Alameda Creek Aquatic Resources Monitoring Report 2024–25

Hetch Hetchy Regional Water System

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Alameda Creek Aquatic Resources Monitoring Report 2024–25

San Francisco Public Utilities Commission

Water Enterprise

Natural Resources and Lands Management Division

Sunol/Moccasin Biological Resources Section

Sunol, California

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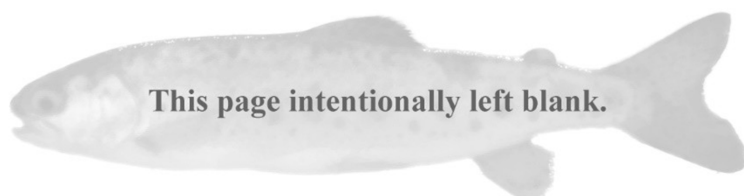
Acronyms and Abbreviations

°C	degrees Celsius
µS/cm	microSiemens per centimeter
ACDD	Alameda Creek Diversion Dam
ACWD	Alameda County Water District
ALC	Alameda Creek
ARH	Arroyo Hondo
BF	American Bullfrog
BMI	benthic macroinvertebrates
BO	Biological Opinion
CAC	Calaveras Creek
CalTrout, Inc.	California Trout
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CDRP	Calaveras Dam Replacement Project
cfm	cubic feet per minute
cfs	cubic feet per second
City	City of San Francisco
cm	centimeters
CSCI	California Stream Condition Index
DO	dissolved oxygen
DSOD	California Division of Safety of Dams
FNT	fyke-net trap
FYLF	Foothill Yellow-legged Frog
GPS	global positioning system
MG	million gallons
mg/L	milligrams per liter
MIB	Methyl-Isoborneol
MOU	Memorandum of Understanding
NMFS	National Marine Fisheries Service
NTUs	nephelometric turbidity units
NU/m^3	natural units per cubic meter
PG&E	Pacific Gas and Electric Company
PIT	Passive Integrated Transponder
RD1	BART Weir/Rubber Dam 1
RFU	relative fluorescence units
RPM	revolutions per minute
RST	rotary-screw trap
SAA	Streambed Alteration Agreement
SFPUC	San Francisco Public Utilities Commission
SVWC	Spring Valley Water Company

SVWTP	Sunol Valley Water Treatment Plant
SWRCB	State Water Resources Control Board
USGS	United States Geological Survey
VES	visual encounter survey
WY	water year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1. Introduction

Spring Valley Water Company (SVWC) began storing water in Calaveras Reservoir on Calaveras Creek, a tributary to Alameda Creek, in 1916. Calaveras Dam was reconstructed between 1918 and 1925, following a loss of dam integrity along its upstream face. In 1925, SVWC began construction of the Alameda Creek Diversion Dam (ACDD) and Tunnel, which were part of the original plans for Calaveras Dam, to secure storage of runoff from the upper portion of the southern Alameda Creek Watershed in Calaveras Reservoir.

Calaveras Dam and the associated SVWC water delivery system and watershed land holdings were purchased by the City of San Francisco (City) in 1930, to consolidate ownership of the regional water system with the Hetch Hetchy system, which the City had been constructing since 1913. The San Francisco Public Utilities Commission (SFPUC) was created at the same time to manage the complex system obtained through the SVWC acquisition.

The SFPUC built the new Calaveras Dam downstream of the original dam between 2011 and 2019, following seismic concerns raised by the California Division of Safety of Dams (SFPUC, 2019a). Construction of the new dam included infrastructure to allow for routine low-flow environmental water releases (Figure 1-1). The recent Calaveras Dam Replacement Project (CDRP) also included modifications to ACDD with the installation of a fish ladder and fish screens, which were initiated in 2016 and reached substantial completion in 2020 (SFPUC, 2019a).

Figure 1-1. *Calaveras Dam low-flow environmental release into Calaveras Creek.*

Both the original and the new Calaveras Dam were built to store up to 96,850 acre-feet of water from 100 square miles of local watershed. Most of the water stored in Calaveras Reservoir comes from the Arroyo Hondo drainage; however, with the completion of ACDD in 1931, the SFPUC began acquiring additional volumes of water from Alameda Creek several miles upstream of its confluence with Calaveras Creek. Flows from upper Calaveras Creek and other small tributaries also contribute to the reservoir.

Prior to 1934, the SFPUC released water from Calaveras Reservoir into Calaveras and Alameda creeks, recapturing it at the Sunol Infiltration Gallery. Since 1934, however, water management by the SFPUC within the southern Alameda Creek Watershed has led to diminished streamflows in Calaveras Creek below Calaveras Dam and in Alameda Creek downstream of its confluence with Calaveras Creek and, to a lesser extent, below the Diversion Dam. Prior to 2019, during normal rainfall years, most of the flows in Alameda Creek came from leakage through Calaveras Dam, upper Alameda Creek when the SFPUC was not diverting at ACDD, groundwater seepage through geologic formations, and runoff from the lower, drier portion of the watershed.

California Trout (CalTrout, Inc.), in a letter to the State Water Resources Control Board (SWRCB) dated September 25, 1990, claimed that “the SFPUC lacked sufficient water rights to store water in Calaveras Reservoir in Alameda and Santa Clara counties,” that “the SFPUC’s failure to release water from Calaveras Reservoir violated section 5937 of the California Fish and Game Code,” and that “the SFPUC diverted water in an unreasonable manner into Calaveras Reservoir, pursuant to Article X, section 2 of the California Constitution” (CDFG, 1997).

In 1991, the SFPUC submitted acceptable evidence of its pre-1914 appropriative water rights for Calaveras Dam to the SWRCB (CDFG, 1997) that established the permitted delivery of water away from local watershed creeks. To settle the operational aspects of the CalTrout complaint, the SFPUC funded the Alameda Creek Water Resources Study (Bookman-Edmonston, 1995) to determine whether it would be feasible to release water from Calaveras Reservoir to improve fishery conditions while recapturing the water further downstream for consumptive use (CDFG, 1997).

In July 1997, the SFPUC signed a Memorandum of Understanding (MOU) with the California Department of Fish and Game (CDFG) (CDFG, 1997) requiring the release of water from Calaveras Reservoir while recapturing it downstream of the Sunol Valley Water Treatment Plant. The MOU also required that the SFPUC establish a monitoring program under pre-water release and post-water release conditions.

In 2001, during the MOU pre-release monitoring phase, the California Division of Safety of Dams (DSOD) raised seismic stability concerns for Calaveras Reservoir and issued an order restricting water storage to approximately 39 percent of its total storage capacity. To resolve DSOD's concerns, the SFPUC elected to build a new 220-foot-zoned earth and rock fill embankment dam downstream of the existing structure that included a new spillway, intake tower, and outlet conduit. The CDRP also involved the installation of environmental water release infrastructure at Calaveras Dam (Figure 1-1) and intake screens and a fish ladder at ACDD.

Permitting for the CDRP included a National Marine Fisheries Service (NMFS) Biological Opinion (BO) and a California Department of Fish and Wildlife (CDFW) Streambed Alteration Agreement (SAA). In addition to project construction avoidance and mitigation measures, the aforementioned documents stipulate a post-construction water release schedule for Calaveras Dam and reduced diversions at ACDD. Other permit requirements included the installation of intake screens and a fish ladder at ACDD to prevent entrainment and allow for passage, respectively. These measures were designed to improve spawning and rearing habitat for the federally threatened Central California Coast Steelhead (*Oncorhynchus mykiss; O. mykiss*) Distinct Population Segment and resident forms of *O. mykiss*. For the remainder of this report, Central California Coast Steelhead and resident forms of *O*. mykiss will be referred to as *O. mykiss*.

In 1972, the grade control structure, known as the BART Weir, was constructed in lower Alameda Creek across the Alameda Flood Control Channel at river mile ALC09.60, and blocked the passage of immigrating anadromous salmonids. On January 1, 2023, the BART Weir was modified. The modifications included installation of a fish ladder, which restored fish passage and anadromy to the southern Alameda Creek Watershed, excluding waters above Turner and Calaveras dams.

The NMFS BO and CDFW SAA include a required monitoring program that supersedes the monitoring program as defined in the MOU. The federal and state documents contain details defined in a Biological Assessment for the CDRP (SFPUC, 2010), which incorporates the original MOU monitoring, previously discretionary watershed-based monitoring, and new monitoring.

The new Calaveras Dam was approved by DSOD in late 2018, and the SFPUC began the refilling process in January 2019. Water releases, following the BO-defined flow schedule, began on January 24, 2019. The diversion screens and fish ladder at ACDD were operational by May 2019. This report presents the findings of the water year (WY) 2024–25 monitoring program.


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2. Setting

Alameda Creek, and its tributaries, constitute the largest watershed draining to the southern San Francisco Bay. Alameda Creek flows for about 40 miles from its headwaters on the northwestern slopes of the Diablo Range to the southeast San Francisco Bay. Headwater elevations approach 4,000 feet, with stream gradients through the upper reaches generally varying from 1 to 5 percent. Gradients throughout the lower reaches seldom exceed 0.005 percent, with the last 10 miles of the stream dropping to near sea level.

The Alameda Creek Watershed is split into three distinct subwatersheds: southern, northern, and lower Alameda Creek watersheds (Figure 2-1). The southern Alameda Creek Watershed is the focus of this report, which is approximately 175 square miles and includes the upstream portions of Alameda Creek, Calaveras Creek, and the Arroyo Hondo. Calaveras Reservoir sits in the western portion of the southern Alameda Creek Watershed, in both Alameda and Santa Clara counties. The ACDD is to the northeast of Calaveras Reservoir in Alameda County. The cities of Fremont and Milpitas are to the west of the drainage, Pleasanton is to the north, and Livermore lies to the northeast.

As described in Section 1, *Introduction,* the Alameda Creek Aquatic Resources Monitoring Program has evolved since the initial 1997 MOU between the California Department of Fish and Game and the SFPUC (CDFG, 1997). The current program includes various surveys in three streams of the southern Alameda Creek Watershed including Alameda Creek from near the Alameda County and Santa Clara County line at river mile ALC31.09 (upstream of ACDD) to its confluence with Arroyo de la Laguna at river mile ALC17.12, Calaveras Creek downstream of Calaveras Reservoir, and the Arroyo Hondo from an upstream feature known as the “slide” (ARH05.40) downstream to the inundation of Calaveras Reservoir. The slide is a nearly impassable waterfall created from a past ancient landslide and is a total barrier to immigrating fish; other semi-aquatic fauna may be able to pass the waterfall via terrestrial routes on either bank. The unique survey reaches for the monitoring program are shown in Figure 2-2.

CDRP components are expected to benefit anadromous and resident *O. mykiss* by improving spawning and rearing habitat and providing passage at ACDD. The monitoring program examines permit compliance, reservoir and stream conditions, *O. mykiss* movement and spawning, fish population and community characteristics, benthic macroinvertebrate assemblages, and the distribution of native amphibians to assess the effectiveness of the Calaveras Dam minimum flow release schedule, a reduction in diversions at ACDD, and fish ladder operations under a variety of water-year types at ACDD.

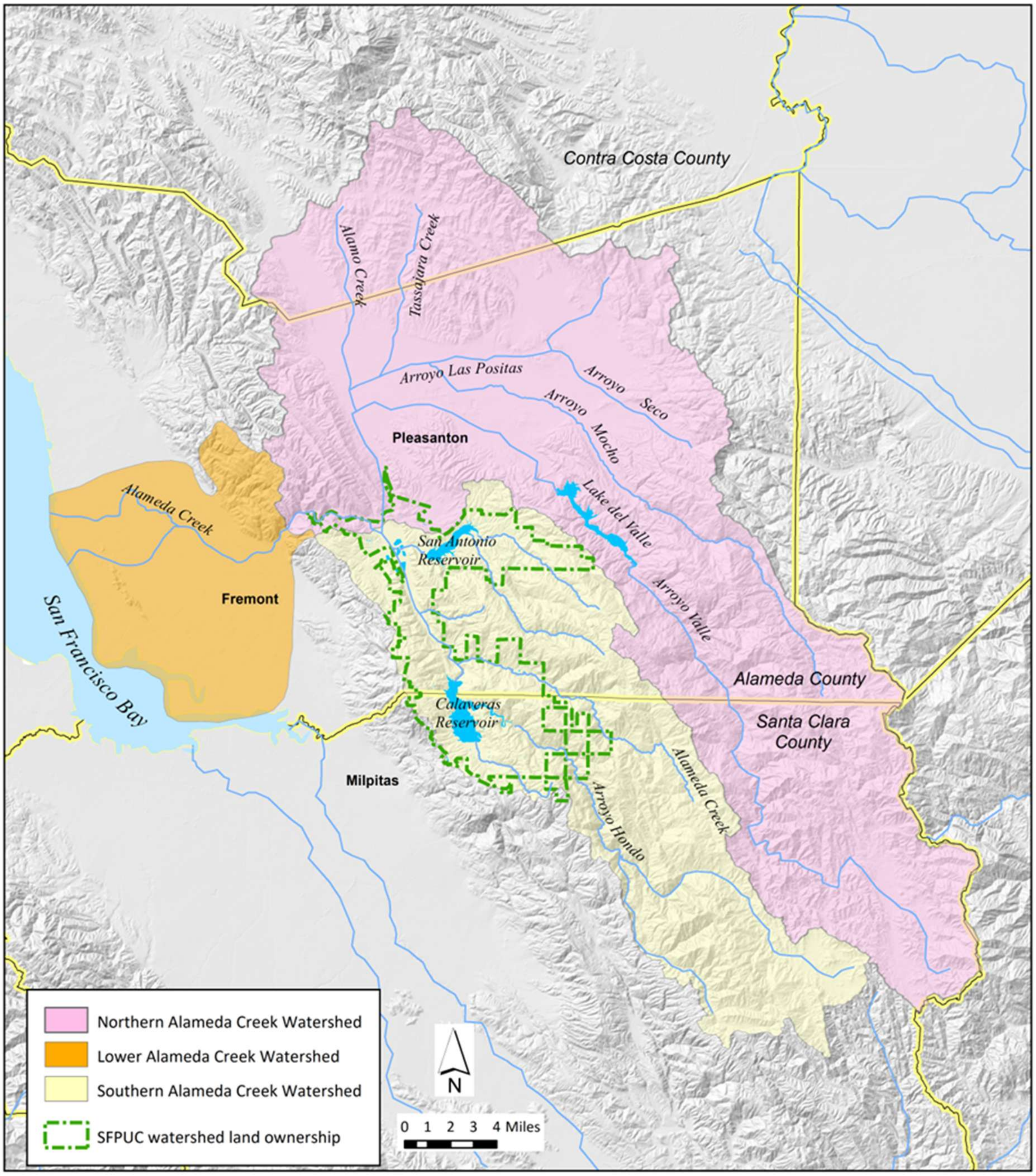


Figure 2-1. *Alameda Creek Watershed overview.*

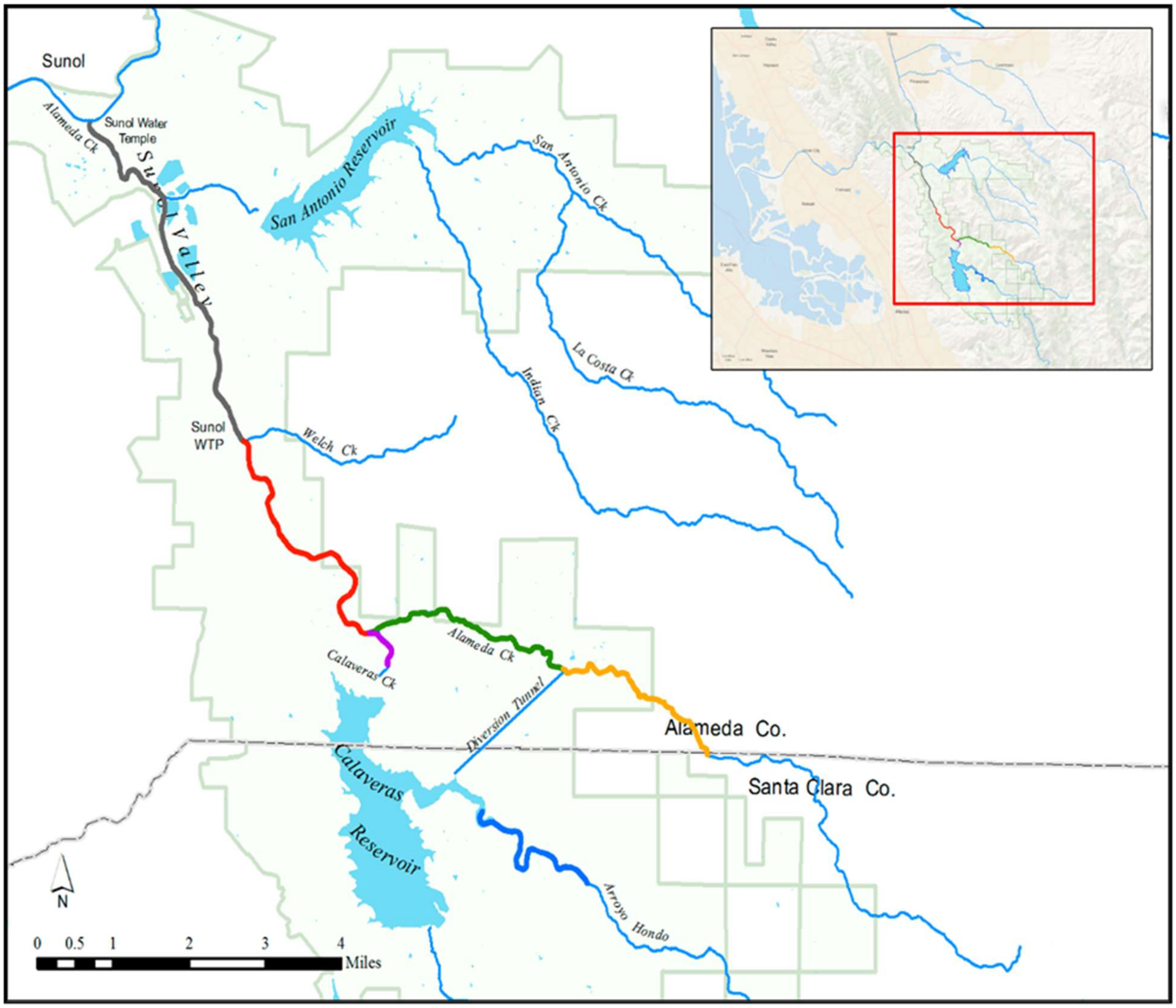
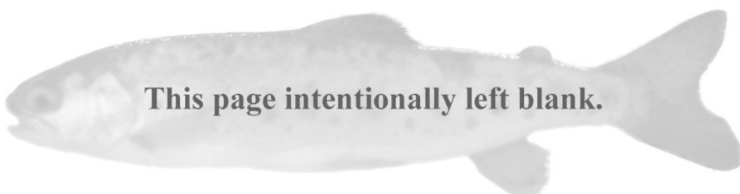


Figure 2-2. *Alameda and Calaveras creeks and Arroyo Hondo reaches (shown as bold-colored stream lines) monitored to assess the effectiveness of Calaveras Reservoir water releases and reduced Alameda Creek Diversion Dam diversions as defined in permitting for the Calaveras Dam Replacement Project.*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3. Permit Compliance Monitoring

3.1 Background

A condition of federal and state permitting for the CDRP requires the SFPUC to release water from Calaveras Reservoir and limit diversions at ACDD to enhance environmental conditions in Alameda and Calaveras creeks downstream of each facility. Water releases and reduced diversions were developed in consultation with and approved by the NMFS and CDFW with the intent of increasing anadromous and resident *O. mykiss* spawning and rearing habitat. The SFPUC also seeks to protect and restore viable populations of all native species (including warmwater fishes and amphibians) and protect the integrity of the native ecosystems.

A NMFS BO and CDFW SAA for the CDRP define Calaveras Reservoir releases for both normal/wet (Schedule A) and dry (Schedule B) WY types (Figure 3-1; Table 3-1), with year type determined twice annually using cumulative Arroyo Hondo inflows (CDFW, 2011; NMFS, 2011). Cumulative Arroyo Hondo inflows are measured at the United States Geological Survey (USGS) gage Arroyo Hondo NR San Jose CA - USGS-11173200. October through December releases are independent of WY type (Table 3-1). The release rate from January through April is determined by the Arroyo Hondo inflow as of December 29, while releases from May through September are based on inflows through April 30. The BO and SAA require ramping between certain flow changes (Table 3-2). The BO and SAA stipulate that release water temperatures be maintained at 15 degrees Celsius (°C) or colder.

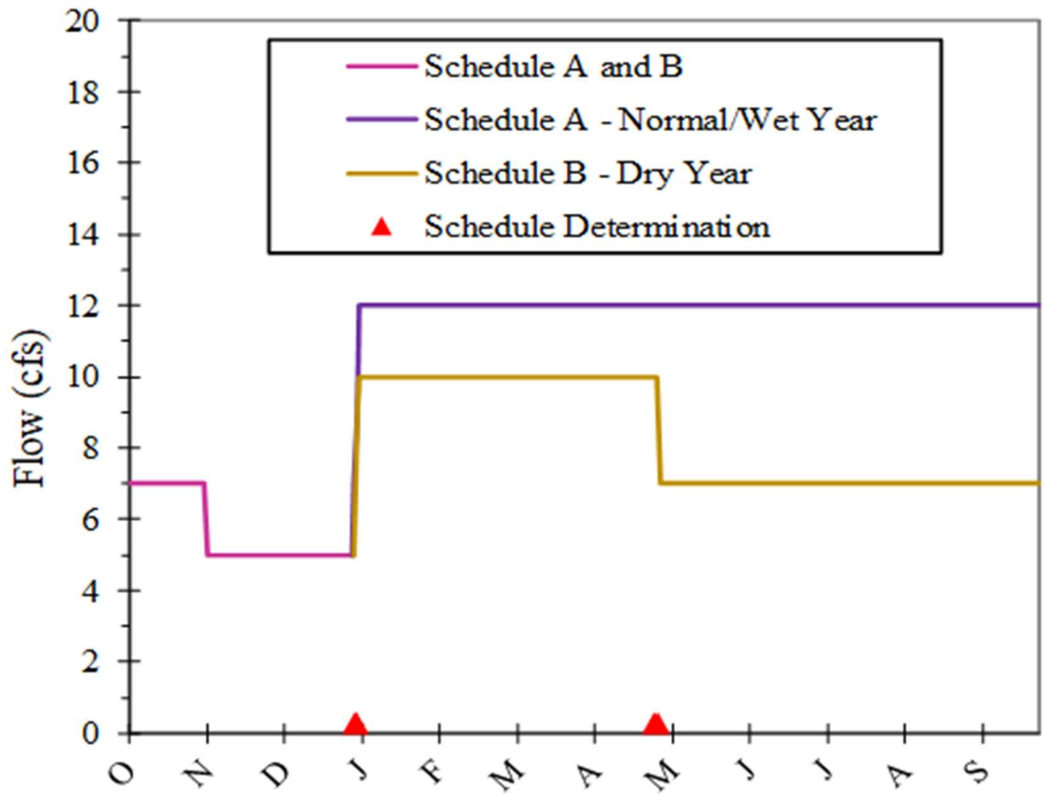

Figure 3-1. *Hydrograph illustrating the minimum instream flow release schedules for Calaveras Dam (NMFS, 2011).*

Table 3-1. *Summary of instream flow schedules below Calaveras Dam (NMFS, 2011).*

Flow Schedule Decision Date	Flow Schedule Application Period	Dry (Schedule B)		Normal/Wet (Schedule A)	
		Cumulative Arroyo Hondo Flows for Water Year Classification (MG)	Flow Release (cfs)	Cumulative Arroyo Hondo Flows for Water Year Classification (MG)	Flow Release (cfs)
N/A	October	N/A	7	N/A	7[1]
N/A	Nov. 01–Dec.31	N/A	5	N/A	5
Dec. 29	Jan. 01–Apr. 30	≤ 360	10[1]	≤ 360	12[1]
Apr. 30	May 01–Sept. 30	≤ 7,246	7	≤ 7,246	12

Notes:

[1] Flows would be ramped as shown in the daily schedule in Table 3-2.

N/A = not applicable; MG = million gallons; cfs = cubic feet per second

Table 3-2. *Ramping rates associated with instream flows below Calaveras Dam (NMFS, 2011).*

Dates	Dry[1] (Schedule B) (cfs)	Normal/Wet[2] (Schedule A) (cfs)
10/1–10/2	7	9 (ramping down)
10/3–10/31	7	7
11/1–12/29	5	5
12/30	5	7 (ramping up)
12/31	7 (ramping up)	10 (ramping up)
1/1–3/31	10	12
4/1–4/30	10	12
5/1–9/30	7	12

Notes:

[1] The threshold value for dry (Schedule B) and normal/wet years (Schedule A) is 60 percent exceedance probability. Sixty percent of the time, cumulative flows in the Arroyo Hondo would be higher than the dry year thresholds identified in Table 3-1. The "dry" schedule would apply to 40 percent of all months.

[2] Normal/wet schedule would apply to 60 percent of all months.

cfs = cubic feet per second

At ACDD the first 30 cubic feet per second (cfs) must stay in Alameda Creek, with flows typically routed through the fish ladder (CDFW, 2011; NMFS, 2011). Once flows exceed 30 cfs, the SFPUC has the option to divert up to 370 cfs to Calaveras Reservoir. Diversions are only permitted from December 1 to March 31. Flows greater than the capacity of the fish ladder, not diverted to Calaveras Reservoir, pass downstream through sluice gates or over the dam crest. During WY 2018–19, the SFPUC began releasing water from the reconstructed Calaveras Reservoir and had the ability to implement diversions at ACDD as defined in the CDRP BO and SAA.

3.2 Procedure

Calaveras Creek flows for approximately 0.5 mile from the Calaveras Dam outlet structure to its confluence with Alameda Creek. The compliance point for Calaveras Reservoir release flows is the USGS gage CALAVERAS C NR SUNOL CA – 11173500 (USGS at CA/USGS Calaveras Creek) in Calaveras Creek downstream of the dam.

Provisional 15-minute flow information obtained from the USGS National Water Information System website (https://waterdata.usgs.gov/monitoring-location/11173500/#parameterCode=00065&period=P7D&showMedian=true) is used to adjust releases to meet requirements. Flows are maintained approximately 0.5 cfs above the mandatory minimum as a buffer to increase the likelihood of compliance following any adjustments made by USGS when finalizing data. Hydrographs are created using approved daily mean streamflow's from the USGS gage CALAVERAS C NR SUNOL CA – 11173500 (USGS at CA/USGS Calaveras Creek).

The compliance location for Calaveras Reservoir water release temperatures is the point of discharge, at the low-flow release structure. To document release water temperatures, the SFPUC deploys a remote temperature sensor immediately downstream of the Calaveras Dam discharge structure, recording year-round data at 30-minute intervals.

The compliance points for stream flow and diversion rate at ACDD are the USGS gage ALAMEDA C AB DIV DAM NR SUNOL CA – 11172945 (ALC abv ACDD) about 700 feet upstream of the dam and the USGS gage ALAMEDA C BL DIV DAM NR SUNOL CA – 11172955 (USGS blw ACDD) about 1,000 feet downstream of the dam. Provisional 15-minute flow data are viewed at the USGS National Water Information website (https://waterdata.usgs.gov/ca/nwis/uv/?site_no=11172945 and https://waterdata.usgs.gov/ca/nwis/uv/?site_no=11172955, respectively) to confirm that the system is operating properly.

3.3 Results

Releases from Calaveras Reservoir remained above the stipulated flow rates for the entirety of WY 2024–25. Release rates for October through December are WY type independent and began with 7 cfs on October 1, 2024 (Figure 3-2). The release was then lowered to 5 cfs for the November-through-December period. Based on an Arroyo Hondo cumulative inflow of 491 million gallons (MG) on December 29, 2024, up-ramping to 12 cfs was conducted from December 29 to 31, and releases starting January 1, 2025, followed the wet year schedule (Schedule A). Water releases remained on the wet schedule (12 cfs) beginning in May 2025, based on the cumulative Arroyo Hondo inflow of 7,788 MG on April 30, 2025 (Figure 3-2).

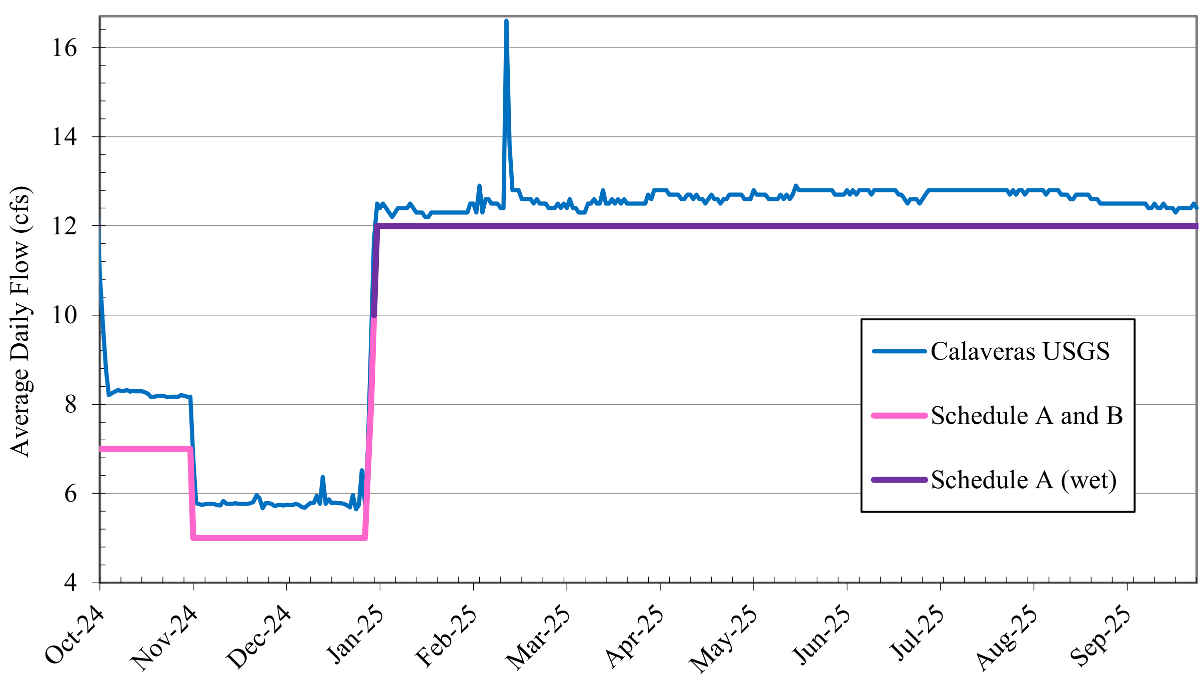

Figure 3-2. *Calaveras Creek (CAC) flow data from the United States Geological Survey gage compliance point (CALAVERAS C NR SUNOL CA—11173500) and the required schedule flows.*

Calaveras Reservoir water release temperatures remained below the 15°C threshold throughout WY 2024–25 (Figure 3-3).

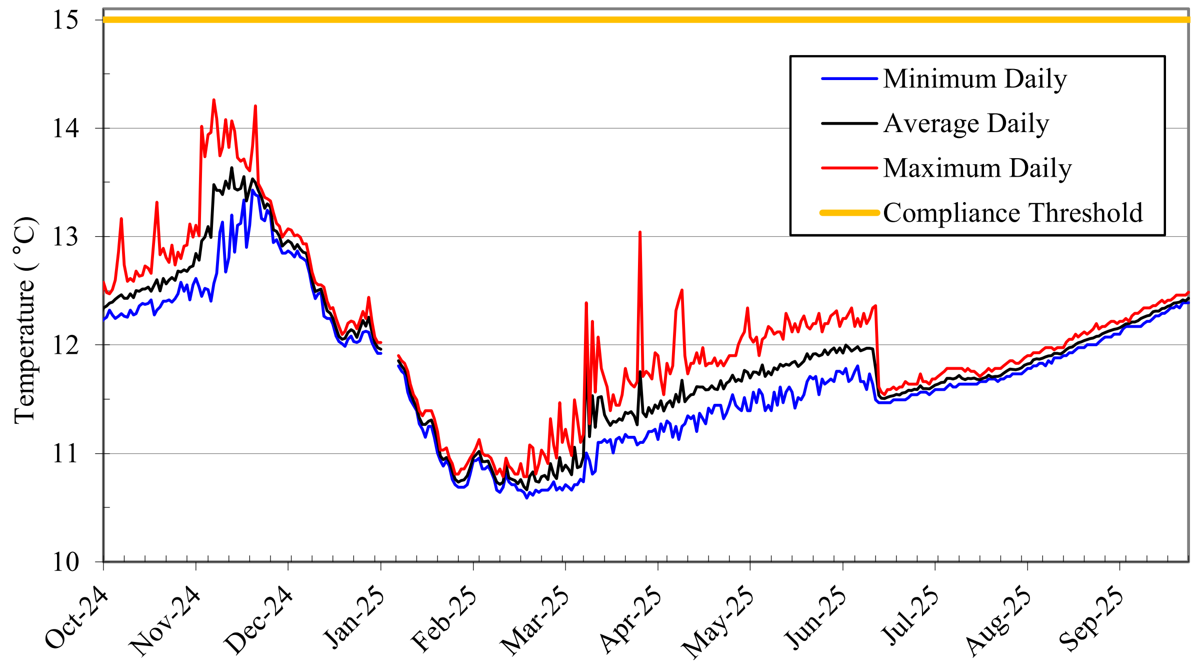

Figure 3-3. *Daily mean, minimum, and maximum water temperature from the compliance point sensor in Calaveras Creek (CAC00.60) and the compliance release temperature threshold.*

The SFPUC made no water transfers from Alameda Creek to Calaveras Reservoir during WY 2024–25. Large storms in early January 2023 resulted in sediment deposition within the diversion structure and precluded diversion operations throughout WY 2023–24 and WY 2024–25. Therefore, all Alameda Creek flow remained in the stream and bypassed ACDD (Figure 3-4). There was no flow maintained through the fish ladder.

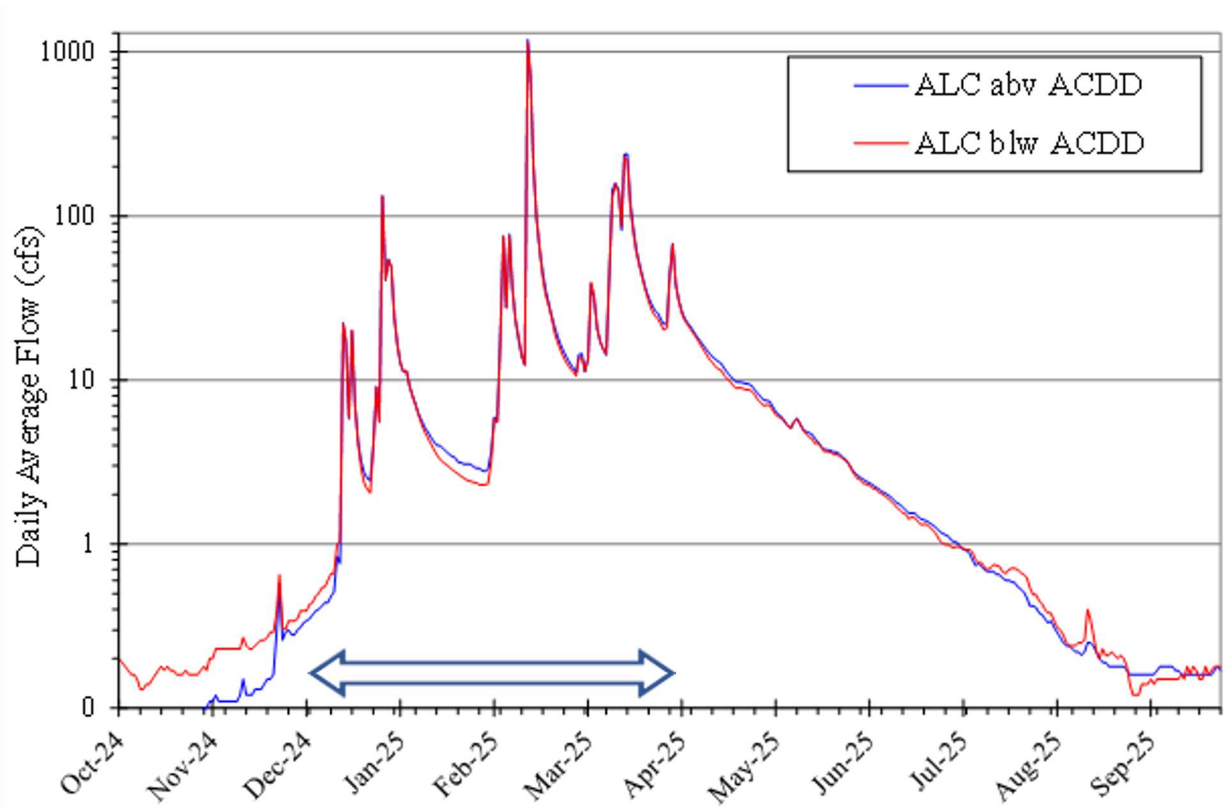

Figure 3-4. *Flow data at the United States Geological Survey gages above (ALAMEDA C AB DIV DAM NR SUNOL CA – 11172945) and below (ALAMEDA C BL DIV DAM NR SUNOL CA – 11172955) the Alameda Creek Diversion Dam during WY 2024–25. Arrow shows the diversion season.*

4. Calaveras Reservoir Conditions

4.1 Background

Calaveras Reservoir is one of two SFPUC raw-water storage reservoirs in the East Bay. It can hold up to 96,850 acre-feet that it receives solely from the local watershed. Calaveras Reservoir's primary water sources are the Arroyo Hondo and upper Alameda Creek via the ACDD and Tunnel. Calaveras Reservoir water can be transferred to the Sunol Valley Water Treatment Plant (SVWTP), moved to San Antonio Reservoir, or released downstream. The CDRP was initiated due to seismic stability and reliability issues raised by the California Department of Water Resources' DSOD. Maximum reservoir storage following a DSOD order was restricted to less than 38,000 acre-feet (DSOD, 2003). Construction began in 2012 and was completed in 2018. In January 2019, the SFPUC began to gradually refill the reservoir and release water into Calaveras Creek.

The reduced volume of water in Calaveras Reservoir, due to the extended DSOD-required drawdown, often resulted in degraded water quality conditions, including low oxygen concentrations, increases in pH, turbidities, and nuisance algal concentrations. A hypolimnetic oxygenation system (HOS), installed in 2005, has been operating seasonally to mitigate the degraded water quality conditions by increasing dissolved oxygen (DO) concentrations in the hypolimnion and at the reservoir's water-sediment interface. The HOS is run to maintain a DO concentration in the hypolimnion of greater than 5 milligrams per liter (mg/L), which also aids in the effort to increase cold-water habitat for an adfluvial *O. mykiss* population.

The CDRP permits require water releases to Calaveras Creek to sustain healthy native fish assemblages and facilitate *O. mykiss* spawning and rearing downstream of the reservoir in both Calaveras and Alameda creeks (CDFW, 2011; NMFS, 2011). Flow and water temperature modeling was incorporated into the CDRP permit documentation. The modeling demonstrated that released water with temperatures equal to or less than 15°C will maintain sufficiently cold and well-oxygenated waters throughout the study area downstream of the release. Limnology surveys are routinely conducted in Calaveras Reservoir to monitor water quality conditions related to SFPUC water treatment requirements, assess habitat conditions for adfluvial *O. mykiss*, and ensure there is an adequate cold-water pool to maintain the required 15°C (or colder) releases to Calaveras Creek.

4.2 Procedures

Natural Resources and Lands Management Division biologists survey Calaveras Reservoir water quality conditions every other week and monitor increases to weekly surveys when one or more water quality treatment triggers are exceeded (SFPUC, 2019b). Survey frequency can also vary depending on weather conditions, SVWTP source-water needs, and staffing. A single monitoring site, located at the deepest part of the reservoir near the adit structure, is sampled from an anchored boat (**Error! Reference source not found.**).

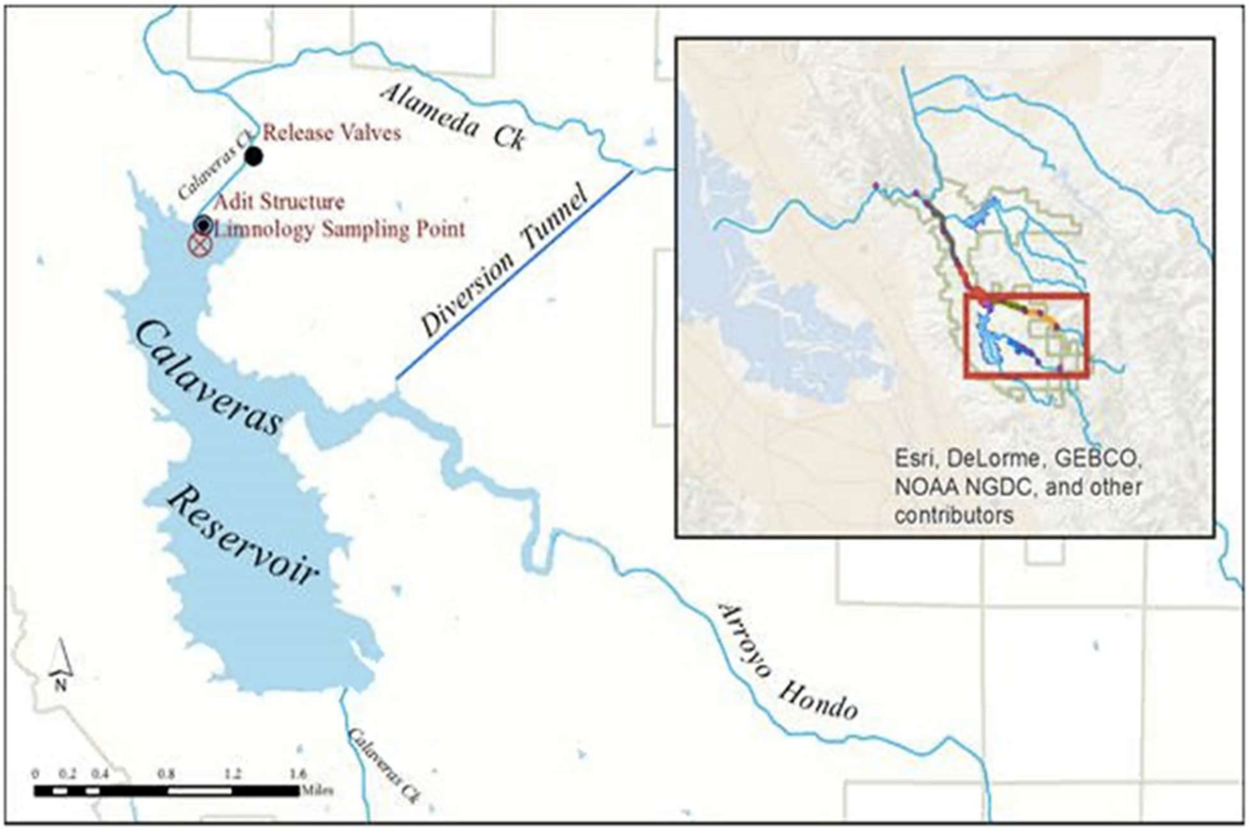

Figure 4-1. *Calaveras Reservoir limnology monitoring site.*

Real-time storage is monitored through a USGS reservoir elevation gage (CALAVERAS RESERVOIR NR SUNOL CA - 11173490) located along the western side of Calaveras Reservoir (https://waterdata.usgs.gov/monitoring-location/11173490/#parameterCode=62614&period=P7D&showMedian=true). A rating curve developed by SFPUC's Water Resources Division is used to convert elevation to volume in acre-feet (Dhakal, pers. comm.).

In-situ water quality measurements are taken at 5-foot intervals, from the surface to the bottom, using a YSI® multi-parameter sonde with probes for measuring temperature, DO, pH, chlorophyll-a, phycocyanin, total dissolved solids, oxygen-reduction potential, and specific conductivity. Discrete water samples are collected using a Kemmerer water sampler. These samples are used to analyze turbidity, Geosmin and Methyl-Isoborneol (MIB) concentrations, and algal toxin levels and can be used for various nutrient and chemistry analyses. A composite plankton sample is taken by pulling an 80-micron mesh net vertically through the upper 50 feet of the water column. An aliquot of the sample is enumerated with light microscopy, and algae are identified to genera. These totals are extrapolated and reported as natural units per cubic meter. Chlorophyll-a and phycocyanin measurements are not calibrated and are reported as reference units.

4.3 Results

4.3.1 Reservoir Storage

Prior to the construction of the new Calaveras Dam, the SFPUC was required to keep the reservoir above an elevation of 690 feet (23,903 acre-feet) to provide sufficient cold water for resident *O. mykiss* and to minimize entrainment of fish within the reservoir by the intake tower (CDFG, 1997; SFPUC, 1991; Figure 4-2). Revised estimates of the lowest reservoir water elevations necessary to keep downstream flow release temperatures below 15°C are still under development. Generally, however, the temperature requirement is expected to be met by keeping the reservoir elevation over 705 feet when using Adit 1 or 735 feet when using Adit 2 (Pluche, pers. comm.). During WY 2024–25, Calaveras Reservoir was at a minimum elevation of 736.9 feet on February 4 and 5, 2025, and it reached a maximum of 749.9 feet on October 1, 2024. Calaveras reservoir did not spill over in WY 2024–25.

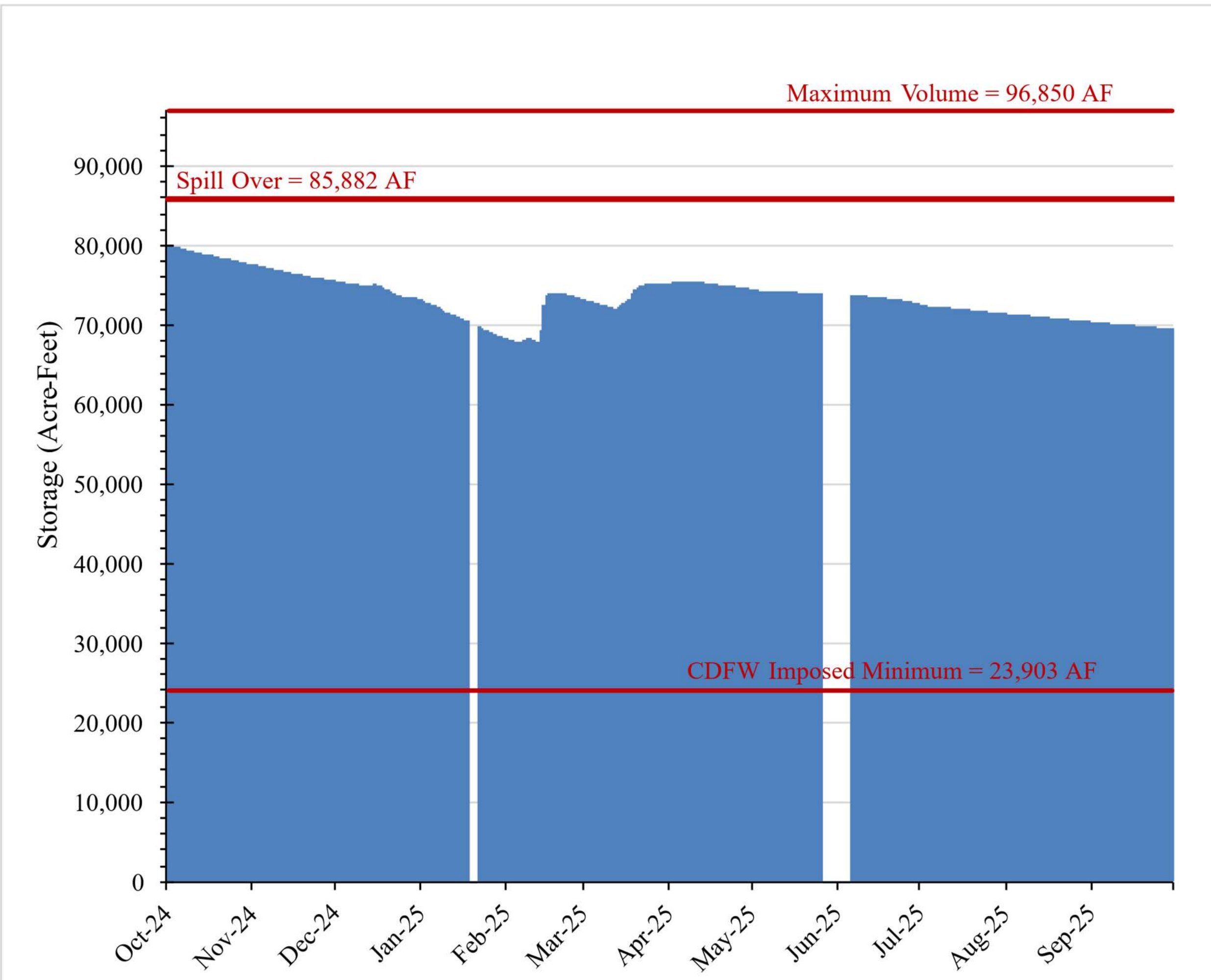

Figure 4-2. *Calaveras Reservoir average daily storage during WY 2024–25. Missing values occurred on January 19 through 21, 2025, and on May 27 through June 5, 2025.*

4.3.2 Reservoir Temperature

Calaveras Reservoir's summer stratification started weakening in mid-November and fully turned over in early December (Figure 4-3; Appendix A, *Calaveras Reservoir Water Quality Data*). The first signs of re-stratification were observed at the end of February, and the reservoir became completely stratified by the end of March. The thermocline was generally 20 to 40 feet below the surface once the reservoir became fully stratified. The coldest water temperature of the WY (10.2°C) was measured at 100 feet deep on February 18, 2025, while the highest temperature (24.6°C) was recorded at the surface on July 14, 2025. The greatest difference between surface and bottom water temperatures (24.6–11.4°C, respectively) also occurred on July 14, 2025.

4.3.3 Reservoir Dissolved Oxygen

The HOS was on at the maximum rate of 80 cubic feet per minute (cfm) at the start of the WY, decreased once to 40 cfm on December 24, 2024, and was turned off on December 27, 2024. During that period, DO concentrations ranged from 3.7 to 10.7 milligrams per liter (mg/L) (Figure 4-3; Appendix A, *Calaveras Reservoir Water Quality Data*). Calaveras Reservoir DO concentrations dropped to 3.4 mg/L at the bottom of the reservoir on March 24, 2025; the HOS was turned on at 20 cfm on March 25, 2025. There were two incremental increases as DO concentrations dropped over time, until the system reached 80 cfm by August 11, 2025, for the remainder of the WY. The HOS was effective at keeping deeper waters from nearing anoxia during stratification, with DO levels near the bottom never falling below 5 mg/L after initiation of the HOS. The highest DO (11.3 mg/L) during the water year was measured at the surface and 5 feet deep on December 30, 2024, while the lowest concentration (2.4 mg/L) was recorded at the metalimnetic oxygen minima zone/thermocline (30 feet deep) on August 8, 2025.

4.3.4 Reservoir pH

Following winter isothermal conditions, reservoir pH values declined in the hypolimnion and increased near the surface (**Error! Reference source not found.**3; Appendix A, *Calaveras Reservoir Water Quality Data*). After the December turnover event, pH values ranged from 7.2 to 7.6 pH units during January through beginning of April. The maximum pH in Calaveras Reservoir (9.1 pH units) was recorded at the surface and at 5 feet deep on August 25, 2025, while the minimum value (6.6 pH units) was observed at 80 and 90 feet deep on November 18, 2024.

