WY2025 ANNUAL MONITORING SUMMARY

for

THE BIOLOGICAL OPINION FOR THE OPERATION AND MAINTENANCE OF THE CACHUMA PROJECT ON THE SANTA YNEZ RIVER IN SANTA BARBARA COUNTY, CALIFORNIA

Prepared by:

CACHUMA OPERATION AND MAINTENANCE BOARD

FISHERIES DIVISION

CONSISTENT WITH REQUIREMENTS SET FORTH IN THE 2000 CACHUMA PROJECT BIOLOGICAL OPINION

MARCH 23, 2026

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Executive Summary

The WY2025 Annual Monitoring Summary (AMS) presents the data and summarizes the results of monitoring Southern California steelhead/rainbow trout (*Oncorhynchus mykiss, O. mykiss*) and water quality conditions in the Lower Santa Ynez River (LSYR) below Bradbury Dam during Water Year 2025 (WY2025, 10/1/24 – 9/30/25). This report also incorporates historical context of the water year type since WY2000, advancements of identified tributary restoration projects, and recommendations for the next water year's monitoring efforts.

The monitoring tasks completed in WY2025 were performed below Bradbury Dam in the LSYR watershed and in Lake Cachuma, which is approximately half the drainage area (450 square miles) and stream distance (48 miles) to the ocean compared to the entire watershed. The area is within the Southern California Steelhead Distinct Population Segment (DPS) and the Monte Arido Highland Biogeographic Population Group (BPG) in the Southern Steelhead Recovery Planning Area (NMFS, 2012). Monitoring focused on three management reaches (Highway [Hwy] 154, Refugio, and Alisal reaches) and Reach 3 specifically the Cadwell Reach on the LSYR mainstem, and tributaries (Hilton, Quiota, El Jaro, and Salsipuedes creeks) known to support suitable habitat for *O. mykiss* (Figure ES-1).

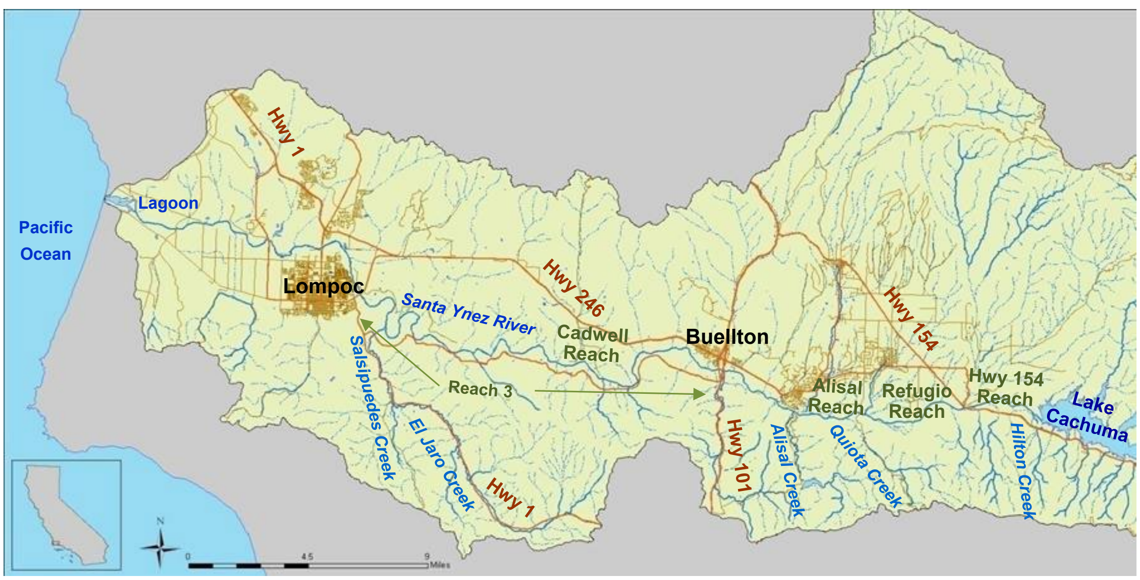

Figure ES-1: LSYR from Bradbury Dam and Lake Cachuma to the Pacific Ocean west of Lompoc, showing tributary creeks and management reaches of interest for the LSYR Fish Monitoring Program.

This report summarizes data gathered since the WY2024 Annual Monitoring Summary (COMB, 2025) and fulfills the annual 2025 reporting requirements of the Cachuma Project Biological Opinion (BiOp). The BiOp was issued by the National Marine Fisheries Service (NMFS) to U.S. Department of the Interior Bureau of Reclamation (USBR or Reclamation) in 2000 for the operation and maintenance of the Cachuma Project (NMFS, 2000). This report was prepared by the Cachuma Operation and

Maintenance Board (COMB) Fisheries Division (FD) with the monitoring and data analyses prepared by COMB-FD staff. In WY2025, some deviations from the monitoring program as described in the BiOp (NMFS, 2000), Biological Assessment (BA) (USBR, 2000), LSYR Fish Management Plan (FMP) (SYRTAC, 2000), and prior Annual Monitoring Reports/Summaries were necessary, specifically in relation to water quality monitoring, redd surveys, and migrant trapping. The modifications were required due to landowner access constraints, a very dry water year, or program evolution from acquired field knowledge. A shortened version of this report, the WY2025 Annual Monitoring Report (AMR), is prepared by COMB-FD and provided by Reclamation to NMFS and the State Board for compliance reporting established in the 2000 BiOp and Water Rights Order (WRO) 2019-0148.

This report is organized into five sections: (1) introduction, (2) background, (3) monitoring results for water quality and fisheries observations, (4) discussion, and (5) conclusions with recommendations. The appendices contain (A) a list of acronyms and abbreviations used in the report, (B) quality assurance and control procedures for monitoring equipment, (C) a list of photo points, and (D) a list of reports generated during the year in support of the fisheries program and for BiOp compliance.

WY2025 was a dry year (9.69 inches of precipitation recorded at Bradbury Dam; long-term average, 1953-2025, is 20.02 inches) with the highest amount of rainfall occurring in February (3.89 inches) and March (3.83 inches). Of the 73-year-long record, this was the 65th wettest, the 9th driest year on record, and the 6th driest water year since the beginning of the BiOp in 2000 (13 dry, 3 normal, and 10 wet years). The driest year on record occurred in 2007 with only 7.41 inches of rain and the wettest year on record was in 1998 with 53.65 inches of rain at Bradbury Dam. The largest storm of WY2025 began on 2/12/25 (3.03 inches of rain). The second largest storm began on 3/13/25 (2.68 inches) and the third largest on 2/5/25 (0.85 inches). Winter storms were late in coming and hardly saturated the watershed to produce significant runoff in February and March. Lake Cachuma did not fill or spill. After the 3/13/25 storm (2.68 inches), there were only 5 additional storms, each producing less than 0.3 inches of rain at Bradbury Dam. This set the stage for a very dry year from May onward that resulted in drying conditions in the tributaries and areas of the LSYR mainstem downstream of Avenue of the Flags Bridge.

The LSYR Lagoon was open to the ocean at the beginning of WY2025 then closed and opened several times for relatively short durations between 10/16/24 and 5/18/25 when it closed for the rest of the water year. At the beginning of the water year (10/1/24), there was 180,475 acre-feet (af) of water stored in Lake Cachuma and 149,715 af at the end of the water year (9/30/25), with peak storage at the beginning of the water year (93.5%) and minimum storage at the end of the water year (77.6% of stated capacity).

BiOp-required target flows were maintained throughout the water year at the Highway 154 Bridge and Alisal Bridge compliance points initially at a minimum of 5 cubic feet per second (cfs) as WRO 2019-0148 Table 2 minimum flow requirements were triggered in WY2024. On 2/16/25, Table 2 minimum flows ended and Table 1 minimum target flows began at 5 cfs at the Highway 154 Bridge and 1.5 cfs at the Alisal Bridge for the rest of the water year. Target flows to Hilton Creek of a minimum of 2 cfs were met throughout the water year through the Hilton Creek Watering System (HCWS) by gravity flow to the Upper Release Point (URP) and the Lower Release Point (LRP).

There were 12 PG&E power outages at Bradbury Dam during WY2025 (12 during CY2025) that would have made continuous HCWS pump operations difficult. None of these power outages affected flows to Hilton Creek as the lake level was high enough to maintain HCWS gravity flow to the URP and LRP throughout the water year.

During the migrant trapping effort, 192 *O. mykiss* (105 juveniles and 87 adults) were captured, all at the Hilton Creek (183) and Salsipuedes Creek (9) traps. The migrant trapping season ended on 4/8/25 upon reaching the 2000 BiOp Incidental Take Limit. Environmental coverage for this action was through the 2000 BiOp and an MOU with California Department of Fish and Wildlife (CDFW) for California Environmental Species Act (CESA) coverage. Of the 192 *O. mykiss* observed, 43 were smolts and no anadromous fish were observed. The LSYR mainstem traps were not operated due to low flows throughout the migration season (January through May). There were 94 redds documented, 42 in the LSYR mainstem (Upper Refugio, Refugio, Alisal, and Narrows reaches) and 52 in the tributaries (15 in Hilton Creek,19 in Quiota Creek, 12 in Salsipuedes Creek, 5 in El Jaro Creek, and 1 in Los Amoles Creek). Continuous turbid streamflow in the Hwy 154 Reach of the LSYR made redd surveys difficult.

A complete barrier beaver dam in Salsipuedes Creek directly upstream of the LSYR confluence with the creek, prevented migration of adults into the creek system for WY2025 with no adult *O. mykiss* captured during migrant trapping operations. Barrier beaver dams in the Alisal, Refugio, and Highway 154 (tail of Long Pool) reaches fragmented spawning populations and forced fish to spawn in sometime suboptimal habitats and prevented population mixing during the spawning season. The presence of numerous and significant beaver dams will continue to hamper recovery efforts by not allowing downstream migrating smolts to reach the ocean (except in spill years and above average runoff years), not allowing upstream migrating steelhead to reach prime spawning grounds, and forcing *O. mykiss* to spawn in suboptimal habitats as has been observed on many occasions.

Even under turbid water quality conditions in WY2025 within the LSYR mainstem, the *O. mykiss* population showed their resilience in the number of fish observed during the spring and fall snorkel surveys. The number of *O. mykiss* observed during those snorkel surveys remained high but not as high as record numbers observed in WY2024 within the Refugio and Alisal reaches. Many young of the year (YOY) were observed, suggesting successful spawning in or near the LSYR mainstem. Numbers were higher in the tributaries than in the previous year, particularly in Quiota Creek with many YOYs observed throughout the creek. Successful spawning occurred throughout lower Quiota Creek from the confluence with the LSYR mainstem up to Crossing 2 which posed a problem in the summer when the creek began to dry out, stranding fish, and requiring fish rescue and relocation specifically due to a dry water year. This suggested that fish came out of the LSYR mainstem, traveled up Quiota Creek to spawn, and then returned to the

LSYR mainstem. As of WY2024, there are no migration barriers (anthropogenic or natural) throughout the creek.

There were no Passage Supplementation events due to a dry year and not meeting the established criteria. There was no Water Rights (WR) 89-18 release in WY2025 due to it being the year after a spill and sustained baseflow conditions that continually recharged groundwater basins downstream of Bradbury Dam.

Since the issuance of the BiOp in 2000, Reclamation, with assistance from COMB, has completed many conservation actions for the benefit of Southern California steelhead including: the construction and operation of the HCWS and the Hilton Creek Emergency Backup System (HCEBS) between Lake Cachuma and Hilton Creek; the completion of tributary passage enhancement projects on Hilton, Quiota, El Jaro, and Salsipuedes creeks; the completion of the bank stabilization and erosion control projects on El Jaro Creek; target flow releases to the LSYR mainstem and Hilton Creek; Hilton Creek gravel augmentation; and the implementation and management of the Fish Passage Supplementation Program. COMB was involved in the planning, design, permitting, and construction of all the tributary projects (except the HCWS, HCEBS, and Cascade Chute Project in Hilton Creek, which were Reclamation projects) and was successful in acquiring grant funding for these projects from state and federal programs. These funds were supplemented by funding from the Cachuma Member Units, which allowed for the construction of 15 fish passage projects restoring access to the upstream reaches of key tributaries in the LSYR watershed for steelhead. The total number of stream restoration, fish passage, and flow enhancement projects completed since issuance of the 2000 BiOp is 22 projects, with the most recent completed five years ago at Quiota Creek Crossing 8, the South Side Erosion Control and Reforestation Project. Stormflow damage in WY2023 to several of the instream elements at El Jaro Creek on Rancho San Julian and Quiota Creek Crossings 4, 3, 8 and 1 was repaired with enhancements made in September and October of 2024. Descriptions and photos of all habitat enhancement projects are presented in Section 4.

The following are recommendations to improve the monitoring program from WY2025 onward and are not listed by priority; some are subject to funding availability and permit acquisition:

- Continue to implement the monitoring program described in the revised BA (USBR, 2000), BiOp (NMFS, 2000), and Water Rights Order (WRO) 2019-0148 (SWRCB, 2019) to evaluate *O. mykiss* and their habitat within the LSYR for long-term trend analyses and consistency of the monitoring effort for improved year-to-year comparisons;
- Obtain a CDFW CESA Incidental Take Permit (ITP) for specific Cachuma Project Operations that were not covered within the obtained CDFW MOU for *O. mykiss* take. These operations include but are not limited to stranding surveys during spill and WRO 89-18 ramp-down, unexpected incidents, etc.;
- Continue to evolve the collaborative relationship with CDFW and NMFS regarding fish rescue and relocation within the LSYR basin until an ITP can be

obtained for these needed efforts. Initiate this effort as soon as conditions warrant entering into the dry season;

- Continue to support Reclamation upon their request for information needed for their Reconsultation process with NMFS, in particular efforts to increase the Incidental Take Statement (ITS) limits for both juvenile and adult *O. mykiss* to best cover the current and future population size;
- Continue to work closely with Reclamation on the implementation of the WRO 2019-0148 to conduct all required monitoring and reporting in a timely manner;
- Write a CDFW-FRGP grant to implement the proposed fish passage and habitat enhancement project within the watered section of Hilton Creek to maximize the access and utility of the fishery. Obtain funding for the project and approval from Reclamation to implement the proposed project;
- Continue to work with Reclamation to maximize releases to Hilton Creek by way of the HCWS/HCEBS versus the Outlet Works to the Stilling Basin to maximize support of the downstream fishery, increase attraction flows to Hilton Creek, and minimize lake release stream temperatures entering the Long Pool and LSYR mainstem habitats downstream;
- Investigate with Reclamation Stilling Basin management actions specifically 1) a Stilling Basin bypass pipeline system at the tail of the pool to provide target flow releases without the potential for thermal heating and warm water fish species movement downstream; 2) limiting *O. mykiss* access to the Stilling Basin, 3) establishing a small road for access to the Stilling Basin, and 4) dewatering of the Stilling Basin for non-native fish removal;
- Continue to complete the draft Annual Monitoring Report by the end of the Calendar Year and the draft Annual Monitoring Summary shortly thereafter;
- Continue to monitor the Narrows Reach specifically during years with limited fish passage to conduct redd surveys, snorkel surveys, and water quality monitoring;
- Continue annual development and implementation of a Migrant Trapping Plan in collaboration with Reclamation that would be reviewed and approved by NMFS to assure compliance with take limits set forth in the 2000 BiOp;
- Consider extending the Hilton Creek Gravel Augmentation Project initiated by Reclamation for an additional 2 years while reconsultation with NMFS continues for a new BiOp. Also, work with Reclamation to evolve this effort into an ongoing program for Hilton Creek and the Hwy 154 Reach of the LSYR mainstem that would be included in the new BiOp;
- Continue to work with the SYRWCD on further developing their ramp-up and ramp-down procedures for WR 89-18 releases to enhance the successful implementation of the release and minimize impacts to the downstream fishery; this collaboration was started in WY2020;
- Initiate a PIT tag monitoring effort in the LSYR basin to identify current and future CDFW tagged fish;
- Continue to monitor hydrogen sulfide and phosphorous on the bottom of the lake and at Outlet Works releases once the lake has fully stratified and anoxic conditions are present on the lake bottom. Hydrogen sulfide is toxic to *O. mykiss* and phosphorus may be a limiting nutrient for prolific downstream algal mat formation;

- Continue to implement the study described in the obtained CDFW Scientific Collection Permit to better understand piscivory by adult largemouth bass and bull frogs on *O. mykiss*;
- Continue collaborative efforts with Reclamation to restore, improve, and make reliable its system operation for delivering lake water to Hilton Creek;
- Continue with scale analyses (including historic data) to assure all scales have been read and documented that are currently in the LSYR *O. mykiss* scale inventory;
- Obtain and deploy turbidity meters going downstream from the dam to the end of the Refugio Reach to track water clarity on a longitudinal profile to better understand and document turbidity issues.. This will require obtaining approximately 10 deployable units with dataloggers.
- Deploy a vertical array of temperature loggers (thermographs) near the deepest point of Lake Cachuma (HCWS Intake Barge) at 1-meter intervals that cross the thermocline with the objective of documenting the observed seiche oscillation in WY2025 after the lake is well stratified and prior to lake turnoff. The deployment should be for a month at 1-hour intervals.
- Continue working with the US Geological Survey to assure stream discharge and water quality monitoring is implemented and posted as contracted;
- Continue to maintain and develop landowner relationships in the LSYR basin to foster cooperation and gain access to reaches for all monitoring and restoration tasks;
- Continue to look for interested parties to develop an Arundo and Tamarisk Eradication Plan and search for funding to implement the needed effort;
- Continue to work with CDFW game wardens to further discourage and report illegal fishing on the LSYR, especially above Alisal Bridge and near the Alisal Bedrock Pool where evidence of illegal fishing practices has been observed; and
- Continue collaborative efforts with Reclamation to gather continuous data on the water temperature discharged from the Outlet Works of Bradbury Dam to the LSYR to monitor BiOp compliance of a maximum of 18 ºC of that discharge water;
- Develop a Beaver Management Plan and an Invasive Species Management Plan for the LSYR basin; and
- Continue working with other *O. mykiss* monitoring programs within the Southern California Steelhead DPS and the Monte Arido Highland Biogeographic Region to improve collective knowledge, collaboration, and dissemination of information.

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Figure 28: 2025 LSYR-7.65 (Double Canopy Pool) surface (1.0-foot) water temperature for (a) daily maximum, average, and minimum for the entire period of record (197 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed in this habitat.

Figure 29: 2025 LSYR-7.65 (Double Canopy Pool) bottom (3.5 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of record (197 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed in this habitat.

Figure 30: 2025 LSYR-8.7 (Head of Beaver Pool) surface (1.0 foot) water temperature for (a) daily maximum, average, and minimum for the entire period of record (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed during snorkel surveys.

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Figure 37: 2025 LSYR-22.68 (Cadwell Pool) surface (1.0-foot) water temperature for (a) daily maximum, average, and minimum for the entire period of record (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25; no *O. mykiss* were observed during spring and fall snorkel surveys due to excessive turbidity. Surface unit exposed to air several times due to declining water levels.

Figure 38: 2025 LSYR-22.68 (Cadwell Pool) middle (7.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of record (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25.

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WY2025 Annual Monitoring Summary

1. Introduction

The 2000 Cachuma Project Biological Opinion (BiOp) requires the U. S. Department of the Interior Bureau of Reclamation (USBR or Reclamation) to provide an annual monitoring report to the National Marine Fisheries Service (NMFS) as stipulated in Reasonable and Prudent Measure (RPM) 11 and Term and Condition (T&C) 11.1 (NMFS, 2000) and further described in the Biological Assessment (BA) (USBR, 2000) and the Lower Santa Ynez River Fish Management Plan (FMP) (SYRTAC, 2000):

> ***RPM 11:*** "Reclamation shall provide NMFS with monitoring data and reports evaluating the effects of the proposed project on steelhead." *(Page 72)*
>
> ***T&C 11.1:*** *"*Monitoring of the Cachuma Project shall occur as described above and as described in the revised project description (USBR, 2000) under the direction of a qualified biologist. Reclamation shall provide NMFS with yearly reports (unless otherwise noted) that include the data taken each year and preliminary data analysis. Especially important for monitoring the effects of the Cachuma Project will be monitoring of: steelhead movement during migration supplementation, successful access, spawning, and rearing of steelhead in previously inaccessible and/or access restricted tributary habitat, and mainstem flow targets and the condition of steelhead in the mainstem.*"* *(Page 79)*

Reclamation is also required under California State Water Resources Control Board Order WR 2019-0148 specifically Term and Condition 27 to submit an annual report by December 31. This deadline was extended by the Board to March 31 of the year following each water year. This report supports that requirement.

The objective of this WY2025 Annual Monitoring Summary (AMS) is to present the monitoring data collected in Water Year 2025 (WY2025, 10/1/24-9/30/25) and to provide preliminary data analysis. Data collected on Southern California steelhead/rainbow trout (*Oncorhynchus mykiss* or *O. mykiss*) in the Lower Santa Ynez River (LSYR) watershed below Bradbury Dam throughout WY2025 regarding (1) hydrologic condition, (2) water quality, (3) habitat quality, (4) migration, and (5) reproduction and rearing are analyzed and presented in this report. The biological monitoring program as outlined in the revised Section 3 of the Cachuma Project Biological Assessment (USBR, 2000) incorporates all elements within RPM 11 and T&C 11.1 of the BiOp as well as WR 2019-0148 and provides scientific data to conduct trend analyses over time in association with habitat and migration enhancement projects. Observations of population variations over the years of monitoring are presented in the 1993-2004 Synthesis Report (AMC, 2009), 2008 Annual Monitoring Report and Trend Analysis for 2005-2008 (USBR, 2011), 2009 Annual Monitoring Report (USBR, 2012), 2010 Annual Monitoring Report (USBR, 2013), 2011 Annual Monitoring Summary (COMB, 2013), 2012 Annual Monitoring Summary (COMB, 2016), WY2013 Annual Monitoring Summary (COMB, 2017), WY2014 Annual Monitoring Summary (COMB, 2018a), WY2015 Annual Monitoring

Summary (COMB, 2018b), WY2016 Annual Monitoring Summary (COMB, 2019a), WY2017 Annual Monitoring Summary (COMB, 2019b), WY2018 Annual Monitoring Summary (COMB, 2020a), WY2019 Annual Monitoring Summary (COMB, 2020b), WY2020 Annual Monitoring Summary (COMB, 2021), WY2021 Annual Monitoring Summary (COMB, 2022), WY2022 Annual Monitoring Summary (COMB, 2023), WY2023 Annual Monitoring Summary (COMB, 2024), and WY2024 Annual Monitoring Summary (COMB, 2025).

The data summarized in this report describe the habitat conditions and the fishery observations in the LSYR during WY2025. This period roughly encompasses the annual reproductive cycle of steelhead, including migration, spawning, rearing, and over-summering as those activities relate to the wet and dry periods of the year. Although fall snorkel surveys occur in October or November (of the following water year), they have been included in the current water year's annual report to provide seasonal continuity of life-cycle observation and *O. mykiss* survival over the dry season.

Throughout this report, LSYR stream network locations are assigned alpha-numeric site-codes indicating the mainstem of the LSYR or a tributary (i.e., EJC for El Jaro Creek), and a river-mile distance downstream of Bradbury Dam on the LSYR mainstem, or upstream from the confluence of the LSYR mainstem with a tributary (e.g., LSYR-0.51 is the Long Pool, which is 0.51 miles downstream from the dam; HC-0.14 is on Hilton Creek 0.14 miles upstream of its confluence with the LSYR mainstem).

WY2025 was classified as a dry year with 9.69 inches of precipitation recorded at Bradbury Dam (long-term 73-year average, 1953-2025, is 20.02 inches). It was the 9th driest year and 65th wettest year on record. The driest year on record was WY2007 with 7.41 inches and the wettest in WY1998 with 53.65 inches at Bradbury Dam. This was the 6th driest rainfall year since issuance of the 2000 BiOp, with 13 of 25 years classified as dry (WY2007, WY2013, WY2002, WY2018, WY2015, WY2025, WY2014, WY2004, WY2016, WY2021, WY2012, WY2022 and WY2009; listed in order of severity), only 3 years as normal (WY2003, WY2020, and WY2000; listed in order of magnitude), and the rest (10 years) were wet years (WY2005, WY2023, WY2024, WY2001, WY2011, WY2017, WY2006, WY2010, WY2019, and WY2008; listed in order of magnitude).

Dry years tend to result in an increase in the number of redds observed due to lower flows, less turbidity, and no scour of redds, as was the case in WY2025. However, extended periods of drought can result in a decrease in access to tributary spawning grounds, a decrease in suitable rearing in the mainstem and tributaries, and a reduction in the overall *O. mykiss* population (i.e., 2016). Wet years are often associated with an increase of the *O. mykiss* population due to higher stream flows, greater availability of rearing habitat, and ocean connectivity for smolt migration and anadromous reproduction (Lake, 2003; COMB, 2013). However, wet years can result in high flows that have the potential to scour redds as has been documented in previous Annual Monitoring Reports. Following wildfires within the upper watersheds, wet years also have the potential to negatively impact the fishery via increased transport of loosely held burn scar sediment into downstream habitats, filling pool habitats, and creating extreme short-term turbid conditions. Positive impacts of wildfires have been observed in subsequent years, particularly in Hilton Creek with respect to increased spawning gravel as was observed in WY2021. Conversely, WY2023 and WY2024 have removed essentially all suitable spawning gravel from all but the lower reaches of Hilton Creek due to high flows and no new gravel recruitment from the upper basin.

Migrant trapping was conducted in WY2025 in Hilton Creek and Salsipuedes Creek and all BiOp take limits were followed. No migrant trapping occurred in the LSYR mainstem in WY2025 due to low river flow conditions. Reproduction and population status were monitored through redd (spawning) surveys and snorkel surveys.

WY2025 was the first dry year after two consecutive wet years, with only 9.69 inches of rain recorded at Bradbury Dam (40.23 inches in WY2023 and 32.61 inches in WY2024). Entering WY2025 (10/1/24), the reservoir elevation at Lake Cachuma was at maximum height of 748.91 feet (approximately 93.5% capacity, 180,475 af). That was the storage peak and the lake level declined through the rest of the water year to the lowest point at the end of the water year on 9/30/25 at 77.6% of capacity (737.91 feet and 149,715 af). The LSYR Lagoon opened to the ocean at the beginning of WY2025 then closed and opened several times for relatively short durations between 10/16/24 and 5/18/25 when it closed for the rest of the water year. Zero flow was recorded at H Street in Lompoc on 5/12/25 and remained at zero for the remainder of the year.

Reclamation continued to release water well above WRO-2019-0148 Table 2 flows at Alisal Bridge and Highway 154 Bridge (5 cfs at both locations). On 2/16/25, Table 2 minimum flows ended, and Table 1 minimum target flows began at 5 cfs at the Highway 154 Bridge and 1.5 cfs at the Alisal Bridge that were met by Reclamation for the rest of the water year. Target flows to Hilton Creek of a minimum of 2 cfs were met throughout the water year through the Hilton Creek Watering System (HCWS) by gravity flow to the Upper Release Point (URP) and the Lower Release Point (LRP).

The following chronology is provided for reader orientation of events or milestones that directly influenced flow releases for the *O. mykiss* population downstream of Bradbury Dam (including Hilton Creek) throughout the water year:

- The LSYR lagoon was open at the start of the water year, closed on 10/16/24, opened on 10/19/24, then periodically opened and closed until it closed on 5/18/25 for the rest of the water year.
- On 2/12/25, a large storm hit the region (3.03 inches recorded at Bradbury Dam) that barely wetted up the watershed to produce streamflow. The second largest storm of the year occurred on 3/13/25 (2.68 inches at Bradbury) that again barely resulted in any significant streamflow.
- The water year started on Table 2 flow releases that ended on 2/15/25 and Table 1 flow releases started on 2/16/25 that continued throughout the rest of the water year.
- Although the lagoon was open to the ocean periodically, there were not many opportunities for fish to migrate up into and out of the LSYR watershed.
- There was no spill event, passage supplementation or WRO 89-18 releases.

- Stranding surveys were conducted throughout the dry season beginning in April specifically in lower sections of every tributary. CDFW with assistance from COMB-FD successfully rescued and relocated 4,021 *O. mykiss* from April through mid-July with 48 *O. mykiss* mortalities found in drying habitats, all from Quiota Creek where fish took advantage of ample spawning gravels and unimpeded access to spawn throughout the watershed, primarily downstream of Crossing 2.
- Peak storage for Lake Cachuma was recorded on 10/1/24 at 180,475 af of storage at 748.91 ft of elevation (93.5% of capacity). Low storage for the water year was on 9/30/25 (149,715 af and 737.91 ft of elevation at 77.6%% of capacity).
- The migrant trapping season started on 2/3/25 and ended on 4/8/25 as the juvenile take limit was reached (105 juveniles and 87 adults).
- On 6/20/25, Reclamation increased releases from the Outlet Works by 9 cfs due to concerns of meeting target flows at the Highway 154 Bridge and Alisal Bridge. Those higher release rates were slowly ramped down over the course of the summer.
- No anadromous steelhead were observed.
- Snorkel observations in WY2025 in the Upper Refugio, Refugio, Alisal, and Avenue reaches had high numbers of *O. mykiss* observed; WY2024 had the highest numbers since monitoring began in the mid-1990s. The upper LSYR mainstem has become an important component of the LSYR basin fishery with the majority of the *O. mykiss* counted occurring in the Upper Refugio, Refugio and Alisal reaches as compared within Hilton Creek or Salsipuedes Creek.
- An unprecedented amount of successful spawning occurred in lower Quiota Creek (downstream of Crossing 2) that required extensive fish rescue/relocation as the creek dried out in the summer month. The effort was conducted by CDFW with assistance from COMB-FD staff.
- State water deliveries to Lake Cachuma were conducted through the CCWA bypass pipeline throughout the water year. No State Water was wheeled through the Outlet Works and Penstock. State water deliveries were sporadic, and the cumulative total was relatively small for a water year total of 458.2 af.
- Lake turnover started in November and continued into December despite a large sequence of early winter storms that hit the area starting on 11/13/25. Cold temperatures and a strong wind event are needed to fully turn over the lake.

2. Background

2.1. Historical Context of the Biological Monitoring Effort

Reclamation, in collaboration with the Cachuma Project Member Units and California Department of Fish and Wildlife (CDFW, previously known as California Department of Fish and Game [CDFG]), and others, began the biological monitoring program for *O. mykiss* in the LSYR in 1993. Since then, the Cachuma Project Member Units have funded and conducted the long-term Fisheries Monitoring Program and habitat enhancement actions within the LSYR basin through the Cachuma Operation and Maintenance Board's (COMB) Fisheries Division (FD), specifically the COMB-FD staff in collaboration with Reclamation in compliance with the 2000 BiOp and the WR 2019-0148. The monitoring and reporting program has evolved in scope and specificity of monitoring tasks after Southern California steelhead were listed as endangered under the federal Endangered Species Act in 1997 (NMFS, 1997) and since critical habitat was designated in 2000 and 2005 (NOAA, 2005). Further refinements were incorporated into the monitoring program during the development of the BA for the Cachuma Project (USBR, 1999), after the issuance of the BiOp (NMFS, 2000), and through subsequent guidance and regulatory documents (SYRTAC, 2000; USBR, 2000). Three comprehensive data summaries were prepared that synthesized the results of the monitoring effort from 1993 to 1996 (SYRCC and SYRTAC, 1997), from 1993 to 2004 (AMC, 2009), and from 2005 to 2008 (USBR, 2011); and 16 Annual Monitoring Reports/Summaries completed for WY2009 (USBR, 2012), WY2010 (USBR, 2013), WY2011 (COMB, 2013), WY2012 (COMB, 2016), WY2013 (COMB, 2017), WY2014 (COMB, 2018a), WY2015 (COMB, 2018b), WY2016 (COMB, 2019a), WY2017 (COMB, 2019b), WY2018 (COMB, 2020a), WY2019 (COMB, 2020b), WY2020 (COMB, 2021), WY2021 (COMB, 2022), WY2022 (COMB, 2023), WY2023 (COMB, 2024), and WY2024 (COMB, 2025). All reports fulfilled the annual monitoring reporting requirements set forth in the 2000 BiOp (T&C 11.1) and WR 2019-0148 for those years.

Rainbow trout (coastal rainbow/freshwater resident) and Southern California steelhead are the same species (*O. mykiss*) and visually indistinguishable except for the larger size of a returning ocean run steelhead and color differences of an outmigrating smolt (silver with blackened caudal fin) observed during the latter half of the migration season. Rainbow trout (non-anadromous or freshwater resident) can remain in freshwater for several years, or even generations, before exhibiting smolting characteristics and migrating to the ocean (NMFS, 2012). The two life history types or strategies (anadromous and resident) will be distinguished, when possible, throughout this report.

2.2. Meteorological and Hydrological Overview

The headwaters of the Santa Ynez River are located approximately 4,000 feet above sea level in the San Rafael Mountains. The river flows in a westerly direction for approximately 90 miles before reaching the Pacific Ocean west of the City of Lompoc and north of Point Conception. The Santa Ynez River watershed is almost entirely contained within Santa Barbara County, with only a small eastern portion in Ventura County. There are three water supply reservoirs on the river: Jameson, Gibraltar, and Cachuma. Lake Cachuma essentially divides the watershed area in half. This region has a Mediterranean-type climate, which is typically warm, dry during the summer, and cool and wet in the winter. Rainfall is highly variable throughout the watershed with long-term records showing that the region routinely experiences periods of wet and dry cycles that can last for several years. Historically, most of the rainfall occurs during the winter and spring (December-May) months with most rain falling from December through April. The migration and spawning season for *O. mykiss* corresponds with the initiation of the wet season, and these activities overlap in both the anadromous and resident forms. The anadromous form of the species can migrate to spawning locations once the sandbar at the mouth of the river is breached, there is river connectivity with the LSYR lagoon sufficient for adults to migrate past critical rifles, and the tributaries begin flowing. This typically occurs sometime after the first couple of major storms of the winter. Hence, review of the meteorological and hydrological conditions for each year is essential for the analysis and interpretation of the fisheries data collected during that year.

2.3. Watershed Condition for Southern California Steelhead

Southern California steelhead and rainbow trout require cool water in order to spawn, rear, and survive the dry season and specifically hot summers below Bradbury Dam. They require clean, well-oxygenated water during all life stages, especially for redd ventilation (embryonic development) and during metabolically expensive activities such as upstream migration. In general, literature suggests Southern California steelhead/rainbow trout prefer water temperatures below 20°C and dissolved oxygen (DO) concentrations greater than 4 mg/L (Molony, 2001; Moyle, 2002). Historically, *O. mykiss* residing within the Santa Ynez River and associated tributaries had access to cooler headwaters throughout the watershed. After the construction of Bradbury Dam in 1953, approximately half of the watershed was inaccessible to anadromous fish. Although Southern California steelhead can tolerate higher temperatures than steelhead residing further north, there are still stressful (sub-lethal) and lethal effects to individuals caught in pools above tolerable water quality thresholds. Stressful and lethal stream temperatures and DO concentrations limits for southern steelhead are not well defined. Most studies were conducted on *O. mykiss* from the north and in different hydrologic conditions. A literature review suggests a stream water temperature of 20 °C is stressful, 24 °C is severely stressful and 29 °C is lethal, and DO concentrations at 5 mg/L is stressful and 3 mg/L is lethal for *O. mykiss* (Matthews and Berg, 1997; DeVries, 2013a; DeVries, 2013b). Observations of the *O. mykiss* population within the LSYR basin indicate these suggested limits do not hold true in this area, as LSYR basin fish appear to have higher tolerances for warmer stream temperatures and lower DO concentrations. The thresholds are dependent upon life-stage, exposure time, and access to cool-water refugia.

2.4. Monitoring and Data Quality Assurance and Control

Field monitoring activities for migrant trapping, snorkel surveys, and redd surveys followed established CDFW and NMFS protocols as described in the BiOp and the literature (Hankin and Reeves, 1988; Dolloff et al., 1993). All water quality monitoring followed regulatory and industry guidelines for quality assurance and control, which are presented in Appendix B.

3. Monitoring Results

The results from the WY2025 monitoring effort are organized by (1) hydrologic condition, (2) water quality, (3) habitat quality, (4) migration of *O. mykiss*, (5) Aging of *O. mykiss* migrant captures, (6) reproduction and rearing, (7) tributary enhancements project monitoring, and (8) additional investigations.

3.1 Hydrologic Condition

Precipitation, Stream Runoff, and Bradbury Dam Spills: Historically, the water year type for the Santa Ynez River basin has been defined as a dry year when rainfall (e.g., precipitation) at Bradbury Dam is equal to or less than 15 inches, a normal (average) year when rainfall is 15 inches to 22 inches, and a wet year when rainfall is equal to or greater than 22 inches (AMC, 2008). The California State Water Resources Control Board (SWRCB) uses different criteria that focus on river runoff (in this case inflow to the Cachuma Reservoir); a critically dry year when inflow is equal to or less than 4,550 acre-feet (af); a dry year when inflow is between 4,550 af and 15,366 af; a below normal year when inflow is between 15,366 af and 33,707 af; an above normal year when inflow is between 33,708 and 117,842 af; and a wet year when inflow is greater than 117,842 af (SWRCB, 2011). Due to the longstanding classification used in previous AMS/AMR reports, the SWRCB approach will not be used in this report, although the designation for WY2025 would have been dry, with 8,785 af of computed inflow to Lake Cachuma.

WY2025 had 9.69 inches of rainfall recorded at Bradbury Dam (9.02 inches reported by Santa Barbara County) and therefore was classified as a dry year (less than 15 inches) (Table 1). The long-term 73-year average (1953-2025) at the dam is 20.02 inches. This was the 65th wettest, the 9th driest year on record, and the 6th driest water year since the beginning of the BiOp in 2000 (13 dry, 3 normal, and 10 wet years). The largest storm of WY2025 began on 2/12/25 (3.03 inches of rain). The second largest storm began on 3/13/25 (2.68 inches) and the third largest on 2/5/25 (0.85 inches). Winter storms were late in coming and hardly saturated the watershed to produce significant runoff in February and March. Lake Cachuma did not fill or spill. After the 3/13/25 storm (2.68 inches), there were only 5 additional storms, each producing less than 0.3 inches of rain at Bradbury Dam. This set the stage for a very dry year from May onward that resulted in drying conditions in the tributaries and areas of the LSYR mainstem downstream of Avenue of the Flags Bridge.

The highest average daily flow rates recorded at various USGS gauging stations occurred on 2/13/25 at Salsipuedes Creek (43.9 cfs), on 2/14/25 at the Narrows (90.3 cfs), and on 2/14/25 at H Street (88.3 cfs) with H Street declining to zero flow on 5/12/25. The highest average daily flow at USGS Solvang occurred on 2/13/25 (88.3 cfs). Maximum inflow to Lake Cachuma reached 912.89 af on 2/14/25 but quickly dropped off thereafter. The relatively large storm in March on 3/13/25 (2.68 inches at Bradbury) on resulted in a daily inflow rate of 402.7 af on 3/14/25. Historic minimum, maximum, and WY2025 rainfall data at 7 locations within the Santa Ynez River basin including at Bradbury Dam are presented in Table 2. The precipitation record shows high spatial and inter-year variability between western and eastern locations within the watershed as well as between wet and dry years. There were 14 precipitation events in WY2025 with rainfall equal to or greater than 0.1 inches at Bradbury (Table 3 and Figure 1). Most of the recorded precipitation at Bradbury Dam fell during the months of February (3.89 inches, 40.1%) and March (3.83 inches, 39.5% combining for 79.6% of the total rainfall for the year with November, December, January, and April providing 5.2%, 3.9%, 3.8%, and 3.4%, respectively for a total of 96.0% of total rainfall over six consecutive months. Annual daily mean discharge hydrographs for the LSYR basin at the H Street (USGS-11134000), Narrows (USGS-11133000), Salsipuedes Creek (USGS-11132500), Solvang (Alisal Bridge) (USGS-11128500), Highway 154 (USGS-11126400), Hilton Creek (USGS-11125605), Bradbury Dam (Reclamation), and Los Laureles (USGS-11123500) (upstream of Lake Cachuma) gauges are shown in Figures 2 and 3.

The Hilton Creek gauge (USGS-11125605) and Highway 154 gauge (USGS-1126400) are low flow gauges only (less than 50 cfs and less than 65 cfs, respectively). There were no days in WY20025 when discharges were not recorded due to high flow.

Ocean Connectivity: The Santa Ynez River lagoon was open at the beginning of the water year then closed on 10/16/24 and reopened on 10/19/24. The lagoon opened and closed periodically throughout the wet season and finally closed on 5/18/25 for the rest of the water year. It was open for 154 days during the water year; 89 days were during the migration season (January through May). Table 4 presents the lagoon status in WY2025 as well as conditions going back to WY2001. The USGS H Street gauge recorded daily streamflow greater than 10 cfs on 10/12/24 but less than 90 cfs until 4/12/25 when it dropped below 10 cfs and went to zero on 5/12/25 for the rest of the water year. Peak daily discharge was 88.3 on 2/14/25. The USGS gauge at the Narrows recorded peak daily flow of 90.3 cfs on 2/14/245 and dropped below 10 cfs on 5/10/25 tapering off to zero on 7/7/25 for the rest of the water year.

Since WY2006, the presence of the lagoon sandbar has been monitored routinely from Ocean Park (at the lagoon, see Figure ES-1). From WY2001 to WY2005, the lagoon was monitored weekly and the flow at the USGS 13th Street gauge (approximately 1.2 miles upstream of the lagoon) was used to determine when the lagoon was open.

Fish Passage Supplementation: No Fish Passage Supplementation occurred during WY2025 due to a dry rainfall year and no lake spill.

Adaptive Management Actions: There were no Adaptive Management Committee (AMC) meetings during WY2025. No flow allocations were made by the AMC from the Adaptive Management Account (AMA).

Target Flows: WY2025 started under WRO 2019-0148 Table 2 flows given the wet previous water year. Target flows at the Highway 154 Bridge and the Alisal Bridge were 5 cfs on 10/1/24 but ended on 2/16/25 when Table 2 minimum flows ended and Table 1 minimum flows began at 5 cfs at the Highway 154 Bridge and 1.5 cfs at the Alisal Bridge for the rest of the water year. Target flows to Hilton Creek of a minimum of 2 cfs were met throughout the water year through the Hilton Creek Watering System (HCWS) by gravity flow to the Upper Release Point (URP) and the Lower Release Point (LRP).

For reference, there were 12 PG&E power outages at Bradbury Dam during WY2025 and 12 during the Calendar Year 2025. These power outages would have made continuous HCWS pump operations difficult.

Water Rights Releases: Water Rights releases are non-discretionary releases called for by the Santa Ynez River Water Conservation District (SYRWCD, downstream Water Rights holders) as described in WR Order 89-18 (WR 89-18). There were no WR 89-18 releases in WY2025 due to two previous wet years with ample groundwater recharge river flows.

Mixing and Temperature of State Water Project Waters Released into the LSYR: Reclamation monitors downstream releases to comply with the 50% mixing criterion required by BiOp RPM 5.1 (NMFS, 2000) for release of State Water Project (SWP) water into the Santa Ynez River below Bradbury Dam (Outlet Works). The Central Coast Water Authority (CCWA) in collaboration with Reclamation delivers SWP water to Lake Cachuma. SWP water is mixed with water releases from Lake Cachuma in the Penstock and Stilling Basin at the base of the dam. Lake Cachuma water is delivered to Hilton Creek through the HCWS and/or HCEBS delivery systems and flows through Hilton Creek into the LSYR mainstem just upstream of the Long Pool. The determined point for mixing is the Long Pool that receives both water sources (Outlet Works and HCWS/HCEBS). SWP water can be delivered to Lake Cachuma through a bypass system that goes up and over the dam, eliminating the need to use the Penstock (Outlet Works).

CCWA did not deliver SWP to the lake through the Penstock (Outlet Works) throughout the water year. Hence, the criterion was met for RPM 5.1 throughout WY2025 (Figure 4). All SWP deliveries to Lake Cachuma went through the bypass instead of through the Penstock. Since the issuance of the BiOp in 2000, the 50% mixing criterion has been met 100% of the time during the migration season (December – June), when the lagoon was open, and flow was continuous to the ocean.

Outlet Works release waters are being monitored for temperature to assure BiOp compliance of 18 °C or less being released to the Stilling Basin of the LSYR. SWP water can arrive at the dam at higher temperatures than 18 °C at which point it would need to be mixed with cool lake water from the bottom of the lake through the Penstock. Reclamation has installed temperature sensors in the CCWA delivery pipe and the Penstock to enable a volumetric calculation of the blended water temperature using the water temperature and the rate of flow from each source. No SWP water was delivered to Lake Cachuma through the Penstock, hence there were no issues with water temperatures from releases from the Outlet Works to the LSYR mainstem. Reclamation does not routinely record water temperatures going through the Penstock when there is no SWP water being delivered through the Outlet Works. Hence, monthly lake profile data from the bottom were used as a surrogate since the profile is taken near the intake to the Penstock at the bottom of the lake (Figure 4). Outlet Works water temperatures were well below 18 °C throughout WY2025.

3.2. Water Quality Monitoring within the LSYR Basin:

Water quality parameters were monitored within the LSYR Basin from April through October to track conditions for over-summering *O. mykiss*. The critical parameters for salmonid survival, water temperature and dissolved oxygen (DO) concentrations, were recorded and are presented below.

Stream temperatures play a critical role in salmonid energy conversion by influencing the metabolic requirements for food and governing the rate of food processing as salmonids are not able to regulate their temperature physiologically (Moyle, 2002). They can compensate for thermal conditions behaviorally by adjusting activity rates and metabolic demand in adverse thermal conditions (Nielson et al., 1994). Stream and lake water temperature and DO concentrations are presented below for the LSYR mainstem and selected tributaries.

Stream water temperatures were collected at various locations within the LSYR mainstem and its tributaries with thermographs (recording continuously at the beginning of every hour) and dissolved oxygen concentrations at select sites with multi-parameter units (Sondes or U-26s). Since 1995, a thermograph network has been deployed in the LSYR mainstem and tributaries downstream of Bradbury Dam as described in the BA (USBR, 2000), to monitor seasonal trends, diel variations, longitudinal and vertical gradients, and general temperature suitability for *O. mykiss*. Changes in channel configuration and associated pool habitats from spill events have necessitated slightly modifying the thermograph deployment regime and locations described in the BA (USBR, 2000). When presented, the two data sources (thermographs and multi-parameter units) will be discussed separately for the LSYR mainstem and tributaries.

Results of water quality monitoring are presented in all cases but described in further detail only if the habitat contained *O. mykiss*, non-native aquatic species, or there was an observation of particular importance. Data presentations include daily minimum, average, and maximum water temperatures as well as hourly data during the warmest portion of the year (July through September). Several monitoring locations were added over the years starting in WY2013 to increase the understanding of the thermal regime in various LSYR mainstem and tributary habitats as they relate to fish assemblages, specifically *O. mykiss*.

Water Temperature: During WY2025, thermographs were deployed in one of two configurations: single units mainly in the tributaries and 3-unit vertical arrays at selected pool locations within the LSYR mainstem (Figure 5 and Table 5). At vertical array sites, thermographs were consistently deployed with a surface (approximately 0.5 feet below the surface), middle (center of the water column), and bottom (0.5 feet above the bottom of the monitoring site) units. For reference, a table was prepared with the monitoring sites (habitat name and Stream ID) and which fish species were present or absent during the monitoring period (Table 6). The monitoring results of each unit are presented in separate graphs where the habitat depth is given in the caption, and the actual placement depth of the instrument is presented in the associated figure caption. Single unit thermograph deployments within the LSYR mainstem and tributaries were uniformly positioned approximately 0.5 feet above the bottom of the stream channel.

Most monitoring locations were legacy sites and have been monitored since before the 2000 Cachuma Project BiOp (see previous Annual Monitoring Reports) and were originally monitored specifically due to the presence of *O. mykiss* to evaluate seasonal rearing conditions as it relates to temperature. Keeping legacy sites that are now sometimes absent of *O. mykiss* allows for a comparison of how habitats respond to different flow regimes, and occupancy rates as it relates to water year types over time. Other sites were selected and monitored to evaluate the longitudinal thermal gradient along the LSYR, to document the presence of cold-water refuge habitats, and to monitor the rearing conditions where *O. mykiss* were present, while some previously monitored locations were discontinued due to channel shifts (i.e., LSYR-7.3 and LSYR-9.6), absence of fish observed over several years (Nojoqui Creek), impassible barriers to anadromous steelhead (San Miguelito Creek), or access limitations (2 sites within the Santa Ynez River Lagoon). One site was added to the LSYR mainstem thermograph network at LSYR-4.17 (Upper Refugio Run) to monitor water temperatures in a newly accessible reach where successful spawning and rearing occurred during WY2024 and WY2025.

On the LSYR mainstem, there were 30 thermograph units deployed at 15 sites which are listed below with the number of units in parentheses:

- Stilling Basin parapet wall (LSYR-0.01) (3);
- Downstream of Stilling Basin (LSYR-0.25) (1);
- Long Pool (LSYR-0.51) (3);
- LSYR directly downstream of Long Pool and upstream of Reclamation and Crawford-Hall property boundary (LSYR-0.68) (1);
- Grim Property upstream (LSYR-1.09) (1), that was lost before downloading;
- Grim Property downstream (LSYR-1.54) (1);
- Grimm Property pool (LSYR-1.71) (3);
- Kauffman Property run (LSYR-2.77) (1);
- Upper Refugio run (LSYR-4.15) (1);
- Encantado Pool (LSYR-4.95) (3);
- Double Canopy Pool (LSYR-7.65) (2);
- Head of Beaver Pool (LSYR-8.7) (3);
- Alisal Bedrock Pool (LSYR-10.2) (3);
- Avenue of the Flags (LSYR-13.9) (1); and
- Cadwell Pool (LSYR-22.68) (3).

In the tributaries, there were 12 thermograph units deployed at 12 sites which are listed below, all of which were single unit deployments:

- Hilton Creek (HC, 2 sites):
    - HC-lower (HC-0.12); and
    - HC-upper (HC-0.54).
- Quiota Creek (QC, 1 site):
    - QC-Crossing 6 (QC-2.66);
- Salsipuedes Creek (SC, 5 sites):
    - SC-lower (SC-0.77);
    - SC-Reach 2 (SC-2.2);
    - SC-Highway 1 Bridge (SC-3.0);
    - SC-Jalama Bridge (SC-3.5); and
    - SC-upper (SC-3.8).
- El Jaro Creek (EJC, 3 sites):
    - EJC-lower (EJC-3.81);
    - EJC-Palos Colorados (EJC-5.4); and
    - EJC-Rancho San Julian (EJC-10.82).
- Los Amoles Creek – Tributary to El Jaro (LAC, 1 site):

- LAC-Los Amoles Creek (LAC-7.0).

In Hilton Creek, single units were deployed at two locations: at the Upper Release Point (URP) and just upstream of the trap site (near the confluence with the LSYR mainstem) to monitor stream temperatures in the artificially watered sections of the creek on Reclamation property.

Again, all stream temperature monitoring locations are presented in Figure 5 with their deployment period and type in Table 5, and the observed fish species in each habitat in Table 6 for the LSYR mainstem and tributaries. Photos of each LSYR mainstem and tributary deployment location are presented in Figures 6-10 for general reference.

LSYR Mainstem Thermographs: The data are presented by site from upstream to downstream.

Stilling Basin Parapet Wall – Pool (north) (LSYR-0.01)

A 3-unit vertical array was deployed along the northwestern parapet wall of the Stilling Basin from 4/15/25 through 10/24/25 (Figure 6 and Figures 11-13). The units were deployed at 1-foot, 14-feet, and 28-feet. The Stilling Basin is the largest habitat on the LSYR and measures approximately 866 feet long from the spillway to the downstream riffle crest, is 482 feet wide at its midpoint, and is approximately 36 feet deep when at full capacity. In the absence of high-volume water releases, the upper lens of the Stilling Basin water column heats while cooler water sinks to the bottom, particularly during the summer. Water temperatures at this location are greatly influenced by both low- and high-volume water releases from the Bradbury Dam Outlet Works. When water is released from the Outlet Works, it is released from the cold hypolimnion at the bottom of the lake causing a rapid decrease in water temperatures.

Surface, middle and bottom maximum water temperatures remained less than 20 °C for the entire deployment period. Adult *O. mykiss* were observed from the parapet wall on several occasions milling/feeding on the surface. Carp and largemouth bass (LMB) were also observed at various times throughout the year. Water temperatures were optimal for *O. mykiss* rearing; however, chronically turbid water observed in the Stilling Basin persisted approximately 2.5 miles downstream of Bradbury Dam and prevented snorkel surveys on Reclamation property. Turbid water conditions have persisted since WY2023.

An increase in release rate to meet target flows downstream from approximately 7.5 cfs to 16.5 cfs occurred on 6/20/25 resulting in a significant decrease in water temperature (~2.5 °C) that translated downstream to several monitoring locations and improved water quality for the *O. mykiss* population.

Downstream of the Stilling Basin – Run (LSYR-0.25)

A single temperature unit was deployed in a 1.5-foot-deep run habitat approximately 40-feet downstream of the Stilling Basin tailwater control from 4/15/25 through 10/24/25 (Figure 6 and Figure 14). Maximum water temperatures remained less than 20 °C and minimum temperatures were less than 18 °C during the entire deployment showing little 24-hour variation. No snorkeling was conducted due to turbid conditions coming from the Stilling Basin, but *O. mykiss* presence was likely due to the abundance of *O. mykiss* in Hilton Creek directly downstream as well as cool well oxygenated water recorded in the Stilling Basin. Water temperature data show a brief rapid decline in mid-June coincident with increased water releases to meet target flows.

Long Pool – Pool (LSYR-0.51)

Prior to the Whittier Fire in 2017, the Long Pool habitat dimensions were approximately 100 feet wide at the widest point and 1,200 feet long with a maximum depth of over 9 feet. Since the Whittier Fire, the Long Pool has lost considerable length and depth due to extensive alluvial deposition from the Hilton Creek watershed specifically from the Whittier Fire that burned the upper third of the watershed. Prior to the spill events during the winters of 2023 and 2024, the Long Pool was approximately 900 feet long and had a maximum depth of just under 5.5-feet. Since the last two wet winters, the Long Pool habitat dimensions have increased in both length and depth though still shy of historic dimensions. The Long Pool can be fed by three water sources when there is no spill: the Outlet Works; the Chute Release Point (CRP) which is part of the HCWS that can release water directly into the Stilling Basin; and Hilton Creek proper (URP and LRP of the HCWS/HCEBS and natural upper basin creek flow). These water sources come together and mix at the head of the Long Pool.

Over the last 30 years, the Long Pool has been inhabited by various invasive species that can limit *O. mykiss* colonization due to predation, competition, and degradation of water quality. This conclusion was based on visual observations of the lack of multi-year age classes within the habitat, particularly smaller 1–2-year-old *O. mykiss*. In addition, chronic turbidity which can negatively affect salmonids was observed throughout the Highway 154 and Upper Refugio Reaches due to releases from the bottom of Bradbury Dam and non-native fish activity within the Stilling Basin. Since the winter of 2023 and continuing through all of 2025, chronic turbidity has plagued portions of the Hwy 154 Reach. Beaver activity and carp presence has also been an issue with respect to water clarity in past years prior to WY2016. After WY2016, dry conditions within the Hwy 154 Reach extirpated beavers from this section of the river. However, beavers are once again expanding their range into the Hwy 154 Reach creating dams and contributing to chronic turbidity within the reach. Beaver caused turbidity is often related to cutting new channels, digging bank dens, and repairing dams, during nocturnal activity that results in chronic highly turbid conditions within beaver pools that translate turbid water through the beaver dam to downstream habitats. Additionally, carp are well-established drivers of chronic turbidity in freshwater systems due to benthic feeding which dislodges fine particles and results in aquatic macrophyte vegetation loss.

Water quality measurements taken at the Bradbury Dam Outlet Works and at several locations downriver suggest low to moderate turbidity at the Outlet Works (~2-5 NTU measured June and September 2024), followed by increased turbidity at the Stilling Basin (~9-19 NTU) and subsequent tapering off downstream. Turbidity spikes occurring at the Stilling Basin, coupled with observations of carp, preliminarily seem to indicate a phenomenon of carp-induced sediment resuspension as a major contributing factor of turbidity within the Stilling Basin, with downstream impacts.

A vertical array was deployed on 4/15/25 and removed 10/31/25 (199 days) at the deepest portion of the pool habitat at 1-foot, 3.5 feet and 7.0 feet below the surface. Maximum surface water temperatures remained less than 21 °C for the entire deployment period with slight warming occurring during the summer period (Figure 6 and Figures 15-17). Minimum surface water temperatures remained less than 17 °C during the critical summer period. Middle and bottom water temperatures essentially mimicked each other, indicating little stratification. While no snorkel observations took place due to chronic turbid conditions, water quality conditions were favorable for *O. mykiss* rearing throughout the year, and their presence was likely, based on observation in the Stilling Basin, lower Hilton Creek, and areas further downstream.

Downstream of Long Pool (LSYR-0.68)

A single temperature unit was deployed 300 feet downstream of the Long Pool in a shallow run habitat with a maximum depth of 2 feet from 4/15/25 to 10/24/25 (192 days) (Figure 6 and Figure 18). Water temperatures collected at this location are similar to surface temperatures recorded at the Stilling Basin and slightly cooler than Long Pool with maximum temperatures just over 19 °C from early June through early September and less than 18 °C for the remainder of the deployment period. Minimum temperatures remained less than 17 °C for the majority of the deployment. While no snorkel surveys were conducted due to turbid conditions, *O. mykiss* presence was likely, based on suitable water temperatures.

Grimm Property Upstream – Run (LSYR-1.09)

A single thermograph was deployed in a run habitat measuring approximately 100 feet long, 15 feet wide, and 1.5 feet deep on 4/17/25. Unfortunately, routine ranch road maintenance crossed the river and mistakenly removed/destroyed the thermograph. COMB staff searched for the unit, but it was not recovered and is presumed lost. A replacement unit was not deployed.

Grimm Property Downstream – Run (LSYR-1.54)

A single thermograph was deployed in a run habitat measuring approximately 45 feet long, 15 feet wide, and 1.5 feet deep from 4/17/25 to 10/24/25 (190 days) (Figure 6 and Figure 19). Water temperatures show slight seasonal warming from mid-June through early September before gradually cooling. Overall, maximum water temperatures spiked in late May at approximately 21 °C but remained slightly greater than 20 °C through early September. Minimum temperatures remained less than 17 °C. The slight warming at this monitoring location is likely due to the absence of over story canopy and the presence of several large pool habitats between the two sites that act as heat sinks, warming surface waters. Multiple age classes of *O. mykiss* were observed in this area during snorkel surveys.

Grimm Property - Pool (LSYR-1.71)

A three-unit vertical array was deployed in this pool habitat from 4/17/25 to 10/24/25 (190 days) (Figure 7 and Figures 20-22). The habitat measured approximately 200 feet long, was 35 feet wide, and 7.5 feet deep. Temperatures collected at the surface, middle, and bottom recorded nearly identical measurements with no stratification and that Table 2 flows (ended 2/15/25) and Table 1 flows (started 2/16/25) provided cool and suitable rearing temperatures throughout the monitoring period though noticeably warmer compared to the previous two wet years that had greater Table 2 releases. Maximum temperatures approached 22 °C during late May-early June and remained between 19-21 °C through September. Flow increase from Bradbury Dam in late June resulted in an immediate approximate 2 °C decrease in water temperatures showing that an increase in cool water releases translate into locations further downstream and helped improve general rearing conditions. Multiple age classes of *O. mykiss* were observed in this habitat during the spring snorkel surveys.

Kaufman Property – Run (LSYR-2.77)

A single thermograph was deployed in a run habitat measuring 50 feet long, 20 feet wide, and 2 feet deep from 4/17/25 through 10/24/25 (190 days) (Figure 7 and Figure 23). Overall, maximum water temperatures were similar but slightly higher than other monitoring locations upstream, generally between 20-22 °C through mid-August before cooling. Minimum temperatures remained less than 19 °C during the summer period. *O. mykiss* were observed in this habitat during snorkel surveys.

Upper Refugio – Run (LSYR-4.17)

A single thermograph was deployed at the head of the habitat which measured 120 feet long, 20 feet wide and approximately 1.5 feet deep from 4/15/25 to 10/27/25 (195 days) (Figure 7 and Figure 24). The presence of large numbers of multi age class *O. mykiss* necessitated the deployment of a thermograph to monitor water temperatures during the spring, summer, and fall rearing period. This area was especially important to monitor Table 2 and Table 1 flows and how rearing *O. mykiss* responded to higher flow rates which provide more favorable rearing conditions during the critical summer period. Table 2 flows (reduced to Table 1 flows on 2/16/25) in 2025 were much reduced compared to the previous two wet years and the effects of lower flow releases with respect to temperature were apparent at this monitoring location. Water temperatures were several degrees warmer in 2025 indicating that thermal control of water temperatures versus lower flow rate resulted in a loss of thermal control and noticeably warmer water temperatures compared to upstream monitoring locations (and compared to the last two years). A flow bump in late June to meet target flows did ensure compliance and lowered water temperatures for rearing *O. mykiss*. Maximum water temperatures briefly exceeded 24 °C in late May before decreasing to just over 23 °C through the beginning of September. Minimum temperatures remained less than 20 °C for the entire deployment period. Multiple age classes of *O. mykiss,* particularly YOYs were observed in large numbers throughout this section of the Upper Refugio Reach during spring and fall snorkel surveys indicating successful spawning and rearing.

Encantado Pool – Pool (LSYR-4.95)

When full, the Encantado Pool is approximately 400 feet long, an average of 30-feet in width, and has a maximum depth of 6 feet when residual pool depth is being maintained. The two winters spill events of 2023 and 2024 have changed the pool habitat creating overall shallower conditions near the head while deepening the habitat further downstream. A three-unit vertical array was deployed in this habitat approximately 150 feet downstream of its original deployment location from 4/17/25 to 11/3/25 (200 days) (Figure 7 and Figures 25-27). Maximum surface temperatures were several degrees warmer than the upper Refugio monitoring location, approaching or exceeding 26 °C briefly in late May and most of July while minimum temperatures were generally less than 20 °C for most of the deployment period. Bottom temperatures were slightly cooler compared to surface temperatures. Adult and juvenile *O. mykiss* successfully over-summered in this habitat though their overall numbers were lower and distribution was confined to areas of deeper depth where water temperatures were cooler compared to the previous two spill years. Illegal fishing activity occurred in this habitat during 2025. In addition, a passage barrier beaver dam is present approximately 1/8 of a mile upstream which completely blocks both upstream and downstream fish movement.

Double Canopy - Pool (LSYR-7.65)

The Double Canopy Pool is located directly upstream of the Refugio Bridge. The pool was approximately 350 feet long, 40 feet wide, and 3.5 feet deep at its deepest point when the habitat is filled and flowing. Beaver dams have routinely been observed in this region of the river in the absence of spill events (i.e., 2025). A vertical array (surface and bottom only) was deployed at this site from 4/17/25 to 10/31/25 (197 days) (Figure 7 and Figures 28-29). Surface temperatures were slightly cooler compared to LSYR-4.95 with maximum temperatures reaching 24 °C in early July and were greater than 22 °C through mid-September. Minimum temperatures at the surface were generally less than 20 °C except for a few occasions in August and September. Bottom temperatures closely mimicked those recorded at the surface. *O. mykiss* successfully reared in this habitat during 2025 though in lesser numbers compared to the previous year. Of note was evidence of illegal fishing activity in and around this habitat and areas immediately downstream.

Head of Beaver Pool (LSYR-8.7)

This habitat is located approximately ¼ mile downstream of the Quiota Creek confluence with the LSYR mainstem. The habitat is approximately 730 feet long, 50 feet wide, and 5.5 feet at the deepest point while residual pool depth is being maintained. A vertical array was deployed in this habitat from 4/29/25 to 10/31/25 (185 days). Comparison of the three units deployed at this site show near identical temperature measurements indicating no stratification development with Table 2 flows (Figure 7 and Figures 30-32). Maximum water temperatures at each unit varied from 19 °C to just over 23 °C from May through September before rapidly cooling for the remainder of the deployment period. Minimum water temperatures were generally less than 21 °C during the same period before rapidly cooling. *O. mykiss* were observed in this habitat though in smaller numbers compared to the previous year and successfully oversummered at this location. As seen in previous years, there are several large beaver dams immediately upstream of this habitat that were constructed during the summer of 2025 and will likely act as a barrier to migration and spawning in the absence of high flow events. Illegal fishing activity was observed both upstream and downstream of this habitat.

Alisal Bedrock Pool (LSYR-10.2)

The Alisal Bedrock Pool is a corner scour pool habitat approximately 60 feet long and 40 feet wide with a maximum depth of 10 feet. A vertical array was deployed in this habitat from 4/29/25 to 10/31/25 (185 days) (Figure 8 and Figures 33-35). Winter storms and the resulting spills significantly deepened portions of the habitat in 2023 then partially filled the habitat during the spill of 2024 that slightly changed the channel configuration. This resulted in the historic deployment location to be partially isolated from the main flow in 2025. Because this habitat has high public use, it was decided for security purposes to install the array at the historic location even though it was not centered in the middle of the thalweg. Water temperatures collected on the surface and middle water column in this habitat were by far the warmest collected in the LSYR mainstem. Maximum surface and middle temperatures were greater than 24 °C and consistently between 26-28 °C from June through the beginning of September. Minimum water temperatures at the surface and middle fluctuated between 19-28 °C during the warmest portion of the year. Bottom maximum temperatures were noticeable cooler but were still greater than 25 °C on several occasions during summer. No *O. mykiss* were observed in this habitat during snorkel surveys, likely due to unsuitable water temperatures and illegal fishing activities, unlike the previous year when multiple age classes of *O. mykiss* successfully oversummered at this location.

This pool habitat is located approximately ¼ mile upstream of the Alisal Bridge and is often frequented by the public, especially during the warmer times of the year when people are more apt to recreate in the river. As such, extensive fishing activity was observed in the form of trash, lost tackle, and fishing line snagged in trees and bushes, along the banks of this habitat and other areas upstream and downstream during snorkel surveys. California Department of Fish and Wildlife (CDFW) Wardens cited at least 6 individuals for fishing in closed waters at this location in 2025.

