4	21.6	22.8	23.3	21.9	22.8	23.3	21.9	22.7	23.1	22.0	22.9	23.6	22.3	23.3	24.1	22.5	22.9	23.4	22.0
9/11/2024	22.2	23.1	21.2	22.3	23.0	21.5	22.3	22.9	21.5	22.2	22.8	21.5	22.4	23.1	22.0	22.8	23.5	22.1	22.5	23.2	21.6
9/12/2024	21.8	22.4	20.7	21.8	22.3	21.0	21.8	22.3	21.0	21.6	22.1	20.9	21.9	22.8	21.2	22.3	22.9	21.5	21.9	22.5	21.1
9/13/2024	21.9	22.5	20.9	21.8	22.5	21.1	21.8	22.5	21.1	21.6	22.1	21.1	21.9	23.3	20.9	22.1	22.8	21.1	22.0	22.6	21.3
9/14/2024	22.0	22.6	21.1	22.0	22.6	21.4	22.0	22.6	21.4	21.8	22.3	21.3	22.0	23.4	21.1	22.3	23.0	21.4	22.2	22.7	21.5
9/15/2024	22.0	22.6	21.1	22.0	22.6	21.5	22.0	22.5	21.5	21.8	22.3	21.4	22.0	23.2	21.3	22.3	22.9	21.5	22.2	22.7	21.6
9/16/2024	21.1	22.1	20.3	21.2	22.0	20.5	21.1	22.0	20.5	21.0	21.8	20.6	21.1	21.8	20.2	21.5	22.4	20.9	21.4	22.3	20.6
9/17/2024	20.6	21.2	19.7	20.5	21.1	19.8	20.5	21.1	19.8	20.2	20.7	19.5	20.4	21.6	19.6	20.6	21.3	19.8	20.7	21.3	20.0
9/18/2024	20.7	21.4	19.9	20.7	21.2	20.1	20.7	21.2	20.1	20.2	20.7	19.7	20.4	22.0	19.2	20.6	21.3	19.8	20.8	21.4	20.2
9/19/2024	21.0	21.5	20.4	21.0	21.5	20.6	21.0	21.5	20.6	20.7	21.2	20.3	20.9	22.2	20.0	21.0	21.7	20.4	21.1	21.6	20.7
9/20/2024	20.7	21.2	20.0	20.7	21.1	20.1	20.7	21.1	20.1	20.6	20.9	20.0	20.8	21.1	20.7	21.3	21.8	20.8	20.9	21.2	20.2
9/21/2024	20.6	21.4	19.6	20.7	21.4	19.8	20.7	21.4	19.8	20.5	21.2	19.8	20.8	21.8	19.9	21.0	22.1	20.1	20.8	21.5	20.0
9/22/2024	20.8	21.3	19.8	20.8	21.4	20.1	20.8	21.4	20.1	20.7	21.2	20.1	21.0	22.2	20.0	21.3	22.1	20.4	21.0	21.5	20.3
9/23/2024	21.0	21.5	20.1	21.1	21.6	20.4	21.1	21.6	20.4	20.9	21.4	20.5	21.3	22.5	20.3	21.7	22.5	20.8	21.2	21.7	20.6
9/24/2024	21.0	21.5	20.1	21.0	21.4	20.5	21.0	21.4	20.5	20.9	21.3	20.5	21.2	22.5	20.2	21.8	22.4	21.0	21.2	21.5	20.6
9/25/2024	20.9	21.5	19.8	21.0	21.4	20.1	21.0	21.4	20.1	20.9	21.2	20.1	21.1	21.9	20.5	21.7	22.4	20.8	21.1	21.5	20.2
9/26/2024	20.7	21.4	19.7	20.8	21.3	19.9	20.8	21.3	20.0	20.7	21.1	20.0	21.0	21.7	20.5	21.5	22.2	20.6	20.9	21.4	20.1
9/27/2024	20.6	21.1	19.5	20.6	21.1	19.9	20.6	21.1	19.9	20.5	20.9	19.9	20.7	21.8	19.9	21.1	21.9	20.3	20.7	21.2	20.0
9/28/2024	20.8	21.2	20.0	20.9	21.3	20.4	20.8	21.3	20.4	20.7	21.1	20.3	20.9	22.3	19.8	21.2	22.0	20.4	21.0	21.4	20.5
9/29/2024	20.8	21.3	19.9	20.8	21.3	20.2	20.8	21.3	20.2	20.6	21.1	20.1	20.9	22.0	20.0	21.3	22.0	20.5	20.9	21.4	20.3
9/30/2024	20.7	21.2	19.7	20.7	21.1	20.0	20.7	21.1	20.0	20.5	21.0	20.0	20.8	21.7	20.0	21.2	21.9	20.3	20.8	21.2	20.1
10/1/2024	21.0	21.6	20.2	21.0	21.4	20.5	21.0	21.4	20.5	20.8	21.3	20.4	21.0	22.2	20.1	21.3	22.1	20.5	21.1	21.5	20.6
10/2/2024	21.2	21.6	20.3	21.3	21.7	20.7	21.3	21.7	20.7	21.2	21.6	20.7	21.5	22.5	20.7	21.8	22.6	21.0	21.4	21.8	20.8
10/3/2024	21.2	21.6	20.2	21.2	21.7	20.5	21.3	21.7	20.5	21.2	21.6	20.6	21.5	22.3	20.9	22.0	22.6	21.1	21.4	21.8	20.7
10/4/2024	21.0	21.4	20.3	21.1	21.5	20.6	21.1	21.5	20.6	21.0	21.4	20.6	21.3	22.3	20.5	21.7	22.3	21.0	21.2	21.6	20.7
10/5/2024	21.2	21.6	20.7	21.3	21.7	20.9	21.3	21.7	20.9	21.1	21.6	20.7	21.3	22.6	20.2	21.7	22.2	21.0	21.4	21.8	21.0
10/6/2024	21.0	21.4	20.4	21.1	21.5	20.7	21.1	21.5	20.7	20.9	21.4	20.5	21.2	22.3	20.2	21.7	22.2	21.0	21.2	21.6	20.8
10/7/2024	21.1	21.5	20.4	21.1	21.5	20.7	21.1	21.5	20.7	21.0	21.4	20.7	21.2	22.2	20.4	21.6	22.1	20.9	21.2	21.6	20.8
10/8/2024	21.0	21.5	20.1	21.1	21.4	20.4	21.0	21.4	20.5	20.9	21.3	20.4	21.1	22.0	20.5	21.6	22.2	20.9	21.2	21.5	20.6
10/9/2024	20.8	21.2	19.9	20.8	21.2	20.2	20.8	21.2	20.2	20.7	21.1	20.2	20.9	21.6	20.3	21.3	21.8	20.6	20.9	21.3	20.3
10/10/2024	20.7	21.1	20.0	20.7	21.1	20.2	20.7	21.1	20.2	20.6	21.0	20.2	20.7	21.8	20.0	21.0	21.6	20.3	20.8	21.2	20.4
10/11/2024	20.6	21.0	20.0	20.7	21.0	20.3	20.6	21.0	20.3	20.5	20.8	20.2	20.5	21.6	19.5	21.0	21.5	20.4	20.8	21.1	20.4
10/12/2024	20.2	20.5	19.7	20.2	20.5	19.8	**19.4**	**20.7**	**13.3**	20.0	20.4	19.5	**19.0**	**23.2**	**16.4**	20.2	20.9	19.4	20.4	20.7	19.9

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
10/13/2024	20.0	20.5	19.5	19.8	20.5	19.3	**16.9**	**28.6**	**11.4**	19.7	20.4	19.1	**18.3**	**26.5**	**14.5**	20.0	20.7	19.2	20.1	20.7	19.5
10/14/2024	20.1	20.9	19.4	19.8	20.6	19.2	**17.8**	**30.4**	**11.4**	19.7	20.3	19.0	**18.8**	**27.3**	**14.5**	20.0	20.7	19.2	20.1	21.0	19.5
10/15/2024	20.1	21.1	19.3	19.9	20.5	19.3	**18.7**	**31.3**	**11.9**	19.8	20.4	19.0	**19.4**	**28.9**	**15.1**	20.2	20.9	19.4	20.2	21.1	19.4

Notes: Values in bold show dates that the loggers at sites KR 54.2 and KR 50.3 were dewatered due to flow decrease to attempt to facilitate the AQ 3 – Fish Population Study.

Table 5-18. Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C) By Site (May 15 to October 15, 2025)

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
5/15/2025	15.9	17.3	14.3	15.9	17.2	14.4	16.0	17.1	14.4	16.0	17.1	14.5	16.2	17.0	15.2	—	—	—	16.0	17.2	14.6
5/16/2025	16.1	17.0	14.8	16.2	17.1	15.0	16.2	17.1	15.1	16.3	17.1	15.2	16.7	17.1	16.1	—	—	—	16.3	17.2	15.2
5/17/2025	15.5	16.6	14.7	15.7	16.8	15.1	15.7	16.8	15.2	15.8	16.8	15.3	16.3	16.9	15.5	—	—	—	15.9	17.0	15.2
5/18/2025	15.7	16.7	14.4	15.7	16.6	14.8	15.8	16.5	14.9	15.8	16.5	15.0	16.0	16.9	15.3	—	—	—	15.8	16.7	14.9
5/19/2025	16.0	17.4	14.2	16.0	17.3	14.4	16.1	17.3	14.4	16.1	17.3	14.5	16.4	17.1	15.5	—	—	—	16.1	17.4	14.6
5/20/2025	16.5	17.8	14.9	16.6	17.8	15.2	16.7	17.8	15.2	16.7	17.8	15.3	17.1	17.7	16.1	—	—	—	16.7	17.9	15.3
5/21/2025	16.6	17.8	15.0	16.8	17.8	15.3	16.8	17.8	15.3	16.8	17.7	15.5	17.3	17.7	16.4	—	—	—	16.9	17.8	15.5
5/22/2025	16.7	17.8	15.2	16.8	17.8	15.5	16.9	17.8	15.5	16.9	17.7	15.6	17.3	17.8	16.4	—	—	—	16.9	17.9	15.6
5/23/2025	16.5	17.6	15.0	16.7	17.6	15.2	16.7	17.6	15.2	16.8	17.7	15.3	17.2	17.7	16.4	—	—	—	16.8	17.8	15.3
5/24/2025	16.6	17.8	15.1	16.7	17.8	15.2	16.7	17.8	15.2	16.7	17.8	15.4	17.1	17.8	16.1	—	—	—	16.8	17.9	15.4
5/25/2025	16.9	18.3	15.2	17.1	18.2	15.6	17.1	18.1	15.7	17.1	18.1	15.9	17.6	18.0	16.9	—	—	—	17.1	18.2	15.7
5/26/2025	17.0	18.0	15.8	17.1	18.2	16.1	17.2	18.1	16.1	17.2	18.1	16.2	17.6	18.0	17.1	—	—	—	17.3	18.3	16.2
5/27/2025	17.1	18.6	15.3	17.1	18.6	15.4	17.1	18.5	15.5	17.1	18.5	15.5	17.4	18.4	16.3	—	—	—	17.1	18.6	15.6
5/28/2025	17.6	18.6	16.2	17.8	18.6	16.4	17.8	18.6	16.4	17.8	18.6	16.5	18.2	18.8	17.4	—	—	—	17.9	18.7	16.5
5/29/2025	17.6	18.6	16.3	17.8	18.6	16.5	17.8	18.6	16.6	17.8	18.6	16.7	18.3	18.8	17.5	—	—	—	17.9	18.7	16.7
5/30/2025	17.7	19.4	16.2	17.8	19.3	16.3	17.9	19.3	16.4	17.9	19.3	16.4	18.3	19.2	17.1	—	—	—	17.9	19.4	16.5
5/31/2025	18.1	19.0	16.8	18.3	19.2	17.0	18.3	19.2	17.0	18.3	19.3	17.1	18.8	19.3	17.8	—	—	—	18.4	19.4	17.2
6/1/2025	18.0	19.1	16.7	18.3	19.1	17.0	18.3	19.1	17.1	18.3	19.1	17.2	18.9	19.3	18.1	—	—	—	18.4	19.2	17.2
6/2/2025	17.9	19.4	16.4	18.1	19.3	16.5	18.1	19.3	16.6	18.1	19.3	16.7	18.5	19.4	17.3	—	—	—	18.2	19.4	16.7
6/3/2025	17.5	18.3	16.5	17.6	18.7	16.6	17.7	18.7	16.7	17.7	18.8	16.7	18.1	19.2	17.2	18.7	18.9	18.4	17.8	19.1	16.8
6/4/2025	17.8	19.6	16.3	17.9	19.5	16.4	17.9	19.5	16.4	17.9	19.5	16.4	18.2	19.5	16.9	18.7	19.7	17.8	17.9	19.6	16.5
6/5/2025	18.1	19.4	16.6	18.2	19.4	16.8	18.3	19.4	16.8	18.3	19.4	16.9	18.7	19.5	17.6	19.5	20.2	19.0	18.3	19.5	16.9
6/6/2025	18.0	19.5	16.4	18.2	19.5	16.5	18.2	19.5	16.5	18.2	19.5	16.6	18.6	19.5	17.2	19.5	20.0	18.8	18.3	19.5	16.7
6/7/2025	18.2	19.5	16.7	18.3	19.5	16.8	18.3	19.5	16.8	18.4	19.5	16.9	18.8	19.6	17.5	19.7	20.3	19.1	18.4	19.6	17.0
6/8/2025	18.4	19.7	16.9	18.5	19.7	17.1	18.6	19.7	17.1	18.6	19.7	17.2	19.1	19.8	18.1	20.1	20.9	19.6	18.6	19.8	17.2
6/9/2025	18.4	20.2	16.8	18.6	20.2	16.9	18.6	20.2	16.9	18.6	20.2	17.0	19.1	20.3	17.6	20.0	20.6	19.4	18.7	20.3	17.1
6/10/2025	18.6	20.3	17.1	18.8	20.3	17.2	18.8	20.3	17.2	18.9	20.3	17.3	19.4	20.4	17.9	20.4	21.0	19.8	18.9	20.3	17.4
6/11/2025	18.5	19.7	17.3	18.7	19.8	17.4	18.7	19.8	17.4	18.8	19.8	17.5	19.3	20.4	18.1	20.2	20.6	19.8	18.9	20.2	17.6
6/12/2025	18.2	19.7	16.6	18.3	19.6	16.7	18.3	19.6	16.7	18.4	19.6	16.7	18.7	19.7	17.3	19.5	19.9	18.9	18.4	19.7	16.9
6/13/2025	18.1	19.6	16.6	18.2	19.7	16.6	18.2	19.7	16.6	18.2	19.7	16.6	18.6	19.6	17.0	19.2	19.8	18.3	18.3	19.7	16.7
6/14/2025	18.5	20.2	16.7	18.5	20.1	16.8	18.5	20.1	16.8	18.6	20.1	16.9	18.8	20.0	17.4	19.5	20.2	18.7	18.6	20.2	17.0
6/15/2025	18.6	20.2	16.8	18.8	20.1	17.0	18.8	20.1	17.0	18.9	20.1	17.2	19.3	20.1	18.2	20.1	20.9	19.6	18.9	20.2	17.2
6/16/2025	18.6	20.3	16.9	18.7	20.2	16.9	18.7	20.2	16.9	18.7	20.2	17.0	19.1	20.2	17.6	19.8	20.2	19.4	18.8	20.3	17.1
6/17/2025	18.5	20.1	17.0	18.6	20.1	17.0	18.7	20.1	17.0	18.7	20.1	17.0	19.0	20.1	17.3	19.6	20.1	18.7	18.8	20.2	17.1
6/18/2025	18.9	20.9	17.0	18.9	20.9	17.1	19.0	20.9	17.1	19.0	20.9	17.1	19.2	20.9	17.5	19.8	20.4	19.0	19.0	20.9	17.2
6/19/2025	19.1	21.0	17.3	19.2	21.0	17.4	19.3	21.0	17.4	19.3	21.0	17.4	19.7	20.9	18.1	20.3	20.8	19.6	19.3	21.0	17.6
6/20/2025	18.6	19.8	17.4	18.8	19.9	17.4	18.8	20.0	17.4	18.8	20.1	17.4	19.2	20.8	17.7	19.9	20.7	19.2	19.0	20.7	17.6