4.3.5 Reservoir Turbidity

Turbidities were generally low throughout WY 2024–25, particularly at the surface and mid-water column depths (10 to 50 feet). February and March had the highest turbidity values when compared to the rest of the year, with the highest turbidity (154 nephelometric turbidity units [NTUs]) recorded at 110 feet deep on February 18, 2025. The lowest turbidity (0.7 NTU) was found at 10 feet deep on October 7, 2024 (Figure 4-3; Appendix A, *Calaveras Reservoir Water Quality Data*).

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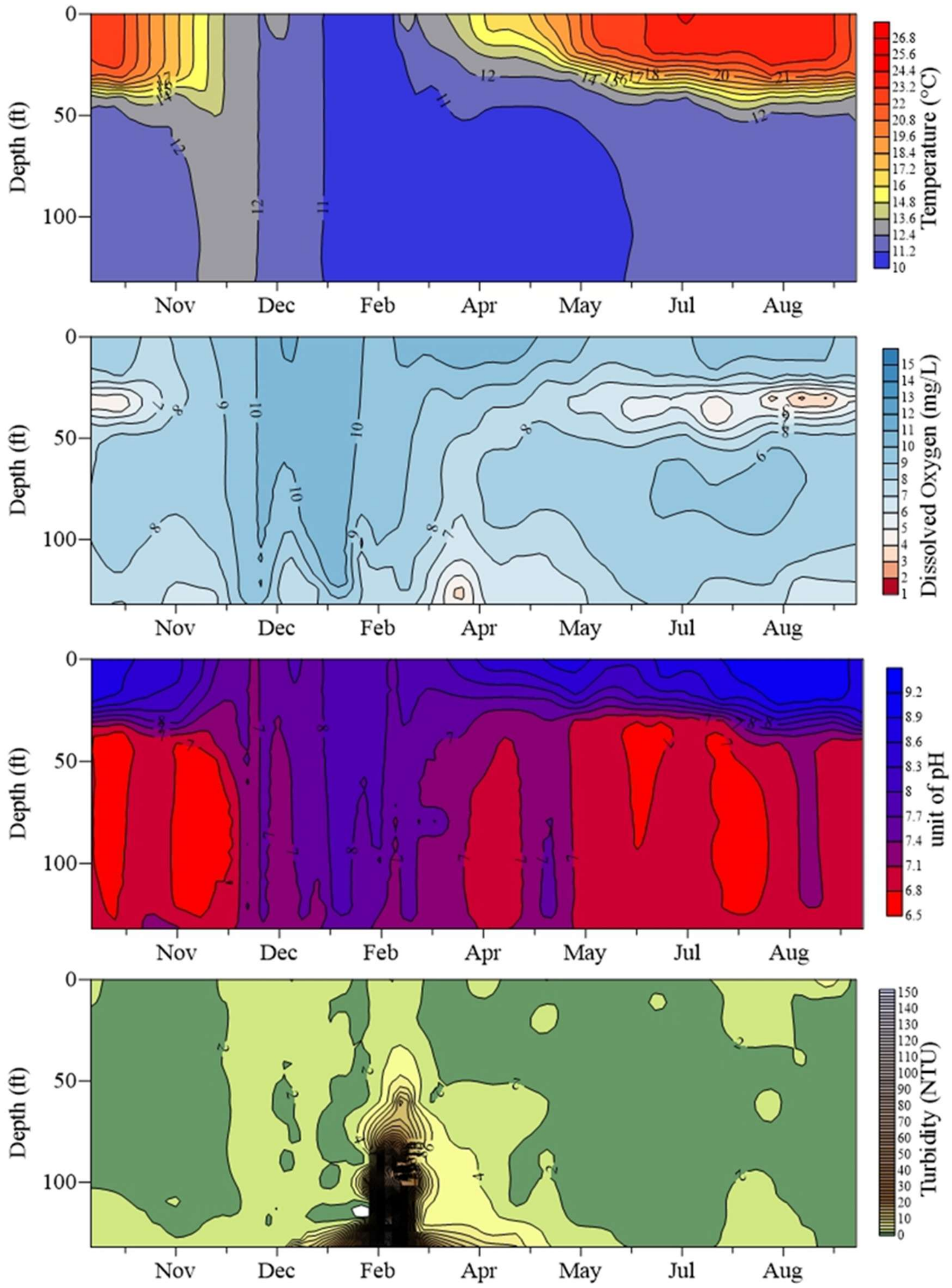

Figure 4-3. *Temporal and spatial trends in temperature, dissolved oxygen, pH, and turbidity at the limnology sampling point in Calaveras Reservoir during WY 2024–25.*

4.3.6 Reservoir Plankton

Plankton concentrations remained below 5 million natural units per cubic meter (NU/m³) throughout most of the water year. except in late December to early January when concentrations exceeded the additional monitoring and algaecide treatment consideration threshold, (January 6, 2025) and the no-treatment threshold of 10 million NU/m³ (December 30, 2024, and January 13, 2025; Figure 4-4). At the beginning of the water year, total plankton concentrations were low, with zooplankton absent from some samples. The lowest concentration was recorded on February 18, 2025, at 146,200 NU/m³. The peak concentration was recorded on January 13, 2025, at 15.8 million NU/m³.

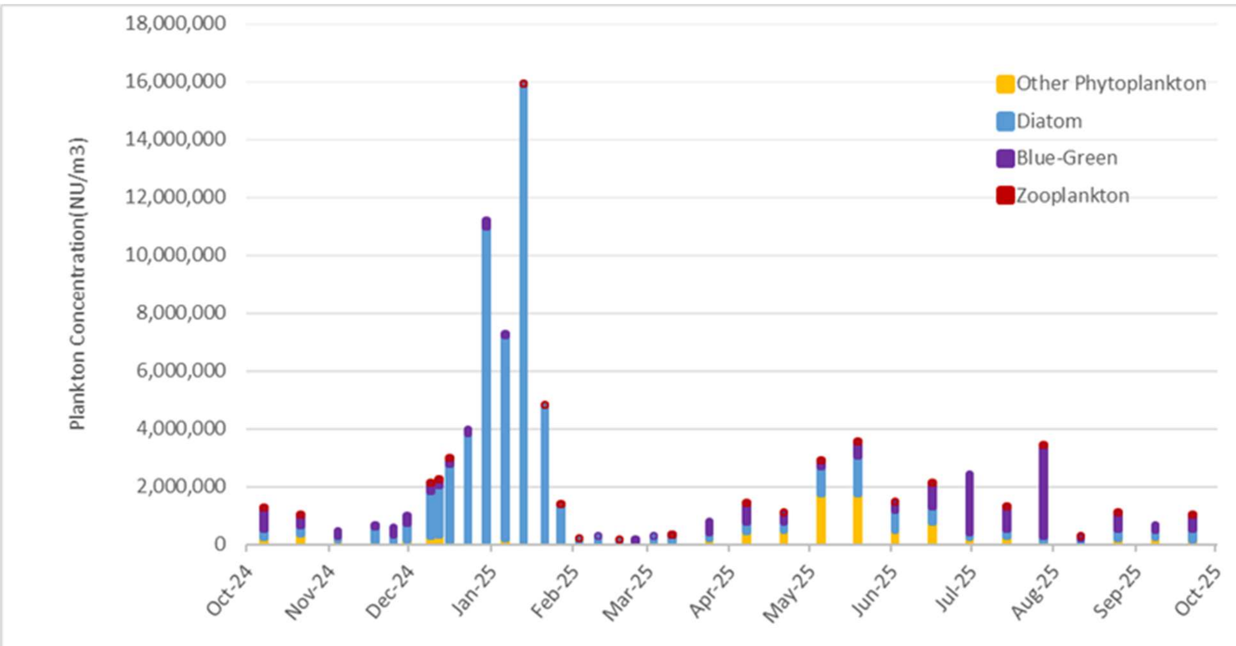

Figure 4-4. *Plankton trends in Calaveras Reservoir during WY 2024–25.*

Diatoms (combined *Asterionella*, *Fragilaria*, *Cyclotella*, and *Stephanodiscus)* were the most abundant algae in 67 percent of the surveys. The blue-green algae *Aphanizomenon*, *Aphanocapsa*, and *Microcystis* were the dominant algae in 29 percent of the surveys, and the golden algae *Dinobyron* dominated for the remaining 4 percent.

Chlorophyll-a values can be used to estimate the algal biomass in a water body. Values were low throughout most of the water column at the sampling location during WY 2024–25 (Figure 4-5). Increases did appear to be correlated with higher phytoplankton concentrations. The highest value (15.7 relative fluorescence units [RFU]) was recorded at the bottom of the reservoir on December 30, 2024, while the lowest value (-0.3 RFU) was recorded at the surface on July 28, 2025.

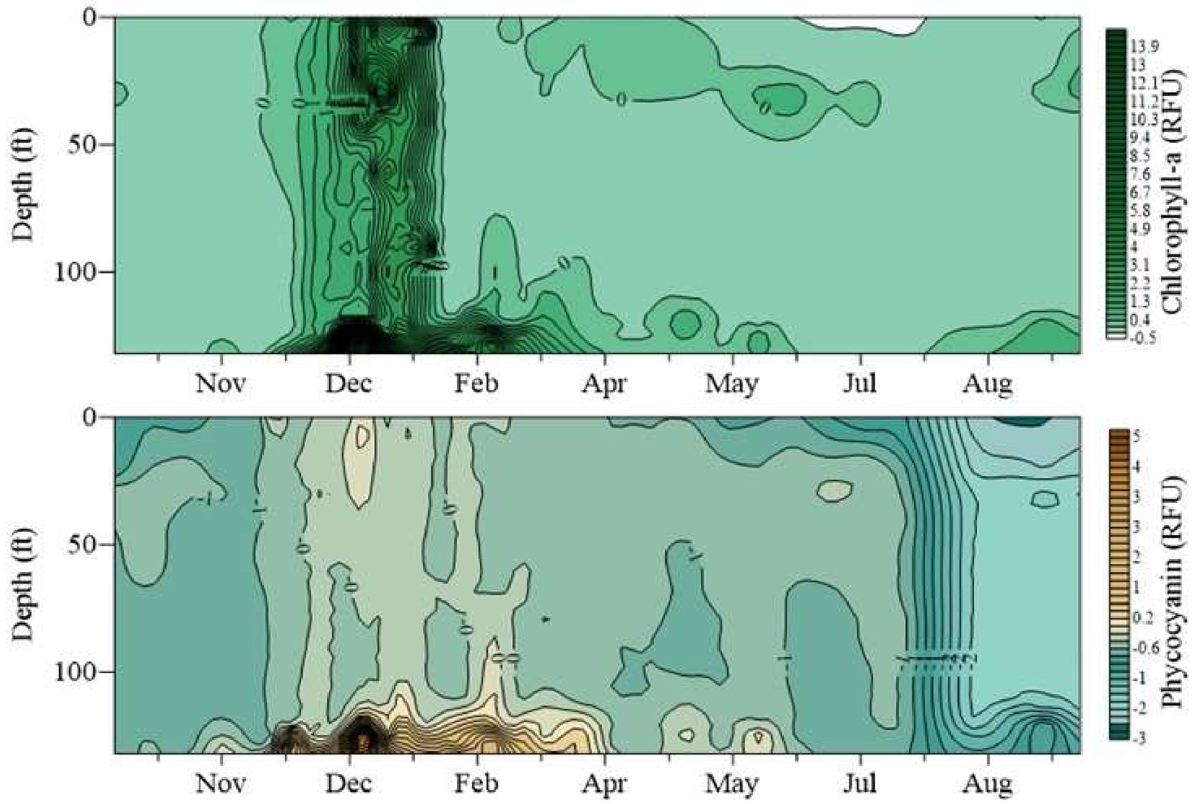

Figure 4-5. *Chlorophyll-a and phycocyanin trends in Calaveras Reservoir during WY 2024–25.*

Phycocyanin concentrations can be used to monitor abundance of cyanobacteria. These values were very low throughout the water column during WY 2024–25. Increases did appear to be correlated with the presence of blue-green algae. The highest value during the water year was 6.1 RFU, which was recorded at the bottom of the reservoir on December 30, 2024, while the lowest value of -2.6 RFU was recorded at the surface on August 8, 2025.


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5. Stream Conditions

5.1 Background

Abiotic factors, such as stream flow and water temperature, can indirectly and directly affect biological resources. Alterations in their magnitude or timing can result in changes to species' distribution, changes in species' abundance, the extirpation of native species, and the invasion of non-native species. Negative indirect effects from alterations to flow and water temperature regimes may include increases in predation on native species, losses of breeding and rearing habitat, and diminished food production and availability. Direct impacts, which are often associated with dams and water diversions, can include the obstruction of migratory routes, alteration in sediment and large woody debris transport, and water quality degradation.

Abiotic factors, including turbidity, pH, and dissolved oxygen concentrations, are not expected to affect *O. mykiss* and other fishes in the southern Alameda Creek Watershed. Elevated water temperatures, however, which contribute to the timing of spawning and the development and growth of individuals, can be unfavorable to the establishment of viable *O. mykiss* populations in some areas (Bookman-Edmonston, 1995). Since construction of the original Calaveras Dam, Calaveras Creek below the reservoir and Alameda Creek downstream of its confluence with Calaveras Creek have exhibited temperature regimes more suited to native and non-native warmwater fishes including California Roach (*Hesperoleucus symmetricus*), Sacramento Pikeminnow (*Ptychocheilus grandis*), Sacramento Sucker (*Catostomus occidentalis*), and Centrarchids such as Bluegill (*Lepomis macrochirus*) and Largemouth Bass (*Micropterus nigricans*).

The objective of discharge and water temperature monitoring, as defined in the NMFS BO (NMFS, 2011) and CDFW SAA (CDFW, 2011) for the CDRP, is to document the effects of Calaveras Dam water releases and reduced ACDD diversions below each facility. These operational changes are intended to create, maintain, or improve *O. mykiss* spawning and rearing habitat in affected areas.

5.2 Procedures

The SFPUC monitors the southern Alameda Creek Watershed stream conditions within distinct Alameda Creek and Calaveras Creek reaches (Figure 5-1). Discharge and water quality data are collected at USGS gaging stations, from SFPUC-installed remote temperature sensors, and during routine faunal surveys.

Hydrographs are produced to document discharge using USGS-reviewed and approved daily mean streamflow data from eight gages (Figure 5-1). These gages also record water temperature. These data are downloaded from the Surface Water Data for the Nation website (http://waterdata.usgs.gov/nwis/sw).

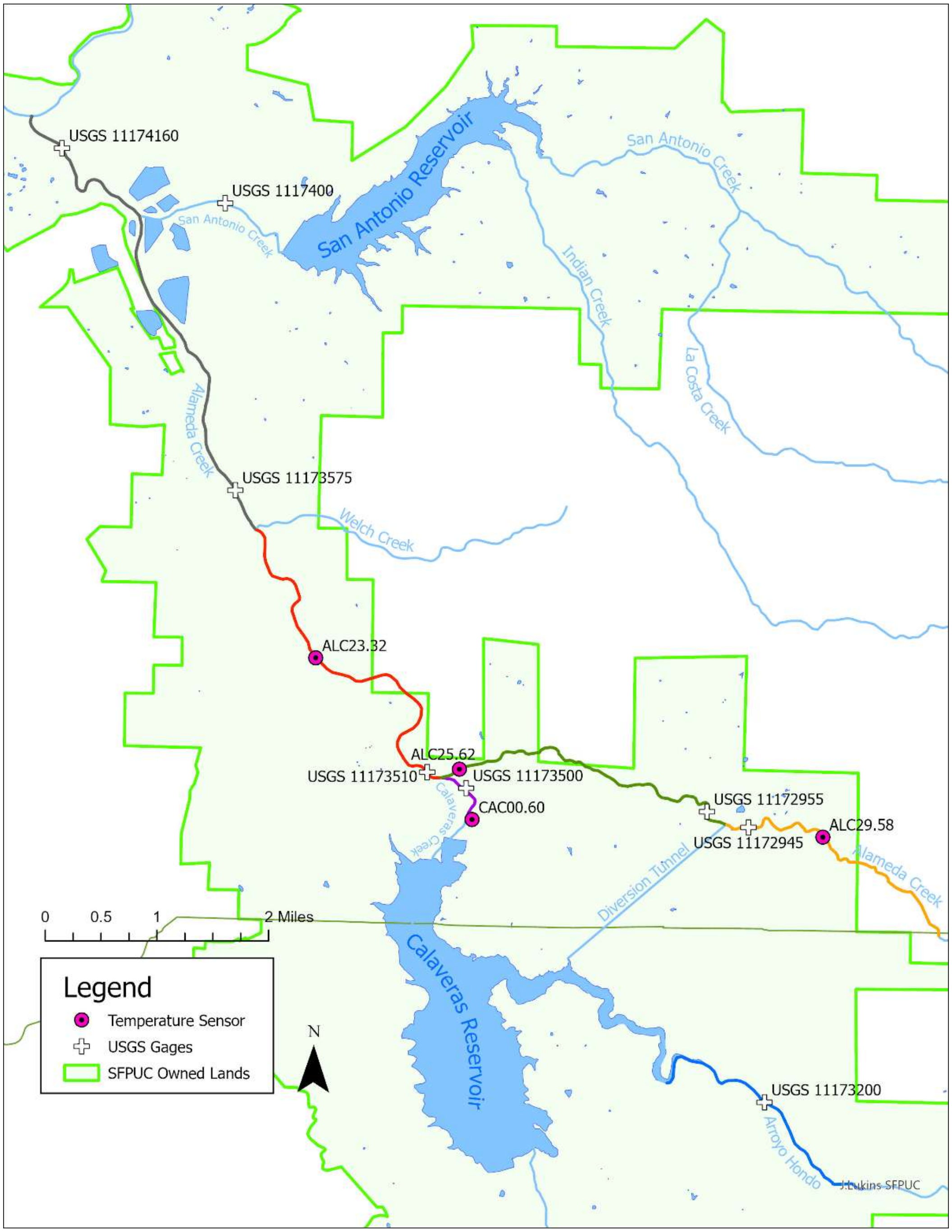

Figure 5-1. *United States Geological Survey gage and San Francisco Public Utilities Commission temperature sensor locations in the southern Alameda Creek Watershed during WY 2024–25.*

The SFPUC deploys and maintains four water temperature sensors (Onset, Hobo® Pro V2, or Hobo® Tidbit) in the southern Alameda Creek Watershed. The sites are distributed within the SFPUC property limits in Alameda Creek upstream of its confluence with Arroyo de la Laguna and in Calaveras Creek below Calaveras Reservoir.

Temperature sensors are deployed using anchoring hardware to deter theft and tampering and to protect the sensors during high flow events. Sensors record water temperature year-round at

30-minute intervals. Data are downloaded multiple times during the year using an optic data shuttle or Bluetooth™-enabled device to prevent monitoring interruptions. Regular sensor visits and downloads also allow for periodic replacements due to sensor failures or data loss and allow for position adjustments necessary due to changes in stream conditions.

Water quality parameters, including turbidity, dissolved oxygen concentration, pH, water temperature, and alkalinity, are measured during annual faunal surveys. Not all parameters are measured for every survey type or location. Most of the data collected during winter and spring are from *O. mykiss* spawning and trapping surveys and herptile surveys. Summer and fall surveys that collect water quality data include benthic macroinvertebrate and *O. mykiss* snorkeling and electrofishing surveys.

5.3 Results

Multiple significant storm events occurred during WY 2024–25. The Calaveras and Alameda Creek reaches, downstream of the environmental releases from Calaveras Reservoir, followed the same general seasonal pattern, although minimum and maximum water temperature changes were muted, in part, by these large storm events. Due to the environmental releases, water temperatures in these reaches are colder year-round relative to reaches not affected by the releases (e.g., Alameda Creek upstream of the Calaveras Creek confluence).

Despite appropriate protection and monitoring efforts, some water temperature sensors had technical failures that resulted in data gaps. Additionally, sensors occasionally recorded erroneous data, when the streambed became dry or disconnected, or when changes in channel morphology left sensors out of the water. Lastly, some sensors were lost due to the high flows and scouring events and were replaced when conditions were safe.

5.3.1 Alameda Creek Upstream of Alameda Creek Diversion Dam

Water temperature data were collected at one SFPUC sensor in Alameda Creek above ACDD (ALC29.58). Temperature and discharge data were recorded at USGS gage ALAMEDA C AB DIV DAM NR SUNOL CA – 11172945 (USGS 11172945) within the same reach (Figure 5-1).

Alameda Creek upstream of ACDD was not affected by SFPUC releases or diversions. At the start of WY 2024–25, baseflows were below 1 cfs (Figure 5-2). The first winter surface flows in Alameda Creek were recorded in November, with larger flow events occurring in December through April. The maximum instantaneous flow observed in WY 2024–25 was 2,980 cfs, occurring on February 13, 2025. The maximum daily average flow was 1,190 cfs, occurring on the same date. Between early December and the end of February, water temperatures remained low. From late March through early July, water temperatures generally increased as instream discharge decreased and air temperatures increased.

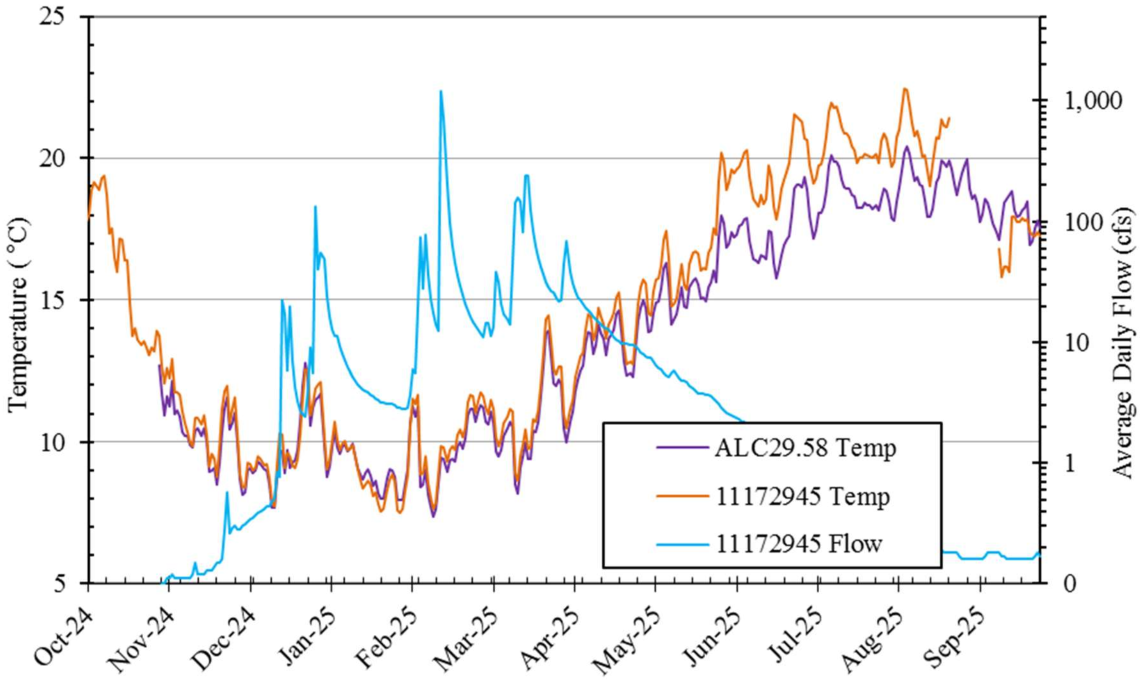

Figure 5-2. *Daily average stream water temperatures above Alameda Creek Diversion Dam and daily average flow at United States Geological Survey gage 11172945.*

Water temperatures at the SFPUC site ALC29.58 began the water year with an average temperature of approximately 18°C. Temperatures gradually dropped with the coldest temperatures occurring in late January and early February. A moderate warming trend started in mid-February and March. From April to May, there was a more noticeable rise in temperatures with the peak in temperatures occurring in July and August. Daily variation in water temperatures are more pronounced during the summer months when air temperatures are at their highest and instream flows are at their lowest. Daily winter temperature variations were minimal (Figure 5-3).

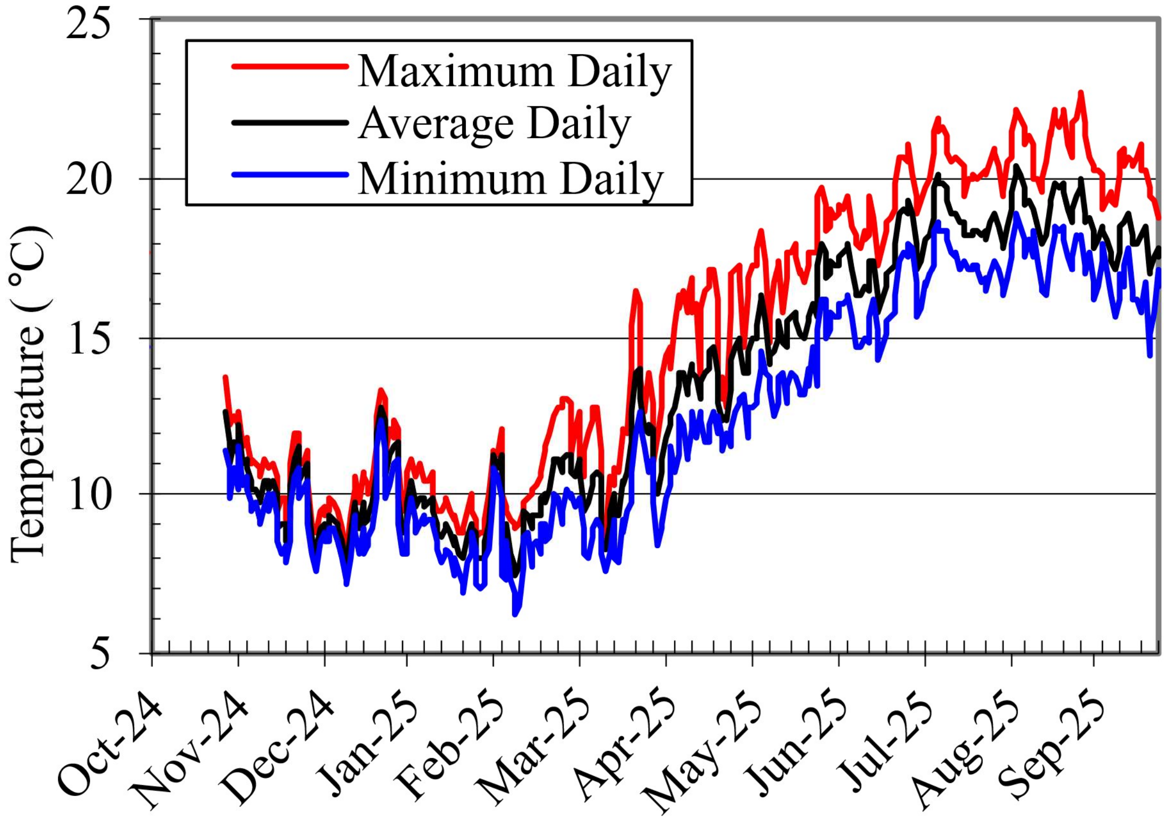

Figure 5-3. *Daily stream temperatures at ALC29.58.*

5.3.2 Alameda Creek from ACDD to the Calaveras Creek Confluence

Alameda Creek water temperature data, downstream of ACDD and upstream of the creek's confluence with Calaveras Creek, were collected from SFPUC sensor ALC25.62 (Figure 5-1). Temperature and flow data were recorded at USGS gage ALAMEDA C BLDIV DAM NR SUNOL CA – 11172955 (USGS 11172955). This section of Alameda Creek can be influenced by operations at ACDD; however, flow and temperature patterns were similar to those observed upstream of ACDD. There was no diversion this water year. The water year began with low baseflows followed by periodic winter spikes and cooler temperatures. The maximum instantaneous flow observed in this water year was 2,620 cfs, occurring on February 13, 2025. The maximum daily average flow was 1,140 cfs, occurring on the same date. Water temperatures increased as baseflows decreased starting in early April and continuing through the end of the water year (Figure 5-4).

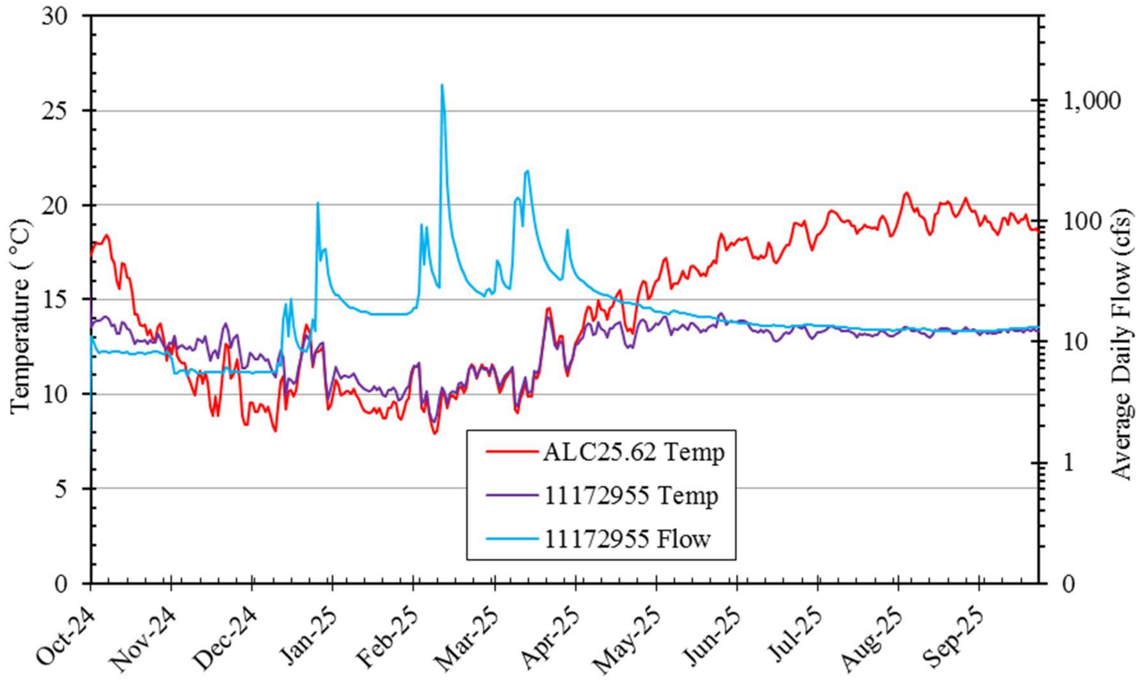

Figure 5-4. *Daily average stream water temperatures below Alameda Creek Diversion Dam and daily average flow at United States Geological Survey gage 11172955.*

The sensor at site ALC25.62 showed a temperature decrease from October to December. In January, the lowest average temperatures were observed. Average temperatures started increasing in mid-February. The highest temperatures were recorded in July, followed by a consistent decrease in temperature throughout the remainder of the water year (Figure 5-5). Notably, the USGS gage 11172955 and the sensor at site ALC 25.62 are within the same stream reach, but the sensor at site ALC 25.62 is approximately 2.7 miles downstream of the USGS gage and showed warmer water temperatures during the summer months.

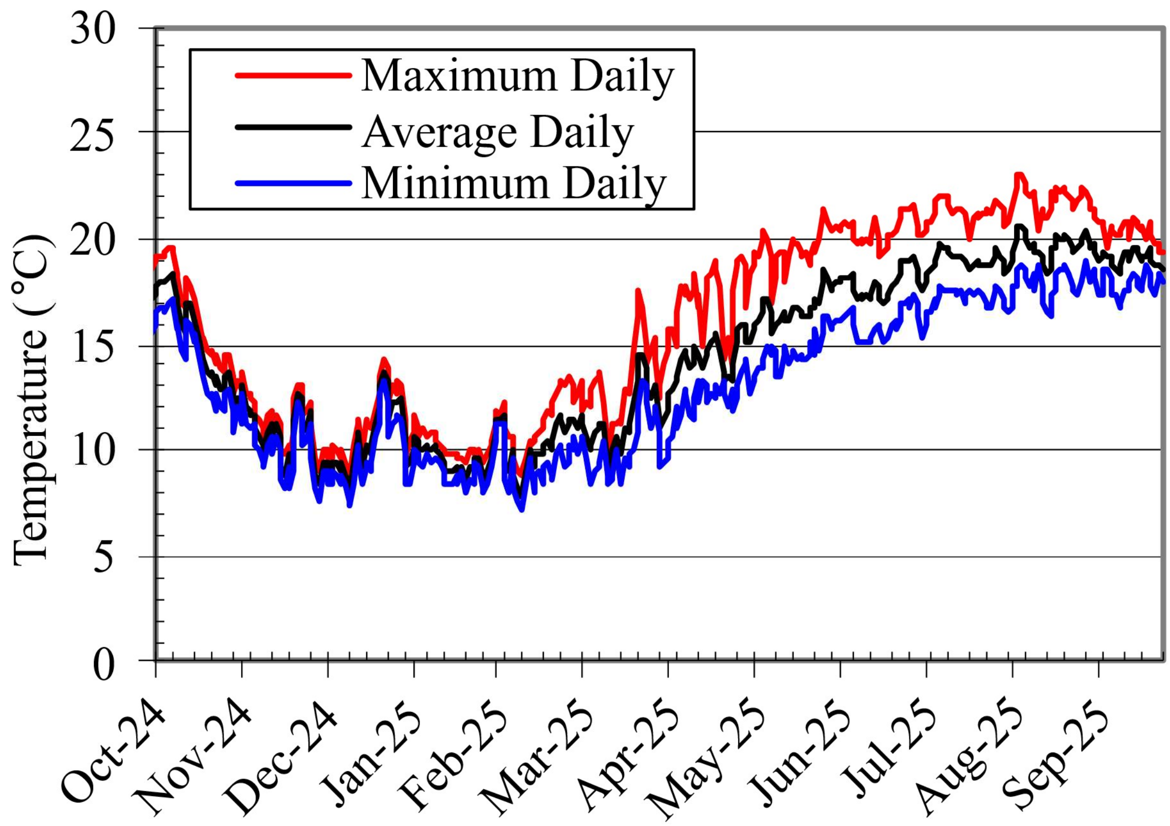

Figure 5-5. *Daily stream temperatures at sensor ALC25.62.*

5.3.3 Alameda Creek from Calaveras Creek to Welch Creek

Alameda Creek water temperatures were monitored at SFPUC sensor ALC23.32. The USGS gage ALAMEDA C BL CALAVERAS C NR SUNOL CA - 11173510 (USGS 11173510), located immediately below the Calaveras Creek confluence, recorded flow and water temperature (Figure 5-1). While both sensor sites are within the same stream reach, the SFPUC sensor at site ALC23.32 is approximately 2 miles downstream of the USGS gage.

The Calaveras to Welch creek reach is influenced by both ACDD operations and Calaveras Reservoir water releases. Environmental releases from Calaveras Reservoir followed the required flow schedule throughout the water year. No releases from the cone valve were initiated. There were no diversions from ACDD this water year.

Low stream temperatures were maintained throughout the winter (Figure 5-6). On February 13, 2025, a maximum instantaneous flow of 3,250 cfs and an average daily flow of 1,330 cfs were recorded. Average water temperatures generally increased from April through July (Figure 5-6). During the summer months, daily water temperature fluctuations at site ALC23.32 were greater than those observed in the preceding months (Figure 5-7).

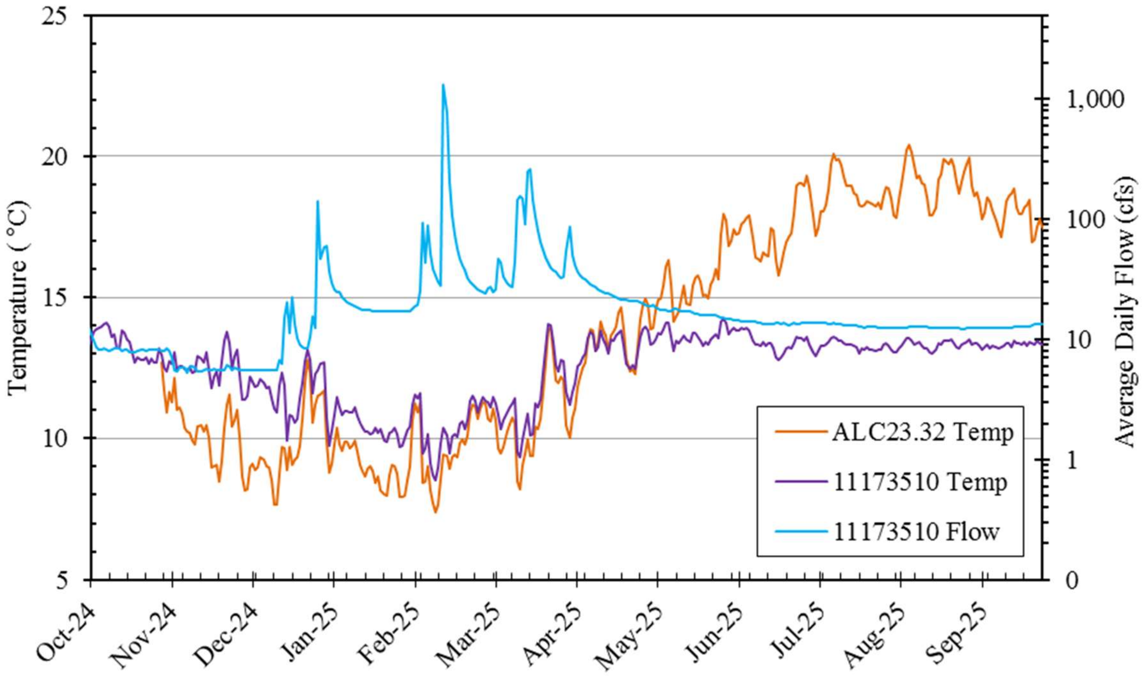

Figure 5-6. *Daily average stream water temperatures between Calaveras Creek and Welch Creek and daily average flow at United States Geological Survey gage 11173510.*

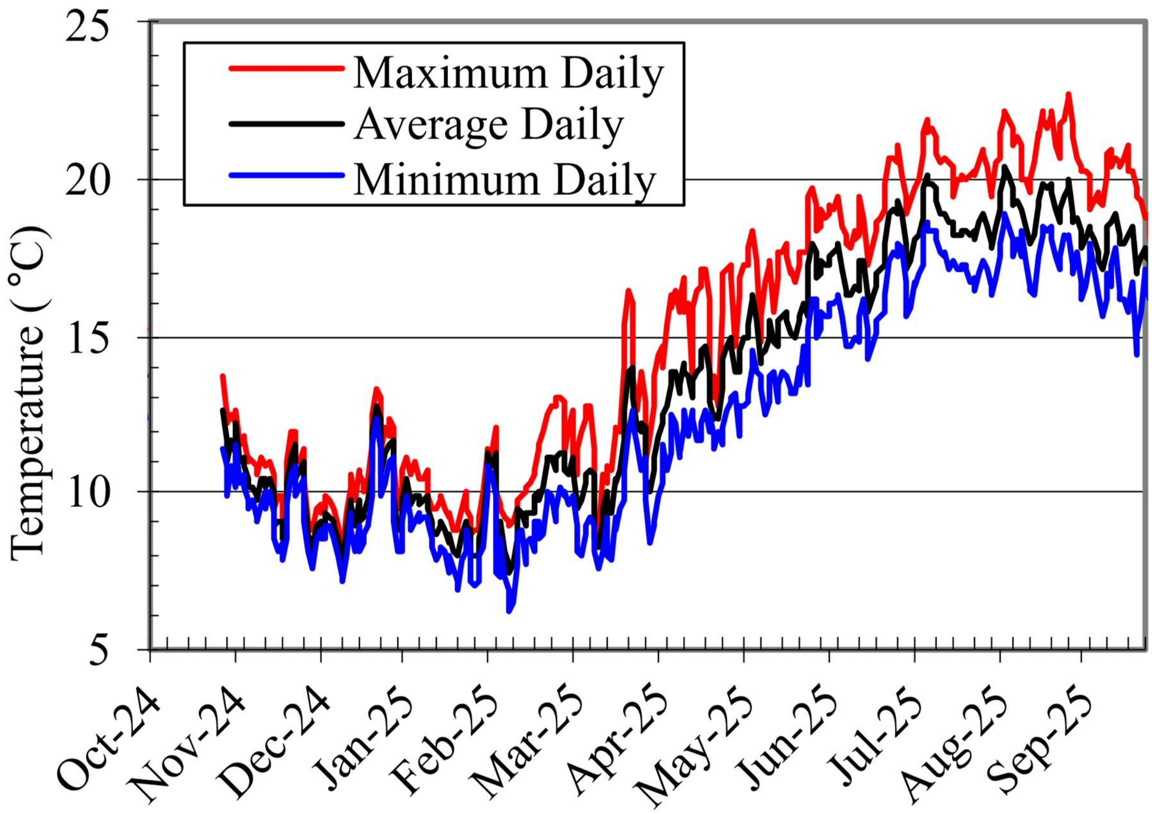

Figure 5-7. *Daily stream water temperatures at ALC23.32.*

5.3.4 Alameda Creek from Welch Creek to Arroyo de la Laguna

Water discharge and temperature were recorded at Alameda C BL Welch C NR Sunol CA – 11173575 (USGS 11173575) near the upstream end of the reach and Alameda C a Sunol Water Temple a Sunol CA - 11174160 near the Sunol water temple (Figure 5-1).

Alameda Creek below the Welch Creek confluence, like the reach immediately upstream, is influenced by both Calaveras Dam releases and ACDD operations. The most downstream sensor (Alameda C a Sunol Water Temple a Sunol CA – 11174160) is also influenced by quarry releases. Cold-water releases from the reservoir influenced flows and water temperatures, with the cooling effects diminishing in a downstream direction (Figure 5-8).

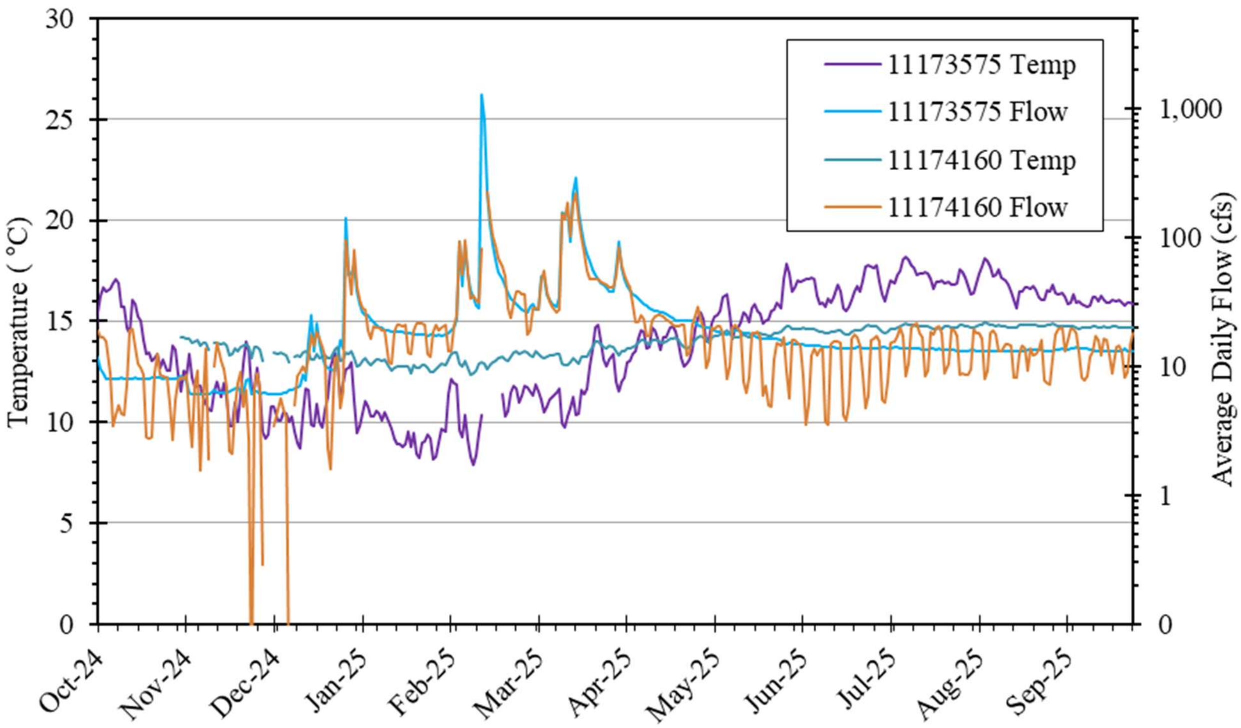

Figure 5-8. *Daily average stream water temperatures between Welch Creek and Arroyo de la Laguna and daily average flow at United States Geological Survey gage 11173575.*

5.3.5 Arroyo Hondo Upstream of Calaveras Dam

Flow and temperature data were downloaded for USGS gage ARROYO HONDO NR SAN JOSE CA - 11173200 in Arroyo Hondo. There were no SFPUC dams or diversions influencing conditions in the Arroyo Hondo. The highest instantaneous flow recorded for the water year was 4,470 cfs, logged on February 13, 2025. Temperatures decreased through December and remained low through late February. Temperatures then started to increase while baseflows decreased beginning in April and continuing to the end of the water year (Figure 5-9).

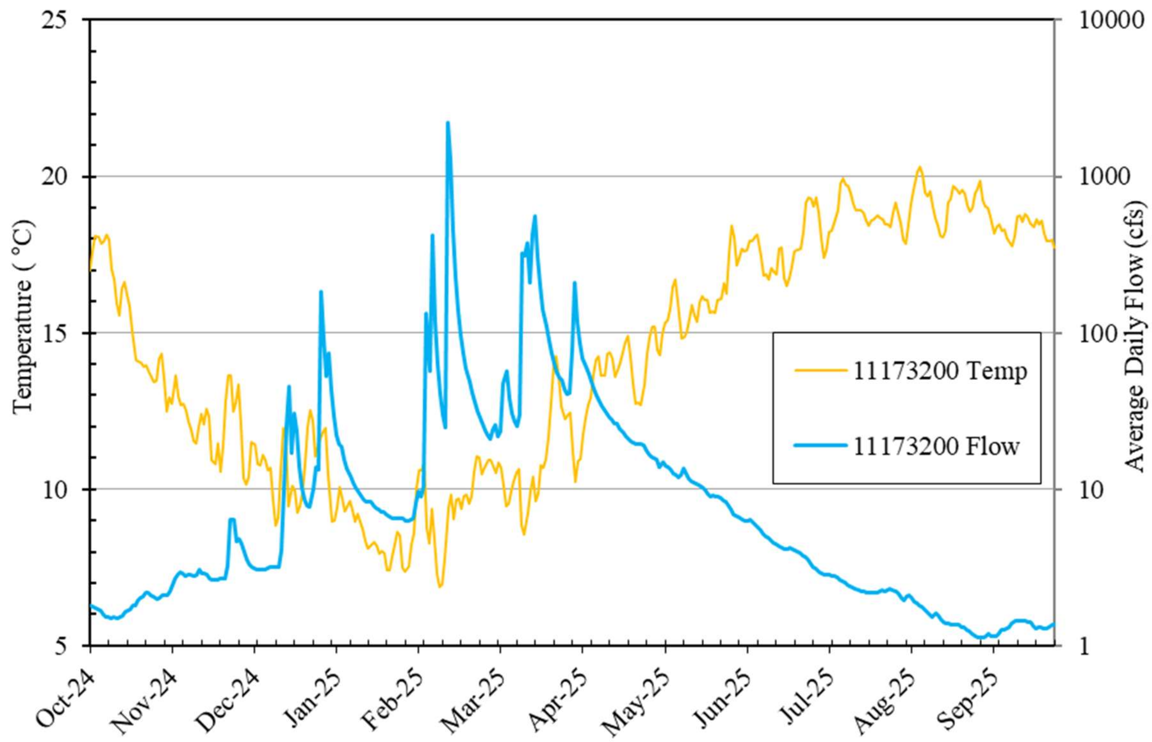

Figure 5-9. *Arroyo Hondo daily average stream temperatures and flow at United States Geological Survey gage 11173200.*

5.3.6 Calaveras Creek Downstream of Calaveras Dam

Calaveras Creek flows for approximately 0.6 mile from the base of Calaveras Dam to its confluence with Alameda Creek. Temperature data were collected near the outflow structure at CAC00.60. Temperature and flow data were recorded at Calaveras C NR Sunol CA - 11173500 (USGS 11173500; Figure 5-1).

Flows in Calaveras Creek below Calaveras Reservoir generally consisted of environmental water releases and groundwater accretions (less than 0.5 cfs). Local runoff within the reach is minimal, even during major rain events. Calaveras Reservoir did not spill in this water year. During the February 13, 2025 storm event, the average daily flow rose to 16.6 cfs, while instantaneous flow peaked at 34.2 cfs (Figure 5-10).

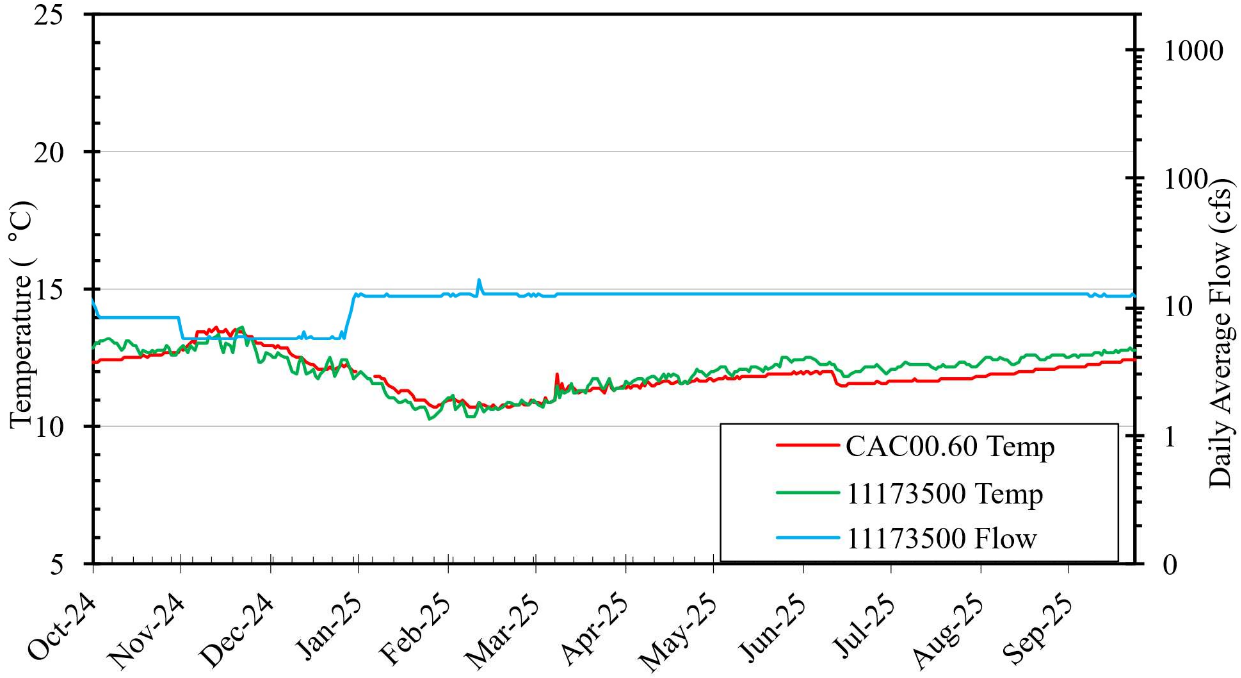

Figure 5-10. *Calaveras Creek daily average stream temperatures below Calaveras Dam and daily average flow at United States Geological Survey gage 11173500.*

Releases were typically drawn from Calaveras Reservoir's colder hypolimnetic waters, which keeps stream temperatures below the 15ºC required minimum threshold, with relatively minor daily fluctuations (NMFS 2011; Figure 5-11). The stream reached a daily maximum temperature of 13.6ºC on November 22, 2024.