Avenue of the Flags – Pool (LSYR-13.9)

The habitat was approximately 65 feet long and 20 feet wide at its widest point with a maximum depth of approximately 6 feet. A single unit was deployed in this habitat from 4/29/25 to 10/31/25 (185 days) one foot off the bottom (Figure 8 and Figure 36). Water temperatures show a wide range of fluctuations with significant dips and rise throughout the year coinciding with limited surface flow at various times. For example, when surface flow is minimal or ceases entirely, stratification and hyporheic flow dominate the temperature regime resulting in significantly cooler water conditions as observed at this location. Turbidity was elevated due to excessive fines deposited from the Lake Fire by way of Alamo Pintado Creek and continuous resuspension of the fines by carp and beaver in this reach. No snorkel surveys could be conducted in this habitat. The presence of *O. mykiss* is unknown. As seen at many other locations this year where public access is easy (i.e., bridge locations), ample evidence of illegal fishing activity was observed in the form of lost tackle and associated trash.

Cadwell Pool (LSYR-22.68)

The pool when full is approximately 850 feet long and 32 feet wide at the maximum point with a maximum depth of approximately 15 feet. A vertical array was deployed in this habitat from 4/29/25 to 10/31/25 (185 days) (Figure 8 and Figures 37-39). The surface unit was exposed to air on several occasions due to declining water levels. The surface unit was repositioned each time it was discovered above the waterline. Overall, water temperature was cooler compared to other monitoring locations upstream and displayed strong stratification at the bottom unit. The surface and middle units showed maximum temperatures between 22-25 °C with minimum temperatures between 18-21 °C with large diel fluctuations. Bottom temperatures showed minimal diel fluctuations and varied between 18-20 °C during the warmest portion of the year.

No *O. mykiss* were observed in this habitat due to turbid conditions during spring and fall snorkel surveys, however, invasive species including largemouth bass and carp were observed from the bank. This pool is one of the largest on the LSYR and has held oversummering *O. mykiss* in the past.

LSYR Mainstem Longitudinal Comparisons

Longitudinal LSYR mainstem (maximum and minimum daily) water temperature at the surface thermographs for LSYR-0.01, LSYR-0.25, LSYR-0.51, LSYR-0.68, LSYR-1.09, LSYR-1.54, LSYR-1.71, LSYR-2.77, LSYR-4.15, LSYR-4.95, LSYR-7.65, LSYR-8.7, LSYR-10.2, LSYR-13.9, and LSYR-22.68 including USGS flows at Hilton Creek and Alisal Bridge in Solvang are presented in Figure 40. Longitudinal maximum and minimum surface temperature comparison was complicated to interpret due to the variety of complex environmental variables all acting in conjunction with each other at each individual site (i.e., flow rate, riparian vegetation development riparian shading, ambient air temperatures, groundwater upwelling, pool stratification, etc.). In addition, the analysis only looked at the maximum and minimum surface water temperature at all sites and did not look at bottom temperatures in pool habitats with vertical arrays (i.e., LSYR-0.01, LSYR-0.51, LAYR-1.71, LSYR-4.95, LSYR-7.65, LSYR-8.7, LSYR-10.2, and LSYR-22.68). Surface maximum temperatures, particularly in pool habitats, did not reflect the general rearing potential throughout the water column of each habitat. For example, *O. mykiss* observed in pool habitats in several past years at LSYR-0.51, LSYR-1.71, LSYR-4.95, and LSYR-7.65 with elevated surface water temperatures did not inhibit fish survival and rearing, specifically during the warmest portion of the year. Those fish were observed almost exclusively near the bottom or mid-water column of the habitats where cooler water quality conditions persisted due to stratification and/or groundwater upwelling thus, while some of these habitats look to be too warm for *O. mykiss* the reality is many of them offer suitable rearing at depth. Alisal Bedrock Pool appears to have reached thermal limits for *O. mykiss* as no *O. mykiss* were observed where they were seen in previous years, where flows were greater and temperatures were cooler. Heavy public use and illegal fishing may have also contributed to the absence of *O. mykiss* observed in the Alisal bedrock pool area.

In past years (see previous Annual Monitoring Summaries) factors influencing surface water temperature rises along the longitudinal profile include: (1) thermally-warmed

Stilling Basin surface water moving downstream resulting in an increase in stream temperature in the Hwy 154 Reach; (2) dry cobble bars with extensive exposure to the sun that warm the leading edge of any released waters moving downstream, which can cause elevated temperatures usually over a short period of time until the full rate of the release arrives and cools the water column thereafter; and (3) the arrival of a WR 89-18 release flow front that elevates water temperatures (associated with the aforementioned factors) for a short period (1-2 hours) followed by a drop in water temperature to favorable conditions for *O. mykiss*, particularly for pools closer to Bradbury Dam. Further downstream from Avenue of the Flags and onward, the water rights releases appear to increase the temperature of the pools due to the continuous surface warming as the water travels down the river compared to the cooler river underflow feeding the pools in the summer months outside of the water rights releases.

WY2025 was a dry year following 2 consecutive spill years with Table 2 flows required under WRO-2019-0148 (reverted to Table 1 flows on 2/16/25). Table 2 flows which call for releases from Bradbury Dam for purposes of spawning (48 cfs 02/15 to 04/14), incubation and rearing (20 cfs 04/15 to 06/01), emigration (25 cfs 06/02 to 06/09 ramp to 10 cfs by 06/30), and rearing resident fish maintenance (5 cfs 10/01 to 02/15). Mean daily discharge recorded at the USGS gauging station in Solvang fluctuated from a low of 2.8 cfs (6/21/25) to a high of 88.3 cfs (brief runoff from the 2/12/25 storm). Overall, flows from May through 9/30/25 ranged from 4.6 cfs to 13.3 cfs. When looking at Figure 40 maximum water temperatures showed a warming trend with distance from Bradbury Dam with the coolest maximum temperatures up to LSYR-2.77, then noticeable warming starting at LSYR-4.15 and continuing downstream with LSYR-10.2 being the warmest overall. There were numerous examples of *O. mykiss* thriving in habitats where surface maximum temperatures exceeded stressful thresholds according to scientific literature. Stream water temperatures at LSYR-10.2 may have reached the thermal limit for *O. mykiss* as no *O. mykiss* were observed but they occurred in years past and flow in the pool has been continuous since WY2023.

Discussing only surface maximum water temperatures does not provide a clear picture of the overall rearing conditions *O. mykiss* face when rearing in the mainstem during the warm summer months. Maximum water temperatures show there were times when temperatures were stressful for rearing *O. mykiss*, but they did not experience these warm conditions continuously and were followed by periods of suitable conditions mostly during the hours of darkness and several hours after sunrise. This was especially true in 2025 as most minimum surface temperatures did not exceed 20 °C (Figure 40).

O. mykiss and Water Temperature Criteria within the LSYR Mainstem

WY2025 was a dry year although a portion of the year had higher Table 2 flows which reverted to Table 1 flows on 2/16/25. Table 1 flows releases were higher than in past years due to the SWRCB requiring the Table 1 flows plus 4.3 cfs at the new Hwy 154 gaging station to correct for potential stream losses between the gaging station location and the Highway 154 Bridge. In addition, during the spring and fall periods in WY2025 Reclamation minimum releases through the Bradbury Dam Outlet Works were affected by the 10-inch valve being inoperable and stuck in a partially open position and leakage from the two 30-inch fixed cone valves which resulted in higher releases above the Table 1 requirements than in years past. YOY, juvenile, and adult *O. mykiss* were observed in large numbers in the Hwy 154 and Upper Refugio reaches with lesser numbers observed in the Refugio and Alisal reaches. The numbers of *O. mykiss* observed in both the Upper Refugio, Refugio, and Alisal reaches increased in WY2023 and were even greater in WY2024 than ever observed since monitoring began in the mid-1990s. This was most likely caused by elevated and sustained baseflow conditions from two previous wet years that resulted in excellent rearing conditions during the WY2025 dry season. Overall, numbers decreased in WY2025 within the Refugio and Alisal reaches due to a variety of environmental factors including greater warming of waters from reduced baseflows compared to the previous two years which impacted downstream *O. mykiss* distribution during the summer. Also, the presence of numerous large beaver dams created choke points for rearing *O. mykiss* as large largemouth bass (LMB) were observed to be staged at the head of beaver pools likely predating upon *O. mykiss* as they grew and transitioned to deeper habitats to rear. In fact, few small *O. mykiss* was observed in habitats occupied by large LMB with genetic testing confirming *O. mykiss* DNA in the stomach contents of bass at several locations. Another population pressure on *O. mykiss* is widespread poaching. Illegal fishing in the LSYR mainstem is on the rise and is likely contributing to the observed reduction of adult *O. mykiss* between the spring and fall snorkel surveys. Although many signs have been posted, public outreach conducted, and numerous calls to the CDFW game wardens resulting in some fines, the issue continues to be difficult to control, with fishing evidence (i.e., empty bait/lure packaging, snagged lures in brush, fishing line, etc.) abundant in areas of easy access (i.e., Alisal Bridge, Refugio Bridge, Avenue of the Flags Bridge)

Tributary Thermographs: The data from single thermograph deployments are presented by site from downstream to upstream along each creek (Figure 5 and Tables 5 and 6).

Lower Hilton Creek (HC-0.12)

A single thermograph was deployed in a run habitat approximately 400 feet upstream of Hilton Creek and LSYR mainstem (Long Pool). The unit had to be relocated upstream of its historical location due to channel changing storm events in 2024. The unit was deployed in a pool habitat directly upstream of the trap site from 4/15/25 to 10/24/25 (192 days) (Figure 9 and Figure 41). Maximum water temperatures remained at or less than 17.0 °C during most of the deployment. Minimum temperatures remained less than 16 °C. There was a noticeable increase in water temperature coinciding with the start of lake turnover at the end of October and was translated from the lake to the creek through the HCWS delivery system. *O. mykiss* were observed throughout this section of the creek during all of WY2025. No invasive species were observed in the lower section of Hilton Creek during spring and fall snorkel surveys.

Upper Hilton Creek (HC-0.54)

A single thermograph was deployed in a pool habitat adjacent to the URP release site from 4/15/25 to 10/24/25 (192 days) (Figure 9 and Figure 42). The instrument was placed at the bottom of a pool habitat 20 feet long and 10 feet wide with a depth of approximately 2.5 feet. The instrument was located at the confluence of natural flow from upper Hilton Creek and the URP where water from Lake Cachuma is delivered to the creek. Natural flow is subject to ambient air temperatures which heat the creek water. Water delivered from the lake is taken from the cold hypolimnion (below the thermocline) and is not subject to heating until it enters the creek. Water temperatures recorded at this monitoring location typically show slightly elevated temperatures and greater 24-hour variation compared to the lower monitoring location as warm natural runoff mixes with releases from the URP. When there is natural upper basin runoff, water temperatures are typically slightly warmer at the URP compared to the lower creek which is usually followed by a noticeable reduction in temperature as natural runoff decreases. This signal was somewhat lessened in 2025 as natural flows were much decreased due to a dry water year type compared to the previous two years. Maximum water temperatures remained less than 17 °C and minimum temperatures remained less than 16 °C.

Temperature fluctuations in late October corresponded with the beginning of lake turnover. *O. mykiss* were observed in this habitat during spring and fall snorkel surveys with noticeable numbers of YOY moving down from upstream of the Reclamation property boundary as flows decreased from the upper portion of Hilton Creek. The fact that YOY were observed upstream of the URP indicates that some successful spawning did occur somewhere between the Highway 154 culvert and the URP.

Quiota Creek (QC-2.66)

A single thermograph was deployed approximately 35 feet upstream of Crossing 6 on Refugio Road from 4/15/25 through 10/28/25 (196 days) (Figure 9 and Figure 43). The unit was placed at the bottom of a pool habitat 30 feet long and 10 feet wide with a depth of approximately 3.5 feet. Quiota Creek flowed at this location for the entire year though extensive areas upstream and downstream did go dry in 2025. Maximum water generally hovered around 20 °C during the warmest portion of the year while minimum water temperatures remained below 18 °C except for a few occasions during September. *O. mykiss* were observed in this habitat during snorkel surveys and successfully over-summering.

Lower Salsipuedes Creek (SC-0.77)

A single thermograph was deployed in this habitat approximately 1.5 feet below the surface from 4/16/25 to 10/16/25 (183 days) (Figure 9 and Figure 44). The habitat measured approximately 40 feet long and 12 feet wide with a maximum depth of 3.0 feet. High magnitude storm runoff during the winter of 2023 and 2024 resulted in significant instream channel changes with much of the instream vegetation completely removed from multiple areas of the creek including large bank failures observed in several locations. Resultant loss of riparian vegetation allowed for greater thermal heating of surface waters compared to previous years and the data reflects that fact. This monitoring location recorded the warmest temperatures compared to other locations upstream. Maximum water temperatures show seasonal warming starting in May and peaking August through early September before rapidly cooling.

Maximum water temperatures exceeded 26 °C on several occasions and regularly greater than 24 °C. Minimum water temperatures generally remained less than 20 °C, providing some relief if rearing *O. mykiss* were present. No *O. mykiss* were observed in this habitat as snorkel surveys were not conducted due to excessive turbidity from numerous beaver dams.

Salsipuedes Creek-Reach 2-Bedrock Section (SC-2.2)

A single thermograph was deployed in a pool habitat approximately 4 feet below the surface from 4/16/25 through 10/16/25 (183 days) (Figure 9 and Figure 45). This is a short bedrock dominated reach with deep pools, extends approximately 1/3 of a mile, and represents some of the best habitat for over-summer rearing *O. mykiss* within the entire Salsipuedes/El Jaro Creek watershed due to the presence of numerous bedrock formed deep pools. The monitored habitat is approximately 40 feet long, 15 feet wide, and 6-8 feet deep at its deepest point. *O. mykiss* have been routinely observed for years at this location when visibility permits, and they were observed during snorkel surveys in 2025 though in smaller numbers compared to upstream reaches. Observed *O. mykiss* consisted of primarily juvenile and adults with some YOYs. Numerous invasive green sunfish were also observed in this habitat during the spring and fall snorkel surveys. Maximum water temperatures were much cooler compared to lower Salsipuedes Creek, remaining at or less than 20 °C during the warmest time of the year. There was an uptick in water temperature during September coincident with a late season heat wave before rapidly cooling at the end of the month. Overall, maximum temperatures ranged from 19-23 °C during the period of deployment. Minimum temperatures hovered around 18 °C before the late season heat wave.

Salsipuedes Creek-Reach 4 – Highway 1 Bridge (SC-3.0)

A single thermograph was deployed in the pool habitat approximately 5 feet below the surface, 200 feet downstream of the Hwy 1 Bridge from 4/16/25 through 10/17/25 (184 days) (Figure 9 and Figure 46). This deployment site used to be the deepest pool on Salsipuedes Creek measuring 175 feet long and 45 feet wide with a maximum depth of approximately 14 feet. Instream work conducted by Caltrans during their Highway 1 Bridge replacement project over Salsipuedes Creek has subsequently filled the pool with cobble and boulder material. The roughened ramp through the riffle upstream has eroded during high flow events and a high percentage of it has washed downstream leaving large concrete blocks in the stream bottom and an unstable stream profile with noticeable head cutting upstream. The site is still passable for juvenile and adult fish although not as designed and built. The downstream pool where the unit was deployed has reduced to 75 feet long, 30 feet wide with a maximum depth of approximately 5-6 feet, a significant reduction compared to pre-project bridge replacement. This thermograph location is near the top of Reach 4, the second significant bedrock dominated section of the creek. Reach 4 is similar to Reach 2 in that there are numerous deep pool habitats formed in the bedrock that offer excellent over-summering opportunities for rearing *O. mykiss*.

Water temperature remained relatively cool at this monitoring location with maximum temperatures fluctuating between 18-21 °C during the warm summer months and minimum temperatures fluctuating between 15-20 °C. *O. mykiss* were observed in this habitat during snorkel surveys, as well as large numbers of invasive green sunfish.

Salsipuedes Creek-Reach 5 – Jalama Bridge (SC-3.5)

A single thermograph was deployed in a pool habitat approximately 4 feet below the surface, directly downstream of the Jalama Bridge fish ladder from 4/16/25 through 10/17/25 (184 days) (Figure 10 and Figure 47). The pool dimensions were approximately 30 feet long, 18 feet wide, and 7 feet deep. Water temperatures collected at this site were among the coldest collected in Salsipuedes Creek. Maximum temperatures remained less than 22 °C generally hovering around the 18-21 °C for much of the deployment period. Minimum temperatures were also noticeably cooler, remaining less than 18 °C except during the September heat wave. Multiple age classes of *O. mykiss* were observed upstream and downstream of this location, indicating successful spawning and rearing throughout the year. Invasive green sunfish were also observed in this pool habitat.

Upper Salsipuedes Creek (SC-3.8)

Upper Salsipuedes was negatively impacted by the prolonged drought which dried the creek for an extended period and extirpated *O. mykiss* entirely from upper Salsipuedes Creek upstream of its confluence with El Jaro Creek. In the years prior to the drought, upper Salsipuedes Creek routinely held various age classes of *O. mykiss* as well as multiple spawning locations for both resident and anadromous steelhead. Despite the past 3 years of flowing conditions (2023-2025), *O. mykiss* continued to be absent and have yet to recolonize this section of the watershed. Upper Salsipuedes Creek, when flowing, provides a significantly cooler water source compared to El Jaro Creek and is important for rearing *O. mykiss* both upstream in the upper portions of the creek as well as providing cool water for areas downstream of the confluence of the two creeks.

A single thermograph was deployed on the bottom of the creek in a shallow run habitat 15 feet long, 3 feet wide, and approximately 0.5-foot deep from 4/16/25 through 10/22/25 (189 days) (Figure 10 and Figure 48). Water temperatures collected were among the coldest observed in the watershed with maximum remaining less than 20 °C during the hot summer period (excepting the September heat wave) and minimum temperatures remaining less than 17 °C (with the exception of the September heat wave) showing favorable rearing conditions throughout the year. YOY and juvenile *O. mykiss* were observed in the El Jaro/Salsipuedes confluence pool immediately downstream of the monitoring location in both the spring and fall as well as several other habitats downstream to Jalama Bridge.

Lower El Jaro Creek Upstream of Salsipuedes Confluence (EJC-3.81)

A single thermograph was deployed at the bottom of a run habitat 200 feet upstream of the El Jaro/Salsipuedes Creek confluence from 4/16/25 to 10/22/25 (189 days) (Figure 10 and Figure 49). Due to channel changes in 2023, the thermograph monitoring location was moved upstream approximately 40 feet to take advantage of a deeper section of the habitat. The habitat was roughly 80 feet long and 12 feet wide with a maximum depth of 2.0 feet. This location routinely held rearing *O. mykiss* but none were observed this year. Water temperatures show large fluctuations starting at the deployment in April and continuing through the first half of June, with maximum temperatures reaching 23 °C before precipitously decreasing to 18 °C for the remainder of the deployment. This is likely an artifact of a decrease in flow coincident with a lowering of temperature as hyporheic conditions exert greater influence on temperature in the absence of greater surface water contribution (as observed at LSYR-13.9). Minimum temperatures remained less than 18 °C for the majority of the deployment. While no *O. mykiss* were observed in this habitat unit, they were observed in several habitats upstream during the spring and fall snorkel surveys.

El Jaro Creek – Palos Colorados (EJC-5.4)

A single thermograph was deployed 0.5 feet from the bottom of a boulder-influenced pool habitat from 4/16/25 through 10/22/25 (189 days) (Figure 10 and Figure 50). The habitat measured approximately 35 feet long, 7 feet wide, and 3.5 feet deep. *O. mykiss*, including YOY, juveniles and adults have been observed sporadically in past years in and around the monitored habitat, and YOY (5), juveniles (3) and one adult was observed here in the spring snorkel survey. No fall snorkel surveys were conducted here due to time constraints. This area is thermally influenced by Palos Colorados Creek, a spring that confluences with El Jaro Creek approximately 1/8 of a mile upstream of the monitoring pool. Maximum water temperatures were highest during the May timeframe (22-24 °C) before declining slightly (19-22 °C) for the remainder of the year. Minimum temperatures stayed less than 18 °C except for a few brief periods during the September heat wave.

El Jaro Creek – Rancho San Julian (EJC-10.82)

O. mykiss have regularly been observed within the plunge pool, the fish ladder, and in habitats upstream of the fish ladder in past years. The drought extirpated *O. mykiss* from large sections of upper El Jaro Creek including in and around the Rancho San Julian fish ladder as large portions of the creek did not flow in the summer of 2013, 2014, and were completely dry in 2015, 2016, and 2022. This section of the creek flowed for the entirety of 2023, 2024 and 2025. A thermograph was deployed in the pool habitat immediately downstream of the bridge from 4/16/25 through 10/22/25 (189 days) (Figure 10 and Figure 51). The habitat was 30 feet long and 20 feet wide with a maximum depth of 3.0 feet. YOY (6), juvenile (6) and adult (2) *O. mykiss* were observed in the monitoring pool and 10 (mostly YOYs) were observed within the fish ladder during the spring snorkel survey. This is especially important to highlight as it shows successful recolonization by *O. mykiss* in an area from where they were recently extirpated. The fact that YOY were observed shows that successful spawning took place in this area. Except for a few brief occasions, maximum water temperatures remained less than 20 °C for the entire deployment period. Minimum temperatures remained less than 18 °C except during the September heat wave when they approached 20 °C before rapidly decreasing.

Los Amoles Creek – Tributary to El Jaro – (LAC-7.0)

A single thermograph was deployed 0.5 feet from the bottom of a corner scour pool habitat from 4/16/25 through 10/22/25 (189 days) (Figure 10 and Figure 52). The habitat was 30 feet long, 15 feet wide, and 3.0 feet deep and was located approximately 1/8 of a mile upstream from the confluence with El Jaro Creek. Los Amoles Creek has regularly held various age classes of *O. mykiss* and spawning sites have been identified sporadically in the creek over the years. Recent drought conditions temporarily extirpated *O. mykiss* from this tributary as conversations with the landowner confirmed that the entire creek was dry in 2020, 2021, and 2022. No *O. mykiss* have been observed, however, a single redd site was identified in 2025 suggesting recolonization is taking place. No snorkel surveys were conducted in the creek to verify *O. mykiss* have returned but their presence is likely, especially considering the favorable water quality conditions. Overall, maximum water temperatures remained between 18-20 °C except during the September heat wave with minimum temperatures remaining less than 18 °C during the same period.

Salsipuedes Creek Longitudinal Comparisons

Longitudinal maximum and minimum daily water temperatures for Salsipuedes Creek and El Jaro Creek are shown in Figure 53 for the thermographs at Rancho San Julian (EJC-10.82), Palos Colorados (EJC-5.4), Los Amoles Creek (LAC-7.0), the confluence with El Jaro/Salsipuedes Creek EJC-(3.81), Upper Salsipuedes Creek upstream of the El Jaro confluence (SC-3.80), Salsipuedes Creek at Jalama Bridge (SC-3.5), Salsipuedes Creek at Highway 1 Bridge (SC-3.0), Salsipuedes Creek in the Reach 2 Bedrock Section (SC-2.20), and lower Salsipuedes Creek (SC-0.77). Also included in the graph was the Los Amoles Creek monitoring location (LAC-7.0) which is a tributary to El Jaro Creek and approximately 2.5 miles upstream of EJC-5.4. At the majority of monitoring locations, maximum water temperatures grouped within about 4-5 °C of each other and ranging from about 17 °C to 22 °C during the warmest portion of the year with the primary outlier being lower Salsipuedes Creek which recorded substantially higher temperatures. Heat waves in both May and September both resulted in elevated water temperatures throughout the monitoring sites. All monitoring locations show rapid cooling at the end of September.

It is important to describe the minimum water temperatures across the watershed as it paints a clearer picture of instream conditions faced by *O. mykiss* rearing at various locations. While maximum water temperatures showed relatively inhospitable rearing conditions, minimum water temperatures showed that *O. mykiss* did not experience hot temperatures constantly over a 24-hour period and instead experienced fairly cool water temperatures during the hours of darkness and the early morning, providing a reprieve to potentially stressful conditions. As such, Figure 53 clearly shows daily minimum temperatures remained less than 20 C for the entire deployment period.

O. mykiss and Water Temperature Criteria within the Tributaries

The Salsipuedes/El Jaro Creek watershed is a dynamic system with many variables that influence water temperatures at any given time. The amount of surface flow, depth within individual habitats, groundwater upwelling, geomorphic features (i.e., bedrock), ambient air temperatures, drought, and presence/absence of riparian vegetation all influence the flow and thermal regime within individual habitats in the watershed and, as a result, this area exhibits the most variability compared to other tributaries. The recent drought caused much of the Salsipuedes/El Jaro Creek habitat to constrict down to a few fragmented and small isolated flowing sections of creek. The wet water year of 2019 (33.99 inches at Rancho San Julian) and average water year of 2020 (21.0 inches at Rancho San Julian) helped to some degree reconnect the creek system. Unfortunately, the dry water year of 2021 (14.89 inches at Rancho San Julian), and average water year of

2022 (18.91 inches at Rancho San Julian) again caused significant retraction in habitat extent, specifically in Lower Salsipuedes Creek downstream of Santa Rosa Bridge (dry) and portions of El Jaro Creek upstream of the upper Salsipuedes confluence to Rancho San Julian (dry). That all changed during the wet water years 2023 and 2024 where 55.78 inches and 36.59 inches of rainfall, respectively, were recorded at Rancho San Julian. Those wet years resulted in continuous flow conditions throughout the entire watershed and provided recolonization opportunities for *O. mykiss* present in the system. Juvenile and resident adult *O. mykiss* were observed in and around Rancho San Julian for the first time in 10 years. That trend continued in WY2025 as successful spawning resulted in YOY being observed and successfully rearing. Despite these elevated temperatures, *O. mykiss* successfully reared at several locations within the Salsipuedes/El Jaro watershed, suggesting higher thermal tolerances than the literature values. Based on snorkel observations primarily in areas with deeper pool habitats, water quality conditions within the Salsipuedes/El Jaro Creek watershed offered successful rearing opportunities.

Quiota Creek in the areas of flowing water offered excellent rearing opportunities throughout WY2025 with optimal water temperatures for rearing. Typically, in areas with perennial flow, water temperatures are not as varied as observed in Salsipuedes/El Jaro Creek. Multiple age classes of *O. mykiss* successfully oversummered in areas with flowing water. Unfortunately, the dry winter of WY2025 did not provide enough rainfall to keep the entire creek running during the dry season as was observed in WY2023 and WY2024. In fact, many fish rescues/relocations were conducted in Quiota Creek by CDFW with assistance from COMB-FD staff to remove *O. mykiss* (mainly YOYs) from drying habitats and relocate them to upper Quiota Creek and sections of the LSYR specifically within the Hwy 154, Upper Refugio, and Refugio reaches with flow and suitable water temperatures and DO concentrations.

Hilton Creek stream temperatures were the least varied of the tributaries listed above due to cool water released via the HCWS. Hilton Creek provides optimal water temperatures that are not subject to influences from ambient air temperatures as seen in other creeks, creating excellent rearing opportunities for *O. mykiss* inhabiting the creek.

Lake Cachuma Water Quality Profiles: Water quality profiles at Bradbury Dam were collected near the intake for the HCWS on 1/7/25, 2/4/25, 3/4/25, 4/10/25, 5/6/25, 6/3/25, 7/1/25, 8/5/25, 9/2/25, 10/7/25, 11/3/25, and 12/2/25 (Figure 54). The HCWS intake hose is adjustable and is set at an optimal depth to provide cold water temperatures for *O. mykiss* in Hilton Creek, at or below 18 °C as stipulated in the BiOp. Conducting lake profiles throughout the year assures that the adjustable HCWS intake hose is set at the proper depth for downstream fish releases. COMB-FD staff typically used a boat from the Lake Cachuma Marina and moored up to the HCWS Intake Barge, which is close to the deepest part of the lake and close to the Bradbury Dam Outlet Works intake. The water quality instrumentation is sent down from the back of the boat so that the monitoring equipment is not entrained into the snorkel hose of the HCWS, logging water quality data at approximately every meter going to depth all the way to the bottom of the lake.

The HCWS intake is set at an approximate depth of 65 feet below the water surface, which is typically well below the thermocline, with water temperatures below 18 °C. Although Lake Cachuma received very little inflow and elevation gain in WY2025, the reservoir capacity remained relatively high throughout the year, allowing continuous gravity flow of cold water to be released into Hilton Creek.

The first lake profile in January revealed almost perfectly uniform water temperatures from top to bottom, ranging from 13.9 °C at the surface to 13.5 °C at the bottom of the lake (Figure 54). The second profile of the calendar year showed even colder temperatures in February with only 0.3 °C difference between the top and the bottom of the reservoir. The following profiles in March and April showed some warming at the lake surface, with the April data indicating a thermocline just beginning to form around 30-40 feet from the surface. By June, the lake was clearly stratified with a surface temperature of 21.8 °C and a bottom temperature of 13.6 °C. The thermocline in June and July, although present, was long and stretched out between 20 and 70 feet below the surface with no clear demarcation. Peak reservoir surface heating at the top of the water column was evident during the August and September profiles, at 23.3 °C and 24.9 °C respectively. The thermocline was clear and present in August at approximately 40 feet below the surface, while the September thermocline was stretched out in a similar fashion and depth to what observed back in June. A shorter photo period and cooler weather was apparent during the October profile, with surface temperatures dropping several degrees (max of 22.2 °C) towards the surface. A well-defined thermocline had lowered to a depth of approximately 50 feet below the surface. The November profile showed a continuing trend of cooler surface waters (surface max of 19.7 °C) with a distinct thermocline at 60 feet below the reservoir surface. The lake started to turn over in November and continues to be in process in December even with a sequence of large storms in the middle of November. Cold temperatures and a strong wind event are needed to complete the lake turnover process.

Dissolved oxygen (DO) concentrations during the January lake profile were uniformly high ranging from 8.3 mg/L at the surface to 8.0 mg/L at the bottom of the lake (Figure 54). Profiles between February and April continued to show elevated DO concentrations at all depths of the lake. The May and June profiles began to show signs of oxygen depletion at depth, with DO levels less than 5 mg/L, but only the last few meters from the bottom. By August, hypoxic conditions were found 43 feet below the surface with a reading of 3.4 mg/L, with almost no oxygen (anoxic) at the bottom of the lake. Profiles in September through October maintained elevated DO concentrations from the surface to about 35-40 feet below the surface, with hypoxic conditions toward the bottom all three months. Surface DO ranged from 7.7 mg/L at the surface to 7.0 mg/L at 60 feet below the surface in November, with DO values near zero from 60 feet down to the bottom of the reservoir. The December profile continued to show lake stratification with a sharp drop off of DO concentrations at 80 feet of depth going to near 0 mg/L thereafter. Turbidity always increases just above the bottom of the lake (the milk shake layer), which may be the source of turbid waters observed in the Stilling Basin.

3.3. Habitat Quality within the LSYR Basin

Habitat quality monitoring during WY2025 within the LSYR Basin was conducted via photo documentation, specifically by maintaining a long-standing record of photo point locations using digital cameras. Photographs were taken at designated locations (photo points) to track long-term and short-term changes that had occurred as a result of stormflows, spill events, phreatophyte growth, changes in canopy coverage and type, periods of drought, spill events, and the results of management activities in the drainage. Illustrative photo point locations are those that provide the best vantage point to show representative changes over time. A list of WY2025 LSYR mainstem photo points is provided in Appendix C (Figure C-1 and Tables C-1 and C-2)**.**

LSYR mainstem photo point locations include all bridges from the Highway 154 Bridge to the Highway 246 Robinson Bridge near Lompoc. Several other LSYR mainstem photo point locations are located on Reclamation property near Bradbury Dam, within the Refugio and Alisal reaches, and at the LSYR lagoon. Tributary photo points include various locations on Hilton, Quiota, Alisal, Nojoqui, Salsipuedes, El Jaro, and San Miguelito creeks.

Photo point comparison between 2005 and 2025 showed an increase of LSYR mainstem riparian growth since the target flows were required to be met at the Alisal Bridge (2005), approximately 10.5 miles downstream from Bradbury Dam (Figures 55-60). Sections of the LSYR mainstem that were nearly devoid of vegetation in 2005 now show abundant new growth with willow, sycamore, and cottonwood trees in excess of 40 feet in height in some locations. Since 2011, the region has experienced 5 consecutive years of drought (WY2012-WY2016), followed by additional dry years in WY2018, WY2021, WY2022, and WY2025, four wet years (WY2017, WY2019, WY2023, and WY2024), and one average year (2020). The last few years (WY2023, and WY2024) of above average rainfall have resulted in positive changes to the riparian vegetation with new growth observed in areas hit hard by the drought. Bradbury Dam spilled in WY2023 for the first time in 12 years and again in WY2024. These two years of high flow events removed significant numbers of large trees throughout the mainstem and tributary floodplain. WY2025 was a stark departure from the previous two wet years with less than 10-inches of rain (dry) recorded at Bradbury Dam. Despite WY2025 being a dry year, riparian vegetation has started to regrow and expand in areas hit hardest by two years of high flow events.

Photo documentation within Hilton Creek continues to show a maturing and dynamic riparian zone, particularly within the reach between the URP and LRP which was initially activated in 2005 (Figures 61-62). Larger trees (willows, alders, sycamores, and cottonwoods) are replacing the smaller understory within the drainage. The large storm flow events of 2023 and 2024 caused several channel changes within the creek, deepening some habitats and filling in others and created multiple confluence channels where the creek meets the mainstem. The formation of multiple channels at the confluence with the Santa Ynez River is unfortunate because it hampers the ability of adult *O. mykiss* to find and negotiate a pathway into favorable spawning habitat especially in the absence of stormflow events, as was observed in WY2025. Of note is the reduced amount of spawning sized gravel distributed in the creek. Between the LRP and URP, spawning material is essentially absent compared to previous years as much of it was removed during high flow events and not naturally replenished. Gravel augmentation was conducted in Hilton Creek in 5 locations in WY2025 to improve the spawning conditions. Outside of the gravel augmentation sites, from the LRP downstream to the confluence with the LSYR had few locations where migrating *O. mykiss* were able to spawn which was localized mainly near the confluence. Absence of adequate spawning material in the upper and middle portions of the creek at the start of WY2025 highlights the need to conduct annual gravel augmentation throughout the creek to support recovery efforts. All gravel augmentation efforts are being done through Reclamation obtained permits and implemented by the COMB-FD.

Salsipuedes and El Jaro Creeks underwent widespread channel changes with multiple areas of mass wasting and loss of riparian habitat during the winter storms of WY2023 and WY2024 (Figures 63-65). Numerous bank failures occurred throughout the creek with the most notable observed downstream of the Santa Rosa Bridge (T-28) and downstream of the Caltrans Highway 1 Bridge project where instream boulder placement (roughened ramp) unraveled and filled deep pool habitats downstream. Habitats in and around the Cattle Exclusionary Fencing Project in lower Salsipuedes Creek (completed in WY2015) fared well as the increased riparian vegetation helped anchor soils and caused deepening of some habitats and reduced bank failures in some locations.

3.4. Migration - Trapping

Migrant trapping activities to monitor both migrating anadromous and resident *O. mykiss* have been conducted in the LSYR and/or several of its tributaries every year since 1993. Exceptions to trapping include the endangered listing of steelhead (1997) and threatened listing of California red-legged frog (2000) which caused trapping delays due to scientific permitting issues during those years, no trapping in WY2013 due to a misinterpretation of a NMFS incidental take request by Reclamation, and a shortened trapping season in WY2023 (23 days) due to permitting issues with the listing of steelhead as endangered by the State of California. Results from the WY2025 migrant trapping effort remained below the 2000 BiOp established Incidental Take Statement (ITS) limits due to modified trapping operations that truncated migrant trapping efforts both on the front end and back end of the migration season. Modified trapping operations have worked well to stay within established ITS limits but limit the ability to answer important Southern California steelhead recovery effort questions such as: 1) what factors influence the timing of upstream resident *O. mykiss* spawning migration in dry, average, and wet year types, 2) what are the minimum and optimal flows required to encourage the spawning migration of *O. mykiss* into Hilton Creek, 3) can Hilton Creek flows or releases from the Outlet Works be adjusted for more flows to go to Hilton Creek than the Outlet Works with no overall change in the cumulative dam releases to encourage spawning behavior in and around the Hwy 154 Reach and within Hilton Creek, 4) when does the smolt run from Hilton and Salsipuedes Creeks start and end in dry, average, and wet years and how does that relate to water releases from Bradbury Dam (Outlet Works and to Hilton Creek), and 5) can releases be used to mimic natural storm events to encourage spawning in the Hwy 154 Reach and Hilton Creek during dry and average years.

Starting in WY2013, NMFS required COMB to stay within the juvenile (110) and adult (150) take limits as described within the BiOp ITS, even though juvenile take had been exceeded multiple times since the 2000 BiOp was issued (i.e., WY2001, WY2003, WY2004, WY2006, WY20008-WY2012) and adult take exceeded in WY2008 only. Excess take was reported to NMFS each year in annual reports and was initially viewed as a positive outcome to management efforts until WY2013. Unless the juvenile take exceedance is increased from the current level of 110, the truncated trapping season will continue to hamper data collection efforts with respect to both adult and smolt migration numbers and timing, which is essential to evaluate management efforts with respect to recovery.

To stay within the limits of the ITS and to maximize data gathering with limited take, trapping efforts have been starting in February (instead of January) to reduce juvenile numbers captured and remain within regulatory compliance. The trapping effort focuses on upstream migrating adults after the start of the spawning season followed by a focus on outmigrating smolts (often juveniles) during the second half of the migration season. Trapping typically ends before the completion of the smolting run as the juvenile ITS number is usually reached by late March or early April and does not reflect actual total numbers of outmigrating smolts leaving both Hilton Creek and Salsipuedes Creek watersheds. The downstream traps at Hilton Creek and Salsipuedes Creek can be modified with a pass-through pipe system that allows any fish entering the trap to move through the trap unencumbered. A 12-inch HDPE pipe approximately 15-feet long is secured to the back of the downstream traps below the water level to provide unhindered downstream movement when activated/open. The pipe outlet has a small drop at the downstream end to help prevent upstream fish from migrating up into the pipe and through the downstream trap. Historically the HDPE pipe has been installed at Hilton Creek only as the juvenile population has been significantly greater there compared to Salsipuedes Creek or the LSYR mainstem. Juvenile and adult ITS take limits were not exceeded in WY2025. Across the migrant trapping effort, there were 105 juveniles and 87 adult captures, which were below the established 2000 BiOp ITS limits.

In WY2025, migrant traps were deployed in Hilton Creek and Salsipuedes Creek with no trapping in the LSYR mainstem due to it being a dry year with low mainstem stormflows. No Passage Supplementation releases were conducted in 2025 due to not meeting the established criteria. Two sets of paired upstream and downstream migrant traps were deployed at lower Hilton Creek (tributary farthest from the ocean) 0.14 miles upstream from the confluence with the LSYR mainstem (HC-0.14) and Salsipuedes Creek approximately 0.77 mile upstream of the confluence with the mainstem (SC-0.77). Migrant traps were installed from 2/3/25 through 4/8/25 (Table 7). The downstream trap pass through system was not installed due to a smaller number of juveniles captured compared to previous years.

WY2025 was classified as a dry year with 9.69 inches of rain recorded at Bradbury Dam. Rainfall was limited and sporadic from October 2024 through January 2025 with a total of 1.32 inches of rain for those four months combined. February 2025 had the highest monthly rainfall with 3.89 inches (40.1% of yearly total) followed by March 2025 with 3.83 inches (39.5% of yearly total). Storms tapered off in April 2025 (0.33 inches) and May 2025 (0.07 inches) with no additional rain falling until late September 2025 when subtropical remnants of a hurricane and additional monsoonal moisture dropped a combined 0.25 inches of rain at Bradbury Dam. Runoff during the migration season did little to increase flows significantly in the tributaries. Storms in February and March increased flows in Hilton Creek briefly to 11 cfs and 10 cfs respectively before decreasing to baseline flows approximately 6 cfs from the HCWS. In Salsipuedes Creek, flows were briefly elevated to 22 cfs and 44 cfs in February and 19 cfs in March. During each of these storm events, flows quickly attenuated to around 2.5 cfs and provided little opportunity for migrating fish to navigate critical riffle bars (or breach the barrier beaver dams downstream of the trap site) to reach optimal spawning habitat.

Catch per unit effort (CPUE) for WY2025 at the Hilton Creek and Salsipuedes Creek upstream and downstream migrant trap was 3.16 and 0.23 captures per day, respectively, with 89.2% trapping efficiency at the Hilton Creek and 81.6% efficiency at the Salsipuedes Creek traps (Table 8). The low CPUE at Salsipuedes Creek was a direct result from a large beaver dam approximately ¼ mile downstream from the trapping location that was effectively blocking all upstream movement when flows were elevated, essentially blocking all *O. mykiss* upstream migration for the duration of the season. In fact, there were several beaver dams upstream of the trapping location that remained intact and likely negatively influenced downstream movement of smolts.

Nighttime fish movement is a well-documented survival adaptation to avoid predation during migration (Mains and Smith, 1964; Krcma and Raleigh, 1970; Meehan and Bjornn, 1991; Brege et al., 1996). Others found that elevated turbidity can also reduce predation, specifically during stormflow events, suggesting migration during the receding limb of storm hydrographs (Knutsen and Ward, 1991; Gregory and Levings, 1998). The COMB-FD staff checks each trap a minimum of 4 times per 24-hour period. Fish captures are aggregated into the following time categories; 1st AM (05:00-10:00), 2nd AM (10:01-13:00), 1st PM (17:00-22:00) and 2nd PM (22:01-01:00) depending on when they were captured. WY2025 migrant trapping results suggested *O. mykiss* in general were more likely to move during the late night (2nd PM) and early morning hours (1st AM) trap checks with 54 percent (103 of 1192 total captures) of captures occurring during the hours of darkness (Table 9).

Hilton Creek Migrant Traps: Both upstream and downstream migrant traps were installed from 2/3/25 through 4/8/25 (Table 7). There were 79 upstream migrant captures ranging in size from 96 mm (3.8 inches) to 497 mm (19.6 inches) of which 2 were recaptures, all classified as juvenile or adult (Figure 66-69, and Table 10). Fourteen of the upstream migrants were classified as juveniles (<254 mm [10 inches]) and the remainder (65) were classified as adults (>= 254 mm [10 inches]). Upstream migrating fish were captured throughout the trap deployment with the first *O. mykiss* captured on 2/3/25 and the last captured on 4/8/25.

There were 104 downstream migrating fish captured, ranging in size from 70 mm (2.8 inches) to 470 mm (18.5 inches), of which 5 were recaptures (Figures 69-72). The timing of each capture compared to the annual hydrograph is presented in Figure 68. Downstream migrating fish were captured throughout the trap deployment with 37 of the 104 fish captured (36%) identified as smolts or pre-smolts. Smolting *O. mykiss* were first captured in February (4), with numbers increasing in March (21) before declining to 12 in April one smolt captured a day before traps were removed (Figure 69). Average smolt size for February-April was 159.8 mm (6.3 inches). No anadromous *O. mykiss* were captured or observed in Hilton Creek in WY2025.

During the 65 days of trapping operations, both the upstream and downstream traps had to be removed on three occasions (7 days total) (89% trap efficiency). The catch per unit effort (CPUE) for upstream (1.36 captures/day) and downstream fish (1.36 captures/day) was 3.16 captures per day (Table 8). Of the 183 migrant captures at Hilton Creek, 99 (54%) occurred during the hours of darkness, again suggesting that most of the migrating fish travel at night to reduce predation (Table 9).

Pacific Lamprey*:* Of note were the eight Pacific lampreys (*Entosphenus tridentatus*) captured in Hilton Creek during migrant trapping operations. There was one upstream and seven downstream migrating Pacific lampreys captured from 3/10/25 to 4/1/25 that ranged in size from 360 mm (14.2 inches) to 450 mm (17.7 inches). This is the first time Pacific lamprey have been observed in the Santa Ynez River in nearly 30 years and the first time they have ever been captured in Hilton Creek. Adult Pacific lamprey can spend anywhere from a few months to over a year in the freshwater before they spawn. As WY2025 was a dry year with no opportunity for migration from the ocean, it is likely the lamprey entered the Santa Ynez River sometime during the spill of WY2024 and spent the next year in the river environment before spawning. Tissue samples, measurements, and photos were collected and the lamprey released back into the creek in the direction they were traveling. Further details of Pacific lamprey observations are provided in the Discussion Section.

Salsipuedes Creek Migrant Traps: Both upstream and downstream traps were installed from 2/18/25 through 4/8/25 (Table 7). There was 1 upstream migrant captured classified a juvenile measuring 150 mm (5.9 inches) on February 23 (Figure 69-71 and Table 10). No adult *O. mykiss* were captured moving into Salsipuedes Creek in WY2025. Despite a few small flow bumps following storm events, the lack of upstream migrating movement from the mainstem was concerning. Following flow increases with no adult migrant captures, COMB-FD biologists surveyed the creek downstream of the trapping location and discovered a significant beaver dam approximately 1/8 of a mile downstream that acted as a complete passage barrier to upstream and downstream migration. This dam was located a mere 100 yards upstream of the LSYR Mainstem confluence, effectively cutting off the entire Salsipuedes Creek watershed from upstream migrating fish. The modest flow increases following storm runoff in WY2025 were insufficient to facilitate *O. mykiss* passage around or over the dam. In fact, subsequent spawning surveys documented several redd sites immediately downstream of the dam in suboptimal habitat and highlights the impact of beaver dams on *O. mykiss* movement during the critical spawning period, showing again that beaver dams are blocking fish from moving to optimal spawning locations upstream.

There were 8 downstream migrants captured ranging in size from 108 mm (4.3 inches) to 225 mm (8.9 inches) (Figures 69-71). Downstream migrating fish were captured from 2/18/25 through 3/29/25. Of the 8 downstream migrants, 6 were classified as smolts with the remaining 2 captures classified as juveniles. No downstream migrating adults were captured. The average smolt size was 181.1 mm (7.1 inches). Of the 8 downstream migrants, 4 (50%) were captured during the hours of darkness (Table 9).

LSYR Mainstem Trap: No trapping was conducted in the LSYR mainstem during the WY2025 migration season due to very low flows.

3.5. Aging of *O. mykiss* Migrant Captures plus Carcasses and Mortalities

O. mykiss have scales (cycloid scales) that grow out of the skin and protect the body. They add rings (circuli) to their scales as they grow. The rate at which fish and their scales grow depends upon food availability, water quality, and environmental conditions. Seasonal variations in conditions create annuli (narrowing or cross over of the circuli), which can be used to estimate the age of the fish. Other information that can be estimated from scale analysis includes growth rate, when an individual migrated to the ocean or the lagoon, size at ocean entry, how long they spent at sea, when spawning occurred, and the approximate age they returned to the river. From a fisheries management perspective, it is important to know how long a fish lives, how big a fish can grow, how many offspring a fish can have, and how often they can reproduce. These various parameters make up the life history of the fish that can be studied through scale analysis and other observations. The determined age of a fish can show a broad range of results depending on the fluctuating environmental conditions that affect growth including habitat usage (pool, riffle, run), food availability (aquatic invertebrates, terrestrial drift), and hierarchical position in habitats (i.e., larger fish dominate the better feeding lanes within a given habitat). Smaller fish tend to eat smaller food items then transition to larger food items as the fish gets larger.

COMB-FD staff collects *O. mykiss* scales during migrant trapping efforts from fish that are greater than 120 mm (4.7 inches) and opportunistically during any required fish rescue, or if a carcass or mortality is found. These scales are dried and stored in envelopes until they can be mounted on a microscope slide per fish and added to the *O. mykiss* scale library at the COMB-FD office for analysis as time permits. The scale library is a valuable resource for documenting patterns in migration, growth rate, spawning, and environmental condition.

In WY2025, *O. mykiss* scales were collected and analyzed on 140 of 192 upstream and downstream migrants captured in Hilton Creek (79 upstream and 104 downstream fish) and Salsipuedes Creek (1 upstream and 8 downstream fish) traps plus 10 of 28 mortalities or carcasses found within the LSYR mainstem, Hilton Creek, and Quiota Creek (Table 11). The majority of the upstream fish whose scales were read were classified as adults (2 or more years old) while the majority of the downstream fish whose scales were read were classified as juvenile, pre-smolts or smolts (2+ years old or less). Scale samples could not be taken on fish that were too small (<120 mm), had imbedded scales and could not be collected (typically male *O. mykiss*), or scales were regenerated scales that prohibit full age determination. Hilton Creek and LSYR mainstem fish tend to be larger compared to Salsipuedes fish of the same age, presumably due to the available food supply and elevated continuous streamflow near the dam. *O. mykiss* less than 120 mm listed below were mortalities found in drying habitats that were sampled (tissue and scales) to determine age and genetics.

The age range of analyzed scales (all resident *O. mykiss*) for WY2025 fish was from 1+ to 7+ years with a size range from 76 mm (3.0 inches) to 556 mm (21.9 inches). Fish aged at 1+ ranged in size from 76 mm (3.0 inches) to 176 mm (3.7 inches), 2 to 2+ ranged in size from 151 mm (5.9 inches) to 322 mm (12.7 inches), at 3 to 3+ ranged in size from 238 mm (9.4 inches) to 348 mm (13.7 inches), and at 4 to 4+ ranged in size from 314 mm (12.4 inches) to 497 mm (19.6 inches) with one outlier at 7+ measuring 566 mm (21.9 inches). Figure 72 presents examples of scales analyzed from Hilton Creek fish specifically a 497 mm 4+-year-old resident adult heading upstream on 2/3/25 and a 169 mm 2-year-old smolt heading downstream on 4/1/25. Figure 73 provides examples of scales analyzed from Salsipuedes Creek fish, specifically a 150 mm 1+ year old juvenile heading upstream on 2/23/25 and a 198 mm 2+ year old smolt heading downstream on 2/18/25. Figure 74 shows examples of LSYR mainstem carcasses found on 11/14/24 that was a 373 mm resident adult and a 222 mm smolt found on 2/18/25. On 7/22/25 within the Upper Refugio Reach, a 566 mm resident adult carcass was found that aged at 7+ years old. This large resident fish was female and thought to be the oldest fish ever identified within the LSYR basin, which appeared to have spawned many times due to the number of spawning checks (unique marking) observed on the scale. Results of genetic analysis indicates this fish came from Hilton Creek/Santa Ynez River with genetic markers with steelhead lineage. The fish was found moments before it perished with no discernable cause of death.

3.6. Reproduction and Rearing

Reproduction and rearing of *O. mykiss* in the LSYR basin were monitored through redd surveys (winter and spring) and snorkel surveys (end of the spring and fall). The results are presented below.

Redd Surveys: Redd (spawning) surveys are typically conducted opportunistically once a month in the LSYR mainstem (Hwy 154, Upper Refugio, Refugio, Alisal, and Narrows reaches) and bi-monthly in the tributaries (Hilton, Quiota, Salsipuedes, and El Jaro including Los Amoles and Ytias creeks) in the winter and spring within the reaches where access is permitted and instream conditions clear enough to observe spawning sites.

The winter of WY2024 (32.61 inches of rainfall) as well as WY2023 (40.24 inches) were classified as wet years and brought multiple atmospheric river events to the LSYR watershed, generating significant stormflows during much of the migration and spawning season, providing optimal migration/spawning conditions during the spawning season.

Since 2000, December through March comprises on average approximately 81% of the total annual precipitation. In WY2024, this multi-month total was higher at 89% with a large percentage of the rain falling in February (15.99 inches, 49.0%) and lesser amounts in December (5.16 inches, 15.8%), January (1.87 inches, 5.7%), and March (5.9 inches, 18.1%). The winter of WY2025 (9.69 inches) was classified as a dry year with the multi-month rainfall average totaling 87.4% of the yearly total, though at significantly less amounts. Compared to the previous year, rainfall in February 2025 (3.89 inches, 40.1%) was the highest rainfall month followed by March 2025 (3.83 inches, 39.5%).

Rainfall and subsequent runoff are important in several ways to migrating and spawning *O. mykiss,* and depending on the rain year type (wet, average, or dry) influence the ability for fish to freely move to suitable spawning locations. Besides providing a pathway for migration, the first rains of the season with stream runoff are necessary to remove leaf debris, accumulated silt, and other allochthonous material from spawning beds to make them accessible and usable for spawning fish. During average and dry years, this effect is muted, especially in areas where beaver dams are present as high flow events in those rain year types are of lower magnitude and shorter in duration, sporadic in nature, and do not remove barrier beaver dams. In wet years, high flows in the tributaries and spill events in the LYSR mainstem are higher in magnitude, longer in duration, and effectively remove all beaver dams, resulting in unimpeded access for upstream and downstream migrating *O. mykiss* throughout the watershed. WY2025 was classified as a dry year. The few modest flow events did little to remove or provide access around beaver dams, causing a fragmented situation in the LSYR mainstem and tributaries that segregated *O. mykiss* individuals between, below, and above beaver dams. The previous 2 wet years created excellent rearing and oversummering conditions that allowed a high percentage survivability for all age classes. The overall number of adults (i.e., spawners) within the first 10.5 miles downstream of Bradbury Dam was the highest ever observed in the last 30 years at the end of WY2024 and though the *O. mykiss* adults were highly segregated due to beaver dams, ample spawning was observed in WY2025, especially in locations with high adult survival rates (i.e., Hwy 154, Upper Refugio, Refugio Reach, and Alisal reaches).

The results of the WY2025 redd surveys are presented in Tables 12 and 13 for the LSYR tributaries and mainstem. There were 52 redd sites documented in the tributaries in WY2025; 15 redds in Hilton Creek, 19 in Quiota Creek, 12 in Salsipuedes Creek, 5 in El Jaro Creek, and 1 in Los Amoles Creek. In Hilton Creek, gravel augmentation was conducted at 5 sites throughout the creek in December 2024 through January 2025. There were the same number of redds observed in WY2025 as in WY2024 (15) in Hilton Creek. Many of the redds were confined to gravel augmentation sites and within the lower section of Hilton Creek in Reach 1 that has the best spawning habitat available and is downstream of several passage impediments in the middle of Reach 2. Evidence of spawning *O. mykiss* and successfully constructed redds that hatched YOY was observed at all 5 gravel augmentation sites although the density was higher downstream of the LRP and lower cascade chute. The first YOYs were observed on 3/4/25 at the tail of the Spawning Pool. The lack of available spawning habitat upstream of the LRP (Reach 5) as well as the passage barrier/impediment in the middle of Reach 2 continued to limit *O.*

mykiss access and spawning to nearly 50% of the watered section of the creek on Reclamation property. A CDFW-FRGP Grant was submitted to address the identified passage impediments. If funding is secured, the project would be constructed in the fall of WY2027 and WY2028.

In Salsipuedes Creek, fish movement was negatively influenced by the presence of beaver dams. As mentioned in the migrant trapping section above, a large beaver dam 1/8 mile downstream of the trapping site effectively blocked all upstream *O. mykiss* migration from the LSYR mainstem. Surveyors documented 1 large redd approximately 100 feet downstream of the beaver dam in a region that becomes inhospitable to rearing/oversummering *O. mykiss* due to excessive water temperatures and low streamflow in the summer. Several redd sites were documented in areas immediately upstream and downstream of the Jalama Bridge that provide adequate water quality for successful hatching and summer rearing.

Surveys in Quiota Creek documented a record 19 redd sites from downstream of Crossing 1 to upstream of Crossing 9. Additional spawning production in the form of YOYs was observed well downstream of Crossing 1 to 1/10 of a mile upstream of Crossing 0B that was not documented due to access issues. The spawning effort was incredibly successful with thousands of YOY produced throughout the creek and was the subject of multiple fish rescues/relocations conducted by CDFW with assistance from COMB-FD. In total, CDFW and COMB-FD staff successfully rescued/relocated more than 4,000 *O. mykiss* from drying habitats in the summer and relocated them to suitable areas of the LSYR mainstem downstream of Bradbury Dam in the Hwy 154, Upper Refugio and Refugio reaches.

LSYR mainstem redd surveys resulted in the largest number of spawning sites documented in the Alisal (13), Refugio (9), and Upper Refugio (19) reaches in the last 30 years. Spawning was highly successful with the observation of over 4,000 YOY scattered throughout those reaches during the spring snorkel surveys. As the season progressed, water temperatures warmed significantly in the mid to lower sections of the Alisal Reach resulting in a large decrease in observed *O. mykiss* numbers. That fish could have perished for multiple reasons but water temperatures greater than the lethal limits as stated in the literature (i.e., 28° C) for an extended period of time may have contributed. In addition, poaching has become a serious issue in both the Alisal and Refugio reaches with surveyors finding evidence of fishing (i.e., fishing line, equipment packaging, lost lures, etc.) in high public use areas near both bridge locations.

Snorkel Surveys: Snorkel surveys in 2025 were conducted in the late spring/summer and early fall within the LSYR mainstem and tributaries (Figure 76 and Tables 14 and 17). Standard and accepted single-pass snorkel survey protocols were followed (Hankin and Reeves, 1988). Surveys began slightly earlier compared to previous years due to WY2025 being dry with lower baseflows and releases from Bradbury Dam. The first LSYR mainstem and tributary surveys, although pushing well into the summer, were classified as spring surveys to remain consistent with previous efforts and reporting.

Initial fish counts after the spawning season focus on successful *O. mykiss* emergence and distribution after the wet season and before the critical oversummering period. Dry season rearing habitats for *O. mykiss* are identified after seasonal runoff and spawning to document the number and location of YOY produced over the spawning season. Biologists avoid locations with warmer water that are harboring *O. mykiss* during the peak heat of the summer, as this is the period when fish tend to be the most stressed from poor water quality conditions. The final survey in the fall is typically conducted between October and November which evaluates the population of *O. mykiss* that survived the dry season going into the subsequent water year. The fall fish count is considered the baseline population prior to the following migration and spawning season.

COMB-FD staff strive to execute the same level of effort during each survey, with the same reaches and habitats covered during the spring/summer and fall snorkel survey efforts. Changing environmental conditions such as flow rates, water clarity, and beaver activity can influence some of those objectives and can limit the spatial extent of certain survey reaches. Seeking landowner cooperation to gain access to new reaches has always been a priority for the COMB-FD staff. A prime example of this is when staff gained access to the upper Refugio Reach (LSYR-4.0 – LSYR-4.9) below the Highway 154 Bridge in WY2023. This reach was surveyed in the late spring and early fall in WY2025 and is reported separately below.

With a below average rainfall season, channel changing flows did not occur in the LSYR mainstem and tributaries like they had the previous 2 wet seasons. Surveyors noted that habitats had changed very little (compared to WY2024), although tributary baseflows were substantially lower and LSYR mainstem releases from Bradbury Dam were also lower.

All species of fish were counted and broken down into 3-inch size classes, the exception being carp which are typically very large (over 20 inches) with only their total number recorded. The total number of *O. mykiss* observed during the two rounds of snorkel surveys is shown in Figure 79 with all survey dates shown in Tables 15-16 for the LSYR mainstem and Tables 18-19 for its tributaries.

LSYR Mainstem: LSYR mainstem snorkel surveys were conducted during the spring and fall within the Hwy 154, Upper Refugio, Refugio, Alisal and Avenue of the Flags reaches (Figure 77 and Tables 15-16).

<u>Hwy 154 Reach</u>

The Hwy 154 Reach extends from the Stilling Basin (LSYR-0.01) to the Highway 154 Bridge (LSYR-3.2); the Stilling Basin and Long Pool are usually not snorkeled due to poor water clarity. Ever since Lake Cachuma filled and spilled in the winter of WY2023 and again in WY2024, the water in the Stilling Basin has been plagued by chronic turbidity. The Hwy 154 Reach directly downstream from Bradbury Dam has been subjected to the high turbidity due to its proximity to the Stilling Basin. Turbidity is likely caused by the Outlet Works drafting from the bottom of the lake near the sediment level as well as the resuspension of fine sediments in the Stilling Basin by carp activity.

During past turbidity testing of the Outlet Works and Stilling Basin, the chronic turbidity in the summer months mainly appeared to be from the resuspension of fine bottom sediments in the Stilling Basin by Carp. Despite clear water being released into Hilton Creek and remaining clear down to the confluence of the LSYR mainstem, there was not enough clear water to dilute the turbidity coming from the Stilling Basin to allow snorkel surveys in the reach below. Staff attempted to snorkel the Hwy 154 Reach above and below the Long Pool but divers noted visibilities of less than 1 foot. No fish counts could be conducted on Reclamation Property within the Hwy154 Reach in WY2025.

Upper Refugio Reach

For the third season, COMB-FD staff conducted snorkel surveys in Upper Refugio Reach downstream of Highway 154 Bridge (LSYR-3.2) from LSYR-4.08 to LSYR 4.90 which is just upstream of the Encantado Pool (LSYR-4.95). The first snorkel survey of the year occurred on 8/6/25 through 8/8/25 with fair to good visibility reported by divers. Some of the deeper habitat units were difficult to see the bottom within this reach. A total of 1,678 *O. mykiss* were observed; 703 (41.9%) were 0-3 inches, 524 (31.2%) were 3-6 inches, 245 (14.6%) were 6-9 inches, 158 (9.4%) were 9-12 inches, 33 (2.0%) were 12-15 inches, 14 (0.8%) were 15-18 inches and 1 (0.1%) was 18-21 inches (Tables 15-16 and Figure 78). Water clarity was reported as being fair to good, with better visibility observed with distance further downstream from Bradbury Dam. Abundant spawning was observed within this reach in January (15 redds) and March (4 redds), contributing to the high numbers of YOY observed in the spring survey. Unlike WY2024, when adjacent tributaries such as San Lucas Creek and Calabazal Creek likely contributed to the higher numbers of YOY in this reach, storm runoff and downstream migration opportunities within those tributaries was severely limited in WY2025. Only 1 storm event in February and 1 storm event in March possibly generated enough runoff from those smaller tributaries to allow migration in and out of those drainages.

Divers returned in the fall during the first week of October within the Upper Refugio Reach and counted a total of 1,289 *O. mykiss*. This was a reduction of approximately 23% compared to the spring total. The size breakout consisted of 388 (30.1%) 0-3 inches, 528 (41.0%) 3-6 inches, 240 (18.6%) 6-9 inches, 112 (8.7%) 9-12 inches, 19 (1.5%) 12-15 inches, and 2 (0.2%) 15-18 inches. Lower target flows, warmer LSYR mainstem water temperatures, and the frequent observation of predatory birds (cormorants, blue herons, and mergansers) likely contributed to the drop in smaller size classes of fish in the fall. Fish could have also moved upstream or downstream out of the Upper Refugio Reach into other sections of the LSYR mainstem. It should be noted that several new, large beaver dams were observed in this reach during the fall survey, some of which were categorized as complete barriers to upstream and downstream navigation. If *O. mykiss* had moved out of the reach prior to the fall survey, they likely did so soon after the first survey in the spring.

Refugio Reach

The Refugio Reach extends from the downstream end of the Upper Refugio Reach (LSYR-4.9) downstream to Refugio Bridge (LSYR-7.8) (Figure 77). The results are presented in Figure 79 and Tables 15-16. Divers began their spring surveys in late June and completed this reach 3 weeks later in July. COMB-FD staff were tasked with assisting CDFW conduct fish rescue/relocation efforts in Quiota Creek for the first few weeks of July, leading to a pause in snorkel surveys within this reach. Surveyors enumerated a total of 778 *O. mykiss* during the spring survey, of which 334 (42.9%) were 0-3 inches, 191 (24.6%) were 3-6 inches, 83 (10.7%) were 6-9 inches, 108 (13.9%) were 9-12 inches, 51 (6.6%) were 12-15 inches, 8 (1.0%) were 15-18 inches, 2 (0.3%) were 18-21 inches, and 1 (0.1%) was 21-24 inches. Once again, divers reported better visibility towards the middle and lower sections of Refugio Reach compared to the upper portion of the reach. This reach spans nearly 3 river miles from top to bottom, with the historic dry gap (losing surface water to groundwater reach with subsurface, hyporheic flow paths serving to cleanse and cool the surface water).

The fall survey was conducted during the final week of September through the first few days of October. A total of 763 *O. mykiss* were counted; 158 (20.7%) were 0-3 inches, 268 (35.1%) were 3-6 inches, 156 (20.4%) were 6-9 inches, 137 (18.0%) were 9-12 inches, 40 (5.2%) were 12-15 inches, 3 (0.4%) were 15-18 inches, and 1 (0.1%) was 18-21 inches. This represented a 1.9% reduction in the total when comparing the spring snorkel count. It should be noted that Quiota Creek fish rescue and LSYR mainstem release activities were occurring between the spring and fall surveys, helping to boost the overall number of smaller size classes of *O. mykiss* (principally in the Upper Refugio and Refugio reaches).

<u>*Alisal Reach*</u>

The Alisal Reach extends from Refugio Bridge (LSYR-7.8) downstream to the Alisal Bridge (LSYR-10.5) (Figure 77). Snorkel survey results are presented in Figure 80, and Tables 15-16. The Alisal spring survey took place the final week of June, with fair to good visibility being reported by divers. That said, several of the deeper and larger pool habitats such as the mid-Alisal Pool (LSYR-9.2) and Alisal bedrock thermograph pool (LSYR-10.2) had poor visibilities at the times of the surveys. A total of 971 *O. mykiss* were counted with 561 (57.8%) at 0-3 inches, 215 (22.1%) at 3-6 inches, 118 (12.2%) at 6-9 inches, 58 (6.0%) at 9-12 inches, 14 (1.4%) at 12-15 inches, 3 (0.3%) at 15-18 inches, 1 (0.1%) at 18-21 inches, and 1 (0.1%) at 21-24 inches. COMB-FD staff recorded 13 spawning sites in the Alisal Reach during the winter and spring of WY2025, so the observation of large numbers (nearly 58% of the total fish observed) of YOY in the spring indicates that spawning was successful.

Divers conducted the Alisal Reach fall survey during the final week in September over a 2-day period. Visibility was once again reported as being fair to good throughout most of the reach, the exception being the deep bedrock thermograph pool at LSYR-10.2. This particular habitat is known for harboring large numbers of carp, which were the likely culprit of the poor water clarity. The total number of *O. mykiss* observed during this final survey was 448; 151 (33.7%) at 0-3 inches, 162 (36.2%) at 3-6 inches, 94 (21.0%) at 6-9 inches, 33 (7.4%) at 9-12 inches, 6 (1.3%) at 12-15 inches, and 2 (0.5%) at 15-18 inches. The high percentage, over a third of the total, of the smallest size class of fish (0-3 inches) observed in the fall was unusual compared to WY2024. In the fall of WY2024, YOY accounted for only 4.0% (85 out of 2,127) of the *O. mykiss* total the previous year, indicating a much different growing environment from year to year, even with a population reduction of 79%.