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
6/21/2025	18.3	19.5	17.1	18.3	19.4	17.0	18.3	19.4	17.0	18.4	19.4	17.0	18.5	19.4	17.2	19.0	19.6	18.3	18.5	19.5	17.2
6/22/2025	18.6	20.4	16.9	18.6	20.3	16.9	18.6	20.3	16.9	18.6	20.3	16.9	18.7	20.1	17.3	19.0	19.8	18.1	18.7	20.3	17.0
6/23/2025	19.2	20.6	17.8	19.2	20.5	17.8	19.2	20.5	17.8	19.3	20.5	17.8	19.4	20.4	18.1	19.7	20.5	18.9	19.3	20.6	18.0
6/24/2025	19.4	20.8	18.1	19.5	20.8	18.1	19.5	20.8	18.1	19.5	20.8	18.1	19.7	20.7	18.4	20.2	20.9	19.4	19.6	20.8	18.2
6/25/2025	19.7	21.2	18.2	19.8	21.2	18.3	19.8	21.2	18.3	19.8	21.1	18.4	20.1	21.1	18.8	20.6	21.2	19.9	19.9	21.2	18.5
6/26/2025	19.8	21.1	18.4	19.9	21.1	18.4	19.9	21.1	18.4	19.9	21.1	18.5	20.3	21.1	18.9	20.9	21.4	20.2	20.0	21.1	18.6
6/27/2025	19.9	21.3	18.5	20.0	21.3	18.5	20.0	21.3	18.5	20.0	21.3	18.6	20.3	21.3	19.0	20.9	21.6	20.0	20.1	21.4	18.7
6/28/2025	20.1	21.4	18.7	20.2	21.4	18.8	20.2	21.4	18.9	20.2	21.4	18.9	20.6	21.4	19.4	21.3	22.1	20.5	20.3	21.4	19.0
6/29/2025	20.1	21.4	18.9	20.3	21.3	19.0	20.3	21.3	19.0	20.3	21.3	19.0	20.7	21.4	19.6	21.4	22.2	20.8	20.4	21.4	19.1
6/30/2025	20.1	21.4	18.8	20.2	21.4	18.9	20.2	21.4	18.9	20.2	21.4	18.9	20.6	21.4	19.3	21.2	22.0	20.6	20.3	21.5	19.0
7/1/2025	20.0	21.4	18.7	20.1	21.4	18.7	20.1	21.4	18.7	20.2	21.4	18.8	20.5	21.4	19.1	21.0	21.6	20.3	20.4	21.4	19.0
7/2/2025	20.1	21.4	18.9	20.2	21.4	18.9	20.2	21.4	18.9	20.2	21.4	19.0	20.6	21.4	19.3	21.2	21.8	20.6	20.3	21.4	19.1
7/3/2025	20.2	21.7	18.8	20.3	21.7	18.9	20.3	21.7	18.9	20.3	21.7	18.9	20.6	21.7	19.2	21.3	22.0	20.4	20.4	21.7	19.0
7/4/2025	20.0	21.1	18.7	20.1	21.1	18.8	20.1	21.1	18.8	20.1	21.1	18.8	20.5	21.5	19.2	21.1	21.6	20.5	20.3	21.7	18.9
7/5/2025	20.1	21.6	18.7	20.1	21.6	18.7	20.1	21.6	18.7	20.1	21.6	18.8	20.4	21.5	19.0	20.8	21.5	19.8	20.2	21.7	18.9
7/6/2025	20.4	21.9	18.9	20.4	21.8	19.0	20.4	21.8	19.0	20.4	21.8	19.1	20.7	21.7	19.4	21.2	21.9	20.4	20.5	21.9	19.2
7/7/2025	20.4	21.9	19.1	20.5	21.8	19.1	20.5	21.8	19.1	20.5	21.8	19.1	20.8	21.7	19.4	21.3	22.0	20.6	20.6	21.8	19.3
7/8/2025	20.4	21.9	18.9	20.5	21.9	18.9	20.5	21.9	18.9	20.5	21.9	18.9	20.8	21.8	19.3	21.3	22.0	20.6	20.6	21.9	19.1
7/9/2025	20.5	21.9	19.1	20.6	21.9	19.1	20.6	21.9	19.1	20.7	21.9	19.2	21.0	21.9	19.6	21.6	22.2	20.8	20.7	21.9	19.3
7/10/2025	20.6	22.2	19.1	20.7	22.1	19.2	20.7	22.1	19.2	20.8	22.1	19.2	21.1	22.1	19.6	21.7	22.2	20.9	20.8	22.2	19.4
7/11/2025	21.0	22.6	19.5	21.1	22.6	19.6	21.1	22.6	19.6	21.1	22.6	19.7	21.4	22.5	20.1	21.9	22.6	21.2	21.1	22.6	19.8
7/12/2025	21.0	22.6	19.4	21.1	22.6	19.5	21.1	22.6	19.5	21.1	22.6	19.5	21.5	22.6	20.0	22.1	22.7	21.5	21.2	22.6	19.6
7/13/2025	21.1	22.7	19.6	21.3	22.6	19.7	21.3	22.6	19.7	21.3	22.6	19.8	21.7	22.7	20.3	22.4	22.9	21.9	21.4	22.7	19.9
7/14/2025	21.3	23.0	19.7	21.4	23.0	19.8	21.4	22.9	19.8	21.4	23.0	19.8	21.8	23.0	20.3	22.4	22.8	21.7	21.7	23.3	20.5
7/15/2025	21.3	23.0	19.9	21.4	22.9	19.9	21.5	22.9	19.9	21.5	22.9	19.9	21.8	22.9	20.4	22.5	23.0	21.8	21.5	23.0	20.1
7/16/2025	21.3	22.7	19.8	21.4	22.8	19.8	21.4	22.8	19.8	21.4	22.8	19.9	21.8	22.8	20.2	22.4	22.8	21.7	21.5	22.8	20.0
7/17/2025	21.3	22.8	19.8	21.4	22.8	19.9	21.4	22.7	19.9	21.5	22.7	20.0	21.7	22.7	20.5	22.4	22.9	21.7	21.5	22.8	20.1
7/18/2025	21.4	22.9	19.9	21.5	22.8	20.0	21.5	22.8	20.0	21.6	22.8	20.0	21.9	22.7	20.6	22.5	23.0	22.1	21.6	22.9	20.1
7/19/2025	21.5	22.9	20.0	21.6	22.9	20.1	21.6	22.9	20.1	21.7	22.9	20.1	22.0	22.9	20.7	22.6	23.1	22.2	21.7	22.9	20.2
7/20/2025	21.7	23.1	20.1	21.8	23.0	20.2	21.8	23.0	20.2	21.8	23.0	20.2	22.1	22.9	20.9	22.8	23.3	22.5	21.9	23.0	20.3
7/21/2025	21.5	22.9	20.0	21.6	22.8	20.1	21.6	22.8	20.0	21.6	22.8	20.1	22.0	22.9	20.6	22.6	23.0	22.2	21.7	23.0	20.2
7/22/2025	21.3	22.6	20.0	21.4	22.7	20.0	21.5	22.6	20.0	21.5	22.6	20.0	21.8	22.6	20.4	22.3	22.7	21.7	21.6	22.7	20.1
7/23/2025	21.3	22.9	19.9	21.4	22.8	20.0	21.4	22.8	20.0	21.4	22.7	20.0	21.5	22.5	20.4	22.0	22.7	21.2	21.5	22.8	20.1
7/24/2025	21.6	23.0	20.1	21.6	22.9	20.2	21.6	22.9	20.2	21.7	22.9	20.3	21.8	22.8	20.7	22.2	22.9	21.5	21.7	23.0	20.4
7/25/2025	21.6	22.7	20.3	21.7	22.6	20.4	21.7	22.6	20.4	21.7	22.6	20.4	21.9	22.7	20.8	22.4	23.0	21.8	21.8	22.9	20.5
7/26/2025	21.6	22.9	20.1	21.6	22.8	20.2	21.6	22.8	20.2	21.6	22.8	20.2	21.8	22.6	20.8	22.3	23.0	21.8	21.7	22.8	20.3
7/27/2025	21.7	23.1	20.1	21.8	23.1	20.1	21.8	23.0	20.1	21.8	23.0	20.2	22.0	22.8	20.8	22.5	23.1	22.0	21.8	23.1	20.3
7/28/2025	22.0	23.3	20.6	22.1	23.2	20.6	22.1	23.2	20.6	22.1	23.2	20.6	22.3	23.1	21.0	22.7	23.4	22.3	22.1	23.3	20.8

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
7/29/2025	22.0	23.4	20.5	22.1	23.3	20.6	22.1	23.3	20.6	22.2	23.3	20.7	22.4	23.2	21.2	22.9	23.4	22.5	22.2	23.3	20.8
7/30/2025	22.0	23.2	20.5	22.1	23.2	20.6	22.1	23.2	20.6	22.1	23.2	20.6	22.4	23.1	21.1	22.8	23.0	22.4	21.5	23.3	20.8
7/31/2025	22.0	23.5	20.4	22.0	23.4	20.4	22.0	23.4	20.4	22.1	23.4	20.4	22.2	23.2	20.8	22.6	23.0	21.9	21.1	21.7	20.7
8/1/2025	22.1	23.3	20.7	22.2	23.2	20.8	22.2	23.2	20.8	22.2	23.2	20.8	22.4	23.2	21.3	22.8	23.4	22.2	22.3	23.3	21.6
8/2/2025	22.3	23.3	20.9	22.4	23.3	21.0	22.4	23.3	21.0	22.4	23.3	21.1	22.6	23.2	21.7	23.1	23.6	22.6	23.2	23.8	22.7
8/3/2025	22.2	23.3	20.7	22.2	23.2	21.0	22.3	23.2	21.0	22.3	23.2	21.0	22.5	23.1	21.6	23.0	23.6	22.6	23.4	24.0	22.8
8/4/2025	21.8	22.8	20.7	21.9	23.0	20.8	22.0	23.0	20.8	22.0	23.0	20.9	22.2	23.0	21.4	22.5	22.8	22.2	22.8	23.3	22.5
8/5/2025	21.9	23.2	20.5	21.9	23.2	20.5	21.9	23.1	20.5	21.9	23.1	20.6	22.0	23.0	20.9	22.3	23.0	21.6	22.7	23.4	22.1
8/6/2025	22.2	23.3	20.8	22.2	23.2	20.9	22.2	23.2	20.9	22.2	23.2	20.9	22.4	23.1	21.3	22.7	23.3	22.1	23.1	23.6	22.6
8/7/2025	22.4	23.5	21.1	22.5	23.4	21.2	22.5	23.4	21.2	22.5	23.4	21.3	22.7	23.3	21.7	23.0	23.6	22.5	23.4	23.9	22.9
8/8/2025	22.6	23.7	21.2	22.6	23.6	21.3	22.6	23.6	21.3	22.6	23.6	21.3	22.8	23.6	21.7	23.2	24.0	22.5	23.5	24.4	22.8
8/9/2025	22.6	23.5	21.3	22.6	23.4	21.4	22.7	23.5	21.4	22.7	23.5	21.5	22.9	23.5	21.9	23.3	24.1	22.7	23.4	23.9	22.8
8/10/2025	22.7	23.6	21.4	22.8	23.6	21.6	22.8	23.6	21.6	22.8	23.6	21.7	23.0	23.5	22.1	23.5	24.4	22.8	23.7	24.3	23.1
8/11/2025	22.9	23.8	21.6	23.0	23.8	21.8	23.0	23.8	21.8	23.0	23.8	21.8	23.3	23.8	22.4	23.7	24.4	23.3	23.8	24.3	23.4
8/12/2025	22.8	23.7	21.6	22.9	23.7	21.7	22.9	23.7	21.7	22.9	23.7	21.8	23.2	23.7	22.4	23.7	24.3	23.4	23.9	24.3	23.5
8/13/2025	22.7	23.5	21.5	22.8	23.5	21.6	22.8	23.5	21.6	22.8	23.5	21.7	23.1	23.6	22.3	23.6	24.2	23.2	23.7	24.2	23.4
8/14/2025	22.5	23.5	21.2	22.5	23.4	21.3	22.6	23.4	21.3	22.6	23.4	21.4	22.8	23.3	21.9	23.2	23.9	22.7	23.4	24.0	22.9
8/15/2025	22.5	23.6	21.1	22.6	23.5	21.4	22.6	23.5	21.4	22.6	23.5	21.4	22.8	23.4	22.0	23.2	24.2	22.6	23.7	24.3	23.0
8/16/2025	22.7	23.6	21.4	22.8	23.6	21.6	22.8	23.6	21.6	22.8	23.5	21.7	23.0	23.5	22.3	23.4	24.2	22.9	23.8	24.6	23.1
8/17/2025	22.8	23.7	21.6	22.9	23.7	21.8	22.9	23.7	21.8	22.9	23.7	21.8	23.1	23.6	22.4	23.6	24.5	23.0	24.0	24.8	23.5
8/18/2025	22.8	23.6	21.6	22.9	23.6	21.8	22.9	23.6	21.8	22.9	23.6	21.9	23.1	23.5	22.4	23.5	24.3	23.1	24.2	24.8	23.4
8/19/2025	22.8	23.7	21.5	22.8	23.6	21.6	22.8	23.6	21.7	22.9	23.6	21.7	23.0	23.5	22.2	23.3	24.1	22.9	23.5	24.0	23.0
8/20/2025	22.8	23.6	21.5	22.9	23.6	21.7	22.9	23.6	21.7	22.9	23.5	21.8	23.1	23.5	22.4	23.4	24.2	22.9	23.7	24.4	23.2
8/21/2025	22.8	23.6	21.6	22.9	23.6	21.8	22.9	23.6	21.8	23.0	23.6	21.9	23.1	23.6	22.4	23.4	24.1	22.8	23.7	24.2	23.2
8/22/2025	23.2	24.2	22.0	23.3	24.1	22.1	23.3	24.1	22.1	23.3	24.1	22.2	23.5	24.1	22.7	23.9	25.0	23.0	23.6	24.3	22.2
8/23/2025	23.1	24.1	22.4	23.3	24.1	22.6	23.3	24.1	22.6	23.3	24.0	22.7	23.7	24.0	23.4	24.2	24.8	23.7	23.4	24.1	22.7
8/24/2025	23.1	23.8	22.4	23.2	23.8	22.5	23.2	23.8	22.5	23.2	23.8	22.6	23.5	24.2	22.8	24.1	24.9	23.2	23.2	23.8	22.6
8/25/2025	23.0	23.5	22.3	23.1	23.7	22.5	23.2	23.8	22.5	23.2	23.9	22.5	23.6	24.3	22.9	24.3	25.3	23.5	23.2	23.7	22.6
8/26/2025	23.1	24.0	22.2	23.2	24.0	22.4	23.3	24.0	22.4	23.3	23.9	22.6	23.4	24.7	22.6	24.0	25.3	22.8	23.3	24.1	22.6
8/27/2025	23.0	23.6	22.0	23.1	23.7	22.5	23.1	23.7	22.5	23.2	23.6	22.7	23.4	24.8	22.3	23.8	25.1	22.6	23.3	23.8	22.6
8/28/2025	22.7	23.2	21.9	22.8	23.1	22.3	22.8	23.1	22.3	22.8	23.1	22.4	22.9	24.2	21.8	23.5	24.5	22.3	22.9	23.4	22.4
8/29/2025	22.8	23.5	21.9	22.8	23.5	22.2	22.8	23.5	22.2	22.8	23.4	22.2	22.9	24.3	21.7	23.5	24.6	22.4	22.9	23.7	22.3
8/30/2025	23.0	23.7	22.3	23.1	23.6	22.5	23.1	23.7	22.5	23.1	23.8	22.4	23.2	24.5	21.9	23.7	25.0	22.6	23.2	23.8	22.6
8/31/2025	23.2	23.9	22.6	23.3	23.8	22.6	23.3	24.0	22.6	23.3	24.2	22.5	23.5	25.0	22.0	24.2	25.5	23.1	23.4	24.0	22.8
9/1/2025	23.3	24.0	22.7	23.4	24.0	22.6	23.4	24.2	22.6	23.5	24.4	22.6	23.6	25.0	22.1	24.5	25.6	23.3	23.5	24.2	22.9
9/2/2025	23.3	23.7	23.0	23.5	24.1	23.0	23.5	24.3	22.9	23.6	24.5	22.8	23.5	24.8	22.4	24.5	25.1	23.8	23.6	24.3	23.1
9/3/2025	23.2	24.1	22.4	23.3	24.2	22.5	23.3	24.2	22.5	23.3	24.2	22.5	23.7	24.9	22.5	24.4	25.4	23.5	23.4	24.3	22.6
9/4/2025	23.5	24.0	22.8	23.6	24.1	23.2	23.7	24.2	23.2	23.7	24.3	23.2	24.1	25.2	22.8	24.8	25.9	23.8	23.8	24.3	23.3

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
9/5/2025	23.4	23.9	22.8	23.5	23.9	23.1	23.5	24.0	23.1	23.6	24.1	23.1	23.9	25.1	22.9	24.8	25.7	23.8	23.6	24.1	23.2
9/6/2025	23.0	23.6	22.3	23.1	23.6	22.6	23.1	23.5	22.5	23.2	23.7	22.6	23.4	24.5	22.1	24.2	25.2	23.3	23.3	23.7	22.7
9/7/2025	22.8	23.4	22.1	22.8	23.4	22.3	22.9	23.4	22.3	22.9	23.4	22.3	22.9	24.1	21.8	23.6	24.5	22.6	23.0	23.6	22.5
9/8/2025	22.4	23.1	21.7	22.5	23.0	21.9	22.5	23.0	21.9	22.5	23.0	21.9	22.5	23.7	21.2	23.0	24.0	21.9	22.7	23.2	22.1
9/9/2025	22.4	23.1	21.7	22.4	23.0	21.7	22.4	23.1	21.7	22.4	23.1	21.7	22.4	23.6	21.3	22.8	23.9	21.9	22.5	23.2	21.9
9/10/2025	22.3	22.9	21.8	22.3	22.7	21.9	22.3	22.8	21.9	22.3	22.8	21.8	22.3	23.4	21.5	22.7	23.4	22.0	22.5	22.9	22.1
9/11/2025	22.1	22.6	21.6	22.1	22.6	21.6	22.1	22.6	21.6	22.0	22.5	21.6	21.9	22.8	21.2	22.2	22.6	21.8	22.2	22.8	21.8
9/12/2025	22.2	22.6	21.6	22.1	22.6	21.8	22.1	22.6	21.8	22.1	22.5	21.7	21.9	22.5	21.3	22.1	23.0	21.4	22.5	23.3	22.0
9/13/2025	22.4	23.1	21.6	22.4	23.0	21.8	22.4	23.0	21.8	22.4	23.0	21.7	22.3	23.6	21.2	22.4	23.6	21.4	23.0	23.8	22.5
9/14/2025	22.5	23.1	21.9	22.6	23.1	22.0	22.6	23.2	22.0	22.6	23.2	22.0	22.6	23.8	21.5	22.9	23.9	22.1	23.2	23.8	22.7
9/15/2025	22.4	22.9	21.8	22.5	22.9	21.9	22.5	23.0	21.9	22.5	23.1	21.9	22.6	23.7	21.4	23.1	24.1	22.2	23.1	23.7	22.6
9/16/2025	22.4	23.0	21.7	22.4	23.1	21.7	22.4	23.2	21.7	22.4	23.3	21.6	22.4	23.6	20.9	23.1	24.2	22.0	23.1	23.8	22.4
9/17/2025	22.6	23.0	22.1	22.6	23.2	22.1	22.6	23.3	22.0	22.6	23.3	21.9	22.7	23.6	21.4	23.1	24.1	22.1	23.3	23.9	22.8
9/18/2025	22.2	22.6	21.9	22.4	22.7	22.0	22.4	22.7	22.0	22.4	22.8	22.0	22.5	23.1	22.2	23.0	23.6	22.7	23.0	23.5	22.7
9/19/2025	22.0	22.4	21.7	22.0	22.5	21.6	22.1	22.6	21.7	22.1	22.6	21.7	22.4	23.0	21.7	22.8	23.8	22.1	22.7	23.2	22.3
9/20/2025	22.5	23.2	21.9	22.1	22.3	21.9	22.6	23.4	21.9	22.5	23.3	21.8	22.7	24.1	21.6	23.4	24.4	22.5	23.2	24.1	22.6
9/21/2025	22.8	23.3	22.5	22.8	23.7	22.2	23.1	23.8	22.4	23.1	23.8	22.4	23.2	24.6	22.1	23.9	24.7	23.1	23.7	24.5	23.2
9/22/2025	22.6	23.0	22.2	22.8	23.3	22.2	22.8	23.5	22.2	22.8	23.5	22.2	23.2	24.2	22.2	23.7	24.3	23.0	23.4	24.0	22.9
9/23/2025	22.5	22.8	22.2	22.7	23.3	22.1	22.7	23.5	22.1	22.8	23.7	22.0	23.0	24.4	21.7	23.7	24.8	22.7	23.1	23.6	22.4
9/24/2025	22.7	23.1	22.4	22.4	22.8	22.3	22.9	23.7	22.3	22.9	23.7	22.2	23.4	24.7	22.7	24.2	24.8	23.5	22.9	23.8	22.4
9/25/2025	22.3	22.6	22.0	22.4	22.9	22.0	22.5	23.0	22.1	22.5	23.0	22.1	22.8	23.8	22.2	23.9	24.5	23.2	22.6	23.1	22.2
9/26/2025	22.1	22.4	21.6	22.1	22.4	21.7	22.1	22.5	21.7	22.1	22.6	21.7	22.3	22.9	21.6	23.2	23.7	22.6	22.2	22.5	21.8
9/27/2025	22.1	22.5	21.7	22.2	22.7	21.8	22.2	22.7	21.8	22.2	22.7	21.7	22.1	22.8	21.3	22.6	23.2	22.0	22.3	22.8	22.0
9/28/2025	22.3	22.9	21.7	22.2	22.7	21.8	22.3	22.8	21.8	22.2	22.8	21.8	22.4	23.5	21.5	22.7	23.7	21.9	22.4	22.9	22.0
9/29/2025	22.2	22.6	21.7	22.2	22.6	21.8	22.2	22.6	21.8	22.2	22.7	21.8	22.3	23.2	21.5	22.7	23.4	22.0	22.4	22.7	22.0
9/30/2025	21.7	22.1	21.3	21.8	22.1	21.5	21.8	22.0	21.5	21.7	22.1	21.6	21.7	22.5	21.2	22.2	22.7	21.7	21.9	22.3	21.7
10/1/2025	21.5	22.0	20.8	21.4	22.0	20.9	21.4	22.0	20.9	21.4	21.8	20.8	21.3	22.3	20.5	21.6	22.4	20.8	21.6	22.1	21.1
10/2/2025	21.5	22.1	20.7	21.5	22.0	21.0	21.5	21.9	21.0	21.5	21.8	21.0	21.4	22.4	20.6	21.6	22.5	20.7	21.6	22.1	21.1
10/3/2025	21.1	21.8	20.3	21.3	21.7	20.3	21.2	21.7	20.2	21.2	21.7	20.4	21.0	21.7	20.3	21.3	22.0	20.5	21.5	21.9	20.6
10/4/2025	20.2	20.8	19.6	20.1	20.7	19.5	20.1	20.6	19.5	20.0	20.6	19.4	19.9	21.2	18.9	20.1	20.8	19.3	20.3	21.0	19.7
10/5/2025	20.3	20.7	19.8	20.2	20.8	19.6	20.1	20.9	19.5	20.0	20.9	19.3	19.5	21.1	18.3	19.8	20.7	18.9	20.4	21.0	19.8
10/6/2025	20.4	20.9	20.0	20.3	21.0	19.8	20.3	21.1	19.6	20.2	21.1	19.4	19.7	21.2	18.5	19.8	20.7	18.8	20.5	21.2	20.0
10/7/2025	20.2	20.8	19.8	20.2	20.8	19.6	20.2	20.9	19.5	20.1	21.0	19.3	19.7	21.0	18.7	20.0	20.9	19.0	20.4	21.0	19.9
10/8/2025	20.0	20.4	19.5	20.0	20.3	19.6	20.0	20.6	19.4	19.9	20.5	19.4	19.7	20.6	18.4	19.9	20.7	19.0	20.2	20.5	19.8
10/9/2025	19.9	20.4	19.1	19.8	20.1	19.4	19.8	20.0	19.4	19.8	20.0	19.5	19.6	20.6	18.7	19.6	20.4	18.8	20.0	20.2	19.6
10/10/2025	20.2	20.7	19.4	20.1	20.6	19.7	20.1	20.6	19.7	20.0	20.5	19.7	19.8	20.8	19.1	19.7	20.5	18.8	20.2	20.7	19.8
10/11/2025	19.7	20.6	19.1	19.8	20.4	19.3	19.8	20.3	19.2	19.8	20.3	19.3	19.7	20.4	19.0	19.7	20.3	19.1	20.0	20.5	19.5
10/12/2025	19.2	19.7	18.4	19.1	19.5	18.5	19.1	19.5	18.6	19.0	19.3	18.6	18.8	19.7	18.2	18.9	19.6	17.9	19.3	19.7	18.7