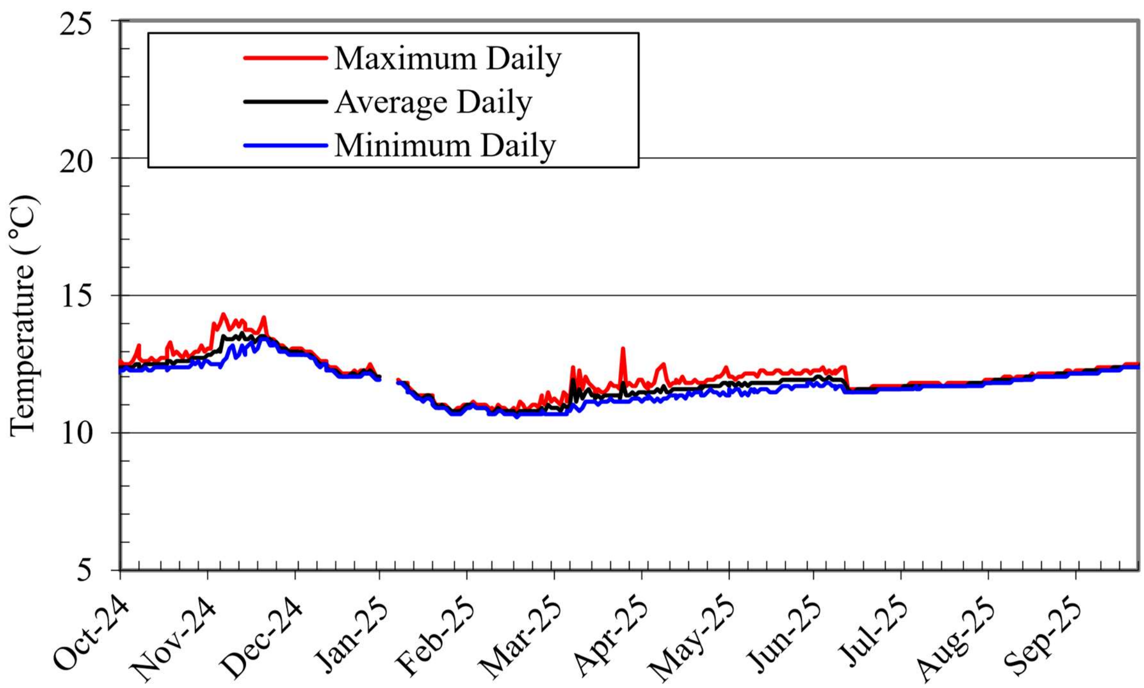

Figure 5-11. *Daily stream temperatures from CAC00.60.*

5.3.7 San Antonio Creek Downstream of Turner Dam

Flow and temperature data were downloaded from USGS gage San Antonio C NR Sunol CA - USGS-11174000 on San Antonio Creek below Turner Dam, with flows influenced by San Antonio Reservoir. Flows below Turner Dam are limited to occasional reservoir spills (there were no spills during WY 2024–25), seepage, and localized winter runoff events. During the February 13, 2025 storm event, instantaneous flow peaked at 10.0 cfs and on February 14, 2025 the daily average peaked at 4.5 cfs (Figure 5-12).

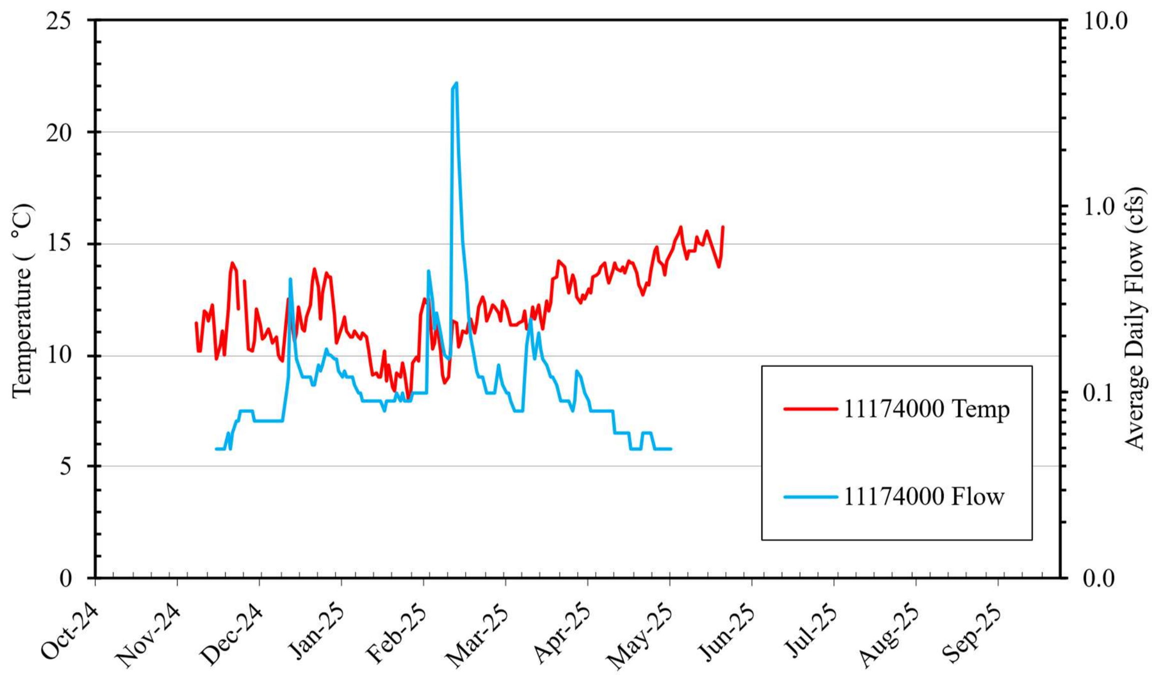

Figure 5-12. *San Antonio Creek average stream temperatures and flow at United States Geological Survey gage 11174000.*

5.4 Stream Survey Water Quality

Discrete water quality measurements were taken in conjunction with other faunal surveys that occurred during WY 2024–25 (Appendix B, *Miscellaneous Survey Water Quality Data*). *Oncorhynchus mykiss* spawning surveys, fish trapping, and amphibian surveys, and their associated water quality measurements, were conducted in winter and spring when temperatures are generally cooler, the stream channel is often connected, and high flow events have the potential to increase turbidities. Summer and fall benthic macroinvertebrate, snorkeling, and electrofishing surveys produced data more representative of decreasing or disconnected flows with higher variation between sites.

For all watershed locations and survey dates, turbidity ranged from 0.25 to 891.3 NTUs (Appendix B, *Miscellaneous Survey Water Quality Data*). The pH ranged from 7.6 to 8.7. Dissolved oxygen concentration ranged from 6.5 to 12.1 mg/L. Conductivity was between 80.5 to 601.3 microSiemens per centimeter (µS/cm). Alkalinity, measured at seven locations during benthic macroinvertebrate surveys, ranged from 90 to 145 mg/L.

6. *Oncorhynchus mykiss* Movement Patterns

6.1 Background

The Alameda Creek Watershed is South San Francisco Bay's largest source of water. Intermittent and perennial mainstem and tributary reaches, within both the Arroyo de la Laguna and Alameda Creek drainages, have historically provided passage and enough suitable spawning and rearing habitat to sustain anadromous *O. mykiss* populations (Stanford et al., 2013). With increased development, however, including the construction of dams, water diversions, and culverts, the migratory form of the species was extirpated by the early 1960s.

The watershed-wide approach being employed to restore anadromous *O. mykiss* to the Alameda Creek Watershed includes removing or modifying several partial and total passage barriers within the mainstem (Figure 6-1). Changes to water management practices, including releases from Calaveras Dam and reduced diversions from the ACDD, are intended to improve spawning and rearing habitat. To help evaluate the effectiveness of these restoration efforts, *O. mykiss* outmigrant trapping takes place in the lower portion of upper Alameda Creek, while a Passive Integrated Transponder (PIT) antenna system monitors fish movements through the ACDD fish ladder. One additional PIT antenna system, operated by an outside entity, is currently in operation in Alameda Creek. The system is operated by the Alameda County Water District (ACWD) at the BART Weir/Rubber Dam 1 (RD1) in Alameda Creek at river mile ALC9.67. The antenna system is an in-series, multi-antenna setup that improves detection efficiency, provides redundancy, and allows for directionality determination of individuals (i.e., upstream or downstream movement).

6.2 Procedures

A 5-foot rotary-screw trap (RST) and 0.25-inch mesh fyke-net trap (FNT) document the downstream movement patterns of fishes, including juvenile *O. mykiss* emigrational timing and age-class-specific relative abundances, in the southern portion of the Alameda Creek Watershed. The different trap styles allow for monitoring over a wide range of flows, with the RST fishing under higher flow conditions (approximately 20–400 cfs) and the FNT fishing at lower flows (approximately 5–40 cfs).

An RST is installed in an Alameda Creek pool at river mile ALC21.55, directly downstream of a riffle, between the Welch Creek confluence and the SVWTP bridge (Figures 6-1 and 6-2). It is held in place using a system of cables, ropes, and pulleys, which allow for lateral and longitudinal movements into optimal flow-based fishing positions. The system also permits the movement of the trap to safe locations during high flow events.

Biologists visit the RST a minimum of once daily. The trap is checked multiple times per day when fish counts or debris loads are high enough to raise concerns about fish health. Nighttime checks are not conducted because of safety concerns.

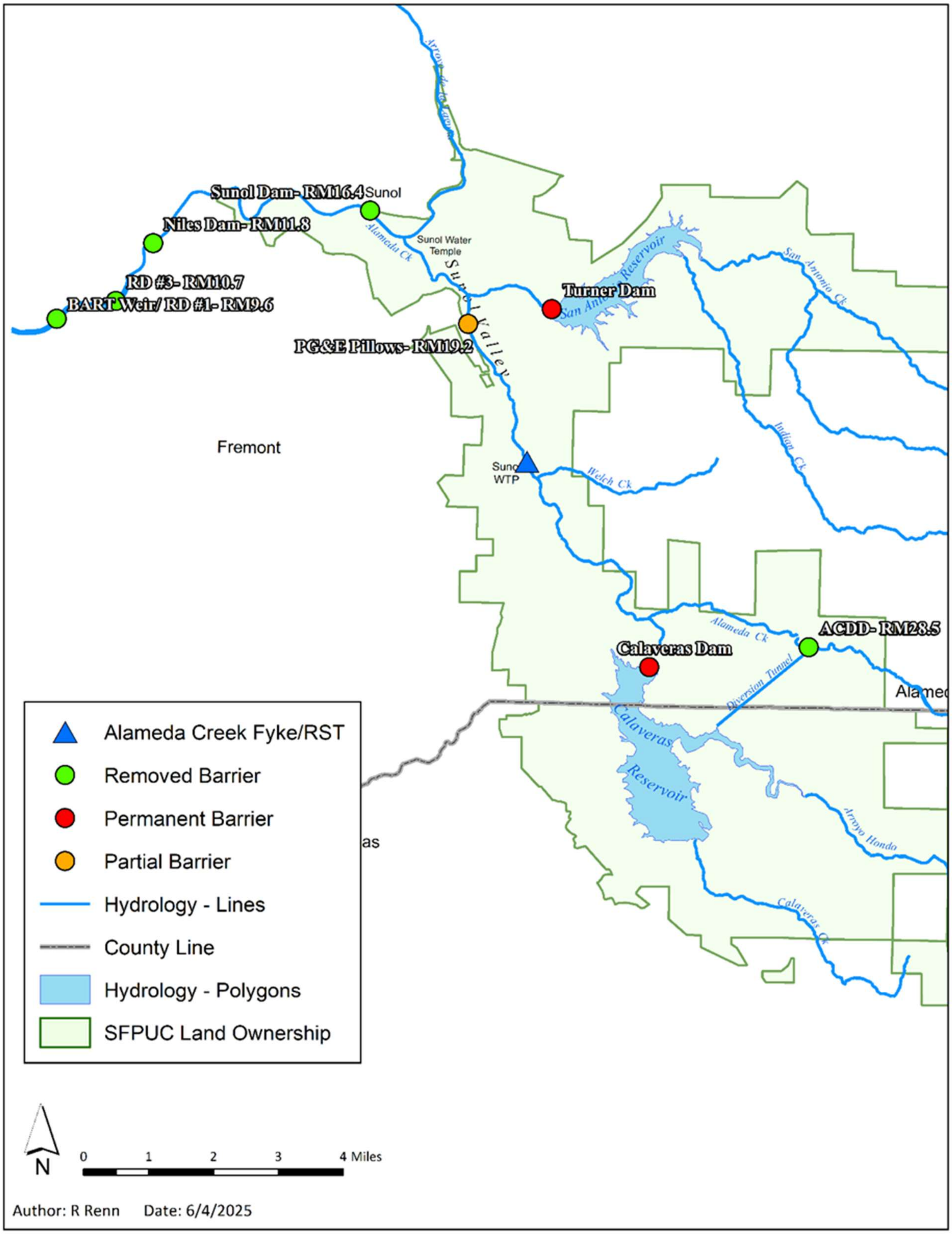

Figure 6-1. *Alameda Creek mainstem and southern watershed fish-passage barriers and fish-trap locations.*

Figure 6-2. *Alameda Creek rotary-screw-trap fishing.*

During RST checks, the equipment is inspected to make sure that it is functioning properly. Cone rotation speed is measured and recorded, and when necessary, the trap's position is adjusted so that the rate is within a 3 to 8 revolutions per minute (RPM) target range (Ettlinger et al., 2015). Fishing is stopped when the cone speed drops below 2.5 to 3 RPM despite attempts to adjust its positioning (typically at streamflows of 25 to 30 cfs or less). The RST was also taken out of service when flows become too dangerous for staff to board the rig safely (typically greater than 400 cfs).

Debris is removed from the live box during trap checks, and the volume is measured and recorded. The rate of accumulation is calculated, and the next trap check is scheduled based on avoiding buildups of more than 50 percent (75 gallons) of the live box volume (150 gallons). Fishing is suspended when overnight debris loads are anticipated to be greater than the 50 percent threshold, then put back in service as debris loads decline.

An FNT is installed with the funnel toward the upstream end of a riffle and the wings in flatwater (Figure 6-3) in Alameda Creek at river mile ALC21.53 (Figure 6-1). The trap is just downstream of the RST but still upstream of the SVWTP bridge.

Figure 6-3. *Alameda Creek fyke-net trap after installation in April 2024.*

The V-shaped, sandbag-lined mesh wings are installed to allow for the upstream movement of adult *O. mykiss* and other biota with a 0.7-foot minimum depth criteria (CDFW, 2012). The netted portion of the FNT is connected to a plywood live box (Figure 6-3), and the entire system is checked and cleaned of all debris once daily, at a minimum. The trap is checked multiple times per day when discharge and/or debris loads are high enough to raise concerns about fish health. High debris loads can clog the live box and decrease flow through the trap. The FNT is removed from the stream when flows greater than 50 cfs are expected.

During trap checks, all fishes are carefully removed from the RST and/or FNT live boxes and placed into 5-gallon aerated buckets with fresh stream water. Fishes are separated into size-range-specific buckets to avoid predation and physical trauma. The water in the buckets is maintained to stay within 2°C of the ambient creek temperature. *Oncorhynchus mykiss* were always processed first (SFPUC, 2015). Fish exhibiting signs of stress were immediately released downstream of the trap without further handling.

The remaining *O. mykiss* are categorized as fry, parr, resident, partial smolt, smolt, or adult life stages based on their size, the presence or absence of parr marks, and color morphology. When ambient water temperatures are less than 21°C, fish are weighed and measured (fork length). All individuals are scanned for PIT-tags using a Biomark ISO RFID portable reader. When water temperatures are below 20°C, *O. mykiss* scales and fin clips are collected (SFPUC, 2016) from fish more than 64 millimeters (mm). *Oncorhynchus mykiss* over 64 mm and in good health are also anesthetized and tagged with a 12.5-mm full duplex PIT-tag. Tagged fish are released at a distance of at least two pool/riffle sequences, but not more than 300 meters, upstream of the trap to assess trap efficiency (Volkhardt et al., 2007). All remaining fishes and wildlife are identified to species, enumerated, and released downstream of the trap.

The fish ladder at ACDD is equipped with a PIT-tag antenna system to detect and record previously tagged *O. mykiss* as they pass through the ladder (Figure 6-4). The system includes a Biomark Master Controller, which serves as the data-collection center for four antennas capable of reading full and half duplex tags. There is a pair of antennas (#3 and #4) near the downstream entrance to the ladder in the pool and weir section and another pair (#1 and #2) in the vertical slot section close to the upstream exit. The multiple paired-antenna system allows for the determination of the direction that detected fish are moving and the amount of time that it takes them to move through the ladder. The paired antenna system also helps to reduce missing fish detections and can measure tag detection efficiency.

Figure 6-4. *Biomark Passive Integrated Transponder tag antenna in the weir section of the Alameda Creek Diversion Dam fish ladder.*

The ACWD fish ladder at the BART Weir/ RD1 in Alameda Creek at river mile ALC9.67 is equipped with a PIT-tag antenna system (the BART Weir/ RD1 antenna system) to detect and record previously tagged *O. mykiss* as they pass through the conveyance (Figure 6-5). The BART Weir/RD1 antenna system is operated and maintained by ACWD and includes a Biomark Master Controller, which serves as the data-collection center for four double-band antennas capable of reading full- and half-duplex tags. There are four antennas installed in the vertical slot fish ladder, with a pair of antennas (#1 and #2) closer to the downstream entrance to the ladder and another pair (#3 and #4) 31.5 feet upstream. At each location, one lower antenna loop detects tagged fish passing through the vertical slot opening, and one upper antenna loop detects tagged fish passing above the vertical slot weir walls when flows within the ladder exceed approximately 75 cfs. The multiple-antenna system allows for the determination of the direction that detected fish are moving and their speed of travel through the ladder. The paired-antenna system also helps to reduce detections of missing fish.

Figure 6-5. *The BART Weir/ Rubber Dam 1 antenna in the fish ladder in Alameda Creek at river mile ALC9.67.*

While antenna sites generally operate reliably, various factors can affect detection performance. These include but are not limited to unknown sources of ambient noise, antenna shape and size, stream morphology, and equipment maintenance or failure. Under normal operations, data are downloaded from the SFPUC PIT-tag antenna system at ACDD approximately once every 2 weeks.

6.3 Results

During WY 2024–25, the RST was operational between February 5 and June 26, 2025, for a total of 132 fishing days (Figure 6-6; Appendix C, *2025 Alameda Creek Fish Trapping Data*). The FNT was not deployed in WY 2024–25. The RST was in operation for 18 days in February, 29 days in March, and for the entirety of April and May. The RST fished continuously through June until removal on June 26, 2025. Non-fishing periods in February and March were due to predicted or observed high flows.

Daily average streamflow at the USGS gage ALAMEDA C BL WELCH C NR SUNOL CA – 11173575 (USGS blw Welch Creek/USGS Welch Creek), downstream of the traps, ranged from 13.7 to 1,290.0 cfs during the trapping period. Multiple storm events between February and early April resulted in larger peak flows and maintained elevated instream flows relative to baseline conditions through the same period (Figure 6-6). Calaveras Reservoir did not spill during the trapping season. The cone was lifted, and fishing was stopped three times in February and once in March during the trapping season, when flows were predicted to exceed 400 cfs or overnight debris loads were anticipated to fill more than the 50 percent of the live well. After the last shutdown in March (March 13–14, 2025), the RST continued fishing until the trap was removed on June 26, 2025.

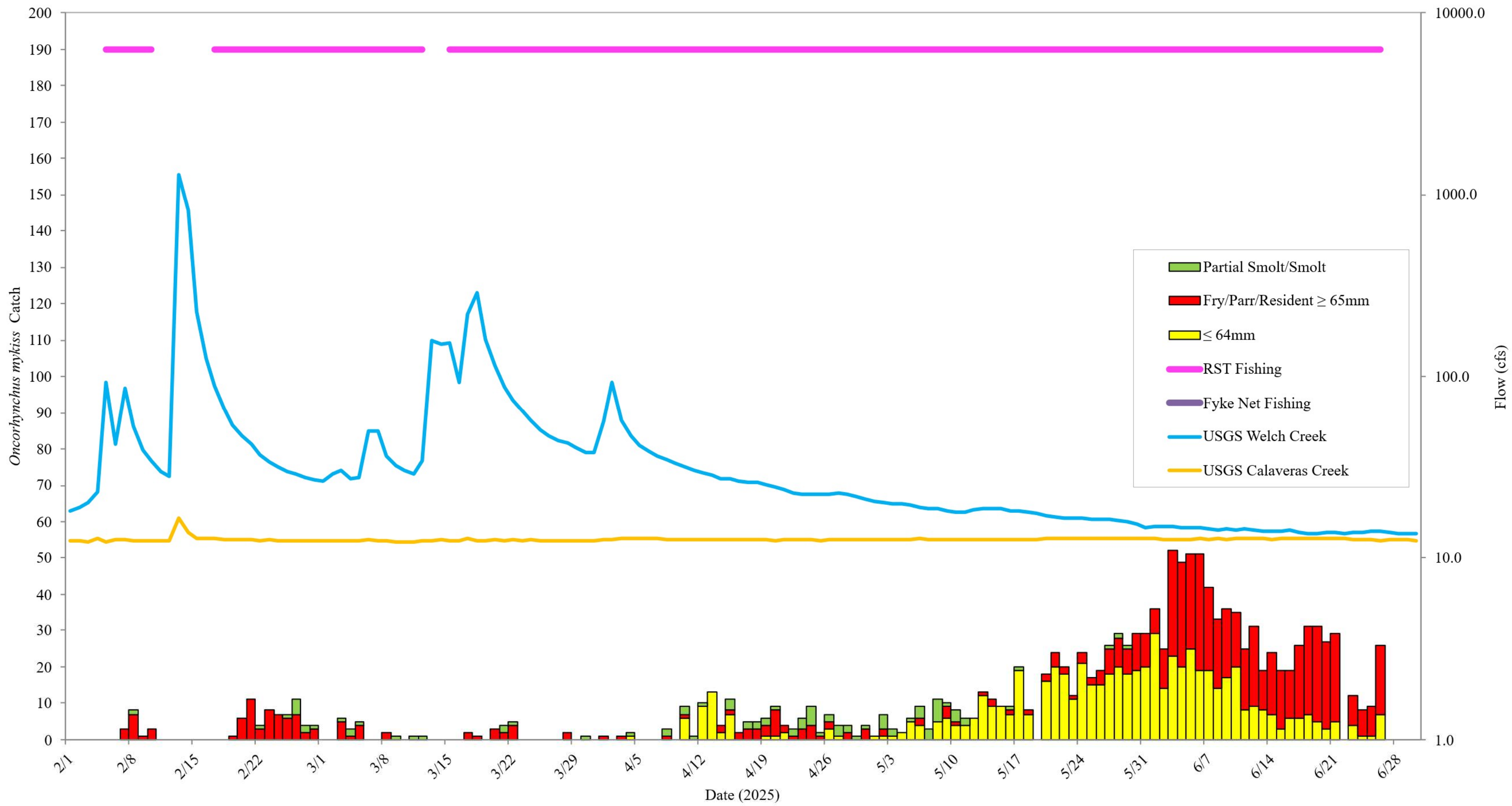

Figure 6-6. *Alameda Creek and Calaveras Creek hydrographs, fishing dates for the rotary-screw trap, and the number of Oncorhynchus mykiss ≤64mm, fry/parr/resident, partial smolt, and smolt captured during the 2025 trapping season.*

A total of 1,199 unique *O. mykiss* were captured during the 2025 trapping season. Of these *O. mykiss*, 592 received a PIT-tag. The first *O. mykiss* was captured on February 7, 2025, and the last on June 26, 2025. A total of 639 young-of-year, less than 65 mm, were captured between April 4, 2025, through June 26, 2024. *Oncorhynchus mykiss* classified as partial smolts and smolts were captured from February through late May, totaling 88 fish (Appendix C, *2025 Alameda Creek Fish Trapping Data*). *Oncorhynchus mykiss* fork lengths ranged from 19 mm to 392 mm, with the majority of captured *O. mykiss* less than 100 mm (Figure 6-7).

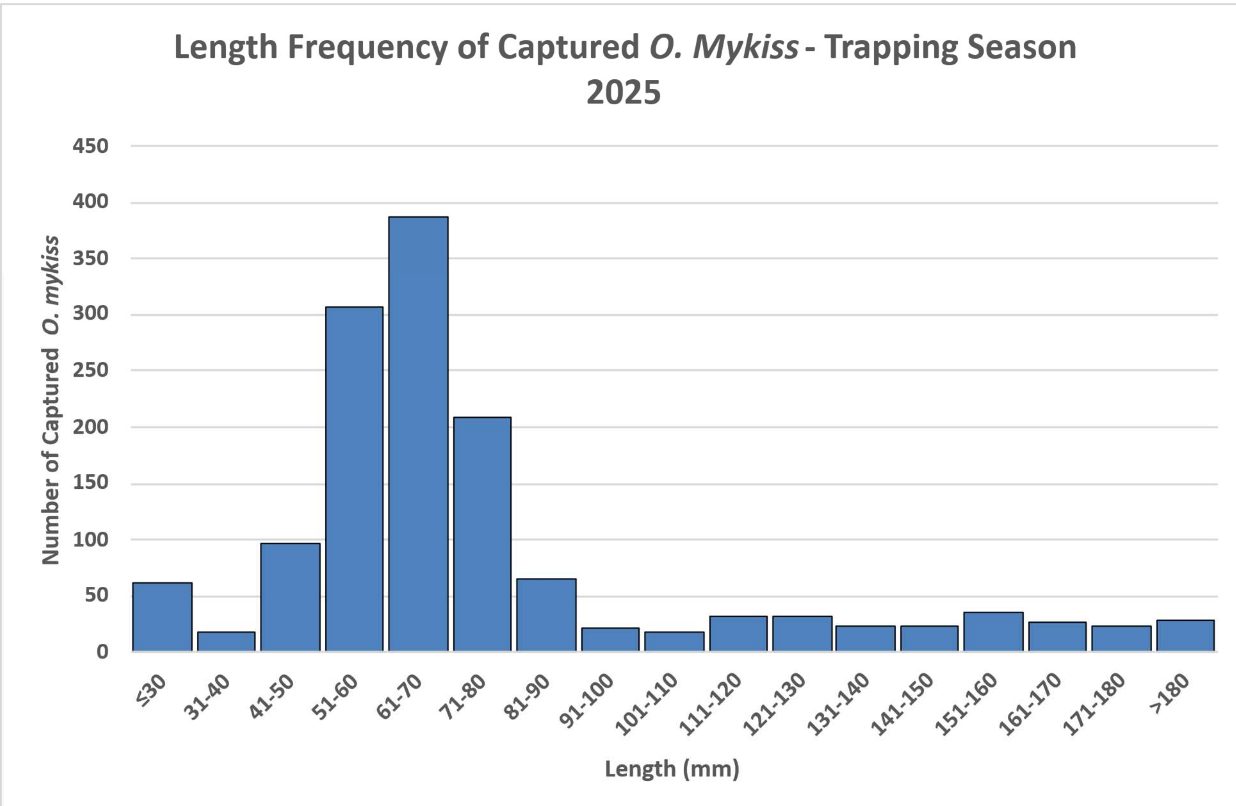

Figure 6-7. *Length frequency distribution of Oncorhynchus mykiss captured during 2025 Alameda Creek fish trapping.*

A total of 520 *O. mykiss* were released upstream of the traps after successful tag implantation. Out of the 208 total recaptures, 207 of these fish were tagged during the 2025 trapping season. Therefore, RST trap efficiency can be estimated to be approximately 40 percent for the 2025 trapping season. Tagged *O. mykiss* were also periodically retained within the trap's live box overnight to assess escapement of fish once captured. Throughout the season, 15 fish were retained within the RST live box and 15 were recaptured the following day for a retention rate of 100 percent.

One *O. mykiss* captured in the RST during the 2025 trapping season was PIT-tagged prior to the 2025 trapping season. The individual was captured during electrofishing surveys conducted in fall 2024. This individual was tagged in Calaveras Creek approximately 0.33 mile upstream of its confluence with Alameda Creek, about 4 miles upstream of the RST. The growth rate for the recaptured *O. mykiss* was approximately 2.04 mm per week and 0.60 gram per week (Table 6-1).

Table 6-1. *Recaptured O. mykiss from 2025 Alameda Creek fish trapping.*

PIT Tag Number	Initial Capture				Recapture					Growth		
	Date	Location (River Mile)	Length (mm)	Weight (g)	Date	Location (River Mile)	Length (mm)	Weight (g)	Life Stage	Weeks between capture	mm/ week	g/ week
989.002029071403	10/29/2024	CAC00.33	74	4.8	4/15/2025	ALC21.55	123	19.1	fry/parr/resident	24	2.04	0.60

Other fishes captured during the WY 2024–25 trapping period included Bluegill, California Roach, *Lampetra spp*., Pacific Lamprey (*Entosphenus tridentatus*), Prickly Sculpin (*Cottus asper*), Sacramento Pikeminnow, and Sacramento Sucker (Appendix C, *2025 Alameda Creek Fish Trapping Data*).

Amphibians, reptiles, and invertebrates captured during WY 24–25 trapping included American Bullfrog (*Lithobates catesbeianus*), California Newt (*Taricha torosa*), Foothill Yellow-legged Frog (*Rana boylii*), Pacific Chorus Frog (*Pseudacris regilla*), Signal Crayfish (*Pacifastacus leniusculus*), Western Fence Lizard (*Sceloporus occidentalis*), Western Pond Turtle (*Actinemys marmorata*), and Western Toad (*Anaxyrus boreas*). Additionally, several small and medium sized rodent species were captured during the 2025 fish-trapping season (Appendix C, *2025 Alameda Creek Fish Trapping Data*).

The ACDD fish ladder PIT-tag antenna system was not operational during WY 24–25 due to power source issues and sediment blockage. However, 24 unique PIT-tags were detected at the RD1 PIT-tag antenna system during WY 24–25. All but two detections were moving in a downstream direction; two detections had an unknown direction of travel. The first detection occurred January 2, 2025, and the last on May 18, 2025. One detection occurred in both January and February, five in March, 10 in April, and seven in May. These detections came from *O. mykiss* PIT-tagged during 2024 fall electrofishing surveys (5 unique PIT-tags), 2024 spring outmigrant fish-trapping surveys (4 unique PIT-tags), and 2025 outmigrant fish-trapping surveys (15 unique PIT-tags). All fish were PIT-tagged within Alameda Creek. These Alameda Creek individuals were originally captured and PIT-tagged between river miles ALC28.40 and ALC21.55 (Appendix D, *ACWD RD1 Tag Detections WY 2024–25*).

6.4 Discussion

As discussed previously, antenna sites have the potential to experience periods of non-operation due to various issues. During WY 24–25, the PIT-tag antenna system at ACDD was non-operational due to power source issues and from being buried in sediment from high storm flows in previous years. PIT-tagged fish were unable to pass through the fish ladder in this timeframe due to the fish ladder being non-operational for the entirety of the migration season.

The SFPUC and ACWD collaborated to produce a data sharing protocol (Appendix E, *Draft Final ACWD–SFPUC Fisheries Data Sharing Protocol*), which assists with the sharing of preliminary data and communication of updates within the watershed that may affect fish passage. The shared data are finalized by both parties before being reported. This data sharing protocol will be refined and improved as the SFPUC and ACWD gain more experience in fish-passage monitoring.

7. *Oncorhynchus mykiss* Spawning Observations

7.1 Background

Oncorhynchus mykiss spawning in the southern Alameda Creek Watershed typically occurs between January and April and is dependent on water temperatures and flow. Females, which can deposit up to 12,000 eggs, construct redds in the gravelly substrates of riffles and pool tail-outs (Moyle, 2002). Relatively smaller *O. mykiss,* less than 30 centimeters (cm) in fork length, produce fewer than 1,000 eggs per year (Moyle, 2002; Behnke, 1992). At 10 to 15°C, eggs incubate for 3 to 4 weeks, with newly hatched larval trout spending another 2 to 3 weeks in the gravel before emerging as young-of-year (Moyle, 2002).

The fish ladder at the BART Weir (ALC09.70) was completed by ACWD in December 2022, allowing anadromous fishes to return to the upper Alameda Creek Watershed for the first time in nearly 50 years (ACWD, ACA, and SFPUC, 2023). Both anadromous and resident populations are now able to use the upstream habitat for all stages of their life cycle, including spawning.

Cold-water releases from Calaveras Dam and reduced diversions at ACDD are intended to improve spawning conditions for resident and anadromous *O. mykiss* downstream of each facility. The fish ladder at ACDD is also anticipated to increase habitat utilization upstream of the dam. The operational changes and new infrastructure are not expected to influence spawning success in the Arroyo Hondo above Calaveras Reservoir. Spawning surveys are conducted in Alameda Creek and Calaveras Creek below Calaveras Dam to assess biological responses of *O. mykiss* to water releases, decreased diversions, and improved fish passage. Surveys in the Arroyo Hondo are considered controls and used to evaluate natural temporal variability within the region.

7.2 Procedures

7.2.1 Site Selection and Description

Oncorhynchus mykiss spawning surveys are conducted in six distinct reaches of Alameda Creek, Calaveras Creek, and the Arroyo Hondo (Figure 7-1). Reaches are delineated based on the locations of tributaries, geomorphic changes, or infrastructure. Reaches are divided into five equal-distance sections, except for Calaveras Creek, which has two sections. Sections are randomly selected and surveyed from January to April, providing both spatial and temporal spawning activity data.

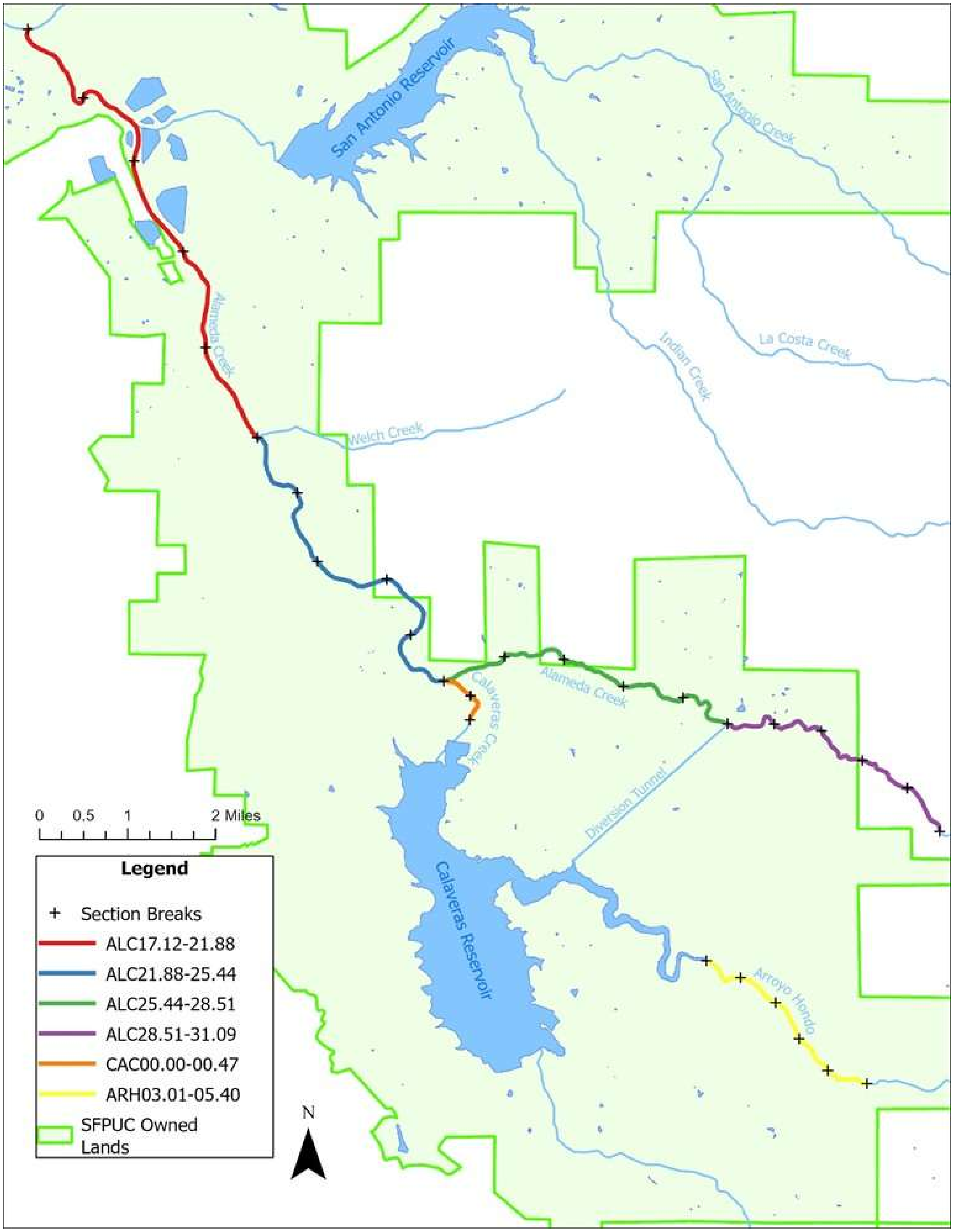

Figure 7-1. *Alameda Creek (ALC), Arroyo Hondo (ARH), and Calaveras Creek (CAC) spawning survey reaches and reach-breaks (delineating sections).*

Fourteen stream miles of Alameda Creek are surveyed from the creek's confluence with Arroyo de la Laguna (ALC17.12) to Camp Ohlone (ALC31.09), with reach-breaks at Welch Creek (ALC21.88), the Calaveras Creek confluence (ALC25.44), and ACDD (ALC28.51). The Arroyo Hondo is surveyed from Calaveras Reservoir (defined as the inundation point at the beginning of the calendar year) to an upstream, impassable feature known as the "slide" (ARH05.40). Calaveras Creek downstream of Calaveras Reservoir has a single reach from its confluence with Alameda Creek (CAC00.00) to a likely impassable natural fall near the base of Calaveras Dam (CAC00.47).

7.3 Survey Methods

Spawning surveys begin the first full week of January and run through the last week of April. A single section within each of the six reaches is selected at random and surveyed biweekly. Surveys are canceled, not rescheduled, when high flows and poor visibility are likely to compromise data or when conditions become unsafe.

Survey and data-collection methods generally follow the Coastal Northern California Salmonid Spawning Survey Protocol (Gallagher and Knechtle, 2005). Surveys are not intended to address the suitability of spawning habitat or reproductive success and are not designed to provide reach-wide population estimates. The purpose of these surveys is to identify and enumerate redds.

Spawning surveys are conducted by at least two biologists wading or walking the entire lengths of selected sections from downstream to upstream. Surveyors avoid walking in the water whenever possible. Hats with visors and polarized sunglasses are used to reduce glare and improve visibility.

At the beginning and end of each survey biologists record water and air temperature, turbidity, weather, and wind. All observed *O. mykiss* larger than fry are geolocated and assigned to 25-mmsized bins. Fry were recorded as either absent or present. When present, abundance was categorized into bins of <10, 11–100, or >100 individuals. Other fishes, and *O. mykiss* not positively identified, are not recorded. Redds are geolocated or flagged on adjacent vegetation to reduce the potential for double counting and to allow longevity tracking. The width and length of the pot and tail of each redd are measured, and the dominant substrate sizes of both are estimated. Test redds or diggings are marked but not measured. *Oncorhynchus mykiss* constructing or occupying redds are noted, and the measurements of their redds are delayed until subsequent visits. If a section is repeated in subsequent surveys, previously identified redds are assessed for scour and observability and measured if measurements were not previously collected.

7.4 Results

There were 46 *O. mykiss* spawning surveys conducted covering 24 sections in Alameda Creek, Calaveras Creek, and the Arroyo Hondo during WY 2024–25 (Appendix F, *Alameda Creek, Calaveras Creek, and Arroyo Hondo Oncorhynchus mykiss Spawning Survey Data*). Ten redds were identified in Alameda Creek, three in Calaveras Creek, and nine in the Arroyo Hondo (Figure 7-2; Appendix F). All redds were measured (Appendix G, *Oncorhynchus mykiss Spawning Survey Redd Observation Data*).

7.4.1 Alameda Creek Spawning Observations

There were 31 *O. mykiss* spawning surveys conducted in Alameda Creek between January 6 and April 28, 2025. Seventeen of 20 Alameda Creek sections were surveyed at least once during that period with 10 redds and three diggings observed (Figures 7-2 and 7-3; Appendices F and G). Sixteen *O. mykiss* were observed (size classes ranging from 76 mm to 275 mm). No fish were observed in Reach 1, one in Reach 2, 13 in Reach 4, and two in reach five. During these surveys, fry were only observed during the month of April in Reaches 4 and 5 (Figure 7-3; Appendix F, *Alameda Creek, Calaveras Creek, and Arroyo Hondo Oncorhynchus mykiss Spawning Survey Data*).

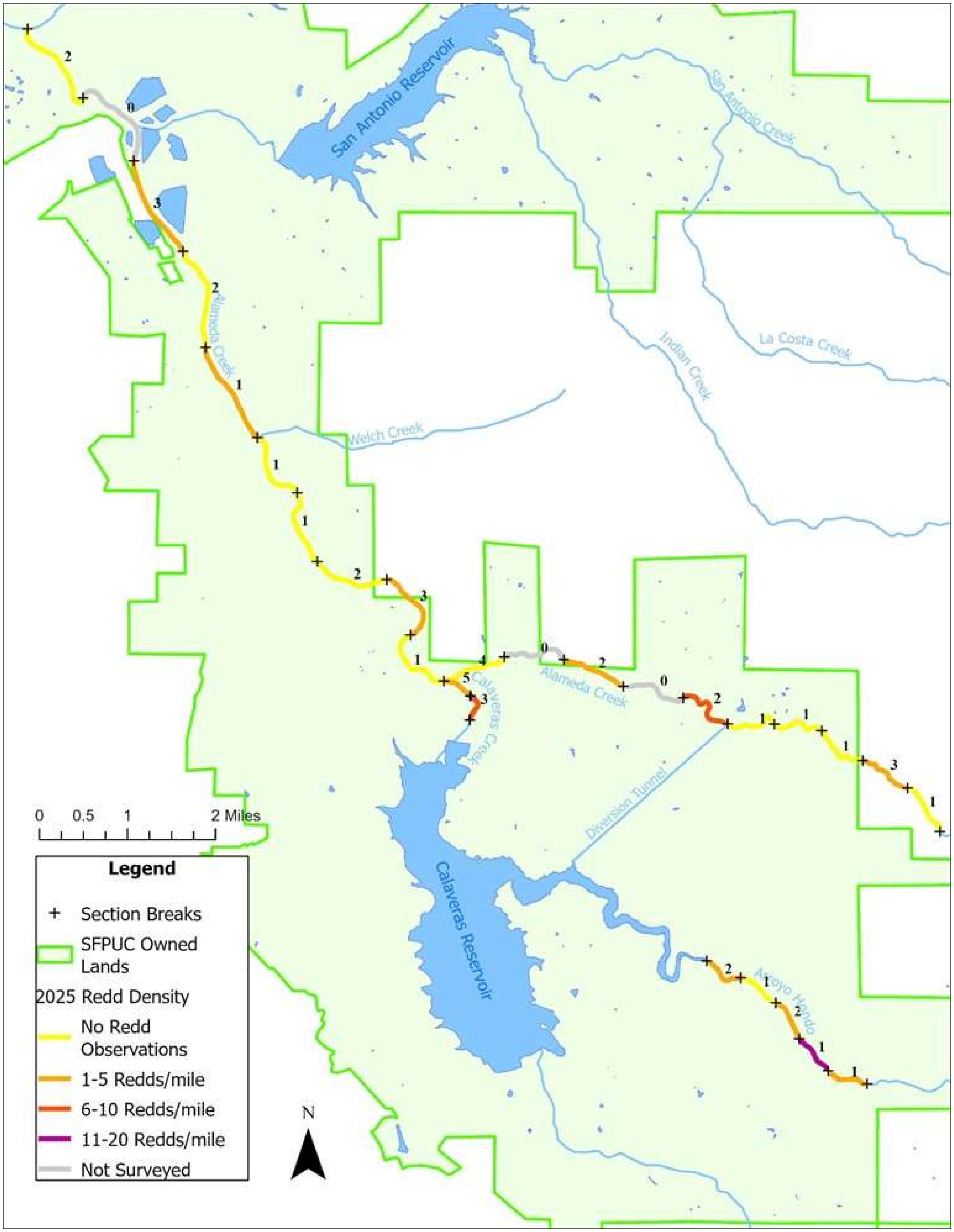

Figure 7-2. *Alameda Creek, Calaveras Creek, and Arroyo Hondo survey distribution and redd density. The number of surveys per section is labelled (in purple) next to each section.*

Figure 7-3. *Alameda Creek flow and spawning survey results. Vertical blue bars represent completed sections within each of the four Alameda Creek (ALC) reaches. Gray horizonal lines represent the location of reach-breaks. Oncorhynchus mykiss redd observations are shown as red bars, and diggings as yellow bars; each bar is refenced to its observation date. The total number of observed fish is next to the survey section's vertical bar. Graphed on the secondary y-axis are the average daily flows at the ALAMEDA C AB DIV DAM NR SUNOL CA—11172945 (blue) and ALAMEDA C BL WELCH C NR SUNOL CA –11173575 (red) United States Geological Survey stream gages.*

7.4.2 Calaveras Creek Spawning Observations

There were eight spawning surveys conducted in Calaveras Creek during WY 2024–25. The most downstream section (CAC00.00-00.28) was surveyed five times, and the upstream section (CAC00.28-00.47) was surveyed three times. Three redds were observed: one in the downstream section, and the other two in the upstream section. Four *O. mykiss* (two in each section; ranging from 101 mm to 225 mm) were observed. Fry were not seen in this reach during WY 2024–25 (Figures 7-2 and 7-4; Appendix F, *Alameda Creek, Calaveras Creek, and Arroyo Hondo Oncorhynchus mykiss Spawning Survey Data*).

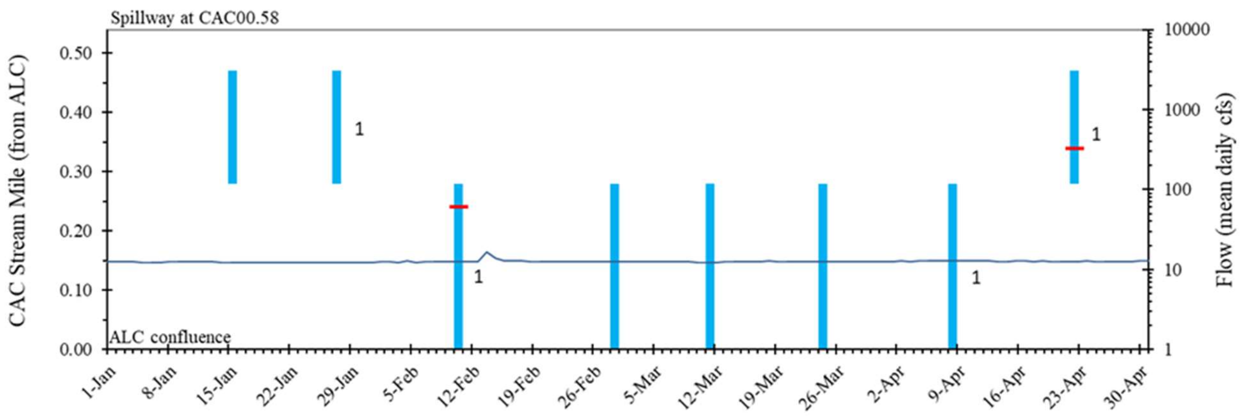

Figure 7-4. *Calaveras Creek flow and spawning survey results. Vertical blue bars represent completed sections within the Calaveras Creek (CAC) reach. Oncorhynchus mykiss redd observations are shown as red bars. The total number of observed fish is next to the survey section's vertical bar. Graphed on the secondary y-axis are the average daily flows at the CALAVERAS C NR SUNOL CA – 11173500 (blue) United States Geological Survey stream gage.*

7.4.3 Arroyo Hondo Spawning Observations

Arroyo Hondo *O. mykiss* spawning surveys were completed in seven out of the nine scheduled weeks of WY 2024–25 (Figures 7-2 and 7-5). Two surveys were canceled due to storms. All five sections were completed at least once. Nine redds and five diggings were observed (Figure 7-5; Appendices F and G). Twenty-five *O. mykiss* were observed (ranging from 101 mm to 400+ mm). Fry were only observed during the month of April.

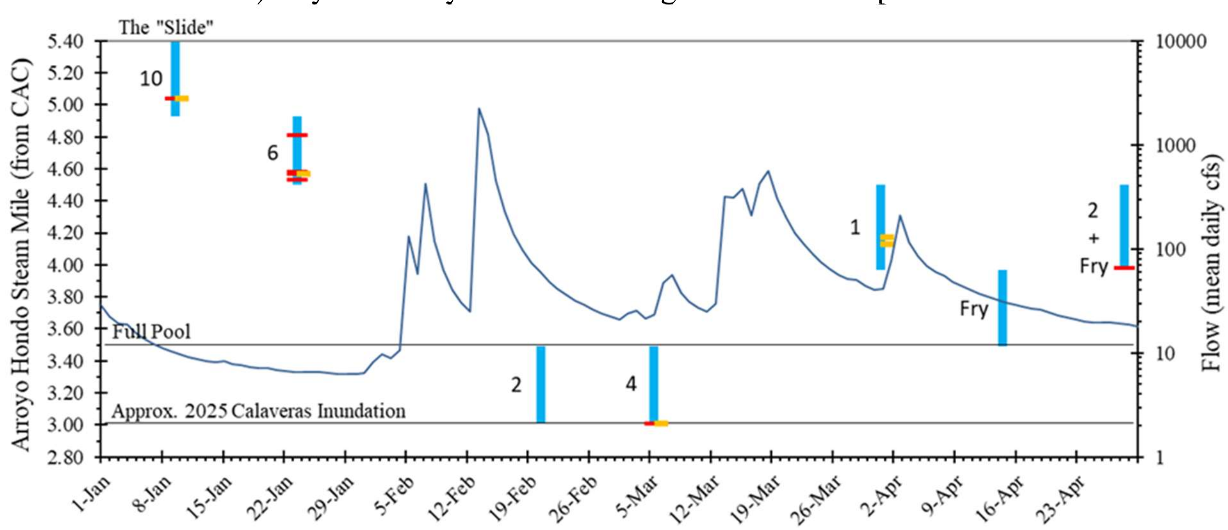

Figure 7-5. *Arroyo Hondo flow (United States Geological Survey gage ARROYO HONDO NR SAN JOSE CA – 11173200) and spawning survey sections. Gray horizonal lines represent the Calaveras Reservoir approximated full pool and the approximate level of Calaveras Reservoir inundation in 2024. Blue vertical bars represent completed sections. Red horizontal bars represent redd locations, and yellow bars represent diggings on that date. Total observed Oncorhynchus mykiss are described in text next to the survey section's vertical bar.*


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8. Fish Population Community Characteristics

8.1 Background

Fish habitat conditions downstream of Calaveras Dam and the ACDD are expected to improve following the initiation of permit-required water releases and reduced diversions. Additional waters and improved habitat quality may increase the distribution and abundance of *O. mykiss* in lower Calaveras Creek and in Alameda Creek downstream of the Calaveras Creek confluence, while maintaining populations of native, warmwater fishes further downstream. Operational changes are not anticipated to alter conditions in the Arroyo Hondo upstream of Calaveras Reservoir.