Avenue of the Flags Reach

The Avenue of the Flags Reach is located from Alisal Bridge (LSYR-10.5) down to the Avenue of the Flags Bridge (LSYR-13.9) (Figure 77). Divers attempted to snorkel this reach in the early summer and encountered very poor water clarity. The Lake Fire, which burned over 38,000 acres in July and August of 2024, scorched the upper watershed of Alamo Pintado Creek. This south facing tributary enters the LSYR approximately 0.5 mile upstream of Alisal Bridge (LSYR-10.5). Although WY2025 was a dry year, two significant storms in mid-February and mid-March generated runoff and fire debris from Alamo Pintado Creek into the LSYR from just above Alisal Bridge downstream through the Avenue of the Flags Reach. Staff observed a fine layer of mud and silt that had been deposited from the Lake Fire, principally in the habitat units from Alisal Bridge downstream through the Avenue of the Flags Reach. This layer of fine sediment seemed to stay suspended and created turbid conditions throughout the oversummering period. Even minimal activity from beaver, carp and aquatic birds can easily stir up the water column and create chronically turbid conditions. COMB-FD staff made several attempts to enumerate fish in this reach but the water clarity remained poor.

The remainder of the LSYR mainstem below the Avenue of the Flags Bridge is mostly private property that has been divided into sub-reaches where the COMB-FD has been granted access. Survey crews attempted to snorkel several of the sub-reaches of the LSYR mainstem in August, including Baer, Cargasacchi, and the Narrows (above and below the Salsipuedes Creek confluence). By mid-summer, many of the lower reaches of the river had either gone dry, were isolated, or had poor visibility due to beaver dam activities. No snorkel surveys were able to be conducted within and downstream of Avenue of the Flags reach in WY2025.

T***ributaries***: Tributary snorkel surveys were conducted in the late spring/early summer and fall in WY2025 at all the long-term monitoring locations within Hilton, Quiota, Salsipuedes, and El Jaro creeks. The location, timing, and results are presented in Figure 77, Tables 17-19, and Figures 81-85. Unlike the previous 2 wet seasons, lower than normal spring baseflows created better visibilities within the tributaries in the late spring and early summer. Beginning in WY2020, summer snorkel surveys (during the peak heat of the season) are no longer being conducted due to concerns of adverse impacts on the fishery by divers in refuge habitats when water quality conditions are often the most stressful for *O. mykiss.*

Hilton Creek

Hilton Creek snorkel surveys are conducted on Reclamation property from the confluence of the LSYR mainstem upstream to the Reclamation property boundary, which is approximately 100 feet above the URP of the HCWS and a total distance of approximately 3,000 feet (Figure 81). Hilton Creek is divided into 6 reaches, separated by geomorphic breaks in creek and channel morphology. Since Hilton Creek is supplemented with year-round flow from Lake Cachuma from the HCWS and HCEBS along a relatively short stretch that contains a relatively high density of *O. mykiss*, all habitats within Hilton Creek on Reclamation property are snorkeled and have been since the installation of the HCWS in 2001.

Target flows throughout WY2025 were provided through the HCWS via gravity flow to the URP of Hilton Creek, with a small amount of trickle flow being released through the LRP. A relatively constant release rate of about 7 cfs was provided throughout the year, with a small amount of natural background flow (0.1 cfs - 0.2 cfs) continuing through the late spring. Flows from the upper basin ceased in late June with the upper basin presumably going dry above the Reclamation property boundary.

Consistent with previous Hilton Creek surveys, divers conducted the first survey in late August, delaying the "spring" survey to allow YOYs time to grow and occupy deeper habitats where they are more easily detectable. Oftentimes, recently produced *O. mykiss* fry inhabit low flow, creek margin habitat that is too shallow for divers to see underwater. COMB-FD personnel counted a total of 1,604 *O. mykiss* with the following size class breakdown; 829 (51.7%) 0-3 inches, 575 (35.8%) 3-6 inches, 174 (10.8%) 6-9 inches, 21 (1.3%) 9-12 inches, 4 (0.2%) 12-15 inches, and 1 (0.1%) 15-18 inches. Although the percentage of 0-3 inch YOYs was significantly lower than in the spring of WY2024 (84.1% of the total population compared to 51.7% this spring), it was evident that spawning was successful throughout Hilton Creek in WY2025. YOY were observed in all 5 reaches, indicating that some (if not most) of the 15 observed redds in the winter and spring were successful.

The final Hilton Creek survey was conducted in late October, prior to Lake Cachuma initiating the process of turning over that started in November and continued in December. Lake turnover typically leads to the mixing of the complete vertical profile that results in unithermal temperatures and DO concentrations, and generally more turbid water being released downstream into Hilton Creek and through the Outlet Works at the base of the dam. COMB-FD divers counted 1,357 *O. mykiss* in the final survey; 780 (57.5%) 0-3 inches, 475 (35.0%) 3-6 inches, 92 (6.8%) 6-9 inches, 8 (0.6%) 9-12 inches and 2 (0.2%) 12-15 inches. Curiously, although the total number of 0-3 inch YOYs dropped approximately 50 fish, the percentage of this smaller size class made up a higher proportion of the total population in the fall compared to the spring.

Quiota Creek

In past seasons and previous AMS/AMR reports, surveyors have focused their efforts on a historic section of Quiota Creek between Crossing 5 and Crossing 7 with persistent and perennial flows during all water year types. Beginning in WY2024, the COMB-FD surveyed all wetted habitats between Crossing 1 (QC-1.92) and Crossing 9 (QC-3.3) along South Refugio Road. The location and results of all snorkel surveys are presented in Figure 77, Tables 18-19, and Figure 82.

Although WY2025 was a dry year, several storm events in February and March created passage opportunities in Quiota Creek for fish occupying the LSYR mainstem to swim upstream and spawn within the drainage. Surveyors documented 19 spawning sites between late February and the end of May, spread out in various locations including below Crossing 1, between Crossing 1 and Crossing 9, and above Crossing 9. The absence of scouring high flows during the spawning season allowed excellent fry emergence and success, as indicated by the snorkel surveys that occurred between late June and mid-July. A total of 2,318 *O. mykiss* were observed from Crossing 1 through Crossing 9, of which 2,231 (96.2%) were 0-3 inches, 81 (3.5%) were 3-6 inches, and 6 (0.3%) were 6-9 inches. For comparison, in the same Quiota Creek reach between Crossing 1 and Crossing 9 in WY2024, divers counted a total of 315 *O. mykiss*. In WY2025, COMB-FD staff counted over 7 times the number of *O. mykiss* than what was observed the previous year.

As mentioned above and thoroughly covered in the Discussion Section below, multiple fish rescue activities by CDFW with assistance from COMB-FD occurred in Quiota Creek between May and July. In particular, the lower reaches of Quiota Creek below Crossing 2 were going dry by the middle of spring and the rescue team had removed many *O. mykiss* prior to being de-watered. For the first time since monitoring began decades ago, biologists encountered and rescued several 9-12 inch and several 12-15 inch *O. mykiss* adults in Quiota Creek during fish rescue activities. These adults were observed in the reach below Crossing 1, as well as the reach between Crossing 1 and Crossing 2. The sheer number of juvenile fish produced in the drainage was likely from these larger adults, which were thought to have migrated upstream from the LSYR mainstem (near the Quiota Creek confluence) up into the drainage during the spawning season. In general, no *O. mykiss* over 10 inches in length have been observed in any habitat unit between Crossing 1 and Crossing 9 since monitoring began in the late 1990s. The removal of the final impediment to upstream migration (Crossing 0B in WY2024), near the confluence with the LSYR mainstem, is the likely catalyst for allowing adult *O. mykiss* migration into the drainage this season.

The final fall survey in Quiota Creek was conducted in late September, long after any fish rescue and relocation activities by COMB-FD and CDFW. Many of the habitat units between Crossing 1 and Crossing 2, as well as between Crossing 3 and Crossing 5 had gone dry by late July. All remaining wetted habitat units between Crossing 1 and Crossing 9 were surveyed during the fall. A total of 892 *O. mykiss* were observed, with 842 (94.4%) falling into the 0-3 inch size class, 44 (4.9%) in the 3-6 inch size class, and 6 (0.7%) in the 6-9 inch size class. The reduction in total fish numbers between the spring and fall was of no surprise to staff given the drying stream conditions, 4,069 *O. mykiss* were successfully rescued/relocated by the fish rescue team (CDFW and COMB-FD). It should be noted that many fish below Crossing 1 (outside of the standard snorkel reach) were also removed and relocated to various reaches of the LSYR mainstem within the Hwy 154, Upper Refugio, and Refugio reaches.

<u>Salsipuedes Creek</u>

Lower Salsipuedes Creek is separated into 5 different reaches based on geomorphic profile differences of the stream channel. Several sections of exposed bedrock help to differentiate the reaches, rather than having one long, continuous reach that extends multiple miles. Reaches 1 through 4 are located from the confluence of Salsipuedes Creek with the LSYR mainstem upstream to the Jalama Road Bridge, a distance of approximately 3.5 stream miles. Reach 5 of Lower Salsipuedes Creek is from Jalama Road Bridge to the confluence with El Jaro Creek, a distance of approximately 0.45 miles. Reach 5 has been a historic monitoring location because of reliable surface flows and good visibility (compared to reaches further downstream), as well as the consistent presence of *O. mykiss* within the reach. Locations, timing, and results are presented in Figure 77, Tables 17-19, and Figures 83-84.

Reach 1-4: The lower reaches of Salsipuedes Creek (Reaches 1 through 4) were surveyed for the first time in WY2025 at the end of July. Divers noted low flow, beaver activity (with new beaver dam formation), and turbid conditions from the confluence of the LSYR mainstem to the bottom of Reach 2. Although several of the deeper habitat units within Reach 2 through Reach 4 contained poor visibility, the snorkel team enumerated a total of 602 *O. mykiss*. The totals, percentage and size classes were as follows; 437 (72.6%) 0-3 inches, 128 (21.3%) 3-6 inches, 22 (3.7%) 6-9 inches, 9 (1.5%) 9-12 inches, 3 (0.5%) 12-15 inches, and 3 (0.5%) 15-18 inches in length. The large numbers of small YOYs indicated successful spawning from the documented redds observed between late February and March of the same year.

COMB-FD staff encountered the same water quality conditions in the fall survey (late October) that was observed during the first survey back in July. Poor visibility hampered all efforts within Reach 1, with only a slight improvement within Reach 2 (although *O. mykiss* and sunfish were observed). Several of the deeper bedrock pool habitats within Reach 2 were too turbid to count any fish species with less than 2 feet of visibility. The total number of *O. mykiss* observed between Reach 2 and Reach 4 was 453 over the course of 3 snorkel survey days. The number and size of fish recorded was 301 (66.4%) 0-3 inches, 134 (29.6%) 3-6 inches, 11 (2.4%) 6-9 inches, 3 (0.7%) 9-12 inches, and 4 (0.9%) 12-15 inches. The spring to fall attrition rate was less than 25%, which was an improvement of the 60% attrition rate observed in WY2024.

Reach 5: This upper reach of Salsipuedes Creek (beginning at Jalama Bridge SC-3.5) is one of the more reliable sections to snorkel due to the lack of cattle activity and generally less beaver and beaver dam building activity. COMB-FD staff conducted the first snorkel survey of the year at the end of July and observed 528 *O. mykiss*. The size class breakout was as follows; 428 (81.1%) 0-3 inches, 87 (16.5%) 3-6 inches, 12 (2.3%) 6-9 inches, and 1 (0.2%) 9-12 inches. Three redd sites were identified in Reach 5 during the spawning season, lending to the sizable YOY observations in this initial spring survey.

The visibility during the final fall survey was similar to the spring survey, as divers reported being able to see the bottom of even the deepest habitat units in Reach 5. The total number of *O. Mykiss* observed in the October survey was 302, with 163 (54.0%) in the 0-3 inch size class, 114 (37.7%) in the 3-6 inch size class, 22 (7.3%) in the 6-9 inch size class, 2 (0.7%) in the 9-12 inch size class, and 1 (0.3%) in the 12-15 inch size class.

<u>*El Jaro Creek*</u>

El Jaro Creek is the main tributary to Salsipuedes Creek and provides much of the runoff within the basin during the rainy and dry seasons. A short, 0.40-mile-long section of El

Jaro Creek, just upstream of its confluence with Salsipuedes Creek, is typically surveyed by the COMB-FD staff each year due to a long history of landowner cooperation and access. Location, timing, and snorkel survey results are presented in Figure 77, Tables 17-19, and Figure 85.

COMB-FD staff conducted the first (spring) snorkel survey in El Jaro Creek at the end of July and a total of 53 *O. mykiss* were observed; 30 (56.6%) were 0-3 inches, 16 (30.2%) were 3-6 inches, 5 (9.4%) were 6-9 inches, 1 (1.9%) was 9-12 inches, and 1 (1.9%) was 12-15 inches. The smaller size classes of YOY indicated that some successful spawning and reproduction did occur near this part of the drainage, as no verified redd sites were specifically observed in this section during routine redd surveys.

The final fall survey occurred in late October and divers reported fair to good visibilities throughout the reach. A total of 32 *O. mykiss* were observed with 19 (59.0%) at 0-3 inches, 8 (25.0%) at 3-6 inches, 3 (9.4%) at 6-9 inches, 1 (3.1%) at 9-12 inches, and 1 (3.1%) at 12-15 inches. Interestingly, the 2 larger fish observed in the spring and the fall were both found inhabiting the same pool habitat. Despite being a dry year and with low summertime baseflows, these larger fish had successfully oversummered in El Jaro Creek.

Other Fish Species Observed: All warm-water non-native fish species in the LSYR mainstem are counted during routine snorkel surveys. These fish are binned into generic groups (bass, sunfish, carp, and catfish) with most broken out into 3-inch size classes similar to the *O. mykiss* count methodology. Results are presented in Figures 86-87. Fish species that inhabit Lake Cachuma are often found throughout the LSYR mainstem downstream of the lake. Typically, the most numerous species observed during snorkel surveys include largemouth bass (*Micropterus salmoides*), three sunfish species including bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), and redear sunfish (*Lepomis microlophus*), common carp (*Cyprinus carpio*), and two catfish species, specifically the black bullhead (*Ameriurus melas*) and channel (*Ictalurus punctatus*) catfish. It is thought that these fish travel downstream during spill events from Lake Cachuma to the LSYR mainstem via the Bradbury Dam spillway (not the Penstock due to high pressure and small aperture release valves), take up residency in the Stilling Basin or habitats downstream and reproduce as conditions allow. Bass, sunfish, and catfish are known predators of *O. mykiss*, particularly the younger life stages. Carp and catfish can stir up the bottom of the substrate and greatly reduce water clarity. Historically, warm-water species were not observed in any of the three tributary drainages (Salsipuedes, Quiota, and Hilton creeks) that the COMB-FD staff monitored. However, snorkel survey results within Salsipuedes Creek and El Jaro Creek in WY2025 continue to verify that warm-water fish are prevalent in this drainage and their population and distribution have been relatively stable for several years. Divers did not encounter any warm-water species occupying Hilton Creek or Quiota Creek during the annual spring or fall snorkel surveys.

LSYR mainstem

Largemouth Bass: The LSYR mainstem had relatively low numbers of largemouth bass during the initial spring surveys. A total of 53 and 4 bass were observed in the Refugio and Alisal Reach, respectively (Figure 86). The final fall survey revealed many more largemouth bass, particularly the 0-3 inch and 3-6 inch size classes, indicating successful spawning in the LSYR mainstem in the spring and summer timeframe. Bass totals were 325 fish in the Refugio Reach and 120 fish in the Alisal Reach in the fall. One particular habitat in the Refugio Reach, a pool located at approximately LSYR-4.97 had 100 largemouth bass (80 in the 0-3 inch size class and 20 in the 3-6 inch size class). Several adult largemouth bass were observed above and below this particular unit, which were the likely source of the YOYs observed in this section of the river.

Sunfish Species: There are several types of sunfish species (green, red-ear, bluegill and crappie) found within the LSYR mainstem, most of which are especially difficult to distinguish at smaller size classes. The COMB-FD staff attempted to categorize the different species of sunfish during snorkel surveys, when possible, but all three species were grouped into a single category in this document. Sunfish numbers continued to be very low in the management reaches of the LSYR mainstem (Figure 86). Only 1 sunfish in the Refugio Reach and 3 sunfish in the Alisal Reach were observed during the initial spring survey. Both the Refugio Reach and Alisal Reach each had 1 sunfish observed during the fall survey.

Catfish Species: The 2 types of catfish found in the LYSR mainstem are easier to differentiate (compared to sunfish) based on their tail morphology (forked for channel and flat for bullhead), but they are lumped into a single catfish category for the purposes of this report. Divers observed catfish (a school of approximately 700 bullhead catfish fry to be specific) in a single habitat unit during the spring survey within the Refugio Reach at LSYR-6.0 (6 miles downstream of Bradbury Dam) near the top end of the historic dry gap (Figure 87). No other catfish were observed in any habitats along the LSYR mainstem during spring and fall surveys.

Carp: Carp were observed in many habitats along the LSYR mainstem in WY2025. In the spring, there were 55 and 234 adult carp observed in the Refugio and Alisal Reaches, respectively (Figure 87). The number of carp observed by divers in the Refugio Reach remained very similar with 54 observed in the fall survey, a decrease of only one fish. In the Alisal Reach, carp numbers dropped off considerably with a fall total of 98, a 58% decrease in the total number of carp observed between the spring and the fall. Unlike WY2024, COMB-FD divers did not observe any smaller size of classes of carp, indicating no successful spawning of carp occurred in the LSYR mainstem during the oversummering period.

<u>Salsipuedes Creek</u>

The sunfish population in Salsipuedes Creek continues to be well established in that tributary watershed. Snorkel surveyors observed a total of 209 green sunfish within Reaches 1 through 4 during the spring count; 24 at 0-3 inches, 134 at 3-6 inches, 46 at 6-9 inches and 5 at 9-12 inches. For comparison, the sunfish total in WY2024 was 375 along the same survey reaches. No other types of warm-water species were observed.

Previous fall surveys have shown a reduction in sunfish counts, WY2025 was no different with only 67 sunfish observed during the October survey (38 at 3-6 inches and 29 at 6-9 inches). COMB-FD deployed thermographs were showing 13°C minimums and 16°C maximums at the time of the surveys. Warm-water fish such as sunfish become inactive at these low water temperatures and will retreat to areas with dense cover (beaver dens, woody debris, cut banks, etc.). The low sunfish count in the fall was likely artificially low because of this fish behavior, coupled with the fact that the water clarity for detecting fish was not optimal in these lower reaches of Salsipuedes Creek compared to the reach immediately upstream (discussed below).

The uppermost reach, Reach 5 (Jalama Bridge to the El Jaro Creek confluence), had a total of 62 green sunfish that fell into two size classes. There were 50 sunfish 3-6 inches and 12 sunfish 6-9 inches observed in this late July survey. Oddly, there was an increase in sunfish observations during the final fall survey that totaled 109 fish (10 at 0-3 inches, 60 at 3-6 inches, 34 at 6-9 inches and 5 at 9-12). The fall increase was likely due to good visibilities that allowed divers to see into areas with dense cover, where many of the sunfish were observed. A single bullhead catfish adult measuring 12-15 inches was observed approximately 200 yards downstream of the confluence with El Jaro Creek. This was the only other type of warm-water species, aside from green sunfish, observed in the Salsipuedes Creek watershed in WY2025.

El Jaro Creek

A regular survey reach of 0.40-mile of El Jaro Creek just above the confluence with Salsipuedes Creek is snorkeled by COMB-FD staff several times per year. The first survey in July revealed a total of 55 sunfish (49 at 3-6 inches and 9 at 6-9 inches). Snorkel data from the spring of WY2024 in the same reach revealed a total of 148 green sunfish, nearly three times the number observed this spring. When divers returned for the fall survey in late October, the number of sunfish observed was about half of what was seen during the spring survey. The sunfish total was 23 (3 at 0-3 inches, 13 at 3-6 inches and 7 at 6-9 inches).

Hilton Creek

For the 6th consecutive year, no warm-water species were observed in Hilton Creek during both surveys in WY2025. With higher lake volumes the past few years, cooler water temperatures being released through the HCWS have likely been discouraging warm-water fish from entering and inhabiting the drainage. The COMB-FD deployed thermograph in lower Hilton Creek near the confluence with the LSYR mainstem showed temperatures lower than 16.5°C (< 62°F) throughout the oversummering season. The current configuration of the creek near the confluence is also discouraging upstream movement of warm-water species, as several shallow, narrow split channels have rendered access to and from the LSYR mainstem difficult in the absence of higher flows.

3.7. Tributary Enhancement Project Monitoring

All tributary enhancement projects are subject to biological monitoring and permitting requirements as stipulated in all project permits and the 2000 BiOp (RPM 8). This includes pre- and post-project monitoring, as well as monitoring during construction.

Construction monitoring of *O. mykiss* includes relocating fish or other aquatic species outside of the project area, as well as monitoring water quality to assure there are no impacts from water being discharged to stream habitats downstream of the project area. COMB-FD conducted and successfully completed 2 fish passage and habitat enhancement projects in the fall of 2024. The first was in El Jaro Creek at Rancho San Julian where the stream channel just upstream of the constructed fishway in 2009 was slightly straightened, bank stabilization was conducted on the western bank, the toe bar was removed on the eastern bank, the road drain was reconditioned, and the disturbed areas were revegetated. The second project was successfully completed on Quiota Creek where constructed stream elements were repaired or enhanced at Crossings 8, 4, 3, and 1 (listed in order of construction). All projects were successfully completed by the end of October.

Post-project (referred to as performance) monitoring continued at all completed tributary enhancement projects within Salsipuedes, El Jaro, Quiota, and Hilton creeks in the late fall. Snorkel surveys, redd surveys, water quality, vegetation maintenance (watering, weeding, mulching, etc.), and photo documentation were all conducted in accordance with the post-project monitoring requirements at each location.

3.8 Additional Investigations

Genetic Analysis: Tissue samples from all of the migrant captures, mortalities, and carcasses during WY2025 were sent to Dr. Carlos Garza of NOAA Southwest Science Center at UC Santa Cruz and to the CDFW Central Valley Tissue Archive. A total of 197 *O. mykiss* tissue samples were taken, split, and sent for analysis.

Past results of captured and sampled migrating *O. mykiss* showed a strong genetic correlation to their streams of origin. In addition, most of the fish sampled during trapping activities indicate that these fish are genetic descendants of native coastal steelhead. COMB is still awaiting the genetic results of the WY2025 tissue samples.

Beaver Activity: Beaver dams and the associated ponds often change riffles and runs into pools that can lead to greater thermal heating of stream water, can fragment habitats and inhibit movement of juvenile and adult *O. mykiss* during the spawning season (exacerbated during low flow conditions), increase siltation, change benthic macroinvertebrate assemblages, and create favorable pool habitat for invasive aquatic species (i.e., bass, sunfish, catfish, and carp). Beaver regularly build their dams at the control points of pool habitats, a prime spawning location for *O. mykiss,* and have been observed to reduce spawning locations/opportunities during normal and drier years in El Jaro/Salsipuedes Creek watershed as well as the LSYR mainstem. Also, beaver dams can affect operational flows of the Fish Passage Supplementation Program, target flow releases, and downstream water right releases. As a result of increased beaver activity in the watershed, an additional monitoring element has been added to the Fisheries Program to track the number, extent (size), and distribution (location) of beaver dams within the LSYR mainstem and tributaries below Bradbury Dam. Beaver dam abundance is a simple way to annually track the beaver population (an active single beaver dam generally means multiple beavers in the area) and spatial distribution within the LSYR basin. This survey is conducted each year prior to the steelhead migration season, typically from November through January.

Beaver dam surveys were conducted from November 2024 through March 2025 from Bradbury Dam (LSYR-0.0) downstream of the Salsipuedes Creek confluence with the LSYR mainstem (approximately LSYR-34.4). The survey also looked at the wetted section of the river downstream of the Lompoc Wastewater Treatment Plant (approximately LSYR-42.0) to the 13th Street Bridge on Vandenberg Space Force Base and the start of the lagoon. Salsipuedes Creek from the confluence with the Santa Ynez River and a significant portion of El Jaro Creek containing perennial flow and habitat were also surveyed for beaver dams.

Dams were classified as barriers, impediments, or passable utilizing CDFW passage criteria. For migrating *O. mykiss* to pass over barriers, CDFW criteria states that a pool at the downstream end of a passage barrier needs to be 1.5 times the height of a dam to allow fish to jump over the barrier. Note that the CDFW criteria was written for engineered structures (dams, weirs, culverts, grade control, etc.), however, it is a useful metric in assessing beaver dams keeping in mind the ability of fish to opportunistically navigate through porosity, side flows, and breaches in beaver dam structure especially during storm pulses. Surveyors measured each dam's height then measured the depth of the downstream habitat at the base of the dam to determine if a fish could make the jump at the flow rate at the time of the survey. Dams were classified as barriers if the habitat downstream was less than 1.5 times the height of the dam. Beaver dams are typically built at pool control points (i.e., tail out of pool habitats) and hence create an immediate barrier to movement as no pool habitat exists downstream of the dam to allow fish to jump over. Barrier dams are large in height with minimal depth immediately downstream to allow fish to jump over the dams. Barrier dams span the river channel with no flanking flows around the dam. Impediment dams are challenging for *O. mykiss* to traverse as clear flow pathways are usually shallow in depth and are categorized at the discretion of the surveyor based on severity. Compared to a barrier dam, impediment dams were generally smaller in height, had greater depths at their downstream side and/or were flanked by flow along one or both channel margins that would allow fish to swim around the impediment. Passable dams are all small in height with deeper habitats immediately downstream of the dam with some measure of flanking occurring, or in some cases are in the process of being built and small in stature.

The results of the WY2025 beaver dam surveys showed a sizable increase in the number of beaver dams in the LSYR mainstem and in the tributaries compared to the previous year (Figure 88 and Table 20). In the LSYR mainstem, there were 79 beaver dams documented in WY2022, 74 documented in WY2023, 37 documented in WY2024 and 62 documented in WY2025. Of the 62 beaver dams identified, 36 were classified as barriers, 9 as impediments, and 16 as passable at the survey flow rate with 61 of the 62 dams determined to be active.

There was 1 beaver dam observed in the Hwy 154 Reach completely blocking migration at the tail of the Long Pool, 8 in the Refugio Reach (including Upper Refugio), 3 in the

Alisal Reach, and 48 in Reach 3 between Buellton and Lompoc. The last 2 wet years filled the reservoir and created significant spill conditions that effectively scoured all dams from both the LSYR mainstem and its tributaries and likely displaced/killed an indeterminant number of beavers. The fact that flows had an impact on the beaver population is evident with the reduced number of dams observed in 2024. Greater magnitude flow releases during WY2024 coupled with the formation of deeper habitats in some locations (mainly in Reach 3) likely prevented additional dam building activities as building behavior by beavers is diminished when ample pool habitat is available. Additionally, higher flow rates make it more difficult for dams to be constructed. This was not the case in WY2025 as the dry year enabled the remaining beaver population to once again expand dam building activities throughout the watershed, particularly in Reach 3 of the mainstem which saw an increase from 25 dams to 48 dams. As mentioned above, the uppermost beaver dam is located approximately ¼ mile downstream of Bradbury Dam and the lower most dam was located approximately 5 miles upstream of the Santa Ynez River lagoon on Vandenberg Space Force Base property (downstream of the Floradale Bridge). There were several dams more than three feet in height and one more than four feet in height creating complete passage barriers to migration. Depending on the specific location, dams between one to three feet also acted as complete passage barriers in the absence of high flow events. Of the 62 beaver dams, 36 (58%) were classified as complete barriers.

Active beaver dams in the Salsipuedes/El Jaro Creek watershed increased from 5 in WY2023 to 7 in WY2024 with 4 observed in Salsipuedes Creek and 3 in El Jaro Creek. In WY2025, beaver dams increased from 7 to 14 with all 14 observed in Salsipuedes Creek and none documented in El Jaro Creek. Of the 14 beaver dams, 9 (64%) were classified as complete barriers to migration with the remaining 5 classified as impediments. As mentioned earlier in this document (Trapping and Redd Surveys), beaver dams were especially problematic in this watershed by preventing upstream and downstream movement during the upstream spawning migration and the downstream smolt migration. No dams were observed in either Quiota Creek or Hilton Creek.

4. Discussion

The Discussion section provides additional historical context for the WY2025 results presented above, specifically since the issuance of the 2000 BiOp (4.1-4.2), discussion of specific topics of interest or concern (4.3-4.22), and the status of last year's Annual Monitoring Summary recommendations (4.23). Summaries of the LSYR Fisheries Monitoring Program (Annual Monitoring Reports/Summaries) have been compiled for 1993-1997 (SYRCC and SYRTAC, 1997),1993-2004 (AMC, 2008), 2005-2008 (USBR, 2011), 2009 (USBR, 2012), 2010 (USBR, 2013), 2011 (COMB, 2013), 2012 (COMB, 2016), 2013 (COMB, 2017), 2014 (COMB, 2018a), 2015 (COMB, 2018b), 2016 (COMB, 2019a), 2017 (COMB, 2019b), 2018 (COMB, 2020a), 2019 (COMB, 2020b), 2020 (COMB, 2021), 2021 (COMB, 2022), 2022 (COMB, 2023), 2023 (COMB, 2024), and 2024 (COMB, 2025).

4.1. Water Year Type since WY2000

The monthly rainfall (Table 21), monthly average runoff at Solvang and the Narrows (Table 22), and water year type with the years that Lake Cachuma spilled (Table 1 and Figure 89) are presented from WY2000-WY2025. Since WY2000, there have been 10 wet years (8 spill events), 3 normal (average) years, and 13 dry years. Rain has been recorded yearly at Lake Cachuma starting in 1953. From 1953-1999, average rainfall was 20.22 inches (range 9.11 inches (1989) – 53.37 inches (1998)). From 2000-2025, average rainfall decreased slightly to 19.14 inches (range 7.33 inches (2007) - 43.47 inches (2005)). Over the entire 73-year record, the long-term rainfall average is 20.02 inches. Rainfall over the last 25 years has been highly variable with no clear linear trends with pronounced drought periods interspersed with very wet years. Average rainfall is a misnomer as individual years often deviate sharply as seen in the ranges of rainfall listed above. The primary trend is a continuation of historical patterns (i.e., unpredictable). Rainfall in our area is characterized by boom-bust rainfall cycles rather than a steady and predictable change.

4.2. Dry Year after 2 Spill Years

The last 3 water years have exhibited the high variability of a Mediterranean-like climate such as the Santa Ynez River basin and possible climate change exemplified by more extreme conditions both wet and dry. Over the 73-year record at Bradbury Dam, WY2023 was the 6th wettest year on record with 40.23 inches and WY2024 was the 12th wettest year on record with 32.61. In stark contrast, WY2025 was the 9th driest year on record with only 9.69 inches. The long-term average is 20.02 inches. The mudflows of February 2023 encouraged *O. mykiss* residing in the Hwy 154 Reach to seek better water quality conditions within the Upper Refugio, Refugio, Alisal and Avenue reaches. Those fish remained in WY2023 and then again in WY2024 to take advantage of the high baseflow conditions over the dry season, extended habitat, and suitable oversummering conditions to spawn within the LSYR mainstem or up in adjacent tributaries. Snorkel surveys in WY2024 recorded the highest number of observed *O. mykiss* since monitoring began in 1993 (totals were even higher in the tributaries in WY2025). Quiota Creek, with all its anthropogenic fish passage barriers removed, resulted in extensive spawning with thousands of YOYs observed.

Challenging conditions for the LSYR fishery returned in WY2025. Meager rainfall caused a drop in dry season baseflows in the LSYR mainstem and tributaries, particularly within the lower section of Quiota Creek that completely dried up and required rescuing and relocating 4,069 *O. mykiss*, the majority of which were YOYs. Traditionally those sections of Quiota Creek go dry in the summertime. Conditions in Salsipuedes/El Jaro Creek were also difficult but did sustain some baseflow but in many locations the water quality was poor. Snorkel surveys showed a drop in observed *O. mykiss* from the spring to the fall survey results in the Upper Refugio, Refugio, and Alisal reaches of 389, 15, and 523 fish, respectively (Figure 90). In the tributaries, the reduction in population for Hilton, Quiota, Salsipuedes, and El Jaro creeks was 247, 1426, 375, and 21 fish, respectively. In Quiota Creek, long-term routine snorkel surveys do not include the lower section where the majority of the fish rescue/relocation efforts took place since that area has historically not been favorable for spawning or rearing fish. Two wet years provided the conditions (flow and water quality) for population expansion while the dry conditions of WY2025 caused a population reduction both within the LYSR mainstem and its tributaries.

4.3. Target Flow Compliance to Hilton Creek, the Highway 154 Bridge, and the Alisal Bridge

Monitoring for the required 2000 BiOp and WR 2019-0148 target flows is conducted by USGS and USBR for Hilton Creek and for the LSYR at the Highway 154 Bridge and the Alisal Bridge. The new USGS Highway 154 Bridge gauge has been operating well and as contracted. It is a telemetry gauge that records stage throughout but discharge only up to 65 cfs. Required target flows at all compliance points were maintained throughout the water year (Figure 91). The water year started on Table 2 flow releases (5 cfs to both the Highway 154 and Alisal bridges) that ended on 2/15/25 and Table 1 flow releases (5 cfs to the Highway 154 Bridge with a 4.3 cfs buffer imposed by the State Board for a total of 9.3 cfs, and 1.5 cfs to the Alisal Bridge) started on 2/16/25 that continued throughout the rest of the water year. The target flows to Hilton Creek were a minimum of 2 cfs that was met throughout the water year.

4.4. *O. mykiss* Temperature Tolerance; Pulse Flow Releases

Historically, Reclamation has conducted Pulse Flow Releases for multiple reasons, specifically to meet target flow compliance, assist smolt migration to the ocean, improve water quality for the downstream fishery (decrease of stream temperature, increase dissolved oxygen concentration and reduce algae), and other adaptive management efforts. Reclamation conducts Pulse Flow Releases from Bradbury Dam Outlet Works and/or the HCWS/HCEBS. When done in the dry hot summer months, they can decrease downstream stream temperatures and allow for thermally controlled stream temperatures for some distance downstream of the dam, depending on their magnitude and duration.

An increase in Outlet Works flow was initiated by Reclamation to meet downstream target flows in June 2025. The release rate was increased from 7.6 cfs (6/20/25) to a maximum of 17.7 cfs (6/22/25) from the Outlet Works, then slowly ramped down thereafter to fine tune compliance at the Alisal Bridge. To show the results, a graph was made of 15-minute flow data from the USGS Highway 154 gauge and maximum hourly water temperatures at nine surface COMB-FD thermograph monitoring locations from the Stilling Basin (LSYR-0.01) to the Encantado Pool (LSYR-4.95) (Figure 92). The recorded data clearly showed a noticeable decrease in maximum water temperatures at each location coincident with the arrival of the pulse flow. The degree to which temperatures were reduced was related to distance downstream from the dam and the magnitude of the release (i.e., larger releases equal greater miles of thermal control while lower releases equal lesser miles of thermal control). For example, cooler Pulse Flow Release waters at monitoring locations near the dam were not as impacted by thermal heating of the surface waters (i.e., LSYR-0.25) and showed a small decrease in water temperature. Surface warming was more pronounced at monitoring locations further downstream (i.e., LSYR-4.15 and LSYR-4.95) with the increased flow showing a clear reduction in water temperature indicating that thermal control was possible for many miles downstream with modest flow increases. As flows were ramped down, maximum water temperatures rose as ambient air temperatures exerted greater influence through thermal heating.

Comparing water temperature versus flow within the Upper Refugio Reach at LSYR-4.15 between a wet water year with higher releases (2024) and a dry water year with lower releases (2025) showed a large difference in how solar heating and higher flow impact water temperatures and rearing conditions for *O. mykiss*. In 2024, Lake Cachuma was allowed to spill over the radial gates at approximately elevation 754 feet for the purpose of capturing/storing as much water as possible. With the reservoir elevation at a maximum and runoff continuing to flow into the lake well into summer, additional flow needed to be released downstream to prevent further radial gate overtopping. This was of great benefit to rearing *O. mykiss* downstream of the dam as the additional water provided cooler water temperatures and excellent rearing conditions for more than 10 miles downstream of the dam. Water releases from mid-June to October at the Highway 154 gauge ranged from 50 cfs to 30 cfs (Figure 93a). Correspondingly, maximum water temperatures downstream at LSYR-4.15 remained relatively cool and less than 21 °C for much of the summer. The decreases in flow from 50 cfs to 30 cfs did little to impact water temperatures as the higher releases allowed for thermal control at the monitoring location used for this example.

Conversely, water releases were lower in 2025, that varied between 11 cfs to 14 cfs at the USGS Highway 154 gage, except for the brief flow increase to meet compliance described in the above paragraph. Figure 93b clearly shows increased maximum water temperatures throughout the summer rearing period in excess of 23 °C and an immediate reduction in water temperature coincident with the arrival of the pulse flow.

4.5 Quiota Creek Fish Population Explosion and Fish Rescue/Relocation

Although COMB has removed 10 fish passage impediments in Quiota Creek by replacing concrete low flow road crossings with fully spanning bottomless arched culvert bridges by the fall of 2019, it wasn't until October of 2024 when a private landowner removed the final anthropogenic fish passage impediment near the confluence with the LSYR mainstem at Crossing 0B. This allowed for unimpeded juvenile and adult passage to all of the Quiota Creek watershed in the subsequent migration season. Despite WY2025 being a dry year, several storms in February and March were large enough to generate runoff and connectivity between Quiota Creek and the LSYR mainstem to finally allow *O. mykiss* full volitional passage to all sections of the drainage.

As a result, a total of 19 spawning sites (redds) were recorded within Quiota Creek between late February and April. Redds were observed from below Crossing 1 all the way upstream to the main tributary in the upper portion of the basin above Crossing 9. In late April, while conducting spawning surveys, COMB-FD staff observed recently produced YOYs throughout the entire drainage. Over the course of the following months as the dry season began and baseflows began to drop, personnel started making regular trips to the lower portion of Quiota Creek (downstream of Crossing 1) to assess these drying conditions.

With the lack of spring rainfall and runoff, stream discharge in Quiota Creek rapidly deteriorated starting in May, particularly in the section below Crossing 1. COMB-FD staff began observing isolated habitats with stranded *O. mykiss* at the beginning of May. The CDFW and NMFS were notified of the impending need for fish rescue/relocation efforts and the first action to relocate fish occurred on 5/15/25. Over the course of next two months, ending on 7/15/25, 12 different fish rescue/relocation actions were carried out by CDFW with assistance from COMB-FD staff. Prior to fish rescue events, the COMB-FD staff collected data (habitat length, width, depth, temperature/DO, and the approximate number and size of fish needing to be rescued) and provided it to CDFW who then discussed the need and conditions with NMFS. CDFW wrote a final report on the Quiota Creek fish rescue/relocation operation during WY2025 (CDFW, 2025).

Upon NMFS' approval, backpack electrofishing units, seines, dipnets, and aerated buckets of cool creek water were used to remove and relocate fish (Figures 94 and 95). Some of those rescued fish received PIT tags prior to their release. Staff also collected habitat and fish data from individual habitat units as teams carried out the rescue operations. On the final fish rescue day in July, four electrofishing crews including 22 members of the COMB-FD, CDFW, NMFS and Ojai Valley Land Conservancy (OVLC) attempted to capture as many *O. mykiss* as possible. That day alone, a total of 1,493 *O. mykiss* were successfully captured and transported to several locations within the Hwy 154 Reach. During that rescue/relocation effort, a CDFW Bonar bin (large cooler) with aerators placed in a pickup truck were used to facilitate the transport of fish from Quiota Creek to the release sites.

A total of 4,021 *O. mykiss* were rescued and relocated to upper Quiota Creek and mostly to the LSYR mainstem over the course of 12 separate outings; the majority were YOY (over 90%) that had been produced in the winter and spring of WY2025. Across all rescue/relocation efforts, there were 48 mortalities directly associated with the efforts, and 32 additional carcasses were found in dried up habitats. Tissue samples were collected from 15 of the larger rescued fish to help improve COMB and CDFW's genetic tissue repository from the Quiota Creek basin. Additional fin clips were also retrieved from some of the carcasses that had already occurred, due to specific habitats already drying out prior to fish rescue efforts. Most of the habitats where live fish were rescued had already become isolated and were rapidly losing water depth, in addition to some units containing elevated water temperatures and depressed dissolved oxygen concentrations. Considering that the majority of lower Quiota Creek went dry shortly after teams completed their efforts, these activities were highly successful in saving many of the fish in peril that had been produced in lower Quiota Creek during the WY2025 spawning season.

CDFW and NMFS previously agreed to PIT tag a small sub-set of the rescued fish from Quiota Creek. See CDFW's 9/17/25 final report for PIT tagging details. On 6 of the 12 rescue efforts, CDFW staff tagged a total of 57 *O. mykiss* ranging in size between 109 mm (4.3 inches) and 233 mm (9.2 inches). The average size of PIT tagged fish was 148 mm (5.8 inches) with 7-12 fish tagged during each effort. The size of the fish determined the size of the PIT tag, with larger fish receiving a large tag (23 mm) and smaller fish receiving a smaller tag (12 mm). All fish receiving a PIT tag were measured at their fork length and placed into a separate anesthetizing bucket prior to incisions and the insertion of the tag. Each PIT tag was carefully scanned and its unique number identifier recorded by staff. A disinfectant solution of isopropyl alcohol was used to sanitize the scalpel (and individual PIT tags) prior to each fish receiving the procedure. A very sharp scalpel was used to make a small incision into the abdominal cavity of each *O. mykiss* and the tag carefully pressed into the cavity to help ensure retention. Once the tag was inserted, fish were moved to a separate recovery bucket containing several aerators. Once fully recovered, fish were released into suitable and deep habitats in the LSYR mainstem.

Several reaches of the LSYR mainstem below Bradbury Dam had been previously identified by COMB and CDFW as being suitable relocation sites for the rescued fish that would not cause overcrowding. The upper reaches of the LSYR mainstem that contained the lowest temperatures, clearest water and habitat space included the Refugio Reach, Upper Refugio Reach and the lower end of the Hwy 154 Reach (Kaufman and Grimm properties).

4.6 Hilton Creek Spawning Success and Trends; Gravel Augmentation and the Proposed Fish Passage Project

Hilton Creek is a sediment starved system with limited spawning gravels and sources of replenishment. Spawning success by resident and anadromous *O. mykiss* is influenced by a variety of factors each year including rain year type (wet, average, and dry), instream flow (ability to negotiate low flow and high flow barriers), access to the creek (attraction flow/multiple confluence channels across the delta), partial/complete barriers (anthropogenic, LSYR beaver dams, and geologic features), and availability of suitable sized spawning gravel throughout the creek. Since 2010, the creek has experienced wet years (2010, 2011, 2017, 2019, 2023, and 2024), an average year (2020), dry (drought) years (2012-2016, 2018, 2021, 2022, and 2025), fire (Whittier Fire 2017), and gravel augmentation projects (2018, 2019, and 2025), all of which affected the ability of *O. mykiss* to successfully enter, negotiate the creek, find suitable spawning locations, spawn, and rear (Figure 96).

Specific fish passage impediments/barriers within Hilton Creek were in the recently formed delta (WY2023 and WY2024) at the confluence (shallow riffles in braided stream channels with limited channel depths and attraction flows to locate the stream entrance), geologic features (steep bedrock chutes and cascades) creating velocity barriers with no resting habitats, and an impassable concrete culvert (Highway 154 that is a complete barrier to upstream migrating fish). This resulted in the majority of fish in WY2025 spawning downstream of passage barriers in Reach 2 (Figure 97). Some spawning occurred in the middle sections of the creek in and around the Spawning and Honeymoon pools (Reach 3), but was far less than past years and was limited to *O. mykiss* that were most likely already rearing in those areas. Spawning between the URP and LRP has been nearly absent since WY2023 as high flow events in WY2023 and WY2024 effectively removed nearly all suitable spawning gravel, suggesting gravel augmentation would be biologically beneficial.

All these variables have reduced the spawning potential of the watered section of Hilton Creek and made trend analysis complicated. From WY2010-WY2014, the population trend was positive. From WY2014-WY2017 the drought took hold and the trend was negative.

From WY2017-WY2021, the trend was again positive and from WY2021-WY2025 the trend was back to negative (Figure 96). This was substantiated by the number of redds observed; from WY2010 through WY2019 the number remained relatively static ranging from a low of 2 (WY2016 and WY2017) to a high of 17 (WY2014). In WY2019 after the Whittier Fire (WY2017), heavy rains resulted in significant bedload movement from the upper watershed that distributed an enormous amount of spawning sized gravel throughout the entire creek and an uptick in the number of redds with 8 sites identified in WY2018 and WY2019, tripling to 24 in WY2020 then doubling to 48 in WY2021. In WY2021, many of the redds were identified between the URP and LRP where abundant spawning gravel was present, primarily due to Whittier Fire gravel deposits. Since WY2021, there has been a decline in the number of redd sites with 23 observed in WY2022, 8 and 15 respectively in the 2 wet years of WY2023 and WY2024, and 15 in WY2025. The decline in observed redd sites has to do with the availability of spawning gravels and the ability of *O. mykiss* to move to the upper sections of the creek (upstream of the LRP). The wet years of WY2023 and WY2024 have severely impacted both access to the creek and navigation through the creek. Of note is the delta formation at the confluence that resulted in multiple braided stream channels that are shallow with low attraction flow. Those high flow events have changed the channel configuration in Reach 2 creating several passage barriers with respect to velocity and jump height.

Gravel augmentation (direct placement at specified locations) to improve spawning conditions has been conducted in WY2018 (1.56 tons at 5 sites), 2019 (6.5 tons at 7 sites), and 2025 (13.6 tons at 5 sites) at locations where spawning has been observed in the past but lacked available substrate. In general, gravel augmentation has been very successful, exemplified by spawning *O. mykiss* pairs occurring within days of gravel placement, especially in WY2018 and WY2025. Gravel augmentation in WY2019 was of limited success as high flow storm runoff soon after augmentation effectively removed placed gravel from most locations and redistributed the gravel downstream of the Hilton Creek confluence and into the LSYR mainstem.

In July of 2025, HDR was contracted to provide 65% design drawings to enhance habitat by creating a single channel that confluences with the LSYR instead of multiple braided channels across the delta, as well as enhancing fish passage within Reach 2 and Reach 4 in the bedrock and chute sections. A CDFW-FRGP grant was submitted in the spring of 2025 but was not awarded. COMB, with assistance from HDR, continues to advance the designs and project descriptions in hopes that a second grant application will be successful and the identified fish passage and habitat enhancements can be put in place.

Hilton Creek has great potential to facilitate recovery efforts due to the HCWS which provides cool water releases from the lake throughout the year to nearly 3,000 feet of creek channel between the URP and the confluence with the LSYR mainstem. Hilton

Creek releases, coupled with cool water releases from the Outlet Works have created a sustainable fishery in the LSYR mainstem for the first 5+ miles downstream of Bradbury Dam as evident by the abundant and multiple age classes of *O. mykiss* inhabiting these regions in addition to successful spawning observed in the Upper Refugio Reach and Refugio Reach. The proposed improvements would increase the accessibility of and enhance habitats in Hilton Creek that could greatly increase the *O. mykiss* population and maximize the biological benefit of the released lake water to the creek in our effort to recover the species.

4.7 Reproduction Challenges in the Salsipuedes/El Jaro Creek Watershed

Resident and anadromous *O. mykiss* life history forms rearing, spawning and migrating through the Salsipuedes/El Jaro Creek watershed face a variety of reproductive challenges in any given year. The following details several of these issues observed by fisheries staff over the years. The primary challenges observed since 1994 include: drought and low flows with poor water quality, beaver dams, habitat degradation (mass wasting and fine sediments), instream cattle activity, and timing of high streamflow events during the spawning season that can scour redds from the streambed.

Drought with Low Streamflows and Poor Water Quality

The ability of both life history forms of *O. mykiss* to successfully over-summer and migrate has been challenging at times, as observed since monitoring began in the mid-1990s, wet years being the exception. Dry years and prolonged periods of drought have seriously hampered the ability of *O. mykiss* to successfully migrate to spawning grounds and survive the dry season. Low baseflow during the dry season is often associated with poor water quality conditions (i.e., elevated stream temperatures and low dissolved oxygen concentrations). For anadromous *O. mykiss*, low streamflows from Salsipuedes Creek to the ocean, beaver dams and lagoon closures during the migration season prevent ocean run fish from making the journey upstream to reproduce. For resident fish, low flows hamper the ability of fish to negotiate low flow riffles or migrate around established beaver dams, effectively segregating populations to short sections of the creek. Higher flows are needed to remove allochthonous material (leaf litter) from control (tailwater) points and to redistribute, expose, and clean gravels to be used for spawning fish. High flows are also necessary to remove barrier beaver dams. Observations during extreme low flow years have shown extensive leaf litter covering control points in pools thereby preventing fish from accessing and utilizing spawning habitat. Low streamflow and higher temperatures also allow the proliferation of warmwater species, especially green sunfish within the Salsipuedes/El Jaro watershed, which compete and predate upon *O. mykiss*.

The impact of low flows was most pronounced during the WY2012-WY2018 drought where there was only one year with stormflows greater than 100 cfs (WY2017) (Figure 98). The discharge was set to a logarithmic scale to better illustrate flow versus time. Apart from wet years, each graph clearly shows the rapid decline in the hydrograph after a storm indicating the short windows of opportunity for *O. mykiss* to successfully move through the watershed.

Beaver Dams

Historically introduced beavers in the LSYR watershed and the numerous dams they create continue to plague the ability of both life-history forms of *O. mykiss* to successfully navigate to suitable spawning grounds and over-summer in dry years. Some of their dams have been documented to act as complete passage barriers to migrating *O. mykiss* during the spawning season, preventing movement through the creek and fragmenting populations, with WY2025 being the most recent example. CDFW policies prohibit tampering with beaver dams; plus, the number of beaver dams in the LSYR mainstem makes management prohibitive. Dams are typically built at the control point of pools. These are the primary areas where *O. mykiss* spawn. The presence of a beaver dam and the associated impounded water effectively cover, inundate, and make inaccessible previously suitable spawning areas. Dams also limit the migration potential, especially during dry years forcing fish to spawn in suboptimal areas prone to dewatering and/or elevated summer water temperatures and decreased dissolved oxygen concentrations. In the absence of high flow events, beavers continue to build upon their dams increasing both their height, breadth, and the potential for plant growth within the dams. Large beaver dams can withstand significant flow events. One of the most extensive beaver dams observed in WY2008 was able to withstand flows of 687 cfs following storm runoff. That dam withstood those flows and was a complete barrier to migration (Figure 99a). The most recent example of a barrier beaver dam was in WY2025 at a site approximately 1/8 of a mile downstream of the Salsipuedes Creek migrant trapping location. Biologists investigated as to why no upstream migrating fish had been captured and the reason was a beaver dam causing a complete migration barrier to both upstream and downstream migrating *O. mykiss* in lower Salsipuedes Creek (Figure 99b). In fact, spawning was documented directly downstream of this dam with no successful emergence of young of the year likely due to no access to better upstream spawning grounds and suboptimal water quality conditions in the spring and summer.

Habitat Degradation

Mass wasting of streambanks following extreme rain events is common throughout Salsipuedes/El Jaro Creek. This contributes vast amounts of fine sediment throughout the creek channel. Prolonged periods of low flow allow riparian vegetation to establish and expand, helping to cool water temperatures and lock sediment plumes in place. When large magnitude flow events occur (>2,000 cfs), much of the newly established riparian zone is completely inundated and scoured leaving the potential for mass wasting and areas directly exposed to the sun with extensive fine sediments deposits in the stream channel that are not conducive to spawning (Figure 100).

Timing of Flow Events During Spawning

The flashiness of Mediterranean climate streams reflects how quickly discharge increases or decreases during stormflow. The Salsipuedes/El Jaro Creek watershed, for example, regularly produces flashy hydrographs where the stream displays rapid and short-lived increases and decreases in streamflow. The attenuation of the hydrograph from peak stormflow back to baseflow can occur as quickly as over a few hours or a few days.

Wetter years equals a longer attenuated annual hydrograph whereas during dryer years that attenuation can be very short (Figure 101). Because of this flashiness, the creek substrate is subject to scour during high stormflow events. Since 2000, approximately 87.6% of rainfall occurs during the months of January through April. Coincidently, since 2008 (consistent year-to-year redd surveys), spawning occurs during the months of January through April with most occurring during February and March with less spawning in January and April. As such, redd scour has been observed and has occurred repeatedly during those high flow events. The most recent occurrence happened in January 2024 when 11 redds were documented in Salsipuedes (3) and El Jaro (8) creeks. On 2/1/24, stormflows increased to a daily average discharge of 598 cfs and on 2/4/24 another storm generated daily average flows of 1,910 cfs. Subsequent snorkel surveys resulted in no observations of young of the year *O. mykiss* in areas where redds were observed previously, indicating that high flows completely scoured those redds from the streambed.

4.8. Trends in Migrant Trapping WY2001 through WY2025

Trend analyses of migrant captures through the longstanding migrant trapping effort provide insights into the dynamics of the *O. mykiss* population within the LSYR basin. The migrant trapping results have been complicated by the limited amount of take provided by the 2000 BiOp's Incidental Take Statement (ITS), specifically only 110 juveniles and 150 adults. Since the issuance of the 2000 BiOp, it has been evident that those take limits (specifically for juveniles) are insufficient for the size of the *O. mykiss* population within the LSYR basin, particularly Hilton Creek, where many of the juveniles are captured. Prior to WY2012, all captures were reported and no limitations were imposed. As of WY2012 onward, the ITS limits in the 2000 BiOp were enforced by NMFS. This resulted in the need for a truncated trapping effort (February – April) and an incomplete dataset for each migration season that does not fully capture the environmental conditions/cues (migration flows, changes in water temperatures, photoperiod, etc.) and subsequent population response throughout the entire migration season (January – May). Unfortunately, the current Migrant Trapping Plan starts in February and misses the start of the adult migration season in January and often the end of the smolt run in April and May, hence capture numbers do not accurately reflect actual population totals and dynamics over the migration season given the imposed ITS limits. Since WY2012, take limits have not been exceeded for juveniles and adults, with take limits typically being met (for juveniles) and trapping ending by early April in most years. Increases in the ITS limits for trapping have been requested to improve monitoring of the population recovery from the numerous management actions/projects implemented within the LSYR basin. However, to date these requests have been unsuccessful. Even with a truncated trapping effort, many insights can be gained by conducting trend-analyses from the migrant trapping effort and gathered data.

The LSYR basin *O. mykiss* population trends are presented in Figure 102 and Tables 23-25 with juvenile and adult take numbers provided in Table 26. The juvenile take limit was exceeded from WY2001 through WY2011 except for WY2002 and WY2005. Adult take was not exceeded throughout the monitoring effort except in WY2008 by one fish. The population was trending upward within the Hwy 154 Reach of the LSYR mainstem, Hilton Creek, Quiota Creek, and Salsipuedes/El Jaro Creek until the onset of the drought in WY2012 where the observed number of fish and available habitat decreased annually through WY2016. Nearly the entire LSYR mainstem dried up in WY2016 with only the Stilling Basin, a few reaches in Hilton Creek, and small portions of Quiota and Salsipuedes Creek remaining wetted. The fall of WY2017 was the low point of population and thereafter began a general increase through WY2025 with WY2023 not being representative due to a premature end of the trapping effort (22 days trapping) due to the CESA listing of Southern California steelhead.

From WY2001 to WY2025, the maximum number of migrant *O. mykiss* captures across all trapping locations was in WY2007 with 665 captured and a minimum of 5 in WY2017 that reflected the basin wide impact of the long-term drought (Table 25). Anadromous steelhead have been captured during every spill year (except WY2023, a shortened trapping season) and the total numbers of anadromous *O. mykiss* were most likely underestimated given that migrant traps need to be removed during high stormflow events when fish were most likely moving. Anadromous fish captured over that time had a high in WY2008 of 16 with the next highest of 9 in WY2011 (one being a recapture at Hilton Creek that was initially captured in Salsipuedes Creek), both wet year types (Table 27). Since the issuance of the 2000 BiOp, there have been 9 years with 1 or more anadromous steelhead observed, primarily in Salsipuedes Creek (WY2001, WY2003, WY2005, WY2006, WY2008, WY2009, WY2010, WY2011, and WY2024) all corresponding to primarily wet and occasional average rainfall years. In only 3 years have anadromous steelhead been observed in Hilton Creek (WY2008, WY2009, and WY2011), most likely from the WY2005/WY2006 and WY2008 (all spill years) cohorts. The number of returning anadromous adults has been low since monitoring began, but WY2008 and WY2011 (wet years) showed positive signs of the viability of the LSYR watershed for maintaining the Southern California steelhead population. An increase in the number of anadromous returns during those 2 years was also observed in other watersheds where monitoring has taken place across the Monte Arido Highlands Biogeographic Population Group (NMFS, 2012; Dagit et al., 2020) showing the importance of wet years and high flow events in allowing for outmigrating smolts and returning steelhead adult to move out of and into the various rivers and tributary creeks.

Unfortunately, the drought of WY2012-WY2016 hampered the positive population increase of resident and anadromous *O. mykiss* within the LSYR watershed. In Hilton Creek, the number of resident adults (> 10-inches) migrating upstream to spawn have shown a positive trend from a low of zero captured in WY2017 (due to the long-term drought and Whittier Fire impacts) to a high of 65 captured in WY2025 (Table 26). In Hilton Creek, every single year since modified trapping operations have been conducted, the number of adults captured moving downstream was greater than those captured moving upstream indicating that both modified trapping operations (late February start) and high flow events (where traps are removed) were missing adults moving into the creek to spawn. For example, in WY2023 there were 14 adults captured moving upstream and 19 captured moving downstream. In WY2024, the difference was larger with 33 adults captured moving upstream and 62 captured moving downstream. However, this trend reversed for the first time in WY2025 with 65 adults captured moving upstream and

22 moving downstream. The Hwy 154, Refugio, and Alisal reaches benefited *O. mykiss* due to target flows released from Bradbury Dam to the Alisal Bridge allowing better overall dry season rearing conditions. In Salsipuedes Creek since the drought, there have been few resident or anadromous adult *O. mykiss* captured moving upstream or downstream. This may be due to a depressed population recovering from the drought, the presence of barrier beaver dams and poor instream flows in the lower river hampered the same population increase observed in Hilton Creek and the upper LSYR mainstem primarily due to the proximity of cool water releases from the dam. In WY2024, Salsipuedes Creek saw the highest number of adults captured since WY2001 with 5 adults captured moving upstream (including 1 anadromous steelhead) and 31 captured moving downstream (22 adults and 9 smolts). This is likely the result of two consecutive spill years which established flow connection throughout the LSYR watershed in both WY2023 and WY2024 that removed beaver dams and provided better overall rearing conditions and allowed *O. mykiss* to freely move within the creek and river system recolonizing areas and increasing distribution. This brief positive trend in adult movement stopped in WY2025 as no adult *O. mykiss* were captured moving upstream or downstream during that dry year.

Smolt captures had a maximum of 445 in WY2006 at all trapping locations (Hilton Creek [213], Salsipuedes Creek [218], and the LSYR mainstem [14]) and a low of 2 in WY2017, again reflective of the impact of the drought (Tables 26 and 28, and Figures 103 and 104). Outmigrating smolts in Hilton Creek have also shown an encouraging population response since WY2016 with 2 captured in WY2017, 17 in WY2018, 4 in WY2019, 32 in WY2020, 28 in WY2021, 37 in WY2022, 2 in WY2023 (shortened trapping season), 46 in WY2024 (the highest total since the drought ended), and 37 in WY2025. The months of greatest smolt captures differ slightly in each creek and are reflective of the natural flow regime (Salsipuedes) versus artificial flow regime (Hilton) regarding overall timing of movement. For instance, smolt captures in Salsipuedes are greatest in March and April with significantly less captured in February, January and May (i.e., decreasing in numerical order). In Hilton Creek the timing is much different with most smolts captured in April, March and May with decreasing in numbers captured in February and January (Figure 105). Downstream migrants, especially smolts, are likely undercounted due to the truncated trapping season suggesting that the numbers of smolts moving downstream were likely greater, especially considering that the last fish captured moving downstream on 4/7/25 (Hilton Creek) was classified as a smolt.

Before the drought, Salsipuedes Creek routinely produced the most smolts compared of all trapping sites and was highly correlated to the amount of rainfall received in the watershed providing the necessary cues to initiate smolting behavior. This behavior translates differently in Hilton Creek (artificial cool water) due to the consistent cool water releases from Lake Cachuma and the low water temperature regime from HCWS releases to the creek that are not reflected in Salsipuedes Creek (natural flow only). For example, prior to the drought, wet and average year types typically produced the greatest number of smolts in Salsipuedes Creek whereas during dry years the number of smolts captured was greater in Hilton Creek highlighting the importance of environmental cues to initiate smolt movement in Salsipuedes Creek (Table 28). Since the end of the drought, Hilton Creek has shown marked improvement in smolt production with modest increases through WY2025 compared to Salsipuedes Creek. Salsipuedes Creek has seen slight improvements but still less than what was observed in Hilton Creek and significantly lower compared to smolt totals before the drought.

Tracking the abundance of larger fish is an important metric due to the higher fecundity rate (i.e., more eggs produced) of larger versus smaller spawning fish (Figure 106). It is also useful in assessing the overall rearing conditions that allow fish to grow large and complete their life cycle. The ability of large *O. mykiss* to migrate into Hilton and Salsipuedes Creeks is hampered during dry and average rain year types as stormflows are often not of sufficient magnitude or duration for large fish to move past critical riffle bars or to breach beaver dams (for example in Hilton Creek and Salsipuedes Creek in WY2025). Large *O. mykiss* are defined here as fish equal to or greater than 400 mm (15.7 inches). Since WY2001, the difference in the number of large migrating *O. mykiss* captured in Hilton and Salsipuedes Creeks was a stark reminder of the different rearing conditions fish face between living in habitats where target flows are required versus living in habitats where target flows are not required. From WY2001-WY2023, the number of large fish captured in Salsipuedes has ranged from 0 to 10 with 10 captured in WY2001 and zero captured in 16 non-consecutive years including zero captured from WY2012 through WY2023. WY2024 was a huge departure from that trend with 9 large *O. mykiss* captured including one anadromous steelhead. In WY2023 and WY2024, flow at the Santa Ynez Narrows exceeded 5 cfs throughout the year because of the increased releases and a saturated watershed. This may have allowed more rearing habitat near the Salsipuedes Creek confluence with the LSYR mainstem. Conversely, from WY2001-WY2023, the number of large *O. mykiss* captured in Hilton Creek ranged from 0 to 60 with 60 captured in WY2008 and zero captured in 7 non-consecutive years. The highest totals in each creek were prior to the drought. After the drought, there has been a slow increase in the number of large fish captured with 11 captured in Hilton in WY2024. As mentioned above, the Hwy 154, Refugio, and Alisal reaches benefit *O. mykiss* due to target flows released from Bradbury Dam to the Alisal Bridge allowing better overall rearing conditions compared to the lower river near Salsipuedes Creek confluence where target flows typically do not reach. Two consecutive wet years with high recession inflows coupled with WRO 2019-0148 Table 2 flow requirements appeared to improve the rearing conditions and positively influence survival and growth of smolts and larger *O. mykiss* in WY2024.

WY2025 was a departure from the previous year. There were no adult *O. mykiss* captured in Salsipuedes Creek and only one captured in Hilton Creek. Considering that WY2025 was a dry year with no large flow events, there was a correlation between large fish movement, flow, and barrier beaver dams. Besides limiting movement due to insufficient flow over critical riffle bars, the small flow increases following storm events did not breach barrier beaver dams in either Salsipuedes Creek or in the LSYR mainstem directly downstream of Hilton Creek (for example, Long Pool tail out) thereby preventing larger fish from moving into optimal spawning habitats in the tributaries. As seen in the WY2025 snorkel survey data, there were over 30 *O. mykiss* in excess of 400 mm observed during the spring snorkel surveys within the first 10.5 miles downstream of

Bradbury Dam. It was apparent that flows during dry rain year types coupled with the presence of numerous barrier beaver dams were hampering *O. mykiss* movement during the spawning season. For comparison, there were 139 *O. mykiss* in excess of 15-inches observed during snorkel surveys in the spring of 2024 and only 32 in the spring of 2025.

4.9. Comparison and trends of the Salsipuedes Creek and Hilton Creek Watersheds and Fisheries

Salsipuedes Creek and Hilton Creek are very distinctive tributaries to the LSYR basin in terms of their size, hydrology (rainfall and flow patterns, hydrologic regime, and artificial watering system), land use (chaparral, agriculture, and cattle ranching), and biology (*O. mykiss* migration and population characteristics). Both creeks have hydrologic regimes typical of a Mediterranean-type climate with flashy streams and high inter-/intra-year runoff variability but vary on the timing and magnitude of storm runoff due to their location in the LSYR basin. The Salsipuedes Creek watershed is larger (an order of magnitude bigger) and located to the west and relatively close to the ocean compared to Hilton Creek which is just downstream of Bradbury Dam in the middle of the Santa Ynez River watershed. The Salsipuedes Creek basin often receives more rainfall and hydrologically can act completely independently of the rest of the Santa Ynez River basin in precipitation received, timing and magnitude of runoff, and can open the LSYR lagoon without any significant LSYR mainstem flow being generated by other tributaries (or dam releases) upstream.

Hilton Creek has an artificially sustained baseflow of a minimum of 2 cfs year-round from Lake Cachuma via the HCWS/HCEBS that provides a higher and sustained baseflow rate with cooler water temperatures than observed in Salsipuedes Creek. The Salsipuedes/El Jaro Creek watershed can have significantly higher streamflows due to a larger watershed and western location with baseflows typically approaching 0.05 cfs during the height of the dry season with extensive areas completely drying out during drought years. Out-migrating *O. mykiss* smolts in both creeks have been documented through migrant trapping. In general, smolt movement starts in both creeks in January, is more prolific in Salsipuedes Creek through March then switches to Hilton Creek for the rest of the migration season particularly in May (Figure 105). The travel distance along the LSYR mainstem to and from the ocean is approximately 15 river miles for Salsipuedes Creek and 49 river miles for Hilton Creek fish.