Date	Kern River Daily Average, Maximum, and Minimum of Water Temperature (°C)																				
	KR 55.6			KR 54.36			KR 54.2			KR 53.84			KR 50.3			KR 44.0			KRTR 43.94		
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min
10/13/2025	18.6	19.3	18.1	18.6	19.2	18.3	18.5	19.1	18.3	18.6	19.1	18.3	18.2	18.5	17.7	17.9	18.7	17.1	18.8	19.4	18.4
10/14/2025	18.2	18.6	17.6	18.2	18.4	17.8	18.1	18.4	17.8	18.1	18.3	17.9	17.7	17.9	17.2	17.3	17.9	16.8	18.4	18.6	18.0
10/15/2025	17.9	18.6	17.3	17.7	18.4	17.1	17.7	18.3	17.0	17.6	18.2	17.0	17.2	17.5	16.8	16.9	17.4	16.5	17.9	18.6	17.3

Notes: "–" Indicates missing data due to vandalism at KR 44.0

Table 5-19. Preferred Temperatures for Growth and Activity of Fish Species Observed during Bypass Sampling, December 2025.

Species	Temperature Preferences (°C)	
	Adult	Juvenile
Smallmouth bass	20–27	26[2]
Sacramento sucker	20–25	20–25[1]
Largemouth bass	25–30	28[3]
Rainbow trout	15–18	15–18[1]
Hardhead	24–28	24–28[1]
Brown bullhead	20–33	20–30[4]
White catfish	>21	20[5]

Notes: [1]Moyle 2002
[2]Horning II and Pearson 1973
[3]Diaz et al. 2007
[4]Keast 1985
[5]Kellogg and Gift 1983
Key: °C = degrees Celsius

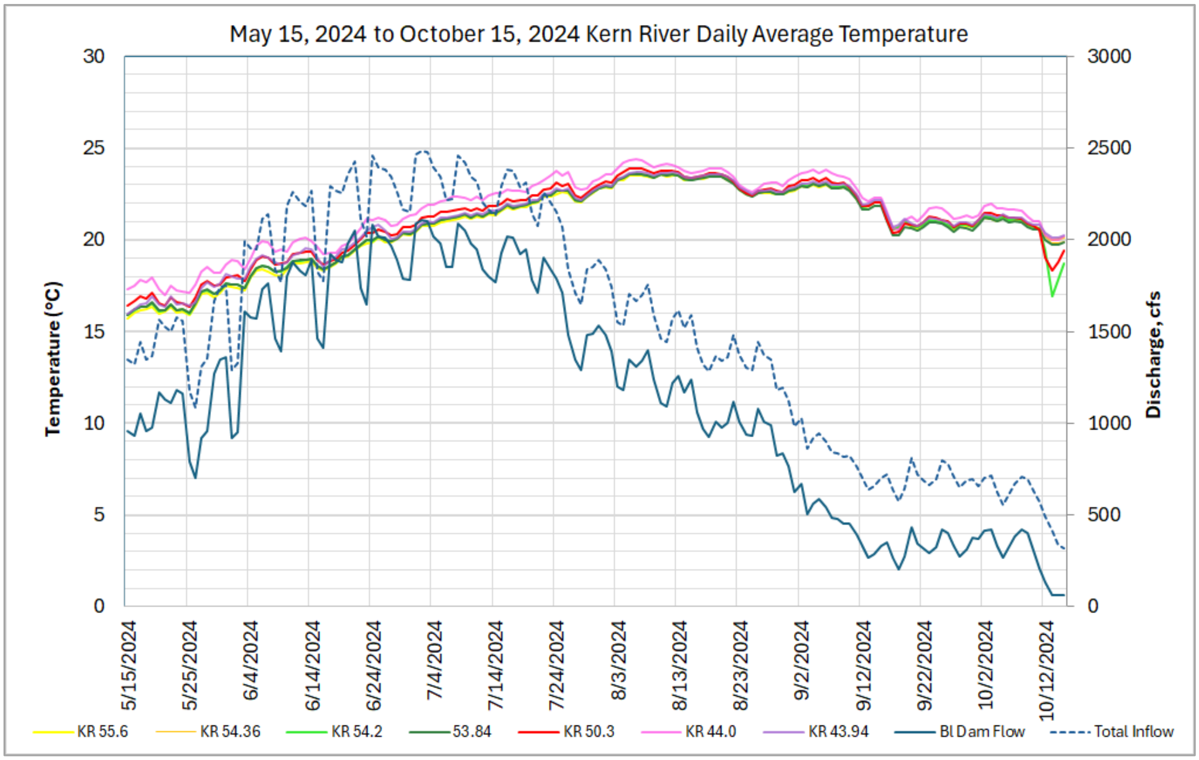
Table 5-20. Methylmercury Fish Tissue Analysis Summary

Species	Sample ID	Sample Date	Sample Time	Fish Weight (g)	Total Length (mm)	Fork Length (mm)	Methylmercury (mg/kg)	Total Mercury (mg/kg)
Brown bullhead *Ameiurus nebulosus*	BBH-1	10/15/24	1248	210.0	247	–	0.24	0.38
	BBH-2	10/15/24	1400	148.0	223	–	0.20	0.32
	BBH-3	10/16/24	1131	185.0	232	–	0.35	0.59
	BBH-4	10/16/24	1133	110.0	189	–	0.21	0.31
	BBH-5	10/16/24	1135	113.0	204	–	0.17	0.23
	BBH-6	10/16/24	1140	168.0	230	–	0.15	0.28
	BBH-7	10/16/24	1148	214.0	251	–	0.21	0.42
	BBH-8	10/17/24	1121	124.7	205	–	0.17	0.24
	BBH-9	10/17/24	1121	136.4	222	–	0.13	0.26
Black crappie *Pomoxis nigromaculatus*	BCR-1	10/15/24	1315	150.0	–	203	0.16	0.23
	BCR-2	10/15/24	1321	121.0	–	200	0.17	0.28
	BCR-3	10/16/24	1129	61.0	–	160	0.08	0.16
Bluegill sunfish *Lepomis macrochirus*	BGS-1	10/15/24	1248	153.0	–	163	0.14	0.22
	BGS-2	10/15/24	1320	162.0	–	169	0.16	0.20
	BGS-3	10/16/24	1122	109.4	–	155	0.14	0.24
	BGS-4	10/17/24	1104	103.8	–	165	0.11	0.19
	BGS-5	10/17/24	1107	96.5	–	158	0.13	0.27
Channel catfish *Ictalurus punctatus*	CHC-1	10/17/24	1055	2010.0	545	–	0.24	0.51

Species	Sample ID	Sample Date	Sample Time	Fish Weight (g)	Total Length (mm)	Fork Length (mm)	Methylmercury (mg/kg)	Total Mercury (mg/kg)
Largemouth bass *Micropterus salmoides*	LMB-1	10/15/24	1332	1276.0	–	401	0.52	0.88
	LMB-2	10/15/24	1333	242.0	–	258	0.25	0.51
	LMB-3	10/15/24	1332	213.0	–	213	0.11	0.23
	LMB-4	10/15/24	1333	207.0	–	272	0.21	0.34
	LMB-5	10/15/24	1350	216.0	–	252	0.21	0.37
	LMB-6	10/15/24	1529	1257.0	–	420	0.23	0.47
	LMB-7	10/15/24	1530	122.0	–	210	0.13	0.24
	LMB-8	10/15/24	1535	>3100	–	520	0.57	1.10
	LMB-9	10/15/24	1549	205.4	–	248	0.16	0.29
	LMB-10	10/16/24	1119	998.0	–	380	0.51	0.99
White catfish *Ameiurus catus*	WC-1	10/16/24	1117	972.0	151	-	0.19	0.37

Key: g = gram
mg/kg = milligrams per kilogram
mm = millimeter

FIGURES



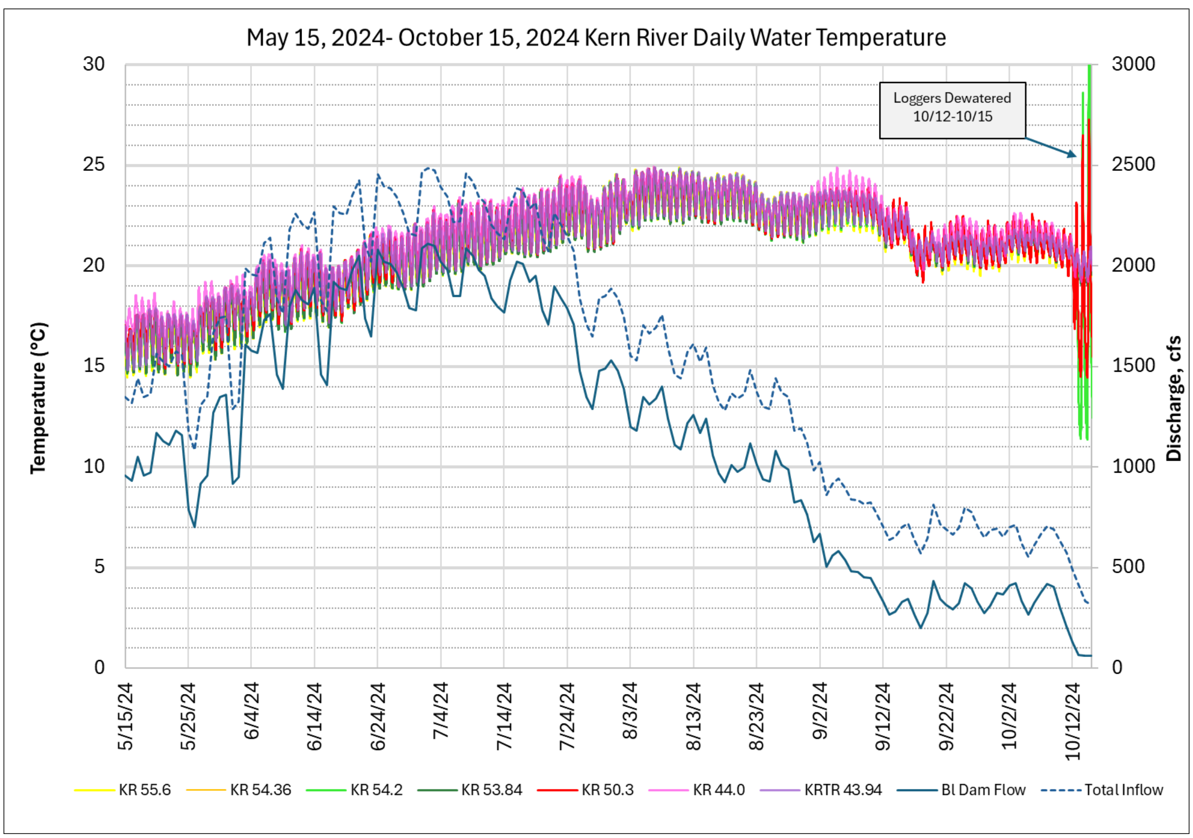
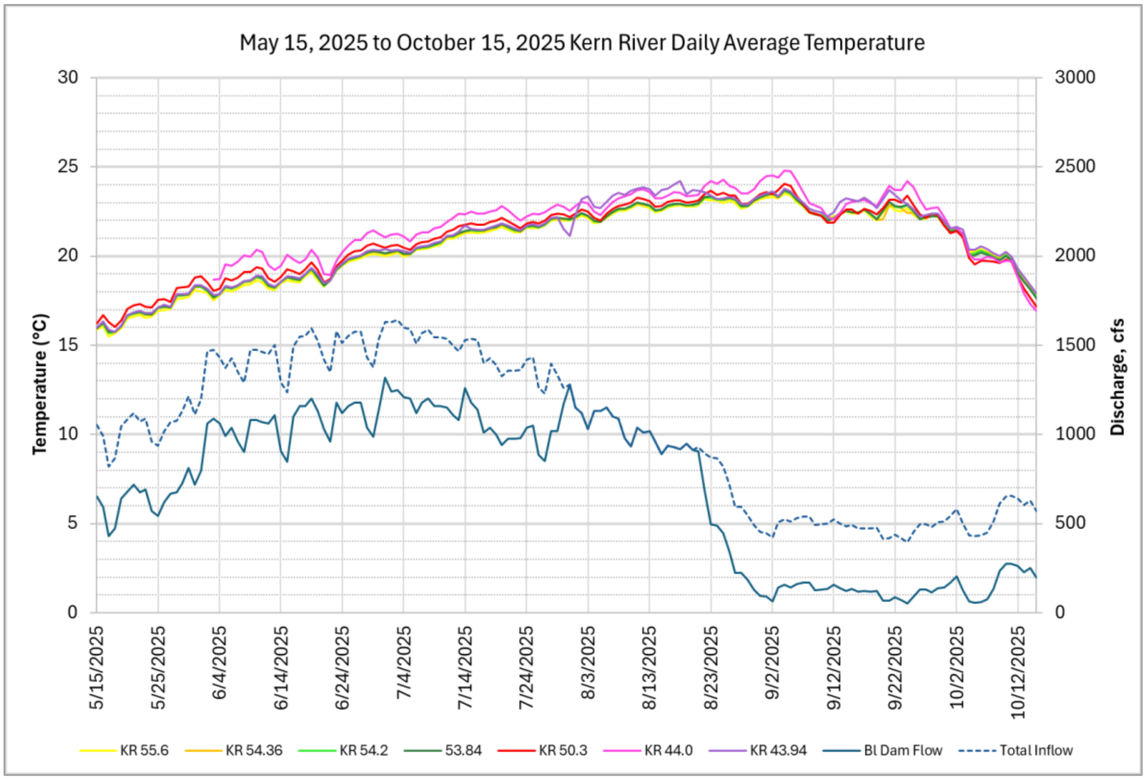


Figure 5-1. 2024 Kern River Daily Average Water Temperature (top) and 15-minute Temperature Data (bottom) with Daily Mean Discharge (total inflow and flow downstream of Democrat Dam)



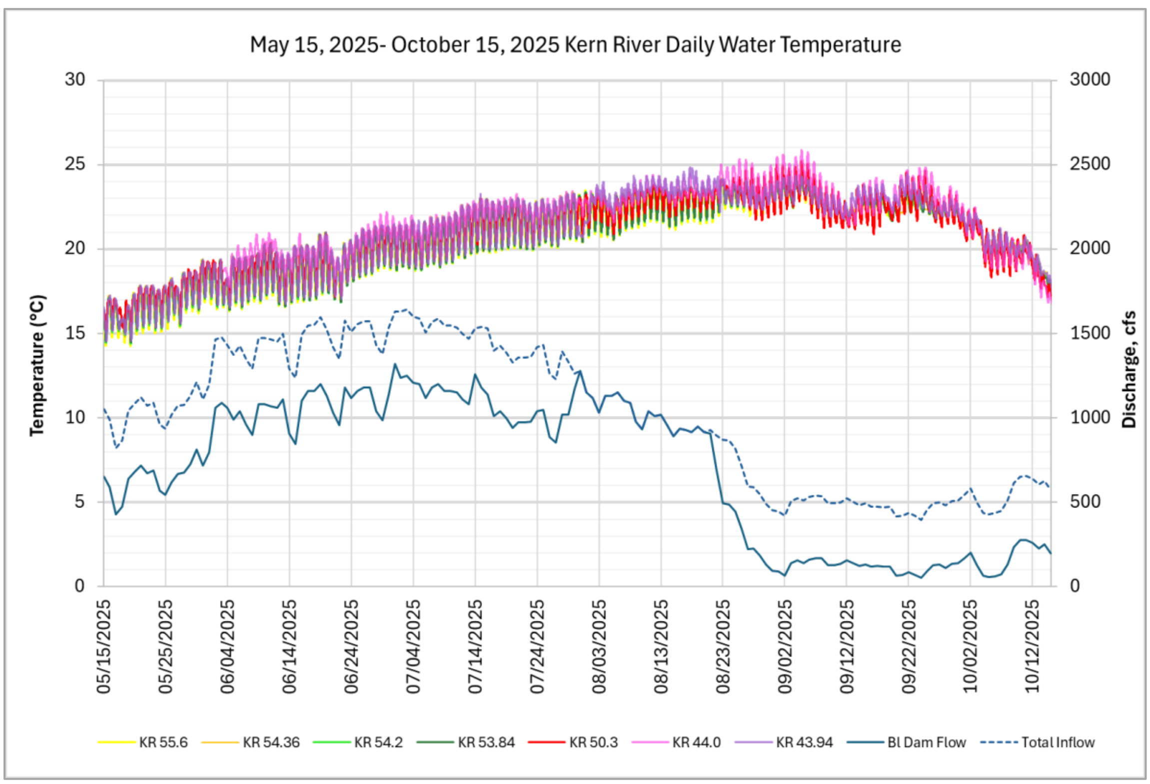
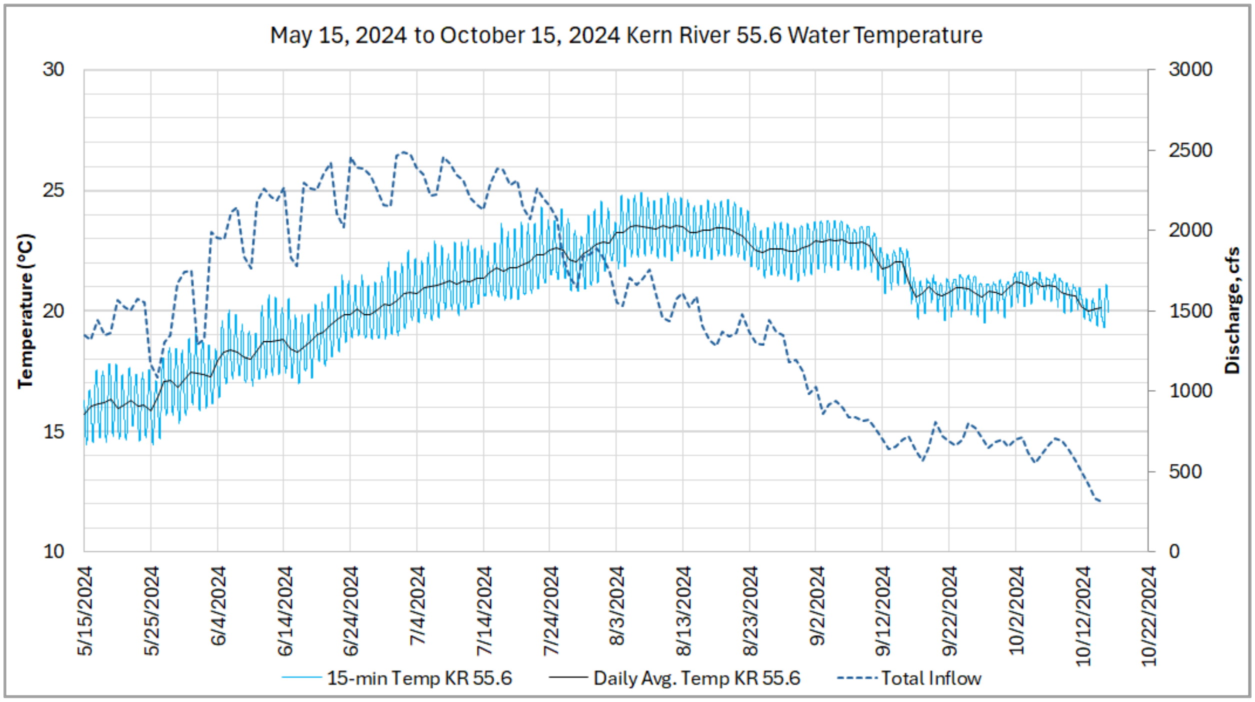