Monitoring local fish populations and communities is necessary to evaluate the effectiveness of flow-related mitigation measures, with before-and-after quantitative surveys especially useful for documenting changes. More than two decades of monitoring in the southern Alameda Creek Watershed in Alameda Creek, lower Calaveras Creek, and the Arroyo Hondo, prior to Calaveras Dam and ACDD operational alterations, have successfully documented baseline conditions. Several years of monitoring in the same areas, following the start of environmental water releases and reduced diversions, will be used to document mitigation-related changes.

Populations of *O. mykiss* and other fishes use a variety of habitat types (pools, riffles, glides, etc.) in the watershed through successive life stages. Pools can provide cover and cold-water refugia throughout the year. In Mediterranean climates, pools are vital during summer and early fall when flows are at their lowest and water temperatures peak. Riffles and shallow flatwater habitats may offer foraging and rearing opportunities when streams are flowing and can be important for fish growth. An effective means of evaluating the distributions and relative abundances of fishes in all habitat types in study areas is to use a combination of pool snorkeling (Figure 8-1) and shallower water electrofishing surveys.

Figure 8-1. *Snorkelers in an Alameda Creek pool.*

8.2 Procedures

8.2.1 Site Selection

Snorkel and electrofishing surveys are conducted in five distinct Alameda Creek and Calaveras Creek reaches. Snorkel surveys are also conducted in the Arroyo Hondo (Figure 8-2).

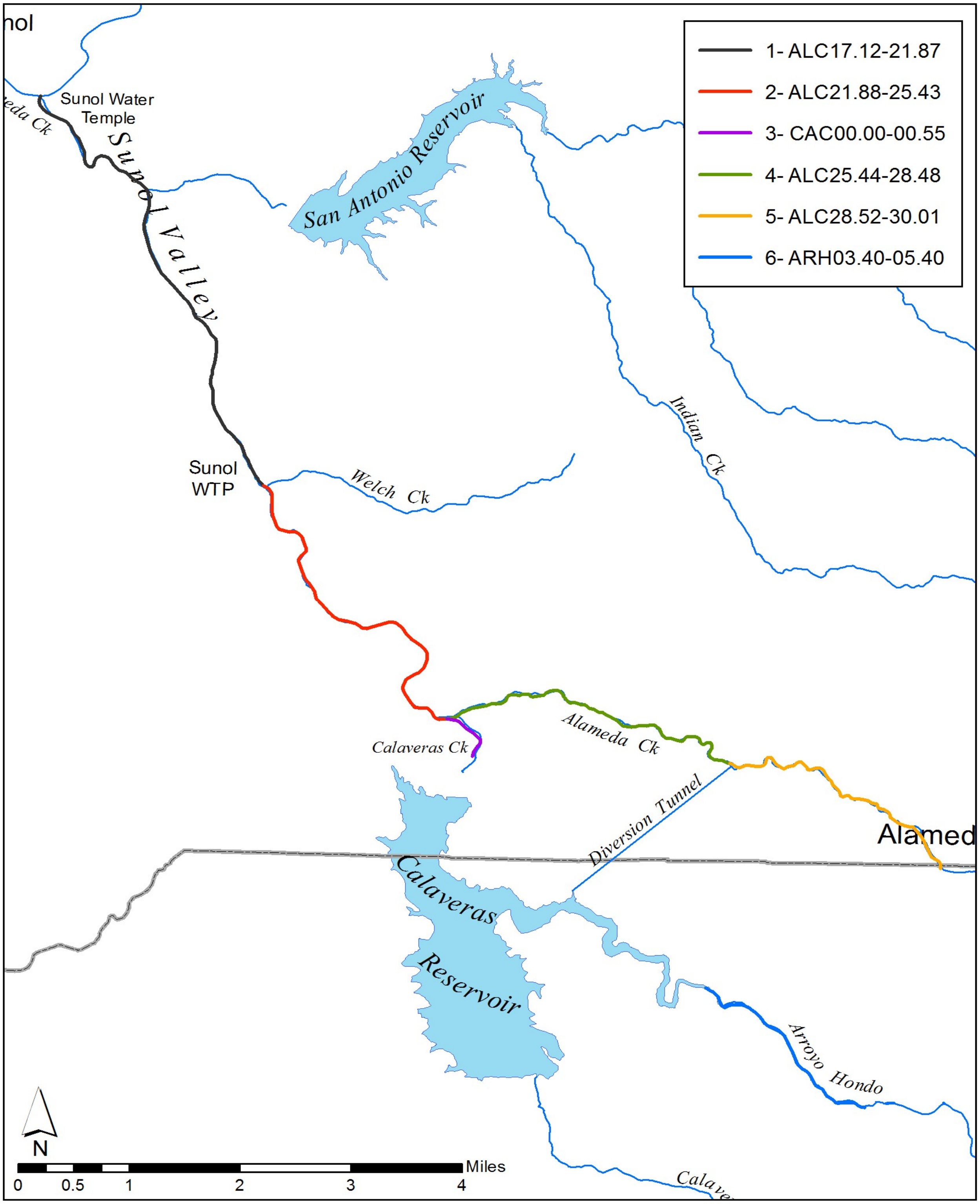


Figure 8-2. *Six study reaches in Alameda Creek, Calaveras Creek, and the Arroyo Hondo.*

Reaches are delineated based on the locations of tributaries, geographic changes, or infrastructure. Sample sites within reaches are randomly selected with the total number surveyed based on the amount of available habitat during the water year. Snorkel surveys are conducted at a minimum of 25 percent of the wetted pools within each reach (Doloff et al., 1993), with estimates of the number of sites based on a previous instream flow study (SFPUC, 2007) and the amount of wetted channel just prior to the survey (typically less than 2 weeks). Dry sections are excluded from the random selection process. Pools are randomly chosen by splitting the wetted portions of each reach into 0.01-mile segments and using the Microsoft Excel RANDBETWEEN function to select them. Pools chosen multiple times are snorkeled only once and replaced with additional selections. The survey site within each chosen segment is identified as the first pool upstream of the segment's coordinates. When pools are found unfit to snorkel (due to health concerns, high turbidity, etc.) they are replaced by additional pools, if possible. Historical sites that are not selected during the random process are added to the survey for long-term trend analyses in addition to the 25 percent of wetted pools total.

Electrofishing surveys are conducted in reaches at a rate of one site for each wetted and accessible mile of stream, with a minimum of one site per reach. The amount of wetted and accessible channel is measured prior to the survey. Inaccessible areas and dry sections are excluded from the random selection process. Areas that are inaccessible include locations that are too far from the truck to safely transport the electrofishing gear or sections of Alameda Creek where vegetation has grown so heavy there is no access to survey. Electrofishing sites are randomly chosen by splitting the wetted and accessible portions of each reach into 0.01-mile segments and using the Microsoft Excel RANDBETWEEN function to select them. The survey site within each chosen segment is identified as the closest suitable habitat upstream of the segment's coordinates. Prior to electrofishing, suitable habitats in selected sites are delineated as flatwater (i.e., glides and runs) or riffles, with at least one of each type surveyed when present. When time allows, additional habitat(s) are surveyed with preference given to the type most representative of the site.

8.2.2 Snorkel Survey

Upon arrival at randomly selected sites, the first pool upstream—with a less than 1 percent gradient and dimensions deeper and wider than the reaches immediately above and below it (Armantrout, 1998)—is identified. Once a pool is assessed and considered acceptable to survey, the biologists discuss how to proceed, including the number of snorkelers required, their starting positions, the count direction and path they will swim, and the survey endpoint.

The number of snorkelers needed to survey a pool depends on the pool's width. Snorkelers must be close enough to each other to ensure accurate identifications and counts, while being adequately separated to avoid impeding their ability to swim. Snorkel surveys begin at the downstream end of a pool, with snorkelers moving upstream as a group, proceeding at the pace of the slowest member (Figure 8-3). Snorkelers are, at times, crawling with only their facemasks partially in the water at the start and finish points due to shallow water depths. When pools contain large boulders or woody debris, making it impossible for one or more snorkelers to swim a straight line, snorkelers deviate around the obstacle in a predetermined path and count in both directions, as necessary.

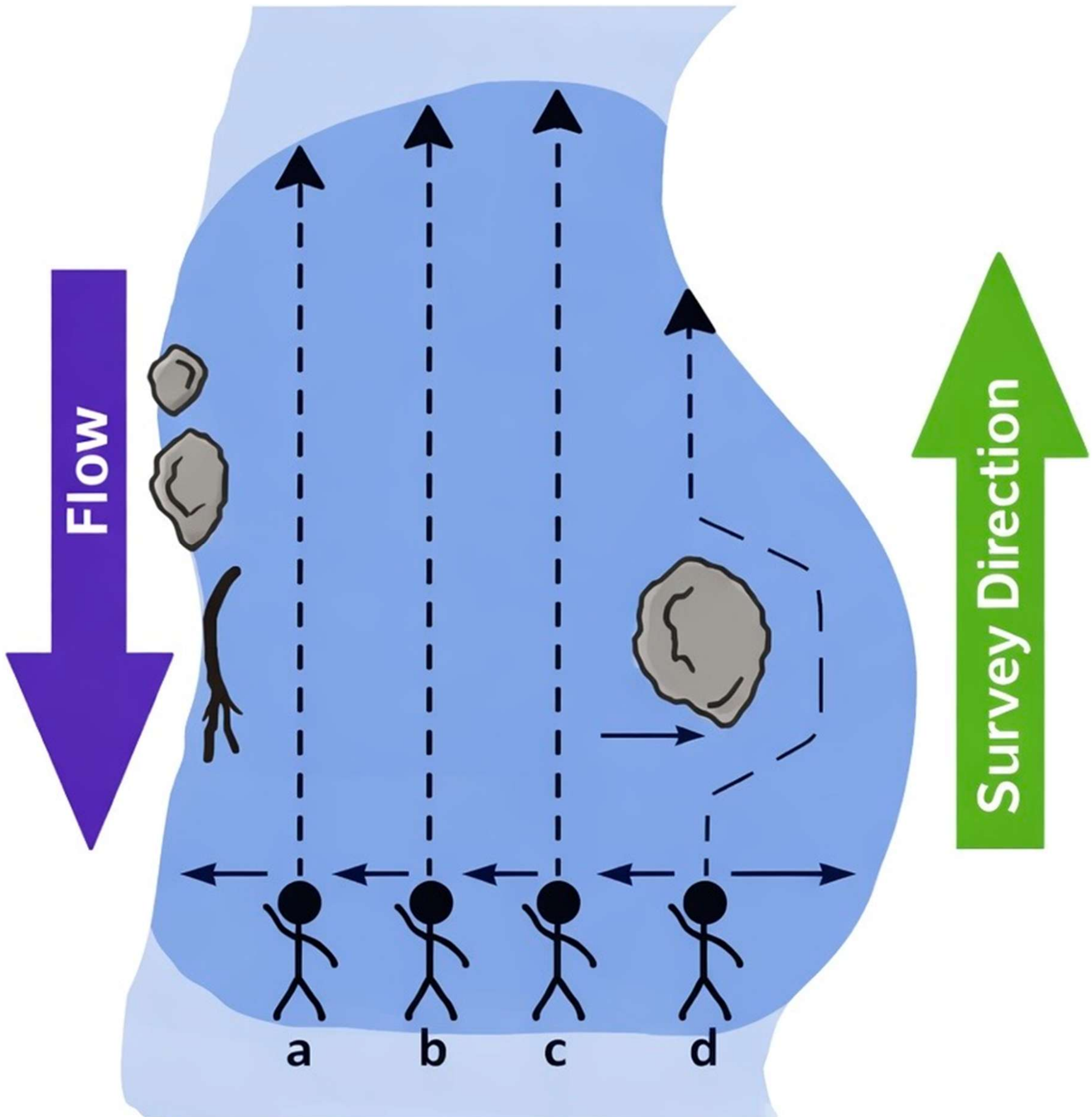


Figure 8-3. *Snorkelers move in an upstream direction, counting fishes to their left and/or right.*

As snorkelers move through each pool, they identify fishes by species and life stage (juvenile/adult), counting them only as they pass between themselves and another snorkeler or between themselves and the bank. All *O. mykiss* are counted, and their total length is estimated to the nearest 25-mm-sized bin. Other fishes are identified to species whenever possible and counted. Their sizes are not estimated but their life stages are recorded as juvenile or adult (Appendix H, *Snorkel Survey Fish Life Stage Size Ranges*).

Snorkelers count fishes in one predetermined direction (to their left or right), with a single snorkeler counting in both directions. When necessary, underwater lights are used to see fishes hiding beneath banks or cover.

Multiple passes through the same pool are used to estimate survey accuracy (Thurow, 1994). Ten percent, or a minimum of one of the pools in each reach, is chosen at random and snorkeled three times (O'Neal, 2007). Resting periods between passes allow the water to clear and fishes enough time to come out of hiding and redistribute within the pool. The counts from the three pass pools are totaled and reported as an average with variances and standard deviations calculated for *O. mykiss* observations at each site.

8.2.3 Electrofishing Survey

Electrofishing is conducted following the National Marine Fisheries Service Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act (NMFS, 2000). Electrofishing is not conducted when water temperatures are above 18°C or are expected to rise above this temperature prior to concluding the electrofishing survey. Individual habitats at randomly selected sites are isolated with 3/8-inch-mesh block-nets, taking care to minimize the amount of walking in the creek prior to deployments (Figure 8-4). Once the nets are set, habitats are sampled using multiple-pass electrofishing techniques, with the appropriate backpack shocker settings based on conservatively adjusting the default levels based on conductivity and historical location-specific settings.

Figure 8-4. *Electrofishing block-net placement between riffle and flatwater habitats in Alameda Creek.*

Depending on each habitat's size and complexity, between one and three teams of biologists make a series of three or more passes from downstream to upstream, replicating effort during each pass to maintain catch efficiency. Teams wait at least 30 minutes between passes to allow stirred-up sediments to settle and fishes to redistribute. Teams typically consist of two people with backpack electrofishers, three people with nets, and two bucket handlers. Teams move slowly upstream working in a herringbone pattern, from bank to bank, to cover the entire area. Netters capture stunned fishes as they are attracted to the electrofisher anode, transferring them to the bucket handler's bucket. The bucket handler opportunistically captures fishes attracted to the trailing cathode.

Fishes are processed following the completion of each pass. All *O. mykiss* are weighed and measured (Figure 8-5). Scale and tail fin tissue samples are collected, and PIT-tags are inserted in *O. mykiss* equal to or greater than a fork length of 65 mm. *O. mykiss* PIT-tagged in previous surveys are measured and weighed and a scale sample is collected; tail fin tissue samples are not collected. All other fish species are identified and counted. After processing, fishes are held in habitat-specific live-cars or aerated buckets until the survey is completed. After completion, all fish are released and redistributed into the habitats from which they were captured.

Figure 8-5. *Oncorhynchus mykiss being measured and weighed.*

A variety of stream morphological characteristics and water quality parameters are measured at each snorkel and electrofishing habitat, during reconnaissance, and after completing the survey.

8.3 Results

8.3.1 Snorkel Surveys

Snorkel reconnaissance surveys were conducted on July 25 and August 4, 2025, in some Alameda Creek reaches, while typically perennial areas in Alameda Creek, Calaveras Creek, and the Arroyo Hondo were assumed to be wetted. Reaches 2, 3, and 6 were fully wetted. Reach 1 was fully wetted but had areas where the riparian density and the Pacific Gas and Electric Company (PG&E) pillow dam construction and removal made parts of the creek inaccessible to conduct snorkel and electrofishing surveys. Reaches 4 and 5 had areas of varying dryness (Table 8-1).

Forty-six pools were snorkeled in Alameda Creek, Calaveras Creek, and the Arroyo Hondo (Table 8-1; Appendix I, *Snorkel Survey Fish Observation Data*). Three Reach 1 pools were not surveyed due to quarry discharge-related high turbidities, making snorkeling impossible due to decreased visibility. In the four Alameda Creek reaches, 35 pools with a combined 2,780 feet of habitat were snorkeled, while in Calaveras Creek and the Arroyo Hondo, four pools at 396 feet and seven pools at 962 feet were snorkeled, respectively. Water quality and environmental conditions were recorded at all snorkel sites (Appendix J, *Snorkel Survey Water Quality and Environmental Conditions Data*).

Table 8-1. *Alameda Creek, Calaveras Creek, and Arroyo Hondo snorkel survey reach information.*

Study Reach	Stream	Reach Description	Stream Mileage	Channel Condition	Linear Miles	Number of Randomly Selected Pools	Number of Pools Surveyed
1	Alameda Creek	Alameda Creek/Arroyo De La Laguna confluence to the Alameda Creek/ Welch Creek confluence	ALC17.12-21.87	Wet	4.75	12	9
				Wet, accessible	3.39		
2	Alameda Creek	Alameda Creek/Welch Creek confluence to the Alameda Creek/Calaveras Creek confluence	ALC21.88-25.43	Wet	3.55	12	13
3	Calaveras Creek	Calaveras Creek/Alameda Creek confluence to Calaveras Dam	CAC00.00-00.55	Wet	0.55	4	4
4	Alameda Creek	Alameda Creek/Calaveras Creek confluence to the Alameda Creek Diversion Dam	ALC25.44-28.48	Wet	2.14	8	8
				Dry	0.90		

Study Reach	Stream	Reach Description	Stream Mileage	Channel Condition	Linear Miles	Number of Randomly Selected Pools	Number of Pools Surveyed
5	Alameda Creek	Alameda Creek Diversion Dam to Grimmer Property Boundary	ALC28.52-30.01	Wet	1.47	5	5
				Dry	0.02		
6	Arroyo Hondo	Calaveras Reservoir high water mark at full pool to the Arroyo Hondo Slide	ARH03.40-05.40	Wet	2.00	7	7

8.3.2 Electrofishing Surveys

Electrofishing reconnaissance surveys were conducted on September 29 and October 1, 2025, in Alameda and Calaveras creeks. Dry sections occurred in two out of four Alameda Creek reaches, while all of Calaveras Creek was wetted (Table 8-2).

Table 8-2. *Alameda and Calaveras creeks electrofishing survey reach information.*

Study Reach	Stream	Reach Description	Stream Mileage	Channel Condition	Linear Miles	Number of Sites	Number of Habitats	
							Flatwater	Riffle
1	Alameda Creek	Alameda Creek/Arroyo De La Laguna confluence to the Alameda Creek/Welch Creek confluence	ALC17.12-21.87	Wet	4.75	3	3	3
				Wet, accessible	2.87			
2	Alameda Creek	Alameda Creek/Welch Creek confluence to the Alameda Creek/Calaveras Creek confluence	ALC21.88-25.43	Wet	3.55	4	4	4
3	Calaveras Creek	Calaveras Creek/Alameda Creek confluence to Calaveras Dam	CAC00.00-00.55	Wet	0.55	1	1	1
4	Alameda Creek	Alameda Creek/Calaveras Creek confluence to the Alameda Creek Diversion Dam	ALC25.44-28.48	Dry	0.90	2	2	2
				Wet	2.14			
5	Alameda Creek	Alameda Creek Diversion Dam to	ALC28.52-30.01	Dry	0.03	1	1	1
				Wet	1.46			

Study Reach	Stream	Reach Description	Stream Mileage	Channel Condition	Linear Miles	Number of Sites	Number of Habitats	
							Flatwater	Riffle
		Grimmer Property Boundary		Wet, accessible	1.02			

Eleven sites and 22 distinct habitats (flatwater and riffle) were electrofished in Alameda and Calaveras creeks between October 2 and October 29, 2025 (Table 8-2). Each site had equal representation of each habitat type. Habitat morphology and water quality were measured at the habitat scale for the sites (Appendix K, *2025 Electrofishing Survey Habitat Morphology and Water Quality Data*).

8.3.3 Oncorhynchus mykiss Populations

During snorkel surveys, *O. mykiss* were observed in 54 percent of the Alameda Creek pools (Figure 8-6; Appendix I, *Snorkel Survey Fish Observation Data*). Densities for Reaches 1, 2, 4, and 5 were 0.3, 2.1, 47.1, and 8.1 fish per 100 feet, respectively (Appendix L, *Snorkel Survey Fish Density Data*). Pool-specific densities were highly variable, ranging from zero to 131.3 *O. mykiss* per 100 feet.

Observations of *O. mykiss* occurred in two of the four pools in Calaveras Creek. Densities for Reach 3 in Calaveras Creek were 2.8 fish per 100 feet. Pool-specific densities in this reach ranged from zero to 16.1 *O. mykiss* per 100 feet.

Oncorhynchus mykiss were observed in all seven pools surveyed in the Arroyo Hondo, with pool-specific densities ranging from 1.1 to 18.0 fish per 100 feet with a reach-wide density of 8.4 fish per 100 feet. In Alameda Creek, Calaveras Creek, and the Arroyo Hondo, three passes were conducted in eight of the surveyed pools to determine survey accuracy, with *O. mykiss* observed in five of the pools.

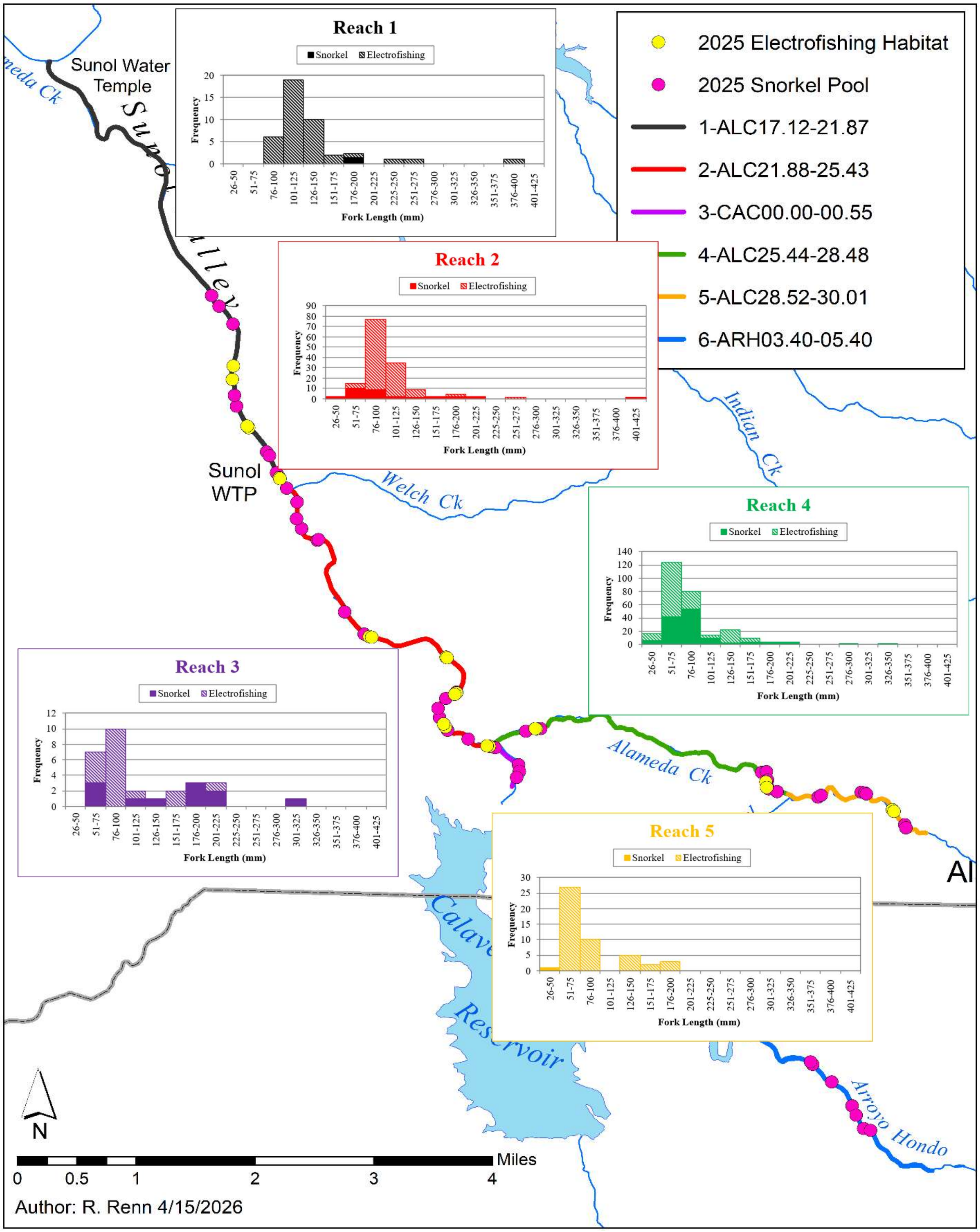


Figure 8-6. *Oncorhynchus mykiss observations in Alameda and Calaveras creeks during snorkel and electrofishing surveys along with their size breakdown by reach.*

The variability of *O. mykiss* length observations between snorkelers was relatively low (Table 8-3). The highest variance was between two snorkelers for fish in the 26-mm to 100-mm-sized bins.

Table 8-3. *Mean, range, standard deviation, and variance of Oncorhynchus mykiss observations at three pass snorkel pools in Alameda Creek, Calaveras Creek, and Arroyo Hondo.*

ALC29.26 - Three Snorkelers					ALC28.34 - Two Snorkelers				
O. mykiss Fork Length (mm)	Number of *O. mykiss*				*O. mykiss* Fork Length (mm)	Number of *O. mykiss*			
	Mean	Range	Std Dev	Variance		Mean	Range	Std Dev	Variance
26-100	1.00	0-2	1.00	1.00	26-100	3.33	1-4	1.15	1.33
101-200	0.00	0	0.00	0.00	101-200	1.00	1	0.00	0.00
201-300	0.00	0	0.00	0.00	201-300	0.00	0.00	0.00	0.00
301-400	0.00	0	0.00	0.00	301-400	0.00	0.00	0.00	0.00
CAC00.40 - Two Snorkelers					**ALC24.75 - Four Snorkelers**				
O. mykiss Fork Length (mm)	Number of *O. mykiss*				*O. mykiss* Fork Length (mm)	Number of *O. mykiss*			
	Mean	Range	Std Dev	Variance		Mean	Range	Std Dev	Variance
26-100	0.00	0	0.00	0.00	26-100	0.33	0-1	0.58	0.33
101-200	0.00	0	0.00	0.00	101-200	0.00	0	0.00	0.00
201-300	0.00	0	0.00	0.00	201-300	0.00	0	0.00	0.00
301-400	0.00	0	0.00	0.00	301-400	0.00	0	0.00	0.00
ALC22.43 - Three Snorkelers					**ALC21.86 - Three Snorkelers**				
O. mykiss Fork Length (mm)	Number of *O. mykiss*				*O. mykiss* Fork Length (mm)	Number of *O. mykiss*			
	Mean	Range	Std Dev	Variance		Mean	Range	Std Dev	Variance
26-100	0.00	0	0.00	0.00	26-100	0.00	0	0.00	0.00
101-200	0.00	0	0.00	0.00	101-200	0.00	0	0.00	0.00
201-300	0.00	0	0.00	0.00	201-300	0.00	0	0.00	0.00
301-400	0.00	0	0.00	0.00	301-400	0.00	0	0.00	0.00
ALC21.55 - Three Snorkelers					**ARH03.91 - Three Snorkelers**				
O. mykiss Fork Length (mm)	Number of *O. mykiss*				*O. mykiss* Fork Length (mm)	Number of *O. mykiss*			
	Mean	Range	Std Dev	Variance		Mean	Range	Std Dev	Variance
26-100	0.00	0	0.00	0.00	26-100	0.33	0-1	0.58	0.33
101-200	0.33	0-1	0.58	0.33	101-200	0.00	0	0.00	0.00
201-300	0.00	0	0.00	0.00	201-300	0.00	0	0.00	0.00
301-400	0.00	0	0.00	0.00	301-400	0.00	0	0.00	0.00

During Alameda Creek electrofishing surveys, *O. mykiss* were collected in all four creek reaches, at all sites, and in 19 of 20 habitats between river miles ALC20.67 and ALC29.61 (Figure 8-6; Appendix M, *2025 Electrofishing Survey Fish Catch Data*). Within that area, *O. mykiss* were collected in all of the sampled riffles and 91 percent of the flatwater habitats. Densities for Reaches 1, 2, 4, and 5 were 4.8, 11.7, 47.6, and 41.9 fish per 100 feet, respectively (Appendix N, *2025 Electrofishing Survey Fish Density Data*). Habitat-specific densities were variable, ranging from zero to 91.0 fish per 100 feet.

Oncorhynchus mykiss were collected in both habitats in Calaveras Creek with a reach-specific density of seven fish per 100 feet. The riffle had a density of 3.5 *O. mykiss* per 100 feet, while the flatwater had a density of 11.4 fish per 100 feet (Appendix N).

8.3.4 *Oncorhynchus mykiss* Length and Age

Oncorhynchus mykiss observed during summer snorkel surveys in Alameda Creek, Calaveras Creek, and the Arroyo Hondo ranged from 26 mm to 475 mm fork length (Figure 8-6). During snorkel surveys, the largest fish observed were in Alameda Creek (Reach 1) and in the Arroyo Hondo (Reach 6).

The largest *O. mykiss* captured during electrofishing surveys measured 380 mm in fork length; the smallest was 45 mm. The largest *O. mykiss* was captured in Reach 1, although *O. mykiss* over 200 mm were also collected in Reaches 1, 2, 3, and 4. The largest individual from Reach 5 measured 192 mm.

Length at age data are not available for WY 2024–25. Scale aging analysis data from sampled fish captured during WY 2024–25 are currently being processed.

8.3.5 Alameda Creek and Calaveras Creek Fish Communities

This section describes the non-*O. mykiss* species observed or captured during WY 2024–25 snorkel and electrofishing surveys.

Five species of fishes were observed during WY 2024–25 snorkel surveys in Alameda and Calaveras creeks, along with unidentified young-of-year (Figure 8-7). All fish observed during snorkel surveys were native except for an individual Centrarchid. *Oncorhynchus mykiss*, covered in Section 8.3.3, *Oncorhynchus mykiss Populations*, and Section 8.3.4, *Oncorhynchus mykiss Length and Age*, were observed in all five Alameda Creek and Calaveras Creek reaches, and the Arroyo Hondo.

Six species of fishes were captured during WY 2024–25 electrofishing surveys (Figure 8-8). All captured fish species were native to the watershed. *Oncorhynchus mykiss* were captured in all Alameda and Calaveras creek reaches.

8.3.5.1 Green Sunfish

One adult Green Sunfish (*Lepomis cyanellus*) was observed in Reach 4 of Alameda Creek during snorkel surveys. Density for Green Sunfish was not calculated due to only one individual being observed during WY 2024–25 snorkel surveys (Figure 8-7). No sunfish were captured during electrofishing surveys.

8.3.5.2 California Roach

California Roach were the dominant species at most snorkel survey sites (Figures 8-7 and 8-8). During snorkel surveys, California Roach were observed in all four Alameda Creek reaches and 83 percent of the pools, while they were not observed in Calaveras Creek pools (Appendix I, *Snorkel Survey Fish Observation Data*). Reach densities for California Roach in Alameda Creek pools ranged from 27.2 to 288.0 fish per 100 feet, while highly variable pool-specific densities were between zero and 1,227.7 fish per 100 feet (Figure 8-7; Appendix I, and Appendix L, *Snorkel Survey Fish Density Data*).

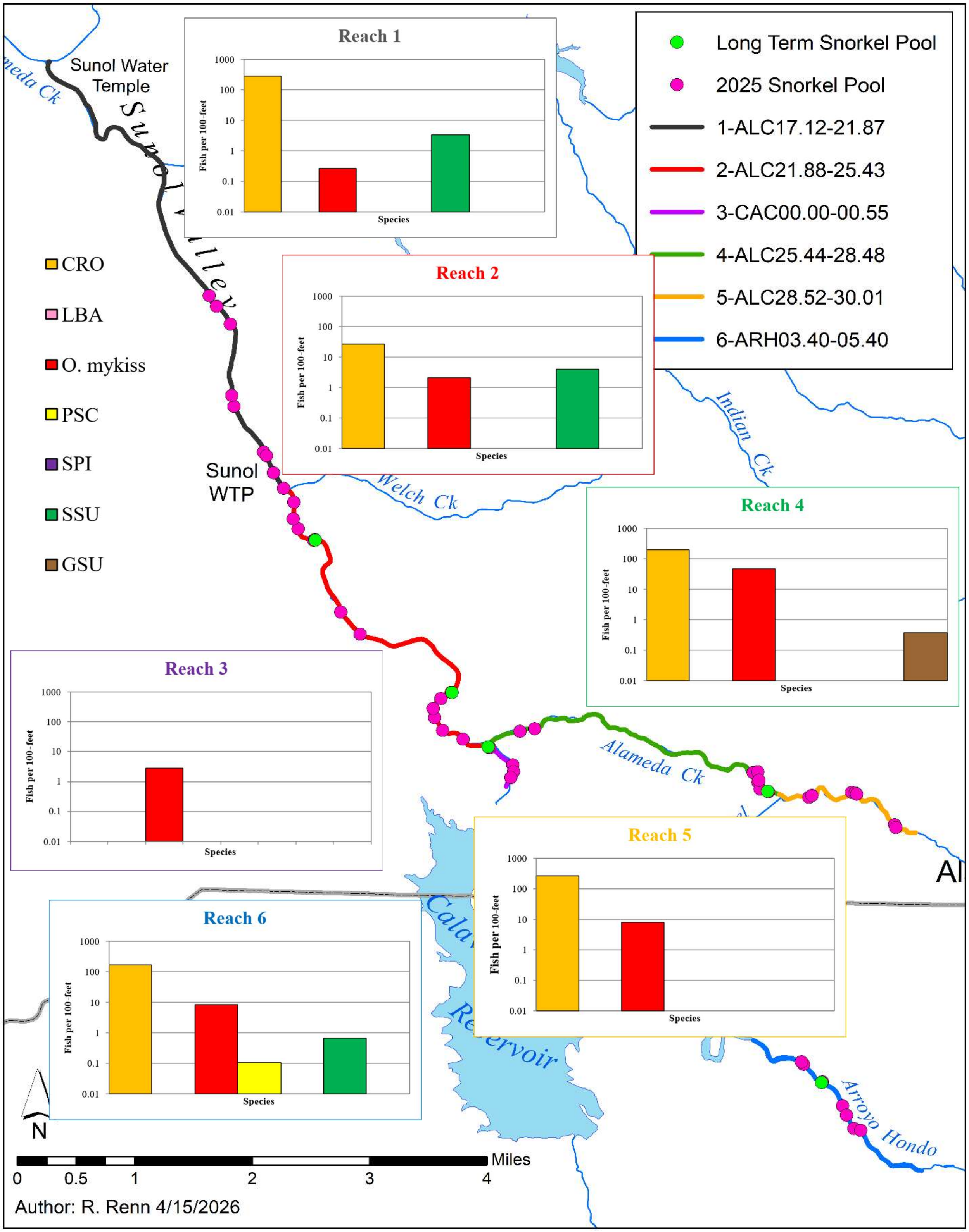


Figure 8-7. *Fish densities at randomly selected snorkel pools, long-term pools on Alameda Creek, Calaveras Creek, and the Arroyo Hondo. Observations include California Roach (CRO), Largemouth Bass (LBA), Oncorhynchus mykiss (O. mykiss), Prickly Sculpin (PSC), Sacramento Pikeminnow (SPI), Sacramento Sucker (SSU), and Sunfish.*

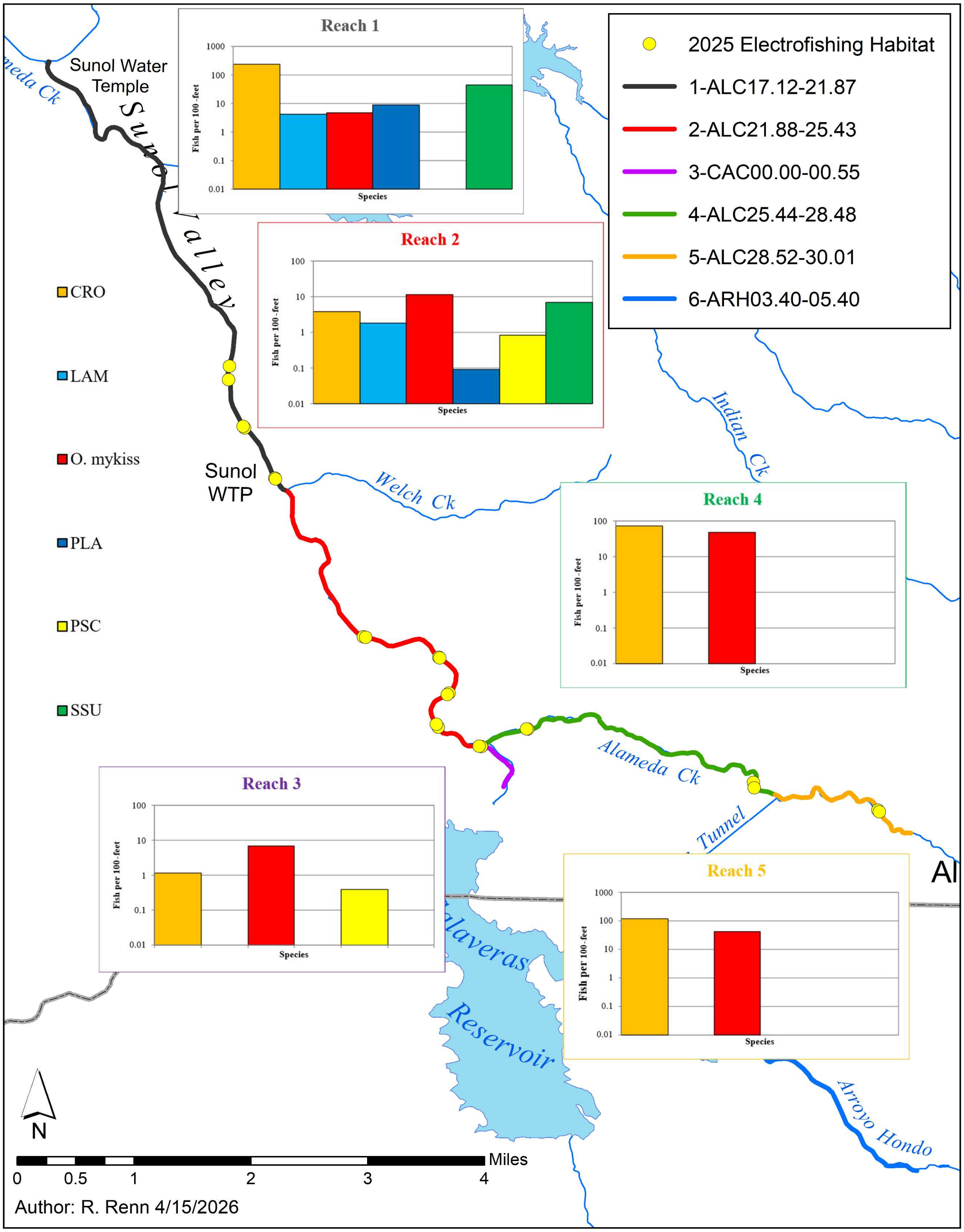


Figure 8-8. *Fish densities at randomly selected electrofishing sites on Alameda Creek and Calaveras Creek. Observed fishes include California Roach (CRO), Lampetra spp. (LAM), Oncorhynchus mykiss (O. mykiss), Pacific Lamprey (PLA), Prickly Sculpin (PSC), and Sacramento Sucker (SSU).*

During electrofishing surveys, California Roach were the most prevalent species at many survey sites (Figures 8-7 and 8-8). California Roach were collected in nine of 10 Alameda Creek sites, and 17 of 20 habitats, accounting for 64 percent of all fishes captured in Alameda Creek (Appendix M, *2025 Electrofishing Survey Fish Catch Data*). Electrofishing was conducted in a riffle and flatwater in Calaveras Creek, with no California Roach captured in the riffle and three individuals captured in the flatwater habitat. In Alameda Creek, flatwater habitat densities ranged from zero to 1,203.6 fish per 100 feet, while riffle habitat-specific densities ranged from zero to 104.5 fish per 100 feet. Reach-wide densities ranged from 1.2 to 242.9 fish per 100 feet with the highest densities occurring in Reach 1 (Figure 8-8; Appendix M, and Appendix N, *2025 Electrofishing Survey Fish Density Data*).

8.3.5.3 Lampetra Species

Lampetra spp. juveniles (ammocoetes) were found in nine Alameda Creek electrofishing habitats, all of which were downstream of the confluence with Calaveras Creek (Figure 8-8; Appendix M, *2025 Electrofishing Survey Fish Catch Data*). Most individuals were captured in flatwater habitats between river miles 20.79 and 25.04. Density estimates for lamprey are unreliable with electrofishing when settings are not set to target lamprey. Juvenile lamprey burrow in the substrate and are typically drawn out in greater numbers during successive passes. Therefore, densities are not reported.

8.3.5.4 Pacific Lamprey

Pacific Lamprey (*Entoshpenus tridentatus*) were collected from five out of 20 Alameda Creek electrofishing habitats between river miles 20.79 and 25.04 in two flatwater and three riffle habitats (Figure 8-8; Appendix M, *2025 Electrofishing Survey Fish Catch Data*). Pacific Lamprey density estimates are unreliable, similar to Lampetra spp.; therefore, no densities are provided.

8.3.5.5 Prickly Sculpin

Prickly Sculpin were observed in low densities during WY 2024–25 electrofishing surveys (Figures 8-7 and 8-8). Prickly Sculpin were collected in four Alameda Creek habitats, all downstream of the Calaveras Reservoir release, and the riffle habitat in Calaveras Creek (Appendix M, *2025 Electrofishing Survey Fish Catch Data*). Sculpin density estimates are not reliable due to their cryptic and demersal nature and the inherent difficulties in capturing them during electrofishing surveys, so densities are not reported.

8.3.5.6 Sacramento Sucker

Sacramento Sucker were observed in 50 percent of the snorkel pools below Little Yosemite (between ALC25.73 and ALC17.12;); 99 percent of observed individuals were juveniles. Sacramento Sucker were not observed in Calaveras Creek during snorkeling surveys. Sacramento Sucker densities in Alameda Creek were variable with reach-wide pool densities ranging from zero to 4.0 fish per 100 feet and pool-specific densities ranging from zero to 18.5 fish per 100 feet (Figure 8-7; Appendix I, *Snorkel Survey Fish Observation Data*, and Appendix L, *Snorkel Survey Fish Density Data*).

During electrofishing surveys, Sacramento Sucker were only captured in Reaches 1 and 2 in Alameda Creek (Figures 8-7 and 8-8). No Sacramento Sucker were collected above the

Calaveras Reservoir release or in Calaveras Creek. Sucker were present in 86 percent of the Alameda Creek electrofishing habitats downstream of the Calaveras Reservoir release (Appendix M, *2025 Electrofishing Survey Fish Catch Data*). Habitat species densities ranged from zero to 115.2 fish per 100 feet. Reaches 1 and 2 had overall densities of 46.7 and seven fish per 100 feet, respectively (Appendix N, *2025 Electrofishing Survey Fish Density Data*).

8.3.5.7 Unidentified Young-of-Year

Recently born or unidentifiable young-of-year were observed in two Alameda Creek snorkel survey pools in Reach 2 (Figure 8-8; Appendix G, *Oncorhynchus mykiss Spawning Survey Redd Observation Data*). Densities were not calculated for these small fish because they could represent more than one species.

8.3.6 Arroyo Hondo Fish Communities

Electrofishing was not conducted in the Arroyo Hondo. There were four species of fish observed in the Arroyo Hondo during WY 2024–25 snorkel surveys. All fish species observed were native to the watershed. *Oncorhynchus mykiss*, covered in Section 8.3.3, *Oncorhynchus mykiss Populations*, and Section 8.3.4, *Oncorhynchus mykiss Length and Age*, were observed in all seven pools in the Arroyo Hondo.

8.3.6.1 California Roach

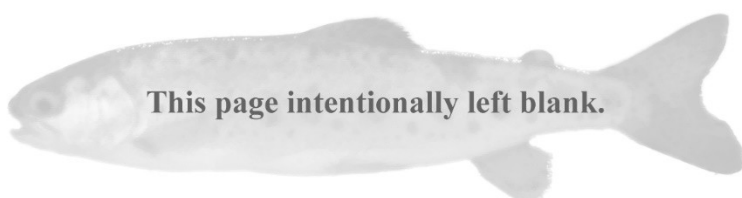
California Roach (56 percent juvenile) were observed in all seven Arroyo Hondo pools snorkeled (Appendix H, *Snorkel Survey Fish Life Stage Size Ranges*). The reach-wide pool density for roach was 168.5 fish per 100 feet, with variable pool-specific densities ranging from 29.7 to 454.0 fish per 100 feet (Figure 8-7; Appendix I, *Snorkel Survey Fish Observation Data*, and Appendix L, *Snorkel Survey Fish Density Data*).

8.3.6.2 Prickly Sculpin

A single adult Prickly Sculpin was found in the Arroyo Hondo’s most downstream surveyed pool (Figure 8-7; Appendix I, *Snorkel Survey Fish Observation Data*). The species’ coloration and cryptic behavior make snorkeling observations difficult. Density for Prickly Sculpin was not calculated due to only one individual being observed during WY 2024–25 snorkel surveys.

8.3.6.3 Sacramento Sucker

Sacramento Sucker (all juvenile) were observed in two of seven Arroyo Hondo pools (Appendix H, *Snorkel Survey Fish Life Stage Size Ranges*). Their reach-wide density was 0.7 fish per 100 feet, with pool-specific densities ranging from zero to 11.8 fish per 100 feet (Figure 8-7; Appendix I, *Snorkel Survey Fish Observation Data*, and Appendix L, *Snorkel Survey Fish Density Data*).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9. Benthic Macroinvertebrate Communities

9.1 Background

Alameda Creek runs through the San Francisco Bay Area's largest watershed, with intermittent and perennial reaches providing habitat for a variety of aquatic organisms including benthic macroinvertebrates (BMI). Community compositions, population sizes, and species distributions of this relatively diverse group can vary based on elevation, stream gradient, and substrate characteristics (Barbour et al., 1999). Some typical BMI taxa include insect larvae, mollusks, and worms (Karr and Chu, 1999). They make ideal environmental indicators because many are sensitive to chemical, physical, and ecological changes in habitat (e.g., water chemistry and temperature, sediment type, channel morphology, and riparian habitat), they have limited capacity for long-distance movements, and their lives typically span more than 1 year (Barbour et al., 1999).

Anadromous *O. mykiss* restoration efforts in the southern Alameda Creek Watershed, which includes releases from Calaveras Dam and reduced diversions from the ACDD, are intended to shift hydrologic conditions toward those of an unregulated stream. Additional water in the creek is, in turn, expected to improve fish habitat and overall stream health. Annual rapid bioassessment monitoring (Figure 9-1) is conducted in Alameda Creek and Calaveras Creek as a means of evaluating the effectiveness of the SFPUC water releases and diversion alterations in improving stream conditions.

Figure 9-1. *Conducting benthic macroinvertebrate sampling at survey site ALC22.52.*

9.2 Procedures

9.2.1 Site Selection and Sample Collection

Benthic macroinvertebrate samples are collected during the May-through-July central and southern California index period following the California Surface Water Ambient Monitoring Program standard operating procedures (Ode et al., 2025). Optional transect measurements and algae samples, however, are not taken. Sampling in Alameda Creek takes place at six sites within five study reaches, while Calaveras Creek is sampled at one site (Figure 9-2). In Alameda Creek there is a single site upstream of ACDD, two sites between ACDD and the Calaveras Creek confluence, and three sites downstream of the confluence.

When the stream's average width is less than 10 meters, a 150-meter site is identified. Within the sample site, 11 main transects (15 meters apart) and 10 inter-transects, all perpendicular to the stream, are sampled.

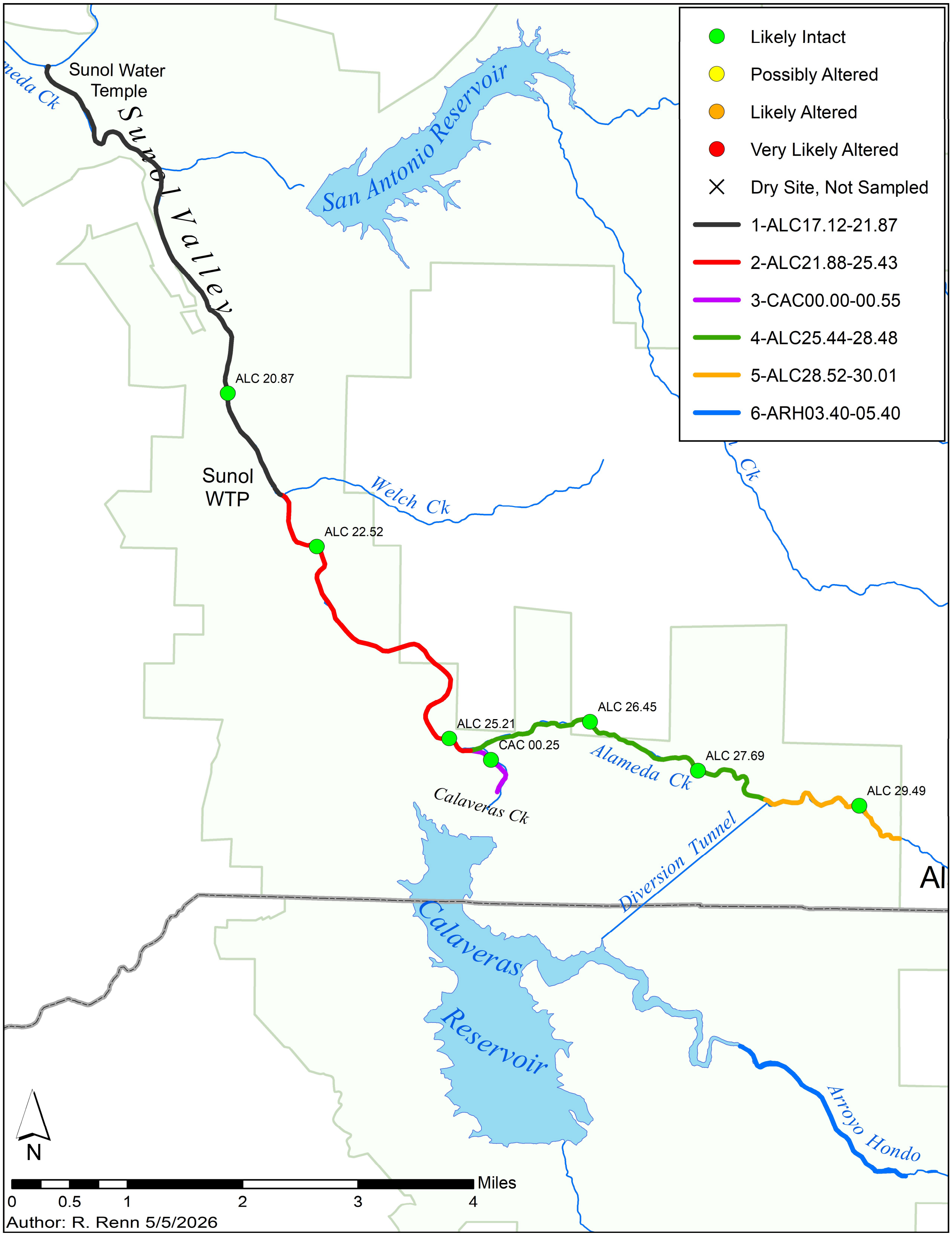

Figure 9-2. *2025 Benthic macroinvertebrate sample collection locations. Composite sample California Stream Condition Index scores ranged from very* ***L****ikely* ***A****ltered, to* ***L****ikely* ***I****ntact.*

When the average width of the stream is greater than 10 meters, a 250-meter sample site is surveyed. Within a 250-meter sample site, 11 main transects (25 meters apart) and 10 inter-transects, perpendicular to the stream, are sampled. Starting at the downstream-most transect, BMI are collected from 1-square-foot sampling sites 1 meter downstream of each of the 11 main transects. The reach-wide benthos procedure requires sampling along each transect with samples alternating between the left, center, and right portions of the channel (25, 50, and 75 percent of the wetted width). When the wetted width of the stream is less than 3 feet wide, and sampling stream left or stream right, the edge of the net is placed at the stream margin.