The *O. mykiss* populations between the 2 creeks exhibit differences in upstream and downstream migration timing, spawning time, rearing habitat, and over-summering characteristics (i.e., water quality, flow, and habitat complexity). Hilton Creek normally has excellent habitat quality (refuge pools with structure and a mature riparian canopy) but has limited stream length and spawning gravels. The Salsipuedes Creek system has extensive stream mileage but only fair habitat quality due to low dry season baseflows, a predominance of fine sediment substrate, lack of exposed spawning gravels, a greater prevalence of invasive species (mainly green sunfish), sometimes high water temperatures in portions of the lower creek, and often numerous beaver dams (AMC, 2009; COMB, 2021; COMB, 2022; COMB, 2024). One result of these differences is earlier resident *O. mykiss* upstream migration in Hilton Creek due to greater availability of water in the LSYR mainstem immediately downstream of the dam where resident *O. mykiss* have been documented to over-summer due to target flows. Hilton Creek also has a longer migration time for smolts to make it to the ocean given the additional distance, often numerous beaver dams to negotiate in the LSYR mainstem, and abundance of instream aquatic vegetation especially during dry water years. Smolts may be inclined to linger in areas within the Hwy 154 Reach as favorable conditions near the dam can diminish some environmental cues for outmigration especially later in the water year as flows decrease and water temperatures increase. Smolts traveling from Hilton Creek may also be stuck behind beaver dams when flows are of insufficient magnitude to breach dams. These phenomena have been observed with tissue/scale analyses of smolts captured moving downstream but then are recaptured the following year (or several years later) as smaller (12-18 inch) adults migrating into Hilton Creek to spawn suggesting some smolts residualized to a resident life-history strategy after over-summering in the Hwy 154 Reach or habitats that are fed by target flows. From scale analyses, Hilton Creek fish tend to grow larger and faster than Salsipuedes Creek fish due to favorable year-round rearing conditions and as a result may outmigrate as smolts at an earlier age and larger than Salsipuedes Creek smolts (Figure 107). However, in WY2024 this typical trend was reversed where the smolt-size at Salsipuedes Creek was greater than average compared to Hilton Creek smolts. This reverse trend may be the result of the lower than typical population in Salsipuedes Creek (caused by the previous extended droughts) which resulted in reduced competition and the increased habitat area due to increased summer baseflows for two consecutive wet years and Hilton Creek fish smolting at a younger age (smaller size). Plus, the HCWS has been delivering less lake water than before the drought as the syphon is not as efficient as before, which decreases the habitat extent and population benefit from those lake releases. Returning anadromous adults also have a much longer travel distance to Hilton Creek compared to Salsipuedes Creek and must navigate a significant number of obstacles along the way, primarily beaver dams, shallow riffles, and extensive aquatic vegetation. This is more of an issue in average and dry years and less of a problem during wet year types.

The drought of WY2012-WY2016 negatively impacted both watersheds, but Salsipuedes to a much greater extent as trapping trend data indicated low numbers of observed *O. mykiss* during drought years. Since the end of the drought, the LSYR watershed has experienced 4 wet years (WY2017, WY2019, WY2023, and WY2024), 4 dry years (WY2018, WY2021, WY2022, and WY2025), and 1 average year (WY2020) (Figure 89). Starting in WY2017, Hilton Creek has shown an increase in the numbers of upstream migrants captured. The number of smolt (including pre-smolt) captured leaving the creek and is discussed further in Section 4.10. The ability to keep *O. mykiss* alive in Hilton Creek during the extended drought was instrumental in keeping a viable seed population alive to repopulate Hilton Creek, the Hwy 154 Reach, and locations further downstream. Since WY2017 in Salsipuedes Creek, only 4 upstream migrating adult *O. mykiss* were captured during the annual effort. Three of these fish were classified as residents and 1 as anadromous. Similarly, downstream captures have also decreased (prior to WY2021) with none captured in WY2017, 3 in WY2018, 2 in WY2019, and 1 in WY2020. Of the downstream migrants captured during those years, only 3 of those fish were classified as smolts with no smolts captured in WY2020. In WY2022, the Salsipuedes Creek trap was not operated due to low flow conditions. WY2021 showed the largest increase in downstream migrants (primarily smolts) with 17 downstream migrants, 15 identified as smolts including pre-smolts. WY2023 showed promising early higher results compared to previous years with 3 juvenile and 1 adult upstream migrant and 10 downstream migrants, 7 of which were classified as pre-smolts. In WY2024, there were 31 downstream migrants of which 9 were smolts and 2 may have been spawned-out lagoon fish due to their size and coloration. In WY2025, there were 8 downstream migrants captured of which 6 were smolts.

The fact that smolts have been captured leaving the Hilton and Salsipuedes creeks in nearly every year since the drought suggests that the remaining *O. mykiss* populations still possess the anadromous gene that expresses smolting behavior under the right environmental conditions. It also illustrates the importance of keeping the HCWS/HCEBS functional and reliable while expanding upon its operational capacity and reliability to assist recovery efforts of the species.

Spawning success is another contrasting observation between Hilton Creek and Salsipuedes Creek watersheds and can vary from year to year. Spawning typically takes place from January through April with some early spawning observed in December and late spawning occasionally in May. Successful spawning requires access of adult *O. mykiss* across critical riffle bars to reach spawning grounds (i.e., higher flow, absence of barriers), suitable substrate in the form of adequately sized spawning gravels with no instream vegetation present, substrate not impacted by fine sediments, cover from predators (i.e., undercut banks, pool habitats, riparian overstory), and suitable water quality. Enumerating spawning locations provides a surrogate data point for the number of spawning sized adult *O. mykiss* inhabiting a particular reach of a creek or river but does not always equate to spawning success. Spawning successes are observed primarily in the form of recently hatched YOYs observed along the margins of the creek/river during trapping operations, subsequent spawning surveys, or during spring snorkel surveys. *O. mykiss* YOYs are typically observed in the February-April timeframe depending on instream and stormflow conditions. Early redd building activities, especially in the December/January timeframe, run the risk of future storms washing away *O. mykiss* spawning efforts due to high flows and bedload movement. This was the case throughout the watershed in WY2024 following the very wet February where nearly 16 inches of rain was recorded at Bradbury Dam causing the dam to spill and significantly elevated streamflows in all tributaries. These flow conditions most likely washed out all early spawning efforts in the LSYR mainstem and Salsipuedes Creek but were not as destructive in Hilton Creek. *O. mykiss* YOYs were first observed in Hilton Creek on 2/15/24 and were observed in a small section of El Jaro/Salsipuedes Creek in June.

In WY2025, YOYs were first observed in Hilton Creek on 3/4/25 in the Spawning Pool whereas YOYs were not observed in Salsipuedes Creek until snorkel surveys were conducted in late July with all of the YOYs observed in Reaches 3-5 where better spawning and over summering rearing habitat existed.

4.10. Comparison of Growth Patterns between Anadromous, Large Residents, and Smolting *O. mykiss* in the LSYR Watershed

Successive wet years in WY2023 and WY2024 provided ample instream movement opportunities for upstream migrating anadromous steelhead to reach spawning grounds and for downstream migrating smolts to reach the ocean. Conversely, WY2025 was a dry year with few opportunities for either adult or smolting *O. mykiss* to effectively move through the watershed (due to low flows and barrier beaver dams). Scales are collected from each fish captured in migrant traps equal to or greater than 120 mm and analyzed to determine age and general life-history based on growth patterns (i.e., resident or anadromous). In addition, scales can also indicate how many times a fish has spawned and the general rearing conditions experienced during its life. For example, spawning steelhead and resident *O. mykiss* will absorb some of the nutrients from its scales to use for metabolic demand during spawning and this absorption shows up as a ‘scaring’ ring on the scale called a spawning check.

In WY2024, a large female steelhead going upstream was captured in Salsipuedes Creek on 3/22/24 measuring 608 mm (23.9 inches) and marked the first year an anadromous steelhead was captured in the LSYR since WY2011. Genetic analysis suggested that this fish may have come from Arroyo Grande Creek in San Luis Obispo County. Scale analysis indicate that this fish was born in 2019, spent 2 years in the freshwater (2019 and 2020), entered the ocean in 2021, and 2+ years in the saltwater (2021 and 2022), came into the fresh to spawn then returned to the ocean that same year, then returned again in 2024 to spawn. The scale showed an obvious spawning check in 2023 suggesting this fish experienced significant metabolic demand to affect its growth pattern of the scale. Though WY2021 was classified as a dry year, a series of storms between late January 2021 through mid-February 2021 provided a brief migratory corridor in the lower river for smolts originating in Salsipuedes Creek to migrate to the ocean or lagoon.

Several large *O. mykiss* were captured during the WY2024 migration season that were suspected to be of anadromous origin due to their overall size and general appearance. A Salsipuedes Creek upstream (SU-08) was a 458 mm (18.0 inch) gravid female that was captured on 4/17/24 in Salsipuedes Creek and a Hilton Creek upstream (HU-39) was a 500 mm (19.7 inch) gravid female that was captured on 3/27/24 in Hilton Creek. Scale analysis suggests that these fish are likely resident *O. mykiss* that benefitted from the improved instream conditions following the wet winter of WY2023 and experienced significant growth due to the abundance of food resources and favorable rearing conditions in the LYSR mainstem. The growth was significant enough to question whether these fish were residents as the spacing of circuli indicated abundant food resources that could be indicative of ocean (or lagoon) growth. From genetic analyses, both SU-08 and HU-39 had the anadromous gene. SU-08 may have migrated into the system from Arroyo Grande Creek. HU-39 typed to Hilton Creek, most likely hatched in Hilton Creek, spent 3 years there then moved into the LYSR mainstem in WY2023, where deeper available habitat and food resources were abundant enough for the rapid growth seen on the scales.

Juvenile fish scales analyzed from similar sized fish collected in WY2024 showed distinctive growth patterns reflecting their different rearing habitat locations within Salsipuedes Creek, Hilton Creek, and the LYSR mainstem. This was thoroughly discussed in WY2024 AMS. WY2025 fish showed similar results after scales were analyzed.

The number of large *O. mykiss* greater than 400 mm (15.7 inches) showed a marked decrease in WY2025 as the dry year presented limited opportunities for movement through the watershed. In WY2024, there were 20 *O. mykiss* greater than 400 mm captured in both Salsipuedes and Hilton Creek migrant traps compared to 2 captured in WY2025; 1 upstream and 1 downstream migrant (Figure 106). No *O. mykiss* greater than 400 mm were captured in Salsipuedes Creek due to both low flows and a barrier beaver dam located downstream of the trapping location. The difference in large *O. mykiss* captures between the two water year types (wet WY2024 vs. dry WY2025) paints a stark picture in the ability of larger fish to migrate through the watershed. Wet years provide ample consecutive weeks/months of unimpeded movement whereas dry years only provide hours/days of movement opportunities.

4.11. The Return of Pacific Lamprey

Pacific lamprey (*Entosphenus tridentatus*) were last observed in the mid-1990s within the LSYR basin. They were observed within San Luis Obispo Creek and the Santa Clara River during the last couple of years. Their unexpected return to the LSYR in WY2025 was a welcomed surprise and was documented through bank observations, redd surveys and migrant trapping efforts. In the spring of WY2025, ammocoetes were observed approximately 5 miles below Bradbury Dam of varying sizes (approximately 4 inches and 6 inches, 2 separate cohorts). suggesting adults entered the basin during WY2023 and WY2024 (wet years) when there was full lower basin connectivity to the ocean and then successfully spawned. Shortly thereafter, adult lamprey were observed spawning in various reaches of the LSYR mainstem (14 miles and 40 miles upstream of the ocean). Eight adult lampreys were captured during routine migrant trapping efforts at Hilton Creek just below Bradbury Dam, which is 49 miles from the ocean. Seven of the eight lampreys had fin clip tissue samples collected from them. The tissue samples were then sent to the National Fish Hatchery in Hagerman ID for analysis that was facilitated by Jon Hess, The Senior Fisheries Geneticist for the Columbia River Inter-Tribal Fish Commission. The genetic results indicated that all 7 were Pacific lamprey, 6 of the 7 were ocean-maturing (early-maturing), all 7 were of large body size, and all 7 matched the expected reporting group (SOUTUS, Southern US). Ocean-maturing means they are ready to spawn upon entering the fresh water whereas river-maturing (late maturing) spend a year in the fresh water before spawning and have slightly different genetic makeup. Upon entering the fresh, lamprey do not parasitize freshwater fish and just use their body mass to survive. Their exact origin could not be determined. Field observations were documented with photographs and videos, and provided visual evidence of spawning activity, migration, and the condition of the individuals observed (Figures 108-110). COMB-FD biologists are now routinely looking for Pacific lamprey during all field activities.

4.12. Chronic Turbidity in the LSYR Mainstem

Chronic turbidity continued to be observed within and coming out of the Stilling Basin for the past 3 years (Figure 111). The Stilling Basin has always had some issues with visibility and turbidity. However, this condition has gotten noticeably worse since the 1/9/23 mudflows when it was thought that deposited sediments at the bottom of the lake had reached the top of the intake structure for the Penstock for the Outlet Works and translated along the lake bottom in the form of a density current. This phenomenon may have continued in WY2024 in a much lesser degree and most likely stopped in WY2025. A second potential cause of Stilling Basin turbidity could be from bottom feeding fish, specifically carp. There are numerous carp in the Stilling Basin that feed on the bottom and muck up water. There are also beavers that are now inhabiting the Stilling Basin that can create turbidity. The exact cause of the chronic turbidity in the Stilling Basin is most likely a combination of these elements where the dominant source would be the Outlet Works during higher releases and the Stilling Basin ecosystem during lower Outlet Works releases during dry years.

O. mykiss are visual feeders and turbid stream waters can negatively impact their ability to feed efficiently although it may provide better cover from predation for movement and migration. COMB-FD staff struggled to conduct snorkel surveys due to the lack of visibility and clear enough water to accurately count the fish assemblage as was done in the past, specifically in the Hwy 154 Reach. By the Upper Refugio Reach (upstream of the Encantado Pool [LSYR-4.95] and the Meadowlark Crossing) and reaches downstream, the water clarity improves particularly when the release rate from the Outlet Works is ramped down.

Options to address these problems are being investigated by Reclamation that include dredging in and around the intake structure for the Outlet Works, raising that structure well above the elevation of the bottom sediments, removing the carp from the Stilling Basin, installing a bypass pipeline around the Stilling Basin to reduce surface water thermal heating during the hotter months of the year, etc. Both dredging or Outlet Works intake structure extension would be very costly and difficult due to that structure's location in the deepest part of the lake. Further analyses are needed to determine an achievable solution to the observed chronic turbidity issue.

4.13. Beaver Dams, Updates and Issues

History: The historic range of the North American Beaver (*Castor canadensis*) in California is highly debated with some asserting that their southern limit was the Tehachapi Range while others state they were present throughout coastal watersheds and the San Franscico Bay Area (Lanman, 2013). CDFW appears to align more with the larger historic range and have set up their beaver management policies accordingly.

According to scientific literature beavers are non-native to the Santa Ynez River and were introduced to several locations in the Santa Ynez River watershed in May of 1947 (13 individuals) and May/June of 1948 (19). Beavers have sustained active populations in the watershed to the present time (Hensley, 1946; Baker and Hill, 2003; CDFG, 2005). The value of beavers in Southern California watersheds is debatable (Richmond et al., 2021). Based on over 16 years of data collection efforts regarding beaver dam distribution and 30 years of observations by the COMB-FD in the LSYR basin (mainstem and tributaries), the negative impact of so many dams in the watershed on *O. mykiss* migration during dry and average rain years cannot be overstated. This is particularly true regarding the ability of smolts to out migrate to the ocean when the windows of opportunity are limited (i.e., dry and average rain year types).

In the mid-1990s, their distribution within the LSYR watershed was spotty, localized to areas downstream of Buellton with a few scattered dams in the Salsipuedes Creek watershed. From 1995 to 2011, the hydrological regime was in a wetter cycle and the lake spilled on average about every three years (1995, 1998, 2001, 2005, 2006, 2008, and 2011) creating beaver migration opportunities throughout the lower LSYR basin (AMC, 2009). Since 2005, Hilton Creek releases and LSYR mainstem target flows were required to improve summertime *O. mykiss* rearing conditions in the LSYR mainstem in the year of and year after a spill when *O. mykiss* were present in the Refugio and Alisal reaches. Target flows are required to the Highway 154 Bridge (Hwy 154 Reach) for all other years until Lake Cachuma storage drops below 30,000 af. This coupled with WRO 89-18 releases during the dry years and WRO 2019-0148 target flows have provided water in the river during June through September that have resulted in a large expansion of riparian corridor vegetation (willows, cottonwoods, sycamores, mulefat, etc.) and in some places has greatly expanded into the surrounding floodplain due to the additional water. More riparian vegetation and a greater extent of flowing river water have enabled expansion of the spatial extent of the LSYR beaver population and their dams throughout the LSYR mainstem and select tributaries. Beaver dams can now be observed in the wetted reaches during the dry season from Bradbury Dam to the Narrows as well as portions of the LSYR mainstem downstream of the Lompoc Wastewater Treatment Plant. In addition, beavers now have successfully colonized the Salsipuedes/El Jaro Creek watershed despite their numbers and distribution being reduced during the WY2012-WY2016 drought.

Well established beaver dams can be of sufficient strength and breadth to remain in place during stormflows in dry and average rain years that can create passage barriers for migrating fish during low to moderate stormflow events. Other potential and significant impacts are submerging suitable spawning areas, increased turbidity due to movement, thermal heating of ponded water, decreased macroinvertebrate production (ponds are less productive than riffles), increased potential for non-native vegetation growth within their dams (i.e., Arundo and Tamarisk), and increased amount of suitable habitat for warm-water non-native piscivorous fish species.

Beaver Dams - Documentation and Potential Migration Barriers: Beaver dams can fragment habitats and force *O. mykiss* to spawn in suboptimal locations as they are unable to negotiate past large well-established dams. In WY2021, two large anadromous steelhead redds were identified 1.5 miles upstream of the Salsipuedes Creek confluence and 0.9 miles downstream of a significant beaver dam within the Narrows Reach. The steelhead spawned in the only area available that consequently went dry before the eggs hatched. Upon inspection, it was clear that the dam was a complete barrier to any upstream migrating fish due to the absence of a jump pool below the beaver dam, the height of the dam (2.7 feet) and no observable flow paths to enable fish to swim through or around the dam. Without the presence of beaver dams, it was likely those fish could have moved upstream into tributaries with more suitable habitats such as Hilton Creek. This was observed again in WY2025 when a large dam downstream of the Salsipuedes Creek trapping site completely cut off access to migrating fish as was discussed above.

From 2005 to 2010, COMB-FD biologists noted an increase in the number of beaver dams observed in the Alisal, Refugio, and Hwy 154 reaches, which called into question the efficacy of conducting Fish Passage Supplementation Releases and how successful the releases were regarding anadromous steelhead and outmigrating smolt passage with many LYSR mainstem beaver dams of varying sizes. In order to evaluate the number and distribution of beaver dams in the LSYR and to better understand movement challenges by *O. mykiss*, annual beaver dam surveys have been conducted along the entire LSYR and the Salsipuedes/El Jaro watershed since 2010. Prior to the 2012-2016 drought, regular spill events acted to remove beaver dams or provide enough flanking flows to allow for both upstream and downstream *O. mykiss* passage as evident in anadromous steelhead captures in both Hilton and Salsipuedes Creeks in WY2008, WY2011, and WY2024. While the drought did contribute to a significant reduction in both the number and geographic distribution of beavers, there has been a noticeable uptick in the number and distribution of beaver dams since the end of the drought in WY2017. The fewest LSYR mainstem dams identified were in 2016 with 45 dams documented. That number has increased to 80 in WY2021, 79 in WY2022, and 74 in WY2023 but decreased to 37 in WY2024 due to high streamflow events. Following the dry WY2025, 62 dams were documented. Beaver dams in the tributaries declined to zero in WY2019 then increased to 11 in WY2021, decreased to 4 in WY2022, increased to 5 in WY2023, increased to 7 in WY2024 and doubled to 14 in WY2025 (Figure 112).

Beaver Activities Transforming the Riparian Corridor: Beavers are classified as ecosystem engineers by changing their habitat to suit their needs (Jones et al., 1997). In the absence of significant spill and/or stormflow events, the overall beaver population and associated dams/pools have increased and contributed to a transformation of the riparian corridor throughout the LSYR watershed where beavers have been active. In the past, biologists have been able to negotiate pathways through the LSYR riparian corridor while conducting the beaver dam survey but that has not been the case since the WY2021 survey. Spatial distribution of dams has changed over time from scattered individual impoundments to contiguous complexes or impoundments along extensive sections of the LSYR. What was once a relatively confined channel (especially in Reach 3) has transformed into a marsh/reed/willow forest that in many places has extended well out into the floodplain and widened the riparian vegetation corridor. The dense vegetation can obscure or eliminate the active channel with no apparent migration pathway available for upstream and downstream migrating *O. mykiss*. Any new channel with flowing water has the potential for beaver dam building that with time could further extend the inundation zone and expansion of vegetation contributing to additional suitable habitat and food sources for beavers. Reed and willow growth in their present state have a high resilience to fluvial disturbances, slowing water velocities and reducing erosion and scour potential from moderate to high stormflows and creating obscure migratory pathways in the absence of high magnitude runoff events (Naiman et al., 1994). The extensive ponding and marsh habitat has also reduced and in some locations eliminated all spawning habitat. Also, the river channel downstream of beaver dams accumulates fine sediments as turbidity caused by beaver activities translates and settles into downstream habitats. Introduced species, such as the American beaver into the Santa Ynez River watershed, have altered the historical ecosystem and most likely negatively disrupted the balance of sustainability for native flora and fauna (Richmond et al., 2021). These beaver dam complexes often attract and favor non-native species (i.e., Centrarchids vs. *O. mykiss*, bull frogs vs. red-legged frogs, arundo donax, tamarisk, etc.). These invasive species all occur in the LSYR basin. Until a beaver management plan is developed and implemented, beavers will continue to impact endangered steelhead habitat and migration potential especially in dry and average years and favor non-native species competition. With climate change already influencing weather patterns, beaver dams will continue to negatively influence migration, spawning, and recruitment of *O. mykiss* within the LSYR basin.

4.14. Largemouth Bass Gut Analyses

O. mykiss can be negatively affected through competition of non-native species, either indirectly or directly. Co-habitation of non-native fish species and *O. mykis*s is an example of indirect competition, while piscivory is considered direct competition. Largemouth bass (*Micropterus salmoides*) are known to compete both indirectly and directly with Southern California steelhead and resident rainbow trout. The form of competition is largely dependent on the size of co-habitating individuals, the condition of the habitat, and the food supply.

COMB obtained a CDFW Scientific Collection Permit in 2024 to investigate piscivory of *O. mykiss* by largemouth bass and bullfrogs (*Lithobates catesbeianus*) within the LSYR mainstem. The CDFW Specific Use Permit (ID S-230095001-23262-001) allowed COMB to sacrifice up to 30 largemouth bass and 30 bullfrogs to conduct eDNA gut analyses to determine the presence of piscivory of *O. mykiss* by these two non-native species.

Back-to-back wet years increased suitable oversummering habitat for *O. mykiss* in the Refugio and Alisal reaches of the LSYR mainstem during the summer of WY2024. Unlike WY2024, WY2025 was a dry year, and as a result there was less suitable oversummering habitat for *O. mykiss*. Despite having less suitable oversummering habitat, an above normal count of *O. mykiss* continued to be recorded during the spring and fall snorkel surveys in these reaches. In addition to a higher than average standing crop of *O. mykiss* within the LSYR mainstem, many fish rescues in Quiota Creek and relocations occurred in the late spring and early summer of WY2025, which increased the total number of smaller trout occupying the upper reaches of the river as rescued fish were released in those reaches.

A boom in the beaver population and their dams as result of the last 2 wet years created more ponding habitat for largemouth bass, bullfrogs, and other non native species.

Despite late August being well past the spawning season and emergence period, COMB staff were able to capture a total of 11 medium to large-sized *M. salmoides* that were sacrificed by spear that were sent out for eDNA gut analysis to Cramer Fish Science (GENIDAQS) lab in Sacramento. All of these fish came from the Alisal and Refugio reaches of the LYSR. Only 2 of the 11 sampled largemouth bass were less than 13 inches, with the majority being in the 13 – 18 inch size class category. It should be noted that divers observed larger bass in WY2025 but were unable to get close enough to spear them. No bullfrogs were in close enough proximity to be captured for gut analysis this year.

In WY2024, 8 largemouth bass were captured in August and their gut content analyzed with no hits of *O. mykiss* DNA. It was determined that the sampling was too late in the year and the sample size was too small.

The results of the eDNA analysis in WY2025 showed 3 positive hits of 11 largemouth bass sampled for *O. mykiss* DNA which represents a 27% detection rate of the sample set. The stomach content evacuation rate of largemouth bass is not a single value but depends heavily on factors such as water temperature, predator size and meal size. Evacuation rates increase exponentially with rising water temperatures. Considering that a bass can fully digest and evacuate prey items in as little as 2 days, the fact that 3 of the sampled bass contained *O. mykiss* DNA suggests that predation by warm-water fish is a significant risk factor for the O. mykiss population. Risk of false positives include bass scavenging deceased trout, secondary predation, and environmental DNA contamination (ingestion of free-floating DNA). In this case, due to the rapid deterioration of DNA within the stomach due to gastric acids, underestimation of predation seems far more likely than overestimation. Suggestions for future sampling would be to obtain the target species earlier in the season when smaller *O. mykiss* YOYs are more likely to be present and more abundant, as well as targeting larger sized largemouth bass that tend to be more piscivorous than their smaller counterparts.

4.15. Poaching Concerns in the LSYR Mainstem

Beginning in 2024, the COMB-FD discovered an increase in evidence of fishing (discarded rods and tackle, lures, bait, etc.) along the LSYR mainstem, principally in the reaches where the general public has access to the river (Avenue of the Flags Bridge, Alisal Bridge, and Refugio Bridge). Fishing for any species is illegal downstream of Bradbury Dam due to the potential for poaching the endangered steelhead/rainbow trout. To help combat this growing concern, the COMB-FD installed additional no fishing signs in WY2024 along river access points, gates, and areas where the public could gain access to the river. At the most popular public access locations, such as Alisal Bridge (LSYR-10.5), multiple (official) no fishing signs were installed. The increase in fishing activity was presumably due to the explosion of the *O. mykiss* population in the LSYR mainstem over the past 2 wet years, whether from people directly seeing abundant trout in the river or from word of mouth from other poachers/anglers in the Santa Ynez River Valley.

In WY2025, nearly every reach of the river from Lake Cachuma down to the confluence of Salsipuedes Creek had evidence of illegal poaching (Figure 113). Even private property reaches away from the public and bridge access locations contained fishing evidence. Fishing items were found during routine spawning surveys, thermograph deployments, and snorkel surveys throughout the year. Fishing lines were found discarded on banks (or attached to vegetation over the water), lures were found hanging off trees (or on branches both over and under the water surface), bobbers, barbed baitholder hooks, and empty night crawler containers were found along the banks of the shoreline. Any fishing tackle found by staff was picked up to discourage additional angling along the river, as well as the standard good practice of keeping the river clear of trash and debris.

COMB has a long-standing relationship and history working with the enforcement divisions of NMFS and CDFW. Since CDFW game wardens patrol the Santa Ynez River basin on a regular basis, this agency has been the preferred point of contact for any poaching related observations as they typically can respond to violations in progress. Depending on the type of violation, the CalTip general dispatch line can be used, or specific game wardens have been directly called via cell phone.

In the summer of WY2025, after seeing an increase in fishing activity along the river, COMB-FD reached out to their CDFW enforcement contacts and provided new detail (maps, photographs, lat/longs) where poaching had recently been observed along the river. In early September, staff conducted a field tour with a local CDFW warden along the river. COMB personnel showed the warden various access points, roads and gate entry, and specific habitats where recent poaching evidence had been discovered. During the field tour, the warden mentioned that 3 new enforcement agents were being hired in the region and he would be instructing his new staff on which sections of the river to regularly patrol.

4.16. Status of the Tributary Fish Passage and Habitat Enhancement Projects

By the end of calendar year 2024, 16 tributary fish passage and habitat enhancement projects and 6 stream restoration projects for a total of 22 projects have been completed within the LSYR basin in support of the LSYR basin *O. mykiss* population (Table 29). Many of the fish passage projects, but not all, were listed in the 2000 BiOp (Tables 30-31-35 and Figures 114-119). All documented anthropogenic passage impediments within the Salsipuedes/El Jaro Creek and Quiota Creek watershed have now been removed, allowing for full adult and juvenile *O. mykiss* passage throughout the streams. Fish have been observed moving through all of these fish passage facilities, and in cases where fish ladders were installed, fish often use the ladders for refuge and over-summering habitats.

The lake water deliveries from the HCWS/HCEBS have transformed Hilton Creek into a dense riparian corridor where there is little thermal heating from the URP to the confluence with the LSYR mainstem. In 2005, completion of the Hilton Creek Cascade Chute Project doubled the available habitat for *O. mykiss* in the watered section of Hilton Creek and releases from the URP provided for extensive riparian vegetation growth that has shaded and cooled the stream water (Figures 62 and 120). Channel changes and the redistribution of optimal sized spawning gravels throughout Hilton Creek from the Whittier Fire, coupled with continuous Lake Cachuma water deliveries to the URP since

WY2019, and gravel augmentation (2017-2018 and 2024-2025) have greatly enhanced instream spawning and rearing conditions throughout the creek.

All these tributary fish passage enhancement projects removed potential passage barriers for adult and juvenile *O. mykiss*, reduced sediment supply to the stream, and/or provided for passage, spawning (gravel augmentation), and rearing of *O. mykiss* upstream of the project area. Many of the completed tributary projects also enhanced the footprint of the project by creating additional pools and refuge habitat, and by increasing native riparian vegetation.

Heavy rainfall and subsequent stormflow events in WY2023 and WY2024 damaged some of the instream elements of several previously completed COMB tributary restoration projects. To bring them back to the As-Built condition or better to address climate change, COMB successfully completed in the fall of 2023 repairs and enhancements on instream constructed elements on Quiota Creek at Crossings 5 and 9. The landowner did the same at Crossing 0A. In the fall of 2024, COMB successfully completed repairs and enhancements on Quiota Creek at Crossings 8, 4, 3 and 1 (listed in the order of construction) plus on El Jaro Creek at Rancho San Julian. The landowner finally removed the partial fish passage barrier at Quiota Creek Crossing 0B in October (2024) and just left it as an at-grade dirt crossing. At the end of WY2025, all of these projects remained in their As-Built (repaired/enhanced) conditions.

Future tributary enhancement projects include further gravel augmentation and fish passage and habitat enhancements in Hilton Creek pending grant applications and receiving funding and permits.

4.17. Aging *O. mykiss* through Scale Analyses (WY2025 and WY2011)

Each year, COMB-FD staff looks back one or several years to catch up on reading and analyzing scales from previous water years. Scale analyses are valuable and offer insights regarding growth patterns, environmental changes, and differences between one stream and another. The following describes findings from WY2025 and WY2011. Scales were not taken or could be analyzed from every captured fish due to being too small to sample, embedded scales that could not be removed, regenerated scales, or recaptured fish.

WY2025: A total of 132 scales were analyzed from WY2025 trapping season; 60 upstream fish (59 from Hilton Creek and 1 from Salsipuedes Creek), 63 downstream fish (57 from Hilton Creek and 6 from Salsipuedes), and 9 carcasses found throughout the year (Highway 154 Reach, Upper Refugio Reach, and Quiota Creek). Fish were classified as 1+ to 4+ year olds with fish ranging in size from 76 mm to 556 mm. An age-length relationship was developed to calculate a trendline and determine an R^2 value. An R^2 value (coefficient of determination) is a statistical measurement that indicates how well a regression model fits a set of data. R^2 values greater than 0.9 are considered an A, 0.89 to 0.8 a B and less than 0.7 are considered a failure. The R^2 value for the WY2025 scales was 0.79 that showed decent agreement between the size and age of the fish sampled (Figure 121).

WY2011: A total of 263 scales were analyzed out of 485 captures during the WY2011 trapping season; 58 upstream migrants (39 from Hilton Creek, 16 from Salsipuedes Creek, and 3 from the LSYR mainstem) and 205 downstream migrants (71 from Hilton Creek, 121 from Salsipuedes Creeks, and 16 from the LSYR mainstem) (Table 32). An age-length relationship was developed with a determined trendline and R^2 value of 0.71 (Figure 122). The most common aged fish were 1+ at 139 and 59 at 2+ with the largest and oldest fish aged at 6 years old (427 mm) (Figure 123). This year, there were 59 from Hilton Creek, 176 from Salsipuedes Creek, and 14 from the LSYR mainstem (Figure 124). There were 9 anadromous steelhead captures all going upstream at Salsipuedes Creek in WY2011; one was a recapture that showed up at the Hilton Creek trap.

4.18. Summary of Actions Taken Under COMB's CDFW MOU

COMB obtained a California Endangered Species Act (CESA) Fish and Game Code Section 2081(a) Memorandum of Understanding (MOU) to allow for take of *O. mykiss* for the following authorized project components:

- Migrant Trapping
- Passive Integrated Transponder (PIT) Tag Placement and Monitoring
- Secondary Basin Monitoring
- Calibration Sampling Associated with Snorkel Surveys

During calendar year 2025, COMB only conducted Migrant Trapping due to having Federal ESA coverage for that action and will be the only project component reported. COMB is awaiting ESA coverage for the other 3 project components. The methodology, procedure, and results of all migrant trapping efforts were presented in Section 3.4 above.

In summary, there were 192 *O. mykiss* captures from both the Hilton Creek and Salsipuedes Creek trap sites, 105 were Juveniles and 87 were adults. There were no *O. mykiss* injuries or mortalities throughout this project component. All fish were released in good condition in the direction they were traveling. These numbers were well below the juvenile, adult, and indirect mortality totals within the MOU (1,700, 450, and 21, respectively). There were 9 COMB-FD employees that participated in the effort, all were listed in the MOU. These data only appear in this WY2025 Annual Monitoring Summary and a reduced version in the WY2025 Annual Monitoring Report that is submitted to NMFS and CDFW by Reclamation.

4.19. Genetic Analyses 2025

NOAA Southwest Fisheries Science Center (Center) at UC Santa Cruz annually receives and analyzes *O. mykiss* tissue samples obtained from the LSYR basin that were collected during migrant trapping, fish rescued/relocated, mortalities, and carcasses. The objective of submitting these tissue samples are:

- Conduct required 2000 BiOp genetic analysis of tissue samples,
- Establish California coastal steelhead lineage (wild or hatchery),
- Determine origin, and
- Determine resident or anadromous.

The genetic analysis at the Center is done under supervision by Dr. Carlos John Garza and Dr. Anthony Clemento. The Center holds the eastern Pacific inventory for steelhead genetics that allows for comprehensive analyses and comparison across the entire species of which tissue samples from the LSYR basin are a small part of the entire inventory. DNA extraction is done with a panel of 95 single-nucleotide polymorphism (SNP) markers, 3 of which are known to be linked to anadromy at chromosome Omy05.
The results and a summary received from the Center of LSYR basin tissue analysis from samples collecting in 2025 revealed the following conclusions (Clemento and Garza, 2026).

In 2025, there were 198 tissue samples submitted from the LSYR basin (mainstem and tributaries). The genetic findings were consistent with past analyses. Each fish received a potential genetic assignment of origin based on the genetic analysis with a rank and score percentage (with 5 levels of ranking) (Table 33). Fifteen of the samples failed genotyping completely. Most of the out of basin assignments had low confidence, hence they were included in the table but only those with higher percentages will be discussed. In general, most of the fish were genetically assigned to the LSYR basin and specifically to their natal stream (Hilton Creek, Salsipuedes Creek, Quiota Creek, or the LSYR mainstem within 10 miles of Bradbury Dam). Most sampled fish from Hilton Creek were assigned to that creek except 8 that were assigned to the LSYR mainstem, 4 to Quiota Creek, and 2 to Santa Cruz Creek upstream of Bradbury Dam. One fish assigned to the Fillmore Hatchery.

This year multiple Quiota Creek fish were sampled, and assignments were to Quiota Creek, the LSYR mainstem, Hilton Creek, Salsipuedes Creek, Arroyo Grande Creek, and the Salinas River (Tassajara Creek). Most of the carcasses and mortalities (7 of 8) recovered from the LSYR mainstem (Upper Refugio Reach) were fish assigned to Hilton Creek, the Salsipuedes Creek, and the LSYR mainstem. Salsipuedes Creek fish showed little to no mixing of populations closer to the dam or from watersheds outside of the LSYR basin. This is not surprising considering target flows from Bradbury Dam are required only to the Alisal Bridge during wet years such as WY2024. Prior to WY2023, the reservoir hadn’t spilled since WY2011 with little opportunity for fish between the 2 creeks to intermingle during those drier years. Also, Salsipuedes Creek is the first stream steelhead from the ocean encounter so the likelihood of steelhead reaching Salsipuedes Creek compared to Hilton Creek is greater in all but the wettest of years.

There was a low level of gene flow from outside of the LSYR basin, documented by low assignment rankings of origin from out of basin locations. This suggests that the *O. mykiss* populations in the LSYR basin in general are isolated by distance but do continue to express an anadromous life-history when possible. Both the resident and anadromous alleles (an alternative version of a specific gene) were present. The anadromy-associated Omy05 allele continues to be present at high frequency (85%) in the LSYR basin.

There continues to be low hatchery introgression (Fillmore Mt. Whitney strain, Mokelumne River, or American River hatcheries) which suggests planted hatchery fish in Lake Cachuma that move downstream during spill events have a low survival rate. Only one Fillmore Hatchery fish was found that was confirmed in the field as the fish had a spaghetti tag.

Clemento-Garza do state that historically the frequency of the anadromous gene associated with anadromy is higher in the Salsipuedes Creek than the Hilton Creek populations suggesting a greater disposition to anadromy and less to the resident life-history strategy as is observed in Hilton Creek. Those same gene frequencies observed in Hilton Creek are more difficult to interpret as the two watersheds have completely different flow regimes (natural vs. artificial), especially during the critical summer period and normal to dry water years. It is possible that the increased frequency of residency associated genes in Hilton Creek reflects the target flow releases to the creek that provide optimal conditions that support a resident life-history (i.e., summer rearing flows) compared to the natural flow regime seen in Salsipuedes Creek.

Overall, the high frequency of the anadromy associated gene observed in the population found throughout the LSYR basin is indicative of their anadromous legacy and provides additional evidence that these fish are indeed descendants of coastal Southern California steelhead. Since these populations still have access to the ocean in most years, the anadromous alleles at Omy05 can confer a predisposition to the pursuit of an anadromous life history when conditions are advantageous.

4.20. Update on the Lake Cachuma Oak Tree Program

The 2024 annual oak tree inventory was completed on 6/03/25 with the objective of determining the status and success rate of the trees planted since the beginning of the program with 13 years of planting. At the end of 2024, 5,740 oak trees have been planted and 4,599 were alive and thriving (an 78.62 % survival rate) (Figure 125). There are 597 alive planted trees above the 2025 mitigation target of 4,002 alive and self-sustaining oak trees. COMB has found that trees planted inside Cachuma County Park as opposed to outside the park have a higher success rate due to easier access for maintenance, less brush that would otherwise provide habitat for herbivores that eat oak trees (e.g., deer, woodrats, rabbits, etc.), a water source inside the Park to ease the process of filling the water truck and trailer, and clean mulch piles on site that can be utilized as needed. The lessons learned by the COMB-FD staff from 13 years of conducting the Oak Tree Program have been put into practice and are recommended for future work. These lessons include annual mulching, deer cage maintenance, exposing buried gopher wire baskets, planting trees slightly above the surrounding ground level when planting new trees, and planting larger trees. The remaining tasks until the end of the program in 2025 are weeding, mulching, maintaining the deer protection cages, then removing the cages when the trees are taller than 6 feet. It is essential to maintain communication with Park officials regarding the trees planted within the park. This helps to ensure that the success rate continues to follow a positive trend within the Park property and public outreach can be done effectively.

4.21. Invasive Plant Species – Monitoring, Status, and Recommendations

Water Hyacinth: Water hyacinth is native to the Amazon Basin in South America. It has emerged as a major weed in more than 50 countries in the tropical and subtropical regions of the world with profuse and profound impacts, specifically in the Sacramento-San Joaquin River Delta where it has heavily impacted the river ecology and fisheries (Villamagna and Murphy, 2010). Invasive water hyacinth (*Eichhornia crassipes*) was first discovered in the LSYR during beaver dam surveys in December 2013, approximately 2 miles downstream of the Avenue of the Flags Bridge in Buellton. The infestation extended approximately 1.2 miles downstream and was contained by COMB-FD staff with assistance from the California Conservation Corps over the course of 3 years within that section of the river channel. Staff surveyed that section of river in WY2025 during beaver dam surveys and did not observe any water hyacinth (last observation was 12/8/16). This has become a routine field monitoring activity during beaver dam surveys.

Arundo: Arundo (*Arundo donax*, giant reed) is a noxious weed and a significant problem in many watersheds in central and southern California due to being a very thirsty plant, which propagates quickly and easily through several means, out competes native plants and reduces biodiversity, and tends to narrow stream channels resulting in increased flood risks. If left unchecked, Arundo can evolve to be the dominant species in the riparian corridor. Arundo was first discovered along the Santa Ynez River several decades ago and was first mapped in 2008 by the County of Santa Barbara Agricultural Commissioner's Office and was observed below and above Lake Cachuma in isolated locations. A weed removal program was conducted by the County for a couple of years (2012-2013) that helped but did not eradicate Arundo. Currently it is found most prominently in the lower watershed west of Lompoc and continues to spread and be a major threat to the wellbeing of the watershed. A comprehensive eradication program needs to be reinitiated.

Tamarisk: Tamarisk (*Tamarix ramosissima*, Salt Cedar) is another noxious plant found along the banks of the Santa Ynez River and Lake Cachuma. It is described as a small multi-stemmed tress with origins in eastern Asia, northern Africa and southern Europe. It was discovered in the watershed about the same time as Arundo and has a similar distribution (above and below Lake Cachuma). Its distribution was mapped at the same time as Arundo in 2008 by the County but only small-scale, temporary efforts have been performed to remove tamarisk in the Santa Ynez River watershed (e.g. Channel Islands Restoration efforts 2020). Its impacts on the watershed are like Arundo and it needs to be treated before it gets out of control as observed in other Southern California watersheds (Ventura and Santa Clara River bottoms) and along the Colorado River. It is prominently found upstream of Lake Cachuma, particularly on the dry lakebed but now it can be found in many locations downstream of the dam and it is rapidly spreading. During fall snorkel surveys (October) in WY2025 tamarisk has been observed throughout the Alisal Reach and particularly in the Refugio and Upper Refugio Reach. In WY2025, COMB-FD staff have observed <u>thousands</u> of newly sprouted plants along the Santa Ynez riverbanks and these newly sprouts have grown and continue to spread along the riparian corridor. This is the largest infestation of tamarisk observed in the LSYR by the COMB-FD in the last 30 years and without some sort of systematic eradication effort soon, tamarisk will begin to negatively impact water delivery for both environmental, municipal and agricultural uses in the near term. This is particularly concerning with respect to the vast amount of water a large tamarisk can transpire in a day which is upwards of 200-300 gallons per day and can lower the water table and make it harder for native plants to compete. Tamarisk roots can grow as far as 15 feet down and extract salt from the soil, which can change the soil's natural chemistry and make it difficult for native plants to survive. By removing tamarisk before it becomes the dominant vegetation component, native plant communities would be maintained, water resources saved and in turn will provide a benefit to aquatic resources dependent on healthy, properly functioning riparian communities. Like Arundo, tamarisk needs to be included in a comprehensive eradication program.

4.22. Seiche Oscillation Observed at Lake Cachuma

Starting in the spring and further developing in the summer, Lake Cachuma develops a stratified thermal gradient, separated by three general zones (Figure 126). At the surface zone, or epilimnion, water is heated by incoming radiation and mixed by the wind, becoming less dense. At the bottom zone or hypolimnion, the water is cold and dense and isolated from the surface wind mixing. These zones of stable temperature are separated by a boundary zone called the thermocline, where water temperature transitions from the epilimnion to the hypolimnion over generally a 10-to-20-foot gradient. A steady wind from one direction, will cause a shift in the location of the thermocline, as the wind results in warm epilimnion water being pushed to the downwind side of the lake, resulting in the upwelling of the hypolimnion. The thermocline becomes tilted, pushed downward on the downwind side and raised temperatures at depth, and pushed upward on the upwind side, causing temperatures to cool at depth at the upwind side. As the wind subsides, the thermocline will tilt back to its original position. This process is known as seiche oscillation.

We can detect this phenomenon at the USGS Hilton Creek Temperature Gauge during a one-to-two-week period in the late fall when the thermocline reaches the depth of the intake for Hilton Creek (65 ft). Normally, when the intake is below the thermocline (through spring, summer, and early fall) there is a diurnal temperature pattern of the stream water which closely follows the air temperature, with the water warmest in the afternoon and coolest just before dawn with a 0.5 degree Celsius oscillation. However, when the thermocline is around 65 feet, and Lake Cachuma experiences winds with an eastern direction during the day (consistent pattern wind increases in the afternoon), we observed temperatures at Hilton Creek dropping in the afternoon and rising at night consistent with the wind-driven seiche oscillation of the thermocline and a 1-to-2-degree Celsius oscillation. (Figure 127). Once the thermocline passes below the Hilton Creek intake the diurnal fluctuation returns to the normal pattern of warmest water in the afternoon and coolest water in the morning with approximately 0.5 degrees Celsius oscillation. This increased oscillation of the temperature of Hilton Creek is a strong signal for the upcoming turnover and full mixing of the lake in the late fall/early winter.

4.23. Status of WY2024 Annual Monitoring Summary Recommendations:

The following is a status report (i.e., completed, ongoing, no longer applicable, or should carry forward to next year) for all the recommendations listed in the WY2024 Annual Monitoring Summary to improve the monitoring program pending available funding:

- Continue to implement the monitoring program described in the revised BA (USBR, 2000), BiOp (NMFS, 2000), and Water Rights Order (WRO) 2019-0148 (SWRCB, 2019) to evaluate *O. mykiss* and their habitat within the LSYR for long-term trend analyses and improve consistency of the monitoring effort for improved year-to-year comparisons;
    - Status: This recommendation is being followed and is ongoing.

- Obtain a CDFW CESA Incidental Take Permit (ITP) for specific Cachuma Project Operations that were not covered on the obtained CDFW MOU for *O. mykiss* take. These operations include but are not limited to stranding surveys during spill and WRO 89-18 ramp-down, unexpected incidents, etc.;
    - Status: This recommendation is in process and may be incorporated to some degree into the current CDFW MOU.

- Continue to support Reclamation upon their request of information needed for their Reconsultation process with NMFS, in particular efforts to increase the Incidental Take Statement (ITS) limits for both juvenile and adult *O. mykiss* to best cover the current and future population size;
    - Status: This recommendation is being followed and is ongoing.

- Develop fish passage and habitat enhancements within the watered section of Hilton Creek to maximize the access and utility of the fishery. Obtain concurrence from Reclamation, develop designs and apply for construction funding to support the project(s);
    - Status: This recommendation is being followed and is ongoing.

- Continue to work with Reclamation to maximize releases to Hilton Creek by way of the HCWS/HCEBS versus the Outlet Works to the Stilling Basin to maximize support of the downstream fishery, increase attraction flows to Hilton Creek, and minimize lake release stream temperatures entering the Long Pool and LSYR mainstem habitats downstream;
    - Status: This recommendation is being followed and is ongoing.

- Investigate with Reclamation Stilling Basin management actions specifically 1) a Stilling Basin bypass pipeline system at the tail of the pool to provide target flow releases without the potential for thermal heating and warm water fish species movement downstream; 2) limiting *O. mykiss* access to the Stilling Basin, 3) establishing a small road for access to the Stilling Basin, and 4) dewatering of the Stilling Basin for non-native fish removal;
    - Status: Little progress has been made on this recommendation, but staff will continue to push forward on this task.

- Complete the WY2025 AMS and submit the WY2025 AMR to Reclamation by the end of the Calendar Year;

  - Status: The draft WY2025 AMR was sent to Reclamation on 12/3/25 and was completed on 2/2/26. The WY2025 AMS will be completed in March of this year. This timetable seems to be working well for all hence will be followed going forward.

- Continue to work closely with Reclamation on the implementation of the WRO 2019-0148 to conduct all required monitoring and reporting in a timely manner;
  - Status: This recommendation is being followed and is ongoing.

- Continue to monitor the Narrows Reach specifically during years with limited fish passage to conduct redd surveys, snorkel surveys, and water quality monitoring;
  - Status: This recommendation is being followed and is ongoing.

- Continue annual development and implementation of a Migrant Trapping Plan in collaboration with Reclamation that would be reviewed and approved by NMFS to assure compliance with take limits set forth in the 2000 BiOp;
  - Status: This recommendation is being followed and is ongoing.

- Continue the Hilton Creek Gravel Augmentation Project for the second year. Work with Reclamation to evolve this effort into an ongoing program for Hilton Creek and the Hwy 154 Reach of the LSYR mainstem;
  - Status: This recommendation is being followed. Staff will investigate with Reclamation on how best to continue the effort.

- Continue to work with the SYRWCD on further developing their ramp-up and ramp-down procedures for WR 89-18 releases to enhance the successful implementation of the release and minimize impacts to the downstream fishery; this collaboration was started in WY2020;
  - Status: This recommendation is being followed and is ongoing.

- Continue to evolve the collaborative relationship with CDFW and NMFS regarding fish rescue within the LSYR basin until an ITP can be obtained for these needed efforts. Initiate this effort as soon as conditions warrant entering into the dry season;
  - Status: This recommendation is being followed and is ongoing.

- Initiate a PIT tag monitoring effort in the LSYR basin to identify current and future CDFW tagged fish;
  - Status: This is being discussed with Reclamation and FD staff is awaiting a response.

- Continue to monitor hydrogen sulfide and phosphorous on the bottom of the lake and at Outlet Works releases once the lake has fully stratified and anoxic conditions are present on the lake bottom. Hydrogen sulfide is toxic to O. mykiss and phosphorus may be a limiting nutrient for prolific downstream algal mat formation;

    - Status: This recommendation is being followed and is ongoing.

- Continue to implement the study described in the obtained CDFW Scientific Collection Permit to better understand piscivory by adult largemouth bass and bull frogs on *O. mykiss*;
    - Status: This recommendation is being followed and is ongoing.

- Develop a Beaver Management Plan and an Invasive Species Management Plan for the LSYR basin;
    - Status: This continues to be a good recommendation and is being considered in the Reconsultation effort between Reclamation and NMFS.

- Continue collaborative efforts with Reclamation to restore, improve, and make reliable its system operation for delivering lake water to Hilton Creek;
    - Status: This recommendation is being followed and is ongoing.

- Continue collaborative efforts with Reclamation to gather continuous data on the water temperature discharged from the Outlet Works of Bradbury Dam to the LSYR to monitor BiOp compliance of a maximum of 18ºC of that discharge water;
    - Status: This recommendation is being followed and is ongoing.

- Continue with scale analyses (including historic data) to assure all scales have been read and documented that are currently in the LSYR *O. mykiss* scale inventory;
    - Status: This recommendation is being followed and is ongoing.

- Continue working with the US Geological Survey to assure stream discharge and water quality monitoring is implemented and posted as contracted;
    - Status: This recommendation is being followed and is ongoing.

- Continue to maintain and develop landowner relationships in the LSYR basin to foster cooperation and gain access to reaches for all monitoring and restoration tasks;
    - Status: This recommendation is being followed and is ongoing.

- Continue to look for interested parties to develop an Arundo and Tamarisk Eradication Plan and search for funding to implement the needed effort;
    - Status: This recommendation is being followed and is ongoing. Multiple potential partners have been contacted with the objective of writing a proposal this coming year.

- Continue to work with CDFW game wardens to further discourage and report illegal fishing on the LSYR, especially above Alisal Bridge and near the Alisal Bedrock Pool where evidence of illegal fishing practices has been observed; and
    - Status: This recommendation is being followed and is ongoing.

- Continue working with other *O. mykiss* monitoring programs within the Southern California Steelhead DPS and the Monte Arido Highland Biogeographic Region to improve collective knowledge, collaboration, and dissemination of information.
    - Status: This recommendation is being followed and is ongoing.

5. Conclusions and Recommendations

WY2025 was a dry year. It was the 65th wettest, the 9th driest year on record, and the 6th driest water year since the 2000 BiOp was issued. Bradbury Dam recorded only 9.69 inches of rain with the highest rainfall occurring in February and March. Lake Cachuma did not spill and started the water year at 93.5% and ended the water year at 77.6% of capacity. A minimum of 2.0 cfs were delivered to Hilton Creek at the URP and LRP, and target flows to the Highway 154 Bridge and Alisal Bridge were met throughout the water year. The lagoon opened and closed several times during the water year but only for short periods of time. It closed on 5/18/25 for the rest of the water year.

WY2025 continued to have turbid water through much of the year in the LSYR mainstem, yet redds and thereafter YOYs were observed, suggesting successful spawning. Snorkel survey numbers were again up in the Refugio and Alisal reaches as was observed in WY 2024. This was a significant year for Quiota Creek where the multi-decadal fish passage restoration efforts were rewarded with an explosion in the population numbers in Quiota Creek as well as indications of an increase frequency of the anadromous alleles in the Quiota Creek population now that it is fully connected to the LSYR. An extensive fish rescue/relocation effort with CDFW was needed in Quiota Creek due to drying conditions in the lower half of the watershed and the highly successful spawning that occurred.

94 redds were documented across the LSYR basin. They were observed in Hilton Creek (15), Quiota Creek (19), Salsipuedes Creek (12), El Jaro Creek (5), Los Amoles (1), and 42 redds observed in the LYSR mainstem (Upper Refugio, Refugio, and Alisal reaches). More redds may have been there as YOYs were observed in Hilton, Quiota, and Salsipuedes/El Jaro creeks as well as within the Upper Refugio, Refugio and same in the Alisal reaches.

Monitoring tributary and LSYR mainstem *O. mykiss* populations has resulted in observations that fluctuate by water year type, instream flows, spawning success, and over-summer rearing conditions. The continuation of the long-term monitoring program within the LSYR basin is essential for tracking population trends, particularly as restoration efforts are completed and adaptive management actions are realized. Collaboration with other local monitoring programs within the Southern California Steelhead DPS and Monte Arido Highland Biogeographical Region is desirable to better understand population viability and restoration potential at a regional scale.

Recommendations to Improve the Monitoring Program: Based on observations and gained knowledge, the following suggestions (consistent with WY2024 AMS recommendations) are provided by the COMB-FD's staff to improve the ongoing fisheries monitoring program in the LSYR basin in accordance with the BiOp, BA, and FMP from WY2025 onward:

- Continue to implement the monitoring program described in the revised BA (USBR, 2000), BiOp (NMFS, 2000), and Water Rights Order (WRO) 2019-0148 (SWRCB, 2019) to evaluate *O. mykiss* and their habitat within the LSYR for long-term trend analyses and consistency of the monitoring effort for improved year-to-year comparisons;
- Obtain a CDFW CESA Incidental Take Permit (ITP) for specific Cachuma Project Operations that were not covered within the obtained CDFW MOU for *O. mykiss* take. These operations include but are not limited to stranding surveys during spill and WRO 89-18 ramp-down, unexpected incidents, etc.;
- Continue to evolve the collaborative relationship with CDFW and NMFS regarding fish rescue and relocation within the LSYR basin until an ITP can be obtained for these needed efforts. Initiate this effort as soon as conditions warrant entering into the dry season;
- Continue to support Reclamation upon their request for information needed for their Reconsultation process with NMFS, in particular efforts to increase the Incidental Take Statement (ITS) limits for both juvenile and adult *O. mykiss* to best cover the current and future population size;
- Continue to work closely with Reclamation on the implementation of the WRO 2019-0148 to conduct all required monitoring and reporting in a timely manner;
- Write a CDFW-FRGP grant to implement the proposed fish passage and habitat enhancement project within the watered section of Hilton Creek to maximize the access and utility of the fishery. Obtain funding for the project and approval from Reclamation to implement the proposed project;
- Continue to work with Reclamation to maximize releases to Hilton Creek by way of the HCWS/HCEBS versus the Outlet Works to the Stilling Basin with no overall change in dam releases to maximize support of the downstream fishery, increase attraction flows to Hilton Creek, and minimize lake release stream temperatures entering the Long Pool and LSYR mainstem habitats downstream;
- Investigate with Reclamation Stilling Basin management actions specifically 1) a Stilling Basin bypass pipeline system at the tail of the pool to provide target flow releases without the potential for thermal heating and warm water fish species movement downstream; 2) limiting *O. mykiss* access to the Stilling Basin, 3) establishing a small road for access to the Stilling Basin, and 4) dewatering of the Stilling Basin for non-native fish removal;
- Continue to complete the draft Annual Monitoring Report by the end of the Calendar Year and the draft Annual Monitoring Summary shortly thereafter;
- Continue to monitor the Narrows Reach specifically during years with limited fish passage to conduct redd surveys, snorkel surveys, and water quality monitoring;
- Continue annual development and implementation of a Migrant Trapping Plan in collaboration with Reclamation that would be reviewed and approved by NMFS to assure compliance with take limits set forth in the 2000 BiOp;
- Consider extending the Hilton Creek Gravel Augmentation Project initiated by Reclamation for an additional 2 years while reconsultation with NMFS continues

for a new BiOp. Also, work with Reclamation to evolve this effort into an ongoing program for Hilton Creek and the Hwy 154 Reach of the LSYR mainstem that would be included in the new BiOp;

- Continue to work with the SYRWCD on further developing their ramp-up and ramp-down procedures for WR 89-18 releases to enhance the successful implementation of the release and minimize impacts to the downstream fishery; this collaboration was started in WY2020;
- Initiate a PIT tag monitoring effort in the LSYR basin to identify current and future CDFW tagged fish;
- Continue to monitor hydrogen sulfide and phosphorous on the bottom of the lake and at Outlet Works releases once the lake has fully stratified and anoxic conditions are present on the lake bottom. Hydrogen sulfide is toxic to *O. mykiss* and phosphorus may be a limiting nutrient for prolific downstream algal mat formation;
- Continue to implement the study described in the obtained CDFW Scientific Collection Permit to better understand piscivory by adult largemouth bass and bull frogs on *O. mykiss*;
- Continue collaborative efforts with Reclamation to restore, improve, and make reliable its system operation for delivering lake water to Hilton Creek;
- Continue with scale analyses (including historic data) to assure all scales have been read and documented that are currently in the LSYR *O. mykiss* scale inventory;
- Obtain and deploy turbidity meters going downstream from the dam to the end of the Refugio Reach to track water clarity on a longitudinal profile to better understand and document turbidity issues. This will require obtaining approximately 10 deployable units with dataloggers.
- Deploy a vertical array of temperature loggers (thermographs) near the deepest point of Lake Cachuma (HCWS Intake Barge) at 1-meter intervals that cross the thermocline with the objective of documenting the observed seiche oscillation in WY2025 after the lake is well stratified and prior to lake turnoff. The deployment should be for a month at 1-hour intervals.
- Continue working with the US Geological Survey to assure stream discharge and water quality monitoring is implemented and posted as contracted;
- Continue to maintain and develop landowner relationships in the LSYR basin to foster cooperation and gain access to reaches for all monitoring and restoration tasks;
- Continue to look for interested parties to develop an Arundo and Tamarisk Eradication Plan and search for funding to implement the needed effort;
- Continue to work with CDFW game wardens to further discourage and report illegal fishing on the LSYR, especially above Alisal Bridge and near the Alisal Bedrock Pool where evidence of illegal fishing practices has been observed; and
- Continue collaborative efforts with Reclamation to gather continuous data on the water temperature discharged from the Outlet Works of Bradbury Dam to the LSYR to monitor BiOp compliance of a maximum of 18 ºC of that discharge water;

- Develop a Beaver Management Plan and an Invasive Species Management Plan for the LSYR basin; and
- Continue working with other *O. mykiss* monitoring programs within the Southern California Steelhead DPS and the Monte Arido Highland Biogeographic Region to improve collective knowledge, collaboration, and dissemination of information.

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3. Monitoring Results

Table 1: WY2000 to WY2025 rainfall (precipitation) at Bradbury Dam, reservoir conditions, passage supplementation, and water rights releases.

Water Year	Rainfall Bradbury* (in)	Year Type**	Spill	# of Spill Days	Reservoir Condition Storage (max) (af)	Elevation (max) (ft)	Passage Supplementation	Water Right Release
2000	21.50	Normal	Yes	26	192,948	750.83	No	Yes
2001	31.80	Wet	Yes	131	194,519	751.34	No	No
2002	8.80	Dry	No	0	173,308	744.99	No	Yes
2003	19.80	Normal	No	0	130,784	728.39	No	No
2004	10.60	Dry	No	0	115,342	721.47	No	Yes
2005	44.41	Wet	Yes	131	197,649	753.11	No	No
2006	24.50	Wet	Yes	54	197,775	753.15	Yes	No
2007	7.40	Dry	No	0	180,115	747.35	No	Yes
2008	22.59	Wet	Yes	53	196,365	752.70	No	No
2009	13.66	Dry	No	0	168,902	743.81	No	No
2010	23.92	Wet	No	0	178,075	747.05	Yes	Yes
2011	31.09	Wet	Yes	53	195,763	753.06	No	No
2012	12.69	Dry	No	0	180,986	748.06	No	No
2013	7.57	Dry	No	0	142,970	733.92	No	Yes
2014	9.96	Dry	No	0	91,681	710.00	No	Yes
2015	9.38	Dry	No	0	60,992	691.09	No	Yes
2016	11.45	Dry	No	0	32,900	669.57	No	Yes
2017	25.48	Wet	No	0	99,152	715.25	No	Yes
2018	9.32	Dry	No	0	82,580	706.27	No	Yes
2019	23.79	Wet	No	0	156,374	740.23	Yes	No
2020	21.03	Normal	No	0	156,960	740.45	Yes	Yes
2021	11.84	Dry	No	0	135,402	731.94	No	Yes
2022	13.13	Dry	No	0	95,586	713.41	No	Yes
2023	40.23	Wet	Yes	271	196,120	754.00	No	No
2024	32.61	Wet	Yes	315	196,976	754.27	No	No
2025	9.69	Dry	No	0	180,475	748.91	No	No

* Bradbury Dam rainfall (Cachuma) period of record = 73 years (1953-2025) with an average rainfall of 20.02 inches.

** Year Type: dry =< 15 inches, average = 15 to 22 inches, wet => 22 inches.

Table 2: WY2025 and historic precipitation data for six meteorological stations in the Santa Ynez River Watershed (source: County of Santa Barbara and USBR).

Location	Station	Initial Year	Period of Record	Long-term Average	Minimum Rainfall		Maximum Rainfall		Rainfall (WY2025)
	(#)	(date)	(years)	(in)	(in)	(WY)	(in)	(WY)	(in)
Lompoc	439	1955	71	14.76	5.31	2007	34.42	1983	8.24
Buellton	233	1955	71	16.54	5.87	2014	41.56	1998	6.99
Solvang	393	1965	61	18.39	6.47	2007	43.87	1998	7.16
Santa Ynez	218	1951	75	15.75	6.58	2007	36.36	1998	6.68
Cachuma*	USBR	1953	73	20.16	7.33	2007	53.37	1998	9.69
Gibraltar	230	1920	106	26.41	8.50	2013	73.12	1998	12.10
Jameson	232	1926	99	28.87	8.50	2007	79.52	1969	12.62
* Bradbury Dam USBR rainfall.									
** UC Cooperative Extension data.									

Table 3: (a) Storm events greater than 0.1 inches of rainfall at Bradbury Dam with associated flow conditions (> 10 cfs) at Salsipuedes Creek (SC) and the Los Laureles (Los L) gauging stations and (b) monthly rainfall totals at Bradbury Dam during WY2025; dates reflect the starting day of the storm and not the storm duration.

(a)

#	Date	Rainfall (in.)	SC 10 cfs	Los L 10 cfs
1	11/27/2024	0.15	No	No
2	12/15/2024	0.10	No	No
3	12/25/2024	0.23	No	No
4	1/26/2025	0.37	No	No
5	2/5/2025	0.85	Yes	No
6	2/12/2025	3.03	Yes	Yes
7	3/3/2025	0.17	No	No
8	3/6/2025	0.54	No	No
9	3/13/2025	2.68	Yes	Yes
10	3/18/2025	0.10	Yes	Yes
11	3/30/2025	0.23	No	No
12	4/26/2025	0.27	No	No
13	9/19/2025	0.11	No	No
14	9/24/2025	0.10	No	No

(b)

Month	Rainfall (in.)	%
Oct-24	0.07	0.7
Nov-24	0.50	5.2
Dec-24	0.38	3.9
Jan-25	0.37	3.8
Feb-25	3.89	40.1
Mar-25	3.83	39.5
Apr-25	0.33	3.4
May-25	0.07	0.7
June-25	0.00	0.0
July-25	0.00	0.0
Aug-25	0.00	0.0
Sept-25	0.25	2.6
Total:	**9.69**	100

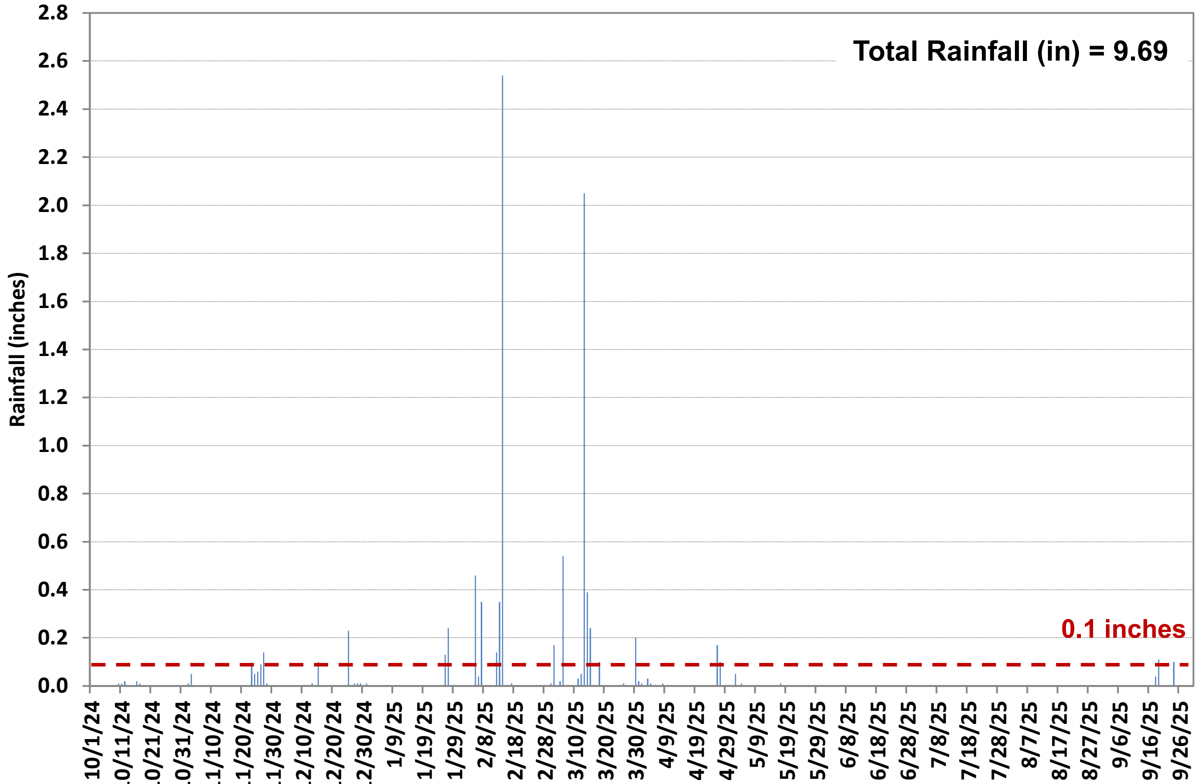


Figure 1: Daily rainfall in WY2025 as recorded at Bradbury Dam (USBR).