Figure 5-2. 2025 Kern River Daily Average Water Temperature (top) and 15-minute Temperature Data (bottom) with Daily Mean Discharge (total inflow and flow downstream of Democrat Dam)



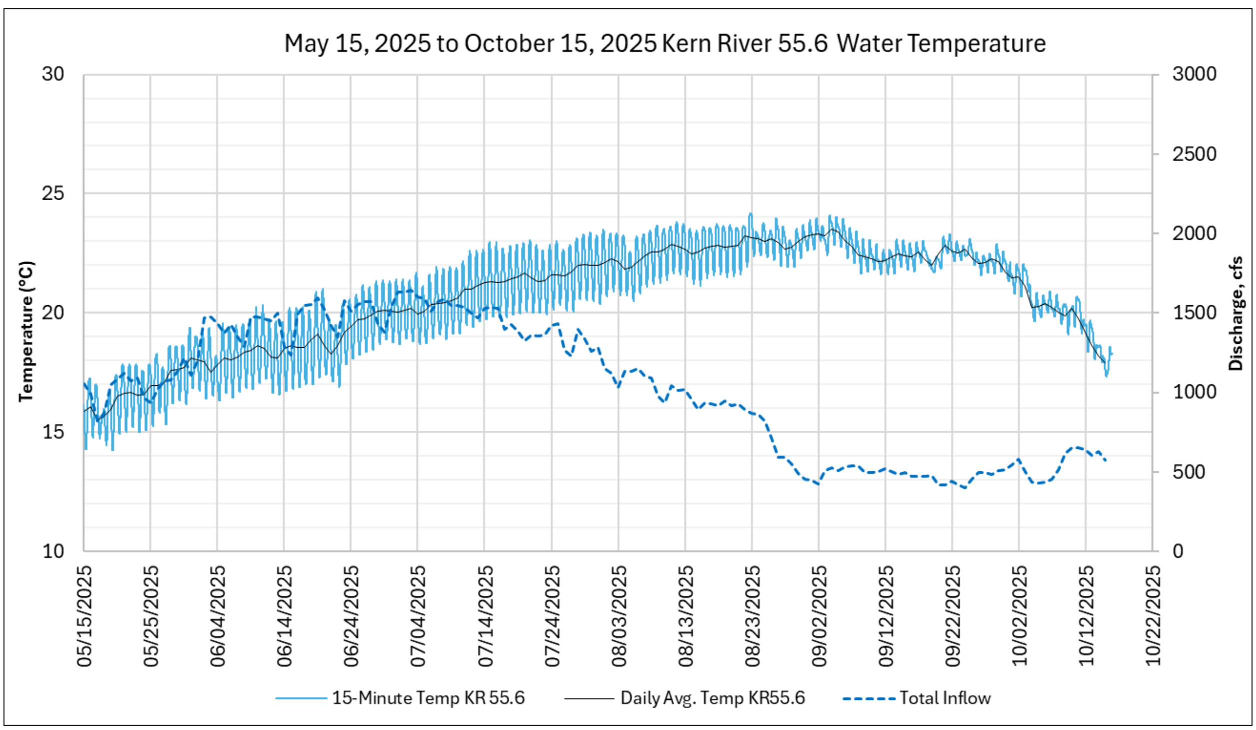
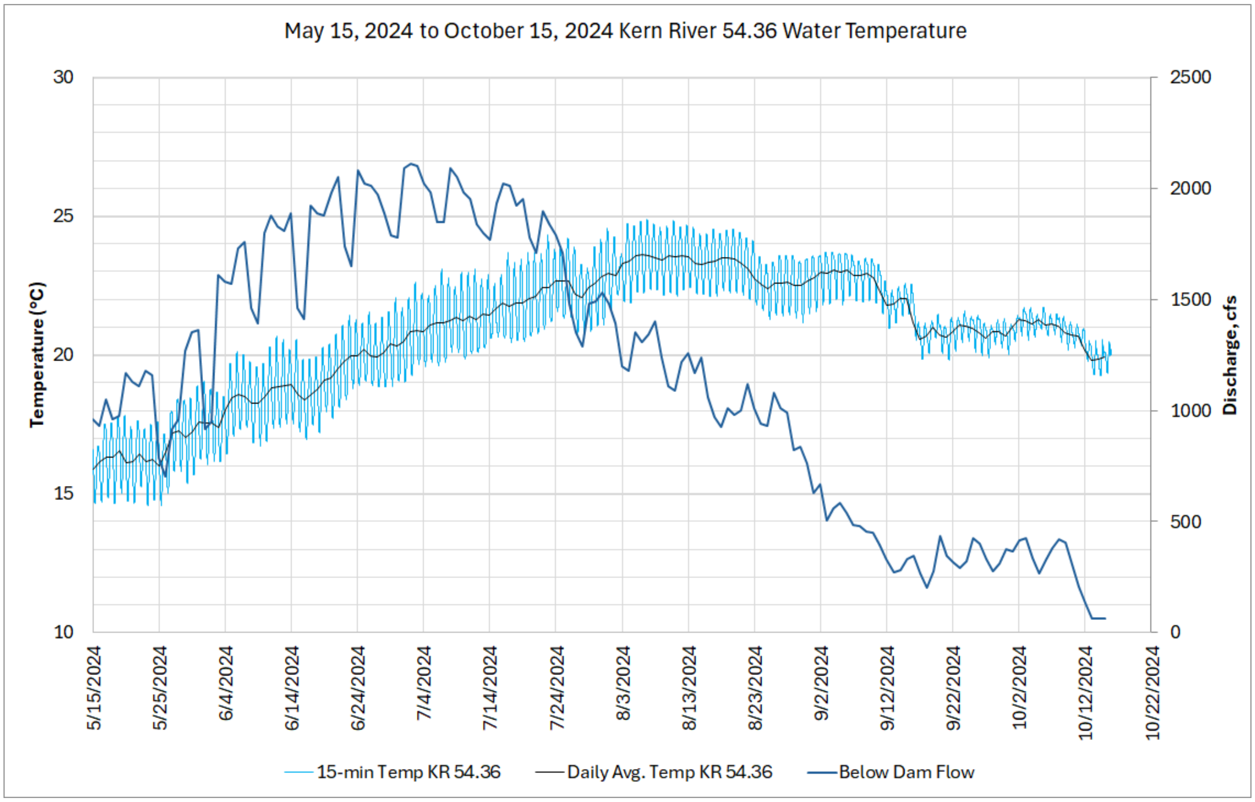


Figure 5-3. Kern River above Democrat Dam, Site KR 55.6, Water Temperature and Daily Mean Discharge for 2024 (Top) and 2025 (Bottom)



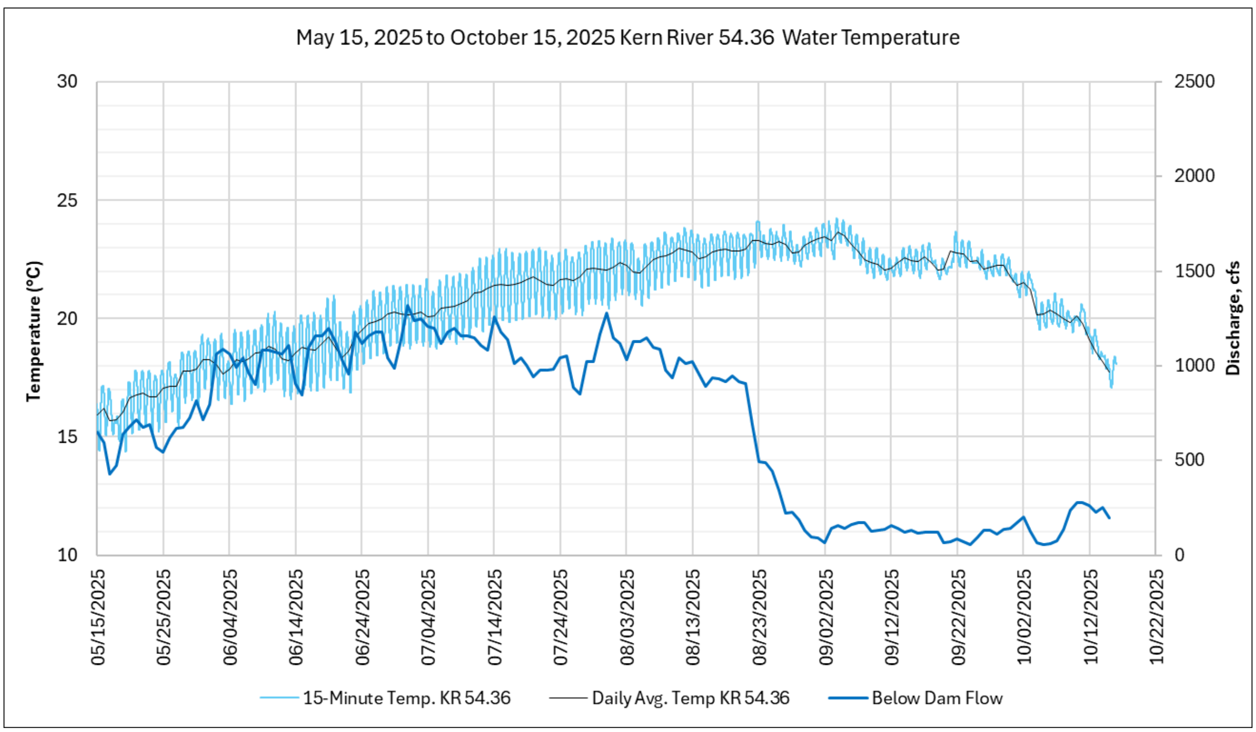
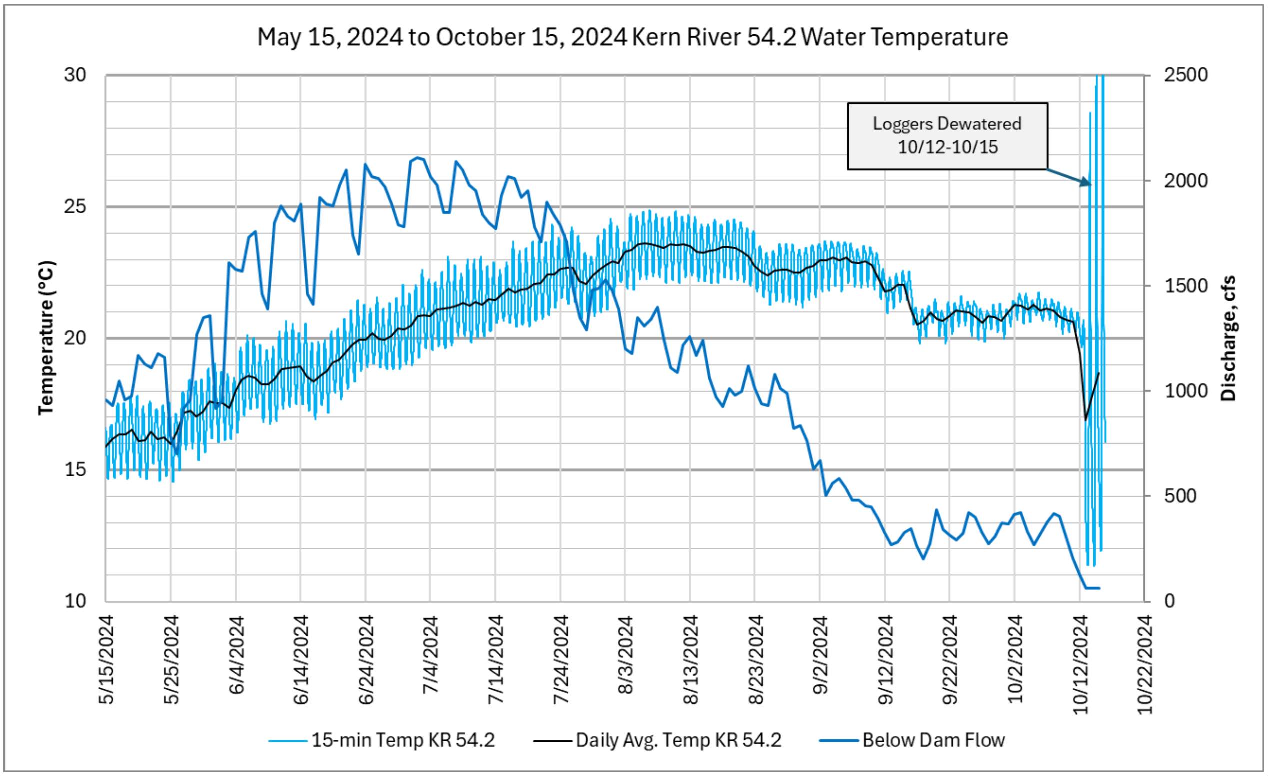


Figure 5-4. Kern River between Democrat Dam and Instream Flow Release, Site KR 54.36 Water Temperature and Daily Mean Discharge for 2024 (Top) and 2025 (Bottom)



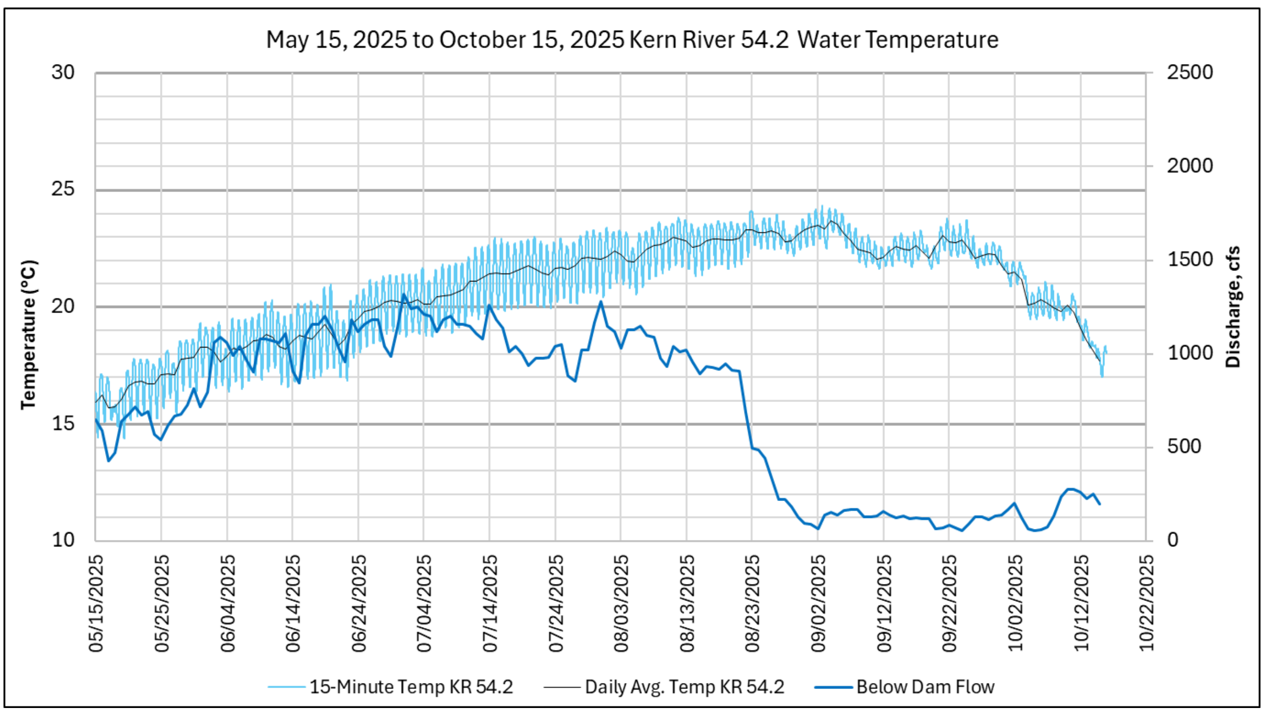
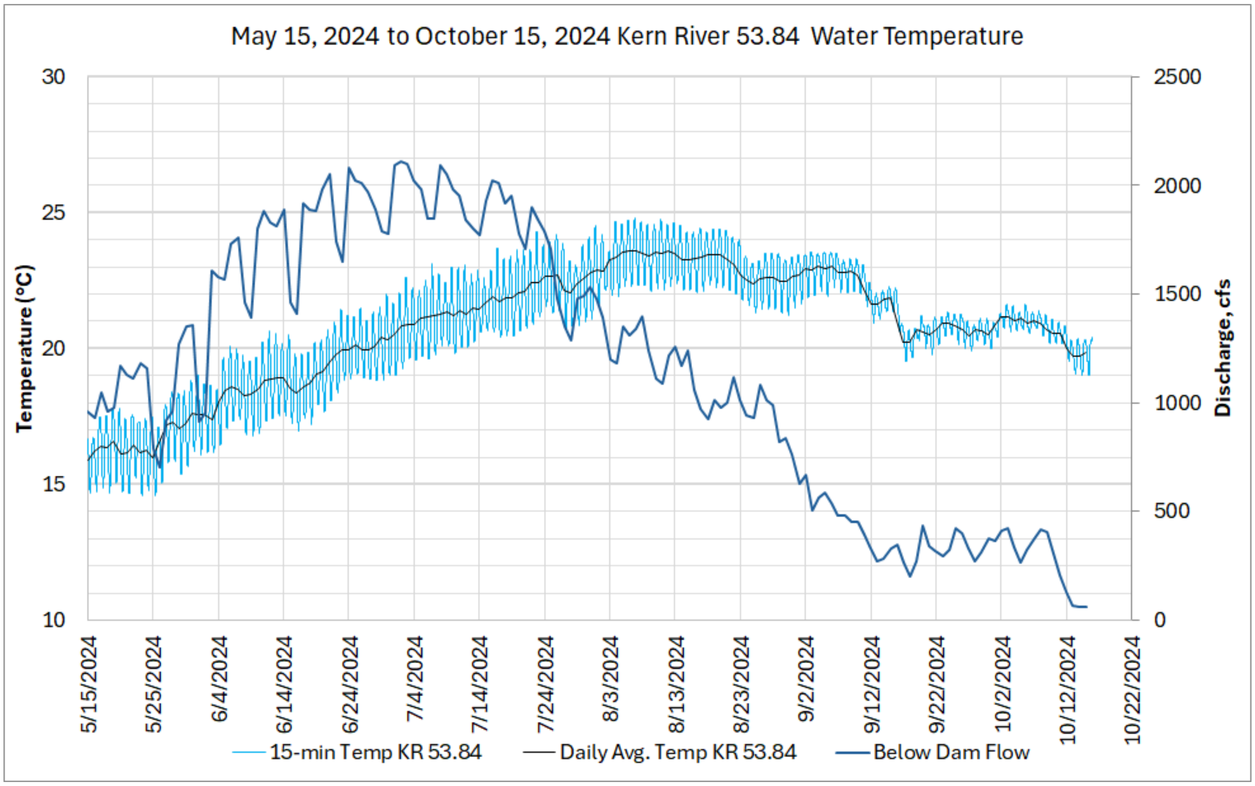