To collect BMI, the substrate within each sampling square is disturbed to a depth of 4 to 6 inches for approximately 60 seconds to dislodge organisms, which are collected in a 0.5-micrometer mesh D-frame net as they drift downstream. The main transect samples for each site are combined into a single composite sample and preserved with 95 percent ethanol. Date and site information is recorded on each Nalgene® container containing the composite samples.

9.2.2 Taxonomic Identification

All preserved composite samples are processed by qualified taxonomists at EcoAnalysts, Inc. following the Southwest Association of Freshwater Invertebrate Taxonomists Level 2 standard of effort (Rogers and Richards, 2006). Individual invertebrates are identified to tribe/genus/species (Chironomidae), class (Oligochaetes), or genus/species (all other taxa) after sorting. One sample is chosen at random and sent to the CDFW Aquatic Bioassessment Laboratory for re-identification as an external quality assurance check to ensure at least 95 percent accuracy.

9.2.3 Data Analyses

EcoAnalysts, Inc. provides spreadsheets with individual taxonomic lists for each site, including standard metrics, after completing the sorting and identifications. Data are forwarded to Moss Landing Marine Laboratories where sites are scored using the California Stream Condition Index (CSCI), which is strongly responsive to disturbance gradients (Rehn et al., 2015). The CSCI is calibrated with the mean score of reference sites set to 1.0 (benchmark for healthy California streams, representing a variety of natural stream types, that have minimal or no human disturbances). Scores approaching 0.0 indicate a greater departure from the reference condition indicating the degradation of biological conditions, while scores closer to 1.0 are suggestive of greater taxonomic richness and more complex ecological functions than predicted for sites given their natural setting (Table 9-1).

Table 9-1. *California Stream Condition Index (CSCI) scoring categories of biological condition.*

CSCI Scoring Categories	Biological Condition
≥0.92	Likely Intact
0.91- 0.80	Possibly Altered
0.79- 0.63	Likely Altered
≤0.62	Very Likely Altered

9.3 Results

During WY 2024–25, bioassessment sampling was conducted on Alameda Creek and Calaveras Creek between May 12 and June 12, 2025 (Table 9-2; Appendix O, *Benthic*

Macroinvertebrate Survey Catch Data). Benthic macroinvertebrates from 20 orders were collected at seven sampling sites. Ephemeropterans generally dominated the samples followed by Dipterans and Trichopterans, each of which were observed at all sites in both creeks. Coleoptera, Plecoptera, and Trombidiformes were also seen in each of the creek sites but generally in lower numbers. The Calaveras Creek site at river mile CAC00.25 and Alameda Creek at river miles ALC22.52 and ALC20.87 were the most diverse sites, containing 13 BMI orders each. Alameda Creek at river miles ALC27.69 and ALC29.49 were the least diverse, containing eight orders each (Table 9-3, Figure 9-3).

Table 9-2. *California Stream Condition Index scores and status for benthic macroinvertebrate sampling sites in Alameda Creek and Calaveras Creek for WY 2024–25. *Duplicate site.*

Site	Date	CSCI Score	CSCI Status
ALC20.87	6/5/2025	1.01	Likely Intact
ALC22.52*	5/29/2025	1.19	Likely Intact
ALC22.52*	5/29/2025	1.14	Likely Intact
ALC25.21	5/28/2025	1.22	Likely Intact
ALC26.45	5/15/2025	1.09	Likely Intact
ALC27.69	5/20/2025	1.07	Likely Intact
ALC29.49	5/12/2025	1.22	Likely Intact
CAC00.25	6/12/2025	0.94	Likely Intact

All CSCI scores resulted in a Likely Intact status classification (Table 9-2). The site at Calaveras Creek had the lowest CSCI score (0.94) but still received a Likely Intact classification.

Table 9-3. *Percentage of benthic macroinvertebrates to the order level or higher at each bioassessment site for WY 2024–25.*

Order	Site						
	ALC20.87	ALC22.52	ALC25.21	ALC26.45	ALC27.69	ALC29.49	CAC00.25
Acari	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.3%
Amphipoda	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%
Coleoptera	6.6%	16.4%	18.0%	1.9%	7.3%	4.1%	6.4%
Decapoda	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Diptera	37.6%	26.7%	12.7%	19.9%	22.0%	16.7%	37.9%
Ephemeroptera	27.5%	27.5%	28.3%	45.4%	52.9%	24.8%	19.4%
Gastropoda	2.4%	1.8%	1.8%	0.0%	0.0%	0.0%	0.3%
Hoplonemertea	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Hygrophila	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Isopoda	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lepidoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%
Megaloptera	0.5%	1.1%	0.0%	0.0%	0.3%	1.1%	0.2%
Odonata	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%
Oligochaeta	6.7%	1.3%	0.5%	0.6%	0.0%	0.0%	1.0%
Ostracoda	0.8%	0.2%	0.3%	0.2%	0.0%	0.0%	3.5%
Plecoptera	0.5%	2.5%	5.3%	4.2%	3.2%	3.3%	7.0%

Order	Site						
	ALC20.87	ALC22.52	ALC25.21	ALC26.45	ALC27.69	ALC29.49	CAC00.25
Trichoptera	15.2%	20.0%	31.0%	26.4%	11.9%	46.6%	21.7%
Trombidiformes	1.8%	2.2%	1.4%	1.1%	2.3%	3.2%	1.6%
Turbellaria	0.2%	0.3%	0.8%	0.0%	0.0%	0.0%	0.6%
Veneroida	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

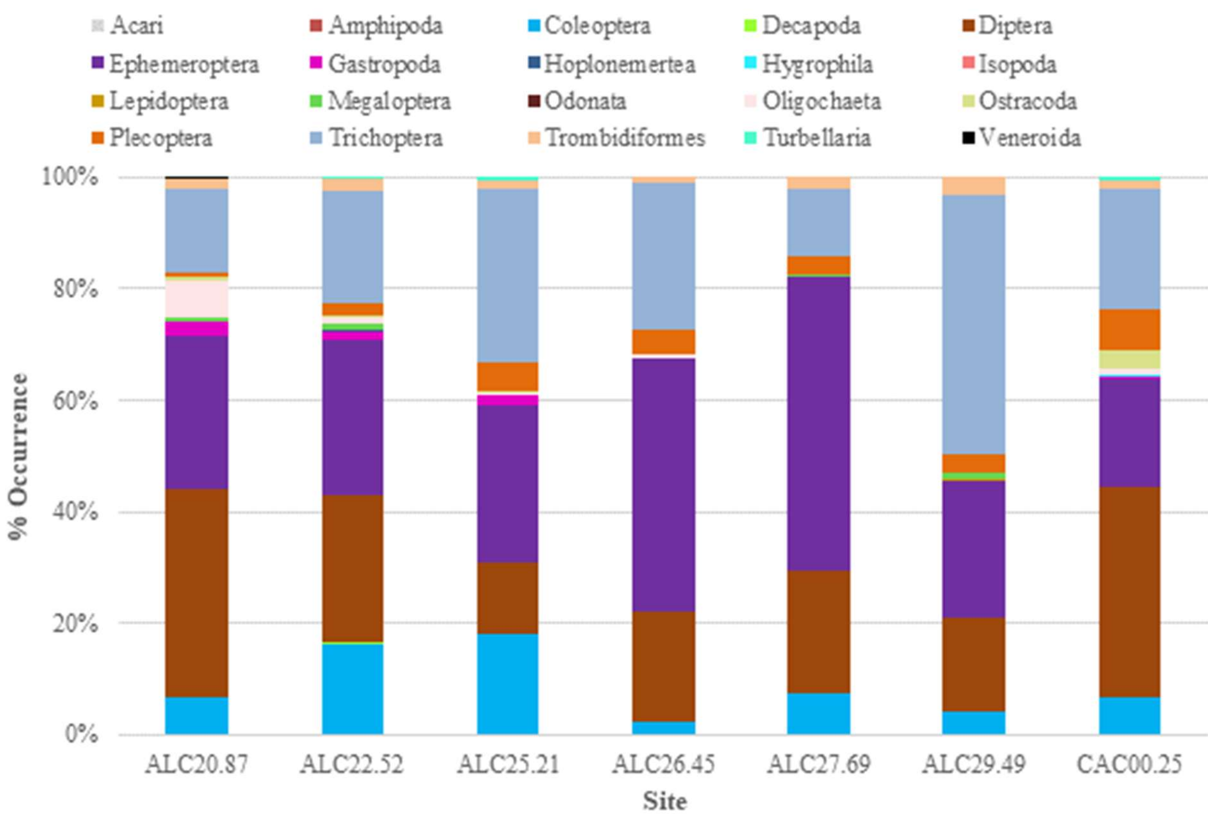

Figure 9-3. *Percent occurrence of benthic macroinvertebrates to the order level or higher at each bioassessment site for WY 2024–25.*

10. Amphibian Communities

10.1 Background

Amphibians use streams for breeding, development, and refuge and often have different flow and temperature preferences than those of other aquatic taxa. Changes in the timing, magnitude, and duration of flows, and increases or decreases in water temperatures, can affect each life stage and entire cohorts. Monitoring the distribution and abundance of amphibian communities over time, in reference and potentially impaired stream reaches, is an effective means of evaluating the consequences of flow and temperature alterations.

The southern Alameda Creek Watershed harbors populations of the native Foothill Yellow-legged Frog (FYLF) and the California Red-legged Frog (*Rana draytonii*; CRLF), along with the invasive American Bullfrog (BF). Foothill Yellow-legged Frogs typically attach their clutches (egg masses) to cobble in stream margins (Figure 10-1). Alameda Watershed FYLF are within the Central Coast Clade and are listed as an endangered species by the CDFW (CDFW, 2020). They are within the Central Coast DPS and are listed as threatened by the United States Fish and Wildlife Service (USFWS, 2023). California Red-legged Frogs, that often attach egg clutches to sticks and vegetation (Figure 10-2), have been considered a Species of Special Concern in California since 2011 and are listed as federally threatened (USFWS, 1996). American Bullfrogs, introduced to the state in the early 1900s, often compete with native frogs for resources, prey upon native frogs, and can be chytrid fungus vectors (www.californiaherps.com).

Figure 10-1. *Foothill Yellow-legged Frog clutch at ALC23.28 newly oviposited on March 28, 2025 (left), recently hatched on April 14 (right), and close-up of developed larvae on May 23, 2025 (inset).*

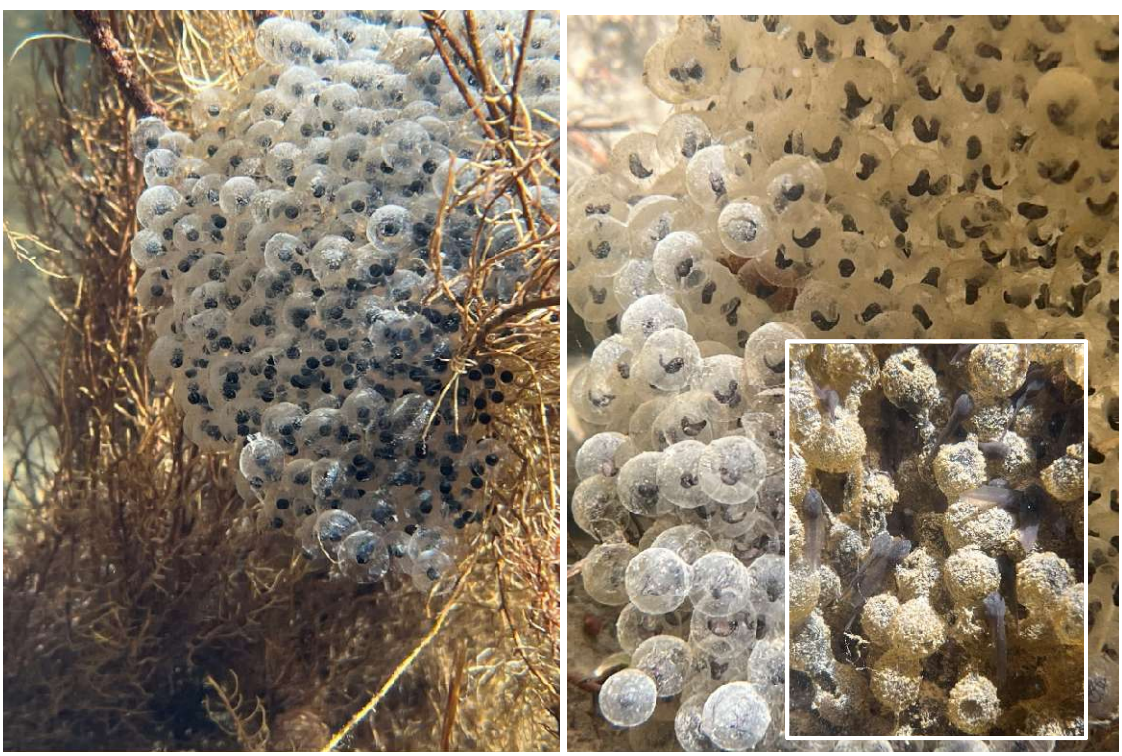

Figure 10-2. *California Red-legged Frog clutch on March 10, 2025 (left), developing larvae on March 23, 2025 (right), and recently hatched on April 15, 2025 (inset).*

Although fish habitat conditions below Calaveras Dam and the ACDD are expected to improve with permit-required environmental water releases and reduced diversions, their effects on the amphibian community remain unclear. To assess and evaluate potential positive and negative impacts, the SFPUC conducts amphibian surveys for FYLF, CRLF, and BF to gain a better understanding of these species' distribution and relative abundance throughout the southern Alameda Creek Watershed.

10.2 Procedures

10.2.1 Site Descriptions

Streams surveyed for amphibians in WY 2024–25 include portions of Alameda Creek from ALC29.60 downstream to ALC19.02, and Calaveras Creek from Calaveras Dam downstream to its confluence with Alameda Creek (Figure10-3).

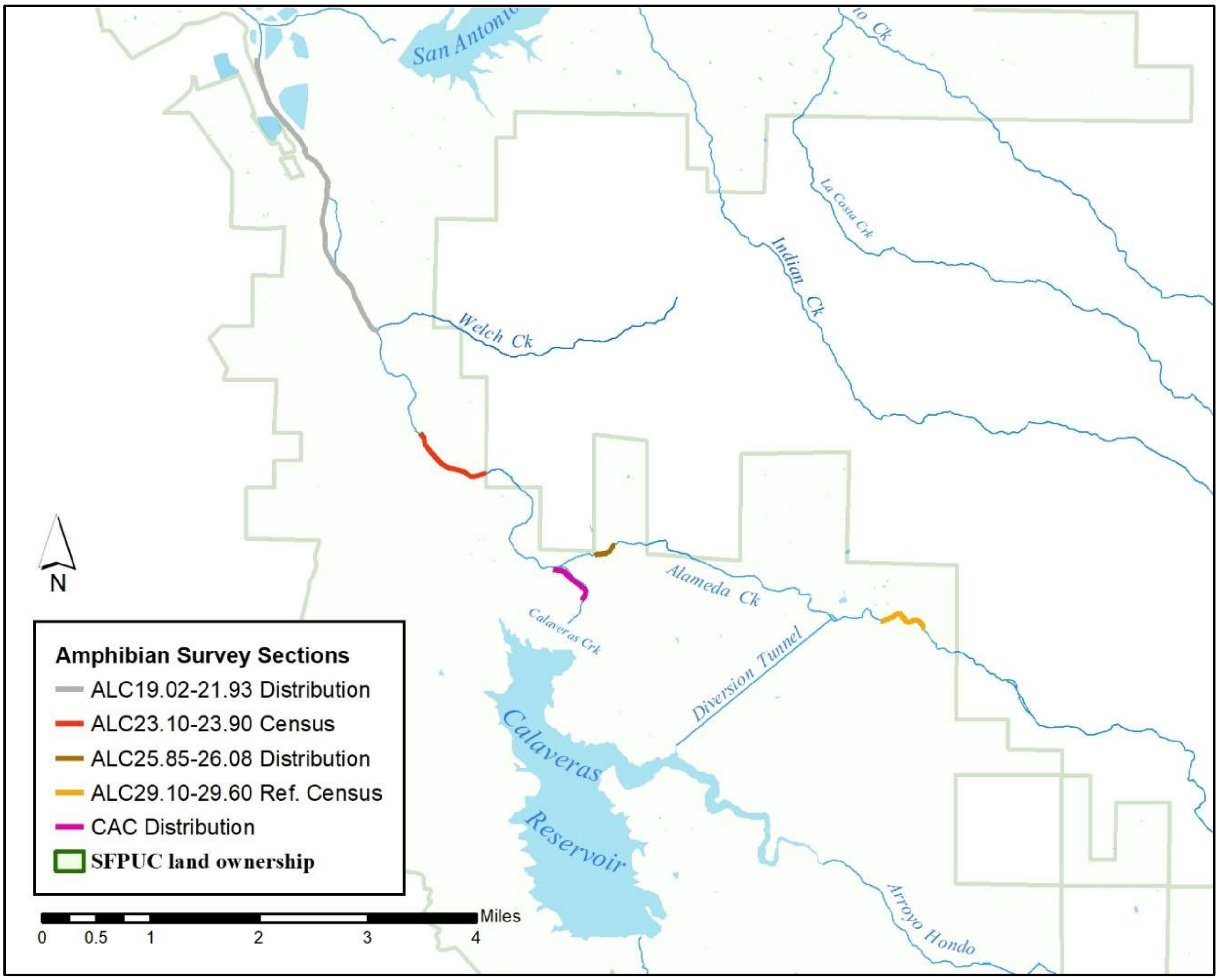

Figure 10-3. *Southern Alameda Creek Watershed amphibian census and distribution survey sections.*

10.2.2 Visual Encounter Surveys

Amphibian monitoring is conducted when local ranid populations are breeding, typically February through June. Standardized visual encounter survey (VES) methods are followed to detect diurnally active amphibians and their clutches (Fellers and Freel, 1995). Daytime VESs are most effective at identifying egg clutches and post-metamorphic FYLF, while they are less suited to detecting post-metamorphic CRLF. Sections may be surveyed again in late summer to assess successful metamorphosis.

Qualified biologists conduct VESs to document the presence of amphibians in the wetted channel and bankfull areas by walking along the stream margins looking for all life stages. The VESs are only conducted when there is adequate water clarity (greater than 1 foot visibility), and biologists can navigate the stream safely. They may scan ahead with binoculars or inspect crevices with flashlights, but no substrate or cover (vegetation, wood, stones, etc.) are moved. Each observation is documented using a global positioning system (GPS). Within stream sections that may be resurveyed, individual clutches are flagged to avoid double counting and to track hatching success.

Surveys occur at different times and frequencies to maximize the efficiency of CRLF and FYLF clutch observations. Sections surveyed repeatedly throughout a species' breeding season to quantify all clutches are referred to as "census" sections. Sections surveyed below the census-level effort, document the general location and timing of breeding and are referred to as "distribution" sections. Amphibians noted incidentally or during various *O. mykiss* surveys are reported as "ancillary" observations.

When conditions allow, CRLF distribution surveys are conducted during the expected peak in clutch observability, typically in February or March. In late March or early April, VESs targeting FYLF clutches begin in census sections and are repeated approximately every 2 weeks until no new breeding is observed. Distribution surveys for FYLF are completed at least once when the maximum percentage of FYLF clutches are expected to be visible. American Bullfrog observations are recorded during all VESs.

In addition to amphibian-specific survey data, documenting frogs during other watershed activities aids our understanding of habitat availability and utilization, metamorphosis timing, and species relationships. These ancillary observations are made outside of amphibian-specific surveys, in particular during *O. mykiss* spawning (January through April), trapping (February through June), stream bioassessment sampling (May through July), snorkel (late July or August), and electrofishing surveys (October or November).

10.3 Results

Visual encounter surveys targeting both CRLF and FYLF clutches were conducted from late January through late May 2025, covering 4.21 miles in Alameda Creek, and 0.44 miles in Calaveras Creek. Ancillary observations of CRLF, FYLF, and BF were recorded during *O. mykiss* surveys. The following sections describe the observations of all life stages of CRLF, FYLF and BF, respectively, within the southern Alameda Creek Watershed streams surveyed in WY 2024–25.

10.3.1 Alameda Creek Amphibian Observations

Amphibian VESs were conducted in Alameda Creek between January 31 and May 23, 2025 (Figure 10-4). February high flow events and reduced visibility limited surveys targeting CRLF breeding, therefore no sections were surveyed at a census-level effort for CRLF.

Surveys for FYLF clutches in Alameda Creek were completed in four sections in WY 2024–25 (Figures 10-4 and 10-5):

1. A 2.91-mile distribution section of Alameda Creek from ALC21.93 downstream to ALC19.02.
2. A 0.8-mile census section of Alameda Creek from ALC23.90 downstream to ALC23.10.
3. A 0.23-mile distribution section of Alameda Creek from ALC26.08 downstream to ALC25.85, in the upstream extent of the area known as the Alameda Creek Overlook.
4. A 0.5-mile census section of Alameda Creek upstream of ACDD from ALC29.60 downstream to ALC29.10 (referred to as the "Reference" reach in the BO).

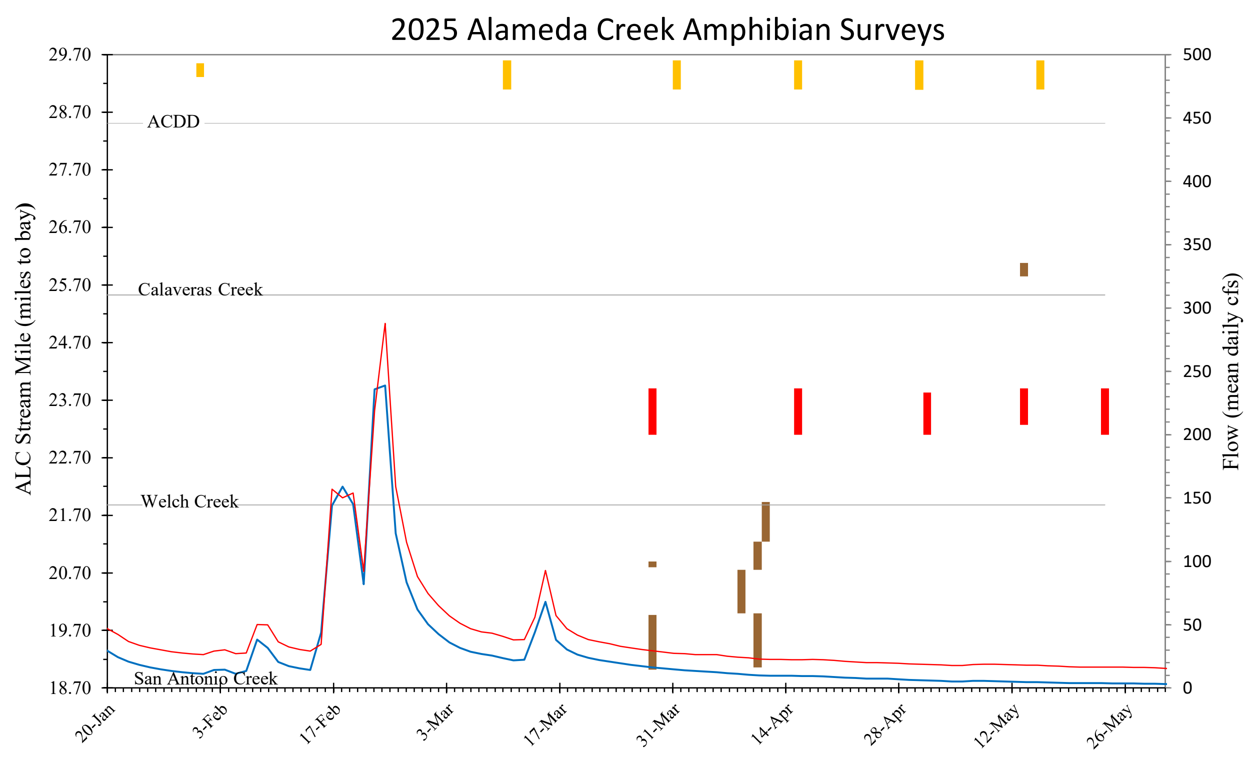

Figure 10-4. *Alameda Creek amphibian surveys (vertical bars represent the extent and date of surveys) and average daily flows at United States Geological Survey stream gage, ALAMEDA C AB DIV DAM NR SUNOL CA – 11172945 (blue) and ALAMEDA C BL WELCH C NR SUNOL CA – 11173575 (red). Red and gold bars represent census surveys. Brown bars represent distribution sections.*

During herptile and ancillary surveys, 22 CRLF clutches were observed upstream of ACDD (ALC28.51) and eight were observed downstream of the Calaveras confluence (ALC25.44; Figure 10-5). The estimated date range of CRLF oviposition was from early-March to early

April. There was one adult and five subadult CRLF ancillary observations (not necessarily unique individuals) during spring surveys, all upstream of the ACDD (Figure 10-6).

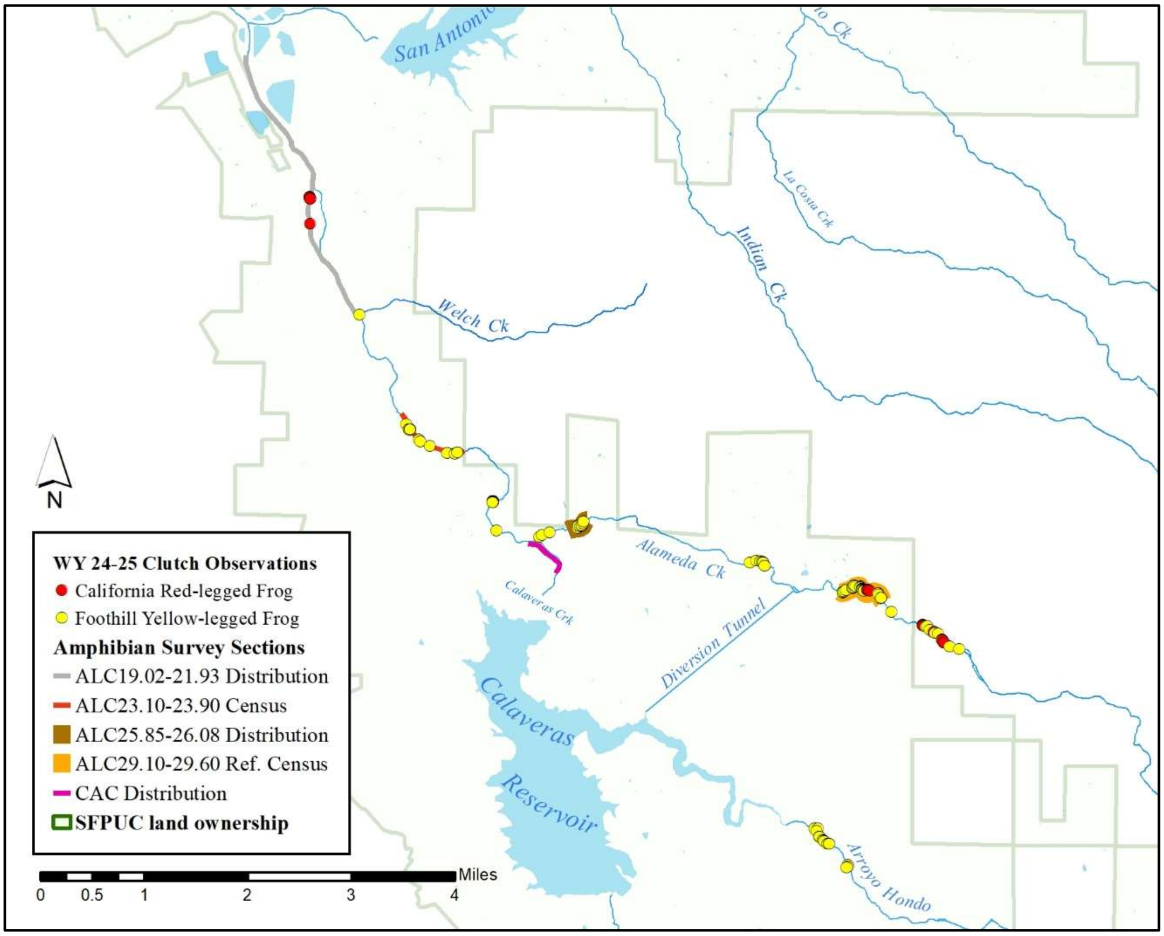

Figure 10-5 *Southern Alameda Creek Watershed Foothill Yellow-legged Frog and California Red-legged Frog clutch locations and survey section delineation.*

A total of 183 FYLF clutches were observed in Alameda Creek (Figure 10-5). One-hundred-two of those were observed within the distribution sections or during ancillary surveys, which is likely an underestimate of breeding activity because these areas are not always surveyed repeatedly. Clutches were first observed on March 28, 2025, during steadily decreasing spring flows, and no significant high flow events occurred for the remainder of the breeding season (Figure 10-4). Based on the observation date and embryo development, the last observed FYLF clutches were estimated to be oviposited during the second week of May 2025. The furthest downstream FYLF clutch observation was at ALC21.90 (near the Welch Creek confluence).

Twenty-one FYLF clutches were observed in the census section downstream of the Calaveras Creek confluence (Figure 10-5). Sixty FYLF clutches were observed in the reference reach above ACDD (Figure 10-5). Based on the temporal spacing of the surveys and the development of the embryos, it is reasonable to consider the totals as complete clutch counts for those sections.

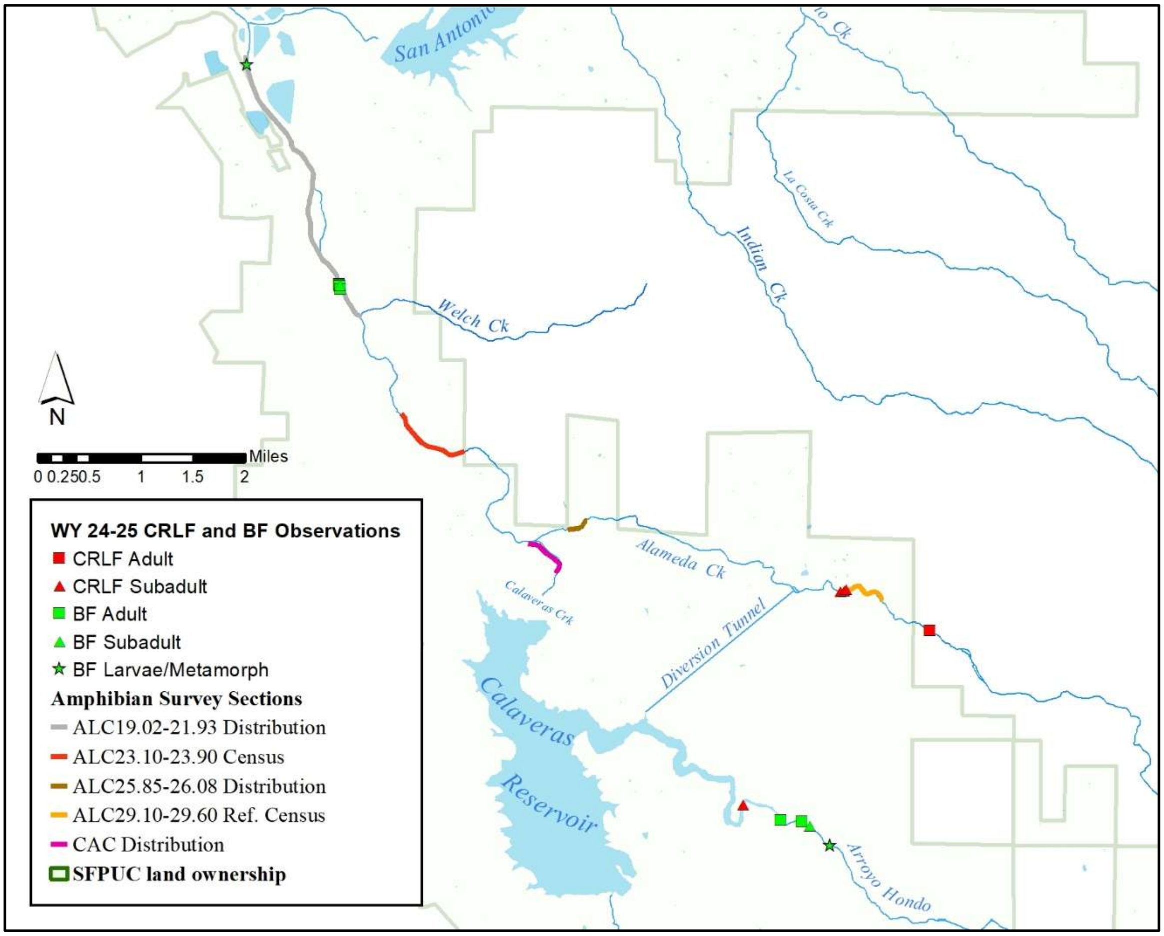

Figure 10-6. *Southern Alameda Watershed California Red-legged Frog and Bullfrog observations.*

Post-metamorphic FYLF (subadult and adults), as well as developing larvae and new froglets were documented during amphibian and ancillary surveys. These are not necessarily unique individuals because the same frogs can be noted during multiple surveys. During spring amphibian and *O. mykiss* spawning surveys, 80 adult and 29 subadult FYLF were observed between ALC30.52 and ALC22.65 (Figure 10-7). During outmigrant trapping, one larval FYLF was captured and released alive. No FYLF were observed during stream bioassessment surveys. Three adults, 2 froglets, and 47 metamorph/larval FYLF were observed during August snorkel surveys. During Alameda Creek electrofishing surveys, there were six adult, five subadult, and 49 metamorph/froglet FYLF observations (not necessarily captured).

There were no BF egg observations in Alameda Creek, although the timing of the surveys is not designed to capture their summer breeding window. During spring amphibian and ancillary *O. mykiss* spawning surveys, there were two BF larvae observed downstream of ALC19.11 (Figure 10-6). During fish-trapping activities, four adult and one subadult BFs were captured and humanely dispatched. There were no BF observations during *O. mykiss* snorkel, electrofishing, or stream bioassessment surveys.

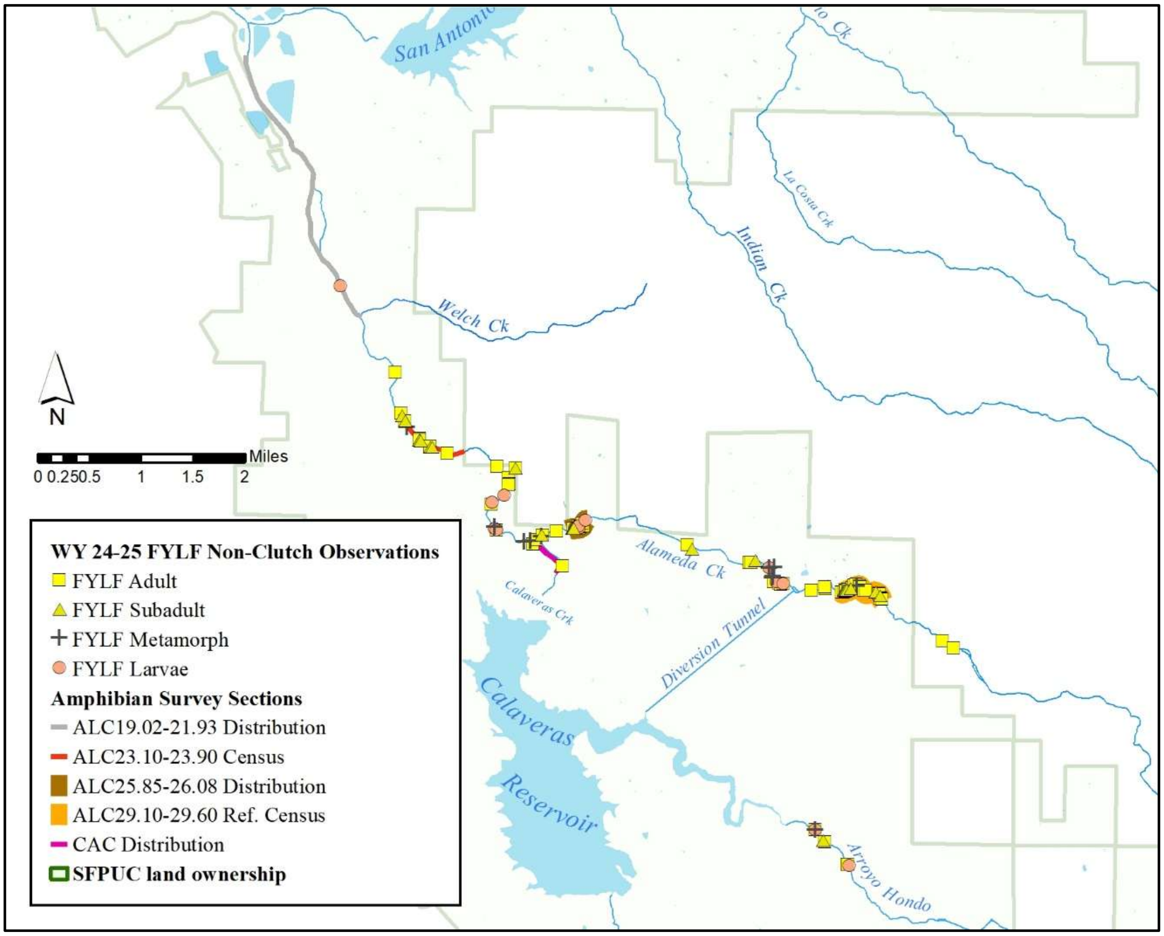

Figure 10-7. *Amphibian survey post-metamorphic Foothill Yellow-legged Frog observations.*

10.3.2 Calaveras Creek Amphibian Observations

Calaveras Creek was surveyed for amphibians multiple times in the late winter and spring of 2025. No CRLF were observed. One adult FYLF was observed near the confluence of Alameda Creek during an amphibian survey on March 11, 2025 (Figure 10-7). No BF were observed. There were no observations of frogs during ancillary surveys.

10.3.3 Arroyo Hondo Amphibian Observations

In the Arroyo Hondo, ancillary observations were made during *O. mykiss* spawning surveys from January through April and during early August snorkel surveys. The fisheries survey reach extended from the geologic feature known as the “slide” at ARH05.40 downstream to ARH03.01, the approximate inundation for Calaveras Reservoir for this period. One CRLF subadult was observed at ARH3.13 (Figure 10-6). A total of 47 FYLF clutches, six adult, one subadult, and 10 metamorph/larval FYLFs were observed as ancillary observations during *O. mykiss* spawning and snorkel surveys (Figures 10-5 and 10-7). Two adults, one subadult, and one larval BF were observed in this reach of Arroyo Hondo (Figure 10-6).

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12. Acknowledgements

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Appendix A Calaveras Reservoir Water Quality Data

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	Turb NTU	Phytoplankton TOTAL	Zooplankton TOTAL	Planktors TOTAL	Blue-Green Total	Diatom Total	Other Total
10/7/2024	0	748.9	22.5	8.7	261	178	9.0	104.4	193.4	-0.2	-0.9	1.5	1239500	27000	1266500	736500	270000	233000
10/7/2024	5	743.9	22.4	8.7	260	178	8.9	102.7	197.7	0.0	-0.8							
10/7/2024	10	739.3	22.4	8.6	260	178	8.8	101.6	199.1	0.0	-0.7	0.7						
10/7/2024	20	728.9	22.3	8.5	259	178	8.1	92.7	204.5	0.0	-0.6	1.0						
10/7/2024	30	719.3	21.7	7.4	252	175	4.3	49.2	215.7	0.0	-0.5							
10/7/2024	35	714.3	19.2	6.7	232	169	3.7	39.5	233.2	0.0	-0.5							
10/7/2024	40	709.3	13.1	6.7	193	163	6.6	62.3	232.6	0.0	-0.6	0.9						
10/7/2024	50	698.9	12.3	6.7	188	161	8.5	79	229.1	0.0	-0.5							
10/7/2024	60	689.1	12.2	6.7	187	161	8.6	80.3	222.4	-0.1	-0.6	1.3						
10/7/2024	70	679.1	12.2	6.7	187	161	8.8	82.4	212.8	-0.1	-0.6							
10/7/2024	80	669.0	12.2	6.7	187	161	8.8	81.6	208.4	-0.1	-0.6							
10/7/2024	90	659.5	12.1	6.8	186	161	8.6	80.4	202.3	-0.1	-0.6	1.6						
10/7/2024	100	649.4	12.1	6.8	186	160	8.4	78.5	192.2	-0.1	-0.6							
10/7/2024	110	638.9	12.1	6.8	186	161	8.3	76.8	186.2	-0.1	-0.6	2.2						
10/7/2024	120	629.0	12.1	6.8	188	162	7.9	73.6	168.8	-0.1	-0.6							
10/7/2024	125	624.3	12.1	6.8	188	162	7.9	73.6	168.8	-0.1	-0.6							
10/7/2024	131	618.7	12.1	6.8	191	165	6.8	62.9	169.1	-0.1	-0.6	2.2						
10/21/2024	0	747.7	19.7	8.5	249	180	7.7	83.9	157.8	-0.1	-0.9	0.9	989500	16500	1006000	335500	300000	354000
10/21/2024	5	742.8	19.7	8.5	249	180	7.6	83.6	156.7	0.0	-0.8							
10/21/2024	10	738.1	19.7	8.4	249	180	7.4	81.3	156.4	0.0	-0.7	0.8						
10/21/2024	20	727.8	19.7	8.3	249	180	7.2	78.4	158.5	0.0	-0.6	0.7						
10/21/2024	30	718.1	19.5	7.7	234	170	6.3	68.6	161.7	0.0	-0.6							
10/21/2024	40	708.1	15.1	6.9	197	158	6.8	67	177.4	-0.1	-0.7	1.6						
10/21/2024	50	697.7	12.6	7.0	190	162	8.5	79.8	175.2	-0.1	-0.7							
10/21/2024	60	687.9	12.4	7.0	189	162	8.5	79.7	170.5	-0.1	-0.6	1.6						
10/21/2024	70	677.9	12.3	7.0	188	161	8.5	79.2	165.1	-0.1	-0.6	1.3						
10/21/2024	80	667.8	12.3	7.0	188	161	8.5	78.9	160.5	-0.1	-0.7							
10/21/2024	90	658.3	12.2	7.0	187	161	8.3	77.5	154.7	-0.1	-0.7	1.2						
10/21/2024	100	648.2	12.2	7.0	187	161	8.1	75.1	148.6	-0.1	-0.7							
10/21/2024	110	637.7	12.2	7.1	187	161	7.5	69.8	138	-0.1	-0.7	1.8						
10/21/2024	120	627.8	12.2	7.1	188	162	7.5	69.9	134.3	-0.1	-0.7							
10/21/2024	129	618.7	12.2	7.2	191	164	7.7	71.8	161.3	-0.1	-0.7	2.8						

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
11/4/2024	0	746.6	17.5	8.4	238	180	8.1	84.7	220.3	-0.1	-0.8	0.8	488500	0	488500	206500	151000	131000
11/4/2024	5	741.6	17.5	8.4	238	180	8.1	84.5	220.3	-0.1	-0.7							
11/4/2024	10	737.0	17.5	8.3	238	181	8.1	84.3	220.9	-0.1	-0.7	1.6						
11/4/2024	20	726.6	17.5	8.1	238	180	7.8	81.6	231.3	-0.1	-0.6	1.3						
11/4/2024	30	717.0	17.4	7.9	238	180	7.4	77.2	236.7	-0.1	-0.6							
11/4/2024	40	707.0	12.9	6.8	193	163	8.3	78.7	252.2	-0.1	-0.6	1.6						
11/4/2024	50	696.6	12.5	6.8	190	162	8.4	79.1	251.3	-0.1	-0.7							
11/4/2024	60	686.8	12.4	6.8	189	162	8.5	79.2	247.1	-0.1	-0.7	1.2						
11/4/2024	70	676.8	12.4	6.8	189	162	8.5	79.8	242.9	-0.1	-0.6							
11/4/2024	80	666.7	12.4	6.7	189	162	8.3	78	197.2	-0.1	-0.6							
11/4/2024	90	657.2	12.3	6.7	189	162	7.9	73.5	186.3	-0.1	-0.6	1.8						
11/4/2024	100	647.1	12.3	6.7	189	162	7.4	69.5	173.6	-0.1	-0.6							
11/4/2024	110	636.6	12.3	6.7	189	162	7.4	68.8	166.8	-0.1	-0.7	2.2						
11/4/2024	120	626.7	12.3	6.7	188	162	7.0	65.8	139.8	-0.1	-0.6							
11/4/2024	130	616.7	12.3	7.1	208	178	6.5	60.5	58.8	0.3	-0.1	2.0						
11/18/2024	0	745.4	15.1	8.0	224	180	8.9	88.4	203.2	-0.1	-0.7	0.9	695500	0	695500	120500	456000	119000
11/18/2024	5	740.5	15.1	7.9	224	180	8.9	88	204.4	0.1	-0.7							
11/18/2024	10	735.9	15.1	7.9	224	180	8.9	88	204.7	0.1	-0.7	1.1						
11/18/2024	20	725.5	15.0	7.6	224	180	8.7	86.7	208.7	0.0	-0.6	1.2						
11/18/2024	30	715.8	15.0	7.2	224	180	8.6	85.1	212.8	0.0	-0.6							
11/18/2024	40	705.8	14.9	6.9	222	179	8.5	84.2	218.8	0.1	-0.7	1.0						
11/18/2024	50	695.5	13.1	6.7	197	166	8.7	82.3	221.2	0.1	-0.6							
11/18/2024	60	685.7	12.7	6.7	192	163	8.6	81	218	-0.1	-0.6	1.4						
11/18/2024	70	675.6	12.5	6.7	190	162	8.5	80.2	200.8	-0.1	-0.7							
11/18/2024	80	665.6	12.5	6.6	190	162	8.6	80.9	188.3	-0.1	-0.7							
11/18/2024	90	656.1	12.5	6.6	190	162	8.5	79.5	177.8	-0.1	-0.8	1.7						
11/18/2024	100	646.0	12.4	6.7	190	162	8.1	75.8	158.3	-0.1	-0.7							
11/18/2024	110	635.5	12.4	6.7	190	162	7.9	73.9	163.2	-0.1	-0.7	1.3						
11/18/2024	120	625.6	12.4	6.7	190	163	7.8	73.1	135.5	-0.1	-0.7							
11/18/2024	128	618.0	12.4	6.8	210	180	6.3	59.1	95.6	-0.1	-0.7	2.4						
11/25/2024	0	745.0	14.1	7.7	217	178	9.2	89.1	126.7	0.2	0.0	1.9	588000	0	588000	281000	260200	46800
11/25/2024	5	740.1	14.1	7.6	217	178	9.1	88.3	123.2	0.3	-0.3							
11/25/2024	10	735.4	14.1	7.5	217	178	9.0	87.9	121.5	0.2	-0.4	2.0						
11/25/2024	20	725.1	14.1	7.4	217	178	9.0	87.2	110.1	0.2	-0.4	1.1						
11/25/2024	30	715.4	14.0	7.2	216	178	8.9	86.8	96.6	0.2	-0.4							
11/25/2024	40	705.4	14.0	7.3	216	178	8.8	85.2	180.3	0.3	-0.4	1.8						
11/25/2024	50	695.0	13.8	6.8	212	175	8.7	83.5	101.1	0.2	-0.4							
11/25/2024	60	685.3	13.3	6.8	203	170	8.8	83.7	102.8	0.1	-0.4	1.6						