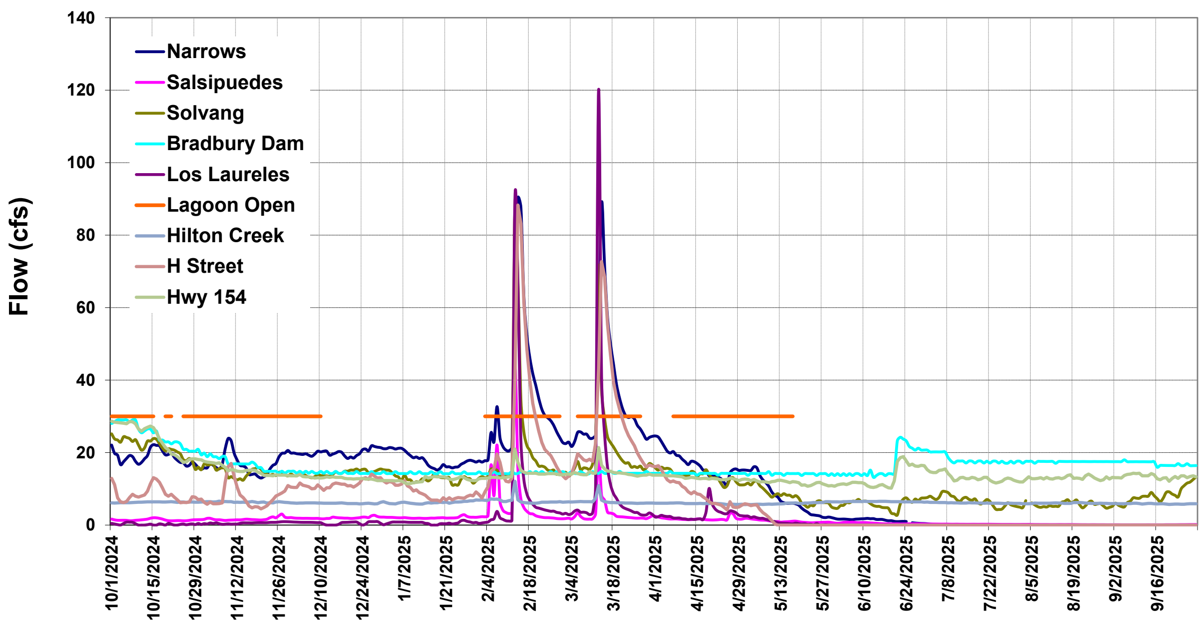


Figure 2: Santa Ynez River discharge and the period when the Santa Ynez River lagoon was open to the ocean (154 days) in WY2025.

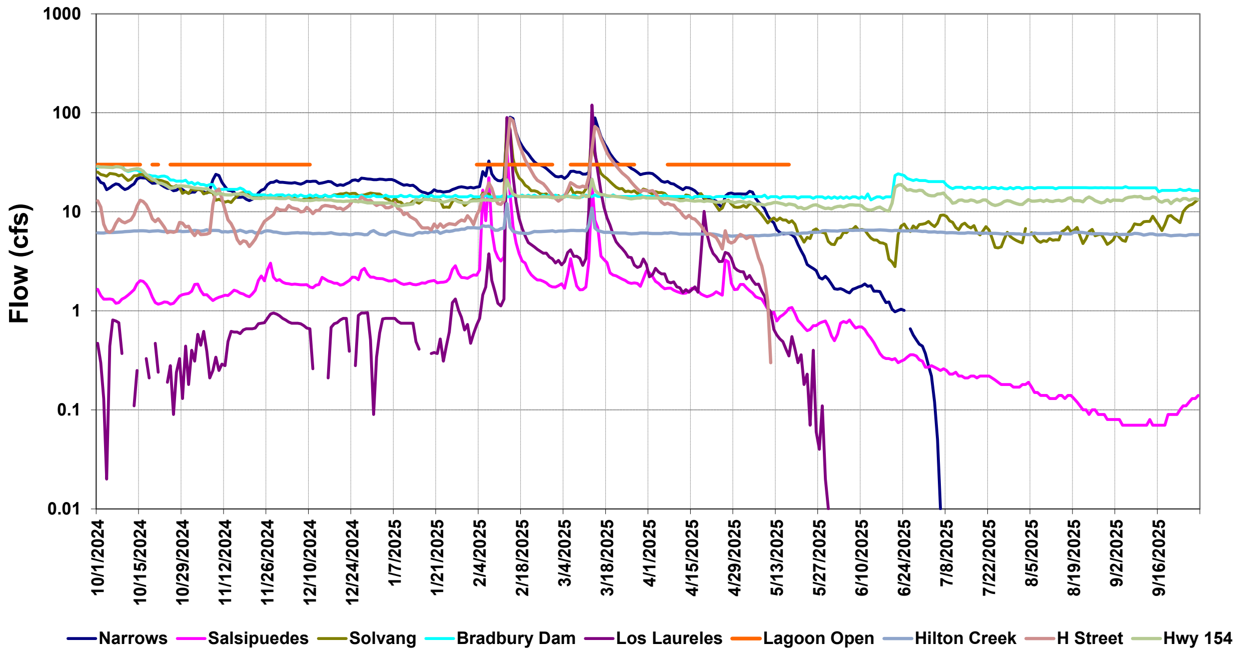


Figure 3: USGS average daily discharge (log scale) at the LSYR mainstem USGS gauging stations at Los Laureles, Bradbury Dam (USBR), Hilton Creek (USBR), Hwy 154, Alisal Bridge (Solvang), Salsipuedes Creek, the Narrows, and H Street (Lompoc) during WY2025.

Table 4: Ocean connectivity, lagoon status and number of days during the *O. mykiss* migration season from WY2001 to WY2025.

Water Year	Year Type	Ocean Connectivity	Lagoon Status Open	Lagoon Status Closed	Lagoon Status # of Days	# of Days Open in Migration Season*
2001	Wet	Yes	1/11/01	6/5/01	146	141
2002	Dry	No	-	-	0	0
2003	Normal	Yes	12/20/02	5/19/03	151	139
2004	Dry	Yes	2/26/04	3/22/04	26	26
2005	Wet	Yes	12/27/04	7/21/05	207	151
2006	Wet	Yes	3/1/06	-	214	92
2007	Dry	Yes	-	11/21/06	52	0
2008	Wet	Yes	1/6/08	5/19/08	135	135
2009	Dry	Yes	2/16/09	3/17/09	30	30
2010	Wet	Yes	1/19/10	5/6/10	107	107
2011	Wet	Yes	12/20/10	-	285	151
2012	Dry	Yes	-	5/17/12**	80	33
2013	Dry	No	-	-	0	0
2014	Dry	No	-	-	0	0
2015	Dry	No	-	-	0	0
2016	Dry	No	-	-	0	0
2017	Wet	Yes	2/7/17	4/4/17	57	57
2018	Dry	No	-	-	0	0
2019	Wet	Yes	1/18/19	5/6/19	107	107
2020	Normal	Yes	4/7/20	-	177	55
2021**	Dry	Yes	-	12/7/20	55	0
			1/28/21	3/10/21	30	30
2022	Dry	No	-	-	0	0
2023	Wet	Yes	1/3/23	-	271	149
2024**	Wet	Yes	-	11/10/23	33	0
			12/21/23	-	282	146
2025**	Dry	Yes	-	10/16/24	16	0
			2/3/25	5/18/25	154	89

* Migration Season is January through May.
** Lagoon opened and closed several times during the water year.

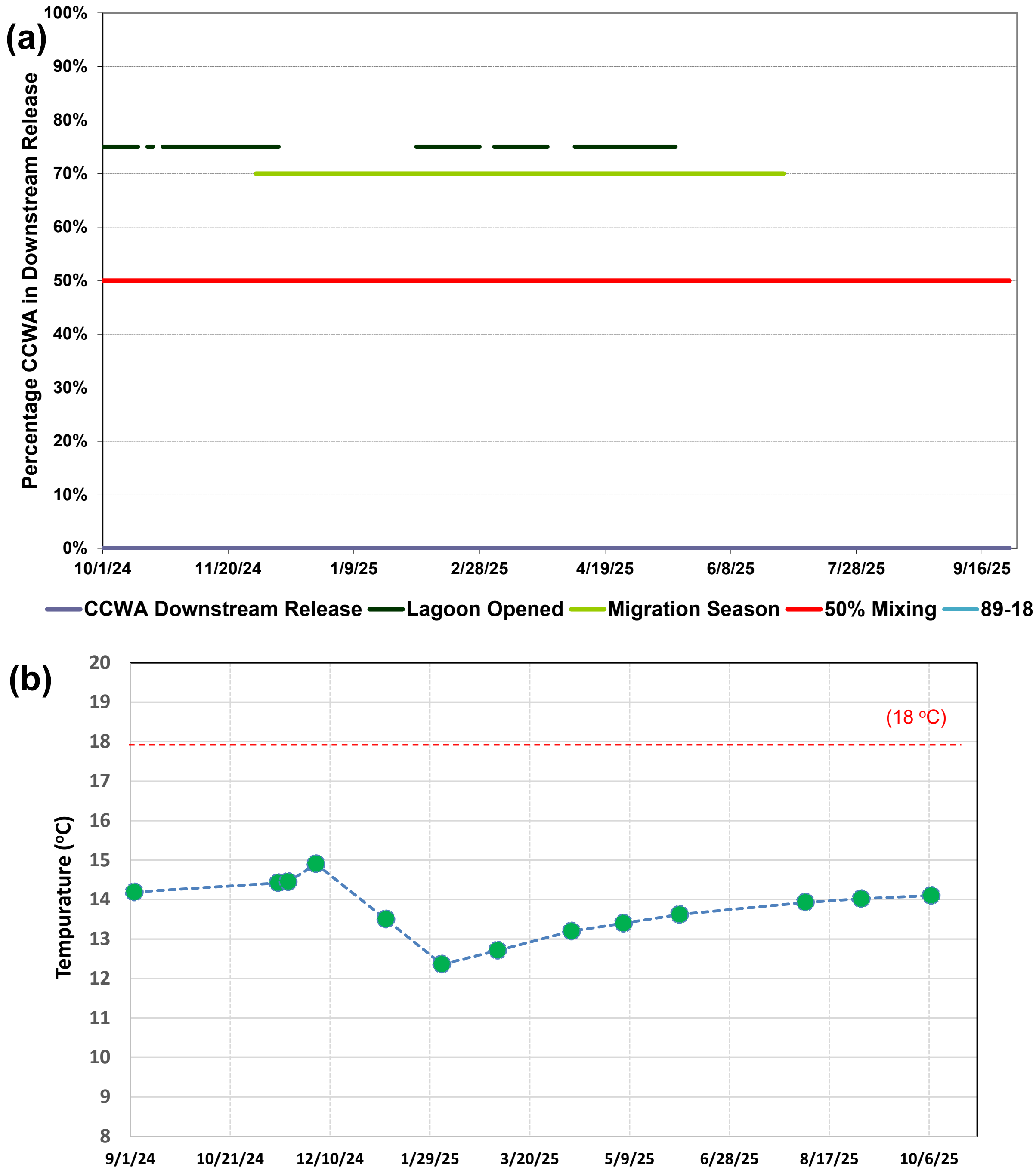


Figure 4: State Water Project (SWP) release into the LSYR regarding BiOp compliance with (a) the 50-50 mix rule showing the percentage of CCWA water being released from Bradbury Dam downstream to the Long Pool and (b) the 18 ºC rule for the water temperature being released from the Outlet Works; there were no SWP deliveries through the Bradbury Dam Outlet Works (penstock) in WY2025 hence bottom lake profile data were used for this graph.

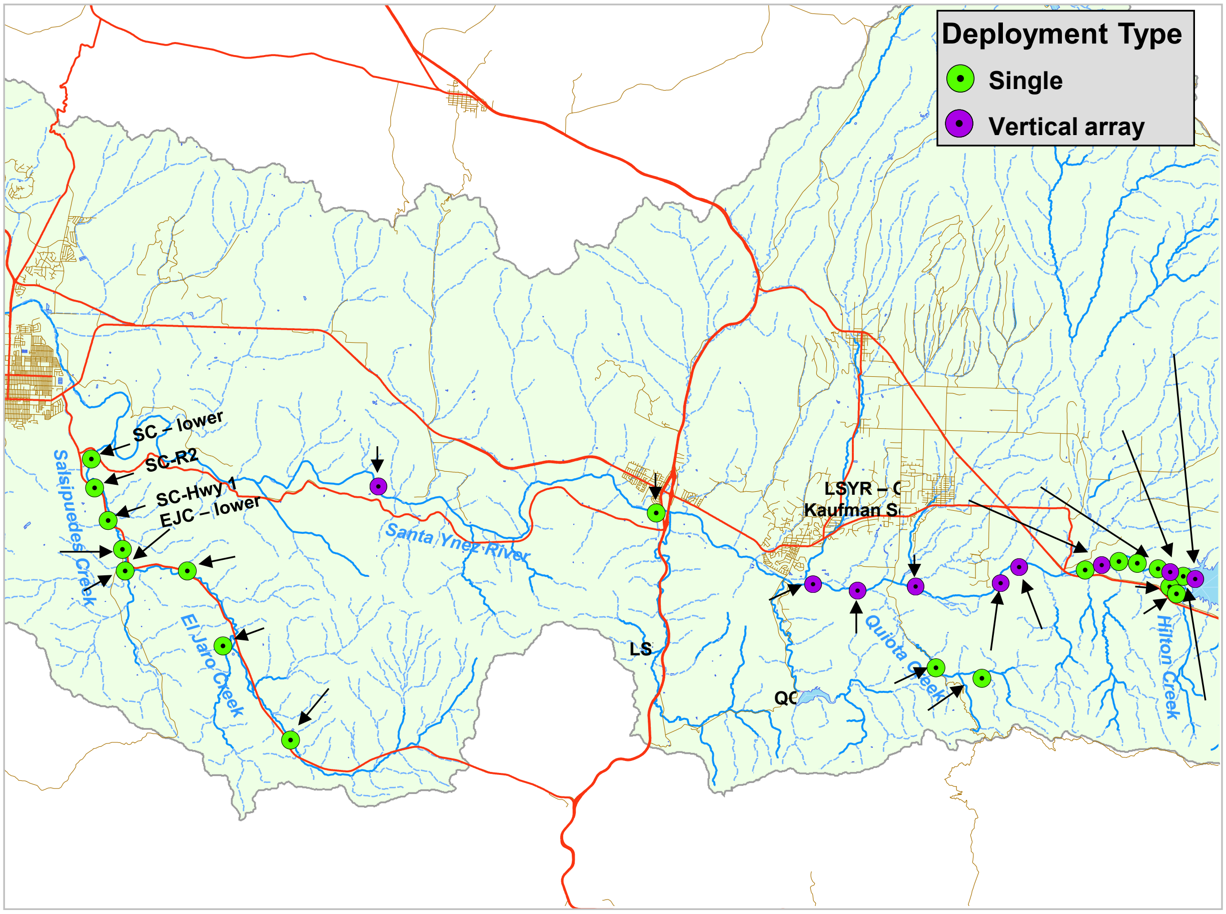


Figure 5: Thermograph single and vertical array deployment locations in WY2025 within the LSYR and its tributaries (HC – Hilton Creek, QC – Quiota Creek, SC – Salsipuedes Creek, and EJC – El Jaro Creek); the El Jaro Creek site and upper Salsipuedes Creek sites are close together with overlapping symbols.

Table 5: 2025 thermograph network locations and period of record listed from upstream to downstream; the LSYR-1.09 unit was lost prior to downloading.

	Location Name	Stream ID	Type	Latitude	Longitude	Deployment Date	Retrieval Date	Period of Record (Days)	# of units (#)
Mainstem	LSYR - Stilling Basin Parapet Wall	LSYR-0.01	Vertical Array	34.585472	-119.98316	4/15/2025	10/24/2025	192	3
	LSYR - D/s of Stilling Basin	LSYR-0.25	Single	34.586502	-119.985333	4/15/2025	10/24/2025	192	1
	LSYR - Long Pool	LSYR-0.51	Vertical Array	34.588545	-119.987998	4/15/2025	10/31/2025	199	3
	LSYR - D/s of Long Pool	LSYR-0.68	Single	34.590550	-119.991317	4/15/2025	10/24/2025	192	1
	LSYR-Grimm Property-Upstream	LSYR-1.09	Single	34.590097	-119.999322	4/17/2025	~	~	1
	LSYR-Grimm Property-Downstream	LSYR-1.54	Single	34.59423	-120.00537	4/17/2025	10/24/2025	190	1
	LSYR-Grimm Property Pool	LSYR-1.71	Vertical Array	34.594533	-120.008004	4/17/2025	10/24/2025	190	3
	LSYR-Kaufman Property Pool	LSYR-2.77	Single	34.589631	-120.025523	4/17/2025	10/24/2025	190	1
	Upper Refugio	LSYR-4.15	Single	34.591814	-120.0473	4/15/2025	10/27/2025	195	1
	LSYR - Encantado Pool	LSYR-4.95	Vertical Array	34.583817	-120.058500	4/17/2025	11/3/2025	200	3
	LSYR - Double Canopy	LSYR-7.65	Vertical Array	34.583998	-120.096764	4/17/2025	10/31/2025	197	2
	LSYR - Head of Beaver	LSYR-8.7	Vertical Array	34.581116	-120.114454	4/29/2025	10/31/2025	185	3
	LSYR - Alisal Bedrock Pool	LSYR-10.2	Vertical Array	34.583267	-120.141369	4/29/2025	10/31/2025	185	3
	LSYR - Avenue of the Flags	LSYR-13.9	Single	34.606734	-120.195150	4/29/2025	10/31/2025	185	1
	LSYR - Cadwell Pool	LSYR-22.68	Vertical Array	34.610143	-120.306920	4/29/2025	10/31/2025	185	3
Tributaries	Hilton Creek (HC)-lower	HC-0.12	Single	34.587132	-119.986255	4/15/2025	10/24/2025	192	1
	HC - upper (URP)	HC-0.54	Single	34.581522	-119.982846	4/15/2025	10/24/2025	192	1
	Quiota Creek (QC)-Crossing 6	QC-2.66	Single	34.559525	-120.084834	4/15/2025	10/28/2025	196	1
	Salsipuedes Creek (SC)-lower-Reach 1	SC-0.77	Single	34.620473	-120.423552	4/16/2025	10/16/2025	183	1
	SC-Reach 2-Bedrock Section	SC-2.2	Single	34.61168	-120.42191	4/16/2025	10/16/2025	183	1
	SC-Reach 4-Hwy 1 Bridge	SC-3.0	Single	34.597429	-120.413034	4/16/2025	10/17/2025	184	1
	SC-Reach 5-Jalama Bridge	SC-3.5	Single	34.589551	-120.408944	4/16/2025	10/21/2025	188	1
	SC-upper at El Jaro confluence	SC-3.8	Single	34.583953	-120.408199	4/16/2025	10/22/2025	189	1
	El Jaro Creek (EJC)-Lower-Confluence	EJC-3.81	Single	34.584167	-120.407983	4/16/2025	10/22/2025	189	1
	EJC-Palos Colorados	EJC-5.4	Single	34.574767	-120.371795	4/16/2025	10/22/2025	189	1
	EJC-Rancho San Julian Bridge	EJC-10.82	Single	34.530013	-120.342545	4/16/2025	10/22/2025	189	1
	Los Amoles Creek (LAC)-Creek Crossing	LAC-7.0	Single	34.558216	-120.369581	4/16/2025	10/22/2025	189	1
*Stream distance for El Jaro Creek (a tributary of Salsipuedes Creek) are to the confluence with the LSYR mainstem.									42

Table 6: 2025 water quality monitoring sites with *O. mykiss* and/or non-native warm water fish species presented as present/absent for reference with the water quality data; blanks indicate no fish species were observed.

Reach	Sub-Reach	Habitat Name	Stream ID	Observed Fish Species*: Spring	Summer	Fall
LSYR Mainstem:						
Reach 1	Hwy 154	Stilling Basin	LSYR-0.01	n/s	n/s	n/s
		Downstream of Stilling Basin	LSYR-0.25	n/s	n/s	n/s
		Long Pool	LSYR-0.51	n/s	n/s	n/s
		Downstream of Long Pool	LSYR-0.68	n/s	n/s	n/s
		LSYR-Grim Property Downstream	LSYR-1.54	O	n/s	O
		LSYR-Grimm Property Pool	LSYR-1.71	O	n/s	
		LSYR-Kaufman Property Run	LSYR-2.77	O	n/s	O
Reach 2	Refugio	Upper Refugio	LSYR-4.15	O	n/s	O
		Encantado	LSYR-4.95	O, B, C	n/s	O, B, C
		Double Canopy Pool	LSYR-7.65	O	n/s	O, B, C
	Alisal	Head of Beaver Pool	LSYR-8.7	O, C	n/s	O, B
		Bedrock Pool	LSYR-10.2	n/s	n/s	n/s
Reach 3	Ave. of the Flags	Ave. of the Flags (HWY 101)	LSYR-13.9	n/s	n/s	n/s
	Cadwell	Cadwell Pool	LSYR-22.68	n/s	n/s	n/s
Tributaries:						
Hilton	Lower Hilton	Lower Hilton Creek near Conf.	HC-0.12	O	n/s	O
	Upper Hilton	Hilton Creek URP Pool	HC-0.54	O	n/s	O
Quiota	Crossing 6	Crossing 6 Pool	QC-2.66	O	n/s	O
Salsipuedes	Reach 1	Salsipuedes Creek at Trap Site	SC-0.77	n/s	n/s	n/s
	Reach 2	Salsipuedes Creek Reach 2 Bedrock Section	SC-2.2	n/s	n/s	n/s
	Reach 4	Salsipuedes Creek at Highway 1 Bridge	SC-3.0	O, S	n/s	O, S
	Reach 5	Salsipuedes Creek at Jalama Bridge	SC-3.5	O, S	n/s	O, S
	Upper Salsipuedes	Salsipuedes Creek upstream of El Jaro Conf.	SC-3.8	n/s	n/s	n/s
El Jaro	Lower El Jaro	El Jaro upstream of Conf. with Salsipuedes	EJC-3.81	S	n/s	
	Palos Colorados	Palos Colorados Pool	EJC-5.4	O, S	n/s	n/s
	Rancho San Julian	EL Jaro at Rancho San Julian Bridge	EJC-10.82	O	n/s	O
Los Amoles	Lower Los Amoles	Lower Los Amoles Creek Crossing	LAC-7.0	n/s	n/s	n/s

* O - *O. mykiss*, B - bass, S - sunfish, C - carp, Ca - catfish, blank means zero observed.

n/s - not snorkeled due to turbidity, or no summer survey conducted.

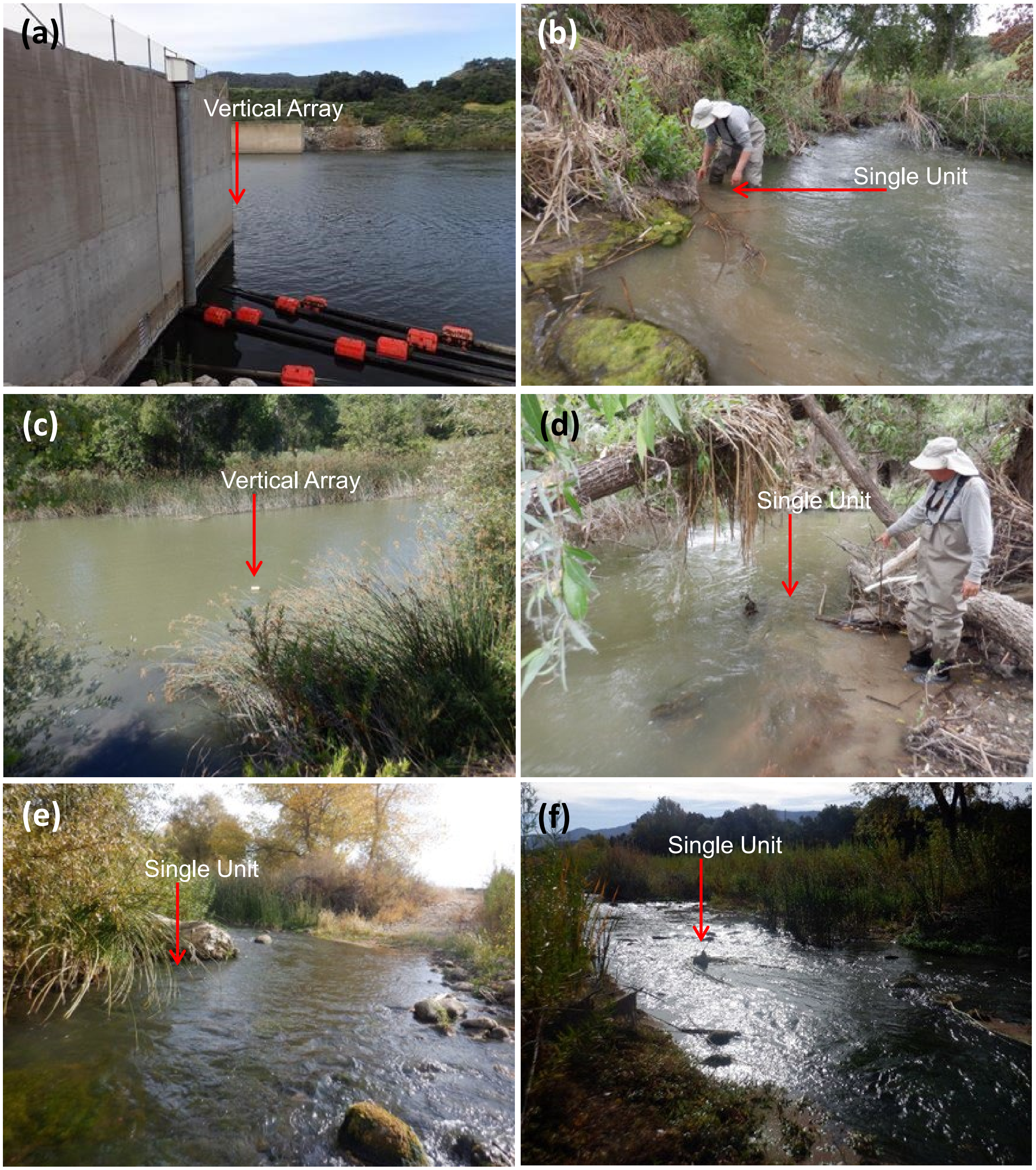


Figure 6: 2025 LSYR mainstem temperature unit deployment locations at: a) LSYR-0.01, b) LSYR-0.25, c) LSYR-0.51, d) LSYR-0.68, (e) LSYR-1.09, and (f) LSYR-1.54.

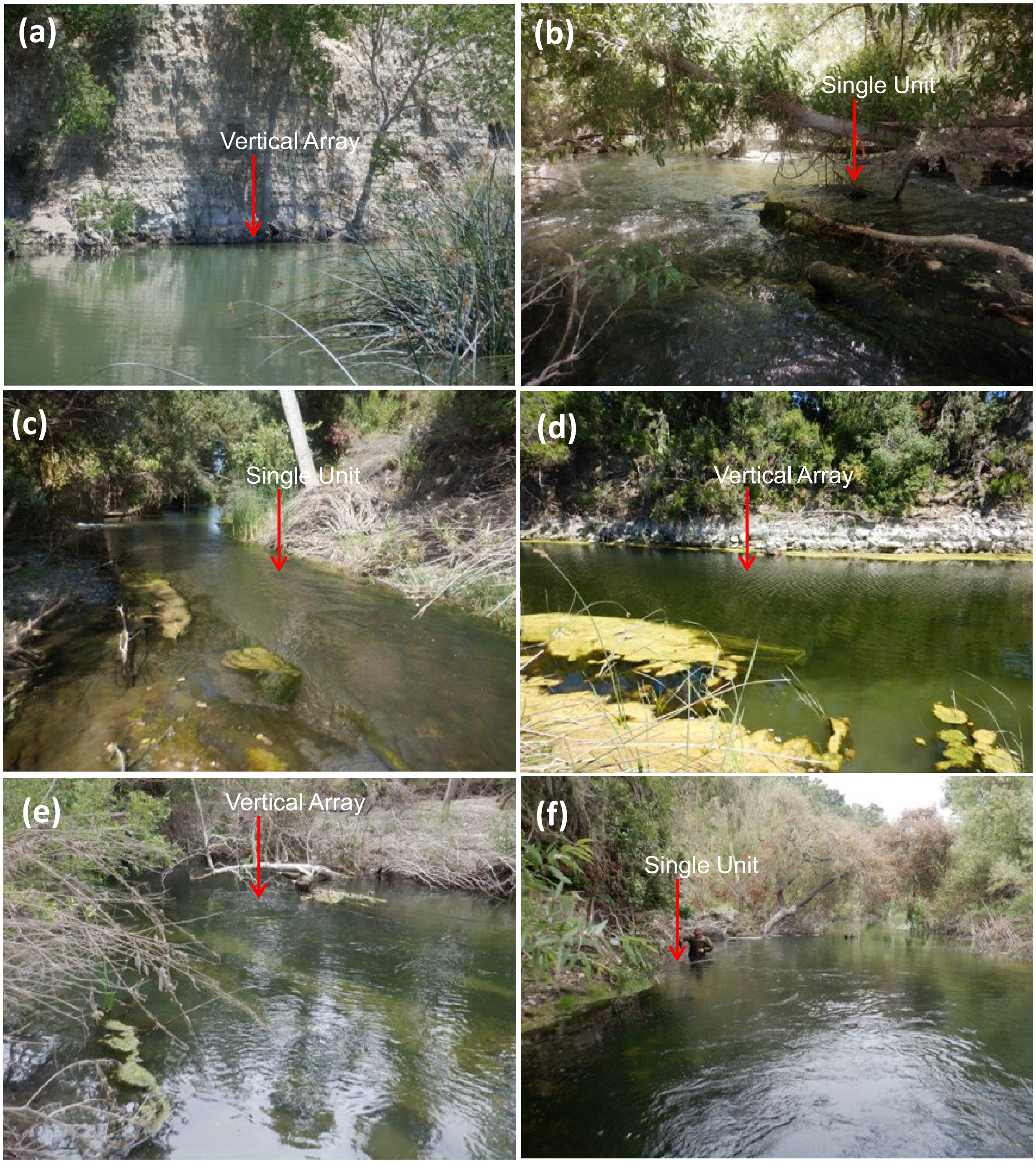


Figure 7: 2025 LSYR mainstem temperature unit deployment locations at: (a) LSYR-1.71, (b) LSYR-2.77, (c) LSYR-4.15, (d) LSYR-4.95, (e) LSYR-7.65, and (f) LSYR-8.7.

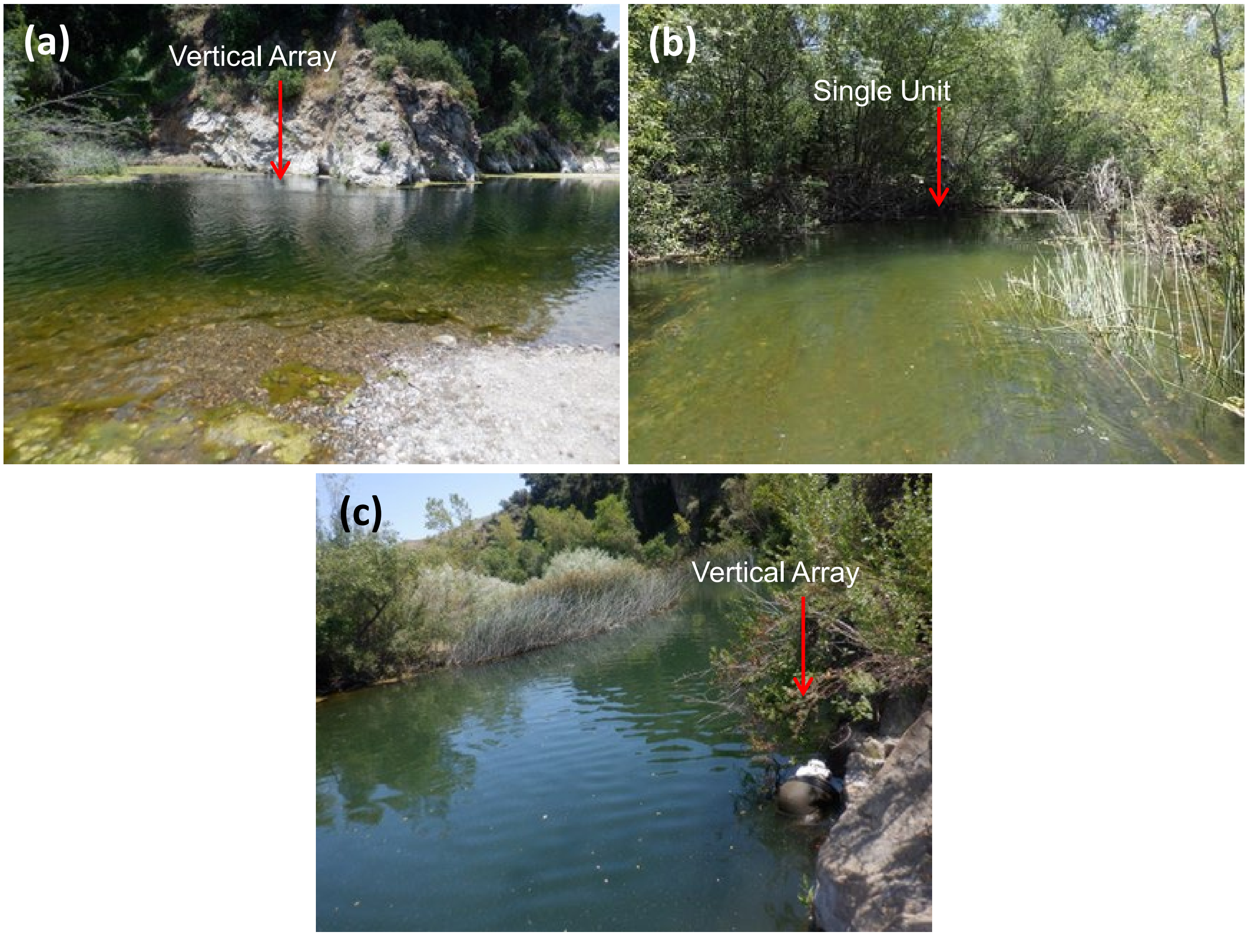


Figure 8: 2025 LSYR mainstem temperature unit deployment locations at: (a) LSYR-10.2, (b) LSYR-13.9 and (c) LSYR-22.68.

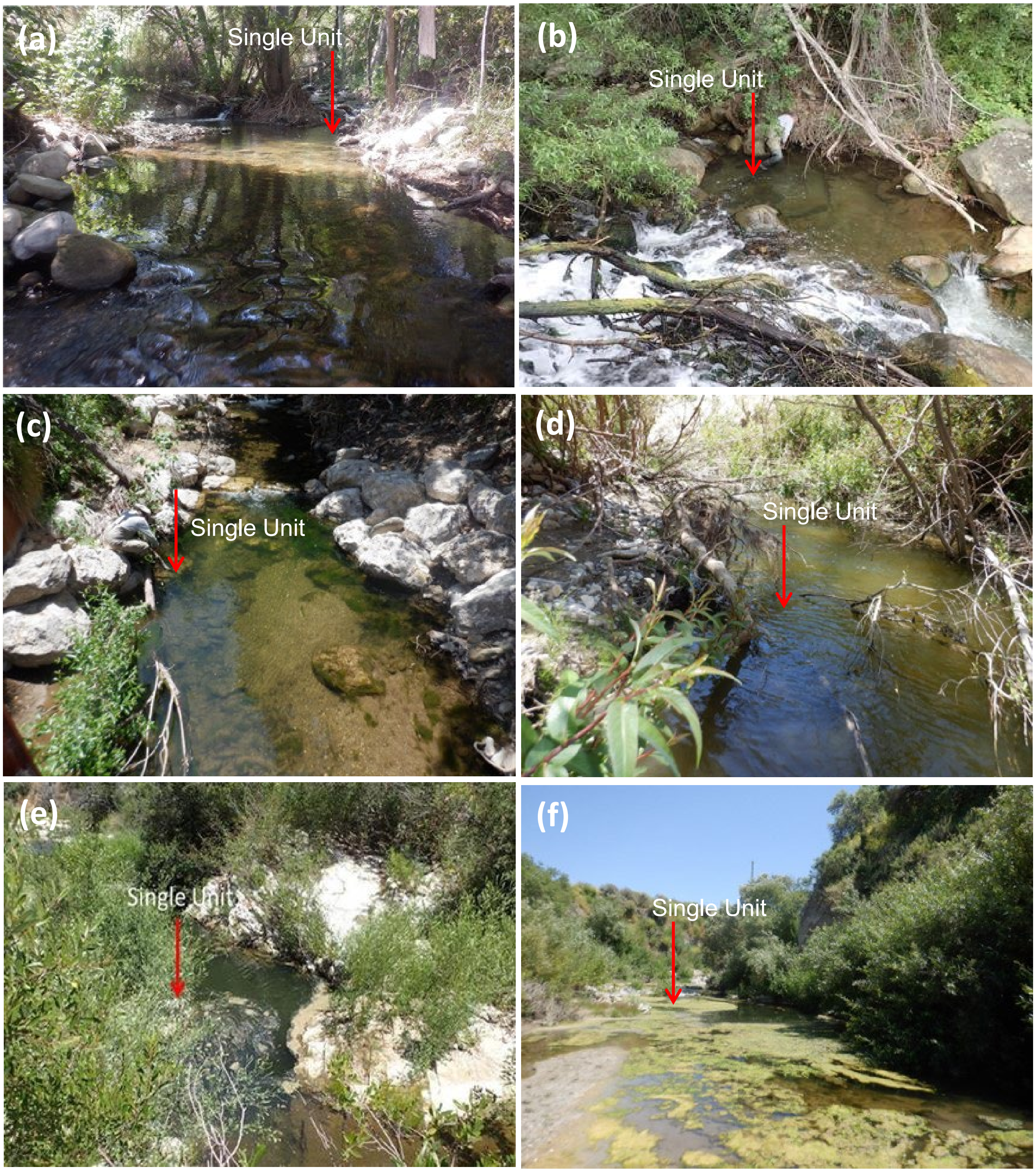
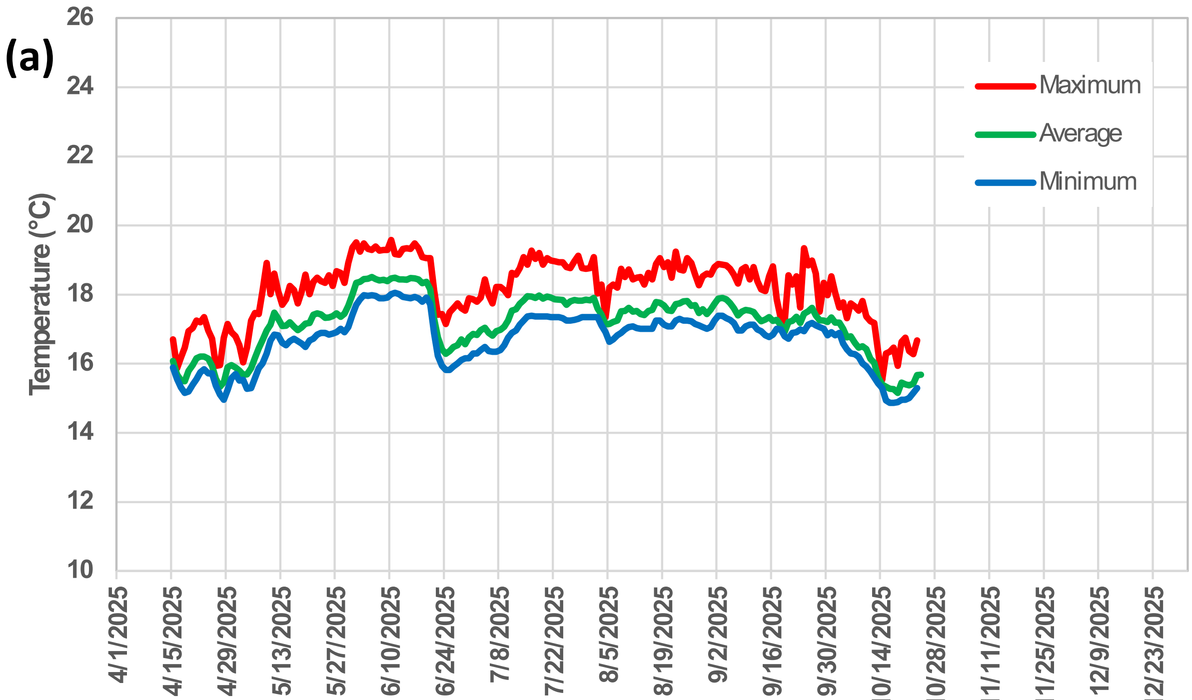


Figure 9: 2025 Tributary temperature unit deployment location at: (a) HC-0.12, (b) HC-0.54, (c) QC-2.66, (d) SC-0.77, (e) SC-2.2, and (f) SC-3.0.

Figure 10: 2025 Tributary thermograph deployment locations at: (a) SC-3.5, (b) SC-3.8, (c) EJC-3.81, (d) EJC-5.4, (e) EJC-10.82, and (f) LAC-7.0.



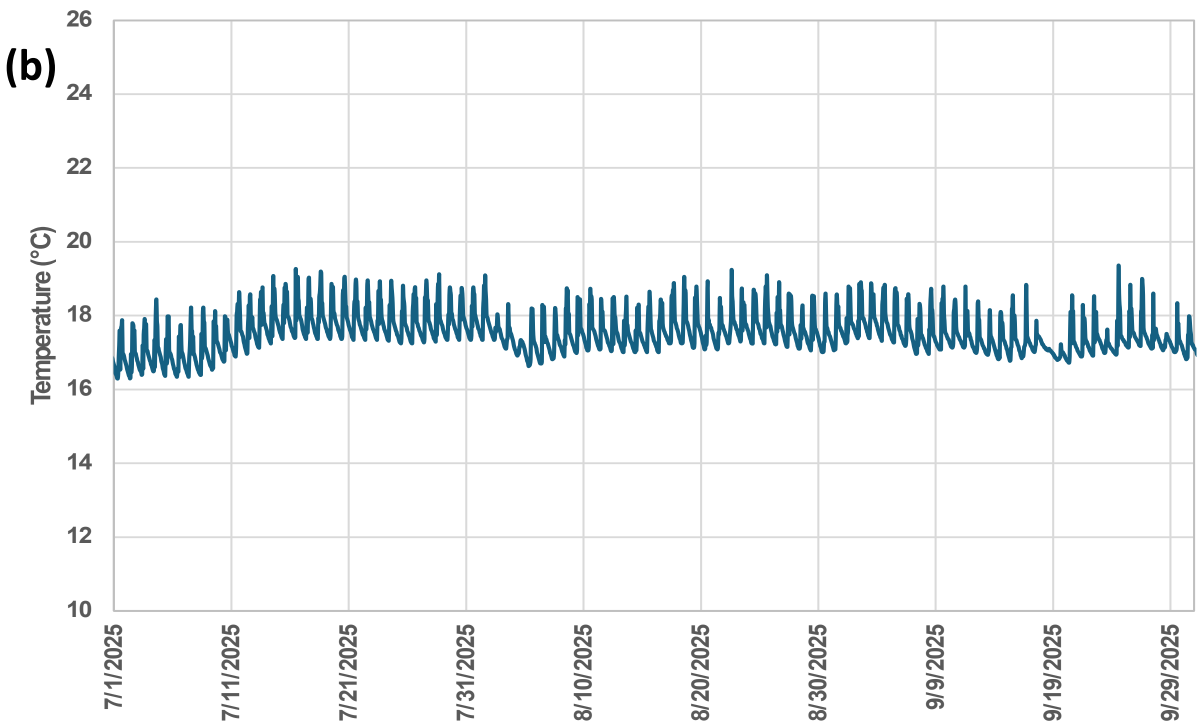
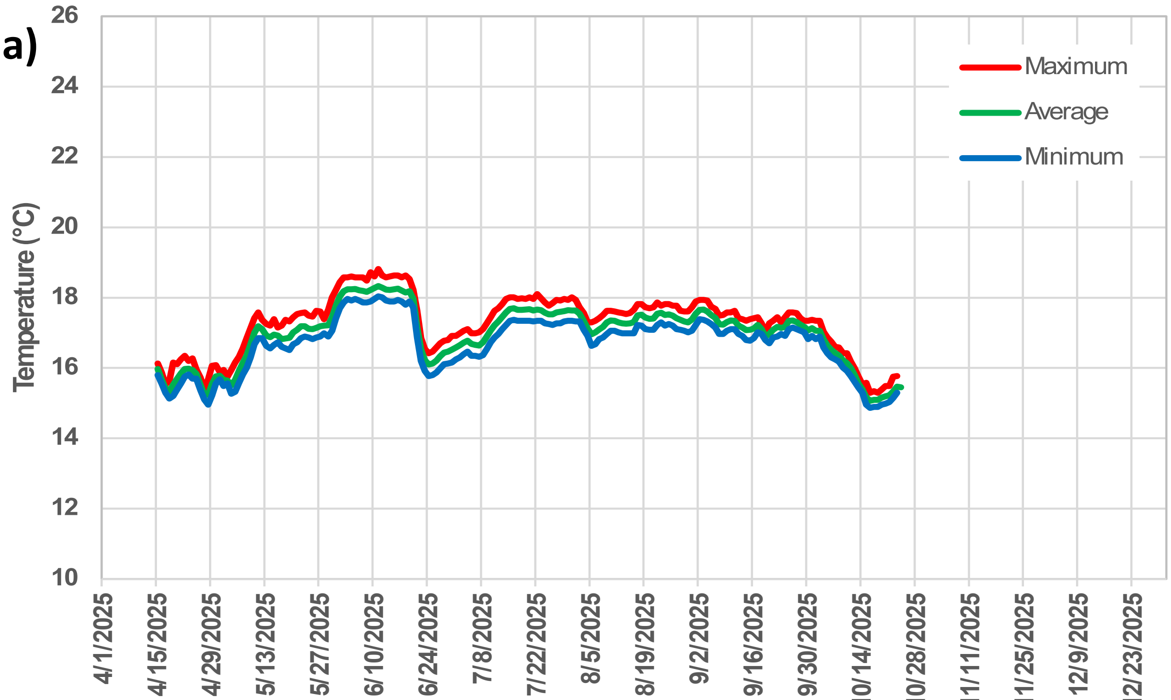


Figure 11: 2025 LSYR-0.01 (Stilling Basin parapet wall) surface (1.0-foot) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (192 days) and (b) hourly measurements from 7/1/25 through 10/1/25; numerous *O. mykiss* were observed on multiple days on the surface of the Stilling Basin.

(a)



(b)

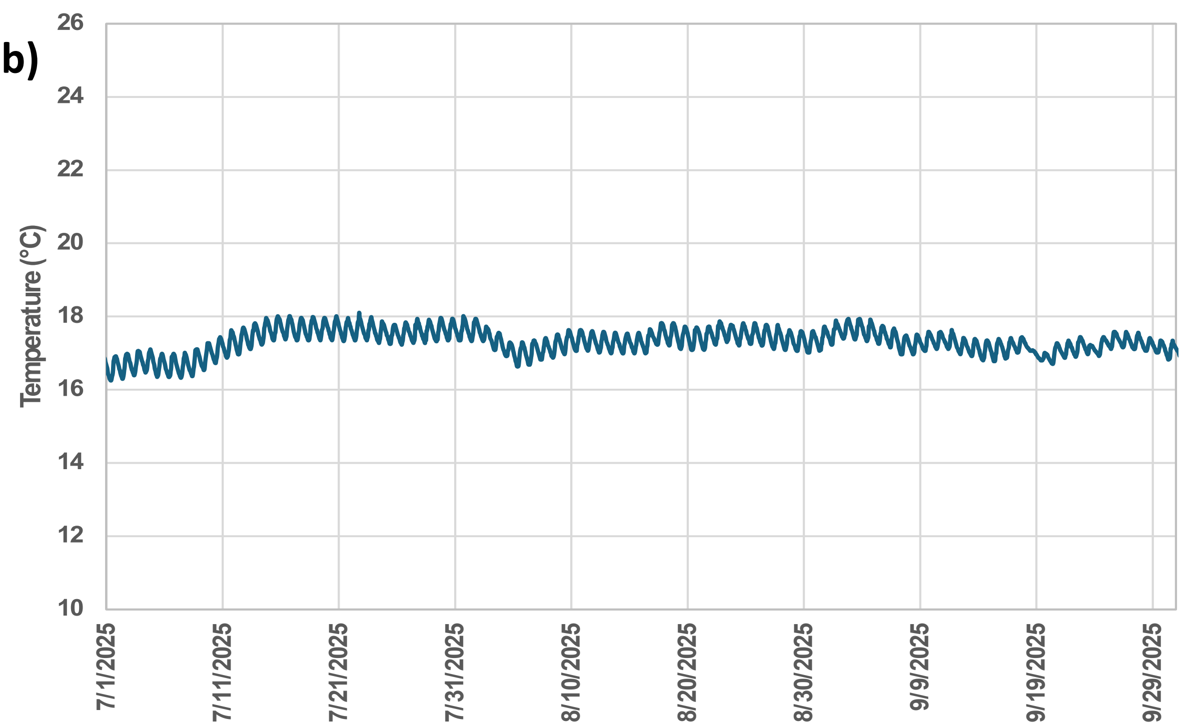


Figure 12: 2025 LSYR-0.01 (Stilling Basin parapet wall) middle (14 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (192 days) and (b) hourly measurements from 7/1/25 through 10/1/25.

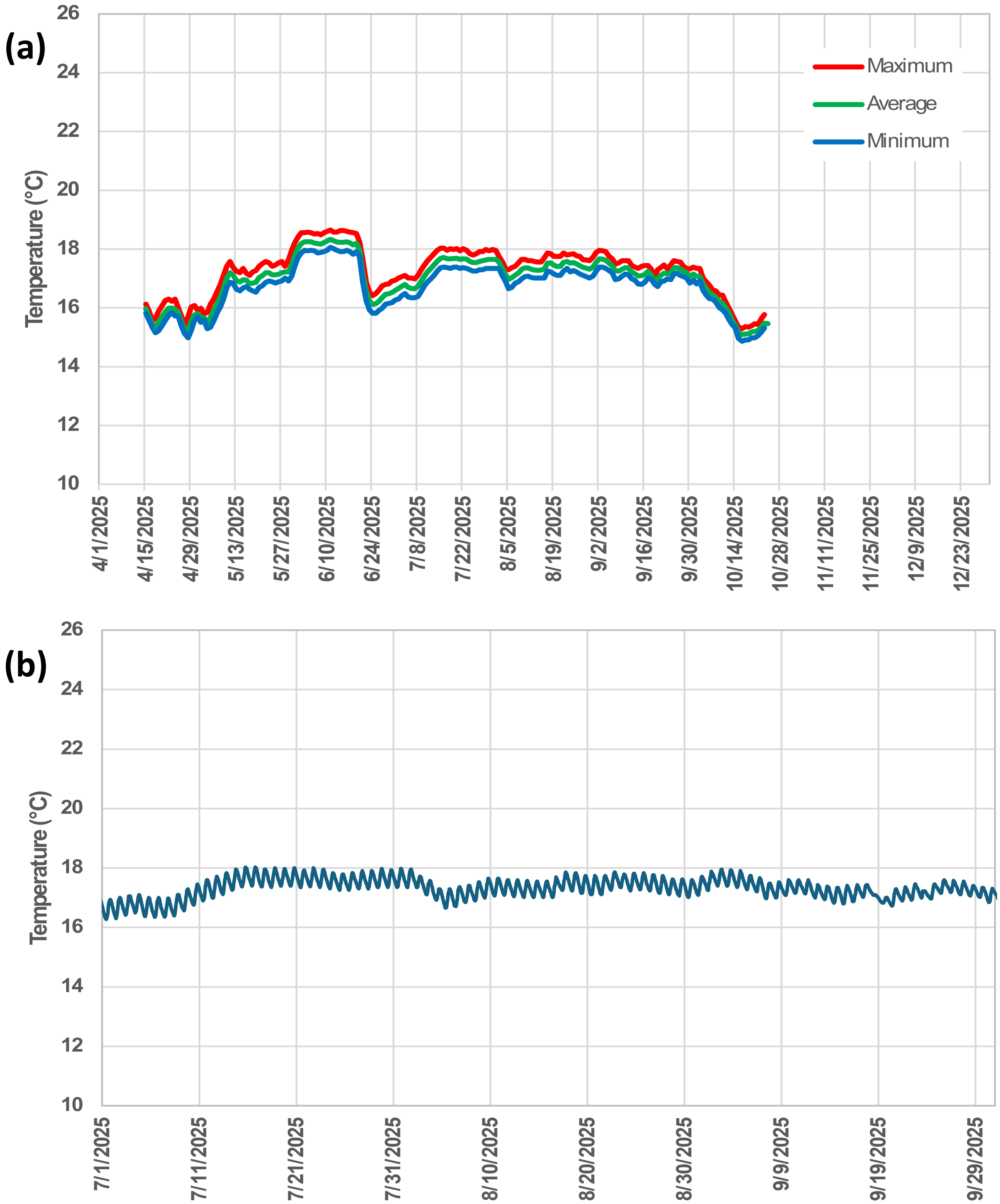
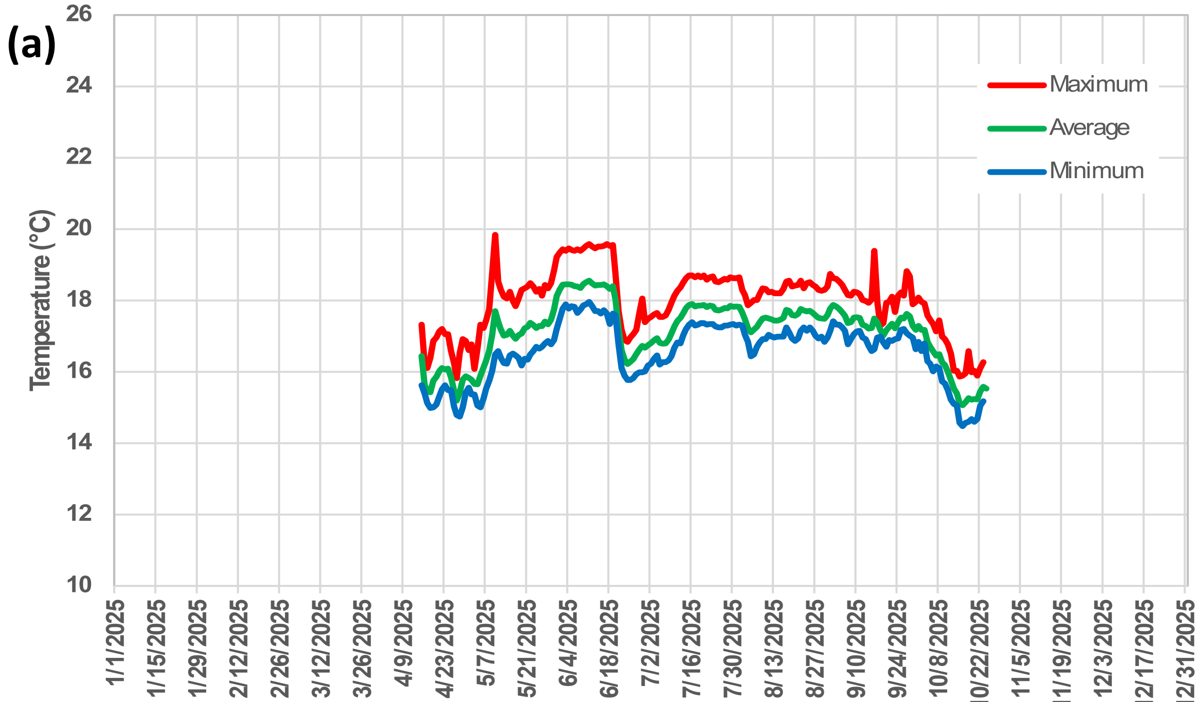


Figure 13: 2025 LSYR-0.01 (Stilling Basin parapet wall) bottom (28 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (192 days) and (b) hourly measurements from 7/1/25 through 10/1/25.



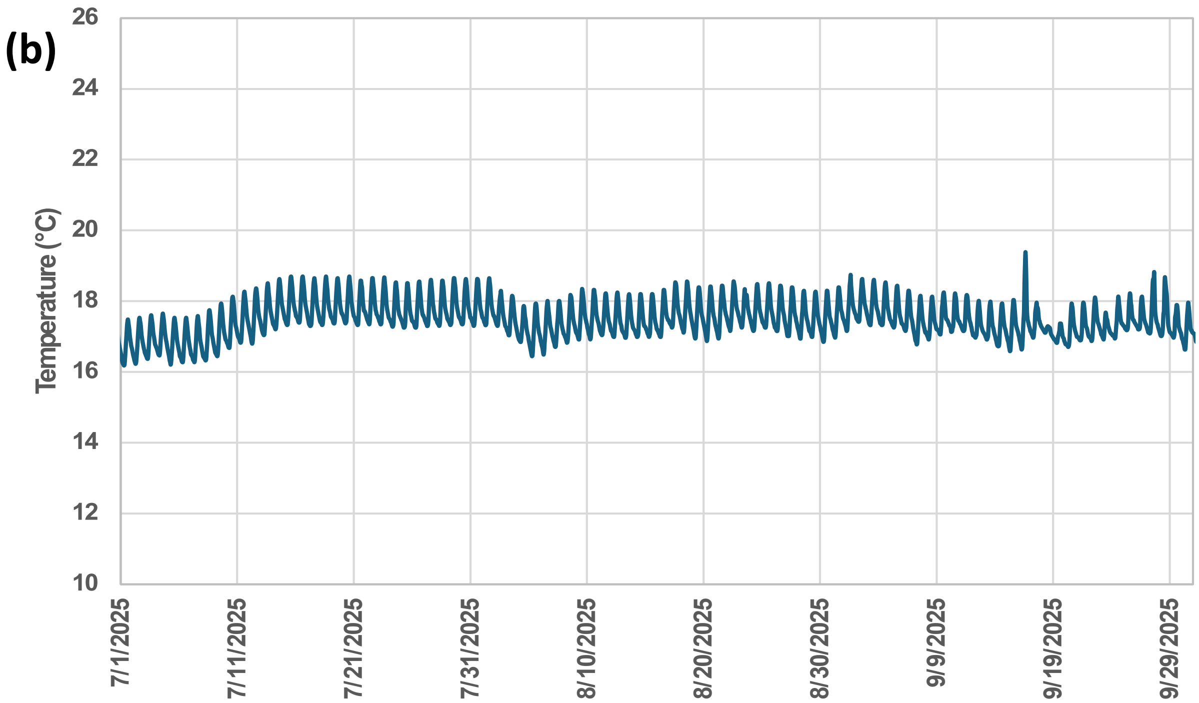
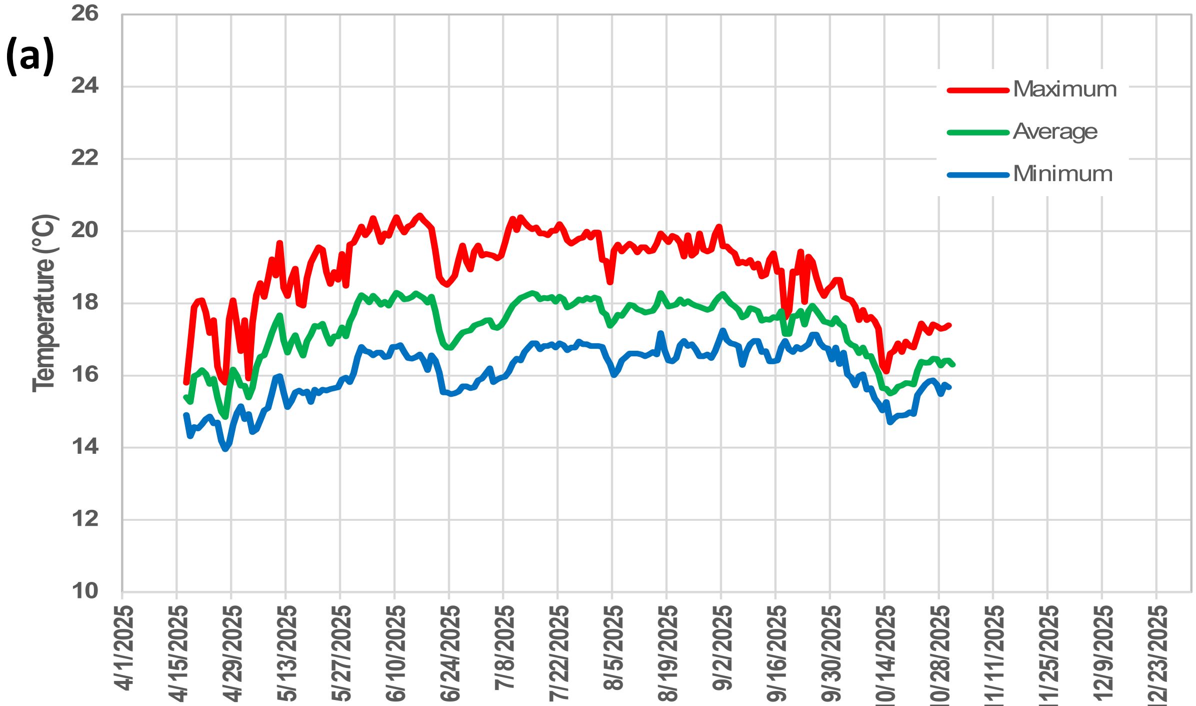


Figure 14: 2025 LSYR-0.25 (downstream of Stilling Basin) bottom (1.5 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (192 days) and (b) hourly measurements 7/1/25 through 10/1/25; *O. mykiss* presence was presumed.



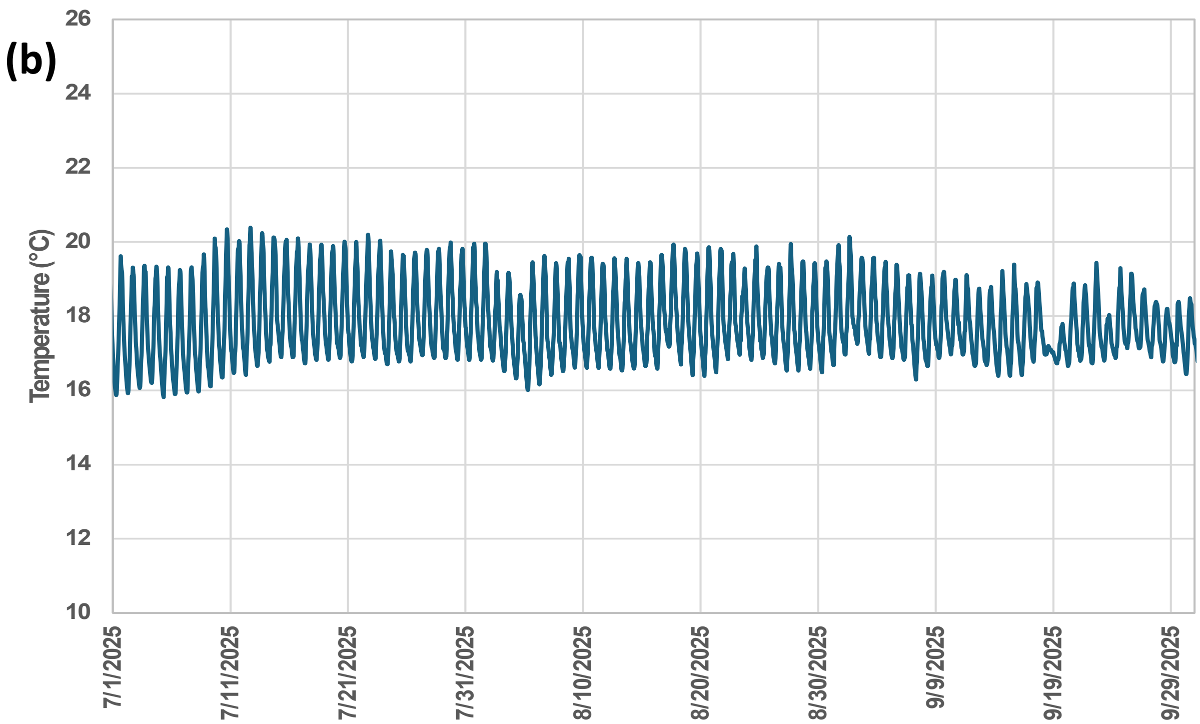


Figure 15: 2025 LSYR 0.51 (Long Pool) surface (1.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (199 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* presence was presumed.