Figure 5-5. Kern River below Instream Flow Release, KR 54.2 Water Temperature and Daily Mean Discharge for 2024 (Top) and 2025 (Bottom)



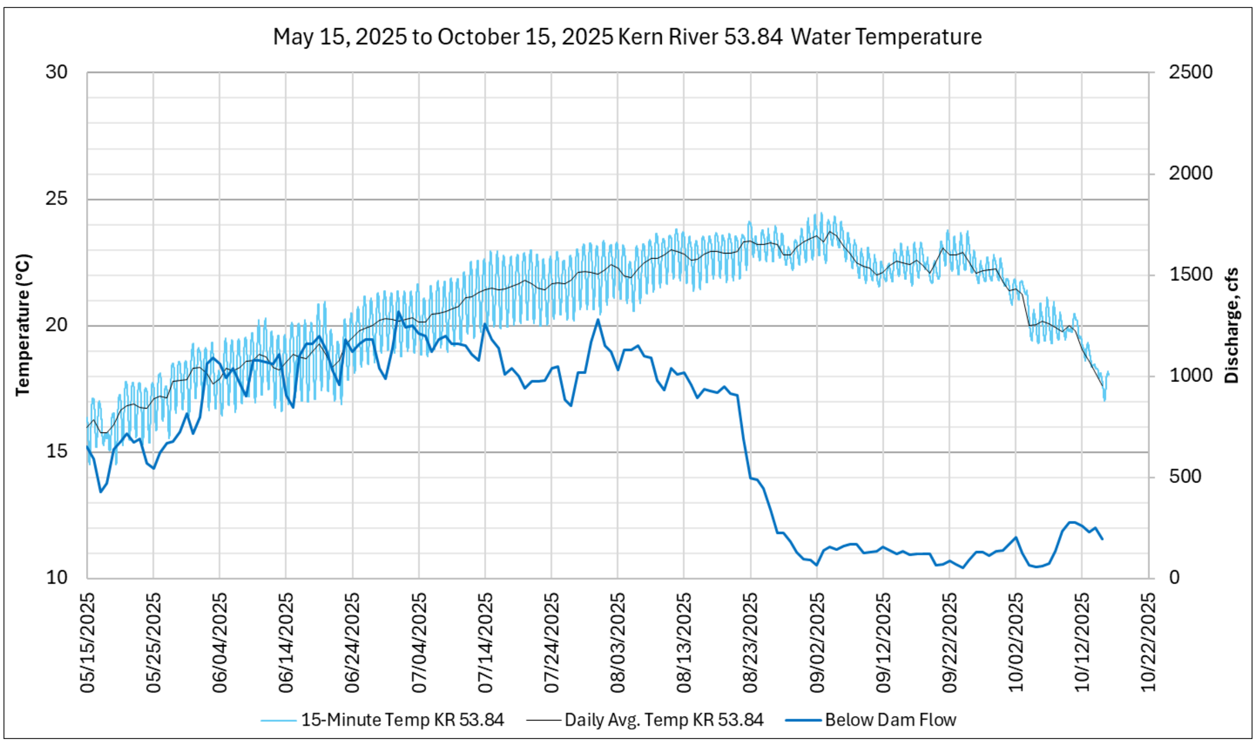
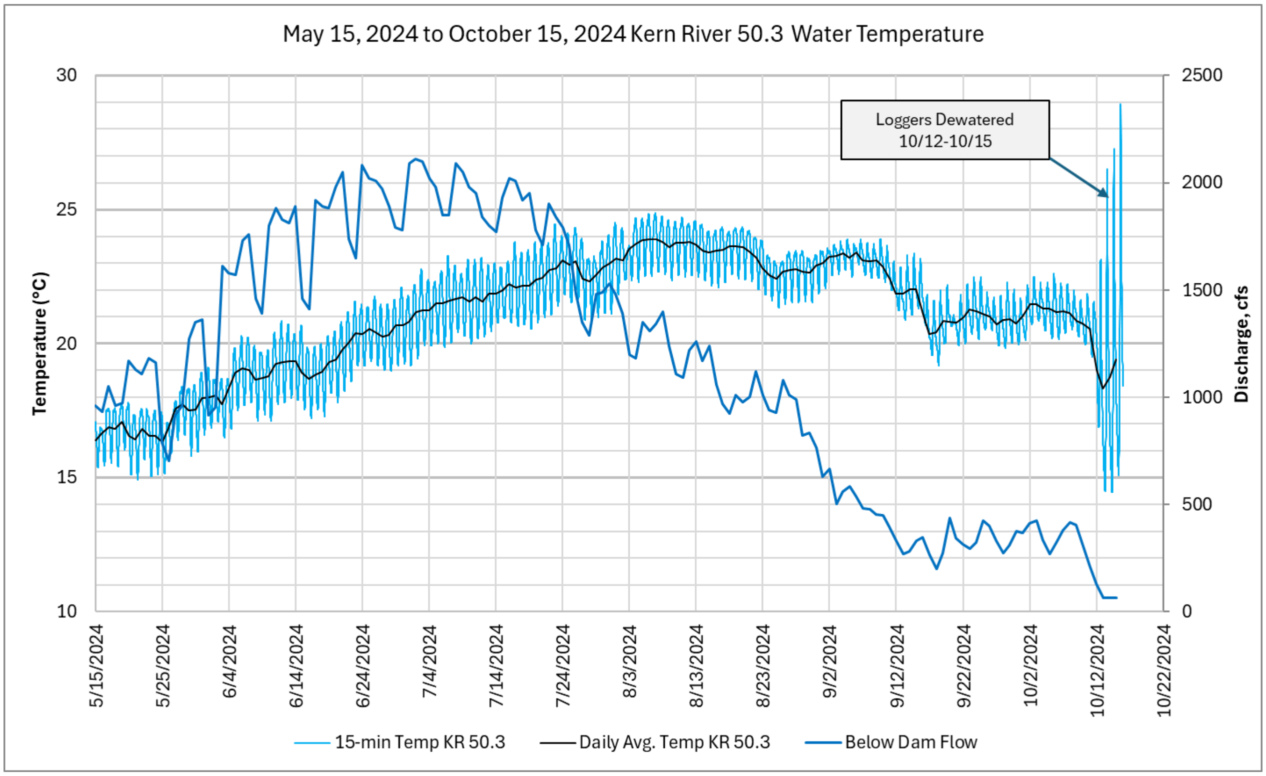


Figure 5-6. Kern River near USGS gage 11192500; below Democrat Dam, KR 53.84 Water Temperature and Daily Mean Discharge for 2024 (Top) and 2025 (Bottom)



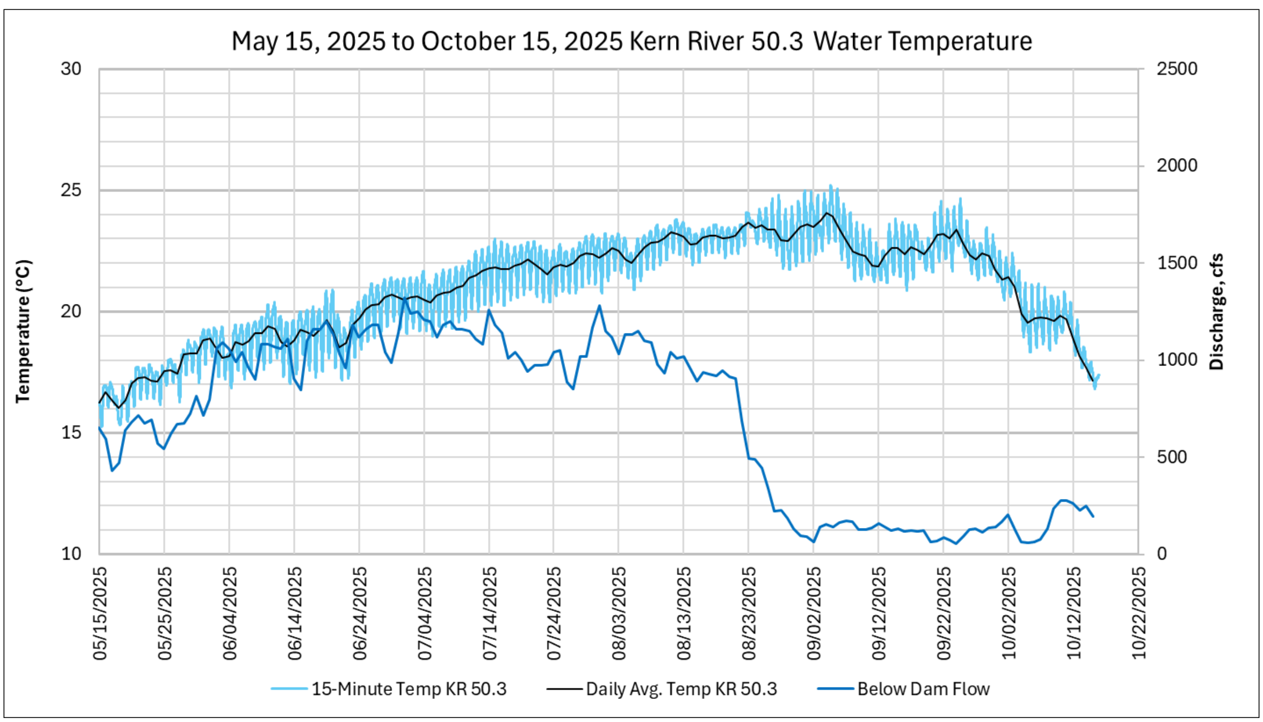
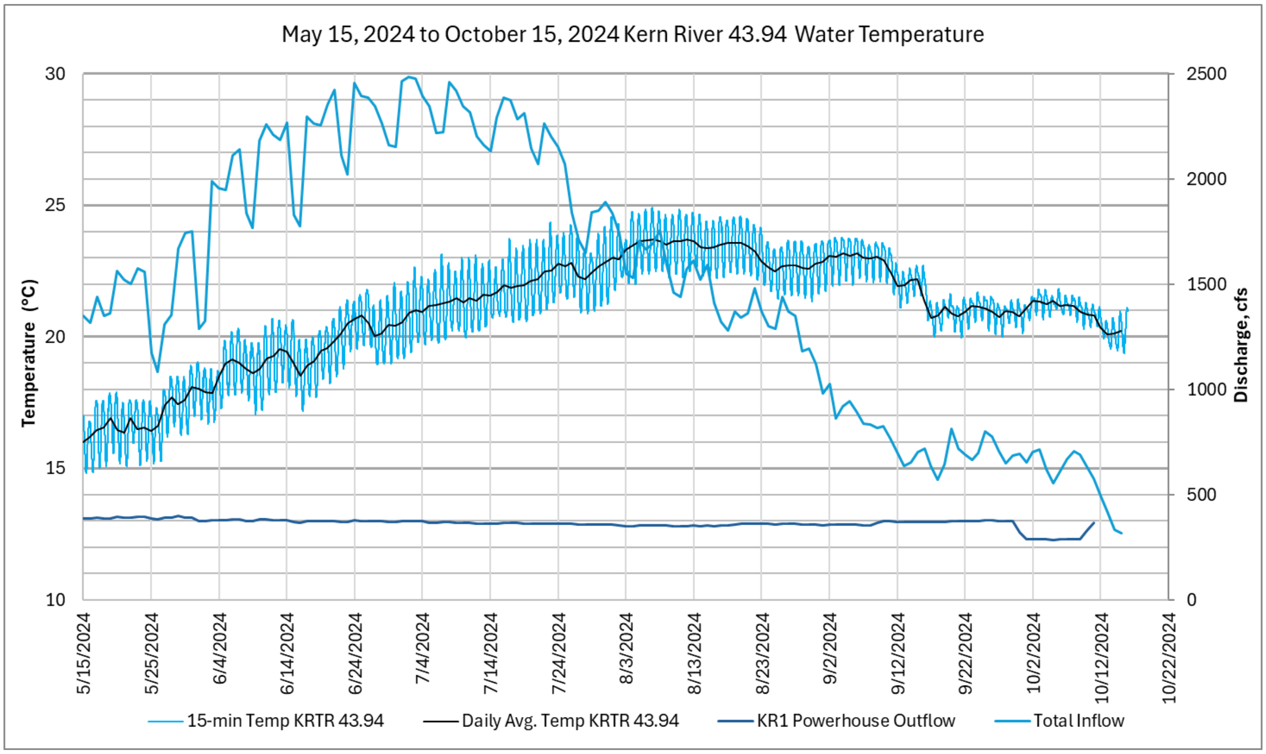


Figure 5-7. Kern River near Lucas Creek, KR 50.3 Water Temperature and Daily Mean Discharge for 2024 (Top) and 2025 (Bottom)



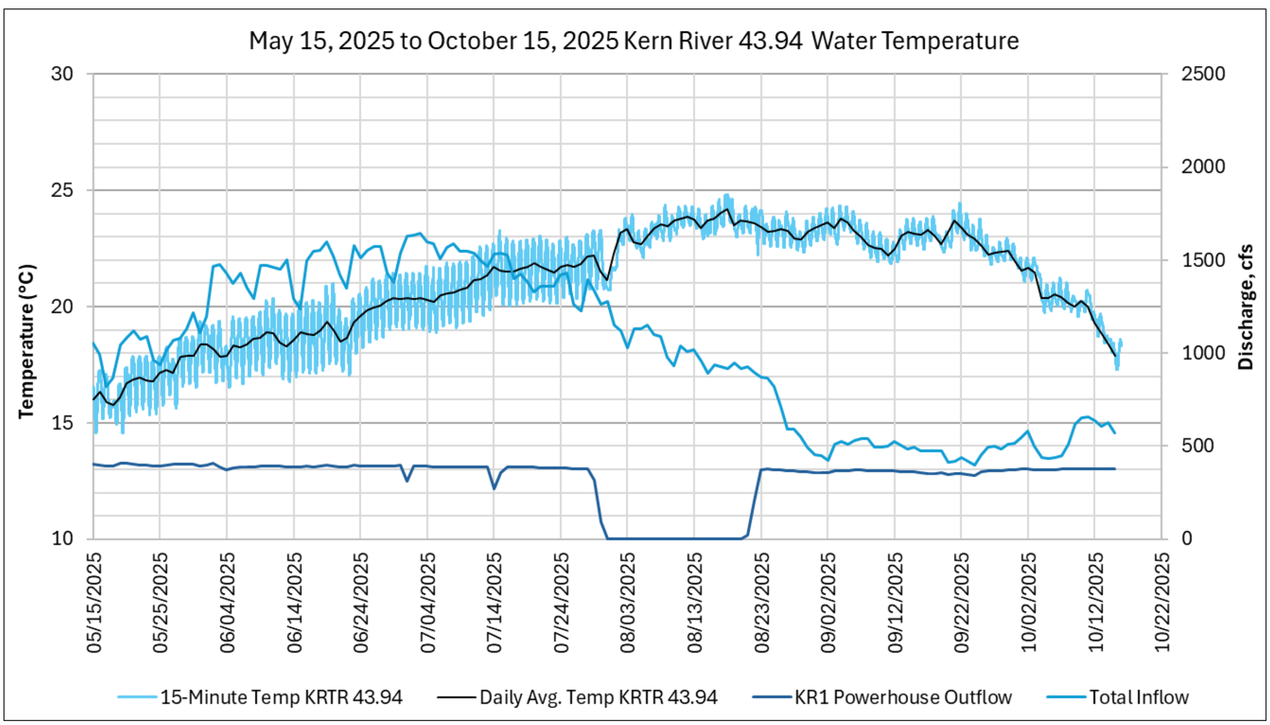
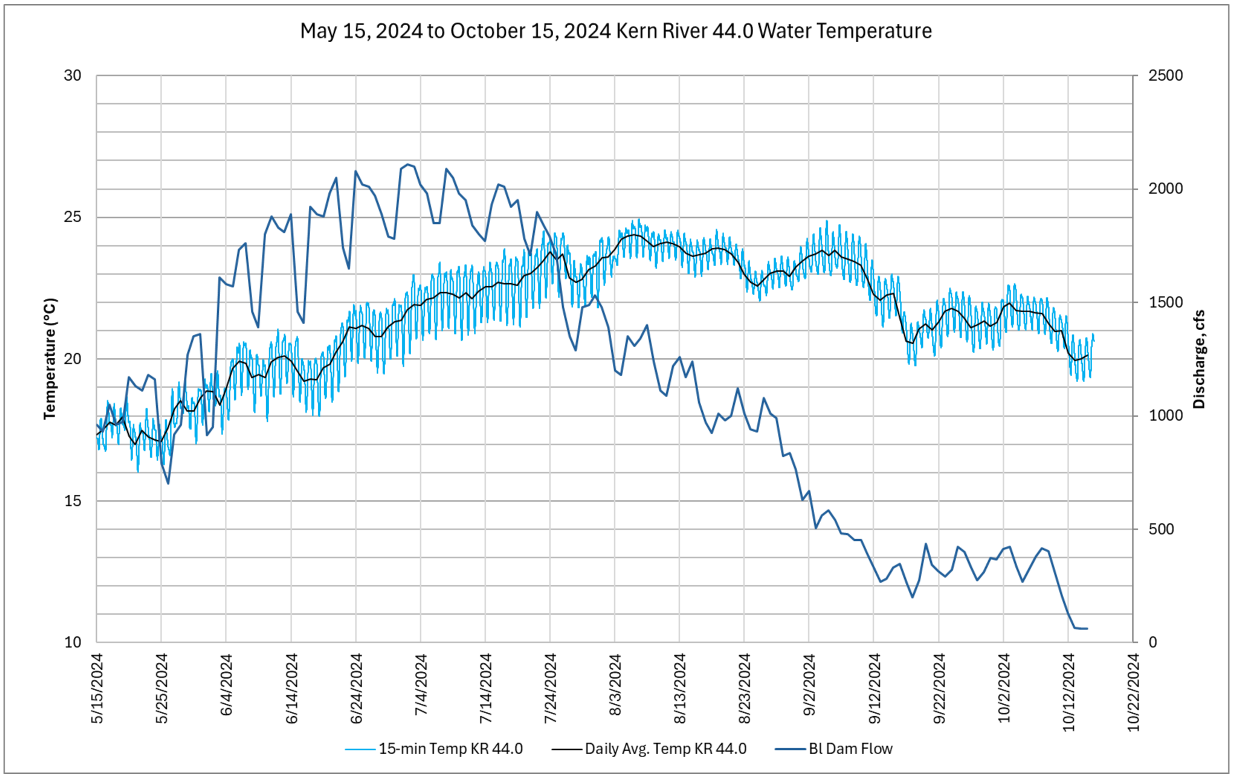