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
11/25/2024	70	675.2	12.7	6.8	193	164	8.6	81	124.9	0.1	-0.5							
11/25/2024	80	665.1	12.6	6.8	192	163	8.7	82	122.9	0.0	-0.5							
11/25/2024	90	655.7	12.5	6.8	191	163	8.4	79	121	0.0	-0.5	1.8						
11/25/2024	100	645.6	12.5	6.8	191	163	8.2	76.5	123	0.0	-0.5							
11/25/2024	110	635.0	12.5	6.9	191	163	7.9	74.3	108.4	0.0	-0.5	2.1						
11/25/2024	120	625.1	12.5	7.0	194	166	7.7	71.9	95.5	0.1	-0.4							
11/25/2024	127	618.4	12.5	7.2	194	166	7.0	65.2	82.5	0.0	-0.5	4.0						
11/30/2024	0	744.6	13.2	7.5	209	176	9.2	87.6	183.1	0.0	-0.5	4.0	1006300	0	1006300	300100	580000	126200
11/30/2024	5	739.7	13.2	7.5	210	176	9.2	87.6	182.8	0.2	-0.5							
11/30/2024	10	735.0	13.2	7.4	209	176	9.2	87.4	182.4	0.3	-0.4	2.0						
11/30/2024	20	724.7	13.2	7.4	210	176	9.2	87.4	182	0.2	-0.4	2.0						
11/30/2024	30	715.0	13.2	7.4	210	176	9.2	87.3	181.6	0.2	-0.5							
11/30/2024	40	705.0	13.2	7.3	210	176	9.2	87.2	180.6	0.2	-0.4	2.5						
11/30/2024	50	694.6	13.2	7.2	210	176	9.1	87.2	180.1	0.3	-0.5							
11/30/2024	60	684.9	13.2	7.0	208	175	9.1	86.7	179.9	0.2	-0.4	2.0						
11/30/2024	70	674.8	13.0	6.7	203	171	9.3	87.8	178.7	0.1	-0.5							
11/30/2024	80	664.8	12.8	6.7	196	166	9.1	85.8	167	-0.1	-0.6							
11/30/2024	90	655.3	12.6	6.7	193	164	8.9	83.5	153.4	-0.1	-0.6	2.0						
11/30/2024	100	645.2	12.6	6.7	192	164	8.7	82.2	134.4	-0.1	-0.6							
11/30/2024	110	634.6	12.6	6.7	192	164	8.4	78.9	118.6	0.0	-0.4	1.6						
11/30/2024	120	624.7	12.6	6.7	192	164	8.1	76.2	114.5	-0.1	-0.6							
11/30/2024	127	617.6	12.6	6.9	206	175	8.1	76.1	-38.3	0.3	2.6	2.3						
12/9/2024	0	744.2	12.8	7.4	206	175	9.7	91.9	197.4	0.2	-0.5	3.0	2091500	8300	2099800	267200	1540000	284300
12/9/2024	5	739.2	12.8	7.4	206	175	9.7	91.9	194.3	0.5	-0.4							
12/9/2024	10	734.6	12.8	7.4	206	175	9.7	91.8	192.6	0.6	-0.4	2.5						
12/9/2024	20	724.2	12.8	7.4	206	175	9.7	91.8	187.7	0.8	-0.4	3.6						
12/9/2024	30	714.6	12.8	7.5	206	175	9.7	91.8	183.1	0.6	-0.4							
12/9/2024	40	704.6	12.8	7.5	206	175	9.7	91.8	176.8	0.7	-0.4	1.9						
12/9/2024	50	694.2	12.8	7.5	206	175	9.7	91.7	169.5	0.6	-0.4							
12/9/2024	60	684.4	12.8	7.5	206	175	9.7	91.6	152.9	0.6	-0.4	2.3						
12/9/2024	70	674.4	12.8	7.5	207	175	9.7	91.6	142.7	0.6	-0.4							
12/9/2024	80	664.3	12.8	7.5	207	175	9.7	91.4	121.5	0.6	-0.4							
12/9/2024	90	654.8	12.8	7.5	207	175	9.7	91.4	103.8	0.6	-0.4	2.5						
12/9/2024	100	644.7	12.8	7.5	207	175	9.7	91.3	80.9	0.7	-0.3							
12/9/2024	110	634.2	12.8	7.5	207	175	9.7	91.2	80.1	0.7	-0.3	2.2						
12/9/2024	120	624.3	12.8	7.5	207	175	9.6	90.7	77	0.7	-0.3							
12/9/2024	126	618.2	12.7	7.4	207	176	9.7	91.4	71.5	0.8	-0.3	3.8						
12/12/2024	0	744.1	12.5	7.3	205	175	9.9	92.8	208.8	0.7	-0.2	3.1	2223200	16300	2239500	202600	1710300	310300

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
12/12/2024	5	739.2	12.5	7.3	205	175	9.9	92.9	208.8	0.8	-0.2							
12/12/2024	10	734.5	12.5	7.3	205	175	9.9	92.9	208.9	0.8	-0.2	2.7						
12/12/2024	20	724.2	12.5	7.3	205	175	9.9	93	209.1	0.8	-0.2	2.7						
12/12/2024	30	714.5	12.5	7.3	205	175	9.9	93	209.1	0.9	-0.1							
12/12/2024	40	704.5	12.5	7.2	205	175	9.9	92.9	209.1	0.8	-0.2	3.5						
12/12/2024	50	694.1	12.5	7.2	205	175	9.9	92.8	208.9	0.8	-0.2							
12/12/2024	60	684.4	12.5	7.2	205	175	9.9	92.8	208.5	0.8	-0.2	2.8						
12/12/2024	70	674.3	12.5	7.2	205	175	9.9	92.8	208.2	1.0	-0.2							
12/12/2024	80	664.2	12.5	7.2	205	175	9.9	92.8	207.6	1.0	-0.2							
12/12/2024	90	654.8	12.5	7.2	205	175	9.9	92.7	207.1	0.9	-0.2	2.6						
12/12/2024	100	644.7	12.5	7.2	205	175	9.9	92.6	206.2	1.0	-0.2							
12/12/2024	110	634.1	12.5	7.2	205	175	9.9	92.5	205.2	0.9	-0.2	3.0						
12/12/2024	120	624.2	12.5	7.2	205	175	9.9	92.5	205.5	1.0	-0.1							
12/12/2024	126	618.6	12.5	7.2	205	175	9.9	92.5	206.5	1.0	-0.2	3.1						
12/16/2024	0	744.0	12.3	7.5	204	175	10.2	95.1	188.4	1.1	-0.4	2.1	2955300	9900	2965200	192100	2676600	86600
12/16/2024	5	739.1	12.3	7.5	205	175	10.2	95	186	1.0	-0.4							
12/16/2024	10	734.5	12.3	7.5	205	175	10.2	95	184.5	1.1	-0.4	2.1						
12/16/2024	20	724.1	12.3	7.5	205	175	10.2	94.9	178.9	1.0	-0.4	2.4						
12/16/2024	30	714.4	12.3	7.5	204	175	10.2	94.9	176.3	0.9	-0.4							
12/16/2024	40	704.4	12.3	7.5	205	175	10.2	94.9	171.4	0.9	-0.4	2.1						
12/16/2024	50	694.1	12.3	7.5	204	175	10.2	94.9	166.4	0.9	-0.4							
12/16/2024	60	684.3	12.3	7.5	205	175	10.2	95	161.4	0.9	-0.4	2.4						
12/16/2024	70	674.2	12.3	7.5	205	175	10.2	95	157	1.1	-0.4							
12/16/2024	80	664.2	12.3	7.5	205	175	10.2	94.9	144.4	0.9	-0.4							
12/16/2024	90	654.7	12.3	7.5	205	175	10.1	94.9	132.1	0.9	-0.4	2.6						
12/16/2024	100	644.6	12.3	7.6	204	175	10.1	94.7	120.7	0.9	-0.4							
12/16/2024	110	634.0	12.3	7.6	205	175	10.1	94.6	107.3	1.1	-0.4	2.7						
12/16/2024	120	624.1	12.3	7.6	204	175	10.1	94	69	1.0	-0.4							
12/16/2024	126	618.7	12.3	7.6	205	176	10.0	93.8	52.4	1.4	-0.3	2.7						
12/23/2024	0	742.8	12.6	7.5	206	176	10.7	101	193.3	0.7	-0.3	2.8	3987300	0	3987300	147200	3779000	61100
12/23/2024	5	737.9	12.5	7.4	206	176	10.7	100	191.8	2.2	-0.2							
12/23/2024	10	733.2	12.4	7.4	205	176	10.5	98.8	189.8	1.3	-0.2	2.7						
12/23/2024	20	722.9	12.2	7.4	204	176	10.4	96.8	184.8	1.9	-0.2	2.8						
12/23/2024	30	713.2	12.1	7.4	204	175	10.2	95.2	178.3	2.4	-0.2							
12/23/2024	40	703.2	12.1	7.3	204	176	10.2	94.7	170.2	2.2	-0.3	2.2						
12/23/2024	50	692.8	12.1	7.3	204	176	10.1	94.4	161.7	1.9	-0.3							
12/23/2024	60	683.1	12.1	7.3	204	176	10.1	93.8	152.1	1.5	-0.4	1.9						
12/23/2024	70	673.0	12.1	7.3	204	176	10.1	93.5	143.6	1.8	-0.4							

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
12/23/2024	80	663.0	12.1	7.3	204	176	10.0	93	129.3	1.1	-0.4							
12/23/2024	90	653.5	12.1	7.2	204	176	9.9	91.8	115.1	1.6	-0.4	2.3						
12/23/2024	100	643.4	12.1	7.2	204	176	9.7	89.8	100.6	1.4	-0.5							
12/23/2024	110	632.8	12.0	7.2	207	179	9.0	83.9	53.5	1.1	-0.5	2.0						
12/23/2024	120	622.9	12.0	7.1	208	179	8.5	79.1	13.7	1.5	-0.1							
12/23/2024	126	617.0	12.0	7.1	210	181	8.1	75.1	64.5	12.3	1.6	2.5						
12/30/2024	0	742.3	12.4	7.8	204	175	11.3	106.3	153	3.7	0.1	1.8	11197500	0	11197500	237500	10902000	58000
12/30/2024	5	737.4	12.4	7.8	204	175	11.3	105.8	151.1	5.4	0.1							
12/30/2024	10	732.7	12.4	7.8	204	175	11.2	105.2	149.4	4.2	0.1	1.8						
12/30/2024	20	722.4	12.4	7.6	204	175	10.9	101.9	144.2	5.3	0.0	2.1						
12/30/2024	30	712.7	12.3	7.6	204	175	10.7	99.8	140.5	3.2	-0.1							
12/30/2024	40	702.7	12.3	7.5	204	175	10.3	96.6	135.2	4.9	-0.2	1.9						
12/30/2024	50	692.3	12.2	7.4	204	176	10.0	93.4	128.3	1.7	-0.3							
12/30/2024	60	682.6	12.1	7.4	205	177	10.0	93.2	119.1	0.8	-0.3	1.2						
12/30/2024	70	672.5	12.1	7.4	205	177	9.7	90.1	113.6	0.8	-0.4							
12/30/2024	80	662.5	12.1	7.4	206	177	9.4	86.9	101.9	0.6	-0.4							
12/30/2024	90	653.0	12.0	7.4	206	178	9.1	84.5	77.1	0.6	-0.4	1.5						
12/30/2024	100	642.9	12.0	7.4	207	179	8.4	77.8	44.8	0.7	-0.4							
12/30/2024	110	632.3	12.1	7.3	210	182	7.7	71.2	12.9	0.7	-0.2	2.7						
12/30/2024	120	622.4	12.1	7.3	226	195	6.8	63.6	-39.5	1.0	1.3							
12/30/2024	125	617.4	12.1	7.3	241	208	7.5	69.4	25.6	15.7	6.1	3.6						
1/6/2025	0	741.3	12.2	7.7	205	177	10.8	100.6	181.4	0.8	-0.5	2.7	7307000	0	7307000	117000	6998000	192000
1/6/2025	5	736.3	11.9	7.6	204	177	10.6	98.2	179.7	2.5	-0.4							
1/6/2025	10	731.7	11.9	7.6	204	177	10.5	97.3	177.9	3.0	-0.4	3.1						
1/6/2025	20	721.3	11.9	7.6	204	177	10.5	97.2	175.5	5.1	-0.4	2.3						
1/6/2025	30	711.7	11.9	7.6	204	177	10.5	97	170.7	7.0	-0.4							
1/6/2025	40	701.7	11.9	7.6	204	177	10.5	96.9	166.8	2.4	-0.4	2.5						
1/6/2025	50	691.3	11.9	7.6	204	177	10.5	97	162.3	2.3	-0.5							
1/6/2025	60	681.5	11.8	7.6	204	177	10.5	97.1	157.9	4.0	-0.4	3.2						
1/6/2025	70	671.5	11.8	7.6	204	177	10.5	96.9	152.5	1.8	-0.4							
1/6/2025	80	661.4	11.8	7.6	204	177	10.5	96.7	147.5	1.9	-0.4							
1/6/2025	90	651.9	11.8	7.6	204	177	10.4	95.8	137.6	2.3	-0.4	2.9						
1/6/2025	100	641.8	11.8	7.5	204	177	9.8	90.2	115.3	3.5	-0.4							
1/6/2025	110	631.3	11.8	7.5	206	179	8.9	82.6	108	2.6	-0.4	2.6						
1/6/2025	120	621.4	11.7	7.5	212	185	7.8	71.6	85.8	2.6	0.1							
1/6/2025	124	618.1	11.7	7.5	214	186	7.7	71.4	207.7	1.1	-0.5	3.4						
1/13/2025	0	740.0	11.3	7.6	201	177	10.8	98.4	175.4	1.3	-0.3	2.3	15904200	19000	15923200	12000	15848000	44200
1/13/2025	5	735.1	11.3	7.6	201	177	10.8	98.3	173.7	3.3	-0.2							

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
1/13/2025	10	730.4	11.3	7.6	201	177	10.8	98.3	172.7	3.2	-0.2	2.4						
1/13/2025	20	720.1	11.3	7.6	201	177	10.7	98.2	170.5	3.8	-0.2	2.1						
1/13/2025	30	710.4	11.3	7.6	201	177	10.7	98.2	163.2	3.0	-0.3							
1/13/2025	40	700.4	11.3	7.6	201	177	10.7	98.2	159.1	3.4	-0.3	2.0						
1/13/2025	50	690.0	11.3	7.5	201	177	10.7	97.9	136.7	3.2	-0.2							
1/13/2025	60	680.3	11.3	7.5	201	177	10.7	97.6	117.4	2.8	-0.3	2.4						
1/13/2025	70	670.2	11.4	7.5	201	177	10.7	97.4	101.1	2.9	-0.2							
1/13/2025	80	660.2	11.3	7.5	201	177	10.6	97	87.5	2.5	-0.3							
1/13/2025	90	650.7	11.3	7.5	201	177	10.6	96.5	74.3	3.0	-0.2	2.2						
1/13/2025	100	640.6	11.3	7.4	201	177	10.3	94.1	29.6	2.5	-0.2							
1/13/2025	110	630.0	11.3	7.3	201	177	9.8	89.8	-28.1	2.9	0.2	2.3						
1/13/2025	120	620.1	11.3	7.3	201	177	9.1	82.8	-73.7	3.2	0.5							
1/13/2025	122	618.5	11.3	7.1	202	178	7.6	69.7	-87.4	3.9	1.1	2.4						
1/21/2025	0	739.1	11.0	8.0	200	177	10.8	97.8	164.1	0.9	-0.3	2.5	4788000	5900	4793900	0.1	4705000	83000
1/21/2025	5	734.2	11.0	8.0	200	177	10.8	97.8	163.2	5.9	-0.2							
1/21/2025	10	729.6	11.0	8.0	200	177	10.8	97.7	161.7	1.3	-0.3	1.9						
1/21/2025	20	719.2	11.0	8.0	200	177	10.8	97.7	159.5	1.5	-0.3	1.9						
1/21/2025	30	709.5	11.0	8.0	200	177	10.8	97.7	156.7	2.1	-0.4							
1/21/2025	40	699.5	11.0	8.0	200	177	10.8	97.6	154.9	2.5	-0.4	2.1						
1/21/2025	50	689.2	11.0	8.0	200	177	10.8	97.6	148	1.4	-0.4							
1/21/2025	60	679.4	11.0	8.0	200	178	10.8	97.6	145.9	0.9	-0.4	2.0						
1/21/2025	70	669.3	11.0	8.0	200	177	10.8	97.7	127.5	1.7	-0.2							
1/21/2025	80	659.3	11.0	7.9	200	177	10.8	97.5	121.7	0.9	-0.4							
1/21/2025	90	649.8	11.0	7.9	200	177	10.7	97.2	117	4.1	-0.4	2.1						
1/21/2025	100	639.7	11.0	7.9	200	177	10.7	96.8	111.7	1.4	-0.4							
1/21/2025	110	629.2	10.9	7.9	200	178	10.7	96.6	107.1	1.4	-0.4	2.6						
1/21/2025	121	618.7	10.9	7.9	200	178	10.6	96.3	109.6	1.1	-0.3	2.4						
1/27/2025	0	737.6	10.6	7.9	199	178	10.4	93.2	179.1	0.0	-0.5	2.7	1397800	12000	1409800	0.1	1299000	69800
1/27/2025	5	732.7	10.6	7.9	199	178	10.4	93.2	178.4	0.1	-0.5							
1/27/2025	10	728.1	10.6	7.9	199	178	10.4	93.2	177.7	0.1	-0.4	1.9						
1/27/2025	20	717.7	10.6	7.9	199	178	10.4	93.2	176.2	0.2	-0.5	2.5						
1/27/2025	30	708.0	10.6	7.9	199	178	10.4	93.2	174.4	0.2	-0.4							
1/27/2025	40	698.0	10.6	7.9	199	178	10.4	93.2	172.9	0.2	-0.5	3.0						
1/27/2025	50	687.7	10.6	7.9	199	178	10.4	93.1	170.4	0.2	-0.5							
1/27/2025	60	677.9	10.6	7.9	199	178	10.4	93.1	168.8	0.2	-0.4	1.8						
1/27/2025	70	667.8	10.6	7.8	199	178	10.4	93.1	161.7	0.2	-0.4							
1/27/2025	80	657.8	10.6	7.8	199	178	10.3	93	158.9	0.2	-0.4							
1/27/2025	90	648.3	10.6	7.8	199	178	10.3	92.7	155.8	0.2	-0.4	2.3						

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
1/27/2025	100	638.2	10.6	7.8	199	178	10.3	92.4	152.4	0.2	-0.5							
1/27/2025	110	627.6	10.6	7.8	199	178	10.2	92	149.3	0.3	-0.4	2.6						
1/27/2025	121	617.0	10.6	7.8	199	178	10.2	91.9	182	0.8	0.0	3.9						
2/3/2025	0	736.6	10.8	7.7	200	178	10.1	91.3	120.9	-0.1	-0.4	1.2	173400	22600	196000	0.1	128600	44800
2/3/2025	5	731.7	10.8	7.7	200	178	10.1	91.1	118.3	-0.1	-0.4							
2/3/2025	10	727.1	10.8	7.7	200	178	10.1	90.9	116.8	-0.1	-0.4	1.5						
2/3/2025	20	716.7	10.8	7.7	200	178	10.0	90.7	113.6	-0.1	-0.4	1.1						
2/3/2025	30	707.0	10.8	7.7	200	178	10.0	90.3	109.5	-0.1	-0.4							
2/3/2025	40	697.0	10.8	7.7	200	178	9.9	89.6	103.9	-0.1	-0.4	1.3						
2/3/2025	50	686.7	10.7	7.7	200	178	9.9	88.9	101.3	-0.1	-0.4							
2/3/2025	60	676.9	10.7	7.6	200	178	9.8	88	98.5	-0.1	-0.4	1.2						
2/3/2025	70	666.8	10.7	7.6	199	178	9.6	86.4	89.7	-0.1	-0.4							
2/3/2025	80	656.8	10.7	7.5	199	178	9.3	84	85.3	-0.1	-0.4							
2/3/2025	90	647.3	10.6	7.5	199	179	8.7	77.8	72.8	-0.2	-0.4	1.1						
2/3/2025	100	637.2	10.5	7.4	201	181	7.5	67.6	50.2	-0.1	-0.4							
2/3/2025	110	626.7	10.5	7.4	203	183	7.2	64.4	32.5	-0.1	-0.4	1.7						
2/3/2025	118	618.6	10.5	7.4	204	183	7.8	69.8	21.2	0.1	0.1	1.8						
2/10/2025	0	736.8	10.7	7.9	200	178	9.7	87.7	164.5	-0.2	-0.4	2.9	275000	0	275000	9600	232000	33400
2/10/2025	5	731.9	10.6	7.9	199	178	9.7	87.4	163.1	-0.1	-0.4							
2/10/2025	10	727.2	10.6	7.9	199	178	9.7	87.4	161.2	-0.1	-0.4	2.4						
2/10/2025	20	716.9	10.6	7.9	199	178	9.7	87.3	156.5	-0.1	-0.4	2.6						
2/10/2025	30	707.2	10.6	7.9	199	178	9.7	87.3	152.9	-0.1	-0.4							
2/10/2025	40	697.2	10.6	7.9	199	178	9.7	87.3	149	-0.1	-0.4	2.3						
2/10/2025	50	686.8	10.6	7.9	199	178	9.7	87.2	145.1	-0.1	-0.4							
2/10/2025	60	677.1	10.6	7.9	199	179	9.7	86.9	130.9	-0.1	-0.3	2.9						
2/10/2025	70	667.0	10.6	7.9	199	179	9.7	86.9	118.1	-0.1	-0.4							
2/10/2025	80	657.0	10.6	7.9	199	178	9.7	86.8	107.6	-0.1	-0.4							
2/10/2025	90	647.5	10.5	7.9	199	179	9.5	85.3	83.3	-0.1	-0.4	2.4						
2/10/2025	100	637.4	10.5	7.8	199	179	9.4	83.9	68.6	-0.1	-0.4							
2/10/2025	110	626.8	10.5	7.8	199	179	9.1	81.9	25.4	-0.1	-0.4	3.5						
2/10/2025	119	618.7	10.5	7.7	200	180	7.4	66.1	-70.9	1.7	0.3	3.0						
2/18/2025	0	743.1	10.6	7.6	198	177	9.9	88.7	157.7	0.0	-0.4	4.3	142000	4200	146200	0	100000	42000
2/18/2025	5	738.2	10.6	7.6	198	177	9.8	88.5	156.8	0.0	-0.4							
2/18/2025	10	733.5	10.6	7.6	197	177	9.8	88.4	156	0.0	-0.4	3.9						
2/18/2025	20	723.2	10.6	7.6	198	177	9.8	88	153.9	0.0	-0.4	4.2						
2/18/2025	30	713.5	10.6	7.6	197	177	9.7	87.5	152.3	-0.1	-0.4							
2/18/2025	40	703.5	10.6	7.5	198	177	9.7	87.1	149	-0.1	-0.4	4.4						
2/18/2025	50	693.1	10.6	7.5	197	177	9.7	86.7	145.1	-0.2	-0.5							

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco-RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
2/18/2025	60	683.3	10.6	7.4	197	177	9.6	86.2	142.4	-0.2	-0.5	6.1						
2/18/2025	70	673.3	10.6	7.3	199	178	9.5	85.7	138.5	-0.1	-0.4							
2/18/2025	80	663.2	10.5	7.3	170	153	9.6	85.5	132.7	0.2	-0.2							
2/18/2025	90	653.7	10.3	7.3	154	139	9.5	85	129.4	0.4	-0.1	76.4						
2/18/2025	100	643.6	10.2	7.2	138	125	8.7	77.1	99.4	0.5	0.0							
2/18/2025	110	633.1	10.3	7.2	142	128	7.9	70.2	76.3	0.6	0.1	154.0						
2/18/2025	120	623.5	10.2	7.1	139	126	7.5	66.9	54.2	0.8	0.3							
2/18/2025	127	616.8	10.3	7.2	141	127	7.0	62.7	80.4	5.2	1.9	137.0						
2/24/2025	0	742.7	13.1	8.0	210	177	10.4	99.1	130.4	0.2	-0.4	2.6	179700	0	179700	56900	69000	53800
2/24/2025	5	737.8	12.8	7.9	208	177	10.2	96.5	128.1	0.3	-0.4							
2/24/2025	10	733.2	12.3	7.9	205	176	10.2	95.5	127.1	0.1	-0.4	3.0						
2/24/2025	20	722.8	11.1	7.9	199	176	9.8	89.2	124.3	-0.1	-0.5	2.6						
2/24/2025	30	713.1	10.8	7.8	197	175	9.6	86.3	118	-0.1	-0.5							
2/24/2025	40	703.1	10.6	7.8	193	173	9.4	84.8	113.4	-0.1	-0.4	5.6						
2/24/2025	50	692.8	10.5	7.7	186	167	9.4	84	106.5	0.0	-0.4							
2/24/2025	60	683.0	10.5	7.7	183	164	9.2	82.9	98.1	0.0	-0.4	17.0						
2/24/2025	70	672.9	10.4	7.6	177	159	9.1	81.6	88.5	0.0	-0.4							
2/24/2025	80	662.9	10.4	7.6	169	153	9.0	80.8	84.9	0.1	-0.4							
2/24/2025	90	653.4	10.3	7.6	162	146	8.9	79.6	71.5	0.2	-0.4	30.7						
2/24/2025	100	643.3	10.3	7.6	159	144	8.8	78.5	58.1	0.2	-0.4							
2/24/2025	110	632.8	10.3	7.6	157	142	8.7	77.5	43.9	0.2	-0.3	38.4						
2/24/2025	120	623.1	10.3	7.6	156	141	8.6	76.5	28.4	0.3	-0.2							
2/24/2025	124	618.7	10.3	7.5	161	146	8.3	73.9	-10.6	1.5	0.3	37.4						
3/3/2025	0	741.9	12.3	7.8	205	176	10.2	95.4	179.7	0.1	-0.5	2.6	297000	0	297000	27000	141000	114000
3/3/2025	5	737.0	12.2	7.8	204	176	10.1	94.2	179.3	0.0	-0.5							
3/3/2025	10	732.4	12.1	7.7	203	175	10.0	93.2	178.8	0.1	-0.6	2.5						
3/3/2025	20	722.0	12.0	7.7	203	175	9.9	91.6	177.6	0.1	-0.5	2.0						
3/3/2025	30	712.3	11.8	7.5	201	175	9.5	87.6	175.4	0.0	-0.5							
3/3/2025	40	702.3	11.3	7.5	197	173	9.1	83.1	173.5	-0.1	-0.5	3.8						
3/3/2025	50	691.9	10.8	7.4	192	171	8.8	79.4	167.9	-0.1	-0.5							
3/3/2025	60	682.2	10.7	7.4	187	167	8.7	78.6	163.4	0.0	-0.4	3.6						
3/3/2025	70	672.1	10.6	7.4	186	166	8.7	78.3	157.9	0.0	-0.4							
3/3/2025	80	662.1	10.5	7.3	181	162	8.6	77.2	143.6	0.0	-0.5							
3/3/2025	90	652.6	10.5	7.3	177	159	8.4	75.7	131.3	0.0	-0.5	8.1						
3/3/2025	100	642.5	10.5	7.3	175	158	8.3	74.6	122.8	0.0	-0.5							
3/3/2025	110	631.9	10.4	7.3	173	155	7.8	69.7	105.6	0.1	-0.4	10.4						
3/3/2025	120	622.3	10.4	7.3	170	153	7.6	67.6	92.5	0.6	0.1							
3/3/2025	124	618.7	10.4	7.4	171	154	7.7	68.5	94.7	1.9	0.5	7.1						

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
3/10/2025	0	741.1	13.1	7.9	208	175	10.3	98.3	205.1	0.0	-0.5	1.3	300200	3400	303600	3400	208000	88800
3/10/2025	5	736.2	13.1	7.9	209	176	10.1	96	206.2	0.2	-0.5							
3/10/2025	10	731.6	12.8	7.8	207	176	10.0	94.4	207.9	0.3	-0.5	1.2						
3/10/2025	20	721.2	12.1	7.6	203	175	9.4	86.9	210.1	0.1	-0.5	1.4						
3/10/2025	30	711.5	11.4	7.4	197	173	8.6	78.6	210.5	0.1	-0.5							
3/10/2025	40	701.5	10.8	7.4	189	168	8.5	76.6	208.9	-0.1	-0.5	2.2						
3/10/2025	50	691.2	10.7	7.4	187	167	8.5	76.9	205.6	-0.1	-0.5							
3/10/2025	60	681.4	10.6	7.3	182	163	8.5	75.9	188.4	-0.1	-0.5	1.8						
3/10/2025	70	671.3	10.6	7.3	182	163	8.4	75.6	185.6	0.0	-0.6							
3/10/2025	80	661.3	10.5	7.8	178	160	8.8	79.1	204.3	-0.1	-0.6							
3/10/2025	90	651.8	10.5	7.3	174	156	8.2	73.7	123.6	0.0	-0.5	4.6						
3/10/2025	100	641.7	10.4	7.3	172	155	8.0	71.9	108.9	0.0	-0.5							
3/10/2025	110	631.2	10.4	7.2	171	154	7.3	65.5	73.2	0.6	-0.3	6.3						
3/10/2025	120	621.5	10.4	7.2	175	157	6.6	59.2	63.5	0.9	0.0							
3/10/2025	123	618.1	10.4	7.2	180	162	6.7	60	52	0.9	-0.2	7.8						
3/24/2025	0	744.1	14.0	8.1	209	172	10.9	105.9	178.7	0.1	-0.5	1.7	780000	0	780000	392200	198000	189800
3/24/2025	5	739.2	13.9	8.1	209	172	10.8	105	178.9	0.2	-0.5							
3/24/2025	10	734.5	13.7	8.0	208	172	10.6	102.3	179.1	0.1	-0.6	1.8						
3/24/2025	20	724.2	12.6	7.6	203	173	9.6	89.9	181.2	0.1	-0.6	1.1						
3/24/2025	30	714.5	12.1	7.5	201	174	9.1	84.5	181.4	0.0	-0.6							
3/24/2025	40	704.5	12.0	7.4	199	172	8.7	81.1	180.8	0.0	-0.6	1.3						
3/24/2025	50	694.1	11.3	7.2	188	166	7.9	72	174.7	0.0	-0.6							
3/24/2025	60	684.4	10.9	7.1	183	162	7.5	68	165.7	0.0	-0.6	3.5						
3/24/2025	70	674.3	10.8	7.1	181	161	7.3	66	156.7	0.1	-0.5							
3/24/2025	80	664.3	10.6	7.1	177	159	7.1	63.8	141.2	0.1	-0.5							
3/24/2025	90	654.8	10.6	7.1	175	157	6.8	61.4	124.4	0.1	-0.5	5.4						
3/24/2025	100	644.7	10.5	7.1	175	157	6.5	58.1	109.1	0.1	-0.6							
3/24/2025	110	634.1	10.5	7.1	175	157	6.0	53.4	82.8	0.2	-0.5	5.7						
3/24/2025	120	624.5	10.5	7.1	175	157	4.5	40.5	36.3	0.2	0.1							
3/24/2025	126	618.3	10.5	7.1	177	159	3.4	30	48.6	0.4	0.5	8.4						
4/7/2025	0	745.0	16.2	8.5	220	172	10.8	109.8	184.7	0.2	-0.6	2.8	1405000	3100	1408100	658600	300100	446300
4/7/2025	5	740.0	16.1	8.4	220	172	10.6	107.9	190.6	0.1	-0.6							
4/7/2025	10	735.0	16.1	8.1	214	167	10.1	102.9	196	0.2	-0.5	2.0						
4/7/2025	20	725.0	13.7	7.7	208	173	9.5	91.1	202.1	0.2	-0.4	1.4						
4/7/2025	30	715.0	12.5	7.2	201	172	8.2	77.1	203.9	0.2	-0.6							
4/7/2025	40	705.0	11.5	7.1	189	166	7.9	72	201.2	0.0	-0.6	1.6						
4/7/2025	50	695.0	11.1	7.1	183	162	7.8	71.2	196.4	0.0	-0.6							
4/7/2025	60	685.0	10.9	7.1	180	160	8.2	73.9	192.9	0.0	-0.6	2.3						

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
4/7/2025	70	675.0	10.8	7.1	179	159	8.6	77.5	186.1	0.0	-0.6							
4/7/2025	80	665.0	10.8	7.1	178	159	8.2	74.2	179.2	0.0	-0.6							
4/7/2025	90	655.0	10.8	7.1	178	159	8.2	74.2	170.5	0.0	-0.6	3.5						
4/7/2025	100	645.0	10.7	7.1	178	159	7.5	67.9	148.7	0.0	-0.6							
4/7/2025	110	635.0	10.7	7.1	177	159	6.9	62.2	140.5	0.0	-0.6	4.5						
4/7/2025	120	625.0	10.7	7.1	179	160	6.8	61.5	130.2	0.2	-0.4							
4/7/2025	126	618.6	10.8	7.1	183	163	6.7	60.7	151.7	0.1	-0.6	5.8						
4/21/2025	0	744.4	16.2	8.5	220	172	10.8	109.8	184.7	0.2	-0.6	1.2	1097500	7000	1104500	331000	283500	483000
4/21/2025	5	739.4	16.1	8.4	220	172	10.6	107.9	190.6	0.1	-0.6							
4/21/2025	10	734.4	16.1	8.1	214	167	10.1	102.9	196	0.2	-0.5	1.1						
4/21/2025	20	724.4	13.7	7.7	208	173	9.5	91.1	202.1	0.2	-0.4	1.5						
4/21/2025	30	714.4	12.5	7.2	201	172	8.2	77.1	203.9	0.2	-0.6							
4/21/2025	40	704.4	11.5	7.1	189	166	7.9	72	201.2	0.0	-0.6	1.7						
4/21/2025	50	694.4	11.1	7.1	183	162	7.8	71.2	196.4	0.0	-0.6							
4/21/2025	60	684.4	10.9	7.1	180	160	8.2	73.9	192.9	0.0	-0.6	2.4						
4/21/2025	70	674.4	10.8	7.1	179	159	8.6	77.5	186.1	0.0	-0.6							
4/21/2025	80	664.4	10.8	7.1	178	159	8.2	74.2	179.2	0.0	-0.6							
4/21/2025	90	654.4	10.8	7.1	178	159	8.2	74.2	170.5	0.0	-0.6	1.6						
4/21/2025	100	644.4	10.7	7.1	178	159	7.5	67.9	148.7	0.0	-0.6							
4/21/2025	110	634.4	10.7	7.1	177	159	6.9	62.2	140.5	0.0	-0.6	1.4						
4/21/2025	120	624.4	10.7	7.1	179	160	6.8	61.5	130.2	0.2	-0.4							
4/21/2025	125	619.1	10.8	7.1	183	163	6.7	60.7	151.7	0.1	-0.6	6.1						
5/5/2025	0	743.6	18.5	8.6	237	176	9.8	104.3	187.8	0.0	-0.6	2.1	2878500	7000	2885500	217000	932500	1729000
5/5/2025	5	738.6	18.1	8.6	236	176	9.4	99.4	192.4	0.2	-0.5							
5/5/2025	10	733.6	17.5	8.4	231	175	9.3	96.6	197	0.3	-0.5	1.8						
5/5/2025	20	723.6	14.8	7.6	220	178	8.1	79.7	198.8	0.2	-0.4	2.8						
5/5/2025	30	713.6	12.6	7.4	201	171	7.5	70.4	195	0.1	-0.5							
5/5/2025	40	703.6	11.5	7.4	189	166	7.9	72.5	188.8	0.0	-0.6	1.0						
5/5/2025	50	693.6	11.1	7.4	183	162	8.6	78.4	176.9	0.0	-0.6							
5/5/2025	60	683.6	11.0	7.4	182	162	8.7	78.5	169	0.0	-0.6	2.2						
5/5/2025	70	673.6	11.0	7.4	182	161	8.7	78.6	160.4	0.0	-0.6							
5/5/2025	80	663.6	11.0	7.4	182	161	8.4	75.9	144.9	-0.1	-0.6							
5/5/2025	90	653.6	11.0	7.5	182	161	7.6	69.1	123.1	-0.1	-0.7	2.1						
5/5/2025	100	643.6	11.0	7.5	182	161	7.1	64.6	101.8	-0.1	-0.6							
5/5/2025	110	633.6	11.0	7.5	182	161	7.0	63	81.2	0.1	-0.4	3.1						
5/5/2025	120	623.6	11.0	7.5	183	162	6.9	62.5	57.9	0.8	-0.3							
5/5/2025	124	619.9	11.0	7.5	183	162	6.8	61.9	38.8	0.5	-0.1	3.6						
5/19/2025	0	743.5	19.9	8.7	247	178	9.4	103	147	-0.1	-0.9	1.1	3537700	6200	3543900	499300	1290000	1748400

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
5/19/2025	5	738.5	19.8	8.6	247	178	9.3	101.8	151.2	0.0	-0.8							
5/19/2025	10	733.5	19.8	8.6	247	178	9.1	100.1	156.4	0.1	-0.7	1.9						
5/19/2025	20	723.5	19.4	8.3	245	178	8.7	94.2	170.5	0.1	-0.6	1.2						
5/19/2025	30	713.5	12.7	7.0	201	171	6.8	64.3	182.4	0.1	-0.5							
5/19/2025	40	703.5	12.0	7.0	194	168	7.1	65.9	179.4	0.0	-0.5	1.0						
5/19/2025	50	693.5	11.2	7.0	185	163	8.1	74	170.3	-0.1	-0.6							
5/19/2025	60	683.5	11.1	7.0	184	163	8.3	75.7	165.1	0.0	-0.6	1.1						
5/19/2025	70	673.5	11.1	7.0	183	162	8.5	77	157.3	-0.1	-0.6							
5/19/2025	80	663.5	11.1	7.0	183	162	8.4	76.6	144.4	-0.1	-0.6							
5/19/2025	90	653.5	11.1	7.0	183	162	8.1	73.7	136.2	-0.1	-0.6	1.8						
5/19/2025	100	643.5	11.0	7.0	183	162	7.7	69.5	122.5	-0.1	-0.6							
5/19/2025	110	633.5	11.0	7.0	183	162	7.4	67.4	109.4	-0.1	-0.6	1.4						
5/19/2025	120	623.5	11.1	7.0	189	167	7.1	64.2	97	0.1	-0.4							
5/19/2025	125	618.2	11.1	7.0	223	197	6.3	57.5	91	0.0	-0.6	2.4						
6/2/2025	0	743.3	22.8	8.5	267	181	8.7	101.2	192.9	-0.2	-0.9	1.2	1433600	7500	1441100	250000	723800	459800
6/2/2025	5	738.3	22.8	8.3	267	181	8.5	98.9	196.9	-0.1	-0.8							
6/2/2025	10	733.3	22.6	8.2	265	181	8.3	96	201.9	-0.1	-0.7	1.1						
6/2/2025	20	723.3	21.4	7.6	241	168	7.3	82.7	211.1	0.1	-0.6	1.0						
6/2/2025	30	713.3	14.8	6.9	210	169	6.3	62.2	215.5	0.5	-0.4							
6/2/2025	40	703.3	12.3	6.9	197	169	7.3	68.3	213.8	0.3	-0.5	1.4						
6/2/2025	50	693.3	11.6	6.9	190	166	7.9	72.3	211.4	0.0	-0.5							
6/2/2025	60	683.3	11.2	6.9	186	164	8.8	80.5	202.9	-0.1	-0.6	0.9						
6/2/2025	70	673.3	11.2	6.9	185	163	8.7	79.5	196.8	-0.1	-0.5							
6/2/2025	80	663.3	11.2	6.9	185	163	8.9	80.6	189.2	-0.1	-0.5							
6/2/2025	90	653.3	11.1	6.9	184	163	8.8	80.4	175.1	-0.1	-0.6	0.9						
6/2/2025	100	643.3	11.1	6.9	184	163	8.7	79.1	160.9	-0.1	-0.5							
6/2/2025	110	633.3	11.1	7.0	184	163	8.1	73.4	125.4	-0.1	-0.5	1.2						
6/2/2025	120	623.3	11.1	7.0	186	164	7.8	71	108.2	0.0	-0.4							
6/2/2025	125	618.5	11.1	7.0	191	169	7.8	70.8	94.9	0.6	0.1	2.3						
6/16/2025	0	742.8	22.5	8.4	266	182	8.6	99.3	191.8	-0.2	-0.8	1.1	2094500	5700	2100200	805700	525700	763100
6/16/2025	5	737.8	22.5	8.2	266	182	8.5	97.7	194.6	-0.1	-0.7							
6/16/2025	10	732.8	22.4	8.2	266	182	8.3	96.1	196.5	-0.1	-0.6	0.9						
6/16/2025	20	722.8	22.3	8.0	264	181	7.6	87.9	198	0.0	-0.5	1.1						
6/16/2025	30	712.8	17.7	6.8	220	166	5.9	61.7	212.5	0.6	-0.5							
6/16/2025	40	702.8	13.3	6.8	205	172	5.7	54.9	210.9	0.4	-0.5	1.9						
6/16/2025	50	692.8	11.8	6.8	192	167	7.5	68.9	207	0.0	-0.5							
6/16/2025	60	682.8	11.4	6.8	188	165	8.5	77.6	200.8	0.0	-0.6	1.1						
6/16/2025	70	672.8	11.3	6.8	186	164	8.7	79.2	193.1	-0.1	-0.6							

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
6/16/2025	80	662.8	11.2	6.8	186	164	8.7	79	186	-0.1	-0.6							
6/16/2025	90	652.8	11.2	6.8	186	164	8.6	78.1	181	-0.1	-0.6	1.1						
6/16/2025	100	642.8	11.2	6.8	185	164	8.2	74.7	176.5	-0.1	-0.6							
6/16/2025	110	632.8	11.2	6.9	185	164	8.1	73.5	163.1	-0.1	-0.6	1.2						
6/16/2025	120	622.8	11.2	6.9	187	165	8.1	73.9	177.7	0.0	-0.6							
6/16/2025	123	619.8	11.2	7.0	187	165	8.1	73.8	193.9	-0.1	-0.7	1.4						
6/30/2025	0	742.0	23.7	8.7	275	184	8.7	102.7	159.8	-0.3	-1.0	0.8	2421300	0	2421300	2024100	151000	246200
6/30/2025	5	737.0	23.7	8.7	275	183	8.7	102.3	158.8	-0.2	-0.9							
6/30/2025	10	732.0	23.7	8.6	275	183	8.6	101.7	160	-0.2	-0.8	2.7						
6/30/2025	20	722.0	23.4	8.0	273	183	8.1	94.9	180.1	-0.2	-0.5	1.5						
6/30/2025	30	712.0	18.9	6.8	216	159	5.7	61.7	195.4	0.1	-0.3							
6/30/2025	40	702.0	12.7	6.8	200	170	6.1	57	194	0.0	-0.6	2.0						
6/30/2025	50	692.0	11.7	6.8	191	166	8.0	73.7	189.6	-0.1	-0.6							
6/30/2025	60	682.0	11.4	6.8	188	165	9.0	82.1	177.2	-0.1	-0.6	1.1						
6/30/2025	70	672.0	11.3	6.8	187	164	9.0	82.6	170.6	-0.1	-0.6							
6/30/2025	80	662.0	11.3	6.9	187	164	9.1	83.4	155.1	-0.1	-0.6							
6/30/2025	90	652.0	11.3	6.9	187	164	9.0	82.3	149.5	-0.1	-0.7	0.9						
6/30/2025	100	642.0	11.3	6.9	187	164	8.7	79.3	131.1	-0.1	-0.7							
6/30/2025	110	632.0	11.3	6.9	186	164	8.5	77.3	106.7	-0.1	-0.7	1.3						
6/30/2025	120	622.0	11.3	6.9	188	165	8.2	75.3	127.8	0.0	-0.6							
6/30/2025	122	620.4	11.3	7.0	189	167	8.3	75.7	119.6	-0.1	-0.8	1.4						
7/14/2025	0	741.3	24.6	8.8	280	184	8.8	106.2	180.4	-0.3	-1.2	0.9	1298200	9400	1307600	789400	233400	275400
7/14/2025	5	736.3	24.4	8.7	280	184	8.8	105.6	181.8	-0.2	-1.0							
7/14/2025	10	731.3	24.2	8.4	279	184	8.7	103.5	191.1	-0.1	-0.8	0.9						
7/14/2025	20	721.3	23.5	8.2	273	183	8.1	95	198.2	0.0	-0.4	1.1						
7/14/2025	30	711.3	18.3	6.9	219	163	5.5	58.3	216.8	0.3	-0.4							
7/14/2025	40	701.3	12.5	6.9	198	169	6.7	62.8	215.2	0.2	-0.5	1.1						
7/14/2025	50	691.3	11.7	7.0	191	166	8.3	76.9	211.7	0.0	-0.5							
7/14/2025	60	681.3	11.4	7.0	188	165	9.0	82.3	203.6	0.0	-0.6	0.9						
7/14/2025	70	671.3	11.4	7.0	188	165	9.1	83.1	197.1	-0.1	-0.6							
7/14/2025	80	661.3	11.4	7.0	188	165	9.1	83.4	189.7	-0.1	-0.6							
7/14/2025	90	651.3	11.4	7.0	188	165	8.9	81.2	179.7	-0.1	-0.6	1.1						
7/14/2025	100	641.3	11.3	7.0	187	165	8.5	77.3	170.9	-0.1	-0.6							
7/14/2025	110	631.3	11.3	7.1	188	165	8.3	75.7	157.9	-0.1	-0.6	1.0						
7/14/2025	120	621.3	11.4	7.1	190	167	8.3	76.2	150.2	-0.1	-0.6							
7/14/2025	123	618.8	11.4	7.1	190	167	8.5	77.3	134.2	-0.1	-0.7	1.6						
7/28/2025	0	741.0	23.8	8.9	275	183	9.5	112	186	-0.3	-1.1	2.3	3393400	10000	3403400	3129000	161000	103400
7/28/2025	5	736.0	23.8	8.8	275	183	9.5	112	186	-0.2	-1.1							

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	**Turb** NTU	Phytoplankton **TOTAL**	Zooplankton **TOTAL**	Planktors **TOTAL**	Blue-Green **Total**	Diatom **Total**	Other **Total**
7/28/2025	10	731.0	23.7	8.8	275	183	9.4	111	186	-0.2	-1.0	1.2						
7/28/2025	20	721.0	23.5	8.7	274	183	8.8	104	191	-0.2	-0.7	1.7						
7/28/2025	30	711.0	20.0	7.0	253	182	4.6	51	214	-0.1	-0.6							
7/28/2025	40	701.0	14.3	6.7	210	172	3.9	39	227	-0.1	-0.5	1.2						
7/28/2025	50	691.0	12.0	6.8	194	167	7.1	66	234	-0.1	-0.6							
7/28/2025	60	681.0	11.6	6.7	190	166	8.7	80	232	-0.1	-0.6	0.9						
7/28/2025	70	671.0	11.5	6.7	189	166	8.9	82	226	-0.1	-0.6							
7/28/2025	80	661.0	11.5	6.8	189	166	9.1	83	211	0.0	-0.5							
7/28/2025	90	651.0	11.4	6.7	189	166	9.0	83	195	0.0	-0.5	0.8						
7/28/2025	100	641.0	11.4	6.7	189	166	8.8	81	182	-0.1	-0.6							
7/28/2025	110	631.0	11.4	6.8	189	166	8.4	77	155	-0.1	-0.6	1.2						
7/28/2025	120	621.0	11.4	6.8	191	167	8.1	74	106	-0.1	-0.6							
7/28/2025	122	619.0	11.4	6.8	190	167	7.5	69	36	-0.1	-0.6	1.5						
8/11/2025	0	740.3										2.4	253900	15000	268900	70000	109000	74900
8/11/2025	5	735.3																
8/11/2025	10	730.3										3.5						
8/11/2025	20	720.3										3.1						
8/11/2025	30	710.3																
8/11/2025	40	700.3										1.6						
8/11/2025	50	690.3																
8/11/2025	60	680.3										1.8						
8/11/2025	70	670.3																
8/11/2025	80	660.3																
8/11/2025	90	650.3										1.8						
8/11/2025	100	640.3																
8/11/2025	110	630.3										3.3						
8/11/2025	120	620.3																
8/11/2025	125	615.3										2.7						
8/25/2025	0	739.8	24.297	9.14	301	181	9.27	110.9	80.5	-0.05	-2.54	2.5	1086000	19300	1105300	582000	304800	199200
8/25/2025	5	734.8	24.24	9.14	301	181	9.2	109.8	79.5	0.03	-2.46							
8/25/2025	10	729.8	24.097	9.13	301	181	9.01	107.3	78	0.06	-2.36	2.6						
8/25/2025	20	719.8	24.039	9.08	301	181	8.66	103	78.6	0.03	-2.27	3.1						
8/25/2025	30	709.8	22.256	8.28	291	181	3.55	40.8	96.1	0.02	-2							
8/25/2025	40	699.8	14.841	7.07	236	170	6.45	63.7	121	-0.16	-2	1.3						
8/25/2025	50	689.8	12.095	7.06	225	172	8.71	81.1	120.4	-0.12	-2.01							
8/25/2025	60	679.8	11.843	6.91	222	171	9.28	85.9	120.4	-0.15	-2.03	2.4						
8/25/2025	70	669.8	11.817	6.89	222	171	9.35	86.4	118.5	-0.14	-2.02							
8/25/2025	80	659.8	11.779	6.86	221	171	9.44	87.2	114.2	-0.14	-2.03							

Date	Depth ft.	Elevation	Temp oC	pH pH units	Cond mS/cm	TDS mg/L	DO mg/L	DO %sat	ORP mV	Chl-a RFU	Phyco- RFU	Turb NTU	Phytoplankton TOTAL	Zooplankton TOTAL	Planktors TOTAL	Blue-Green Total	Diatom Total	Other Total
8/25/2025	90	649.8	11.754	6.86	221	170	9.2	85	110.6	-0.14	-2.05	1.9						
8/25/2025	100	639.8	11.726	6.86	220	170	8.87	81.9	100.8	-0.14	-2.05							
8/25/2025	110	629.8	11.727	6.86	222	171	8.48	78.3	89.5	-0.15	-2.05	2.1						
8/25/2025	120	619.8	11.739	6.89	225	174	8.09	74.7	77.3	-0.14	-2.03							
8/25/2025	122	618.0	11.754	6.84	234	180	8.04	74.3	66.4	0.25	-1.75	3.6						
9/8/2025	0	739.3	23.668	9.07	296	180	9.23	109.1	184.8	-0.15	-2.63	2.3	658200	0	658200	188000	250000	220200
9/8/2025	5	734.3	23.67	9.07	296	180	9.17	108.3	183.5	-0.04	-2.57							
9/8/2025	10	729.3	23.665	9.07	296	180	9.07	107.1	182.7	0.05	-2.5	1.8						
9/8/2025	20	719.3	23.632	9.05	296	180	8.08	95.4	184.1	0.09	-2.3	1.8						
9/8/2025	30	709.3	21.745	7.95	303	191	2.36	26.9	216.8	-0.04	-1.99							
9/8/2025	40	699.3	14.555	7.2	244	177	6.27	61.6	267.1	-0.17	-2.06	2.1						
9/8/2025	50	689.3	12.229	7.18	229	175	8.56	79.8	268.9	-0.15	-2.04							
9/8/2025	60	679.3	12.04	7.16	227	174	8.91	82.8	267	-0.17	-2.07	1.3						
9/8/2025	70	669.3	11.967	7.16	225	173	9.08	84.3	264.3	-0.13	-2.06							
9/8/2025	80	659.3	11.935	7.17	225	173	8.91	82.6	251.4	-0.15	-2.06							
9/8/2025	90	649.3	11.896	7.16	224	173	8.69	80.5	239	-0.17	-2.09	1.9						
9/8/2025	100	639.3	11.882	7.16	224	172	8.32	77.1	224.4	-0.17	-2.05							
9/8/2025	110	629.3	11.876	7.16	225	173	8.13	75.3	213.8	-0.16	-2.08	1.8						
9/8/2025	120	619.3	11.886	7.15	228	176	6.82	63.2	123.7	0	-1.37							
9/8/2025	121	618.1	11.883	7.08	243	187	6.51	60.3	94.5	0.19	-1.55	2.0						
9/22/2025	0	738.9	23.615	9.04	297	180	9.11	107.6	184.1	-0.22	-2.62	5.9	983400	4900	988300	457900	398900	126600
9/22/2025	5	733.9	23.586	9.04	297	180	9.05	106.8	184.5	-0.13	-2.58							
9/22/2025	10	728.9	23.569	9.04	297	180	8.96	105.7	185.3	-0.11	-2.52	1.3						
9/22/2025	20	718.9	23.552	9	296	180	8.8	103.7	189.5	-0.08	-2.43	1.3						
9/22/2025	30	708.9	21.448	7.74	297	188	2.51	28.4	240.2	0.28	-1.93							
9/22/2025	40	698.9	14.433	6.99	243	177	6.23	61.1	269.8	-0.14	-2.08	1.7						
9/22/2025	50	688.9	12.368	6.97	230	175	8.5	79.6	270	-0.13	-2.07							
9/22/2025	60	678.9	12.195	6.96	228	174	8.56	79.8	263.1	-0.17	-2.08	1.4						
9/22/2025	70	668.9	12.125	6.95	227	174	8.81	82.1	255.6	-0.16	-2.08							
9/22/2025	80	658.9	12.091	6.95	227	174	8.75	81.4	248.5	-0.16	-2.06							
9/22/2025	90	648.9	12.08	6.96	227	174	8.74	81.3	238.4	-0.15	-2.06	1.6						
9/22/2025	100	638.9	12.046	6.99	226	173	8.37	77.8	204.3	-0.17	-2.1							
9/22/2025	110	628.9	12.049	7.01	230	177	7.71	71.6	158	-0.09	-1.96	1.7						
9/22/2025	115	623.9	12.051	7.02	232	178	7.56	70.3	138.5	-0.08	-1.9							
9/22/2025	120	619.0	12.055	7.07	233	179	6.96	64.7	111.4	0.71	-0.7	1.9						