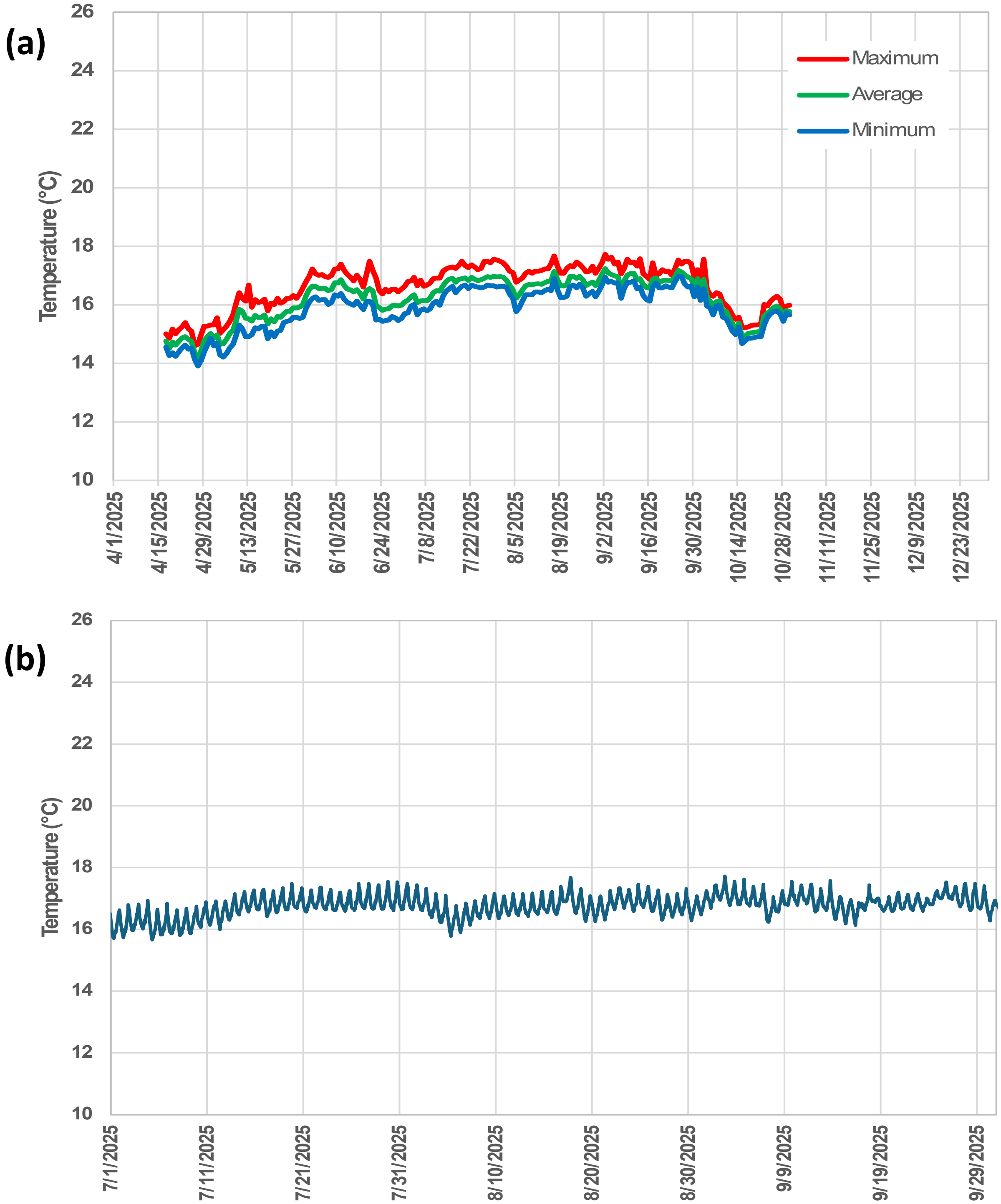
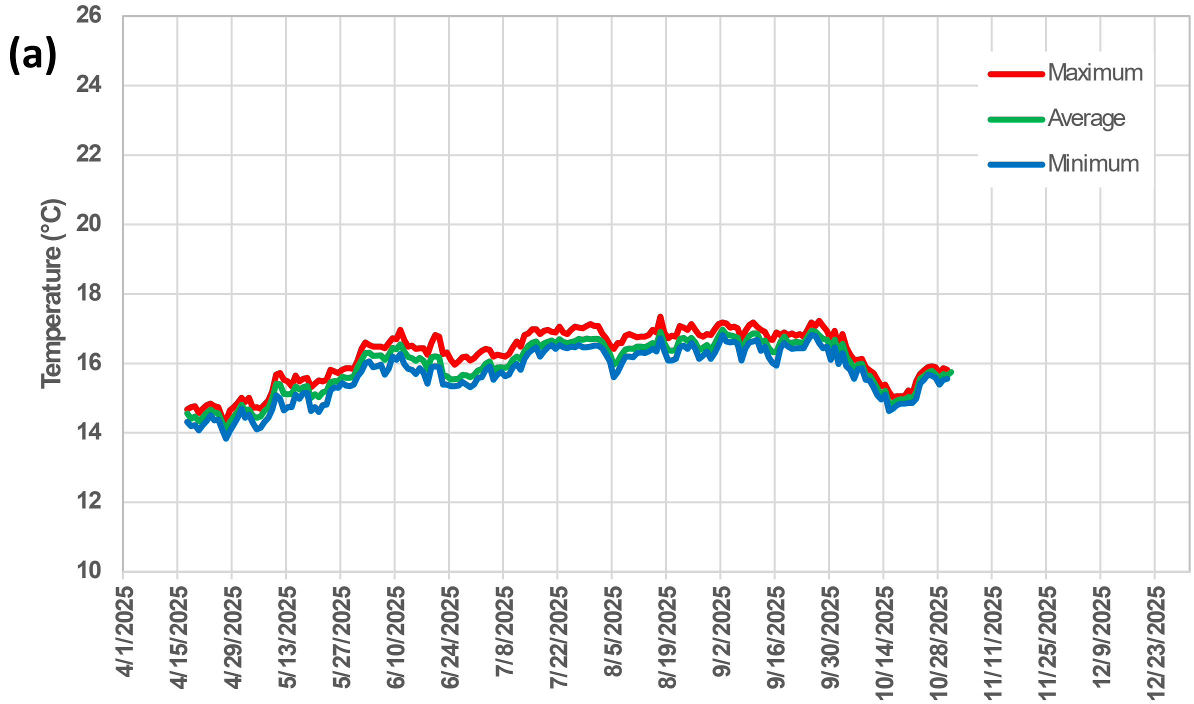


Figure 16: 2025 LSYR-0.51 (Long Pool) middle (3.5 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (199 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* presence was presumed.



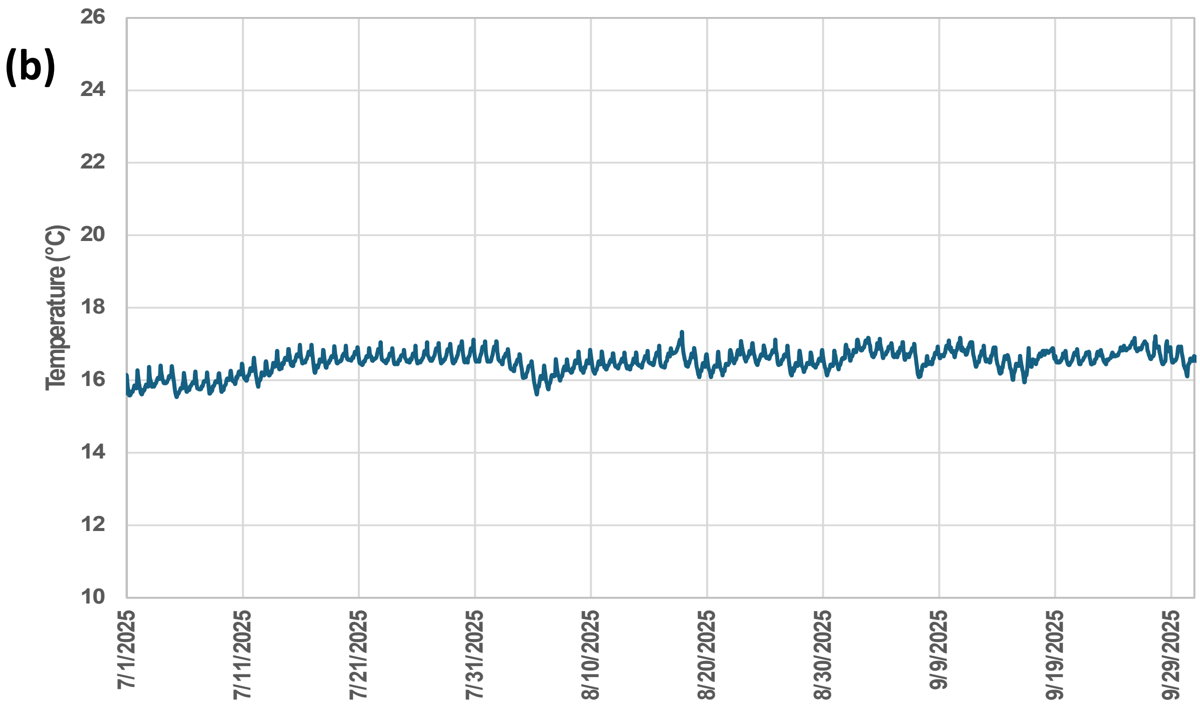


Figure 17: 2025 LSYR-0.51 (Long Pool) bottom (7.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (199 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* presence was presumed.

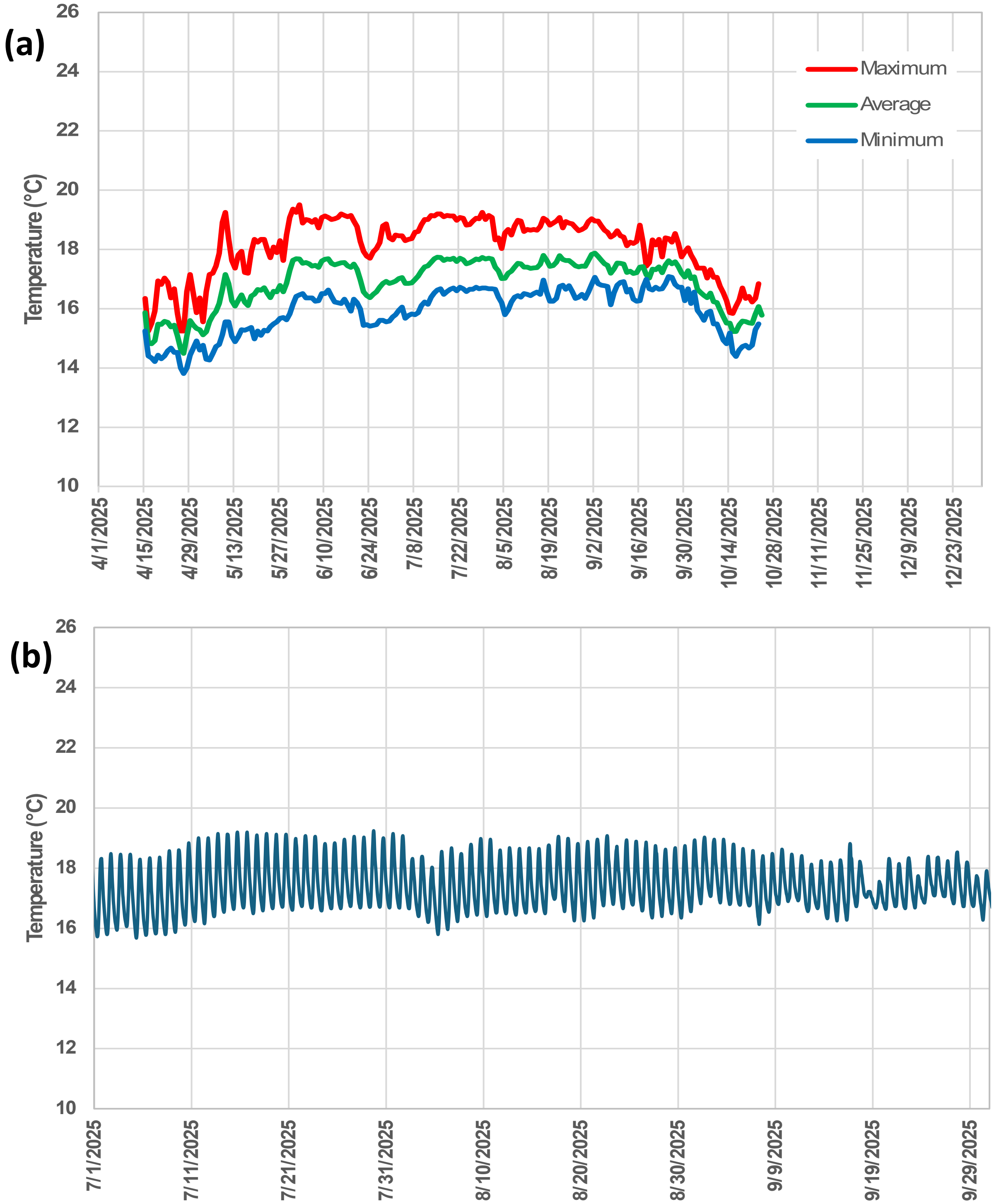


Figure 18: 2025 Reclamation property boundary at LSYR-0.68 (downstream of the Long Pool) bottom (2 feet) thermograph for (a) daily maximum, average, and minimum values (192 days) and (b) hourly data from 7/1/25 through 10/1/25; *O. mykiss* presence was presumed.

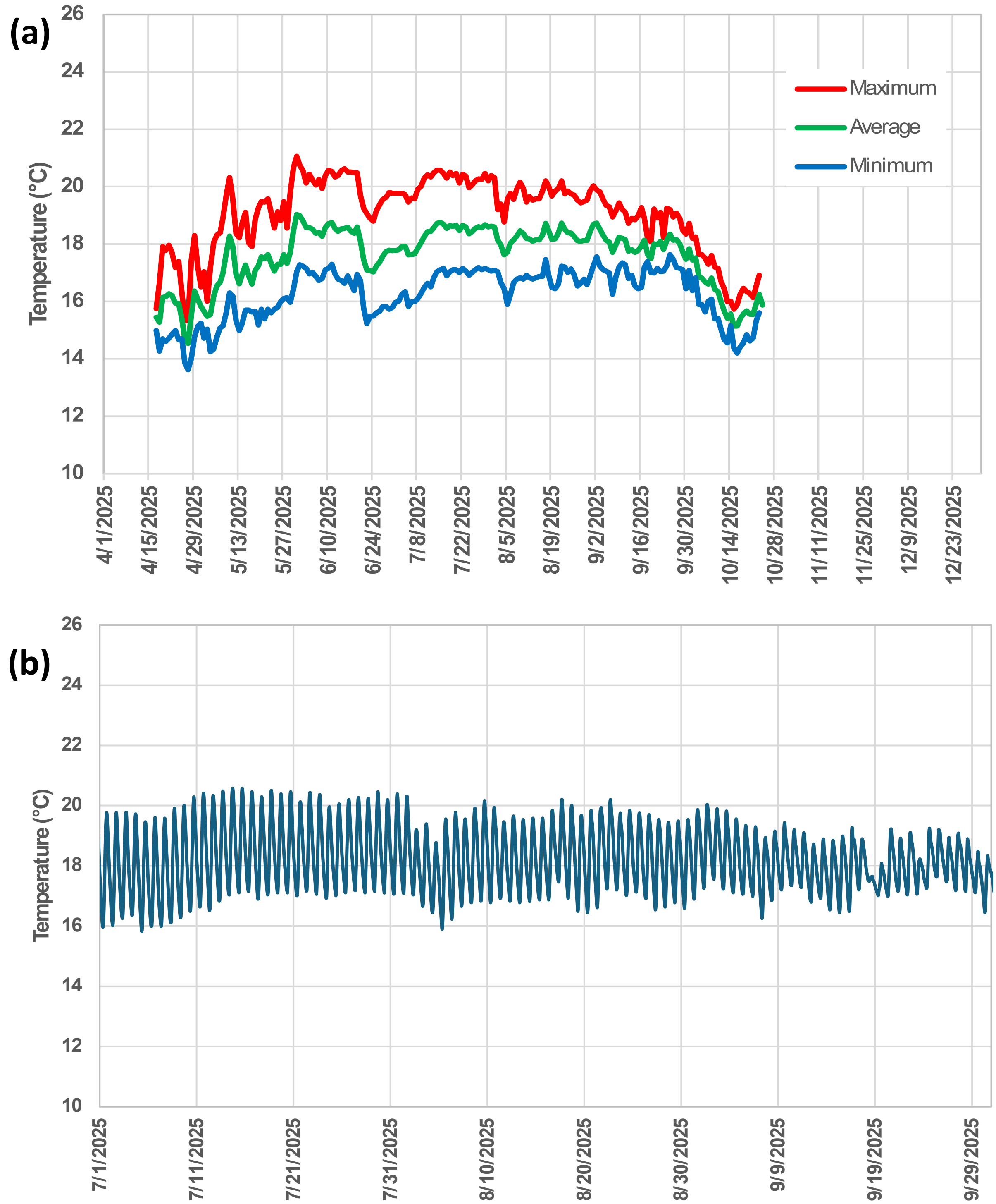
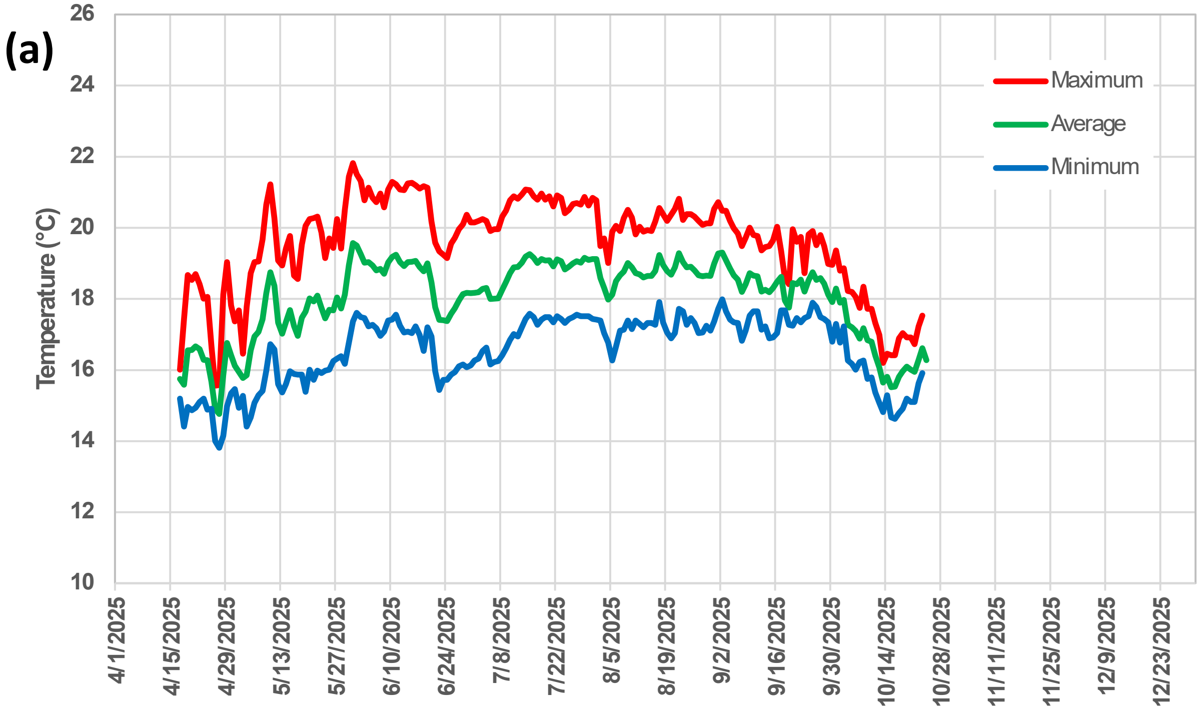


Figure 19: 2025 LSYR-1.54 (Grimm Downstream-run) bottom (1.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (190 days) and (b) hourly measurements from 7/1/25 through 10/1/25. *O. mykiss* were observed during snorkel surveys.



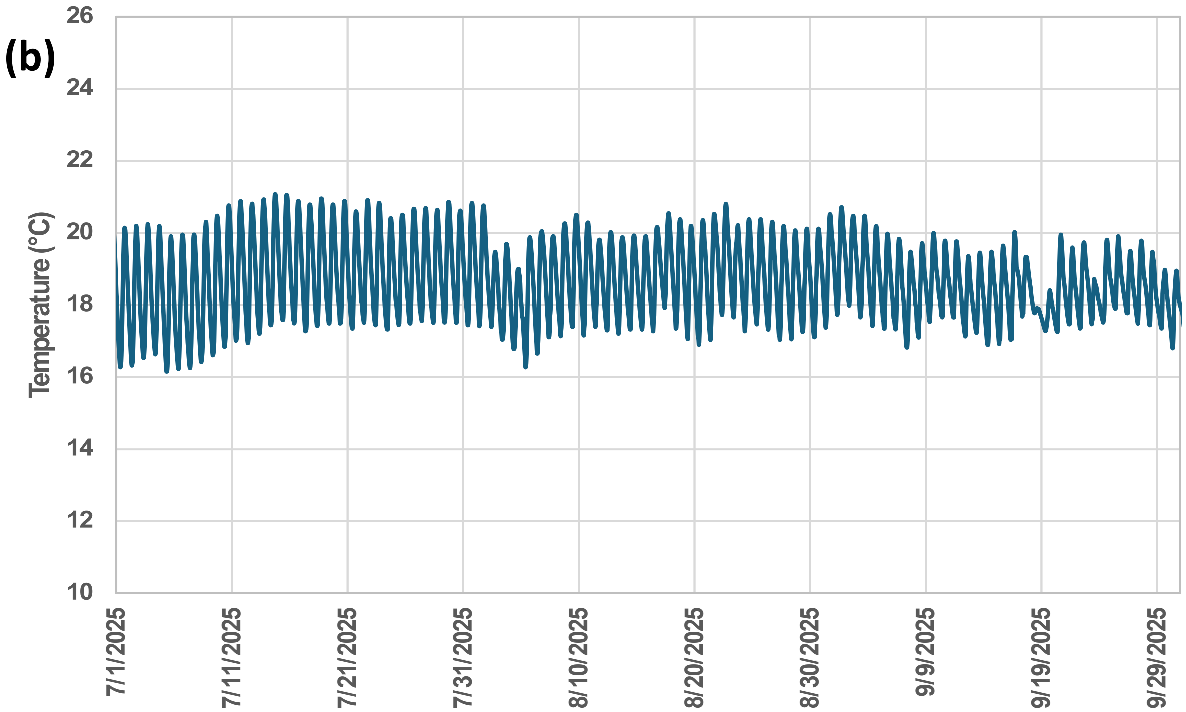


Figure 20: 2025 LSYR-1.71 (Grimm Pool) surface (1-foot) water temperature for (a) daily maximum, average, and minimum for the entire period of record (190 days) and (b) hourly measurements from 7/1/25 through 10/1/25. *O. mykiss* were observed during snorkel surveys.

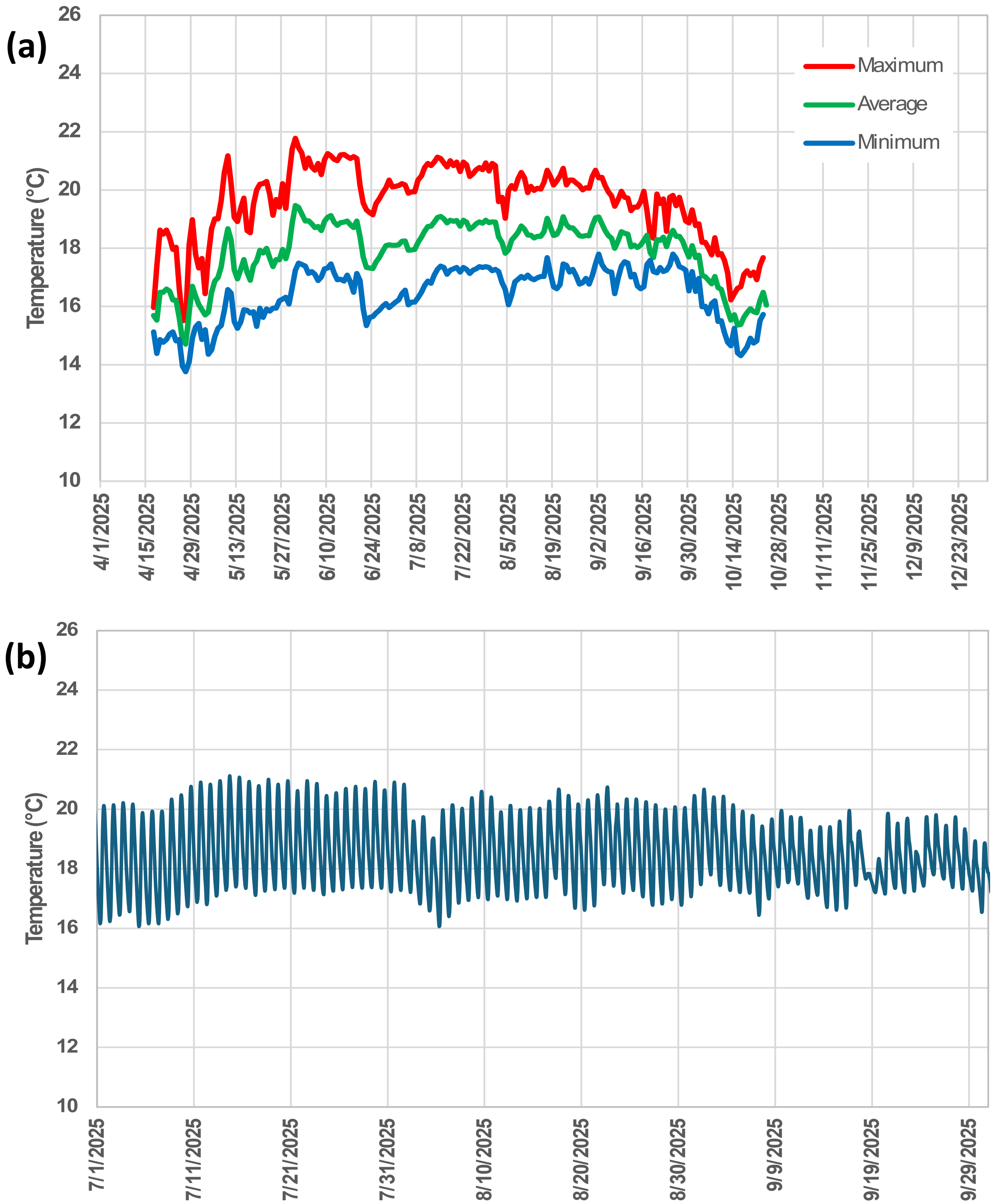


Figure 21: 2025 LSYR-1.71 (Grimm Pool) middle (3.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (190 days) and (b) hourly measurement from 7/1/25 through 10/1/25. *O. mykiss* were observed during snorkel surveys.

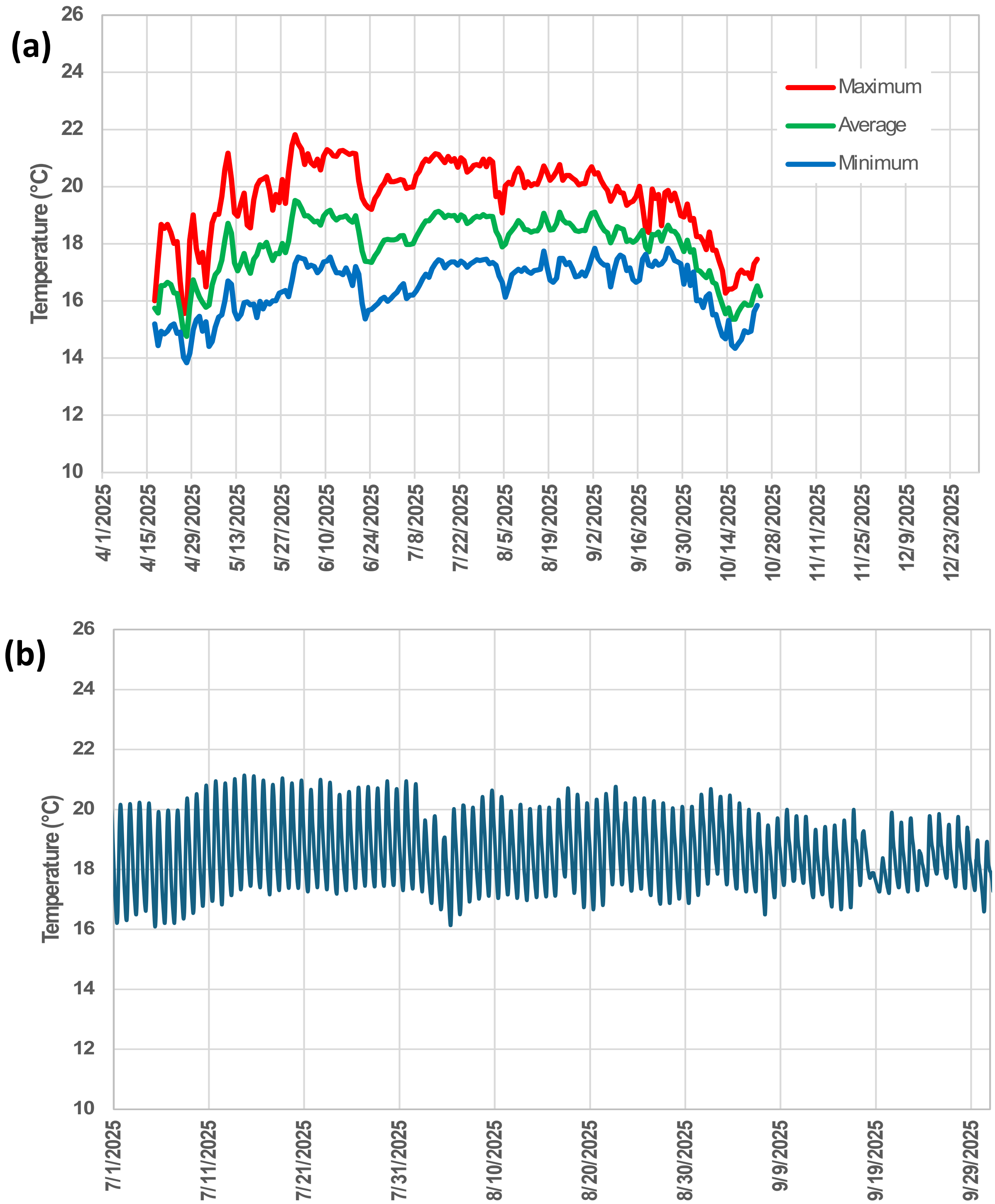


Figure 22: 2025 LSYR-1.71 (Grimm Pool) bottom (7.5 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of record (190 days) and (b) hourly measurements from 7/1/25 through 10/1/25. *O. mykiss* were observed during snorkel surveys.

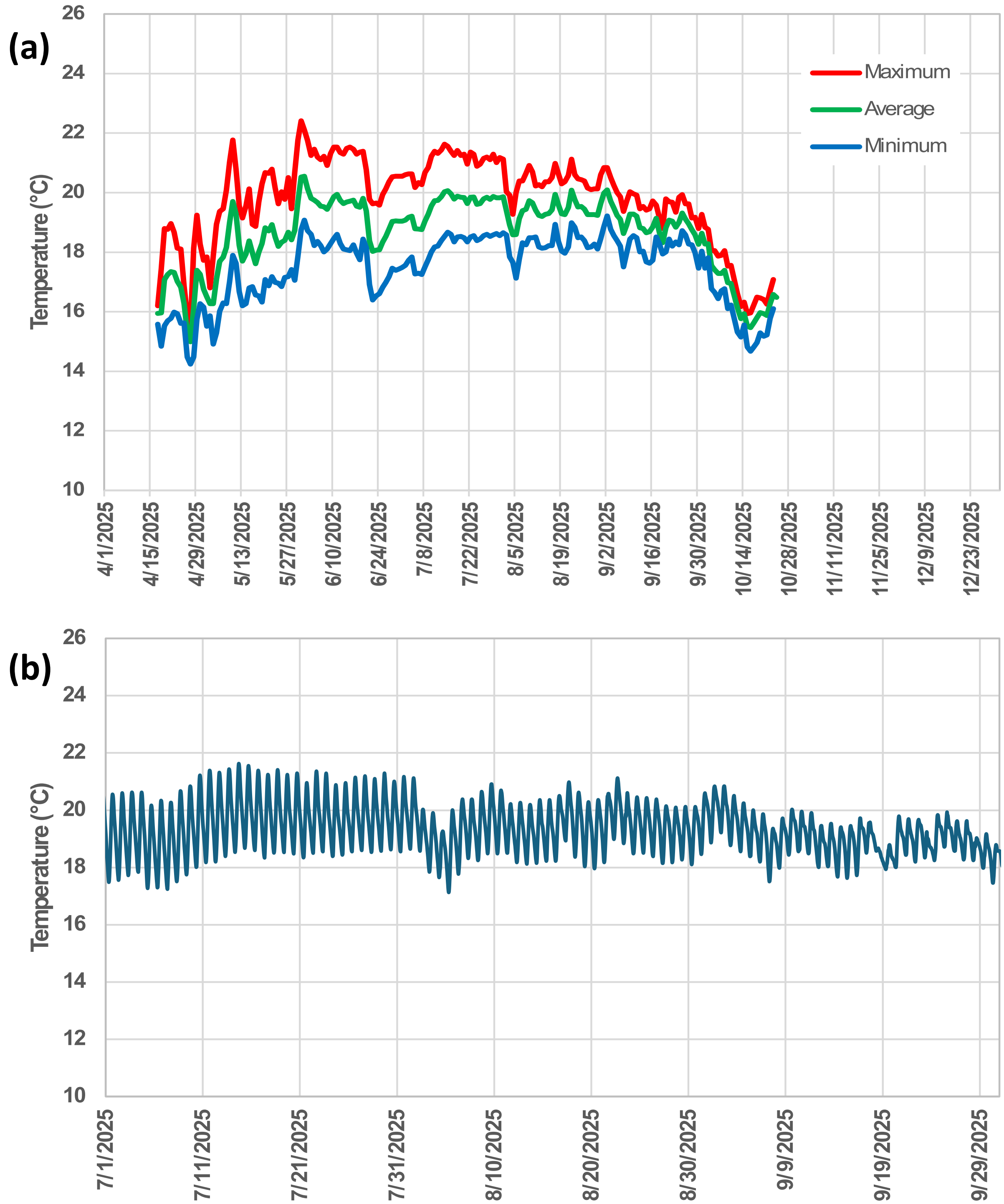
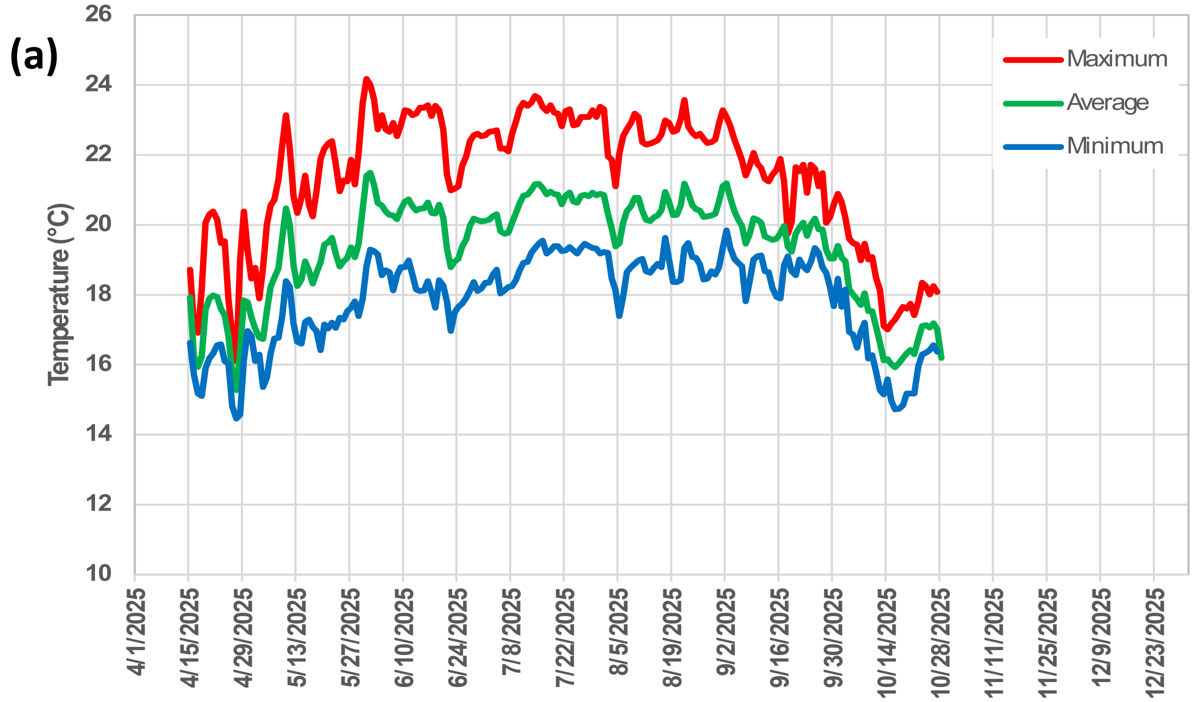


Figure 23: 2025 LSYR-2.77 (Kauffman run) bottom (1.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (190 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed during snorkel surveys.



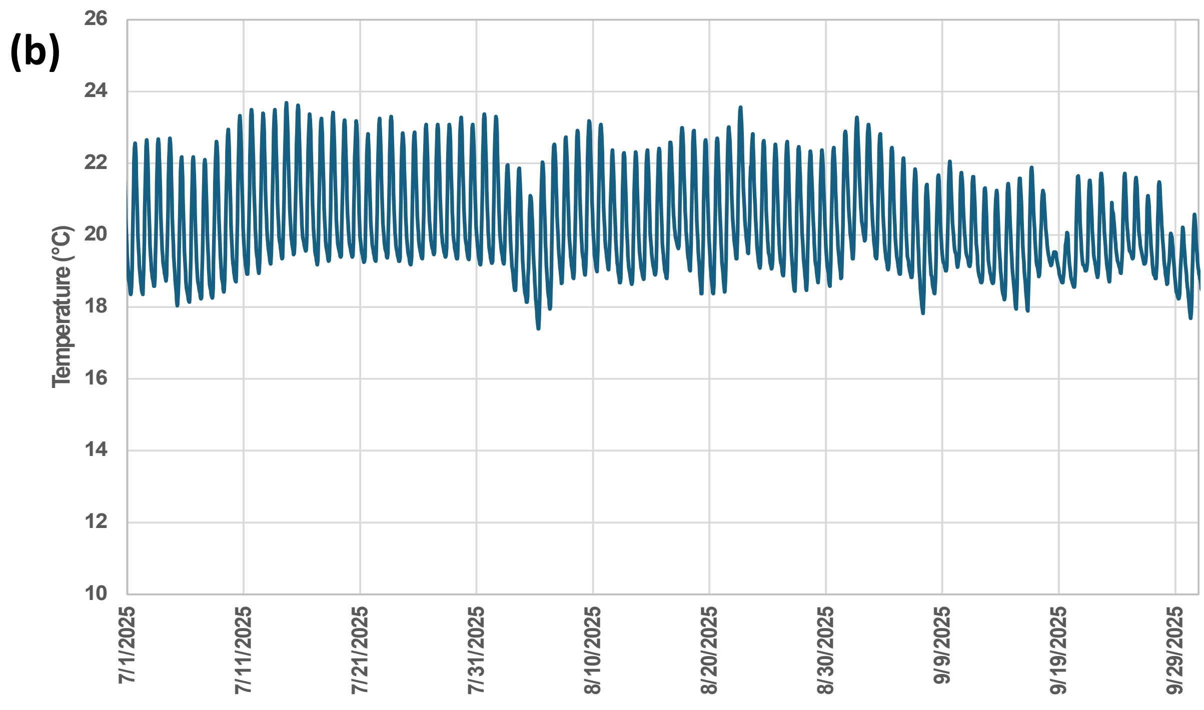


Figure 24: 2025 LSYR-4.15 (Upper Refugio Run) bottom (1.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (195 days) and (b) hourly measurements 7/1/25 through 10/1/25; *O. mykiss* were observed throughout the Upper Refugio Reach.

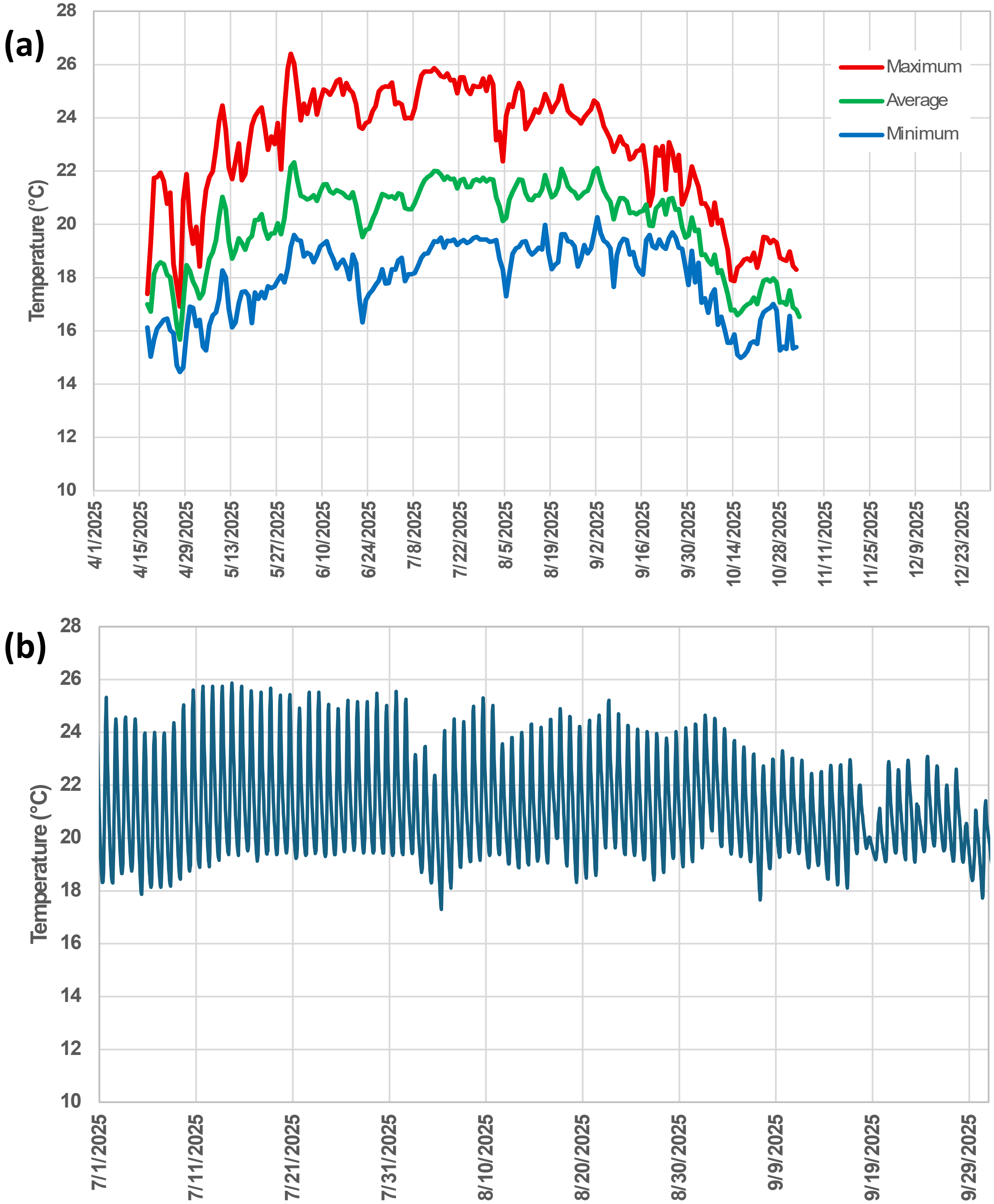


Figure 25: 2025 LSYR 4.95 (Encantado Pool) surface (1.0 foot) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (200 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed in this habitat during snorkel surveys.

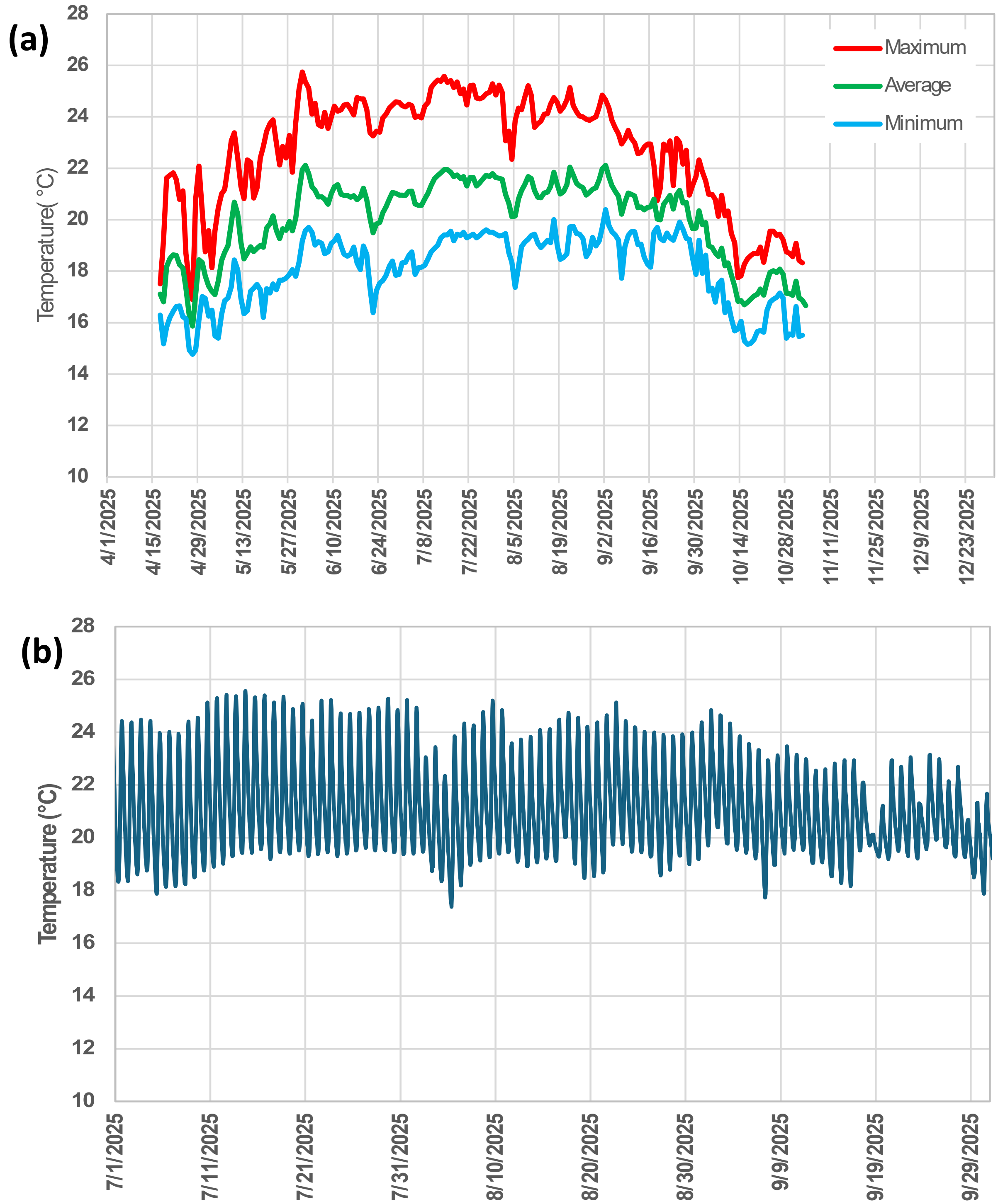
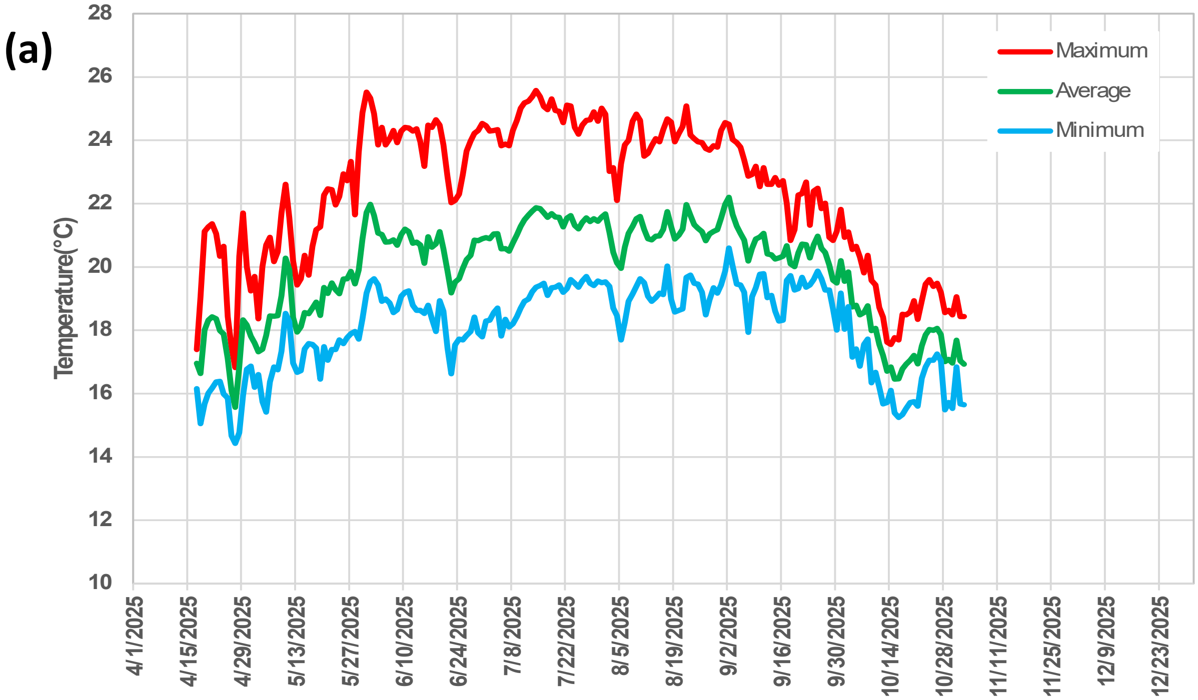


Figure 26: 2025 LSYR 4.95 (Encantado Pool) middle (4.0 foot) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (200 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed in this habitat during snorkel surveys.



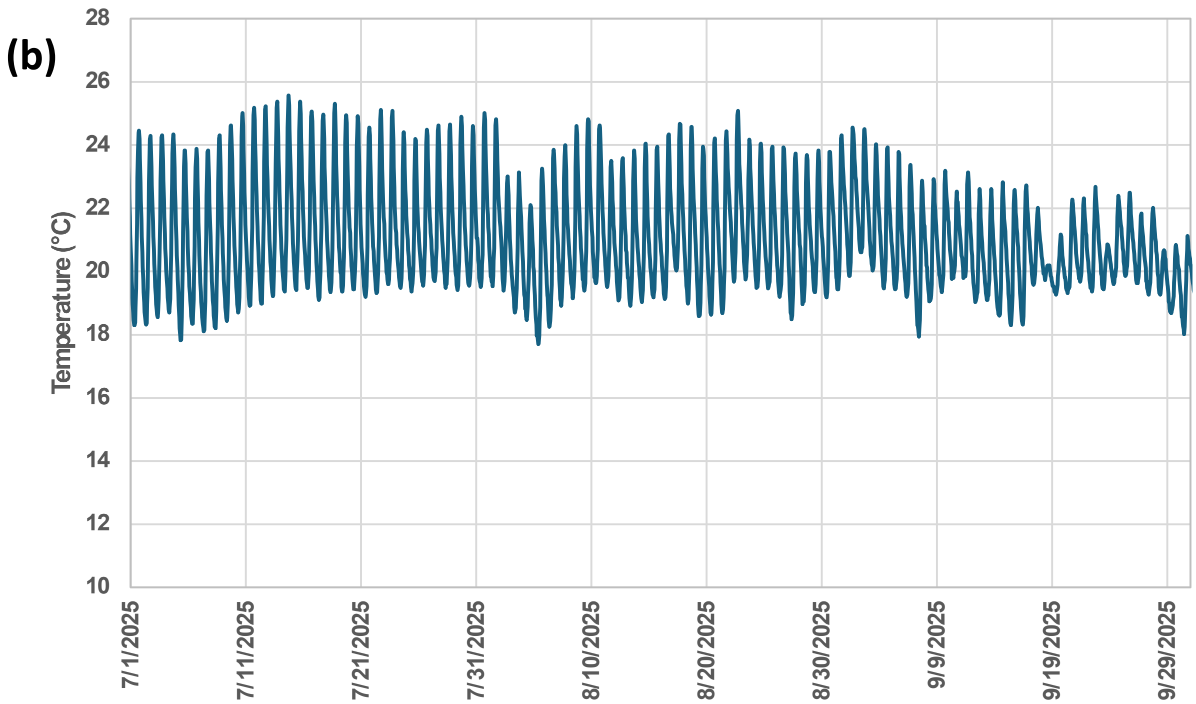


Figure 27: 2025 LSYR-4.95 (Encantado Pool) bottom (8.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (200 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed in this habitat during snorkel surveys.

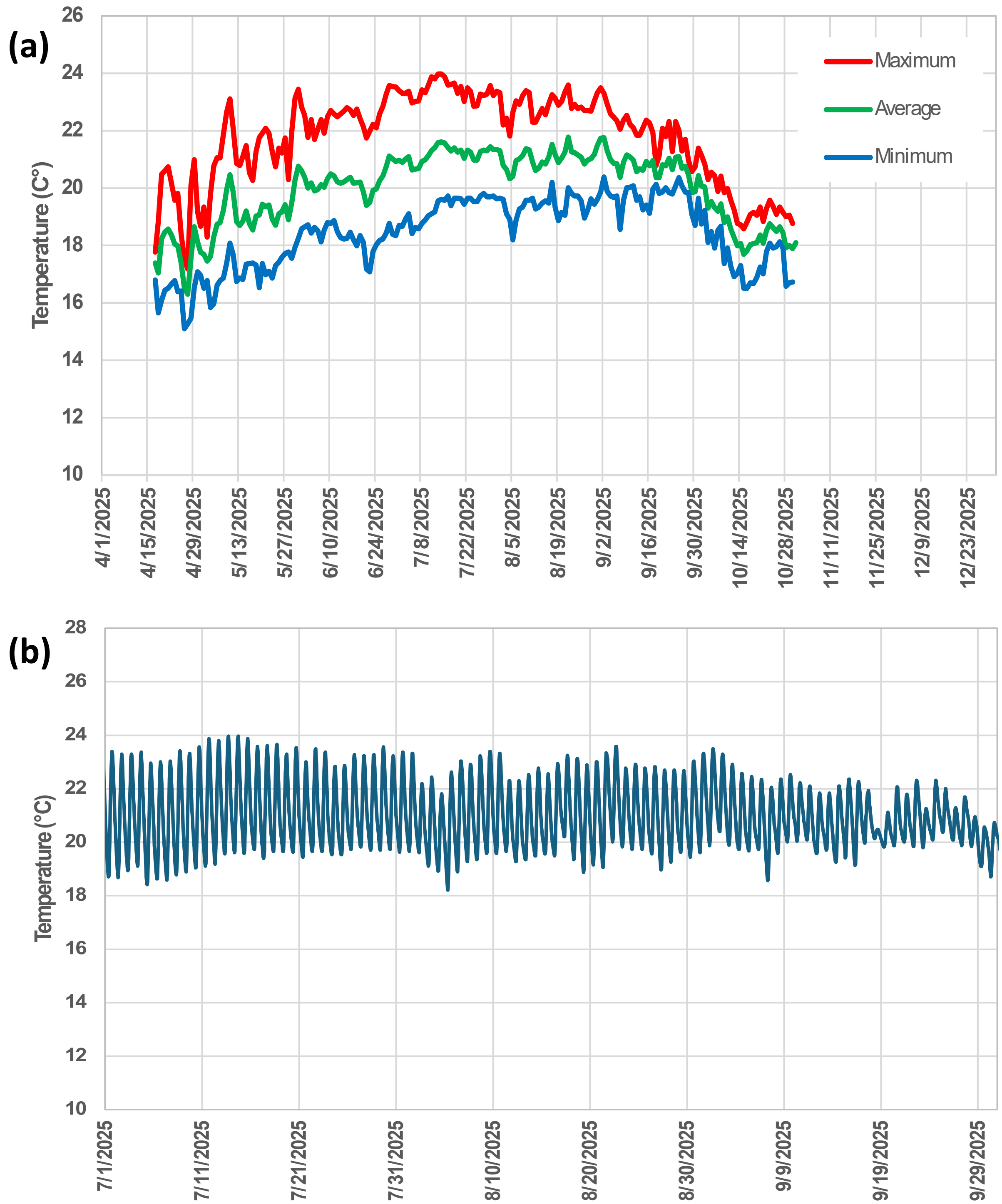
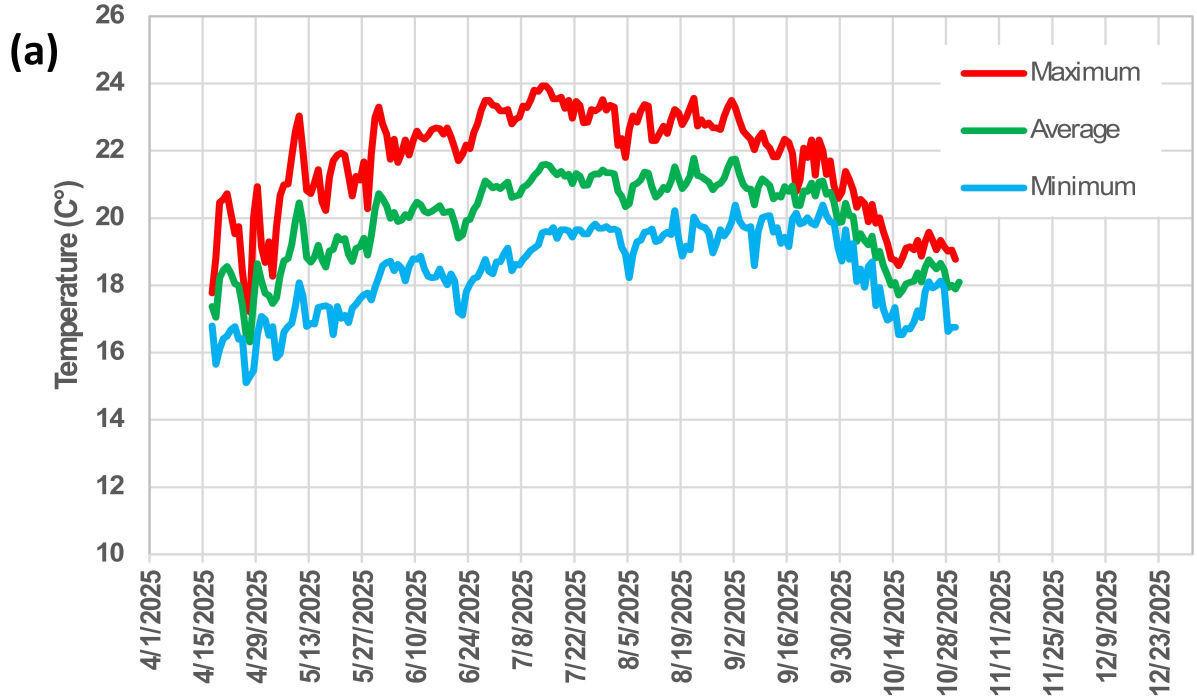


Figure 28: 2025 LSYR-7.65 (Double Canopy Pool) surface (1.0-foot) water temperature for (a) daily maximum, average, and minimum for the entire period of record (197 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed in this habitat.



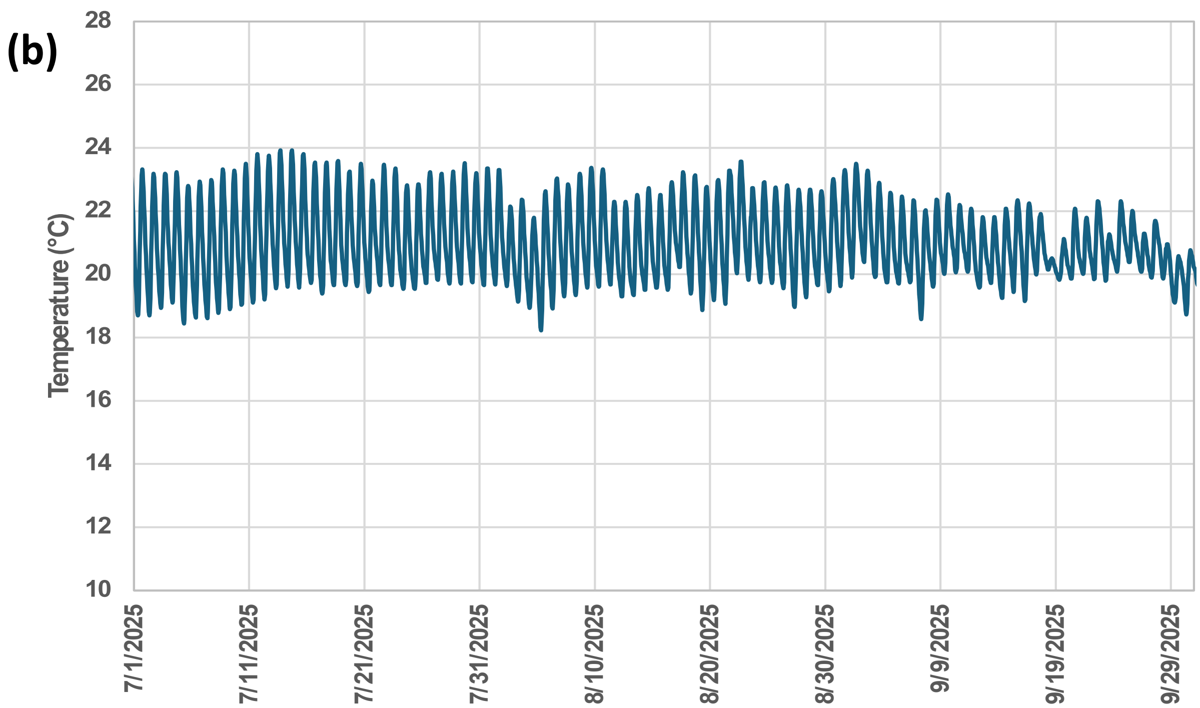


Figure 29: 2025 LSYR-7.65 (Double Canopy Pool) bottom (3.5 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of record (197 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed in this habitat.

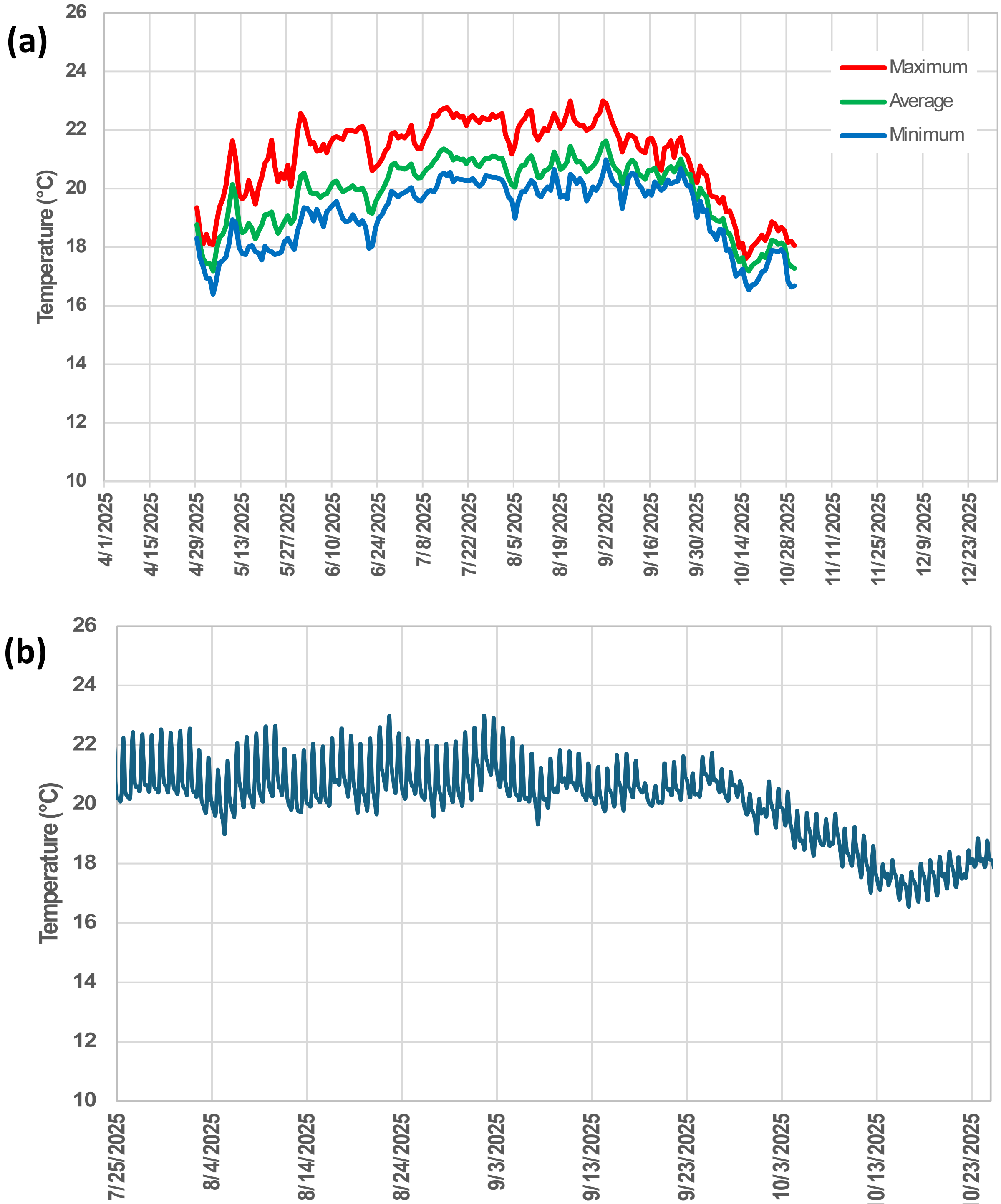


Figure 30: 2025 LSYR-8.7 (Head of Beaver Pool) surface (1.0 foot) water temperature for (a) daily maximum, average, and minimum for the entire period of record (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed during snorkel surveys.