Figure 5-8. Kern River No. 1 Powerhouse Tailrace, KRTR 43.94 Water Temperature and Daily Mean Discharge for 2024 (Top) and 2025 (Bottom)



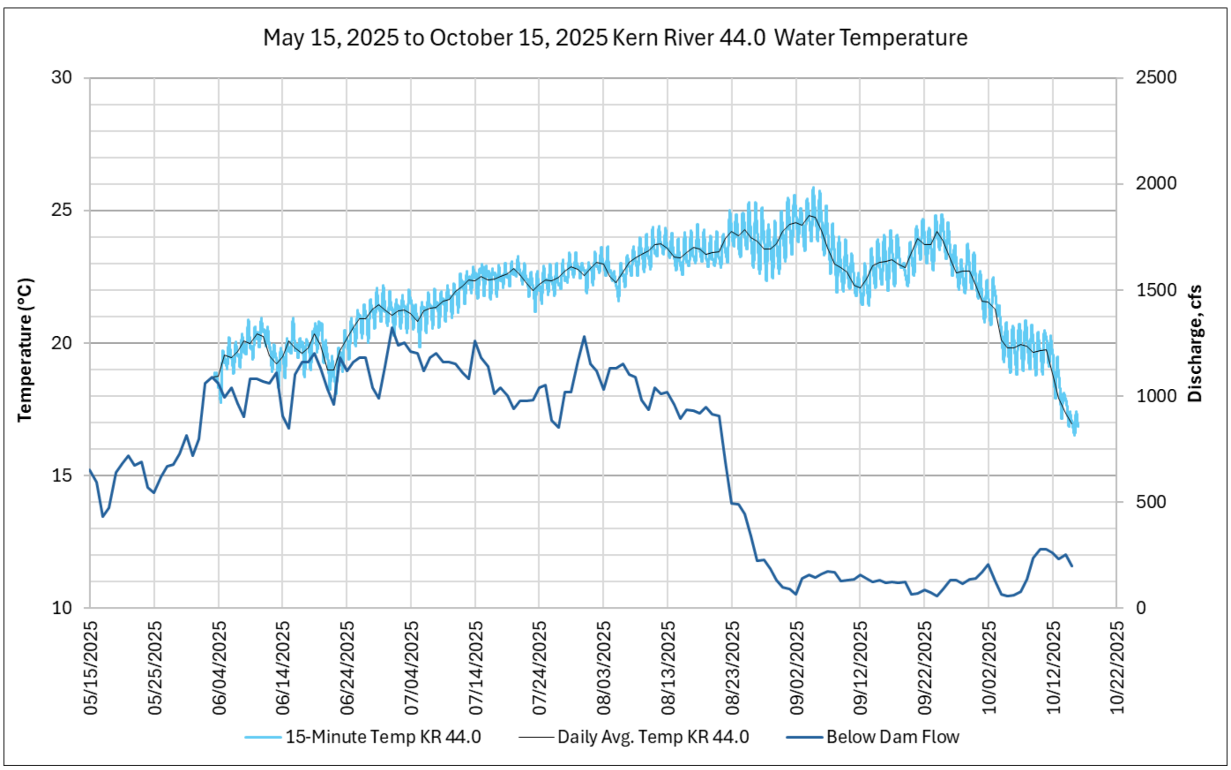


Figure 5-9. Kern River upstream of Kern River No. 1 Powerhouse, Site KR 44.0 Water Temperature and Daily Mean Discharge for 2024 (Top) and 2025 (Bottom)

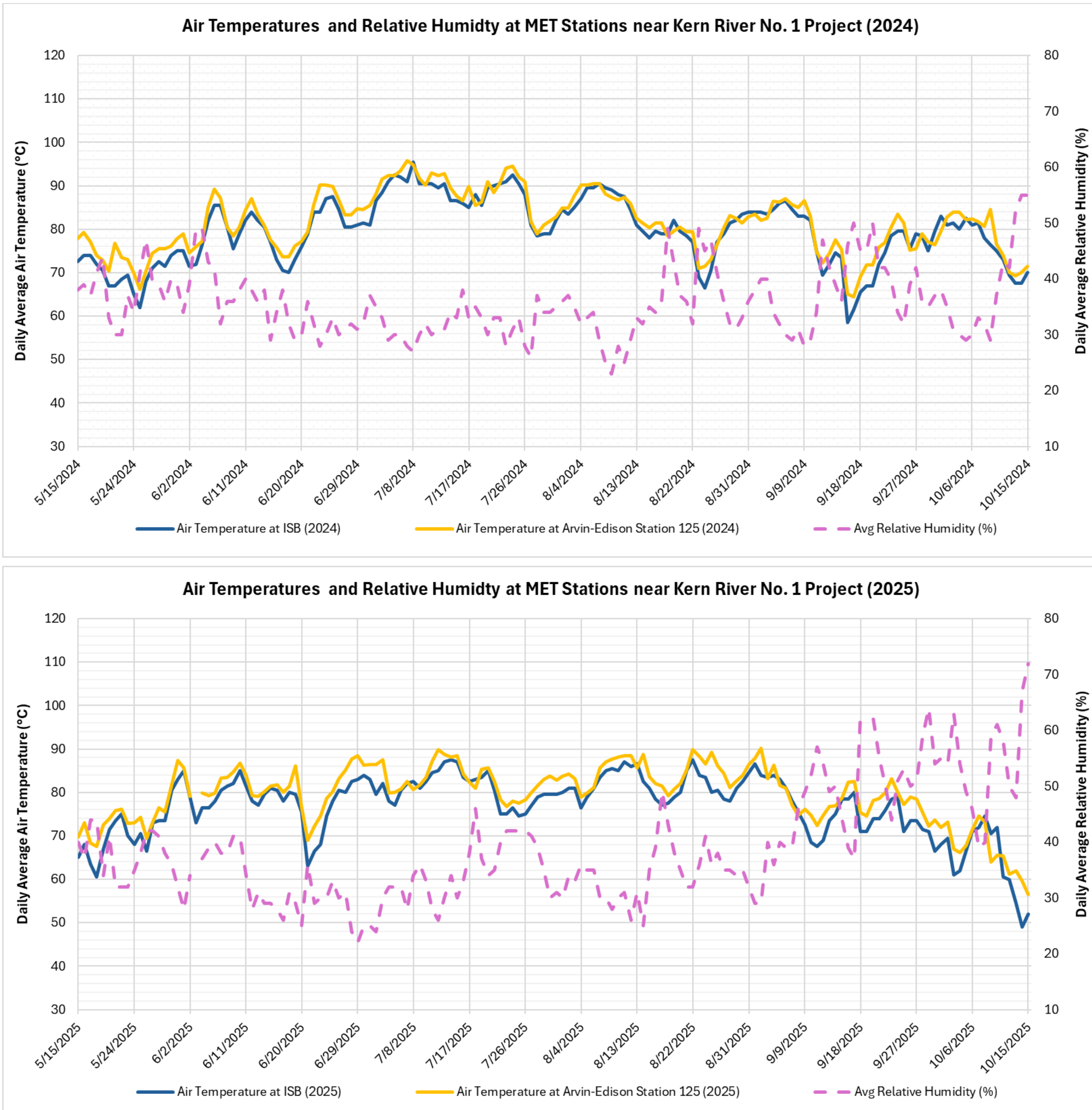


Figure 5-10. 2024 and 2025 Meteorological Station (MET) Data (Daily Average Air Temperature) near the Project Area (Isabella Dam [ISB]) and Arvin-Edison – San Joaquin Valley – Station 125

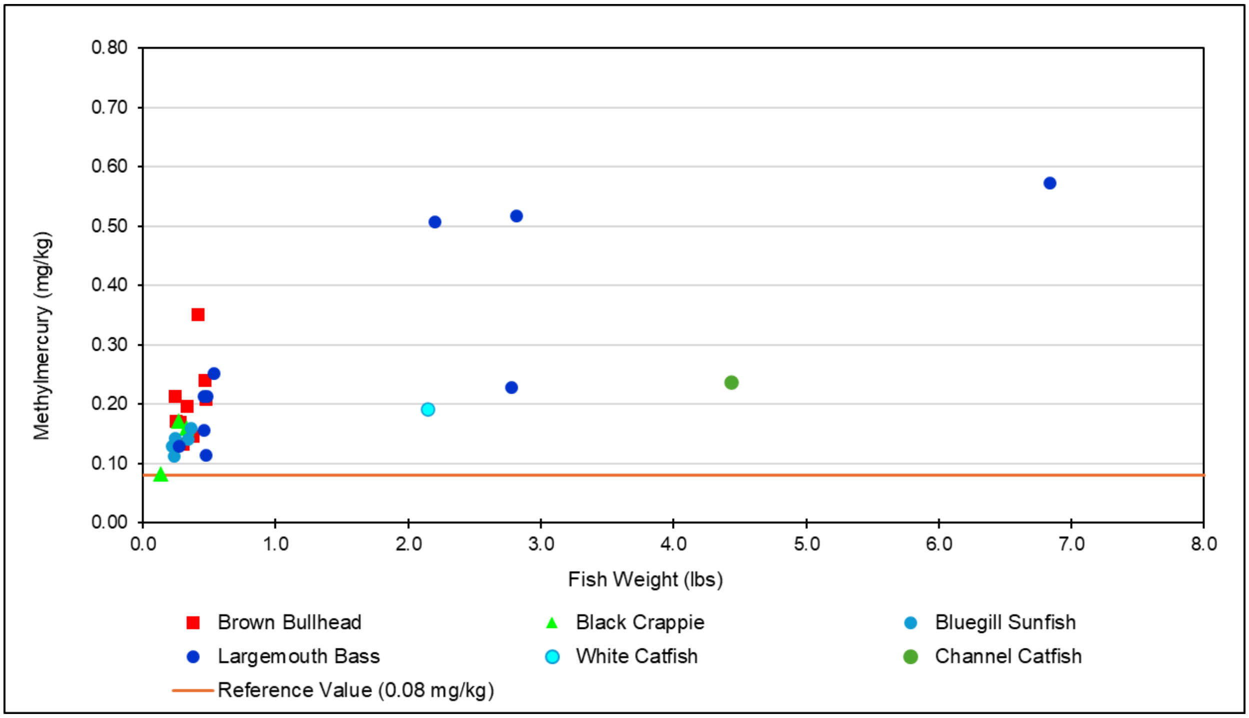
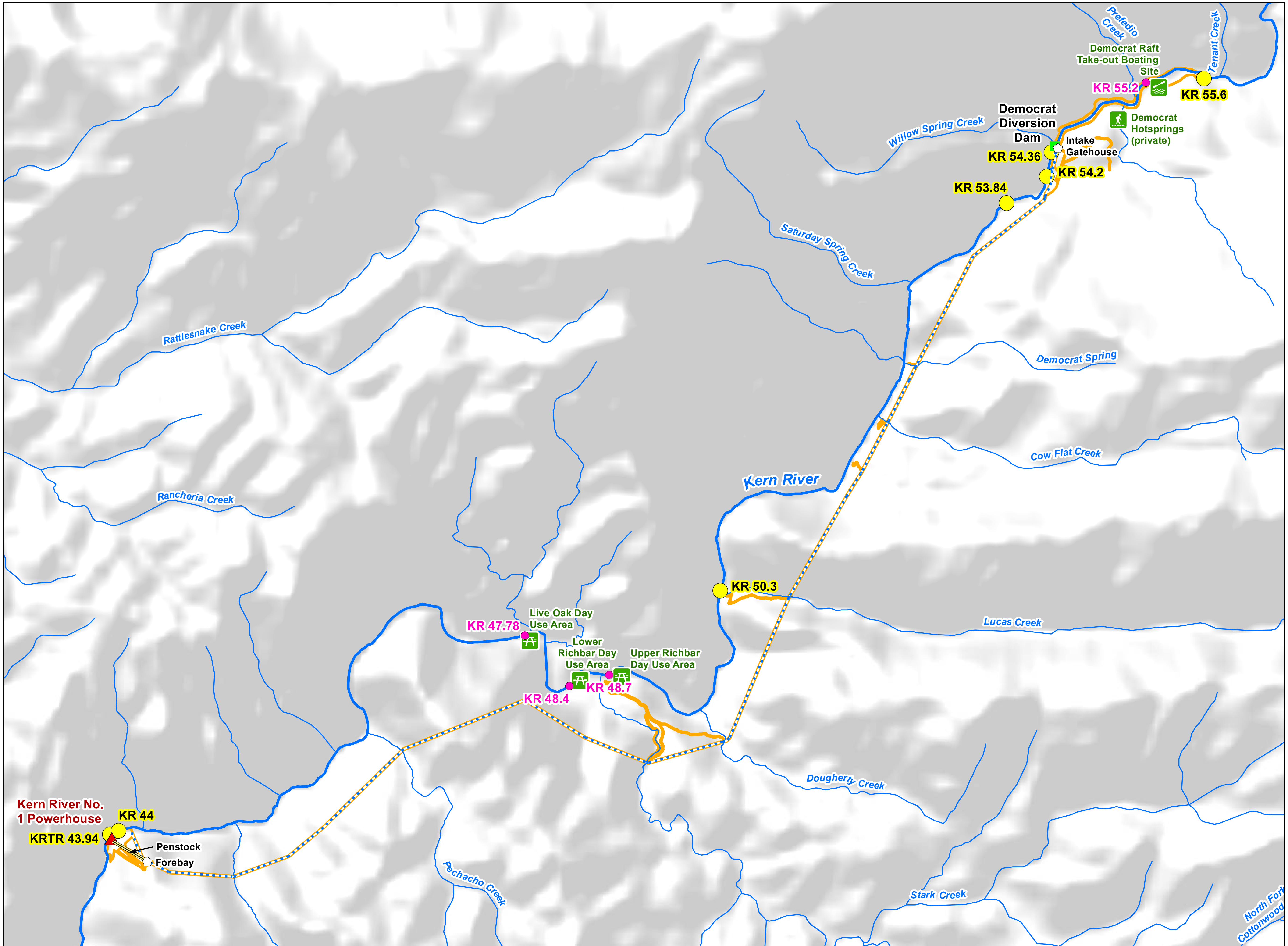


Figure 5-11. 2024 Fish Tissue Methylmercury Concentrations at Democrat Dam Impoundment

MAPS



Facilities

- Dam
- Powerhouse
- Water Conveyence Feature
- Flowline
- Penstock
- FERC Boundary

Other Features

- Watercourse

Water Quality Measurement Sites*

- In-situ Field Measurement and Recreational Site Fecal Coliform
- In-situ Field Measurement, Water Quality Grab Sample, and Continuous Temperature Monitoring

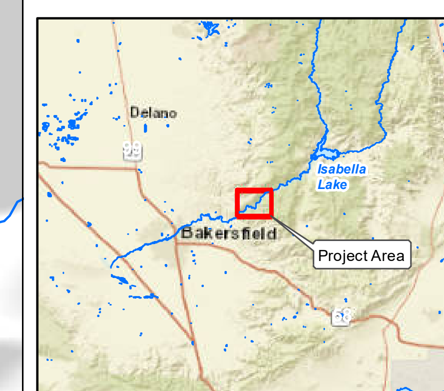
*NOTE: Water Quality Grab Sampling and In-situ Field Measurements occurred at both KR 55.2 and KR 55.6 in 2025.

Forest Service Recreation Sites

- Raft Takeout
- Day Use Area

Private Recreation Sites

- Democrat Hotsprings



Kern River No. 1 Hydroelectric Project
FERC Project No. 1930

Map 3-1

Study Area/Water Quality Measurement Sites

Date: 12/9/2025

0 0.25 0.5 Miles

Projection: UTM Zone 11
Datum: NAD 83

C:\GIS\237800343\map\Kern River 1\AquaticsMaps\SCE_Kern1_AQ2_H2O_Qual_Locations_17i11i_03.mxd

APPENDIX A

Description of Water Quality Parameters

APPENDIX A TABLE OF CONTENTS

Page

LIST OF ACRONYMS

μS/cm	microsiemens per centimeter
As	arsenic
ATSDR	Agency for Toxic Substances and Disease Registry
BASIN	Boulder Area Sustainability Information Network
$CaCO_3$	calcium carbonate
Cd	cadmium
Cu	copper
Cr	chromium
DO	dissolved oxygen
EPA	Environmental Protection Agency
Fe	iron
Hg	mercury
Hg^0	elemental mercury
Hg^{2+}	inorganic mercury
HSDB	Hazardous Substances Data Bank
MELP	Ministry of Environment, Lands and Parks, British Columbia
MeHg	methylmercury
mg/L	micrograms per liter
mL	milliliter
Mn	manganese
NH^3	ammonium (toxic)
NH_4^+	ammonium (non-toxic)
Ni	nickel
ng/L	nanograms per liter
NO_2	nitrite
NO_3	nitrate
NTU	Nephelometric Turbidity Units
P	phosphorus
Pb	lead
PO_4	Ortho-phosphate
TKN	Total kjeldahl nitrogen
TDS	Total dissolved solids
TSS	Total suspended solids
USGS	U.S. Geological Survey

WATER QUALITY MONITORING PARAMETER

IN-SITU MEASUREMENTS

Temperature

Ambient water temperature is a measurement of the intensity of heat stored in a volume of water and is generally reported in degrees Celsius (°C) or Fahrenheit (°F). Natural heat sources include solar radiation, air transfer, condensation of water vapor at the water surface, sediments, precipitation, surface runoff, and groundwater. Anthropogenic sources of heat include industrial effluents, agriculture, forest harvesting, decreases in streamside vegetation coverage, urban development, and mining.

Water temperature has important effects on aquatic biota. Increased water temperature reduces oxygen solubility while elevating metabolic oxygen demand. This causes lower oxygen concentrations that may be detrimental to some aquatic organisms. Reproductive and other biological activities, such as migration, spawning, egg incubation, and fry rearing, are often triggered by water temperature. A rise in water temperature can also provide conditions for the growth of disease-causing organisms. Temperature also influences the solubility of many chemical compounds, thus affecting their toxicity to aquatic life (Environmental Protection Agency [EPA] 1986, Ministry of Environment, Lands and Parks, British Columbia [MELP] 1998).

Dissolved Oxygen

Dissolved oxygen (DO) is a measure of the amount of oxygen dissolved in water. Values for DO in water analyses are commonly provided in mg/L, although a percentage of saturation may also be used. The concentration of DO in surface water is usually less than 10 mg/L (Ministry of Environment, Lands and Parks, British Columbia [MELP] 1998). The actual concentration will vary with other parameters such as temperature, elevation, photosynthetic activity, biotic activity, stream discharge, and the concentration of other solutes (Hem 1989, Michaud 1994). The maximum solubility of oxygen (fully saturated) at sea level is 12.75 mg/L at 5°C and 8 mg/L at 25°C. DO concentrations decrease within increasing temperatures or elevation (MELP 1998).