Appendix B Miscellaneous Survey Water Quality Data

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Spawning	ARH	4.93	1/9/2025 19:33	0.96				
Spawning	ALC	29.03	1/13/2025 17:42	0.58				
Spawning	ALC	23.03	1/13/2025 19:51	2.72				
Spawning	ALC	19.97	1/13/2025 21:24	2.59				
Spawning	CAC	0.28	1/15/2025 18:10	4				
Spawning	CAC	0.47	1/15/2025 18:48	3.46				
Spawning	ALC	25.44	1/15/2025 19:19	3.31				
Spawning	ALC	26.05	1/15/2025 20:48	1.21				
Spawning	ARH	4.5	1/23/2025 18:14	0.68				
Spawning	ARH	4.93	1/23/2025 19:15	0.83				
Spawning	ALC	30.57	1/27/2025 18:14	0.44				
Spawning	ALC	31.09	1/27/2025 18:49	0.72				
Spawning	CAC	0.28	1/27/2025 19:58	2.3				
Spawning	ALC	25.44	1/29/2025 16:48	2.05				
Spawning	ALC	23.3	1/29/2025 18:52	2.72				
Spawning	ALC	21.88	1/29/2025 22:01	2.15				
Spawning	ALC	30.06	2/10/2025 19:33	3.18				
Spawning	ALC	30.57	2/10/2025 20:25	1.43				
Spawning	CAC	0	2/10/2025 22:16	2.65				
Spawning	CAC	0.28	2/10/2025 22:44	2.8				
Spawning	ALC	26.67	2/11/2025 17:32	2.32				
Spawning	ALC	27.28	2/11/2025 18:31	1.94				
Spawning	ALC	21.88	2/11/2025 19:30	2.79				
Spawning	ALC	22.59	2/11/2025 20:41	4.19				
Spawning	ALC	22.59	2/24/2025 20:01	6.81				
Spawning	ALC	23.3	2/24/2025 20:54	7.26				
Spawning	ALC	19.97	2/24/2025 21:46	6.03				
Spawning	ALC	20.93	2/24/2025 22:42	7.03				
Spawning	ALC	30.57	2/27/2025 19:57	1.2				
Spawning	ALC	31.09	2/27/2025 20:34	1.51				
Spawning	ALC	26.67	2/27/2025 21:56	2.49				
Spawning	ALC	27.27	2/27/2025 22:34	3.23				
Spawning	CAC	0	2/28/2025 22:58	3.2				
Spawning	ARH	3.01	3/5/2025 18:33	1.02				
Spawning	ARH	3.49	3/5/2025 19:36	0.91				

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Spawning	ALC	27.9	3/10/2025 17:54	0.92				
Spawning	ALC	30.06	3/10/2025 18:46	0.8				
Spawning	ALC	28.51	3/10/2025 19:31	0.98				
Spawning	ALC	24.01	3/10/2025 20:43	2				
Spawning	ALC	24.72	3/10/2025 21:34	2.29				
Spawning	CAC	0.28	3/11/2025 18:02	5.6				
Spawning	ALC	17.13	3/11/2025 19:26	4.49				
Spawning	CAC	0	3/24/2025 18:13	4.65				
Spawning	CAC	0.28	3/24/2025 18:42	5.46				
Spawning	ALC	24.01	3/24/2025 20:02	3.72				
Spawning	ALC	24.72	3/24/2025 20:49	3.25				
Spawning	ALC	28.51	3/27/2025 17:50	2.98				
Spawning	ALC	29.03	3/27/2025 18:32	1.34				
Spawning	ALC	25.44	3/27/2025 20:13	3.03				
Spawning	ALC	26.05	3/27/2025 21:30	1.59				
Spawning	ALC	19.02	3/28/2025 17:41	3.79				
Spawning	ALC	19.97	3/28/2025 18:55	4.26				
Spawning	ARH	3.97	3/31/2025 18:34	1.38				
Spawning	ARH	4.45	3/31/2025 19:44	1.04				
Spawning	ALC	24.01	4/7/2025 17:57	2.32				
Spawning	ALC	24.71	4/7/2025 18:55	2.71				
Spawning	ALC	17.12	4/7/2025 19:57	11.4				
Spawning	ALC	18.07	4/7/2025 22:05	7.58				
Spawning	ALC	29.54	4/8/2025 16:24	2.69				
Spawning	ALC	30.06	4/8/2025 17:20	1.69				
Spawning	ALC	27.9	4/8/2025 18:15	1.5				
Spawning	ALC	28.51	4/8/2025 19:36	2.21				
Spawning	CAC	0	4/8/2025 20:53	5.29				
Spawning	CAC	0.28	4/8/2025 21:33	5.18				
Spawning	ARH	3.97	4/14/2025 19:10	1.64				
Spawning	ARH	3.49	4/14/2025 19:37	1.88				
Spawning	ALC	19.02	4/21/2025 17:57	2.09				
Spawning	ALC	19.97	4/21/2025 19:20	2.94				
Spawning	ALC	24.72	4/21/2025 20:11	2.13				
Spawning	ALC	25.44	4/21/2025 21:21	1.72				
Spawning	ALC	30.06	4/22/2025 16:27	1.31				
Spawning	ALC	30.57	4/22/2025 17:31	1.79				
Spawning	ALC	25.44	4/22/2025 18:54	1.38				
Spawning	ALC	26.05	4/22/2025 20:18	1.24				

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Spawning	CAC	0.28	4/22/2025 20:56	3.23				
Spawning	CAC	0.55	4/22/2025 21:21	3.61				
Spawning	ARH	3.97	4/28/2025 17:03	0.86				
Spawning	ARH	4.45	4/28/2025 18:14	0.84				
Trapping	ALC	21.55	2/6/2025 15:00	3.83	8.34	338.9	11.49	
Trapping	ALC	21.55	2/6/2025 18:00	2.77	8.37	343.1	11.05	
Trapping	ALC	21.55	2/6/2025 21:00	3.44	8.26	343.9	10.37	
Trapping	ALC	21.55	2/7/2025 0:00	3.68	8.24	349.5	10.19	
Trapping	ALC	21.55	2/7/2025 3:00	4.45	8.25	344.8	10.31	
Trapping	ALC	21.55	2/7/2025 6:00	23.82	8.28	334	10.65	
Trapping	ALC	21.55	2/7/2025 9:00	57.59	8.21	273.5	10.94	
Trapping	ALC	21.55	2/7/2025 12:00	45.04	8.15	253.6	10.97	
Trapping	ALC	21.55	2/7/2025 15:00	28.22	8.22	266.8	10.88	
Trapping	ALC	21.55	2/7/2025 18:00	40.93	8.17	260.4	10.73	
Trapping	ALC	21.55	2/7/2025 21:00	36.18	8.18	269.1	10.7	
Trapping	ALC	21.55	2/8/2025 0:00	25.94	8.18	278.1	10.83	
Trapping	ALC	21.55	2/8/2025 3:00	18.38	8.18	286.2	11.01	
Trapping	ALC	21.55	2/8/2025 6:00	12.85	8.18	293	11.17	
Trapping	ALC	21.55	2/8/2025 9:00	11.32	8.19	299.5	11.28	
Trapping	ALC	21.55	2/8/2025 12:00	8.35	8.26	305.6	11.59	
Trapping	ALC	21.55	2/8/2025 15:00	6.27	8.38	311	11.7	
Trapping	ALC	21.55	2/8/2025 18:00	5.24	8.37	316.5	11.33	
Trapping	ALC	21.55	2/8/2025 21:00	3.97	8.28	321.5	10.92	
Trapping	ALC	21.55	2/9/2025 0:00	3.75	8.24	326.3	11.02	
Trapping	ALC	21.55	2/9/2025 3:00	3.67	8.23	330.3	11.26	
Trapping	ALC	21.55	2/9/2025 6:00	2.12	8.23	333.6	11.4	
Trapping	ALC	21.55	2/9/2025 9:00	1.86	8.23	336.7	11.51	
Trapping	ALC	21.55	2/9/2025 12:00	1.9	8.28	339.7	11.88	
Trapping	ALC	21.55	2/9/2025 15:00	1.33	8.41	341.8	11.96	
Trapping	ALC	21.55	2/9/2025 18:00	1.42	8.41	344.5	11.51	
Trapping	ALC	21.55	2/9/2025 21:00	1.8	8.32	347.6	11.02	
Trapping	ALC	21.55	2/10/2025 0:00	0.85	8.26	350.2	11.01	
Trapping	ALC	21.55	2/10/2025 3:00	0.94	8.24	352.3	11.27	
Trapping	ALC	21.55	2/10/2025 6:00	1.28	8.25	353.5	11.46	
Trapping	ALC	21.55	2/10/2025 9:00	0.65	8.26	354.1	11.61	
Trapping	ALC	21.55	2/10/2025 12:00	1.72	8.3	355.4	12.05	
Trapping	ALC	21.55	2/10/2025 15:00	0.7	8.4	355.6	12.12	
Trapping	ALC	21.55	2/10/2025 18:00	1.15	8.4	355.7	11.59	
Trapping	ALC	21.55	2/10/2025 21:00	4.57	8.26	356.3	11.1	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	2/11/2025 0:00	1.86	8.22	360.2	10.94	
Trapping	ALC	21.55	2/11/2025 3:00	0.75	8.21	362.5	11.1	
Trapping	ALC	21.55	2/11/2025 6:00	0.46	8.21	363	11.29	
Trapping	ALC	21.55	2/11/2025 9:00	0.54	8.24	363.3	11.44	
Trapping	ALC	21.55	2/11/2025 12:00	1.26	8.29	363.2	11.92	
Trapping	ALC	21.55	2/11/2025 15:00	0.62	8.45	362.3	12.13	
Trapping	ALC	21.55	2/11/2025 18:00	0.42	8.5	362.5	11.69	
Trapping	ALC	21.55	2/11/2025 21:00	0.25	8.35	364.2	10.88	
Trapping	ALC	21.55	2/12/2025 0:00	0.79	8.3	364.8	10.69	
Trapping	ALC	21.55	2/12/2025 3:00	0.34	8.26	365.4	10.74	
Trapping	ALC	21.55	2/12/2025 6:00	0.28	8.23	366.3	10.82	
Trapping	ALC	21.55	2/12/2025 9:00	0.39	8.22	367	10.88	
Trapping	ALC	21.55	2/12/2025 12:00	1.24	8.33	366.5	11.5	
Trapping	ALC	21.55	2/12/2025 15:00	0.74	8.55	365.3	11.9	
Trapping	ALC	21.55	2/12/2025 18:00	1.06	8.6	365	11.52	
Trapping	ALC	21.55	2/12/2025 21:00	1.19	8.45	366.7	10.61	
Trapping	ALC	21.55	2/13/2025 0:00	1.35	8.3	362.9	10.37	
Trapping	ALC	21.55	2/13/2025 3:00	1.65	8.24	354.6	10.32	
Trapping	ALC	21.55	2/13/2025 6:00	6.77	8.24	343	10.32	
Trapping	ALC	21.55	2/13/2025 9:00	824.5	7.97	319.7	10.47	
Trapping	ALC	21.55	2/13/2025 12:00	891.3	8	112.1	10.98	
Trapping	ALC	21.55	2/13/2025 15:00	438.2	8.02	116.3	10.94	
Trapping	ALC	21.55	2/13/2025 18:00	438.5	8.07	80.5	10.83	
Trapping	ALC	21.55	2/13/2025 21:00	508.2	8.04	114.4	10.93	
Trapping	ALC	21.55	2/14/2025 0:00	312	8.05	126.3	10.93	
Trapping	ALC	21.55	2/14/2025 3:00	291.1	8.06	139.4	10.91	
Trapping	ALC	21.55	2/14/2025 6:00	296.4	8.08	133.9	11.03	
Trapping	ALC	21.55	2/14/2025 9:00	253	8.06	133.5	11.15	
Trapping	ALC	21.55	2/14/2025 12:00	224.6	8.03	137.7	11.23	
Trapping	ALC	21.55	2/14/2025 15:00	184.6	8.03	148.4	11.14	
Trapping	ALC	21.55	2/14/2025 18:00	157.9	8.06	162.1	11.05	
Trapping	ALC	21.55	2/14/2025 21:00	119.6	8.06	174.1	11.01	
Trapping	ALC	21.55	2/15/2025 0:00	100.2	8.06	185	11.12	
Trapping	ALC	21.55	2/15/2025 3:00	74.38	8.06	194.3	11.27	
Trapping	ALC	21.55	2/15/2025 6:00	62.37	8.07	203.1	11.42	
Trapping	ALC	21.55	2/15/2025 9:00	51.14	8.08	211.1	11.55	
Trapping	ALC	21.55	2/15/2025 12:00	40.37	8.08	218.6	11.61	
Trapping	ALC	21.55	2/15/2025 15:00	45.04	8.11	225	11.31	
Trapping	ALC	21.55	2/15/2025 18:00	29.96	8.13	229.8	10.98	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	2/15/2025 21:00	23.74	8.13	236.9	10.86	
Trapping	ALC	21.55	2/16/2025 0:00	19.98	8.13	243.3	10.94	
Trapping	ALC	21.55	2/16/2025 3:00	16.48	8.13	249.1	11.02	
Trapping	ALC	21.55	2/16/2025 6:00	14.44	8.13	253.3	11.12	
Trapping	ALC	21.55	2/16/2025 9:00	17.97	8.14	259.8	11.2	
Trapping	ALC	21.55	2/16/2025 12:00	12.72	8.15	264.1	11.24	
Trapping	ALC	21.55	2/16/2025 15:00	9.58	8.19	269	10.98	
Trapping	ALC	21.55	2/16/2025 18:00	9.38	8.2	272.3	10.7	
Trapping	ALC	21.55	2/16/2025 21:00	8.34	8.18	276.2	10.6	
Trapping	ALC	21.55	2/17/2025 0:00	8.61	8.17	279.7	10.68	
Trapping	ALC	21.55	2/17/2025 3:00	8.39	8.17	283.1	10.78	
Trapping	ALC	21.55	2/17/2025 6:00	7.02	8.17	286.3	10.89	
Trapping	ALC	21.55	2/17/2025 9:00	8.15	8.19	289.2	10.96	
Trapping	ALC	21.55	2/17/2025 12:00	12.41	8.21	291.7	11.08	
Trapping	ALC	21.55	2/17/2025 15:00	7.62	8.21	294.2	10.88	
Trapping	ALC	21.55	2/17/2025 18:00	10.07	8.22	297.2	10.65	
Trapping	ALC	21.55	2/17/2025 21:00	6.45	8.22	300	10.59	
Trapping	ALC	21.55	2/18/2025 0:00	5.64	8.21	302.9	10.72	
Trapping	ALC	21.55	2/18/2025 3:00	5.8	8.2	304.9	10.9	
Trapping	ALC	21.55	2/18/2025 6:00	6.64	8.2	306.1	11.05	
Trapping	ALC	21.55	2/18/2025 9:00	6.27	8.2	308.6	11.19	
Trapping	ALC	21.55	2/18/2025 12:00	7.33	8.2	310.7	11.26	
Trapping	ALC	21.55	2/18/2025 15:00	4.69	8.22	313.6	10.96	
Trapping	ALC	21.55	2/18/2025 18:00	4.07	8.24	316.4	10.63	
Trapping	ALC	21.55	2/18/2025 21:00	4.61	8.23	319.1	10.49	
Trapping	ALC	21.55	2/19/2025 0:00	2.49	8.21	322.9	10.58	
Trapping	ALC	21.55	2/19/2025 3:00	5.87	8.21	321.6	10.7	
Trapping	ALC	21.55	2/19/2025 6:00	3.87	8.2	323.8	10.78	
Trapping	ALC	21.55	2/19/2025 9:00	3.27	8.21	326.5	10.83	
Trapping	ALC	21.55	2/19/2025 12:00	4.16	8.22	326.5	10.92	
Trapping	ALC	21.55	2/19/2025 15:00	4.9	8.22	327	10.78	
Trapping	ALC	21.55	2/19/2025 18:00	5.05	8.24	327.5	10.52	
Trapping	ALC	21.55	2/19/2025 21:00	4.61	8.23	328.7	10.45	
Trapping	ALC	21.55	2/20/2025 0:00	4.69	8.21	330.2	10.53	
Trapping	ALC	21.55	2/20/2025 3:00	4.88	8.21	331.8	10.68	
Trapping	ALC	21.55	2/20/2025 6:00	4.71	8.2	331.5	10.78	
Trapping	ALC	21.55	2/20/2025 9:00	5.48	8.2	332	10.88	
Trapping	ALC	21.55	2/20/2025 12:00	5.52	8.21	334.2	10.95	
Trapping	ALC	21.55	2/20/2025 15:00	4.68	8.23	336.5	10.62	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	2/20/2025 18:00	4.8	8.23	336.8	10.4	
Trapping	ALC	21.55	2/20/2025 21:00	5.03	8.22	336.7	10.31	
Trapping	ALC	21.55	2/21/2025 0:00	4.6	8.21	337.5	10.46	
Trapping	ALC	21.55	2/21/2025 3:00	5.03	8.2	337.4	10.7	
Trapping	ALC	21.55	2/21/2025 6:00	6.34	8.2	336.6	10.89	
Trapping	ALC	21.55	2/21/2025 9:00	5.18	8.2	338.2	11.02	
Trapping	ALC	21.55	2/21/2025 12:00	5.77	8.2	340.9	11.15	
Trapping	ALC	21.55	2/21/2025 15:00	3.82	8.21	343.9	10.78	
Trapping	ALC	21.55	2/21/2025 18:00	4.39	8.25	344.1	10.54	
Trapping	ALC	21.55	2/21/2025 21:00	3.08	8.23	346.7	10.36	
Trapping	ALC	21.55	2/22/2025 0:00	2.55	8.22	350.4	10.48	
Trapping	ALC	21.55	2/22/2025 3:00	2.34	8.22	351.5	10.71	
Trapping	ALC	21.55	2/22/2025 6:00	3.48	8.21	349.5	10.89	
Trapping	ALC	21.55	2/22/2025 9:00	3.7	8.21	349.1	11.03	
Trapping	ALC	21.55	2/22/2025 12:00	4.82	8.2	347.3	11.17	
Trapping	ALC	21.55	2/22/2025 15:00	4.75	8.21	346.9	10.79	
Trapping	ALC	21.55	2/22/2025 18:00	4.3	8.21	349.4	10.46	
Trapping	ALC	21.55	2/22/2025 21:00	3.55	8.21	352.6	10.25	
Trapping	ALC	21.55	2/23/2025 0:00	2.82	8.19	356	10.26	
Trapping	ALC	21.55	2/23/2025 3:00	2.73	8.17	356.3	10.4	
Trapping	ALC	21.55	2/23/2025 6:00	4.12	8.18	352.4	10.53	
Trapping	ALC	21.55	2/23/2025 9:00	3.84	8.18	352.8	10.65	
Trapping	ALC	21.55	2/23/2025 12:00	4	8.19	352.3	10.8	
Trapping	ALC	21.55	2/23/2025 15:00	4.19	8.21	353	10.59	
Trapping	ALC	21.55	2/23/2025 18:00	4.54	8.23	352.3	10.28	
Trapping	ALC	21.55	2/23/2025 21:00	4.57	8.21	351.6	10.09	
Trapping	ALC	21.55	2/24/2025 0:00	5.66	8.19	351.6	10.15	
Trapping	ALC	21.55	2/24/2025 3:00	4.94	8.17	351.6	10.29	
Trapping	ALC	21.55	2/24/2025 6:00	5.03	8.17	352	10.43	
Trapping	ALC	21.55	2/24/2025 9:00	5.77	8.17	354.6	10.55	
Trapping	ALC	21.55	2/24/2025 12:00	6.44	8.18	353.7	10.69	
Trapping	ALC	21.55	2/24/2025 15:00	4.56	8.22	353.8	10.49	
Trapping	ALC	21.55	2/24/2025 18:00	4.97	8.24	354.6	10.2	
Trapping	ALC	21.55	2/24/2025 21:00	4.96	8.21	355.4	10.04	
Trapping	ALC	21.55	2/25/2025 0:00	4.46	8.18	355.3	10.05	
Trapping	ALC	21.55	2/25/2025 3:00	3.69	8.17	357.3	10.2	
Trapping	ALC	21.55	2/25/2025 6:00	3.85	8.18	358	10.38	
Trapping	ALC	21.55	2/25/2025 9:00	6.07	8.17	356.4	10.54	
Trapping	ALC	21.55	2/25/2025 12:00	4.47	8.19	355.2	10.76	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	2/25/2025 15:00	4.08	8.22	356	10.51	
Trapping	ALC	21.55	2/25/2025 18:00	4.45	8.23	356.4	10.19	
Trapping	ALC	21.55	2/25/2025 21:00	3.92	8.21	359.3	10.11	
Trapping	ALC	21.55	2/26/2025 0:00	4.39	8.2	360.6	10.17	
Trapping	ALC	21.55	2/26/2025 3:00	5.14	8.19	361.7	10.42	
Trapping	ALC	21.55	2/26/2025 6:00	5.42	8.19	359.2	10.66	
Trapping	ALC	21.55	2/26/2025 9:00	5.18	8.19	358.5	10.86	
Trapping	ALC	21.55	2/26/2025 12:00	4.98	8.19	358.7	11.06	
Trapping	ALC	21.55	2/26/2025 15:00	8.76	8.2	359.5	10.7	
Trapping	ALC	21.55	2/26/2025 18:00	50.35	8.23	363.4	10.31	
Trapping	ALC	21.55	2/26/2025 21:00	40.67	8.2	361.8	10.25	
Trapping	ALC	21.55	2/27/2025 0:00	40.44	8.19	361.6	10.27	
Trapping	ALC	21.55	2/27/2025 3:00	30.43	8.18	361.3	10.45	
Trapping	ALC	21.55	2/27/2025 6:00	192.9	8.17	358.5	10.7	
Trapping	ALC	21.55	2/27/2025 9:00	137	8.17	358	10.86	
Trapping	ALC	21.55	2/27/2025 12:00	39.41	8.18	358.8	11.01	
Trapping	ALC	21.55	2/27/2025 15:00	51.44	8.21	358.3	10.77	
Trapping	ALC	21.55	2/27/2025 18:00	381.6	8.24	360.5	10.3	
Trapping	ALC	21.55	2/27/2025 21:00	383.5	8.21	363.1	10.06	
Trapping	ALC	21.55	2/28/2025 0:00	54.65	8.18	363.3	10.05	
Trapping	ALC	21.55	2/28/2025 3:00	86.5	8.16	362	10.24	
Trapping	ALC	21.55	2/28/2025 6:00	69.93	8.16	359.9	10.43	
Trapping	ALC	21.55	2/28/2025 9:00	89.02	8.16	358.1	10.6	
Trapping	ALC	21.55	2/28/2025 12:00	109.9	8.18	358.6	10.82	
Trapping	ALC	21.55	2/28/2025 15:00	160.8	8.22	358.9	10.59	
Trapping	ALC	21.55	2/28/2025 18:00	158.3	8.24	362	10.18	
Trapping	ALC	21.55	2/28/2025 21:00	81.5	8.22	364.3	9.91	
Trapping	ALC	21.55	3/1/2025 0:00	35.68	8.18	363.3	9.85	
Trapping	ALC	21.55	3/1/2025 3:00	61.81	8.17	363.3	10.07	
Trapping	ALC	21.55	3/1/2025 6:00	45.69	8.17	362.7	10.31	
Trapping	ALC	21.55	3/1/2025 9:00	14.18	8.17	360.6	10.41	
Trapping	ALC	21.55	3/1/2025 12:00	9.17	8.21	359.8	10.75	
Trapping	ALC	21.55	3/1/2025 15:00	146.1	8.27	360.1	10.55	
Trapping	ALC	21.55	3/1/2025 18:00	143.4	8.29	360.8	10.25	
Trapping	ALC	21.55	3/1/2025 21:00	114.4	8.25	360.9	10.04	
Trapping	ALC	21.55	3/2/2025 0:00	56.22	8.2	360.3	10	
Trapping	ALC	21.55	3/2/2025 3:00	57.84	8.18	358.3	10.08	
Trapping	ALC	21.55	3/2/2025 6:00	83.45	8.18	359.6	10.2	
Trapping	ALC	21.55	3/2/2025 9:00	50.69	8.18	357.3	10.34	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	3/2/2025 12:00	77.18	8.21	355.5	10.58	
Trapping	ALC	21.55	3/2/2025 15:00	126.9	8.28	356.9	10.71	
Trapping	ALC	21.55	3/2/2025 18:00	236.3	8.32	361.6	10.52	
Trapping	ALC	21.55	3/2/2025 21:00	322.7	8.28	367.8	10.28	
Trapping	ALC	21.55	3/3/2025 0:00	441.7	8.23	370.2	10.3	
Trapping	ALC	21.55	3/3/2025 3:00	634.4	8.21	368.6	10.4	
Trapping	ALC	21.55	3/3/2025 6:00	253.2	8.21	365.8	10.51	
Trapping	ALC	21.55	3/3/2025 9:00	122.2	8.2	364.9	10.65	
Trapping	ALC	21.55	3/3/2025 12:00	90.57	8.23	363.6	11	
Trapping	ALC	21.55	3/3/2025 15:00	285.7	8.31	362.1	10.89	
Trapping	ALC	21.55	3/3/2025 18:00	314.2	8.35	364.6	10.62	
Trapping	ALC	21.55	3/3/2025 21:00	125.6	8.29	364.9	10.24	
Trapping	ALC	21.55	3/4/2025 0:00	167.7	8.23	364.6	10.15	
Trapping	ALC	21.55	3/4/2025 3:00	126.7	8.2	363.3	10.26	
Trapping	ALC	21.55	3/4/2025 6:00	83.26	8.19	361.2	10.36	
Trapping	ALC	21.55	3/4/2025 9:00	97.23	8.18	359.4	10.46	
Trapping	ALC	21.55	3/4/2025 12:00	106.5	8.26	358.6	10.9	
Trapping	ALC	21.55	3/4/2025 15:00	150.5	8.36	359.4	10.91	
Trapping	ALC	21.55	3/4/2025 18:00	205.4	8.4	360.1	10.56	
Trapping	ALC	21.55	3/4/2025 21:00	307.4	8.31	361.3	10.07	
Trapping	ALC	21.55	3/5/2025 0:00	183.9	8.21	361.9	10	
Trapping	ALC	21.55	3/5/2025 3:00	100.8	8.17	362.3	10.11	
Trapping	ALC	21.55	3/5/2025 6:00	71.74	8.15	361.9	10.2	
Trapping	ALC	21.55	3/5/2025 9:00	46.75	8.15	360	10.24	
Trapping	ALC	21.55	3/5/2025 12:00	69.13	8.18	358	10.39	
Trapping	ALC	21.55	3/5/2025 15:00	13.18	8.27	357.3	10.64	
Trapping	ALC	21.55	3/5/2025 18:00	24.55	8.4	359.1	10.85	
Trapping	ALC	21.55	3/5/2025 21:00	22.82	8.36	362.5	10.38	
Trapping	ALC	21.55	3/6/2025 0:00	25.94	8.25	363.1	10.19	
Trapping	ALC	21.55	3/6/2025 3:00	20.57	8.22	361.2	10.3	
Trapping	ALC	21.55	3/6/2025 6:00	38.87	8.23	360.6	10.48	
Trapping	ALC	21.55	3/6/2025 9:00	22.59	8.24	360	10.59	
Trapping	ALC	21.55	3/6/2025 12:00	20.87	8.31	359.1	11	
Trapping	ALC	21.55	3/6/2025 15:00	49.3	8.41	364.8	10.99	
Trapping	ALC	21.55	3/6/2025 18:00	20.71	8.43	361.1	10.74	
Trapping	ALC	21.55	3/6/2025 21:00	52.64	8.34	358.8	10.25	
Trapping	ALC	21.55	3/7/2025 0:00	20.36	8.26	345.4	10.47	
Trapping	ALC	21.55	3/7/2025 3:00	30.91	8.22	333	10.7	
Trapping	ALC	21.55	3/7/2025 6:00	23.12	8.2	325.7	10.9	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	3/7/2025 9:00	15.21	8.2	324.4	11.06	
Trapping	ALC	21.55	3/7/2025 12:00	23.76	8.24	327	11.42	
Trapping	ALC	21.55	3/7/2025 15:00	11.25	8.35	329.8	11.28	
Trapping	ALC	21.55	3/7/2025 18:00	19.77	8.38	333.1	10.77	
Trapping	ALC	21.55	3/7/2025 21:00	14.57	8.29	336.3	10.33	
Trapping	ALC	21.55	3/8/2025 0:00	75.15	8.23	338.5	10.38	
Trapping	ALC	21.55	3/8/2025 3:00	25.56	8.21	338.2	10.68	
Trapping	ALC	21.55	3/8/2025 6:00	114.9	8.21	338.5	10.87	
Trapping	ALC	21.55	3/8/2025 9:00	29.6	8.21	340.4	11.04	
Trapping	ALC	21.55	3/8/2025 12:00	21.19	8.27	341.8	11.51	
Trapping	ALC	21.55	3/8/2025 15:00	3.4	8.39	345.4	11.38	
Trapping	ALC	21.55	3/8/2025 18:00	23.93	8.41	347.1	10.83	
Trapping	ALC	21.55	3/8/2025 21:00	4.53	8.32	348.1	10.25	
Trapping	ALC	21.55	3/9/2025 0:00	8.76	8.23	348.5	10.18	
Trapping	ALC	21.55	3/9/2025 3:00	9.32	8.21	347.8	10.46	
Trapping	ALC	21.55	3/9/2025 6:00	39.73	8.21	347.5	10.68	
Trapping	ALC	21.55	3/9/2025 9:00	4.64	8.21	348.3	10.85	
Trapping	ALC	21.55	3/9/2025 12:00	5.52	8.28	348.9	11.38	
Trapping	ALC	21.55	3/9/2025 15:00	17.42	8.42	349.5	11.33	
Trapping	ALC	21.55	3/9/2025 18:00	38.63	8.47	350	10.77	
Trapping	ALC	21.55	3/9/2025 21:00	6.82	8.37	350.5	10.19	
Trapping	ALC	21.55	3/10/2025 0:00	30.72	8.26	351.5	10.09	
Trapping	ALC	21.55	3/10/2025 3:00	4.27	8.22	352.9	10.34	
Trapping	ALC	21.55	3/10/2025 6:00	5.47	8.21	352.2	10.57	
Trapping	ALC	21.55	3/10/2025 9:00	15.69	8.21	351.5	10.72	
Trapping	ALC	21.55	3/10/2025 12:00	46.82	8.34	352.1	11.5	
Trapping	ALC	21.55	3/10/2025 15:00	81.78	8.48	351.3	11.43	
Trapping	ALC	21.55	3/10/2025 18:00	30.34	8.56	350.8	10.91	
Trapping	ALC	21.55	3/10/2025 21:00	2.39	8.45	352	10.14	
Trapping	ALC	21.55	3/11/2025 0:00	1.72	8.28	354.8	9.89	
Trapping	ALC	21.55	3/11/2025 3:00	1.27	8.24	355.2	10.12	
Trapping	ALC	21.55	3/11/2025 6:00	17.13	8.22	355.3	10.38	
Trapping	ALC	21.55	3/11/2025 9:00	1.66	8.22	355	10.58	
Trapping	ALC	21.55	3/11/2025 12:00	38.46	8.32	354.2	11.27	
Trapping	ALC	21.55	3/11/2025 15:00	2.19	8.49	353.7	11.32	
Trapping	ALC	21.55	3/11/2025 18:00	25.53	8.56	354.4	10.77	
Trapping	ALC	21.55	3/11/2025 21:00	4.27	8.45	354.6	10.11	
Trapping	ALC	21.55	3/12/2025 0:00	38.77	8.29	355.4	9.9	
Trapping	ALC	21.55	3/12/2025 3:00	66.14	8.23	356.1	10.04	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	3/12/2025 6:00	1.26	8.22	355.4	10.15	
Trapping	ALC	21.55	3/12/2025 9:00	4.61	8.22	354.9	10.17	
Trapping	ALC	21.55	3/12/2025 12:00	7.59	8.39	355.3	10.94	
Trapping	ALC	21.55	3/12/2025 15:00	3.05	8.54	355.5	11.13	
Trapping	ALC	21.55	3/12/2025 18:00	26.21	8.49	345.2	10.42	
Trapping	ALC	21.55	3/12/2025 21:00	10.5	8.32	349.9	10.09	
Trapping	ALC	21.55	3/13/2025 0:00	5.94	8.27	352.5	10.17	
Trapping	ALC	21.55	3/13/2025 3:00	93	8.34	344.2	10.78	
Trapping	ALC	21.55	3/13/2025 6:00	79.23	8.12	210.7	11.03	
Trapping	ALC	21.55	3/13/2025 9:00	38.6	8.14	223	11.06	
Trapping	ALC	21.55	3/13/2025 12:00	31.1	8.17	232.7	11.12	
Trapping	ALC	21.55	3/13/2025 15:00	21.21	8.24	253.1	11.04	
Trapping	ALC	21.55	3/13/2025 18:00	20.74	8.23	242.4	10.95	
Trapping	ALC	21.55	3/13/2025 21:00	22.63	8.2	241	10.89	
Trapping	ALC	21.55	3/14/2025 0:00	16.96	8.18	241.3	11.04	
Trapping	ALC	21.55	3/14/2025 3:00	14.02	8.18	246.3	11.09	
Trapping	ALC	21.55	3/14/2025 6:00	10.58	8.19	253.3	11.05	
Trapping	ALC	21.55	3/14/2025 9:00	10.32	8.2	260.5	11.05	
Trapping	ALC	21.55	3/14/2025 12:00	11.63	8.25	266.8	11.21	
Trapping	ALC	21.55	3/14/2025 15:00	27.01	8.29	272.1	11.11	
Trapping	ALC	21.55	3/14/2025 18:00	21.7	8.29	271.3	10.85	
Trapping	ALC	21.55	3/14/2025 21:00	55.49	8.24	252.4	10.98	
Trapping	ALC	21.55	3/15/2025 0:00	104.8	8.12	193.8	11.21	
Trapping	ALC	21.55	3/15/2025 3:00	51.75	8.1	190.2	11.16	
Trapping	ALC	21.55	3/15/2025 6:00	34.98	8.1	197.4	11.21	
Trapping	ALC	21.55	3/15/2025 9:00	27.24	8.12	206.8	11.26	
Trapping	ALC	21.55	3/15/2025 12:00	23.4	8.16	215	11.3	
Trapping	ALC	21.55	3/15/2025 15:00	16.02	8.2	223.3	11.12	
Trapping	ALC	21.55	3/15/2025 18:00	13.62	8.23	231.6	10.78	
Trapping	ALC	21.55	3/15/2025 21:00	11.05	8.19	238.8	10.6	
Trapping	ALC	21.55	3/16/2025 0:00	9.81	8.17	245.2	10.73	
Trapping	ALC	21.55	3/16/2025 3:00	9.18	8.17	251	10.85	
Trapping	ALC	21.55	3/16/2025 6:00	7.34	8.19	256.3	10.95	
Trapping	ALC	21.55	3/16/2025 9:00	6.73	8.19	261.1	11.09	
Trapping	ALC	21.55	3/16/2025 12:00	6.53	8.24	265.5	11.31	
Trapping	ALC	21.55	3/16/2025 15:00	4.76	8.3	269.2	11.07	
Trapping	ALC	21.55	3/16/2025 18:00	4.4	8.31	272.7	10.78	
Trapping	ALC	21.55	3/16/2025 21:00	4.58	8.25	276	10.51	
Trapping	ALC	21.55	3/17/2025 0:00	5.71	8.21	277.3	10.45	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	3/17/2025 3:00	6.01	8.2	279.9	10.47	
Trapping	ALC	21.55	3/17/2025 6:00	7.34	8.23	284	10.54	
Trapping	ALC	21.55	3/17/2025 9:00	18.34	8.26	282.2	10.67	
Trapping	ALC	21.55	3/17/2025 12:00	59.78	8.25	249.3	10.79	
Trapping	ALC	21.55	3/17/2025 15:00	48.18	8.2	226	10.67	
Trapping	ALC	21.55	3/17/2025 18:00	33.83	8.19	220.1	10.61	
Trapping	ALC	21.55	3/17/2025 21:00	28.49	8.18	220	10.7	
Trapping	ALC	21.55	3/18/2025 0:00	75.05	8.18	210.1	10.91	
Trapping	ALC	21.55	3/18/2025 3:00	187.1	8.12	178.7	11.14	
Trapping	ALC	21.55	3/18/2025 6:00	102.6	8.09	175.3	11.29	
Trapping	ALC	21.55	3/18/2025 9:00	60.19	8.1	188.9	11.43	
Trapping	ALC	21.55	3/18/2025 12:00	41.21	8.13	201.2	11.49	
Trapping	ALC	21.55	3/18/2025 15:00	41.02	8.15	208.3	11.19	
Trapping	ALC	21.55	3/18/2025 18:00	41.76	8.18	219.3	10.74	
Trapping	ALC	21.55	3/18/2025 21:00	25.76	8.18	225.4	10.65	
Trapping	ALC	21.55	3/19/2025 0:00	19.4	8.17	231.6	10.85	
Trapping	ALC	21.55	3/19/2025 3:00	17.91	8.17	236.8	11.02	
Trapping	ALC	21.55	3/19/2025 6:00	18.5	8.19	241.4	11.17	
Trapping	ALC	21.55	3/19/2025 9:00	15.19	8.19	245.8	11.36	
Trapping	ALC	21.55	3/19/2025 12:00	12.16	8.22	250.1	11.52	
Trapping	ALC	21.55	3/19/2025 15:00	11.44	8.24	254.1	11.2	
Trapping	ALC	21.55	3/19/2025 18:00	13.96	8.25	257.5	10.81	
Trapping	ALC	21.55	3/19/2025 21:00	12.21	8.22	261	10.6	
Trapping	ALC	21.55	3/20/2025 0:00	10.68	8.2	264.3	10.68	
Trapping	ALC	21.55	3/20/2025 3:00	7.54	8.2	267.3	10.76	
Trapping	ALC	21.55	3/20/2025 6:00	7.08	8.2	270.5	10.8	
Trapping	ALC	21.55	3/20/2025 9:00	6.67	8.21	273.8	10.88	
Trapping	ALC	21.55	3/20/2025 12:00	6.59	8.25	276.7	11.07	
Trapping	ALC	21.55	3/20/2025 15:00	6.28	8.28	279.8	10.82	
Trapping	ALC	21.55	3/20/2025 18:00	4.45	8.28	282.2	10.42	
Trapping	ALC	21.55	3/20/2025 21:00	4.6	8.24	285.3	10.22	
Trapping	ALC	21.55	3/21/2025 0:00	5	8.22	287.6	10.44	
Trapping	ALC	21.55	3/21/2025 3:00	4.64	8.22	289.9	10.68	
Trapping	ALC	21.55	3/21/2025 6:00	4.24	8.23	292.2	10.87	
Trapping	ALC	21.55	3/21/2025 9:00	4.66	8.23	294.5	11	
Trapping	ALC	21.55	3/21/2025 12:00	6.37	8.24	296.9	11.24	
Trapping	ALC	21.55	3/21/2025 15:00	4.04	8.29	299.3	10.93	
Trapping	ALC	21.55	3/21/2025 18:00	4.66	8.3	301.8	10.47	
Trapping	ALC	21.55	3/21/2025 21:00	4.07	8.25	304.1	10.18	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	3/22/2025 0:00	4.75	8.22	305.5	10.34	
Trapping	ALC	21.55	3/22/2025 3:00	4.46	8.21	306.8	10.55	
Trapping	ALC	21.55	3/22/2025 6:00	10.75	8.21	308.4	10.74	
Trapping	ALC	21.55	3/22/2025 9:00	6.02	8.2	310.1	10.85	
Trapping	ALC	21.55	3/22/2025 12:00	11.46	8.26	311.7	11.09	
Trapping	ALC	21.55	3/22/2025 15:00	4.27	8.31	313.7	10.87	
Trapping	ALC	21.55	3/22/2025 18:00	9.64	8.33	315.4	10.56	
Trapping	ALC	21.55	3/22/2025 21:00	4.76	8.26	317.1	10.22	
Trapping	ALC	21.55	3/23/2025 0:00	5.17	8.21	318.7	10.23	
Trapping	ALC	21.55	3/23/2025 3:00	4.04	8.2	319.9	10.39	
Trapping	ALC	21.55	3/23/2025 6:00	5.1	8.21	320.8	10.53	
Trapping	ALC	21.55	3/23/2025 9:00	4.36	8.21	322.2	10.59	
Trapping	ALC	21.55	3/23/2025 12:00	4.44	8.26	323.8	10.85	
Trapping	ALC	21.55	3/23/2025 15:00	6.08	8.29	325.9	10.59	
Trapping	ALC	21.55	3/23/2025 18:00	13.62	8.29	327	10.13	
Trapping	ALC	21.55	3/23/2025 21:00	4.77	8.21	328.3	9.72	
Trapping	ALC	21.55	3/24/2025 0:00	5.03	8.17	329.4	9.81	
Trapping	ALC	21.55	3/24/2025 3:00	5.31	8.18	330.1	10.07	
Trapping	ALC	21.55	3/24/2025 6:00	8.05	8.19	330.8	10.27	
Trapping	ALC	21.55	3/24/2025 9:00	4.83	8.2	331.6	10.46	99.6
Trapping	ALC	21.55	3/24/2025 12:00	7.82	8.25	332.7	10.74	144.8
Trapping	ALC	21.55	3/24/2025 15:00	8.12	8.32	334.5	10.44	125
Trapping	ALC	21.55	3/24/2025 18:00	6.28	8.31	335.5	9.87	123
Trapping	ALC	21.55	3/24/2025 21:00	4.44	8.21	336.9	9.38	128
Trapping	ALC	21.55	3/25/2025 0:00	6.39	8.16	337.8	9.43	126
Trapping	ALC	21.55	3/25/2025 3:00	5.03	8.14	338.1	9.67	90
Trapping	ALC	21.55	3/25/2025 6:00	6.41	8.16	338.8	9.86	
Trapping	ALC	21.55	3/25/2025 9:00	7.29	8.18	339.3	10.03	
Trapping	ALC	21.55	3/25/2025 12:00	5.51	8.25	340.8	10.42	
Trapping	ALC	21.55	3/25/2025 15:00	5.66	8.34	342.5	10.22	
Trapping	ALC	21.55	3/25/2025 18:00	4.45	8.35	342	9.7	
Trapping	ALC	21.55	3/25/2025 21:00	7.53	8.23	343.7	9.13	
Trapping	ALC	21.55	3/26/2025 0:00	6.25	8.15	344.3	9.12	
Trapping	ALC	21.55	3/26/2025 3:00	7.01	8.13	345.1	9.37	
Trapping	ALC	21.55	3/26/2025 6:00	8.91	8.17	342.6	9.56	
Trapping	ALC	21.55	3/26/2025 9:00	6.18	8.21	345.8	9.74	
Trapping	ALC	21.55	3/26/2025 12:00	7.68	8.31	346.8	10.23	
Trapping	ALC	21.55	3/26/2025 15:00	7.28	8.41	347.3	10.24	
Trapping	ALC	21.55	3/26/2025 18:00	13.18	8.42	347.2	9.88	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	3/26/2025 21:00	12.41	8.34	347.1	9.45	
Trapping	ALC	21.55	3/27/2025 0:00	8.25	8.25	348.2	9.45	
Trapping	ALC	21.55	3/27/2025 3:00	7.03	8.24	349.2	9.64	
Trapping	ALC	21.55	3/27/2025 6:00	6.23	8.23	350.1	9.73	
Trapping	ALC	21.55	3/27/2025 9:00	6.27	8.24	349.9	9.79	
Trapping	ALC	21.55	3/27/2025 12:00	11.01	8.33	349.4	10.33	
Trapping	ALC	21.55	3/27/2025 15:00	6.77	8.44	348.7	10.55	
Trapping	ALC	21.55	3/27/2025 18:00	8.28	8.44	344.5	10.2	
Trapping	ALC	21.55	3/27/2025 21:00	7.82	8.35	351.4	9.76	
Trapping	ALC	21.55	3/28/2025 0:00	7.59	8.25	350.2	9.66	
Trapping	ALC	21.55	3/28/2025 3:00	10.03	8.23	353	9.84	
Trapping	ALC	21.55	3/28/2025 6:00	10.38	8.22	352.1	9.95	
Trapping	ALC	21.55	3/28/2025 9:00	13.99	8.22	351.8	10.02	
Trapping	ALC	21.55	3/28/2025 12:00	10.62	8.35	350.7	10.57	
Trapping	ALC	21.55	3/28/2025 15:00	13.08	8.47	350.2	10.83	
Trapping	ALC	21.55	3/28/2025 18:00	18.19	8.49	349.7	10.57	
Trapping	ALC	21.55	3/28/2025 21:00	14.04	8.37	351	9.98	
Trapping	ALC	21.55	3/29/2025 0:00	19.02	8.26	352.8	9.86	
Trapping	ALC	21.55	3/29/2025 3:00	10.63	8.24	353.6	10.05	
Trapping	ALC	21.55	3/29/2025 6:00	18.91	8.24	354.1	10.19	
Trapping	ALC	21.55	3/29/2025 9:00	11.14	8.24	351.6	10.32	
Trapping	ALC	21.55	3/29/2025 12:00	19.48	8.36	354.2	11.01	
Trapping	ALC	21.55	3/29/2025 15:00	15.37	8.5	353.9	10.94	
Trapping	ALC	21.55	3/29/2025 18:00	33.05	8.53	352.5	10.68	
Trapping	ALC	21.55	3/29/2025 21:00	26.15	8.39	352.9	9.83	
Trapping	ALC	21.55	3/30/2025 0:00	13.49	8.26	353.5	9.73	
Trapping	ALC	21.55	3/30/2025 3:00	14.01	8.23	354.8	9.93	
Trapping	ALC	21.55	3/30/2025 6:00	13.01	8.25	355.1	10.03	
Trapping	ALC	21.55	3/30/2025 9:00	14.28	8.26	355.2	10.11	
Trapping	ALC	21.55	3/30/2025 12:00	32.64	8.38	354.9	10.82	
Trapping	ALC	21.55	3/30/2025 15:00	38.77	8.5	354.9	10.89	
Trapping	ALC	21.55	3/30/2025 18:00	15.05	8.51	355.6	10.54	
Trapping	ALC	21.55	3/30/2025 21:00	9.66	8.38	356.1	9.8	
Trapping	ALC	21.55	3/31/2025 0:00	11.63	8.25	357	9.53	
Trapping	ALC	21.55	3/31/2025 3:00	12.21	8.23	358.2	9.64	
Trapping	ALC	21.55	3/31/2025 6:00	12.91	8.23	358.4	9.75	
Trapping	ALC	21.55	3/31/2025 9:00	11.37	8.24	354.8	9.83	
Trapping	ALC	21.55	3/31/2025 12:00	10.58	8.42	353.8	10.77	
Trapping	ALC	21.55	3/31/2025 15:00	30.95	8.57	352.6	11.07	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Trapping	ALC	21.55	3/31/2025 18:00	10.73	8.59	353.5	10.84	
Trapping	ALC	21.55	3/31/2025 21:00	10.29	8.41	354.3	10.01	
Trapping	ALC	21.55	4/1/2025 0:00	11.33	8.28	353.5	9.88	
Trapping	ALC	21.55	4/1/2025 3:00	42.62	8.26	354.6	10.12	
Trapping	ALC	21.55	4/1/2025 6:00	14.91	8.26	355.8	10.29	
Trapping	ALC	21.55	4/1/2025 9:00	15.45	8.27	356.7	10.35	
Trapping	ALC	21.55	4/1/2025 12:00	12.33	8.38	357.9	10.95	
Trapping	ALC	21.55	4/1/2025 15:00	15.95	8.5	354.9	11.17	
Trapping	ALC	21.55	4/1/2025 18:00	18.08	8.54	354	10.93	
Trapping	ALC	21.55	4/1/2025 21:00	19.31	8.42	356.9	10.28	
Trapping	ALC	21.55	4/2/2025 0:00	24.15	8.33	350.8	10.26	
Trapping	ALC	21.55	4/2/2025 3:00	30.94	8.31	337.4	10.51	
Trapping	ALC	21.55	4/2/2025 6:00	31.38	8.29	322.1	10.69	
Trapping	ALC	21.55	4/2/2025 9:00	30.31	8.25	306.9	10.88	
Amphibian	ALC	29.1	03/10/2025 13:41:29	0.8				
Amphibian	ALC	19.02	03/28/2025 10:44:13	3.79				
Amphibian	ALC	19.97	03/28/2025 11:57:36	4.26				
Amphibian	CAC	0	04/08/2025 13:54:52	5.29				
Amphibian	CAC	0.28	04/08/2025 14:57:00	5.18				
BMI	ALC	29.49	5/12/2025	0.71	7.95		9.59	99.6
BMI	ALC	26.45	5/15/2025	0.58	7.87	418.8	8.8	125
BMI	ALC	26.79	5/20/2025	1.3	8.37	417.4	9.72	144.8
BMI	ALC	25.21	5/28/2025	2.39	8.21	298.2	10	123
BMI	ALC	22.52	5/29/2025	2.79	8.34	313.2	10.5	128
BMI	ALC	20.87	6/5/2025	1.74	7.71	312.1	9.53	126
BMI	CAC	0.25	6/12/2025	2.7				90
Snorkel	ARH	3.91	8/5/2025 17:30	0.92	8.18	443.2	9.28	
Snorkel	ARH	4.1	8/5/2025 18:57	0.87	8.7	438.9	10.45	
Snorkel	ARH	4.48	8/5/2025 19:37	0.64	8.23	440.3	9.28	
Snorkel	ARH	4.45	8/5/2025 20:19	0.64	8.23	440.3	9.28	
Snorkel	ARH	4.65	8/5/2025 20:23	0.97	8.56	440.7	9.28	
Snorkel	ARH	4.41	8/5/2025 20:46	0.97	8.56	440.7	9.28	
Snorkel	ALC	29.26	8/6/2025 17:16	1.23	7.64	484.8	6.51	
Snorkel	ALC	29.29	8/6/2025 17:17	1.16	7.64	484.8	6.51	
Snorkel	ALC	29.31	8/6/2025 17:29	2.11	7.64	484.8	6.51	
Snorkel	ALC	28.78	8/6/2025 21:12	1.7	8.26	485.9	9.06	
Snorkel	ALC	28.81	8/6/2025 21:15	1.7	8.26	485.9	9.06	
Snorkel	ALC	28.26	8/7/2025 16:50	1	8.26	480	8.87	
Snorkel	ALC	28.34	8/7/2025 17:01	0.63	8.27	312.79	8.92	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Snorkel	ALC	28.42	8/7/2025 17:44	0.76	8.27	312.79	8.92	
Snorkel	ALC	28.25	8/7/2025 20:35	1	8.26	480	8.87	
Snorkel	ALC	28.13	8/12/2025 16:42	0.58				
Snorkel	ALC	28.17	8/12/2025 17:37	0.8				
Snorkel	ALC	25.81	8/12/2025 18:29	0.44				
Snorkel	ALC	25.95	8/12/2025 19:34	0.44				
Snorkel	Cal	0.09	8/13/2025 18:32	1.71				
Snorkel	Cal	0.34	8/13/2025 18:37	8.99				
Snorkel	Cal	0.4	8/13/2025 19:00	3.58				
Snorkel	Cal	0.44	8/13/2025 19:51	3.61				
Snorkel	ALC	25.26	8/13/2025 21:36	2.48				
Snorkel	ALC	25.07	8/14/2025 16:41	2.72				
Snorkel	ALC	24.92	8/14/2025 17:23	2.34				
Snorkel	ALC	24.84	8/14/2025 17:48	3.11				
Snorkel	ALC	24.75	8/14/2025 18:47	1.59				
Snorkel	ALC	24.63	8/14/2025 19:25	2.02				
Snorkel	ALC	23.47	8/14/2025 21:18	1.97				
Snorkel	ALC	22.43	8/19/2025 16:55	1.44				
Snorkel	ALC	22.46	8/19/2025 17:26	1.63				
Snorkel	ALC	22.25	8/19/2025 18:14	1.93				
Snorkel	ALC	21.71	8/20/2025 18:01	1.1	8.56	193.3	9.63	
Snorkel	ALC	21.86	8/20/2025 18:04	2.01	8.45	319.3	9.5	
Snorkel	ALC	22.03	8/20/2025 18:40	1.21	8.37	308.3	10.25	
Snorkel	ALC	22.13	8/20/2025 19:05	1.21	8.37	308.3	10.25	
Snorkel	ALC	21.49	8/21/2025 16:17	1.95	7.99	323.2	9.19	
Snorkel	ALC	20.82	8/21/2025 17:40	4.29	8.21	321.7	9.44	
Snorkel	ALC	21.55	8/21/2025 17:57	1.86	7.99	323.2	9.19	
Snorkel	ALC	20.92	8/21/2025 18:44	2.64	8.21	321.7	9.44	
Snorkel	ARH	3.91	8/22/2025 16:09	0.7	8.18	443.2	9.28	
Snorkel	ALC	23.02	8/22/2025 19:07	0.83				
Snorkel	ALC	19.97	8/25/2025 16:04	3.86	7.76	319.6	9.09	
Snorkel	ALC	20.07	8/25/2025 16:25	1.51	8.31	316.9	10.35	
Snorkel	ALC	20.18	8/25/2025 16:53	1.51	8.54	314.9	11.06	
Electrofishing	ALC	29.61	10/2/2025					
Electrofishing	ALC	29.63	10/2/2025					
Electrofishing	ALC	28.27	10/3/2025	3.34	7.88	601.3	8.18	
Electrofishing	ALC	28.32	10/3/2025	3.34	7.88	601.3	8.18	
Electrofishing	ALC	25.91	10/7/2025	1.79	7.86	535.4	9.00	
Electrofishing	ALC	25.90	10/7/2025	1.79	7.86	535.4	9.00	