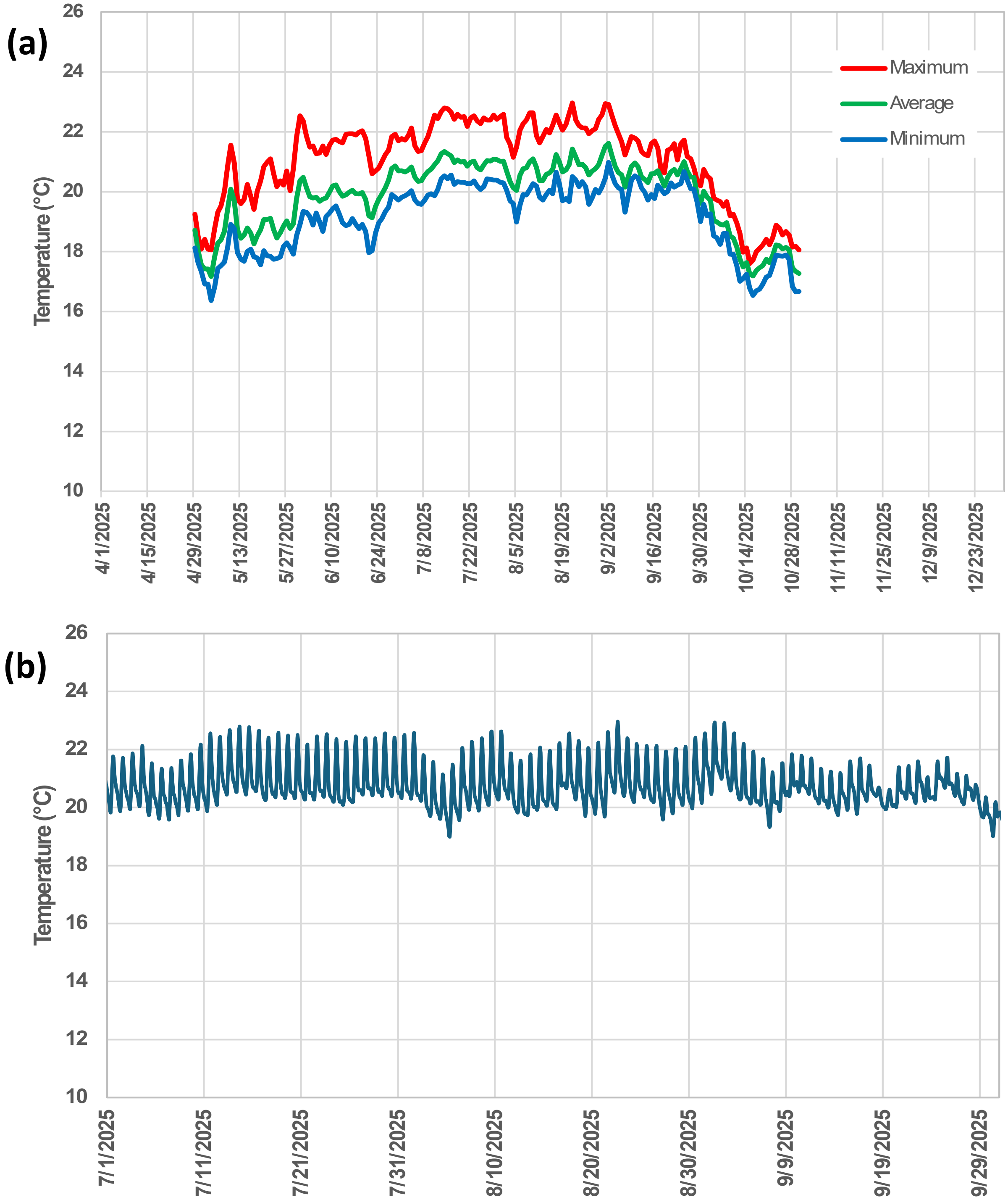
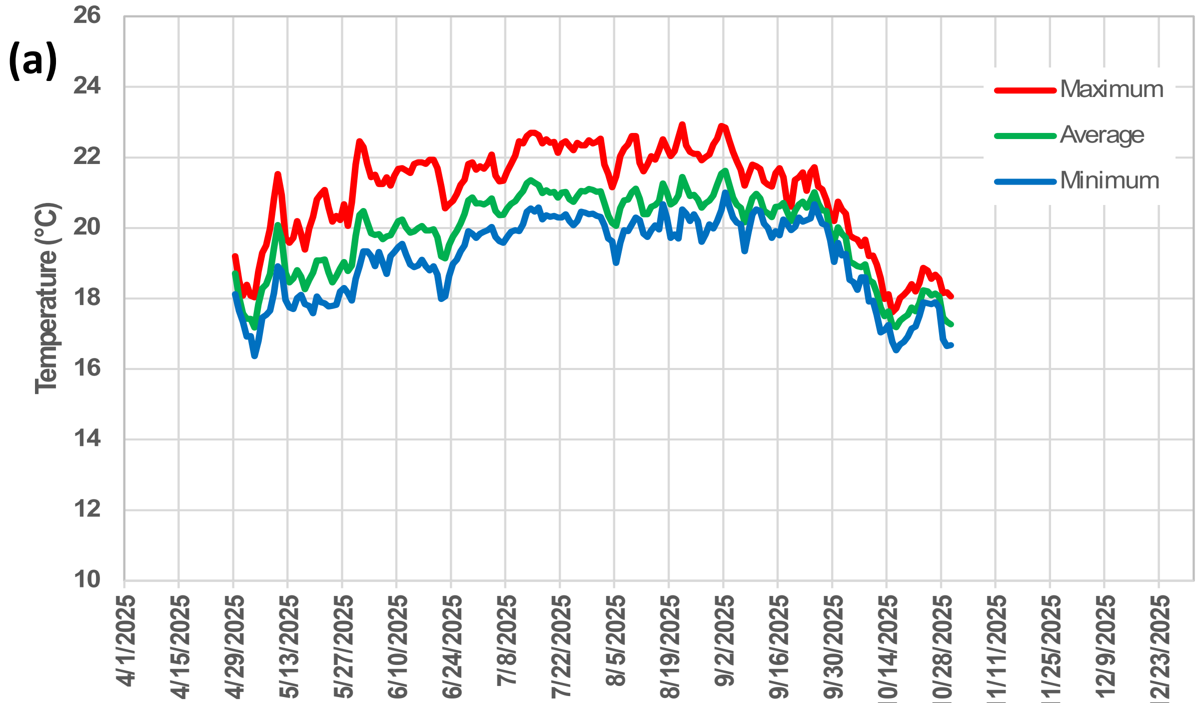


Figure 31: 2025 LSYR-8.7 (Head of Beaver Pool) middle (2.5 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of record (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed during snorkel surveys.



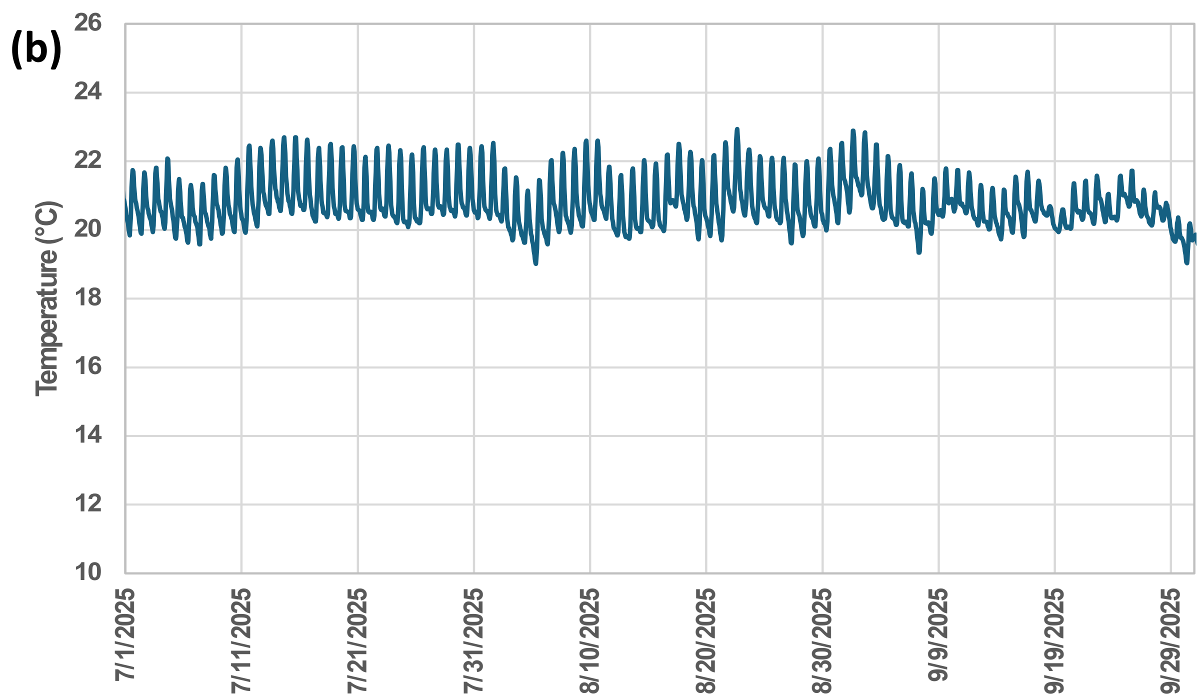
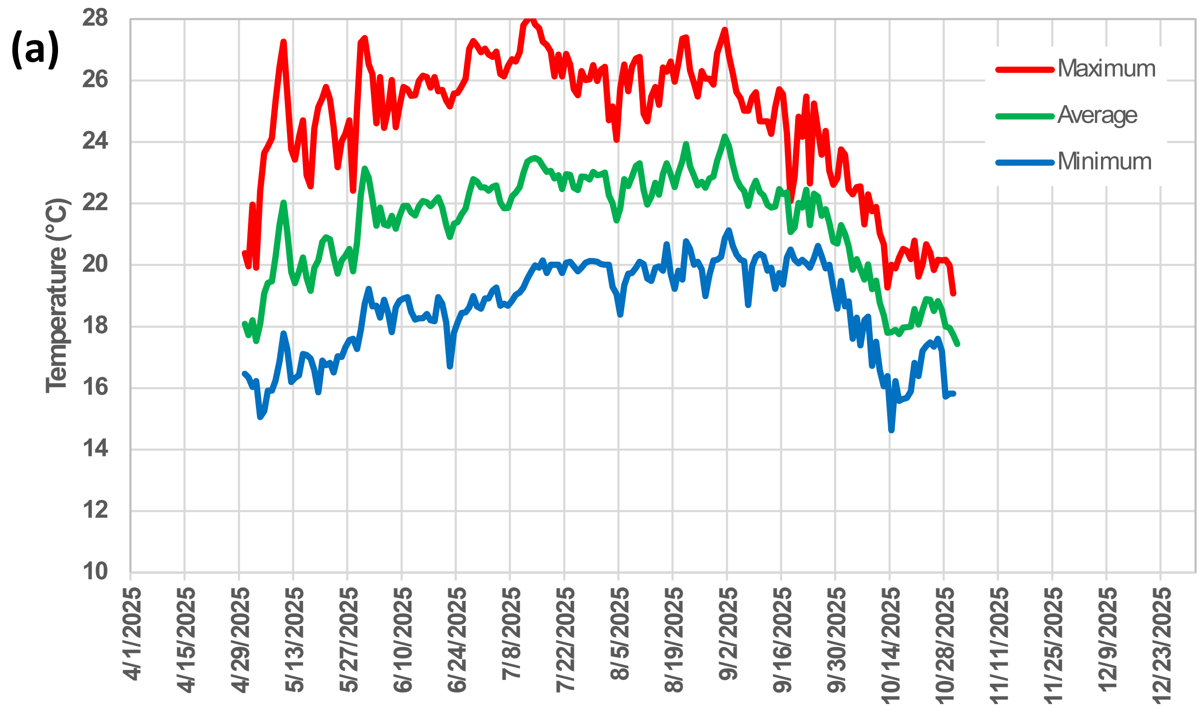


Figure 32: 2025 LSYR-8.7 (Head of Beaver Pool) bottom (5.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of record (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25. *O. mykiss* were observed during snorkel surveys.



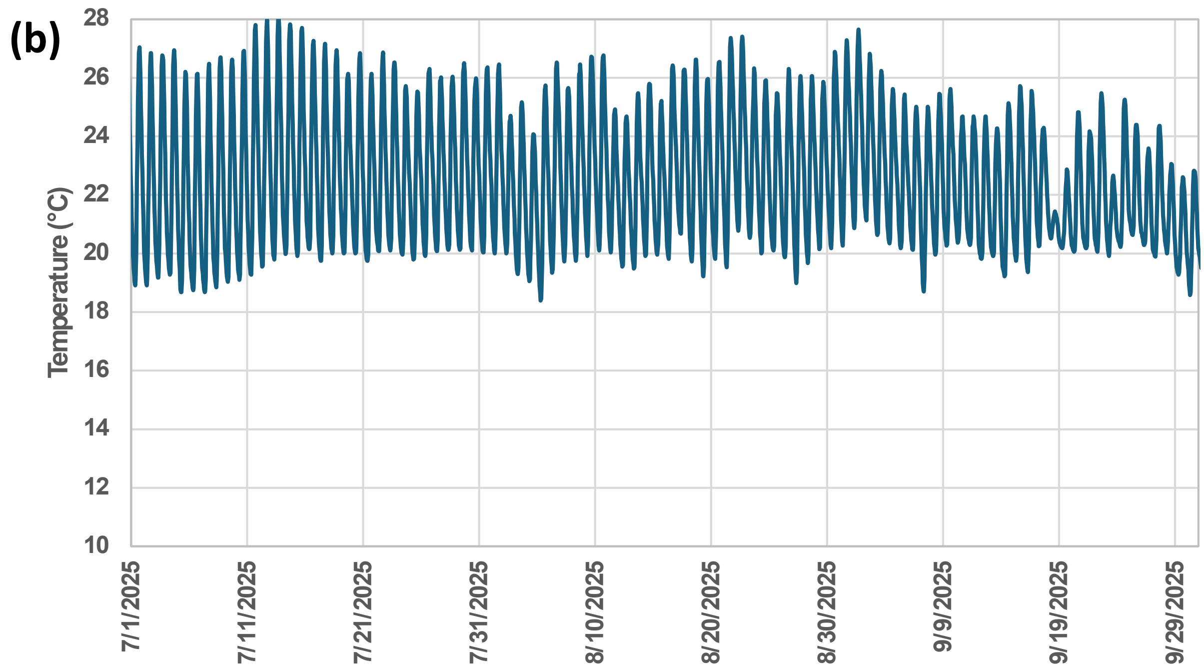


Figure 33: 2025 LSYR-10.2 (Bedrock Pool) surface (1.0-foot) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed during snorkel surveys.

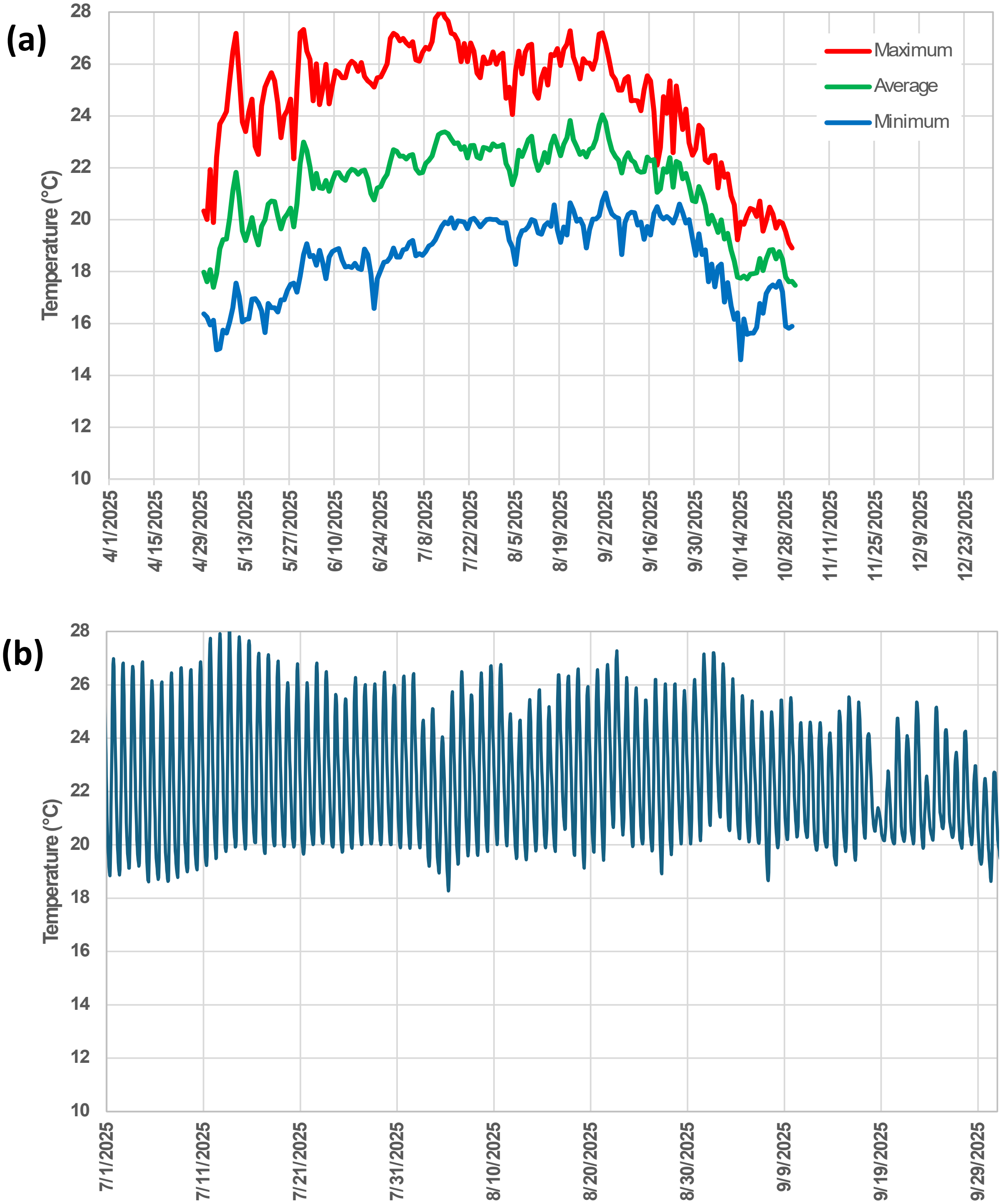


Figure 34: 2025 LSYR-10.2 (Bedrock Pool) middle (4.5 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed during snorkel surveys.

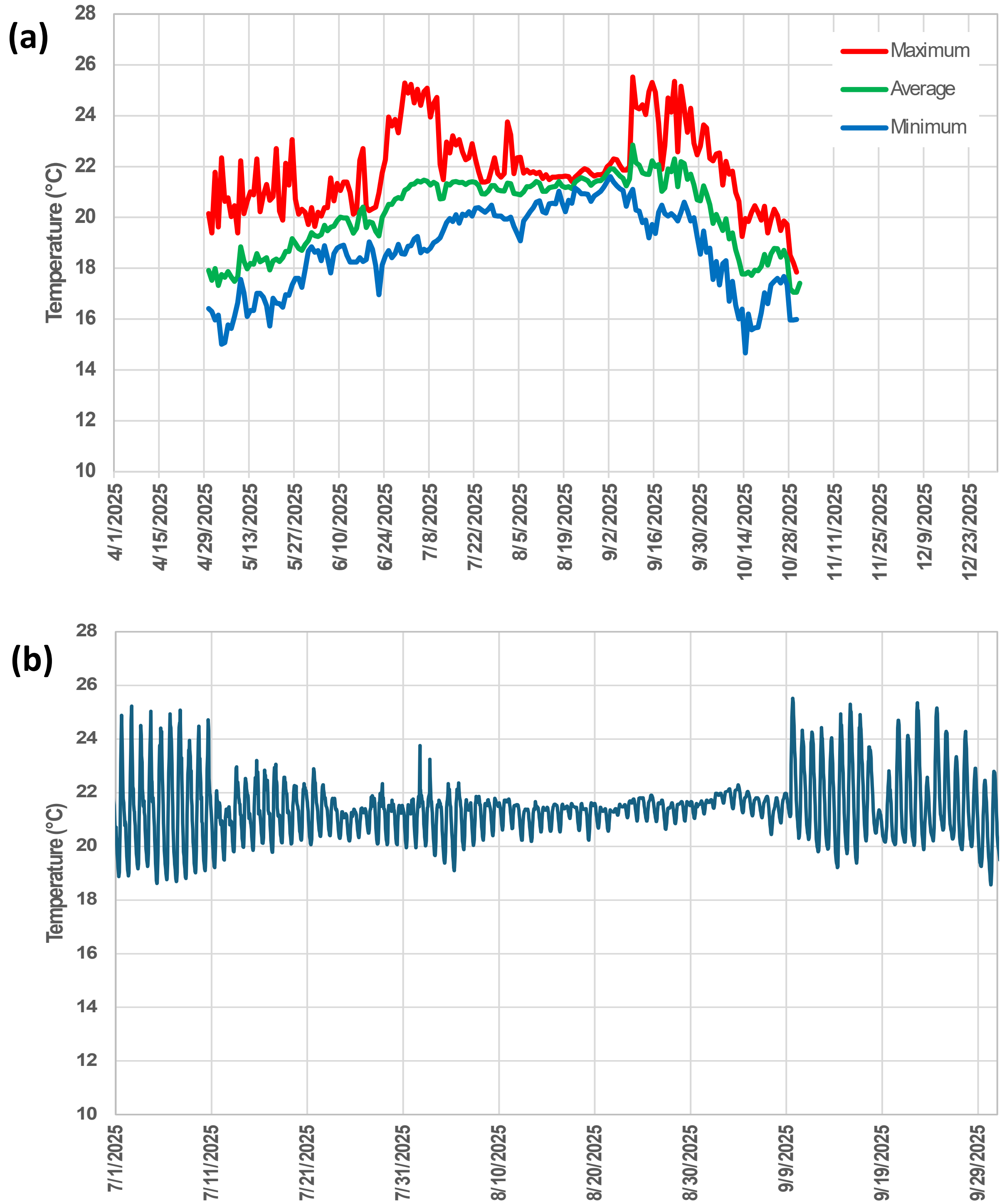


Figure 35: 2025 LSYR-10.2 (Bedrock Pool) bottom (9.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (185 days) and (b) hourly measurements from 7/1/25 to 10/1/25; *O. mykiss* were observed during snorkel surveys.

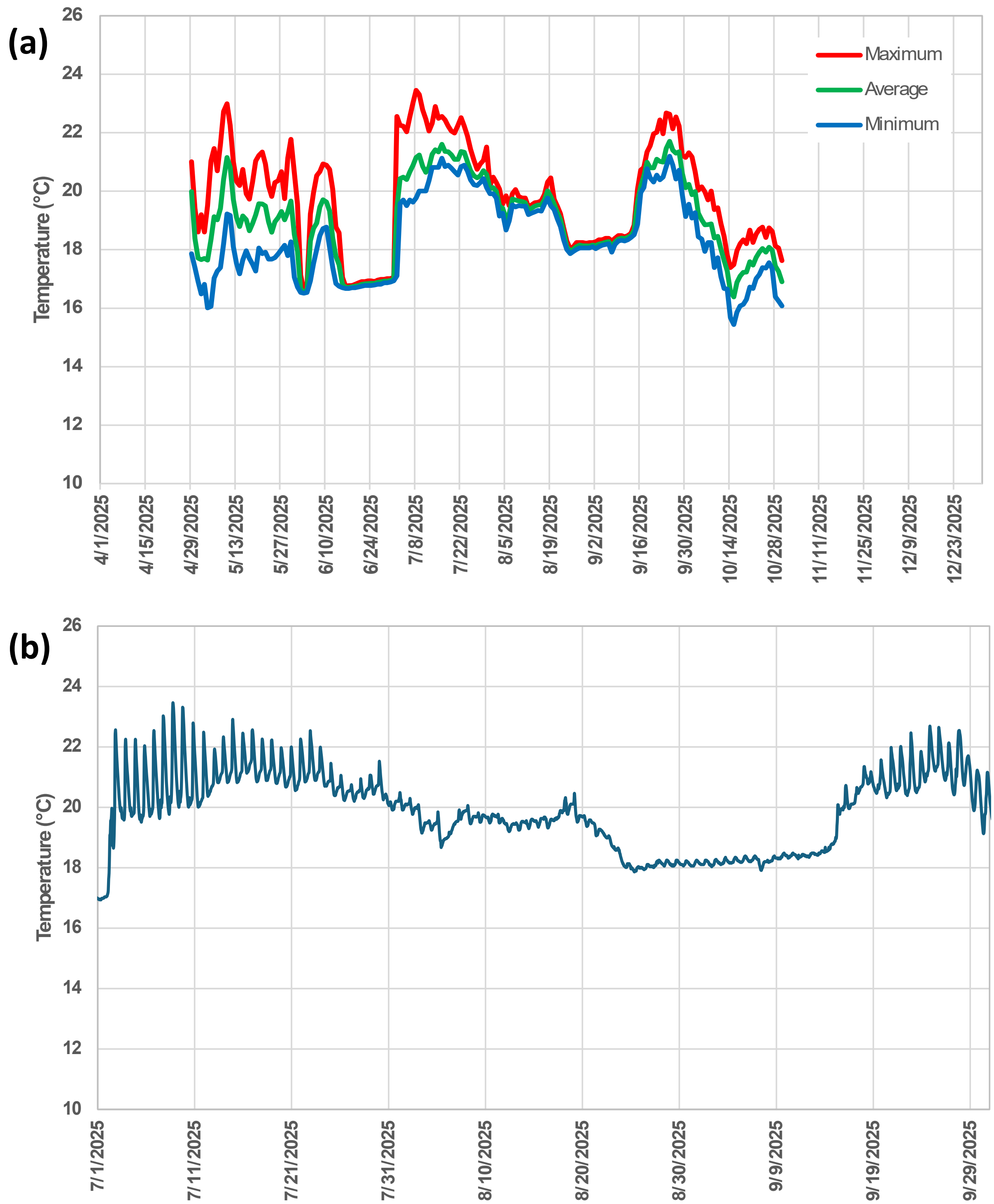
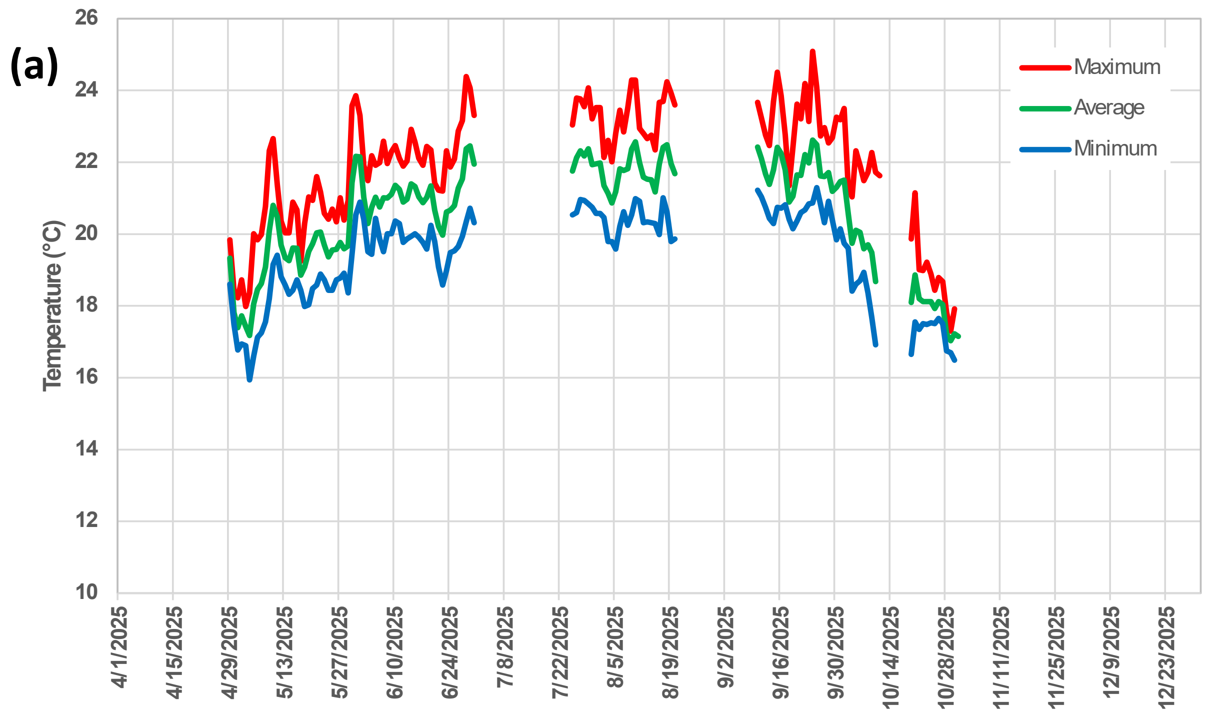


Figure 36: 2025 LSYR-13.9 (Avenue of the Flags) bottom (5.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25; no *O. mykiss* were observed during spring and fall snorkel surveys due to excessive turbidity but an abundance of fishing evidence was observed.



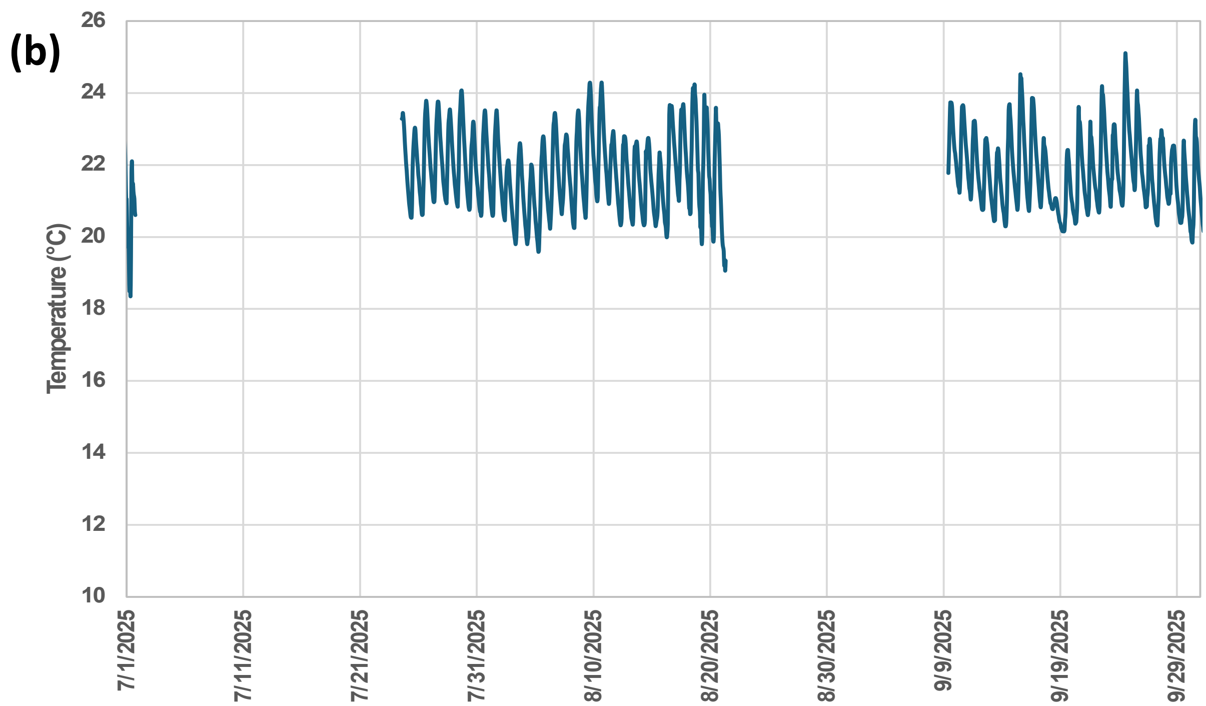
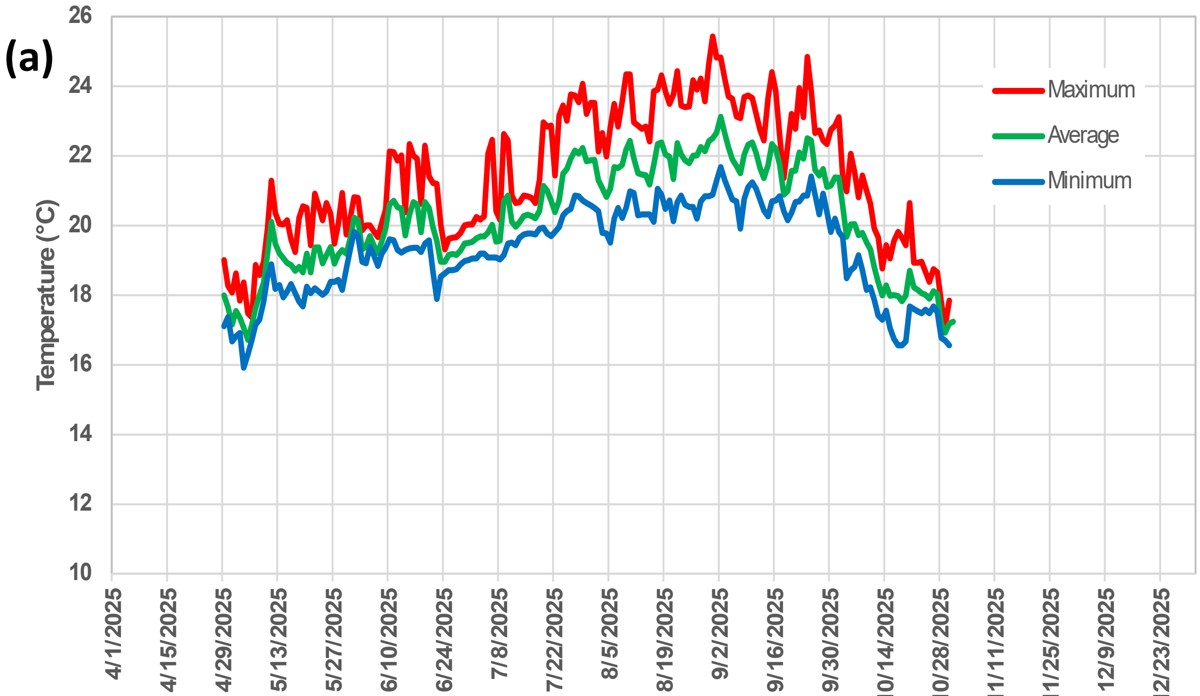


Figure 37: 2025 LSYR-22.68 (Cadwell Pool) surface (1.0-foot) water temperature for (a) daily maximum, average, and minimum for the entire period of record (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25; no *O. mykiss* were observed during spring and fall snorkel surveys due to excessive turbidity. Surface unit exposed to air several times due to declining water levels.



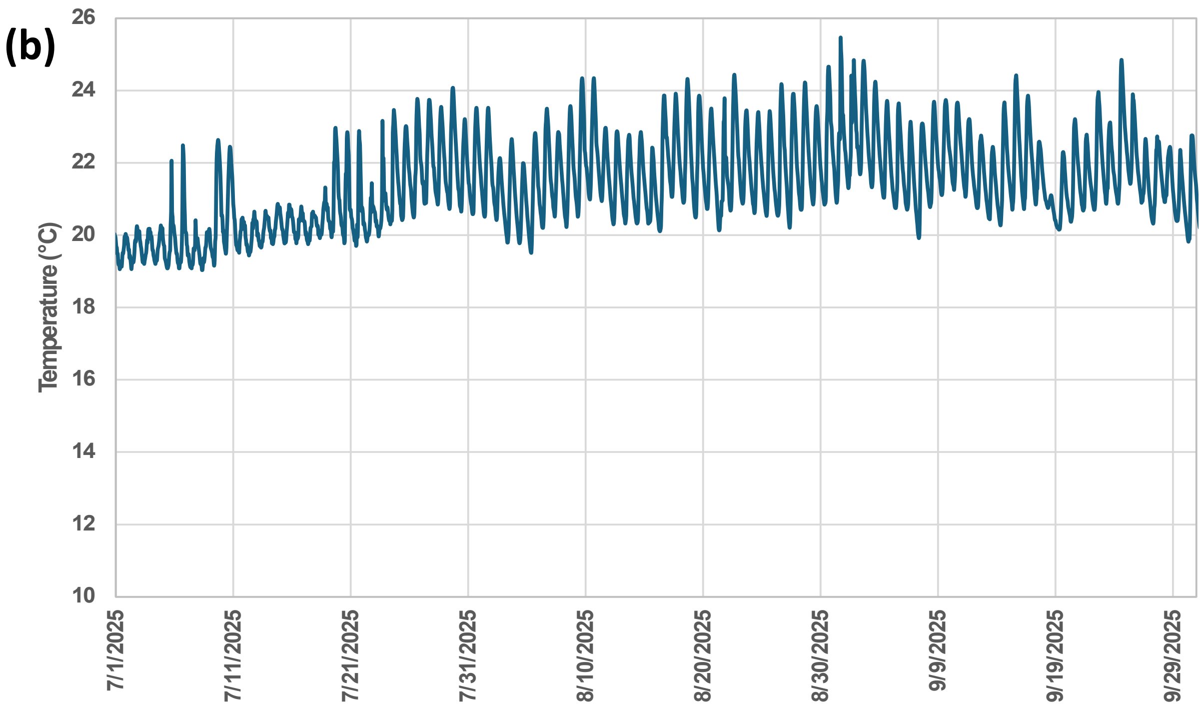
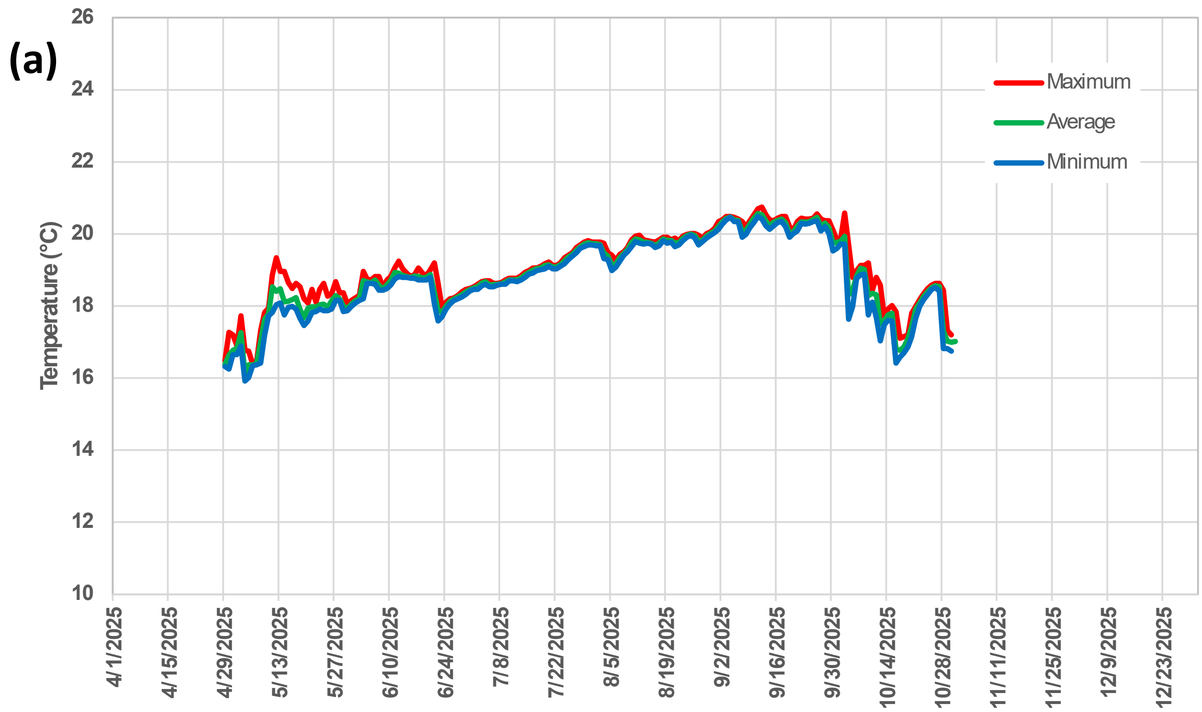


Figure 38: 2025 LSYR-22.68 (Cadwell Pool) middle (7.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of record (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25.



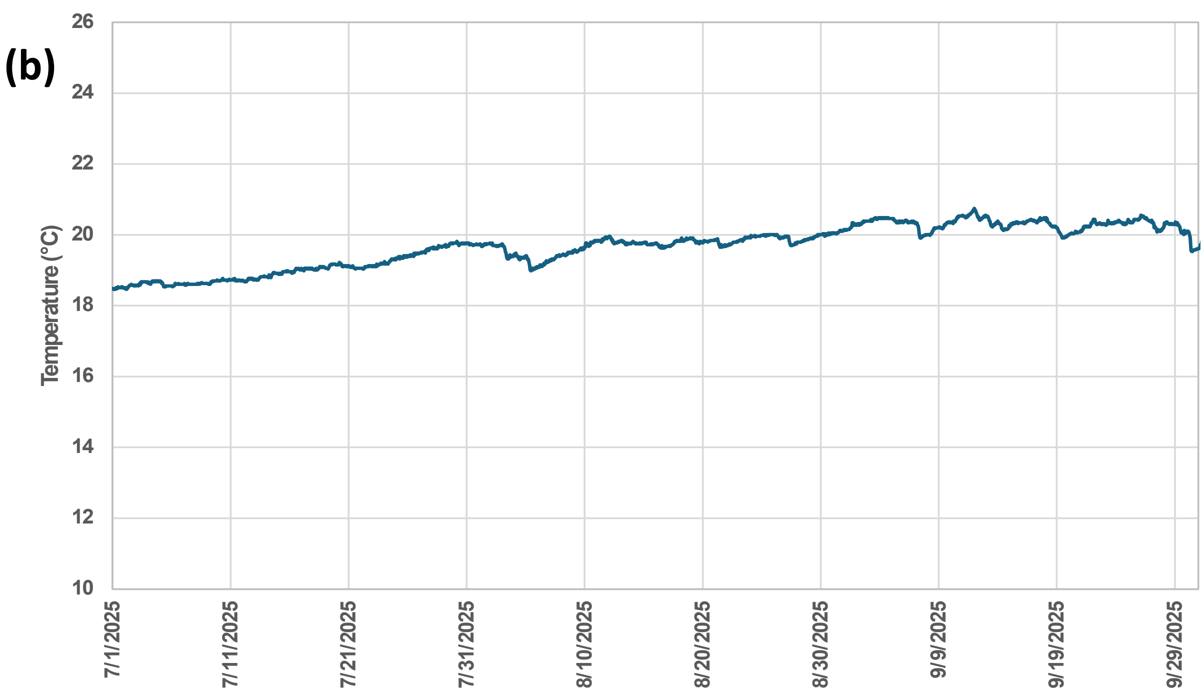


Figure 39: 2025 LSYR-22.68 (Cadwell Pool) bottom (14.0 feet) water temperatures for (a) daily maximum, average, and minimum for the entire period of record (185 days) and (b) hourly measurements from 7/1/25 through 10/1/25.

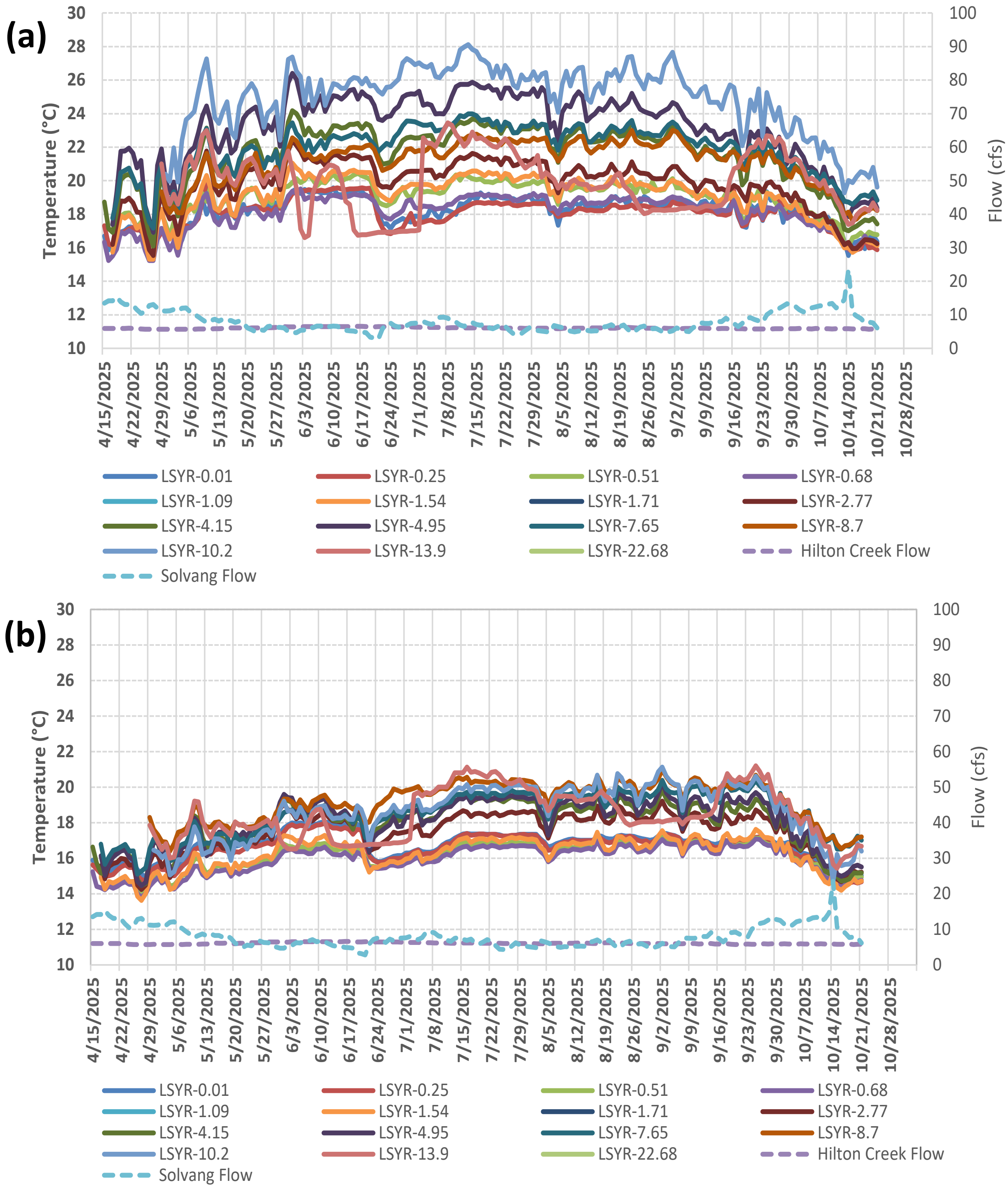


Figure 40: 2025 Longitudinal daily (a) maximum and (b) minimum daily surface water temperatures at: LSYR-0.01 (parapet wall), LSYR-0.25 (downstream of Stilling Basin), LSYR-0.51 (Long Pool), LSYR-0.68 (downstream of Long Pool), LSYR-1.54 (Grimm Downstream), LSYR-1.71 (Grimm Pool), LSYR-2.77 (Kauffman Run), LSYR-4.15 (Upper Refugio), LSYR-4.95 (Encantado Pool), LSYR-7.65 (Double Canopy), LSYR-8.7 (Head of Beaver), LSYR-10.2 (Alisal Bedrock Pool), LSYR-13.9 (Avenue of the Flags), and LSYR-22.68 (Cadwell Pool) with daily flow (discharge) at the Hilton Creek and Solvang (at the Alisal Bridge) USGS gauges.

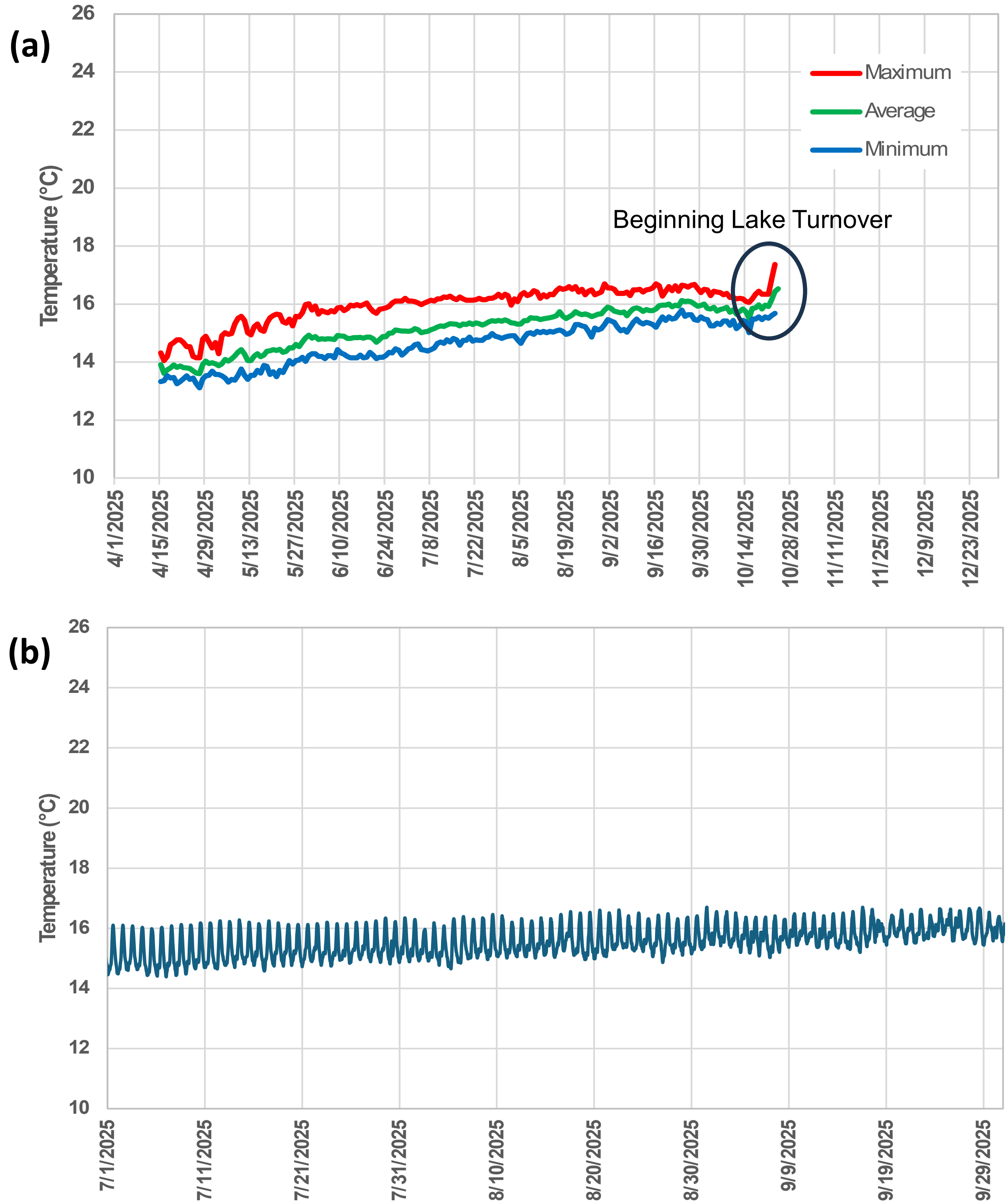


Figure 41: 2025 Lower Hilton Creek (HC-0.12) bottom (1.5 feet) thermograph for (a) daily maximum, average, and minimum daily values for the period of record (192 days) and (b) hourly data from 7/1/25 through 10/1/25; *O. mykiss* were observed in this habitat during spring and fall snorkel surveys.

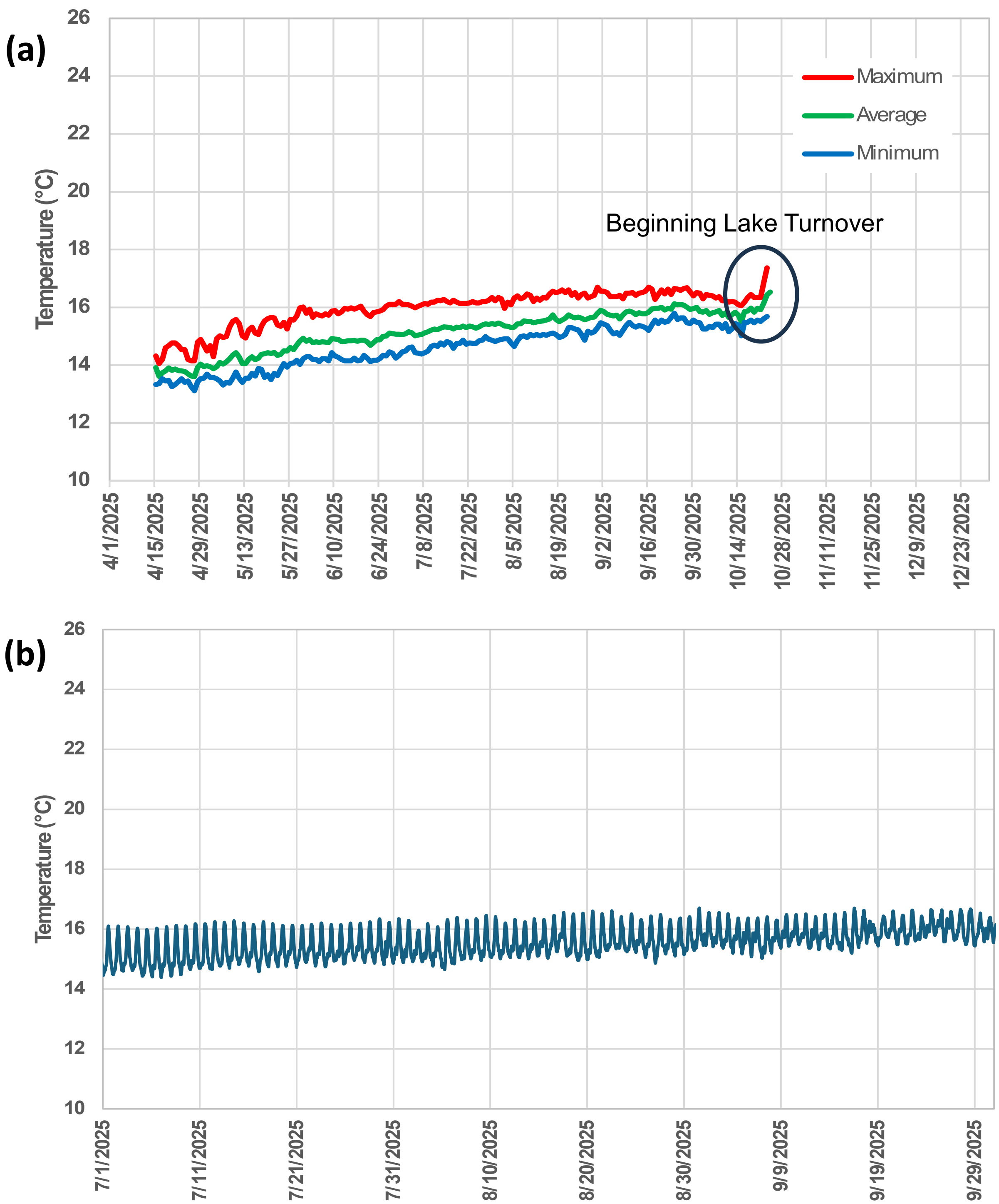
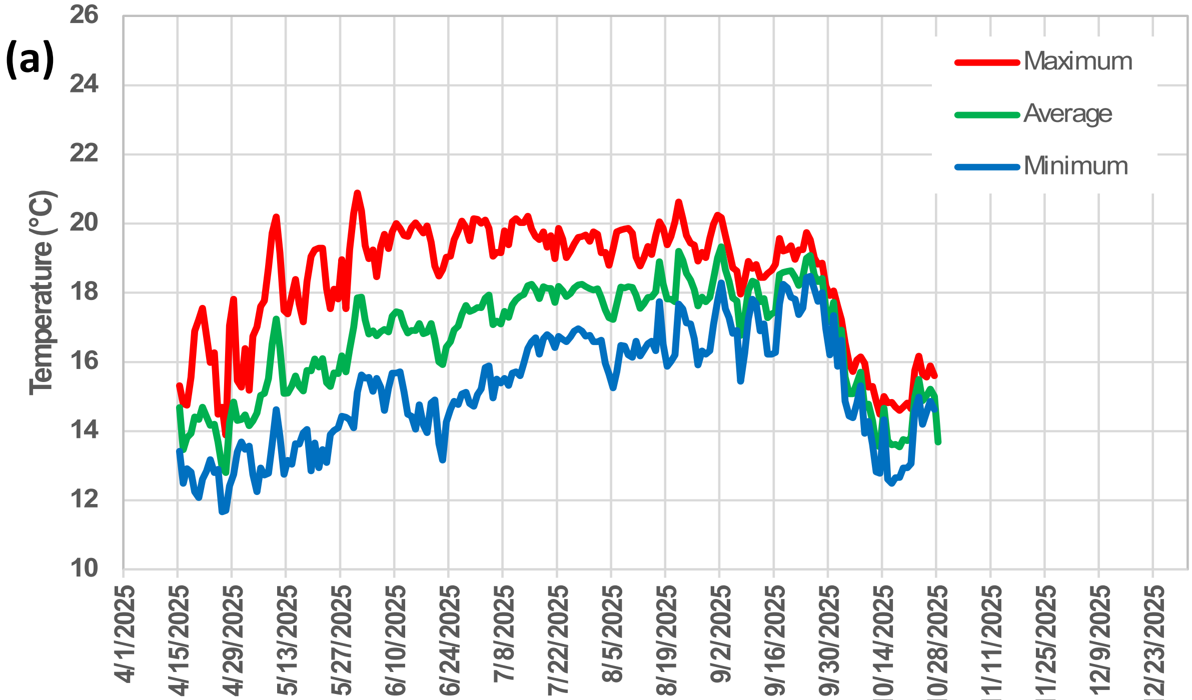


Figure 42: 2025 Hilton Creek at the Upper Release Point (HC-0.54) bottom (2.5 feet) water temperatures for: (a) daily maximum, average, and minimum for the entire period of deployment (192 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* were observed in this habitat during spring and fall snorkel surveys.



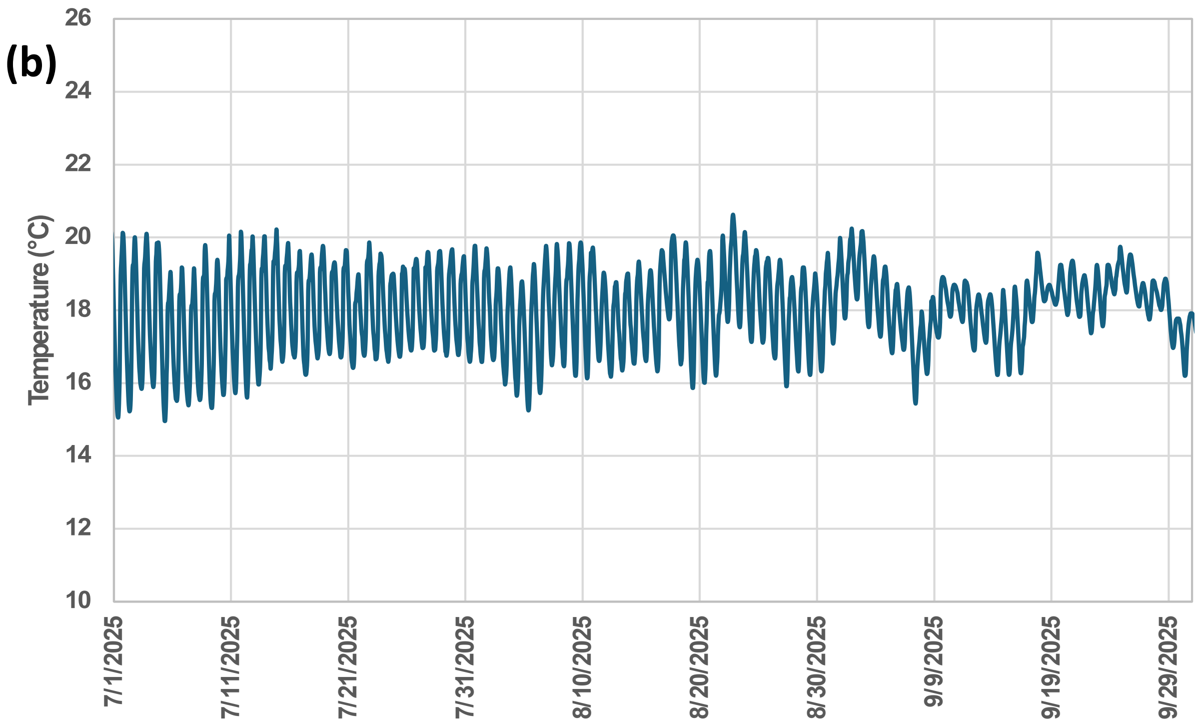
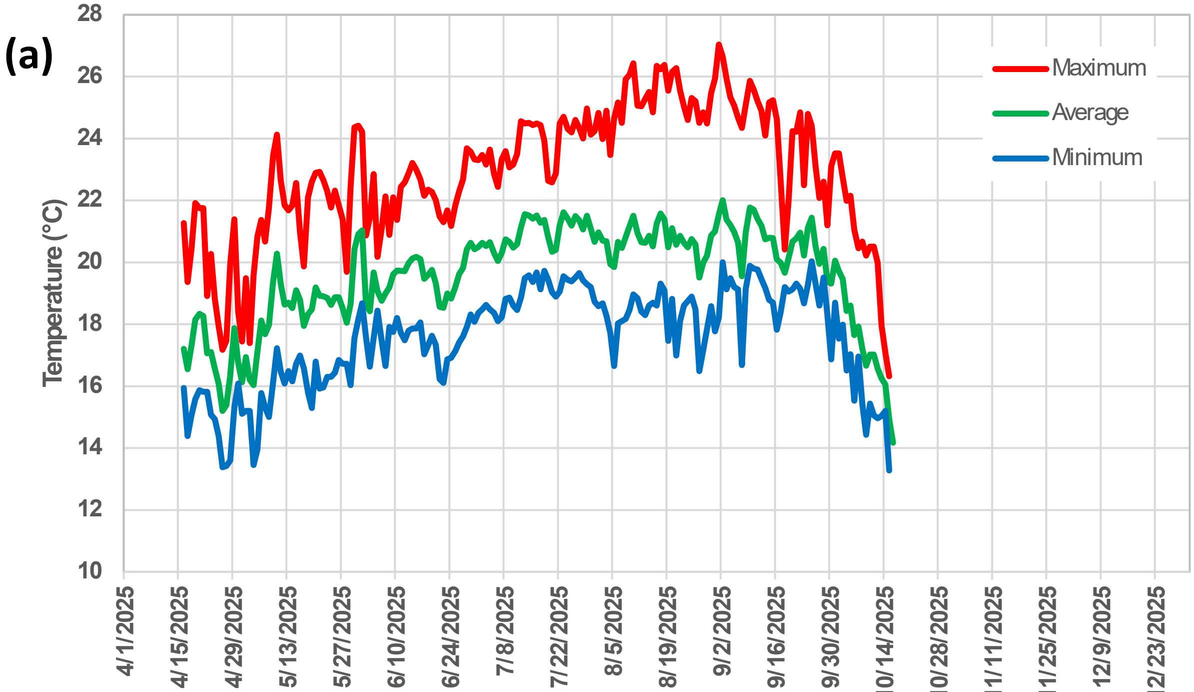


Figure 43: 2025 Quiota Creek (QC-2.66) bottom (2.5 feet) thermograph for (a) daily maximum, average, and minimum daily values for the entire period of record (196 days) and (b) hourly measurements from 7/1/25 – 10/1/25; *O. mykiss* were observed in this habitat during snorkel surveys.



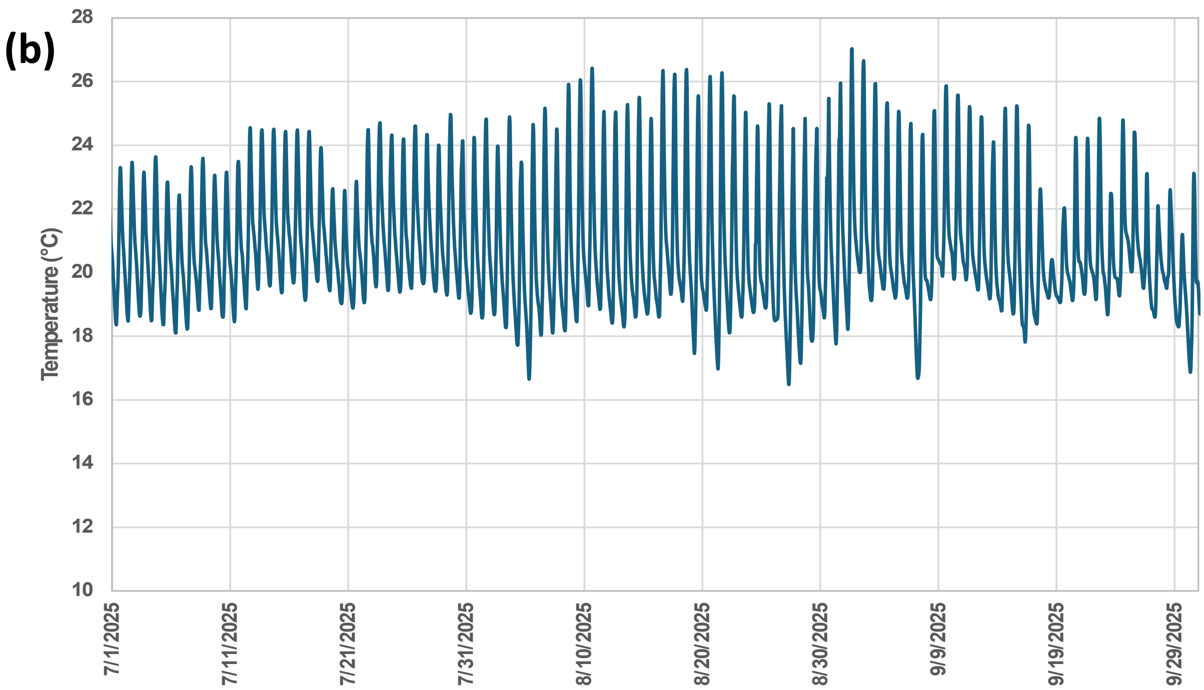


Figure 44: 2025 SC-0.77 bottom (2.5 foot) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (183 days) and (b) hourly measurements from 7/1/25 through 10/1/25; *O. mykiss* presence unknown; no snorkel surveys were conducted due to poor visibility.