Dissolved oxygen is derived from the atmosphere and photosynthetic production by aquatic plants. Atmospheric oxygen is changed to dissolved oxygen when it enters the water, with more mixing occurring in turbulent waters. Dissolved oxygen is essential for the respiration of fish and other aquatic organisms (Michaud 1994). As water moves past their breathing apparatus (such as gills in fish), oxygen gas bubbles in the water (DO) are transferred from the water to their blood. The transfusion is efficient only above certain concentrations. Oxygen is also used for the decomposition of organic matter and other biological and chemical processes. Anoxic waters have obvious detrimental effects on aerobic organisms. These conditions can also lead to the accumulation of chemically reduced compounds, such as ammonium and hydrogen sulfide, in the bottom sediments that can be toxic to benthic organisms (Michaud 1994).

Nutrient solubility and availability rely partly on DO levels, and thus DO also affects the productivity of aquatic ecosystems. In streams, DO concentrations tend to be higher in faster moving waters. During the summer, in particular, when discharges and velocities decrease in streams, DO concentrations can be quite low. Pollution can cause decreases in average DO concentrations by contributing organic matter that uses oxygen or nutrients and stimulates the growth of algae.

Conductivity

Conductivity is a measurement of the ability of water to conduct an electric current and provides an estimate of the concentration of dissolved solids. This property is related to water temperature and total ion content (e.g. chloride, sulfate, sodium, and calcium), and depends on the concentration of dissolved metals and other dissolved materials. Water carries more current with increased ion content in the water. Conductivity is lower in cooler waters. Conductivity is measured in terms of resistance and reported in microsiemens per centimeter (µS/cm) at 25^{o}C. Water source and geologic composition of the watershed are important controlling factors of conductivity. Streams that flow through granite bedrock, for example, have lower conductivity than those that flow through limestone or clay soils. The conductivity of pure waters is 0.055 µS/cm. The conductivity of freshwater at 25^{o}C varies between 50 and 1,500 µS/cm (Hem 1989, MELP 1998). Conductivity measurements in streams flowing through granitic, siliceous, or other igneous rocks usually range between 10 and 50 µS/cm. In comparison, it generally ranges between 150 and 500 µS/cm in streams that are flowing through limestones. Conductivity itself is not an aquatic health concern, but it serves as an indicator of other water quality concerns.

pH

A pH value is a measure of the activity of hydrogen ions in a water sample. Various types of chemical reactions that occur in natural waters produce hydrogen ions, which are then consumed by participating in subsequent chemical reactions in the system. These interrelated chemical reactions that produce and consume hydrogen ions control the pH value of a water body. The pH value shows the status of equilibrium reactions in which the water participates. A pH of 7 is considered neutral, a value less than 7 is acidic, and a value greater than 7 is basic. The units of pH are logarithmic, so a difference of one unit represents a 10-fold change in hydrogen ion concentration. The higher the pH, the fewer free hydrogen ions are present in the water. The pH of natural fresh waters ranges from 4.0 to 10.0, with most waters falling between 6.5 and 8.5 (EPA 1986, Hem 1989, MELP 1998).

The pH of water determines the solubility (the amount that can be dissolved in water) and biological availability (the amount that can be used by aquatic biota) of chemical constituents, such as nutrients (e.g. carbon, nitrogen and phosphorus) and heavy metals (e.g. lead, copper). Unusually high or low pH can have adverse effects on aquatic biota. Values above 9.5 and below 4.5 are considered lethal to aquatic organisms (EPA 1996, MELP 1998). For heavy metals, the degree to which they are soluble determines their toxicity. They tend to be more toxic when pH is lower because they are more soluble and bioavailable.

The pH of water is naturally variable, although the amount of change in natural waters tends to be very small due to many chemical reactions. This ability of the water to maintain a stable pH is called buffering capacity. The initial pH of water is influenced by the geology of the watershed and the original source of the water. In particular, alkalinity, which is typically low in granitic drainages, is usually the primary factor that influences pH values. This causes the waters to be more acidic (pH <7.0) in these types of watersheds (Wetzel 2001). The greatest natural cause for variation is the daily and seasonal changes in photosynthesis. Photosynthesis uses up hydrogen molecules and therefore increases the pH. The pH increases during the day (with maximum values up to 9.0) and decreases at night. Respiration and decomposition processes lower pH. The pH also tends to be higher during the growing season when photosynthesis is greater. As a result, most streams that drain coniferous forests tend to be slight acidic (6.5 to 6.8) (Hem 1989, Michaud 1994, Wetzel 2001).

LABORATORY ANALYSIS PARAMETER

GENERAL PARAMETERS

Nitrate/Nitrite

Nitrate (NO_3^-) and nitrite (NO_2^-) ions are produced during nitrification of reduced and organic forms of nitrogen. Nitrate and nitrite are typically reported in mg/L or µg/L. Nitrite is usually present in only minute quantities in water (<0.001 mg/L) because it in an intermediate, unstable form of nitrogen within the nitrogen cycle (MELP 1998). It is formed from nitrate or ammonium ions by certain microorganisms found in soil and water (EPA 1986). Nitrate is formed by the complete oxidation of ammonium by microorganism in the soil and water. It is the most oxidized and stable form of nitrogen in water, and therefore is the principal form of combined nitrogen. Most surface waters contain less than 0.01 mg/L of nitrite and less than 0.2 mg/L nitrate (MELP 1998, Wetzel 2001).

Nitrate is the primary form of nitrogen used during plant growth. Excessive amounts of nitrate may cause phytoplankton or macrophyte outbreaks. Nitrite is toxic to aquatic life at relatively low concentrations (MELP 1998). Although it is an essential plant nutrient, excessive nitrogen can cause proliferation of algae and macrophytes, resulting in eutrophic water conditions. Eutrophication causes decreased oxygen levels which may cause stress or mortality of fish and invertebrates (EPA 1986). Sources of elevated nitrate and nitrite come from municipal and industrial wastewaters, agricultural runoff, urban development, and automobile exhausts.

Ammonia

Ammonia is found in two forms, ammonium (NH_4^+) that is not toxic and NH_3, which is toxic (EPA 1986). Ammonium is readily adsorbed onto mineral surfaces (Hem 1989). It is reported as mg/L or µg/L, with typical surface water values less than 0.1 mg/L (MELP 1998, Wetzel 2001). Ammonia as NH_3 is reported to be toxic to various aquatic organisms over a range of concentrations (0.53 to 22.8 mg/L) (Oram 2007).

Complex nitrogen cycling and processes occur within aquatic systems. Nitrogen is an essential plant nutrient which contributes to the productivity of a water body. However, excessive ammonia over-stimulates the growth of algae and other plants, leading to eutrophication of a water body. The resulting decrease of oxygen levels may cause stress and mortality of fish and invertebrates (EPA 1986). High ammonia concentrations are also toxic to aquatic life. The specific concentration at which ammonia is harmful to organisms depends upon the temperature and pH of the water. At higher temperatures and pH, a greater proportion of the total ammonia is present as NH_3, increasing the toxicity of the water (EPA 1986). The distribution of ammonia in surface waters varies spatially and seasonally depending upon productivity and the amount of organic matter. Anthropogenic sources of ammonia include fertilizers, livestock wastes, residential effluents (e.g. cleaning products), mining, sewage treatments plans, and effluent from various types of industries (Oram 2007).

Total Kjeldahl Nitrogen

Total kjeldahl nitrogen (TKN) is a measure of both the ammonia and organic forms of nitrogen. Organic nitrogen includes organic compounds, such as proteins, polypeptides, amino acids, and urea. TKN is reported in mg/L or µg/L (MELP 1998). In Sierra Nevadan rivers and streams, TKN values typically range between 0.025 and 0.65 mg/L (EPA 2000).

High ammonia concentrations can be deleterious to aquatic life, as it contributes to the eutrophication of water bodies. Organic nitrogen is not biologically available. As a result, it does not influence plant growth or water quality condition until it is transformed to the inorganic forms of nitrogen (MELP 1998). Natural sources of TKN include decaying organic material such as plants and animals wastes. Some species of streamside vegetation, such as alders, are nitrogen fixers. Elevated nitrogen concentrations have been measured in waters with decaying alder leaves (Wetzel 2001). Anthropogenic sources of TKN include effluents from sewage treatment plants and industry, agriculture (fertilizers), urban developments, paper plants, recreation, and mining.

Total Phosphorus

Phosphorus (P) is a nutrient that is essential for growth, and is a measure of both organic and inorganic forms of phosphorus. It can be measured as total phosphorus or ortho-phosphate. Total phosphorus is the total amount of phosphorus in the sample. Ortho-phosphate is the portion that is available to organisms for growth. Total phosphorus measurements include phosphorus that is in biological tissue, as well as the insoluble mineral particles (Michaud 1994, MELP 1998). Phosphorus is fairly abundant in sediments, but concentrations are usually less than a few tenths of a milligram per liter in surface waters (Hem 1989). Total phosphorus concentrations in the rivers and streams in the Sierra Nevada typically range between 2.5 and 485 µg/L (EPA 2000). It is usually reported in µg/L or mg/L.

Phosphorus is essential for plant growth and is often the most limiting nutrient for plant growth in surface waters. As a result, inputs of phosphorus into surface waters can cause algal blooms. Anthropogenic sources of phosphorus include effluents from sewage treatment plants and industry, agriculture, and urban developments (EPA 1986, Hem 1989, MELP 1998).

Ortho-phosphate

Ortho-phosphate (PO_4) is a measure of the inorganic oxidized form of soluble phosphorus. It is generally reported in mg/L or µg/L. Background concentrations of orthophosphate in surface waters generally average 0.01 mg/L (Hem 1989).

Along with nitrogen, phosphorus is a necessary nutrient for plant growth. Ortho-phosphate is the most readily available form of phosphorus for uptake during photosynthesis. Animals obtain phosphorus through the consumption of plant materials. Excess ortho-phosphate causes prolific algal growth, causing the same detrimental water conditions as described for nitrogen and total phosphorus (MELP 1998). Since phosphorus is typically the most limiting nutrient for plant growth in fresh water, additions of this element are often the primary causes of eutrophication of water bodies. Phosphate ions readily and strongly adsorb onto soils, suspended solids, and streambed sediments. As a result, soil erosion can be a source of ortho-phosphate. Other sources include agricultural, urban, and industrial wastewater effluents.

Total Dissolved Solids

Total dissolved solids (TDS) is a measure of the concentration of inorganic salts (e.g. sodium, chloride, potassium, calcium, magnesium, and sulfate), small amounts of organic material, and dissolved materials in the water column and is reported in mg/L. The value of TDS in fresh water naturally ranges from 0 to 1,000 mg/L (EPA 1986, MELP 1998). Concentrations tend to be comparatively low in streams in granitic and sandstone-dominated watersheds than watersheds with abundant limestone.

The effect of elevated TDS levels on aquatic biota depends on the ionic composition of the dissolved material and the extent of the increase in concentration. Under natural conditions, all aquatic life must be able to survive a range of TDS concentrations (EPA 1986). Sources of TDS include sewage, stormwater and agricultural runoff, salts from roads, and industrial and water treatment plant wastewater discharges. TDS can also be derived from natural sources, including carbonate and salt deposits and mineral springs.

Total Suspended Solids

Total suspended solids (TSS) is a measurement of particulate matter suspended in the water column and is typically reported in mg/L (MELP 1998). Nephelometric Turbidity Units (NTUs) correspond approximately to TSS concentrations. TSS fluctuate with stream flow and may increase significantly during snowmelt and runoff from rain events. Streams in forested watersheds tend to have low TSS concentrations, usually less than 50 mg/L, although concentrations can be naturally much higher in some streams and rivers (Windell 1992). Waters with TSS concentrations less than 20 mg/L are usually considered to be clear. Concentrations between 40 and 80 mg/L are considered to be cloudy. Waters with concentrations greater than 150 mg/L appear dirty.

High TSS concentrations can increase turbidity, resulting in reduced light penetration, reduced primary productivity, damage to fish gills, and impaired fish feeding ability. Once the suspended solids settle on the stream or lake bottom, invertebrate and other benthic organisms and fish spawning can be adversely affected (EPA 1986).

The freshwater aquatic life criterion for TSS set forth in the EPA's *Quality Criteria for Water* (1976) states that "settable and suspended solids should not reduce the depth of the composition point for photosynthetic activity by more than 10 percent from the seasonally established norm for aquatic life." In other words, light penetration should not be decreased more than 10 percent.

Total Alkalinity (as $CaCO_3$)

Alkalinity is a measurement of the ability of water to neutralize acids (buffering capacity). Alkalinity is the concentration of bases in dissolved in water. These bases are usually carbonate and bicarbonate, but can also be hydroxides. These buffers are important because they slow the rate at which the pH changes. The pH can change naturally as a result of photosynthetic activity of the aquatic vegetation. When the pH is very high (greater than 9) hydroxide ions may also be present. In addition, carbonate and bicarbonate reduce the toxicity of some toxic heavy metals (EPA 1986, Hem 1989, Wetzel 2001). Alkalinity is typically expressed as an equivalent amount of calcium carbonate ($CaCO_3$) in mg/L and generally ranges from 0 to 500 mg/L in fresh waters (MELP 1998). Alkalinity levels up to 400 mg/L are not considered to be detrimental to human health (EPA 1986). Alkalinity values less than 10 mg/L are considered very low and the pH of these waters is very susceptible to acid inputs. Alkalinity values are often very low in granitic drainages (Wetzel 2001). Values between 10 and 20 mg/L are considered moderately susceptible to acid inputs.

In general, very low or high alkalinity itself does not cause detrimental effects to aquatic organisms. However, the concentration of the dissolved materials (alkalinity) and their ratio to one another determines the actual pH and buffering capacity in a given water system (EPA 1986, Wetzel 2001). Waters with very low alkalinity values have little capacity to buffer acid inputs and are thus susceptible to acidification (MELP 1998). As previously discussed, extreme pH values can adversely affect aquatic biota, particularly in low pH (acidic) waters. Acidified drainage basins are known to possess increased sulfate and dissolved aluminum concentrations, as well as significant changes in the ion species and ratios (Wetzel 2001). In some inland waters of extremely high salinity, hydroxide, borate, silicate, phosphate, and sulfide may be the major sources of alkalinity (Wetzel 2001). Relatively few aquatic organisms are adapted to these unusual conditions.

METALS DISSOLVED

Arsenic

Arsenic (As) is a widely distributed element in the Earth's crust (Agency for Toxic Substances and Disease Registry [ATSDR] 2007). It is highly volatile and is an important component in many biochemical processes (Hem 1989). In its elemental form, it appears as a metal-like substance but it is usually found in compounds with other elements and appears as white or colorless powder. Inorganic arsenic results from compounds with elements such as oxygen, chlorine, or sulfur. Organic arsenic results from compounds with hydrogen and carbon. Organic arsenic is generally less harmful than inorganic arsenic (ATSDR 2007). Arsenic is measured in µg/L or mg/L. Natural surface water normally contains an arsenic concentration of about 1 µg/L.

Arsenic can be highly toxic to most organisms in excess concentrations. Concentrations above 5 µg/L have been shown to reduce growth and reproduction in aquatic invertebrates and algae (MELP 1998). Concentrations of 550 µg/L have produced mortality in fish (MELP 1998). In addition, organic arsenic can bioaccumulate in fish and shellfish (ATSDR 2007). Concentrations above 25 µg/L can have negative effects on livestock and, therefore, are potentially toxic to wildlife (MELP 1998). Arsenic is used as a preservative for wood, and is used in pesticides, metal alloys (especially in automobile batteries), and semiconductors and light diodes. Anthropogenic sources of arsenic include coal-fired power plants, industrial water discharge, and agricultural runoff (Hem 1989). It occurs naturally in soil and can enter water from wind-blown dust, runoff, and leaching. Volcanoes are another natural source of arsenic (ATSDR 2007).

Cadmium

Cadmium (Cd) is an element that occurs naturally in the environment. It is usually found combined with other elements, such as zinc and lead rather than occurring as a pure metal (MELP 1998, ATSDR 1999). It can be measured in either the dissolved (as in this study) or in the total state in water. It dissolves in water at varying degrees depending on which other elements it is combined. Cadmium most easily dissolves in water when it is in a compound with chlorides and sulfates. These compounds are usually present only in small amounts in the environment (ATSDR 1999). It is reported in mg/L or µg/L. It usually found in very small concentrations (less than 0.1 µg/L) (Wetzel 2001).

Cadmium has highly toxic effects on aquatic plants and animals in all chemical forms. It is extremely toxic to fish and zooplankton, and has been found to accumulate in plant cells and some aquatic organisms. It also diminishes plant growth. Its toxicity increases with the presence of other metals, including zinc and copper (MELP 1998, Oram 2007). The majority of cadmium is released into the environment from natural sources, primarily from the weather of rocks that naturally contain various amounts of cadmium. In addition, it can be releases into the environment by forest fires and volcanoes. Anthropogenic sources of cadmium include industrial effluents, fossil fuels burning, and mining (ATSDR 1999).

Copper

Copper (Cu) is a metallic element, which can occur as a free native metal or combined with ionic metals (Hem 1989). It is measured in either the total or dissolved state in water samples, and reported in µg/L or mg/L. Copper is typically found in trace concentrations from 1 to 10 µg/L (MELP 1998) and levels near 10 µg/L are common in river water (Hem 1989). The fresh water aquatic life criterion for copper depends on the hardness of the water body being tested. Copper toxicity decreases with increasing hardness and increases with increasing pH (EPA 1986, Wetzel 2001).

Copper is an essential element in plant and animal metabolism, but quantities above normal trace concentrations are highly toxic to most aquatic life forms (MELP 1998). Many of the deleterious effects of copper, such as inhibition of phosphorus uptake in green algae, are highly variable depending on other environmental conditions such as pH, alkalinity, total organic carbon, and water hardness (EPA 1986, Wetzel 2001). Copper may be released during industrial, agricultural, and mining activities. Other common sources include copper plumbing and equipment (Hem 1989, MELP 1998).

Iron

Iron (Fe) is the second most abundant metallic element in the Earth's outer crust, but concentrations in water tend to be small (Hem 1989). Iron can be measured in either the total or dissolved state and reported as µg/L or mg/L. Average iron concentrations of 40 µg/L are found in the world's lake and rivers. The typical amount found in neutral and alkaline surface waters ranges from 0.05 to 0.20 mg/L (Wetzel 2001), with an average of 0.16 mg/L in surface waters in North America (Schlesinger 1997). High concentrations of iron are generally only found in acidic waters (pH less than 3 to 4), such as in runoff of streams from strip mines (Wetzel 2001). Concentrations of iron above 0.3 mg/L cause undesirable taste, and when precipitated out of solution due to oxidation, cause a reddish brown color to the water.

Iron is an essential element in plant and animal respiration and its availability in lakes and streams can limit photosynthetic productivity (Wetzel 2001). The chemical behavior of iron is highly dependent on oxidation intensity and is a function of pH and temperatures (Hem 1989, Wetzel 2001). Iron is released in sediment when igneous rock minerals are broken down by water. Iron is also present in organic matter in soils and can be processed into surface water through oxidation and reduction activities that often involve microorganism (Hem 1989). Industrial effluent, acid mine drainage, and smelters are also sources of iron (MELP 1998).

Lead

Lead (Pb) is a metallic element, which is widely dispersed in sedimentary rocks, but has low natural mobility due to low solubility (Hem 1989). The criterion for lead is expressed in terms of dissolved metal in the water column (MELP 1998). Lead concentration is reported in µg/L. The relative abundances of different species of lead are pH dependent and solubility increases with increasing alkalinity (EPA 1986). The freshwater aquatic life criterion for lead depends on the hardness of the water body being tested. The toxic effects of lead decreases as DO and hardness concentrations increase (MELP 1998).