Survey type	Stream Code	Stream Mile	Date-Time	Turbidity (NTU)	pH	Cond. (µS/cm)	DO (mg/L)	Alkalinity (mg/L)
Electrofishing	CAC	00.04	10/8/2025	2.17	8.05	313.0	9.29	
Electrofishing	CAC	00.02	10/8/2025	2.17	8.05	313.0	9.29	
Electrofishing	ALC	25.04	10/9/2025	1.53	8.18	328.7	9.74	
Electrofishing	ALC	25.01	10/9/2025	1.53	8.18	328.7	9.74	
Electrofishing	ALC	24.65	10/14/2025	2.44	8.05	469.9	9.63	
Electrofishing	ALC	24.67	10/14/2025	2.44	8.05	469.9	9.63	
Electrofishing	ALC	24.26	10/15/2025	1.52	8.33	374.0	9.68	
Electrofishing	ALC	24.27	10/15/2025	1.52	8.33	374.0	9.68	
Electrofishing	ALC	23.52	10/21/2025	1.50	8.14	346.7	9.63	
Electrofishing	ALC	23.54	10/21/2025	1.50	8.14	346.7	9.63	
Electrofishing	ALC	21.75	10/22/2025	2.41	8.26	371.9	9.13	
Electrofishing	ALC	21.76	10/22/2025	2.41	8.26	371.9	9.13	
Electrofishing	ALC	21.24	10/23/2025	1.67	8.17	374.2	9.06	
Electrofishing	ALC	21.22	10/23/2025	1.67	8.17	374.2	9.06	
Electrofishing	ALC	20.79	10/29/2025	2.26	8.32	372.8	9.62	
Electrofishing	ALC	20.67	10/29/2025	2.26	8.32	372.8	9.62	

Appendix C 2025 Alameda Creek Fish Trapping Data

Alameda Creek Fish Trapping 2025				
Days Fishing		RST	Fyke Net	Total
		134	0	
Fishes	Bluegill	10	--	10
	California Roach	5167	--	5167
	Lampetra Spp.	185	--	185
	O. mykiss- New capture	1199	--	1199
	O. mykiss- Recapture	208	--	208
	O. mykiss- Total captured	1407	--	1407
	Pacific Lamprey	124	--	124
	Prickly Sculpin	13	--	13
	Sacramento Pikeminnow	27	--	27
	Sacramento Sucker	1014	--	1014
	Unknown Lamprey Spp.	1	--	1
Amphibians and Reptiles	American Bullfrog	5	--	5
	California Newt	1	--	1
	Foothill Yellow-Legged Frog	1	--	1
	Pacific Chorus Frog	3	--	3
	Western Fence Lizard	1	--	1
	Western Pond Turtle	6	--	6
	Western Toad	9	--	9
Invertebrates	Signal Crayfish	38	--	38
Vertebrates	Botta's Pocket Gopher	1	--	1
	Broad Footed Mole	1	--	1
	California Vole	3	--	3
	Dusky Footed Woodrat	2	--	2
	Gopher Spp.	1	--	1
	Unknown Rodent Spp.	6	--	6


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Appendix D ACWD RD1 Tag Detections WY 2024–25

SFPUC O. mykiss Capture Data												ACWD Antenna Data	
Number	Date	Stream	Survey	Species	River Mile	Lat	Long	Length (mm)	Weight (g)	Life Stage at Capture	PIT Tag #	First Detection at RD1	Direction
1	6/18/2024	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	76	5.0	fry/parr/resident	989.001042129951	2025-01-02 21:53:57.000	Downstream
2	10/9/2024	Alameda Creek	Electrofishing	*O. mykiss*	ALC24.48	37.511988	-121.825959	76	5.1	n/a	989.002029071710	2025-02-23 07:10:42.000	Downstream
3	6/16/2024	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	69	3.7	fry/parr/resident	989.001042129915	2025-03-01 03:24:55.000	Downstream
4	2/26/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	181	59.2	Partial Smolt	989.002027333065	2025-03-11 18:26:43.000	Unknown
5	10/10/2024	Alameda Creek	Electrofishing	*O. mykiss*	ALC24.22	37.514607	-121.829217	91	8.9	n/a	989.002027333648	2025-03-20 19:42:01.000	Downstream
6	10/2/2024	Alameda Creek	Electrofishing	*O. mykiss*	ALC25.81	37.505038	-121.816399	160	39.5	n/a	989.002027332600	2025-03-22 12:55:23.000	Downstream
7	5/15/2024	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	70	3.2	fry/parr/resident	989.001042130580	2025-03-25 12:51:17.000	Unknown
8	6/15/2024	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	70	3.9	fry/parr/resident	989.001042129899	2025-04-08 15:54:17.000	Downstream
9	10/3/2024	Alameda Creek	Electrofishing	*O. mykiss*	ALC28.40	37.498035	-121.777941	77	5.3	n/a	989.002027332559	2025-04-10 11:47:03.000	Downstream
10	2/26/2025	Alameda Creek	Fish Trap- RST	O. mykiss	ALC21.55	37.538986	-121.856296	152	34.4	fry/parr/resident	989.002027333053	2025-04-10 12:02:33.000	Downstream
11	2/26/2025	Alameda Creek	Fish Trap- RST	O. mykiss	ALC21.55	37.538986	-121.856296	173	44.1	Partial Smolt	989.002027333068	2025-04-10 14:28:36.000	Downstream
12	2/21/2025	Alameda Creek	Fish Trap- RST	O. mykiss	ALC21.55	37.538986	-121.856296	130	20.8	fry/parr/resident	989.002027333089	2025-04-11 07:38:13.000	Downstream
13	10/9/2024	Alameda Creek	Electrofishing	*O. mykiss*	ALC24.46	37.512259	-121.826051	114	12.4	n/a	989.002029071694	2025-04-13 11:46:19.000	Downstream
14	2/26/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	139	29.0	Partial Smolt	989.002027333042	2025-04-14 18:41:11.000	Downstream
15	2/25/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	165	41.1	fry/parr/resident	989.002027333007	2025-04-15 03:23:03.000	Downstream
16	4/8/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	183	59.2	Smolt	989.002027333784	2025-04-15 17:19:46.000	Downstream
17	3/20/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	148	36.6	fry/parr/resident	989.002027333043	2025-04-22 08:58:29.000	Downstream
18	3/5/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	121	17.9	fry/parr/resident	989.002027333084	2025-05-01 03:26:58.000	Downstream
19	4/19/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	160	39.1	Smolt	989.002027333735	2025-05-01 15:20:31.000	Downstream
20	5/2/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	175	49.5	Smolt	989.002027333762	2025-05-05 03:06:28.000	Downstream
21	5/2/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	160	42.4	Partial Smolt	989.002027333793	2025-05-05 05:47:19.000	Downstream
22	4/30/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	170	47.5	fry/parr/resident	989.002027333792	2025-05-07 08:27:32.000	Downstream
23	4/26/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	158	38.4	Partial Smolt	989.002027333766	2025-05-08 11:53:33.000	Downstream
24	5/2/2025	Alameda Creek	Fish Trap- RST	*O. mykiss*	ALC21.55	37.538986	-121.856296	152	40.8	Partial Smolt	989.002027333712	2025-05-18 07:10:15.000	Downstream


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Appendix E Draft Final ACWD–SFPUC Fisheries Data Sharing Protocol

ACWD–SFPUC FISHERIES DATA SHARING PROTOCOL

DRAFT FINAL

Background and Purpose

The Alameda County Water District (ACWD) and the San Francisco Public Utilities Commission (SFPUC) (Agencies) are conducting fisheries restoration and monitoring projects in the Alameda Creek Watershed and have commitments to collect long-term data under their state and federal environmental regulatory permits, including their respective National Marine Fisheries Services biological opinions (BiOps) and, both have commitments to share detailed data with these state and federal agencies on an annual basis. These annual reports will take time to prepare as data sets may be large and require substantial quality assurance review prior to publication. ACWD is required to submit an annual report by November 1 of each year. The SFPUC is required to submit a report annually by July 31 of each year.

However, both Agencies acknowledge that the timely sharing of some basic, provisional data about the presence / non-presence of salmonids and lampreys with each other will be beneficial for their respective monitoring programs. Timely sharing of data will help facilitate Agencies' operations and inform monitoring efforts with the potential to be more successful in those efforts. As more is learned about the species of interest, such as migration patterns and travel times, this data sharing protocol can be adjusted if both SFPUC and ACWD agree to adjustments.

Overview of Data Collected by the Agencies

San Francisco Public Utilities Commission

The SFPUC monitors spawning, rearing, and the movements of Oncorhynchus mykiss (O. mykiss). The following data-collection processes by ACWD at the BART Weir will provide meaningful information for the SFPUC:

- Passive integrated transponders (PIT) tag antenna detections
- Visual fish observations
- ARIS sonar camera data. The camera data likely will not be monitored in real time and only available later, after substantial processing.

Alameda County Water District

The ACWD monitors migration of steelhead, Pacific Lamprey, and other salmonids including fall run Chinook Salmon. The following data-collection processes by the SFPUC will provide meaningful information for ACWD:

- Spawning surveys conducted between January 1 – April 30

- Outmigrant fish trapping conducted between Feb 1 – May 31 (rotary-screw trap and fyke net)
- PIT-tag detections at antennas

Agreement to Share Data

- To facilitate timely operations between agencies and strive to communicate by email whenever salmonid or Pacific Lamprey presence is detected.
- SFPUC:
    - Spawning surveys and outmigrant fish trapping - January 1st through May 31st
        - At minimum a monthly email will be sent to ACWD including O. mykiss spawning survey observations and a summary of O. mykiss and Pacific Lamprey collected during SFPUC's fish-trapping surveys.
        - A weekly email will be sent to ACWD when ≥ 5 O. mykiss are captured per week during SFPUC's fish-trapping surveys.
    - PIT-tag antenna detections (approximately November through May 31st)
        - If out-migrating O. mykiss are detected at the SFPUC antennas, total fish numbers will be relayed to ACWD after antennas are downloaded (approximately every two to three weeks).
    - Brief indication of conditions for health and safety purposes, such as unexpected flow changes that could affect the safety of downstream staff. To facilitate data sharing, Agencies may develop forms that include key data / indicators.
- ACWD
    - PIT-tag antenna detections
        - ACWD will email the SFPUC unique PIT-tag numbers detected at the BART Weir approximately every month.
    - Visual fish observations
        - ACWD will email the SFPUC when visual observations of in-migrating salmonids and/or Pacific Lamprey are detected within 24 hours. If fish numbers are high, weekly emails will suffice.
    - ARIS camera data
        - ACWD will email the SFPUC when in-migrating salmonids and/or Pacific Lamprey are detected within 1-2 days of processed identification.

What Agencies Will Provide

- SFPUC to provide ACWD:
  - Count of out-migrating smolts
  - SFPUC PIT-tag number confirmations for detections on the BART Weir antenna will be given to ACWD upon request.
- ACWD to provide SFPUC:
  - Presence/non-presence of salmonids (visual or PIT-tag reads)
  - Unique PIT-tag numbers detected at the BART Weir antenna
- The contact at ACWD will be the Water Supply Supervisor, or their designated Water Resources Engineer; the contact at SFPUC will be the Biologist(s) leading the trapping and tag reading projects.

General Guidelines for Data-Sharing Protocol

- All data collected and transmitted is provisional.
- As more is learned about species travel time and migrations, notification and email times between ACWD and SFPUC can be adjusted as necessary.
- ACWD and the SFPUC will not use the other agencies shared data for any other purpose other than their own monitoring operations without the express written approval of the other agency. This includes, but is not limited to, white papers, journal publications, press releases, conference presentations, and its distribution in any form to NGOs, other local, state, or federal agencies, consultants, the media, or the public.
- At a later date, comprehensive scientific data will be shared with the Alameda Creek Fisheries Restoration Workgroup in the form of the annual reports required by state and federal resource agencies.
- This data sharing protocol can be revisited as conditions change.

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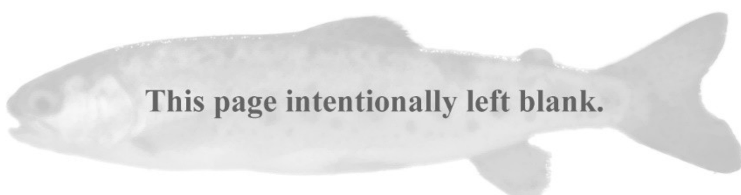
Appendix F Alameda Creek, Calaveras Creek, and Arroyo Hondo *Oncorhynchus mykiss* Spawning Survey Data

Reach Description	Section Start RM	Section End RM	Surveys/ Section	Total Observed Redds	Redds/ mile	Total *O. mykiss* observed	Fry Observed
ALC: Camp Ohlone to ACDD	30.57	31.09	1	0	0	0	No
	30.06	30.57	3	1	2.0	0	Yes
	29.54	30.06	1	0	0	0	No
	29.03	29.54	1	0	0	2	No
	28.51	29.03	1	0	0	0	No
ALC: ACDD to Confluence of Calaveras Creek	27.90	28.51	2	4	6.6	0	Yes
	27.28	27.90	0	-	-	-	-
	26.67	27.28	2	1	1.6	3	No
	26.05	26.67	0	-	-	-	-
	25.44	26.05	4	0	0	10	Yes
ALC: Calaveras Creek Confluence to Welch Creek	24.72	25.43	1	0	0	0	No
	24.01	24.72	3	1	1.4	1	No
	23.30	24.01	2	0	0	0	No
	22.59	23.30	1	0	0	0	No
	21.88	22.59	1	0	0	0	No
ALC: Welch Creek to Arroyo de la Laguna	20.93	21.88	1	2	2.1	0	No
	19.97	20.93	2	0	0	0	No
	19.02	19.97	3	1	1.1	0	No
	18.07	19.02	0	-	-	-	-
	17.12	18.07	2	0	0	0	No
CAC below Dam	00.28	00.55	3	2	7.4	2	No
	00.00	00.28	5	1	3.6	2	No
ARH: "Slide" to Calaveras Reservoir Inundation	04.93	05.40	1	1	2.1	10	No
	04.45	04.93	1	6	12.5	6	No
	03.97	04.45	2	1	2.1	3	Yes
	03.49	03.97	1	0	0	0	Yes
	03.01	03.49	2	1	2.1	6	No



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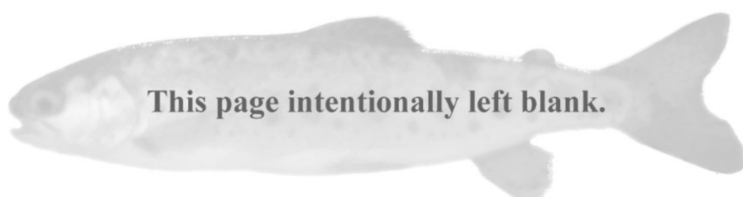
Appendix G *Oncorhynchus mykiss* Spawning Survey Redd Observation Data

Section	Date First Observed	Redd ID	Stream Mile Location	Fish on Redd	Pot Length (cm)	Pot Width (cm)	Pot Dominant Substrate (cm)	Tail Length (cm)	Tail Width 1 (cm)	Tail Width 2 (cm)	Tail Dominant Substrate (cm)
ALC19.97-20.93	3/28/2025	10328251902-001	19.80	0	34	29	1	17	21	20	2
ALC20.93-21.88	1/29/2025	10129252093-001	21.08	0	46	50	5	67	41	57	2
ALC20.93-21.88	1/29/2025	10129252093-002	21.77	0	26	28	6	45	31	21	3
ALC24.01-24.72	3/10/2025	10310252401-001	24.53	0	57	42	7	97	40	41	4
ALC26.67-27.28	2/27/2025	10227252667-001	26.76	0	53	53	4	46	40	31	2
ALC27.28-27.90	3/10/2025	10310252790-001	27.98	0	52	24	6	50	20	22	3
ALC27.28-27.90	3/10/2025	10310252790-002	27.98	0	82	67	7	52	28	29	4
ALC27.28-27.90	3/10/2025	10310252790-003	27.99	0	41	34	7	22	40	30	2
ALC27.28-27.90	3/10/2025	10310252790-004	28.05	0	37	40	4	43	26	22	5
ALC30.06-30.57	3/10/2025	10310253006-001	30.53	0	110	75	3	115	80	50	1
ARH03.01-03.49	3/5/2025	10305250301-001	3.01	0	69	58	6	103	85	111	3
ARH03.97-04.45	4/28/2025	10428250397-001	3.98	0	48	56	4	61	49	44	1
ARH04.45-04.93	1/23/2025	10123250445-001	4.53	0	58	63	5	113	64	49	3
ARH04.45-04.93	1/23/2025	10123250445-002	4.53	0	88	63	8	90	48	29	3
ARH04.45-04.93	1/23/2025	10123250445-003	4.57	0	50	45	9	52	39	95	3
ARH04.45-04.93	1/23/2025	10123250445-004	4.57	0	39	41	5	81	29	39	3
ARH04.45-04.93	1/23/2025	10123250445-005	4.58	0	64	34	10	63	23	22	4
ARH04.45-04.93	1/23/2025	10123250445-006	4.81	0	75	73	6	151	56	50	3
ARH04.93-05.40	1/9/2025	10109250493-001	5.04	0	88	52	5	101	49	51	2
CAC00.00-00.28	2/10/2025	10210250000-001	0.24	0	41	50	5	67	38	24	2
CAC00.28-00.47	4/22/2025	10422250028-001	0.34	0	45	33	4	112	32	45	2
CAC00.28-00.47	4/22/2025	10422250028-002	0.34	0	25	31	4	60	33	31	2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Appendix H Snorkel Survey Fish Life Stage Size Ranges

Species	Juvenile (mm)	Adult (mm)
California Roach	0-50	51-120
Largemouth Bass	0-200	201-750
Lepomis spp.	0-80	81-400
Prickly Sculpin	0-75	76-200
Sacramento Pikeminnow	0-200	201-1400
Sacramento Sucker	0-200	201-560


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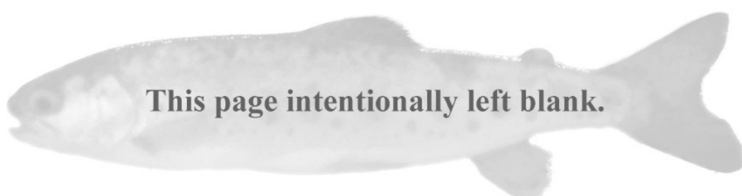
Appendix I Snorkel Survey Fish Observation Data

Surveyed River Mile	Date	Total RTR	Juvenile SSU	Adult SSU	Juvenile SPI	Adult SPI	Juvenile CRO	Adult CRO	Juvenile PSC	Adult PSC	Juvenile GSU	Adult GSU	UNID YOY	Habitat Length (ft)	RTR fish/ 100ft	SSU fish/ 100ft	SPI fish/ 100ft	CRO fish/ 100ft	PSC fish/ 100ft	Sunfish/ 100ft	UNID YOY/ 100ft	Reach
ALC19.97	8/25/2025	--	5.0	--	--	--	95.0	2.0	--	--	--	--	--	57	--	8.8	--	170.2	--	--	--	1
ALC20.09	8/25/2025	--	--	--	--	--	402.0	50.0	--	--	--	--	--	91	--	0.0	--	496.7	--	--	--	1
ALC20.28	8/25/2025	--	7.0	--	--	--	613.0	185.0	--	--	--	--	--	65	--	10.8	--	1227.7	--	--	--	1
ALC20.89	8/21/2025	--	--	--	--	--	--	--	--	--	--	--	--	128	--	0.0	--	--	--	--	--	1
ALC20.94	8/21/2025	--	7.0	--	--	--	290.0	61.0	--	--	--	--	--	97	--	7.2	--	361.9	--	--	--	1
ALC21.50	8/21/2025	1.0	1.0	--	--	--	350.0	1.0	--	--	--	--	--	165	0.6	0.6	--	212.7	--	--	--	1
ALC21.55	8/21/2025	1.3	4.0	--	--	--	--	--	--	--	--	--	--	63	2.1	6.3	--	--	--	--	--	1
ALC21.70	8/20/2025	--	--	--	--	--	9.0	--	--	--	--	--	--	146	--	0.0	--	--	--	--	--	1
ALC21.89	8/20/2025	--	4.0	--	--	--	296.0	91.0	--	--	--	--	--	37	--	10.8	--	1045.9	--	--	--	1
ALC22.02	8/20/2025	--	5.0	--	--	--	32.0	9.0	--	--	--	--	--	97	--	5.2	--	42.3	--	--	--	2
ALC22.17	8/20/2025	--	8.0	--	--	--	81.0	--	--	--	--	--	25.0	150	--	5.3	--	--	--	--	16.7	2
ALC22.26	8/19/2025	--	--	--	--	--	--	--	--	--	--	--	--	108	--	0.0	--	--	--	--	--	2
ALC22.44	8/19/2025	--	--	--	--	--	14.7	--	--	--	--	--	--	47	--	0.0	--	--	--	--	--	2
ALC22.46	8/19/2025	1.0	--	--	--	--	59.0	--	--	--	--	--	--	162	0.6	0.0	--	--	--	--	--	2
ALC23.21	8/19/2025	--	7.0	--	--	--	54.0	--	--	--	--	--	--	163	--	4.3	--	--	--	--	--	2
ALC23.47	8/14/2025	1.0	20.0	1.0	--	--	34.0	1.0	--	--	--	--	10.0	173	0.6	12.1	--	20.2	--	--	5.8	2
ALC24.64	8/14/2025	--	--	--	--	--	2.0	--	--	--	--	--	--	170	--	0.0	--	--	--	--	--	2
ALC24.75	8/14/2025	1.3	--	--	--	--	--	--	--	--	--	--	--	44	3.0	0.0	--	--	--	--	--	2
ALC24.84	8/14/2025	--	--	--	--	--	1.0	--	--	--	--	--	--	89	--	0.0	--	--	--	--	--	2
ALC24.94	8/14/2025	27.0	--	--	--	--	10.0	59.0	--	--	--	--	--	59	45.8	0.0	--	116.9	--	--	--	2
ALC25.07	8/14/2025	--	--	--	--	--	--	--	--	--	--	--	--	69	--	0.0	--	--	--	--	--	2
ALC25.28	8/13/2025	--	15.0	--	--	--	28.0	--	--	--	--	--	--	81	--	18.5	--	--	--	--	--	2
CAC00.08	8/13/2025	1.0	--	--	--	--	--	--	--	--	--	--	--	300	0.3	--	--	--	--	--	--	3
CAC00.34	8/13/2025	--	--	--	--	--	--	--	--	--	--	--	--	16	--	--	--	--	--	--	--	3
CAC00.40	8/13/2025	--	--	--	--	--	--	--	--	--	--	--	--	18	--	--	--	--	--	--	--	3
CAC00.46	8/13/2025	10.0	--	--	--	--	--	--	--	--	--	--	--	62	16.1	--	--	--	--	--	--	3
ALC25.81	8/12/2025	8.0	--	--	--	--	--	2.0	--	--	--	--	--	20	40.0	--	--	--	--	--	--	4
ALC25.94	8/12/2025	27.0	--	--	--	--	59.0	10.0	--	--	--	--	--	34	79.4	--	--	202.9	--	--	--	4
ALC28.12	8/12/2025	5.0	--	--	--	--	80.0	179.0	--	--	--	--	--	52	9.6	--	--	498.1	--	--	--	4
ALC28.17	8/12/2025	18.0	--	--	--	--	2.0	29.0	--	--	--	--	--	45	40.0	--	--	68.9	--	--	--	4
ALC28.25	8/8/2025	14.0	--	--	--	--	19.0	32.0	--	--	--	1.0	--	33	42.4	--	--	154.5	--	--	--	4
ALC28.27	8/8/2025	21.0	--	--	--	--	9.0	7.0	--	--	--	--	--	16	131.3	--	--	100.0	--	--	--	4
ALC28.34	8/8/2025	17.3	--	--	--	--	29.3	9.3	--	--	--	--	--	28	61.9	--	--	138.1	--	--	--	4
ALC28.41	8/8/2025	14.0	--	--	--	--	49.0	30.0	--	--	--	--	--	36	38.9	--	--	219.4	--	--	--	4
ALC28.78	8/6/2025	3.0	--	--	--	--	9.0	41.0	--	--	--	--	--	26	11.5	--	--	192.3	--	--	--	5
ALC28.81	8/6/2025	2.0	--	--	--	--	15.0	84.0	--	--	--	--	--	39	5.1	--	--	253.8	--	--	--	5
ALC29.26	8/6/2025	6.7	--	--	--	--	14.7	70.7	--	--	--	--	--	50	13.3	--	--	170.7	--	--	--	5
ALC29.29	8/6/2025	3.0	--	--	--	--	36.0	48.0	--	--	--	--	--	67	4.5	--	--	125.4	--	--	--	5
ALC29.31	8/6/2025	6.0	--	--	--	--	53.0	297.0	--	--	--	--	--	73	8.2	--	--	479.5	--	--	--	5
ARH03.92	8/5/2025	1.3	5.3	--	--	--	69.3	8.0	--	1.0	--	--	--	45	3.0	11.8	--	171.8	--	--	--	6
ARH03.94	8/5/2025	1.0	--	--	--	--	45.0	1.0	--	--	--	--	--	94	1.1	0.0	--	48.9	--	--	--	6
ARH04.16	8/5/2025	7.0	--	--	--	--	65.0	191.0	--	--	--	--	--	158	4.4	0.0	--	162.0	--	--	--	6
ARH04.44	8/5/2025	45.0	--	--	--	--	47.0	77.0	--	--	--	--	--	250	18.0	0.0	--	49.6	--	--	--	6
ARH04.53	8/5/2025	6.0	--	--	--	--	30.0	--	--	--	--	--	--	101	5.9	0.0	--	29.7	--	--	--	6
ARH04.66	8/5/2025	5.0	1.0	--	--	--	102.0	10.0	--	--	--	--	--	99	5.1	1.0	--	113.1	--	--	--	6
ARH04.71	8/5/2025	15.0	--	--	--	--	574.0	402.0	--	--	--	--	--	215	7.0	0.0	--	454.0	--	--	--	6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Appendix J Snorkel Survey Water Quality and Environmental Conditions Data

Survey ID	Date	Weather	Wind	Air Temperature (C)	Water Temperature (C)	Dissolved Oxygen (mg/L)	pH	Conductivity (us/cm)	Turbidity (ntu)	Habitat Stream Length (ft)
ALC19.97	8/25/2025	overcast	light	18.8	16.2	9.09	7.76	319.6	3.86	57
ALC20.09	8/25/2025	clear	light	18.8	16.4	10.35	8.31	316.9	1.51	91
ALC20.28	8/25/2025	clear	light	20.6	16.9	11.06	8.54	314.9	1.51	65
ALC20.89	8/21/2025	clear	calm	26.0	15.4	9.44	8.21	321.7	4.29	128
ALC20.94	8/21/2025	clear	calm	26.0	15.4	9.44	8.21	321.7	2.64	97
ALC21.50	8/21/2025	clear	calm	24.0	14.2	9.19	7.99	323.2	1.95	165
ALC21.55	8/21/2025	clear	calm	24.0	14.2	9.19	7.99	323.2	1.86	63
ALC21.70	8/20/2025	clear	calm	21.1	13.3	9.63	8.56	193.3	1.10	146
ALC21.89	8/20/2025	clear	calm	22.0	14.0	9.50	8.45	319.3	2.01	37
ALC22.02	8/20/2025	clear	calm	30.4	15.6	10.25	8.37	308.3	1.21	97
ALC22.17	8/20/2025	clear	calm	30.4	15.6	10.25	8.37	308.3	1.21	150
ALC22.26	8/19/2025	clear	calm	20.8	12.9	--	--	--	1.93	108
ALC22.44	8/19/2025	clear	calm	20.4	12.9	--	--	--	1.44	47
ALC22.46	8/19/2025	clear	calm	24.5	13.2	--	--	--	1.63	162
ALC23.21	8/19/2025	clear	calm	24.5	14.6	--	--	--	0.83	163
ALC23.47	8/14/2025	clear	calm	25.6	16.4	--	--	--	1.97	173
ALC24.64	8/14/2025	clear	calm	20.6	14.3	--	--	--	2.02	170
ALC24.75	8/14/2025	clear	calm	21.6	14.0	--	--	--	1.59	44
ALC24.84	8/14/2025	clear	calm	19.8	13.3	--	--	--	3.11	89
ALC24.94	8/14/2025	clear	calm	18.2	13.1	--	--	--	2.34	59
ALC25.07	8/14/2025	overcast	calm	19.1	12.8	--	--	--	2.72	69
ALC25.28	8/13/2025	clear	calm	27.2	14.2	--	--	--	2.48	81
CAC00.08	8/13/2025	clear	light	27.1	12.5	--	--	--	1.71	300
CAC00.34	8/13/2025	clear	light	23.0	12.3	--	--	--	8.99	16
CAC00.40	8/13/2025	clear	calm	25.5	12.2	--	--	--	3.58	18
CAC00.46	8/13/2025	clear	light	28.5	12.4	--	--	--	3.61	62
ALC25.81	8/12/2025	clear	calm	27.5	19.0	--	--	--	0.44	20
ALC25.94	8/12/2025	clear	calm	25.7	18.8	--	--	--	0.44	34
ALC28.12	8/12/2025	clear	calm	24.4	19.2	--	--	--	0.58	52
ALC28.17	8/12/2025	clear	calm	21.4	19.4	--	--	--	0.80	45
ALC28.25	8/8/2025	clear	calm	25.0	19.1	8.87	8.26	480.0	1.00	33
ALC28.27	8/8/2025	clear	calm	25.0	19.1	8.87	8.26	480.0	1.00	16
ALC28.34	8/8/2025	clear	calm	25.0	19.6	8.92	8.27	312.8	0.63	28
ALC28.41	8/8/2025	clear	calm	25.0	19.6	8.92	8.27	312.8	0.76	36
ALC28.78	8/6/2025	clear	calm	33.4	19.4	9.06	8.26	485.9	1.70	26
ALC28.81	8/6/2025	clear	calm	33.4	19.4	9.06	8.26	485.9	1.70	39
ALC29.26	8/6/2025	clear	calm	22.5	17.2	6.51	7.64	484.8	1.23	50
ALC29.29	8/6/2025	clear	calm	22.5	17.2	6.51	7.64	484.8	1.16	67
ALC29.31	8/6/2025	clear	calm	22.5	17.2	6.51	7.64	484.8	2.11	73
ARH03.92	8/5/2025	clear	calm	21.7	16.2	9.28	8.18	443.2	0.70	45
ARH03.94	8/5/2025	clear	calm	21.7	16.2	9.28	8.18	443.2	0.92	94
ARH04.16	8/5/2025	clear	calm	26.5	17.8	10.45	8.70	438.9	0.87	158
ARH04.44	8/5/2025	clear	calm	26.5	17.3	9.28	8.23	440.3	0.64	250
ARH04.53	8/5/2025	clear	calm	25.5	17.3	9.28	8.23	440.3	0.64	101
ARH04.66	8/5/2025	clear	calm	25.8	18.2	9.28	8.56	440.7	0.97	99
ARH04.71	8/5/2025	clear	calm	25.8	18.2	9.28	8.56	440.7	0.97	215


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Appendix K 2025 Electrofishing Survey Habitat Morphology and Water Quality Data

Creek	River Mile	Habitat Type	Habitat Length (ft)	Turbidity (NTU)	Temp. °C	pH	Cond. (µS/cm)	DO (mg/L)	Max Depth (ft)	Mean Width (ft)	Mean Depth (ft)	Latitude (dd.mmm)	Longitude (dd.mmm)	Date
ALC	29.61	FW	64	--	17.10	--	--	--	2.4	16.7	1.2	37.495834	-121.759964	10/2/2025
ALC	29.63	Riffle	53	--	17.10	--	--	--	1.2	9.3	0.7	37.495630	-121.759708	10/2/2025
ALC	28.27	Riffle	98	3.34	17.09	7.88	601.3	8.18	0.5	8.8	0.3	37.499115	-121.779398	10/3/2025
ALC	28.32	FW	111	3.34	17.09	7.88	601.3	8.18	1.9	14.0	0.9	37.498425	-121.779279	10/3/2025
ALC	25.91	FW	45	1.79	15.98	7.86	535.4	9.00	1.8	15.7	0.6	37.505391	-121.814670	10/7/2025
ALC	25.90	Riffle	78	1.79	15.98	7.86	535.4	9.00	1.9	10.3	0.8	37.505397	-121.814852	10/7/2025
CAC	00.04	Riffle	142	2.17	12.65	8.05	313.0	9.29	1.1	10.7	0.7	37.503114	-121.821859	10/8/2025
CAC	00.02	FW	114	2.17	12.65	8.05	313.0	9.29	1.3	17.7	0.8	37.503154	-121.822220	10/8/2025
ALC	25.04	Riffle	147	1.53	12.51	8.18	328.7	9.74	1.7	20.0	0.7	37.505459	-121.828631	10/9/2025
ALC	25.01	FW	123	1.53	12.51	8.18	328.7	9.74	1.4	20.0	0.9	37.505828	-121.828920	10/9/2025
ALC	24.65	FW	142	2.44	12.17	8.05	469.9	9.63	2.0	23	1.0	37.509761	-121.827031	10/14/2025
ALC	24.67	Riffle	167	2.44	12.17	8.05	469.9	9.63	1.0	24.7	0.7	37.509549	-121.827278	10/14/2025
ALC	24.26	FW	76	1.52	12.43	8.33	374.0	9.68	2.5	24.7	1.5	37.514211	-121.828686	10/15/2025
ALC	24.27	Riffle	155	1.52	12.43	8.33	374.0	9.68	1.1	18.7	0.7	37.514112	-121.828553	10/15/2025
ALC	23.52	Riffle	138	1.50	11.87	8.14	346.7	9.63	1.3	20.0	0.7	37.516629	-121.840479	10/21/2025
ALC	23.54	FW	165	1.50	11.87	8.14	346.7	9.63	1.8	21.0	1.3	37.516568	-121.840123	10/21/2025
ALC	21.75	FW	80	2.41	14.16	8.26	371.9	9.13	1.6	21.3	1.1	37.536404	-121.854655	10/22/2025
ALC	21.76	Riffle	107	2.41	14.16	8.26	371.9	9.13	1.6	20.0	1.3	37.536290	-121.854542	10/22/2025
ALC	21.24	Riffle	80	1.67	13.54	8.17	374.2	9.06	1.4	9.3	1.1	37.542608	-121.859470	10/23/2025
ALC	21.22	FW	89	1.67	13.54	8.17	374.2	9.06	2.4	19.3	1.7	37.542826	-121.859705	10/23/2025
ALC	20.79	FW	148	2.26	11.50	8.32	372.8	9.62	1.8	30.3	1.1	37.548637	-121.862096	10/29/2025
ALC	20.67	Riffle	165	2.26	11.50	8.32	372.8	9.62	1.0	13.3	0.6	37.550337	-121.861959	10/29/2025


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Appendix L Snorkel Survey Fish Density Data

Reach	RTR fish/ 100ft	SSU fish/ 100ft	SPI fish/ 100ft	CRO fish/ 100ft	PSC fish/ 100ft	UNID YOY/ 100ft
1	0.3	3.3	0.0	288.0	0.0	0.0
2	2.1	4.0	0.0	27.2	0.0	2.5
3	2.8	0.0	0.0	0.0	0.0	0.0
4	47.1	0.0	0.0	206.7	0.0	0.0
5	8.1	0.0	0.0	262.1	0.0	0.0
6	8.4	0.7	0.0	168.5	0.1	0.0


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Appendix M 2025 Electrofishing Survey Fish Catch Data

Stream Code	Date	Station	Habitat Type	Habitat Length (ft)	Species	Total Fish Captured	Population Estimate (Mfish)	Mfish 95% Confidence Interval	Mfish Standard Error	Mfish Capture Probability	Fish Density/ 100'
Alameda Creek (ALC)	10/2/2025	29.61	Flatwater	64	CRO	101	121	99-143	11.009	0.4469	157.8
					O. mykiss	39	41	36-46	2.620	0.6000	60.9
		29.63	Riffle	53	CRO	13	13	13-14	0.331	0.8125	24.5
					O. mykiss	8	8	8-9	0.512	0.7273	15.1
	10/3/2025	28.27	Riffle	98	CRO	35	35	35-36	0.732	0.7778	35.7
					O. mykiss	33	34	33-38	1.793	0.6471	33.7
		28.32	Flatwater	111	CRO	118	166	118-216	25.462	0.3371	106.3
					O. mykiss	14	15	14-20	2.274	0.5385	12.6
	10/7/2025	25.91	Flatwater	45	CRO	28	28	28-30	1.023	0.7179	62.2
					O. mykiss	33	34	33-37	1.653	0.6600	73.3
		25.90	Riffle	78	CRO	10	10	10-13	1.113	0.6250	12.8
					O. mykiss	71	75	71-82	3.402	0.6068	91.0
	10/9/2025	25.04	Riffle	147	CRO	2	2	2-15	1.038	0.5000	1.4
					LAM	2	2**	2-2	0.000	1.0000	1.4
					O. mykiss	25	35	25-59	11.991	0.3333	17.0
					PLA	1	1*	1-1	0.734	0.5000	0.7
					PSC	3	3	3-4	0.266	0.7500	2.0
					SSU	4	4	4-7	0.969	0.5714	2.7
		25.01	Flatwater	123	CRO	1	1**	1-1	0.000	1.0000	0.8
					LAM	1	1*	1-1	2.182	0.2500	0.8
					O. mykiss	4	4	4-5	0.262	0.6667	3.3
					PSC	4	4	4-6	0.500	0.5714	3.3
	10/14/2025	24.65	Flatwater	142	LAM	7	10~	10-10	0.000	0.0000	4.9
					O. mykiss	2	2**	2-2	0.000	1.0000	1.4
					SSU	4	4	4-6	0.544	0.6667	2.8
		24.67	Riffle	167	LAM	3	3	3-6	0.681	0.5000	1.8
					O. mykiss	28	30	28-36	2.788	0.4590	16.8
					PSC	1	1**	1-1	0.000	1.0000	0.6
					SSU	3	4~	4-4	0.000	0.0000	1.8
	10/15/2025	24.26	Flatwater	76	CRO	2	2**	2-2	0.000	1.0000	2.6
					O. mykiss	6	6	6-6	0.142	0.8571	7.9
					SSU	4	6~	6-6	0.000	0.0000	5.3
		24.27	Riffle	155	*O. mykiss*	20	20	20-21	0.494	0.6897	12.9
					PSC	1	1**	1-1	0.000	1.0000	0.6
	10/21/2025	23.52	Riffle	138	CRO	10	12	10-21	4.029	0.3333	7.2
					O. mykiss	26	26	26-28	1.122	0.5909	18.8
					SSU	13	17	13-31	6.621	0.2889	9.4
		23.54	Flatwater	165	CRO	17	26~	26-26	0.000	0.0000	10.3
					LAM	4	4	4-9	1.468	0.5000	2.4
					O. mykiss	7	7	7-10	1.195	0.5833	4.2
					SSU	40	43	40-50	3.330	0.5634	24.2
	10/22/2025	21.75	Flatwater	80	CRO	2	2	2-15	1.050	0.4000	2.5
					LAM	7	10	7-27	7.415	0.2414	8.8
					O. mykiss	2	2	2-15	1.050	0.4000	2.5
					PLA	6	9~	9-9	0.000	0.0000	7.5
					SSU	12	14	12-22	3.800	0.3529	15.0
		21.76	Riffle	107	CRO	39	82	39-192	55.424	0.1921	36.4
					LAM	1	1*	1-1	0.734	0.5000	0.9
					O. mykiss	7	7	7-8	0.578	0.7000	6.5
					PLA	9	40	9-390	173.245	0.0804	8.4
					SSU	16	19	16-29	4.754	0.4324	15.0
	10/23/2025	21.24	Riffle	80	CRO	29	57	29-136	39.617	0.2086	36.3
					O. mykiss	9	9	9-11	0.690	0.6923	11.3
					PLA	8	12~	12-12	0.000	0.0000	10.0
					SSU	14	16	14-24	3.564	0.4667	17.5
		21.22	Flatwater	89	CRO	172	258~	258-258	0.000	0.0000	193.3
					LAM	19	28~	28-28	0.000	0.0000	21.3
					O. mykiss	10	12	10-21	4.152	0.4167	11.2
					SSU	71	106~	106-106	0.000	0.0000	79.8
	10/29/2025	20.79	Flatwater	148	CRO	891	1,661	1,301-2,021	183.687	0.2260	602.0
					LAM	1	1**	1-1	0.000	1.0000	0.7
					PLA	14	21~	21-21	0.000	0.0000	9.5
					SSU	91	116	91-145	14.517	0.3974	61.5
		20.67	Riffle	165	CRO	116	138	116-160	11.215	0.4549	70.3
					O. mykiss	13	13	13-15	1.088	0.6500	7.9
					SSU	119	152	119-185	16.690	0.3967	72.1
Calaveras Creek	10/8/2025	0.02	Riffle	142	CRO	3	3	3-6	0.709	0.6000	2.1
					O. mykiss	5	5	5-7	0.787	0.6250	3.5
		0.04	Flatwater	114	*O. mykiss*	13	13	13-15	1.088	0.6500	11.4
					PSC	1	1*	1-1	0.734	0.5000	0.9

* No maximum likelihood estimate generated. Reason: only 1 fish caught in all removals

** No maximum likelihood estimate generated. Reason: all fish caught on 1st pass

~ Non-descending removal pattern


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Appendix N 2025 Electrofishing Survey Fish Density Data

Reach	CRO fish/ 100ft	LAM fish/ 100ft	O. mykiss fish/ 100ft	PLA fish/ 100ft	PSC fish/ 100ft	SSU fish/ 100ft
1	242.9	4.4	4.8	9.1	0.0	46.7
2	3.9	1.8	11.7	0.1	0.8	7.0
3	1.2	0.0	7.0	0.0	0.4	0.0
4	72.0	0.0	47.6	0.0	0.0	0.0
5	114.5	0.0	41.9	0.0	0.0	0.0


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Appendix O Benthic Macroinvertebrate Survey Catch Data

Site	Date	Final ID	Result
ALC20.87	05/Jun/2025	Coleoptera	12
ALC20.87	05/Jun/2025	Coleoptera	29
ALC20.87	05/Jun/2025	Diptera	221
ALC20.87	05/Jun/2025	Diptera	14
ALC20.87	05/Jun/2025	Ephemeroptera	172
ALC20.87	05/Jun/2025	Gastropoda	15
ALC20.87	05/Jun/2025	Isopoda	1
ALC20.87	05/Jun/2025	Megaloptera	3
ALC20.87	05/Jun/2025	Oligochaeta	42
ALC20.87	05/Jun/2025	Ostracoda	5
ALC20.87	05/Jun/2025	Plecoptera	3
ALC20.87	05/Jun/2025	Trichoptera	70
ALC20.87	05/Jun/2025	Trichoptera	25
ALC20.87	05/Jun/2025	Trombidiformes	11
ALC20.87	05/Jun/2025	Turbellaria	1
ALC20.87	05/Jun/2025	Veneroida	1
ALC22.52	29/May/2025	Coleoptera	10
ALC22.52	29/May/2025	Coleoptera	93
ALC22.52	29/May/2025	Diptera	176
ALC22.52	29/May/2025	Diptera	3
ALC22.52	29/May/2025	Ephemeroptera	143
ALC22.52	29/May/2025	Gastropoda	10
ALC22.52	29/May/2025	Hoplonemertea	1
ALC22.52	29/May/2025	Megaloptera	4
ALC22.52	29/May/2025	Oligochaeta	2
ALC22.52	29/May/2025	Plecoptera	18
ALC22.52	29/May/2025	Trichoptera	122
ALC22.52	29/May/2025	Trichoptera	42
ALC22.52	29/May/2025	Trombidiformes	11
ALC22.52	29/May/2025	Turbellaria	3
ALC22.52	29/May/2025	Coleoptera	12
ALC22.52	29/May/2025	Coleoptera	89
ALC22.52	29/May/2025	Decapoda	1
ALC22.52	29/May/2025	Diptera	152
ALC22.52	29/May/2025	Diptera	2

ALC22.52	29/May/2025	Ephemeroptera	200
ALC22.52	29/May/2025	Gastropoda	12
ALC22.52	29/May/2025	Megaloptera	10
ALC22.52	29/May/2025	Oligochaeta	14
ALC22.52	29/May/2025	Ostracoda	2
ALC22.52	29/May/2025	Plecoptera	13
ALC22.52	29/May/2025	Trichoptera	69
ALC22.52	29/May/2025	Trichoptera	16
ALC22.52	29/May/2025	Trombidiformes	16
ALC22.52	29/May/2025	Turbellaria	1
ALC25.21	28/May/2025	Coleoptera	32
ALC25.21	28/May/2025	Coleoptera	87
ALC25.21	28/May/2025	Diptera	77
ALC25.21	28/May/2025	Diptera	7
ALC25.21	28/May/2025	Ephemeroptera	187
ALC25.21	28/May/2025	Gastropoda	12
ALC25.21	28/May/2025	Oligochaeta	3
ALC25.21	28/May/2025	Ostracoda	2
ALC25.21	28/May/2025	Plecoptera	35
ALC25.21	28/May/2025	Trichoptera	181
ALC25.21	28/May/2025	Trichoptera	24
ALC25.21	28/May/2025	Trombidiformes	9
ALC25.21	28/May/2025	Turbellaria	5
ALC26.45	15/May/2025	Acari	1
ALC26.45	15/May/2025	Amphipoda	1
ALC26.45	15/May/2025	Coleoptera	8
ALC26.45	15/May/2025	Coleoptera	4
ALC26.45	15/May/2025	Diptera	122
ALC26.45	15/May/2025	Diptera	2
ALC26.45	15/May/2025	Ephemeroptera	283
ALC26.45	15/May/2025	Oligochaeta	4
ALC26.45	15/May/2025	Ostracoda	1
ALC26.45	15/May/2025	Plecoptera	26
ALC26.45	15/May/2025	Trichoptera	96
ALC26.45	15/May/2025	Trichoptera	69
ALC26.45	15/May/2025	Trombidiformes	7
ALC26.79	20/May/2025	Coleoptera	8
ALC26.79	20/May/2025	Coleoptera	40
ALC26.79	20/May/2025	Diptera	134

ALC26.79	20/May/2025	Diptera	11
ALC26.79	20/May/2025	Ephemeroptera	348
ALC26.79	20/May/2025	Megaloptera	2
ALC26.79	20/May/2025	Odonata	1
ALC26.79	20/May/2025	Plecoptera	21
ALC26.79	20/May/2025	Trichoptera	48
ALC26.79	20/May/2025	Trichoptera	30
ALC26.79	20/May/2025	Trombidiformes	15
ALC26.79	20/May/2025	Turbellaria	3
ALC29.49	12/May/2025	Coleoptera	4
ALC29.49	12/May/2025	Coleoptera	22
ALC29.49	12/May/2025	Diptera	101
ALC29.49	12/May/2025	Diptera	5
ALC29.49	12/May/2025	Ephemeroptera	157
ALC29.49	12/May/2025	Lepidoptera	1
ALC29.49	12/May/2025	Megaloptera	7
ALC29.49	12/May/2025	Plecoptera	21
ALC29.49	12/May/2025	Trichoptera	134
ALC29.49	12/May/2025	Trichoptera	161
ALC29.49	12/May/2025	Trombidiformes	20
CAC00.25	12/Jun/2025	Acari	2
CAC00.25	12/Jun/2025	Coleoptera	16
CAC00.25	12/Jun/2025	Coleoptera	24
CAC00.25	12/Jun/2025	Diptera	226
CAC00.25	12/Jun/2025	Diptera	12
CAC00.25	12/Jun/2025	Ephemeroptera	122
CAC00.25	12/Jun/2025	Gastropoda	2
CAC00.25	12/Jun/2025	Hygrophila	1
CAC00.25	12/Jun/2025	Megaloptera	1
CAC00.25	12/Jun/2025	Oligochaeta	6
CAC00.25	12/Jun/2025	Ostracoda	22
CAC00.25	12/Jun/2025	Plecoptera	44
CAC00.25	12/Jun/2025	Trichoptera	120
CAC00.25	12/Jun/2025	Trichoptera	16
CAC00.25	12/Jun/2025	Trombidiformes	10
CAC00.25	12/Jun/2025	Turbellaria	4