Lead is toxic to all animals (MELP 1998) and is particularly toxic to aquatic organism at relatively low concentrations (Wetzel 2001). Fossil fuel combustion, especially of leaded gasoline, contributed greatly to the deposition of lead in waterways in the twentieth century. Other sources of lead include industrial effluent, smelting and refining, batteries, and lead pipe used to transport drinking water (Wetzel 2001).

Manganese

Manganese (Mn) is one of the more abundant metallic elements, although there is only one-fiftieth the amount of manganese in the Earth's crust as there is iron (Hem 1989). It does not naturally occur as a metal, but is found in association with various salts and minerals, often with iron compounds (EPA 1986). Its chemical reactivity is very similar to that of iron and they behave much the same way in freshwater systems (Wetzel 2001). It is a minor constituent of many igneous and metamorphic minerals (Hem 1989). It can substitute for iron, magnesium, or calcium in silicate structures, but it is not an essential element of silicate rock minerals (Hem 1989). Small amounts of manganese are often present in dolomite or limestone as a substitute for calcium. The average concentration of manganese in surface waters is about 35 µg/L (Wetzel 2001). It is rarely found in surface waters at concentrations greater than 1 mg/L (EPA 1986).

Manganese is an essential nutrient for microflora, plants, and animals as an enzyme catalyst and as an important component of photosynthesis and nitrogen fixation (EPA 1986, Hem 1989). High concentrations of manganese can have an inhibitory effect on cyanobacteria and green algae and tend to favor diatom growth (Wetzel 2001). Divalent manganese is released into aqueous solution during weathering of rock and through organic processes (Hem 1989).

Nickel

Nickel (Ni) is one of the five ferromagnetic elements. It only occurs as a very small fraction (0.018 percent) in the Earth's crust (Hazardous Substances Data Bank [HSDB] 2007). It can be combined with various other metals, including iron, copper, chromium, and zinc, and may substitute for iron in igneous rocks. Nickel also may be precipitated with iron oxides and manganese oxides (Hem 1989, ATSDR 2005). In addition, nickel can also be combined with other elements, most commonly sulfur, and oxygen. Many of the compounds containing nickel easily dissolve in water (ATSDR 2005). Concentrations in natural surface waters are usually low (10 µg/L, Hem 1989).

Nickel is an essential element in some enzymes found in bacteria and plants. It is an important component in nitrogen fixation and some enzymes (Wetzel 2001). However, when it occurs in large quantities and is combined with some elements, for example nitrate, sulfur, and chloride, nickel can be very toxic to aquatic biota. It may accumulate in some plants (ATSDR 2005). The toxicity of nickel to aquatic biota is dependent on hardness. Toxicity is greater when the water is softer compared to harder water conditions. It can also be released from volcanoes. Nickel is naturally found in all soils, and strongly attaches to particles that contain iron or magnesium. When this occurs, it is not readily available for uptake by plants and animals. Nickel is found in surface waters as a result of weathering of rocks containing nickel. Anthropogenic sources of nickel include industrial effluent, oil-burning and coal-burning power plants, mining, and trash incinerators (ATSDR 2005).

Chromium

Chromium (Cr) is naturally present in the environment and has a number of oxidation states. The most common forms are chromium (0), trivalent (chromium (III)), and hexavalent (chromium (VI)). Hexavalent chromium (chromium VI) compounds are the most toxic state. It is usually measured as total chromium. Naturally, chromium concentrations in surface water are usually less than 10 µg/L (Hem 1989).

Chromium (VI) compounds adversely affect all aquatic biota, including algae. It does not appear to bioaccumulate in plants and animals. It is also a known human carcinogen (EPA 1986). The toxicity of chromium (VI) increases as hardness and pH increase. Chromium (III) is more toxic in soft waters. Chromium naturally occurs in rocks and soil, but in very small amounts. It is also released during volcanic eruptions. Anthropogenic sources of chromium (0), (III) and (VI) include emissions from coal and oil burning and industrial effluents (ATSDR 2000).

METALS—TOTAL

Mercury

Mercury (Hg) is a trace element in the Earth's crust that normally occurs in quantities of only 1 to 2 ng/L in natural waters (MELP 1998). It may be present in the environment as elemental mercury (Hg^0), inorganic mercury (Hg^{2+}), or organic mercury (primarily methylmercury, MeHg). Elemental mercury was commonly used in thermometers. Methyl mercury is the most toxic of these mercury compounds (EPA 1986). It is a serious neuron-toxin and has been found in high concentrations in lakes far removed from sources of mercury (EPA 1986). Methyl mercury bioaccumulates, which is the process by which organisms that are exposed to chemicals either from their diet, water, or other sources accumulate and retain the chemicals. Inorganic mercury does not accumulate in aquatic organisms. Various chemical and biological processes can readily convert various forms of mercury. Anaerobic bacteria in sediments readily convert inorganic mercury into methylmercury. Except for gold mining areas where elemental mercury is used, mercury is typically present in surface waters, sediment, or soils as inorganic mercury.

Mercury is highly toxic and has a long retention time in animal cells. Rates of methylmercury production and bioaccumulation depend not only on the abundance of inorganic mercury but also on a complex assortment of environmental variables which affect the activities and species composition of the bacteria and the availability of the inorganic mercury for methylation (U.S. Geological Survey [USGS] 2003, HSDB 2007). These variables include, but are not limited to, pH of the water, the length of the food chain, dissolved organic matter, soil type, and the proportion of wetlands in the watershed. Once converted to methylmercury by bacteria, it can bioaccumulate in aquatic organisms and be passed up the food chain (Hem 1989). Temperature, pH, alkalinity, suspended sediment load, and the geomorphology of the watershed are known to affect the accumulation of mercury in fish (Klasing et al. 2006). In addition to bioaccumulating, methylmercury also biomagnifies (higher concentrations at higher levels in the food chain) (USGS 2003). Because bacteria mediate the rate of methylmercury formation, fish living in even mildly contaminated waters are not safe to eat.

Detectible levels of mercury are found in almost all fish, with more than 95 percent of it occurring as methylmercury (Klasing et al. 2006). People primarily become exposed to methylmercury by consuming fish (Klasing et al. 2006). Fish at the highest trophic levels (higher up the food chain) tend to have higher levels of methylmercury than those lower in the food chain. Larger and older fish of a given species also tend to have higher methylmercury levels than smaller and younger fish of the same species. It is particularly toxic to the fetus and young children and can cause serious neurological abnormalities to a fetus even without symptoms in the mother. Recent studies indicate that the fetus is more sensitive to methylmercury than adults. As a result, the Office of Environmental Health Hazard Assessment has established separate ‘reference doses’, which is “the daily exposure likely to be without significant risk of deleterious health effects during a lifetime”. The reference dose for women of childbearing age and children aged 17 and younger is $1x10^{-4}$ mg/kg-day. For men and women beyond childbearing age, the reference dose is $3x10^{-4}$ mg/kg-day (Klasing et al. 2006).

Mercury contamination can occur from both natural processes and human activities. Mercury is highly volatile and thus, atmospheric deposition is a major pathway into aquatic systems (Hem 1989, MELP 1998). Impounded water and flooding also cause the release of sedimentary mercury (MELP 1998). Sources of mercury contamination include coal combustion, waste incineration, mining and smelting, and production of fertilizers (MELP 1998, USGS 2003). Mercury is typically measured as the total mercury in water, soil, or tissue samples. Water samples containing just 5 to 10 ng/L are considered polluted (MELP 1998).

BACTERIA

Total Coliform

Coliform bacteria are a group of several genera of relatively harmless microorganisms that live in soil, water, and the intestines of cold- and warm-blooded animals including humans (Murphy 2007). Total coliform concentrations are reported as the most probable number of bacteria colonies present per 100 milliliter (mL) of sample water (Michaud 1994).

Total coliform bacteria occur naturally in surface and shallow ground waters and are essential in the breakdown or organic matter in water. Oxygen is not a requirement for these bacteria, but they can use it. They produce acid and gas from the fermentation of lactose. Coliform bacteria are not pathogenic and are only mildly infectious. The total coliform group is relatively easy to culture in the lab, and therefore, has been selected as the primary indicatory bacteria for the presence of disease-causing organisms. If large numbers of coliform bacteria are found in water, there is a high probability that pathogenic bacteria or organisms, such as Giardia may be present. Coliform bacteria, rather than actual pathogens, are used to assess water quality because they are easier to isolate and identify (Murphy 2007).

Fecal Coliform

Fecal coliform is a subgroup of the coliform bacteria that live in the intestinal tract and feces of warm-blooded animals (Murphy 2007). The most common member of this group is *Escherichia coli* (*E. coli*). Fecal coliform concentrations are reported as the number of bacteria colonies present per 100 mL of sample water (#/100 mL, Michaud 1991). Fecal coliform bacteria can multiply quickly under optimum growing conditions and die off rapidly when conditions change. For this reason, fecal coliform counts are difficult to predict (Michaud 1994).

Fecal coliform species by themselves are not usually harmful, but are an indicator of the possible presence of pathogenic organisms, such as bacteria, viruses, and parasites, that live in the same environment (Windell 1992; Murphy 2007). Thus, it is used as a parameter for testing the quality of waters used for recreation. The presence of fecal coliform indicates contamination from the feces of humans or other animals. Swimming in waters with high levels of fecal coliform bacteria (over 200 colonies/100 mL) presents a health risk of contracting diseases such as typhoid fever, hepatitis, gastroenteritis, ear infection, and dysentery (Windell 1992; Murphy 2007). Some strains of *E. coli*, such as *E. coli* O157:H7, which is found in the digestive tract of cattle, can cause intestinal illness. The major sources of fecal coliform to freshwater are wastewater treatment plant effluent, failing septic systems, and human and animal wastes. Human and animal wastes can be washed into storm drains, streams, and lakes during storms (Michaud 1994; Murphy 2007).

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APPENDIX B

Quality Assurance/Quality Control Review of Spring and Fall 2024 and 2025 Sample Laboratory Analyses

Table B-1. Quality Assurance/Quality Control Review of Spring and Fall 2024 Sample Laboratory Analyses

	Spring Sampling		Fall Sampling			
Report ID	ZALCO: 2406558_rpt	ZALCO: 240585_rpt	ZALCO: 2410259_rpt	ZALCO: 2410283_rpt	BSK: AHJ3600	BSK: AHJ3577
Sample Locations	KRTR 43.94 KR44.0	KR 54.36 KR 55.2 KR 53.84 KR 50.3 KR 54.2	KRTR 43.94 KR 54.2 KR 53.46 KR 44.0 KR 53.84	KR 50.3 KR 55.2 (surface) KR 55.2 (mid-column)	KRTR 43.94 KR 54.2 KR 53.46 KR 44.0 KR 53.84	KR 50.3 KR 55.6 (surface) KR 55.6 (mid-column)
ZALCO Sample ID Numbers	2406558-01 2406558-02	2406585-01 2406585-02 2406585-03 2406585-04 2406585-05	2410259-01 2410259-02 2410259-03 2410259-04 2410259-05	2410283-01 2410283-02 2410283-03	2410259-01 2410259-02 2410259-03 2410259-04 2410259-05	2410283-01 2410283-02 2410283-03
Date Sampled	6/26/2024	6/27/2024	10/9/2024	10/10/2024	10/9/2024	10/10/2024
Analysis	General Parameters Dissolved Metals Total Mercury	General Parameters Dissolved Metals Total Mercury	General Parameters Dissolved Metals Total Mercury	General Parameters Dissolved Metals Total Mercury	General Parameters: Ammonia as N TKN	General Parameters: Ammonia as N TKN
Do all samples match COC?	Yes	Yes	Yes	Yes	Yes	Yes
Are Sample Locations correct on COC?	No: KRTR = KRTR 43.94	No: KR 50.28 = KR 50.3 KR 55.6 = KR 55.2	No: KR 55.2 = KR 54.2	No: KR 55.6 = KR 55.2	Yes	Yes
Is sample ID consistent throughout report?	Yes	Yes	Yes	Yes	Yes	Yes

	Spring Sampling		Fall Sampling			
Were all sample holding times met?	Yes	Yes	Yes	Yes	Yes	Yes
Were there any quality control data issues?	No	No	No	No	No	No

Key: BSK = BSK Associates
COC = Chain of custody form
TKN = total Kjeldahl nitrogen
ZALCO = ZALCO laboratories, Inc.

Table B-2. Quality Assurance/Quality Control Review of Spring and Fall 2025 Sample Laboratory Analyses

	Spring Sampling				Fall Sampling	
Report ID	ZALCO: 2506076	ZALCO: 2506102	ZALCO: 2506125	Marine Pollution Studies Lab: KR1_2025_W_MeHg_Results	ZALCO: 2510049	Marine Pollution Studies Lab: KR1_2025_W_MeHg_Results
Sample Locations	KR 44.0 KR 44.0 (Duplicate) KRTR 43.94	KR 55.2 (mid-column) Field Blank KR 55.2 (surface) KR 55.6 KR 55.6 (Duplicate) KR 50.3	KR 54.2 KR 54.36 KR 53.84	KR 55.6 KR 55.2 (surface) KR 55.2 (mid-column) KR 54.36 KR 54.2 KR 53.84 KR 50.3 KRTR 43.94 KR 44.0 KR 44.0 (Duplicate) Field Blank	KR 54.36 KR 54.2 KR 44.0 KR 44.0 (Duplicate) KRTR 43.94 KR 55.2 (surface) KR 55.2 (mid-column) KR 55.6 KR 53.84 KR 50.3 Field Blank	Field Blank KR 44.0 KR 44.0 (Duplicate) KRTR 43.94 KR 54.36 KR 54.2 KR 55.2 (surface) KR 55.2 (mid-column) KR 55.6 KR 53.84 KR 50.3
ZALCO Sample ID Numbers	2506076-01 2506076-02 2506076-03	2506102-01 2506102-02 2506102-03 2506102-04 2506102-05 2506102-06	2506125-01 2506125-02 2506125-03	2025-0625 2025-0625-ms 2025-0625-msd 2025-0626 2025-0627 2025-0627-ms 2025-0627-msd 2025-0628 2025-0628-dup 2025-0629 2025-0630 2025-0631 2025-0632 2025-0633 2025-0634 2025-0635	2510049-01 2510049-02 2510049-03 2510049-04 2510049-05 2510049-06 2510049-07 2510049-08 2510049-09 2510049-10 2510049-11	2025-1067 2025-1068 2025-1068-ms 2025-1068-msd 2025-1069 2025-1070 2025-1070-ms 2025-1070-msd 2025-1071 2025-1072 2025-1072-dup 2025-1073 2025-1074 2025-1075 2025-1076 2025-1077
Date Sampled	6/3/2025	6/4/2025	6/5/2025	6/3/2025	9/30/2025 - 10/1/2025	10/1/2025

	Spring Sampling				Fall Sampling	
Analysis	General Parameters Dissolved Metals Total Mercury	General Parameters Dissolved Metals Total Mercury	General Parameters Dissolved Metals Total Mercury	Methylmercury (water samples)	General Parameters Dissolved Metals Total Mercury	Methylmercury (water samples)
Do all samples match COC?	Yes	No: KR 50.28 on COC is labeled as KR 55.28 on lab report.	Yes	Yes	Yes	Yes
Are Sample Locations correct on COC?	No: KR 44 = KR 44.0 KR 43.94 = KRTR 43.94	No: KR 55 hypo = KR55.2 (mid-column) KR 55 blank = Field Blank KR 55 epi = KR 55.2 (surface) KR 50.28 = KR 50.3	Yes	No: KR 55.6 (Sample #1) = KR 55.2 (surface) KR 55.6 (Sample #2) = KR 55.2 (mid-column) KR 55 Democrat Hypolimnion = KR 55.6	No: KR 44.0 (rep) = KR 44.0 (Duplicate) KR 55.2 (mid) = KR 55.2 (mid-column) KR 43.94 = KRTR 43.94	No KR 43.94 = KRTR 43.94
Is sample ID consistent throughout report?	Yes	No: KR 50.28 on COC is labeled as KR 55.28 on lab report.	Yes	Yes	Yes	Yes
Were all sample holding times met?	Yes	Yes	Yes	Yes	Yes	Yes

	Spring Sampling				Fall Sampling	
Were there any quality control data issues?	No	Original report amended by Zalco to include Hardness	Original report amended by Zalco to include Hardness	No	No	No

Key: COC = Chain of custody form
ZALCO = ZALCO laboratories, Inc.

APPENDIX C

Calculations used for Water Quality Criteria Analysis

Calculations

Several criteria must be calculated on a site-by-site basis. The following equations apply to those analytes.

Ammonia:

Criteria are temperature and pH dependent. Equations are from the EPA's Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater (EPA 2013). The Criteria Continuous Concentration (CCC) is a 30-day rolling average concentration of total ammonia nitrogen (milligrams per liter [mg/L]) that cannot be exceeded more than once every three years on average. The Criteria Maximum Concentration (CMC) is the one-hour average concentration of total ammonia nitrogen (mg/L) that cannot be exceeded more than once every three years on average where *Oncorhynchus* species are present. In these equations, temperature should be in degrees Celsius (°C).

$$CCC = 0.8876 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) \times \left(2.126 \times 10^{0.028\times(20-MAX(T,7))}\right)$$

$$CMC = MIN\left(\left(\frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}\right), \left(0.7249 \times \left(\frac{0.0114}{1+10^{7.204-pH}} + \frac{1.6181}{1+10^{pH-7.204}}\right) \times \left(23.12 \times 10^{0.036\times(20-T)}\right)\right)\right)$$

Cadmium (Cd):

Criteria are hardness dependent. The EPA's national water quality criteria equations for cadmium are more stringent than the California Toxics Rule (CTR) criteria equations (65 FR 31682), so the national water quality criteria equations are used (EPA 2019). These equations calculate the freshwater CCC and CMC for cadmium. Hardness should be in mg/L.

$$CCC\ (in\ \mu g/L) = (1.101672 - [\ln(hardness) * 0.041838]) * e^{0.7977 * \ln(hardness) - 3.909}$$

$$CMC\ (in\ \mu g/L) = (1.136672 - [\ln(hardness) * 0.041838]) * e^{0.9789 * \ln(hardness) - 3.866}$$

Copper (Cu):

Criteria are hardness dependent. The EPA's national water quality criteria equations for copper are the same as the equations in the CTR (65 FR 31682, EPA 2019). These equations calculate the freshwater CCC and CMC for copper. Hardness should be in mg/L.

$$CCC\ (in\ \mu g/L) = 0.96 * \ e^{0.8545 * \ln(hardness) - 1.702}$$

$$CMC\ (in\ \mu g/L) = 0.96 * e^{0.9422 * \ln(hardness) - 1.7}$$

Lead (Pb):

Criteria are hardness dependent. The EPA's national water quality criteria equations for lead are the same as the equations in the CTR (65 FR 31682, EPA 2019). These equations calculate the freshwater CCC and CMC for lead. Hardness should be in mg/L.

$$CCC\ (in\ \mu g/L) = (1.46203 - [\ln(hardness) * 0.145712]) * \ e^{1.273 * \ln(hardness) - 4.705}$$

$$CMC\ (in\ \mu g/L) = (1.46203 - [\ln(hardness) * 0.145712]) * e^{1.273 * \ln(hardness) - 1.46}$$

Nickel (Ni):

Criteria are hardness dependent. The EPA's national water quality criteria equations for nickel are the same as the equations in the CTR (65 FR 31682, EPA 2019). These equations calculate the freshwater CCC and CMC for nickel. Hardness should be in mg/L.

$$CCC\ (in\ \mu g/L) = 0.997 * \ e^{0.846 * \ln(hardness) + 0.0584}$$

$$CMC\ (in\ \mu g/L) = 0.998 * e^{0.846 * \ln(hardness) + 2.255}$$