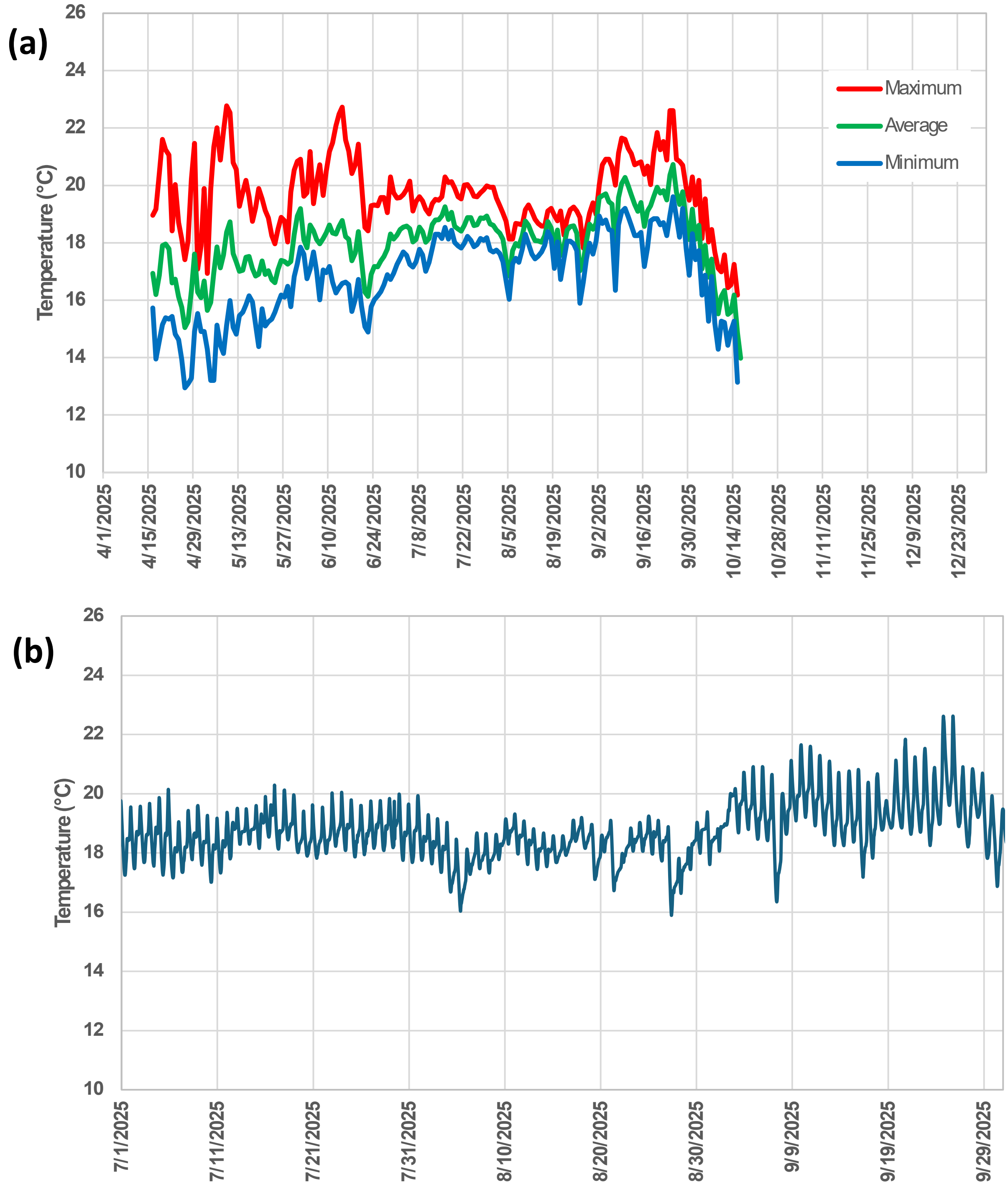


Figure 45: 2025 SC-2.2 (Reach 2 Bedrock Section) middle (4.0 feet) water temperatures for (a) daily maximum, average, and minimum temperatures for the entire period of deployment (183 days) and (b) hourly measurements for the period from 7/1/25 through 10/1/25; *O. mykiss* were observed during the spring snorkel survey.

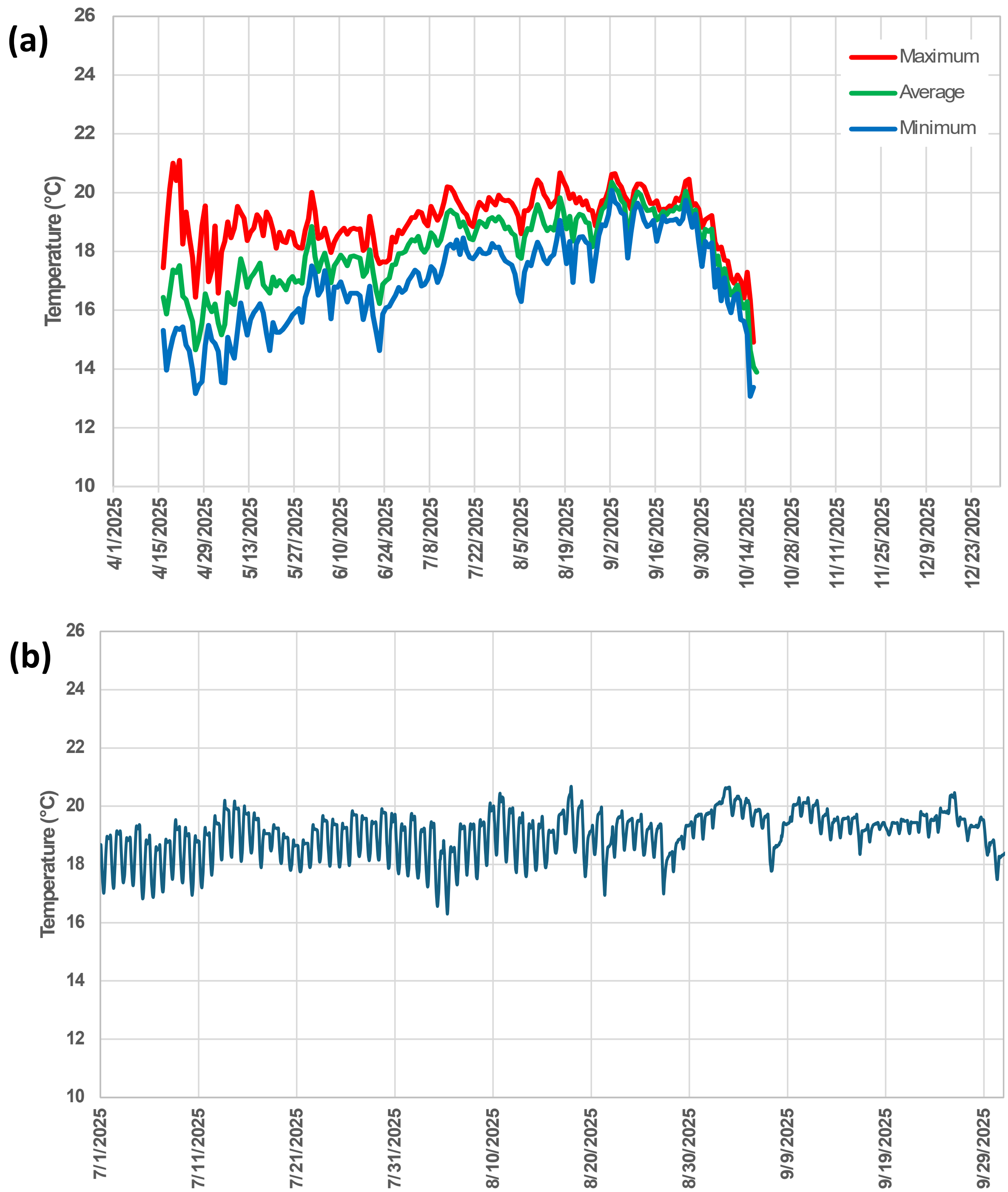


Figure 46: 2025 SC-3.0 (250 downstream of Highway 1 Bridge) middle (6 feet) water temperature for (a) maximum, average, and minimum for the entire period of deployment (184 days) and (b) hourly measurements for the period from 7/1/25 through 10/1/25; *O. mykiss* were observed during the spring and fall snorkel surveys although that pool has filled in considerably due to unraveling of the CalTrans Highway 1 Bridge project during storms of 2023 and 2024.

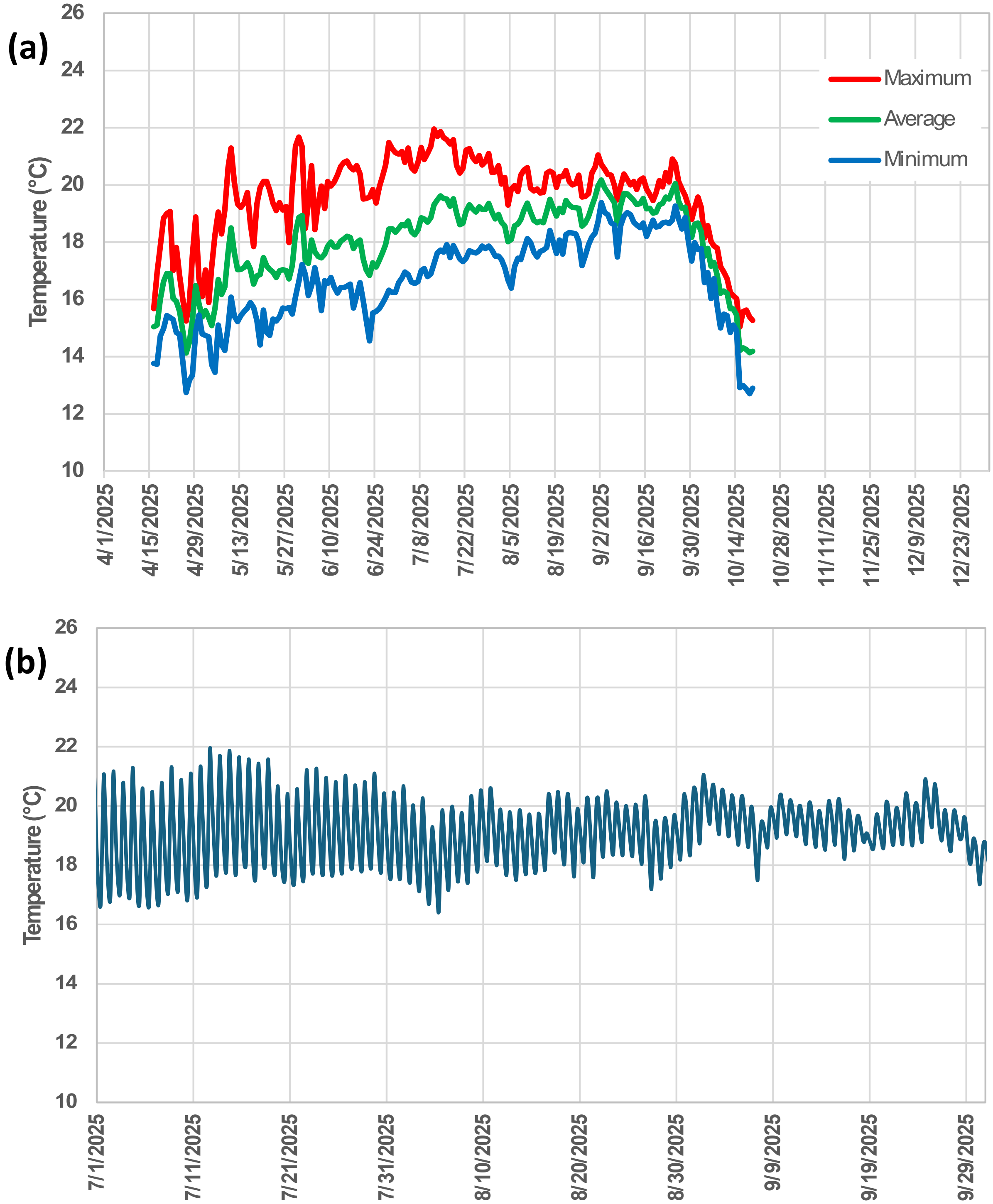


Figure 47: 2025 SC-3.5 (Jalama Bridge Pool habitat) bottom (5.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (188 days) and (b) hourly measurements for the period from 7/1/25 through 10/1/25; *O. mykiss* were observed during the spring and fall snorkel surveys.

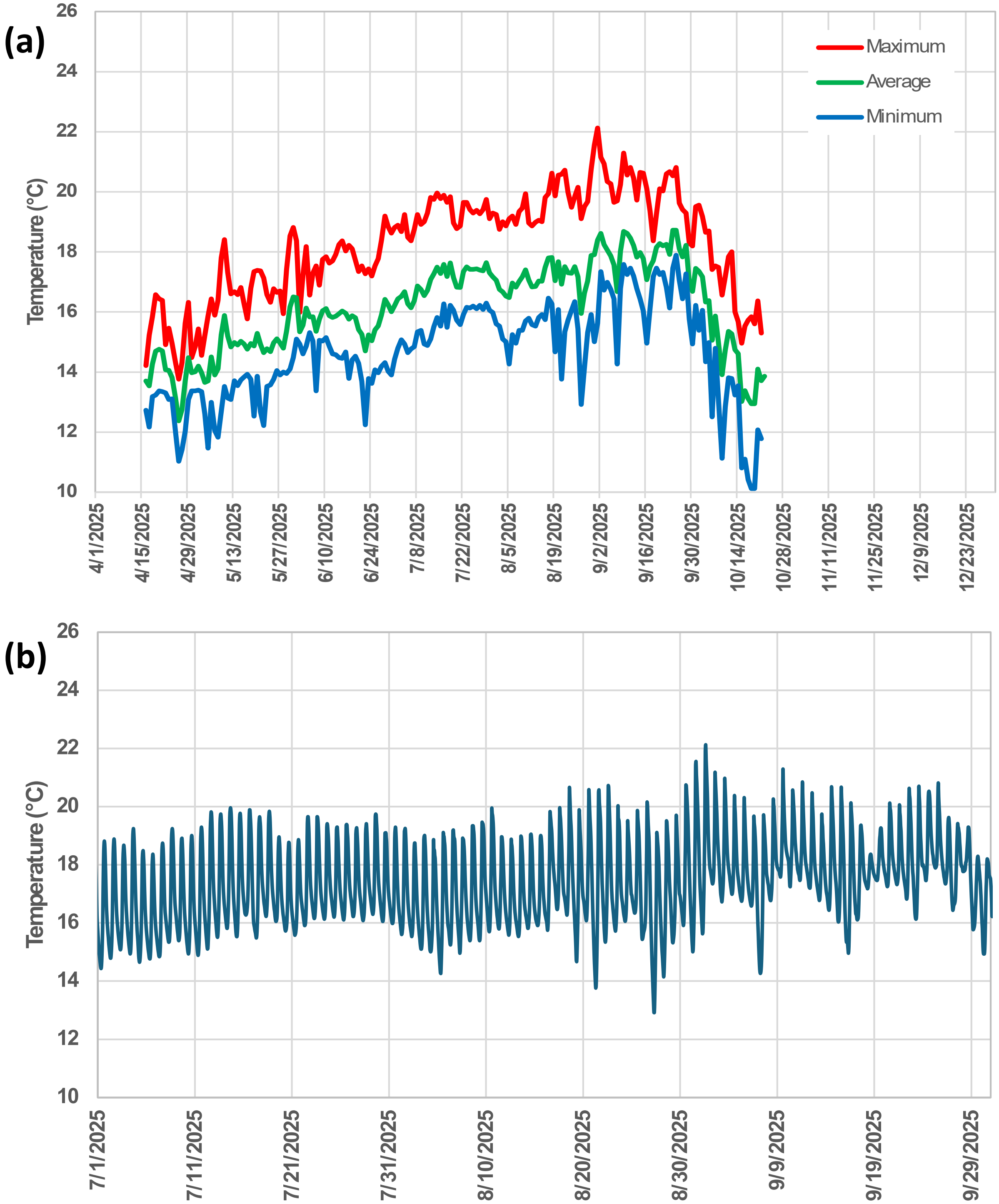


Figure 48: 2025 SC-3.8 Upper Salsipuedes Creek (0.5 feet) water temperatures for (a) daily maximum, average and minimum for the entire period of deployment (189 days) and (b) hourly measurements for the period of 7/1/25 through 10/1/25; no *O. mykiss* were observed during the spring and fall snorkel surveys within the habitat but were observed immediately downstream.

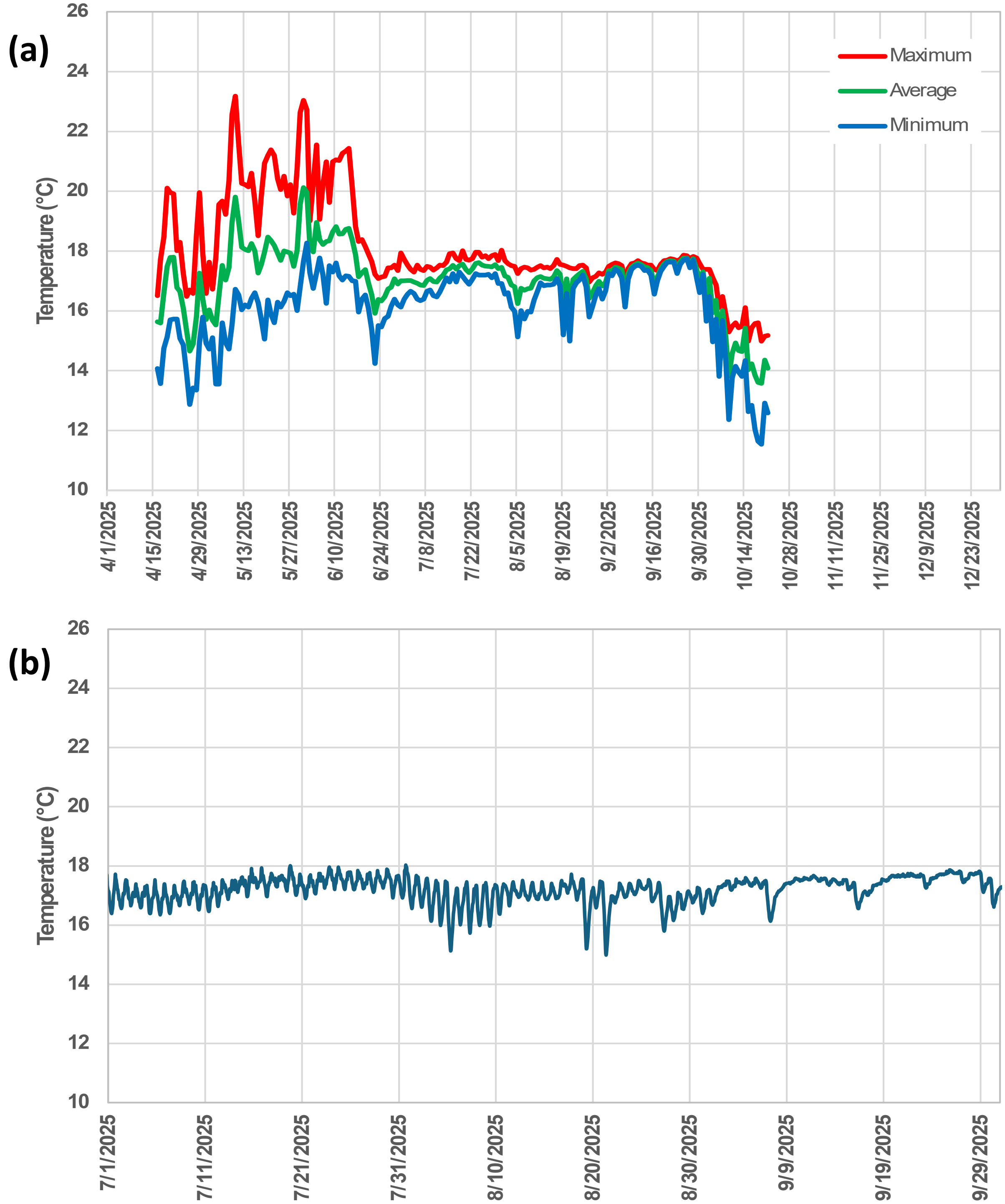


Figure 49: 2025 EJC-3.81 directly upstream of the Upper Salsipuedes Creek confluence – bottom (3.0 -feet) water temperatures for (a) daily maximum, average, and minimum for the entire period of deployment (189 days) and (b) hourly measurements for the period of 7/1/25 through 10/1/25; no *O. mykiss* were observed during snorkel surveys though they were observed immediately upstream and downstream of the monitoring site.

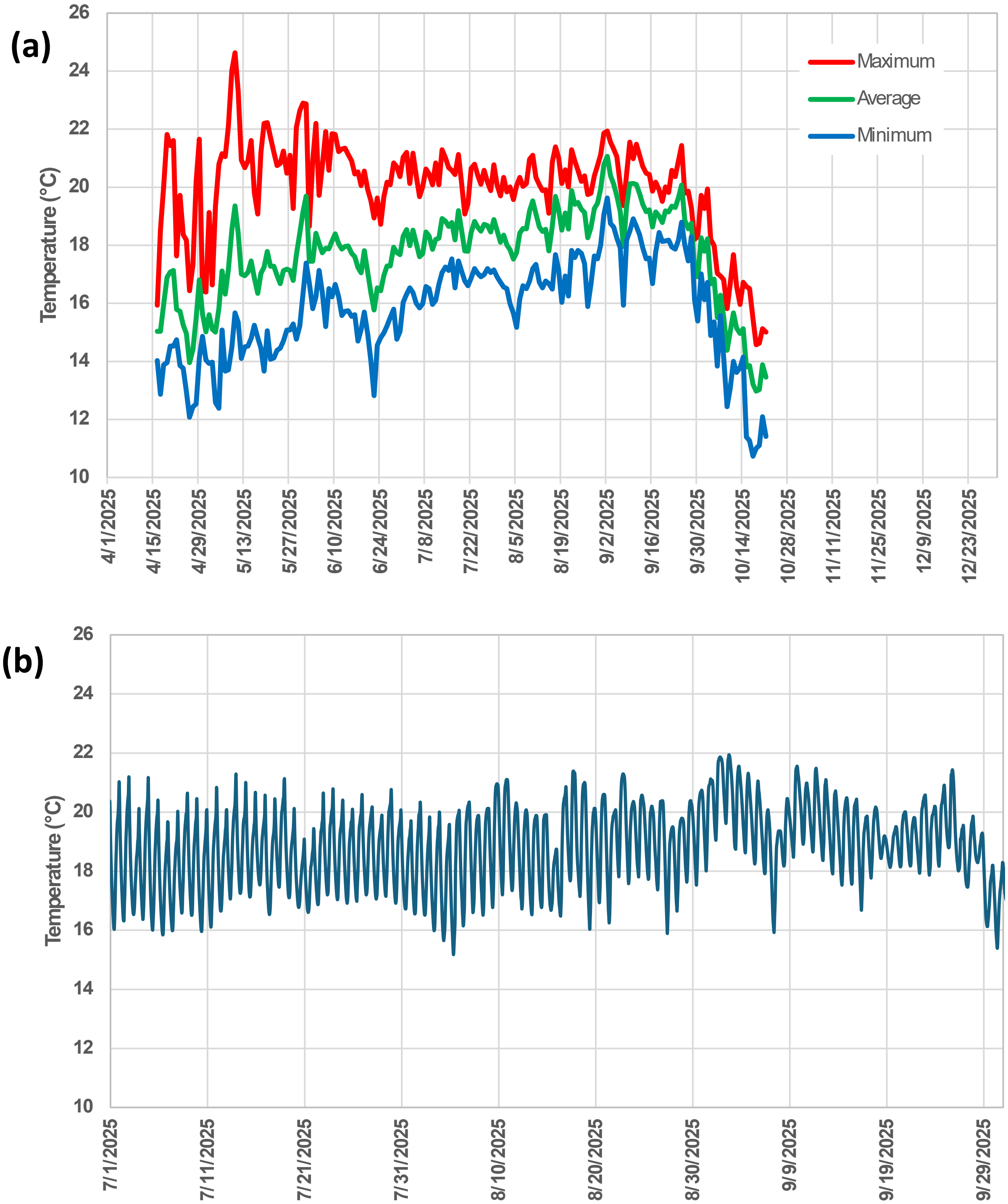


Figure 50: 2025 EJC-5.4 (Palos Colorados Pool habitat) bottom (3.0 feet) water temperature for (a) daily maximum, average, and minimum for the entire period of deployment (189 days) and (b) hourly measurements for the period from 7/1/25 through 10/1/25; no *O. mykiss* were observed during the spring and fall snorkel surveys.

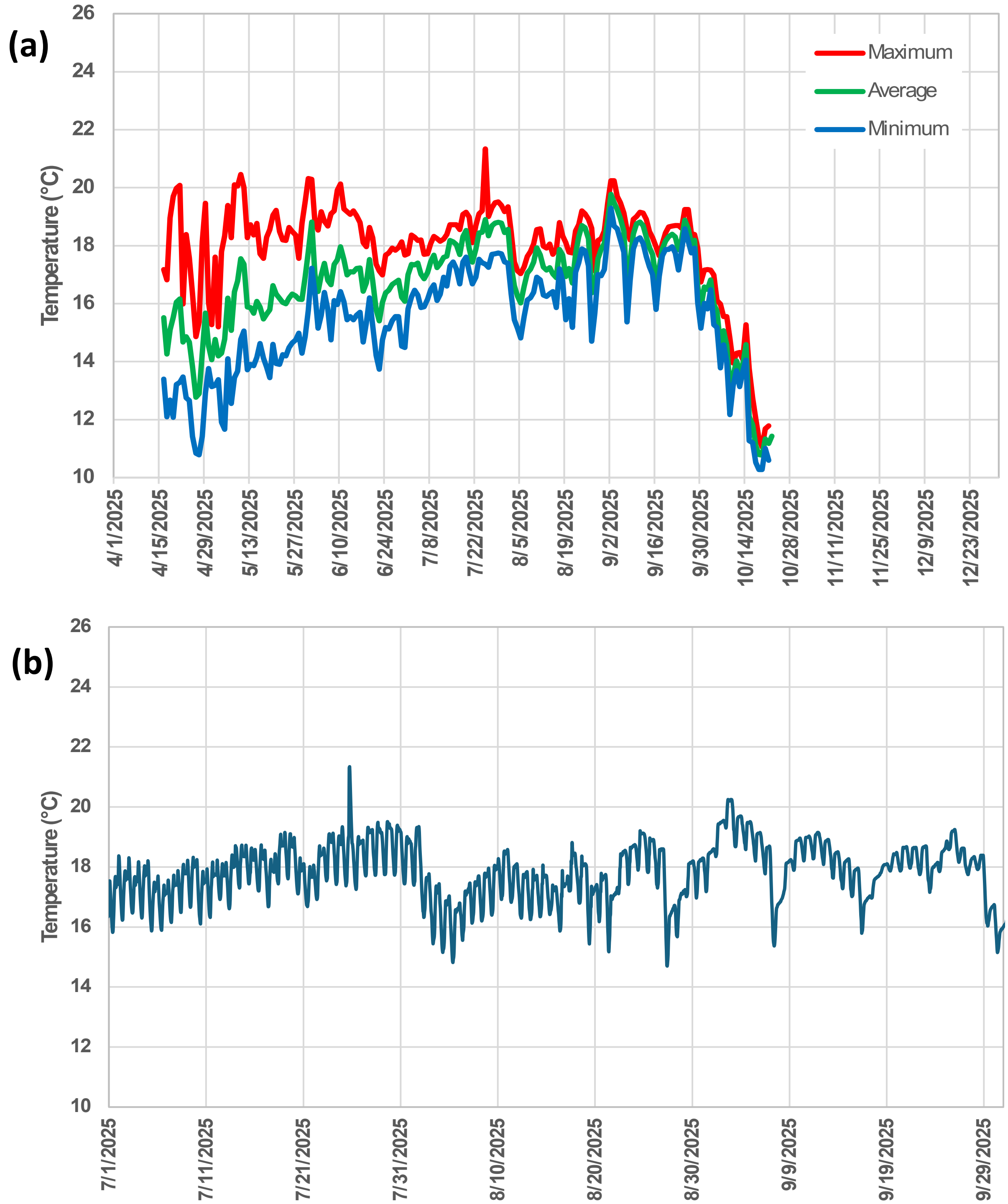
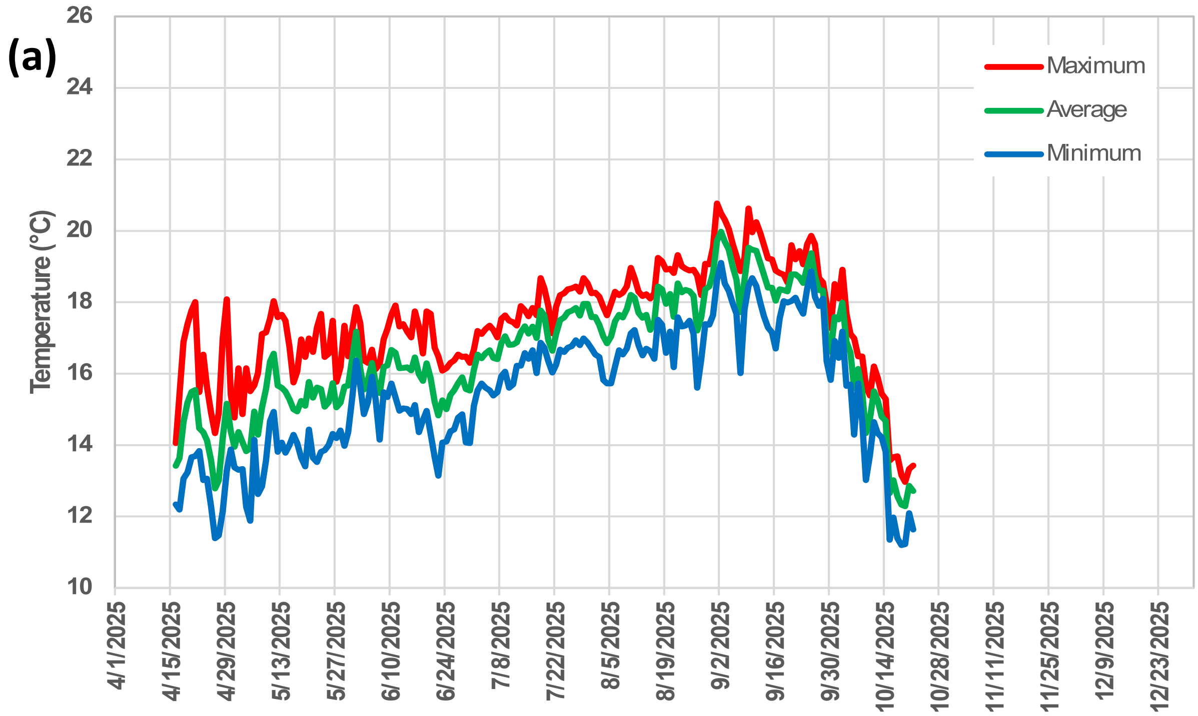


Figure 51: 2025 EJC-10.82 water temperature at Rancho San Julian Fish Ladder bottom (3.5-feet) for (a) daily maximum, average, and minimum for the entire period of deployment (189 days) and (b) hourly measurements for period of 7/1/25 through 10/1/25; *O. mykiss* were observed within the fish ladder and the pool immediately downstream during spring and fall snorkel surveys.



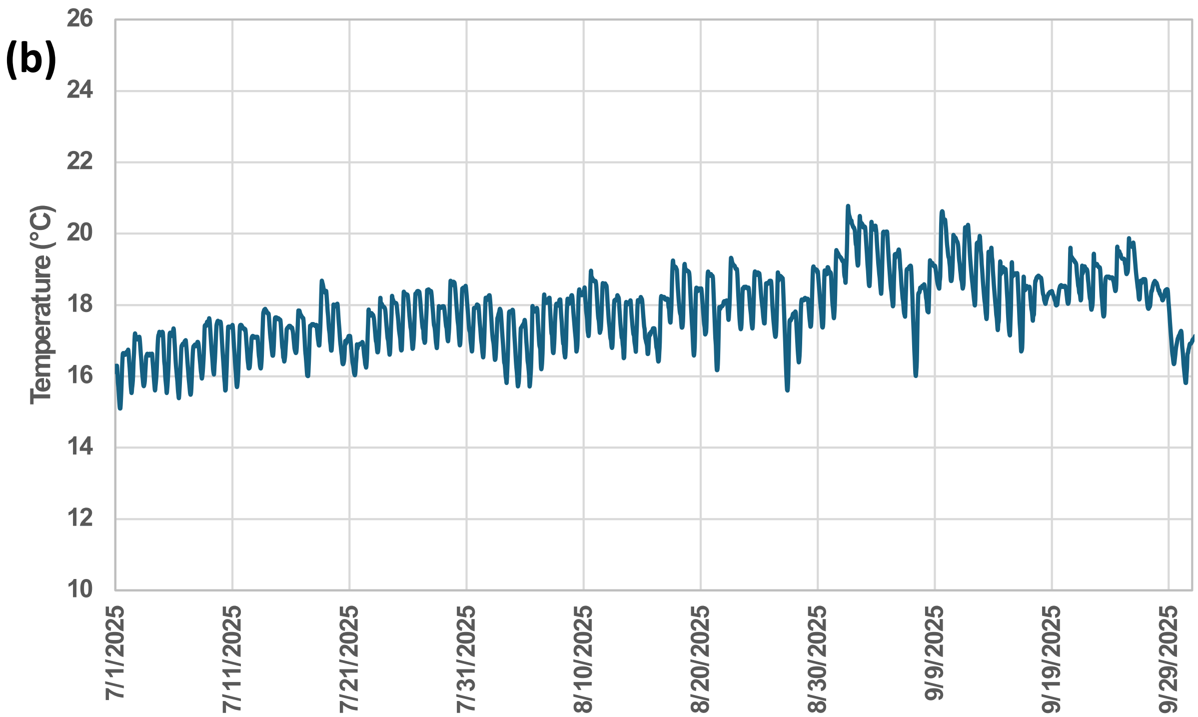


Figure 52: 2025 LAC-7.0 (Los Amoles Creek at Ford Crossing) bottom (2.5 feet) water temperature for (a) daily maximum, average, and minimum for the entire period (189 days) of deployment and (b) hourly measurements for the period from 7/1/25 through 10/1/25; no snorkel surveys were conducted, and *O. mykiss* presence is possible.

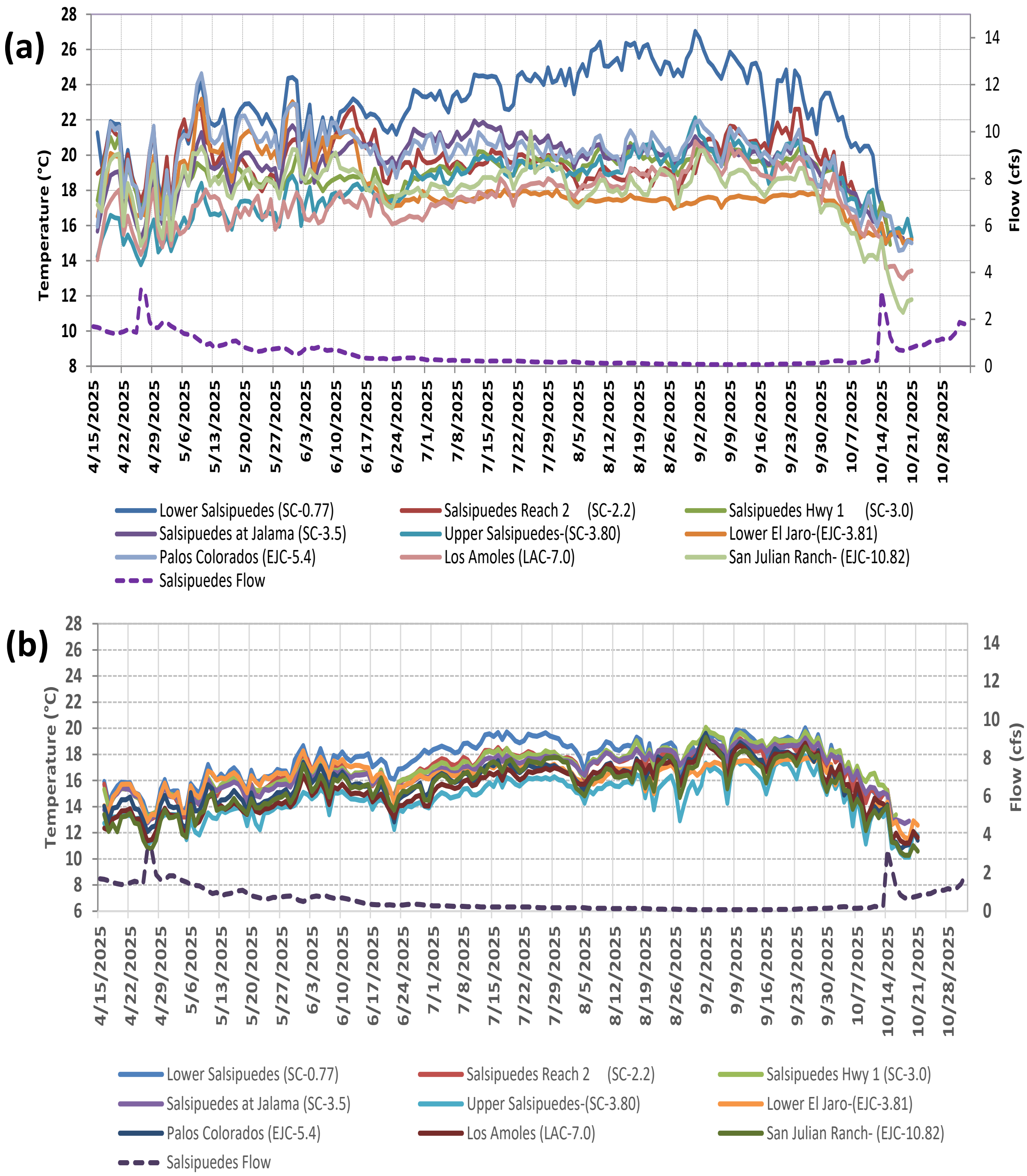
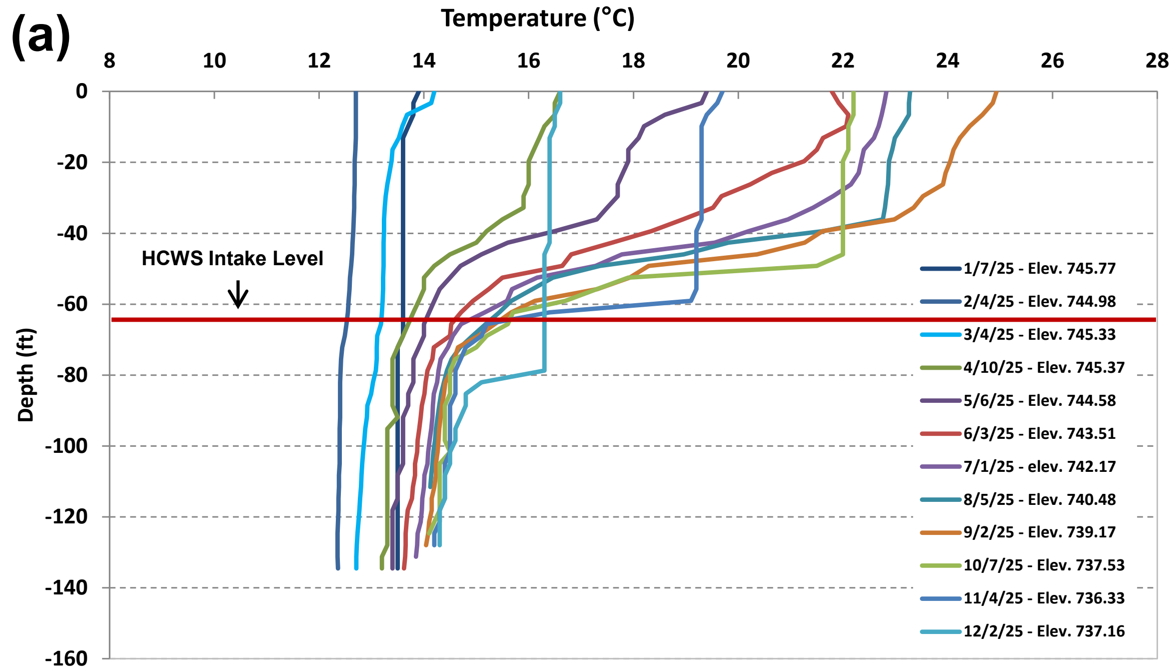


Figure 53: 2025 longitudinal surface daily (a) maximum and (b) minimum water temperatures at 9 tributary locations within Salsipuedes/El Jaro Creek watershed and flow at the USGS gauging station at Salsipuedes Creek.



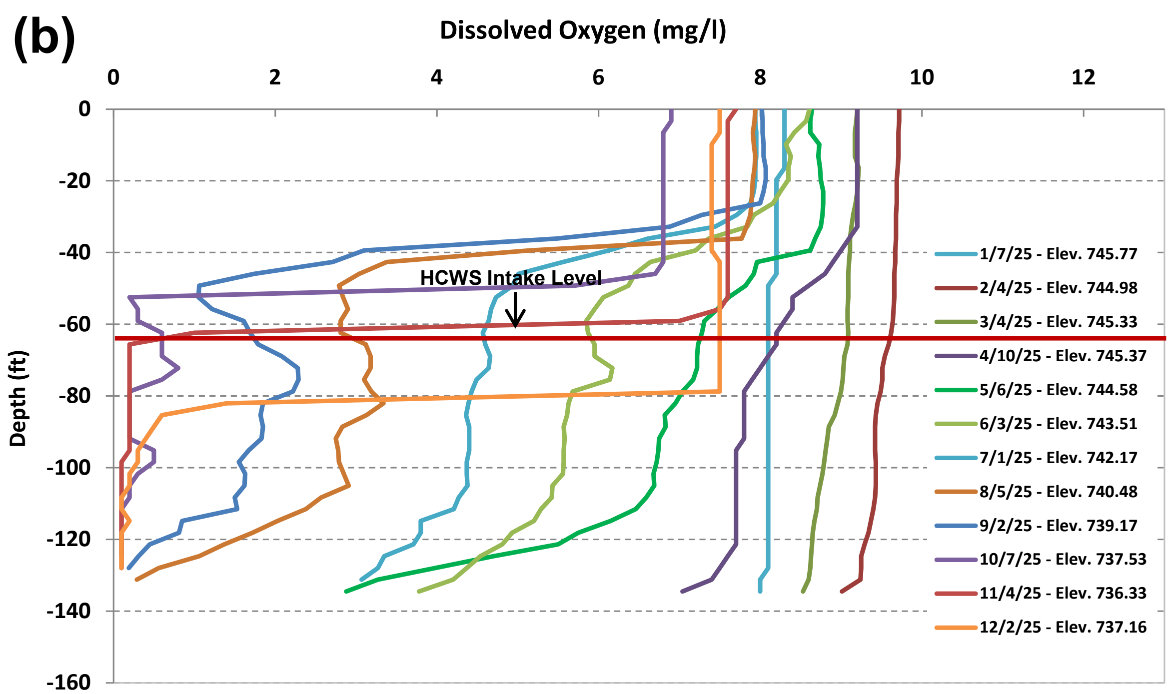


Figure 54: Lake Cachuma 2025 water quality profiles for (a) temperature and (b) dissolved oxygen concentrations at the intake barge for the HCWS; the target depth of HCWS intake hose is 65 feet of depth throughout the monitoring period.

3.3. Habitat Quality within the LYSR Basin

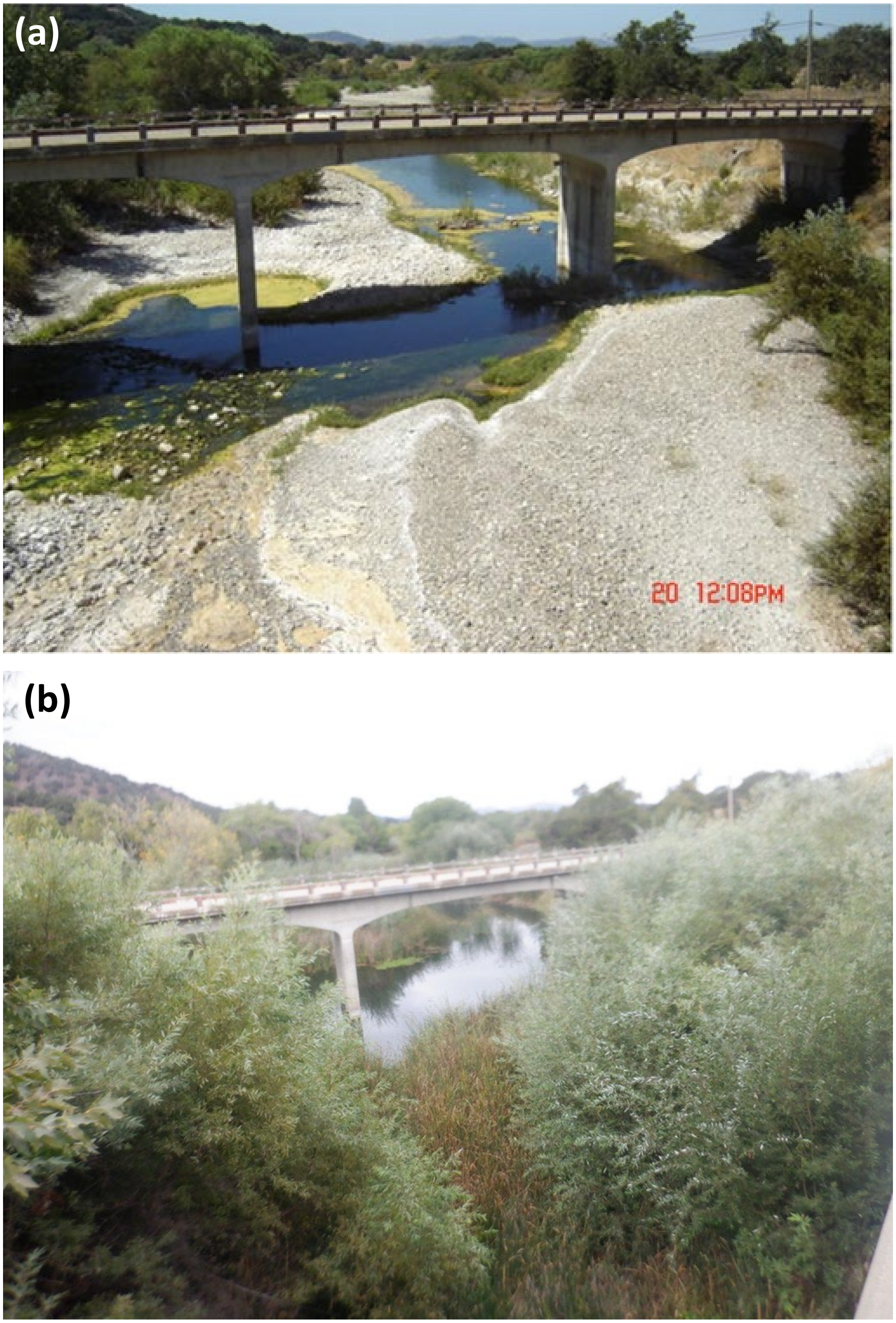


Figure 55: Photo points (M-6) collected at Highway 154 Bridge looking downstream in (a) September 2005 and (b) September 2025.

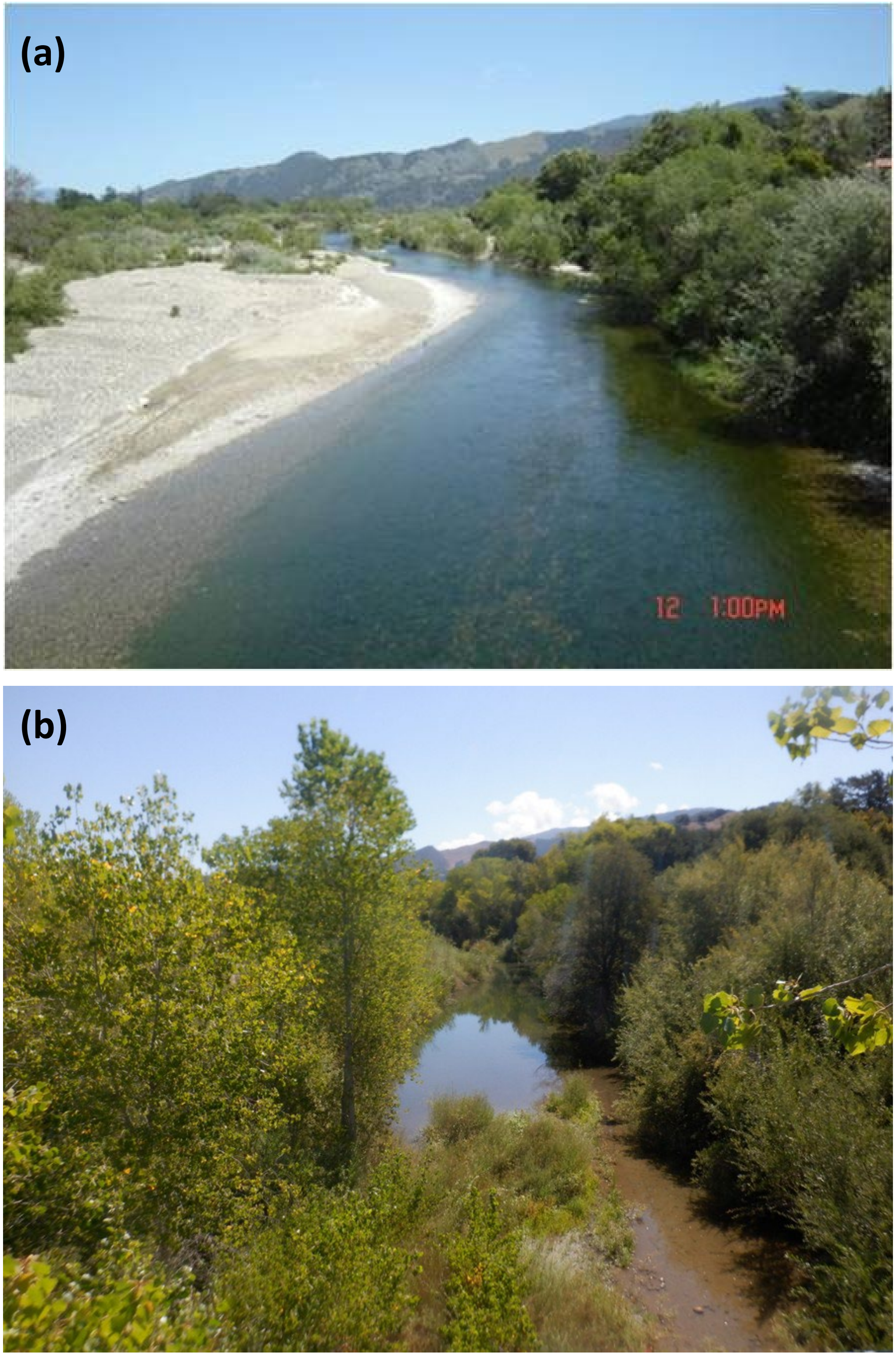


Figure 56: Photo point (M-12) collected at Refugio Bridge looking upstream in (a) May 2005, and (b) September 2025.

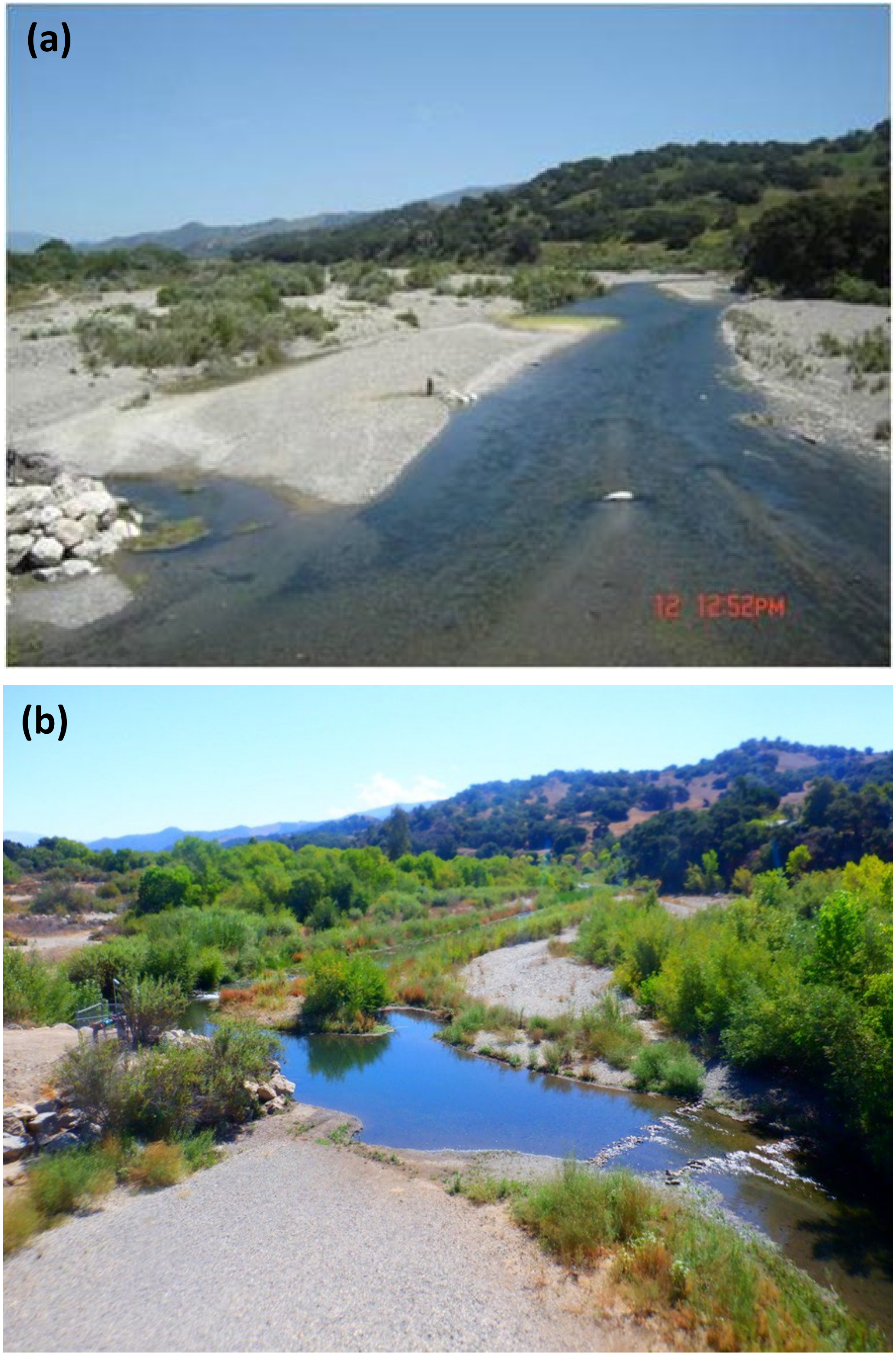


Figure 57: Photo point (M-14) collected at Alisal Bridge looking upstream in (a) May 2005, and (b) September 2025.

Figure 58: Photo point (M-19) collected at Avenue of the Flags Bridge looking upstream in (a) May 2005, and (b) September 2025.

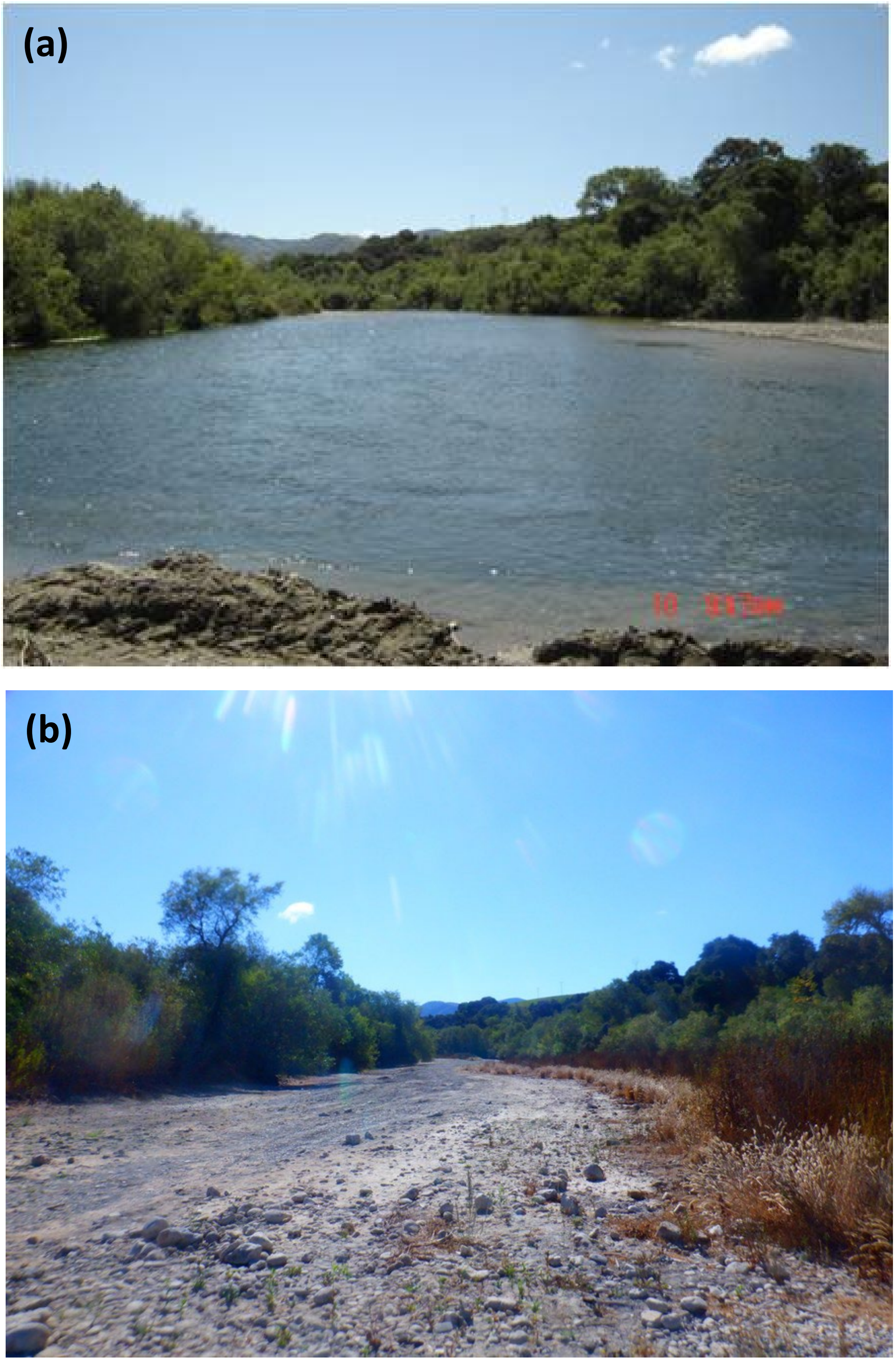


Figure 59: Photo point (M-21) collected at Sweeney Road Crossing looking upstream in (a) May 2005, and (b) September 2025.

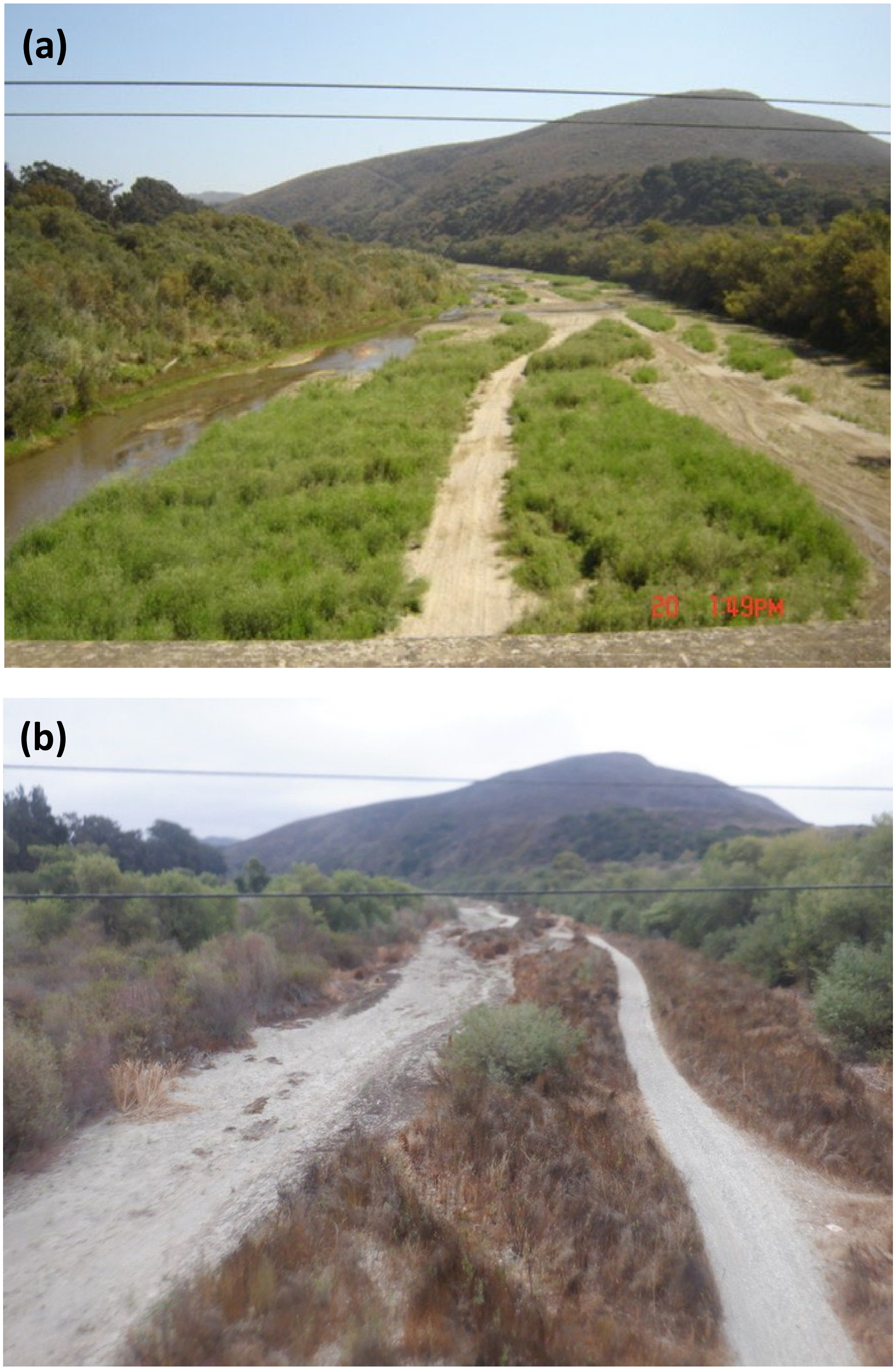


Figure 60: Photo point (M-23) collected at Robinson Bridge looking upstream in (a) September 2005, and (b) September 2025.

Figure 61: Photo point (T-1) collected at Hilton Creek looking upstream towards the trap site on (a) May 2005, and (b) September 2025 (the creek is to the left).

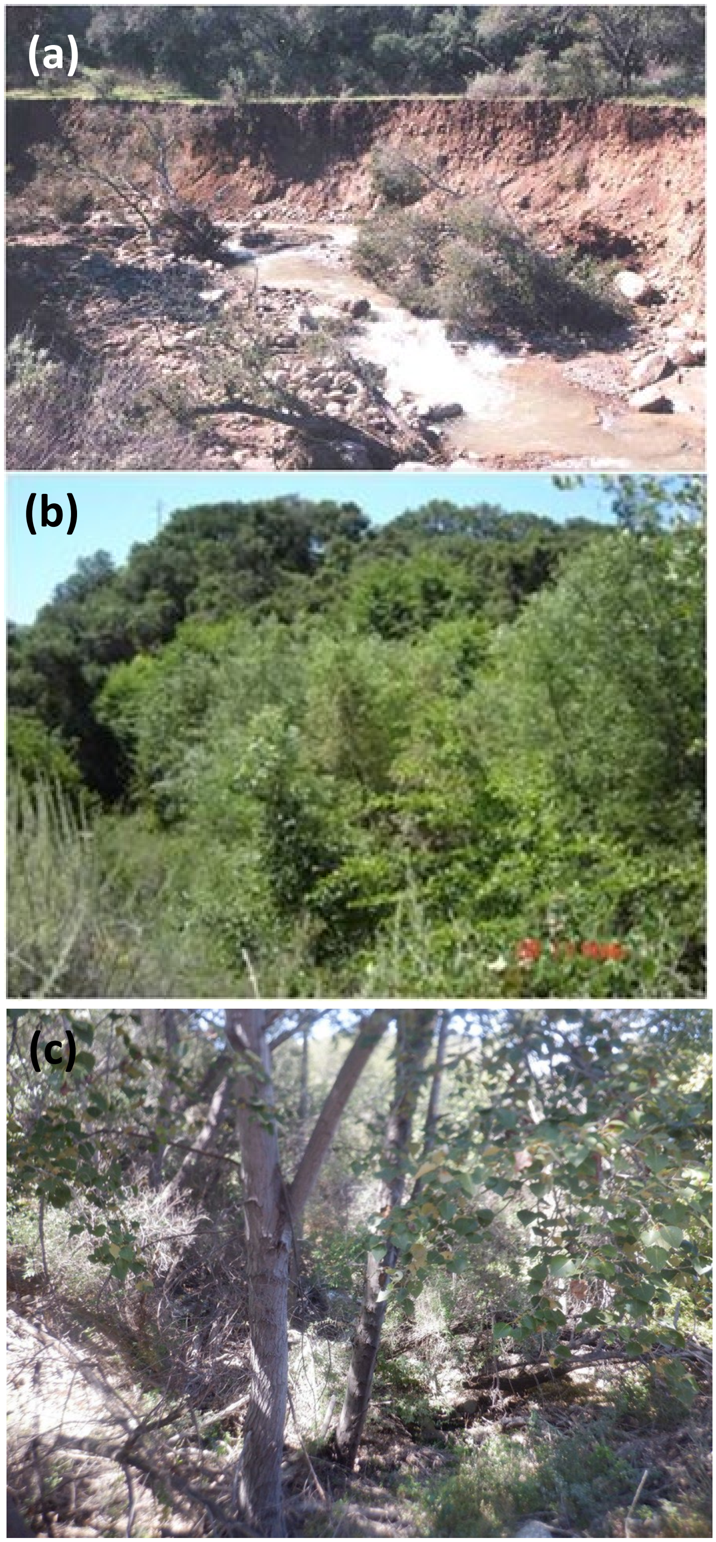


Figure 62: Photo point (T-6) collected at the Hilton Creek ridge trail looking upstream in (a) March 1999, (b) May 2005, and (c) September 2025; the creek is nearly invisible now from this vantage point.

Figure 63: Photo point (T-28) collected at Salsipuedes Creek at Santa Rosa Bridge looking downstream in (a) May 2005 and (b) September 2025.

Figure 64: Photo point (T-39) collected at Salsipuedes Creek at Hwy 1 Bridge in May 2005 and (b) September 2025 (Post CalTrans Hwy 1 Bridge Replacement Project-continues to unravel).

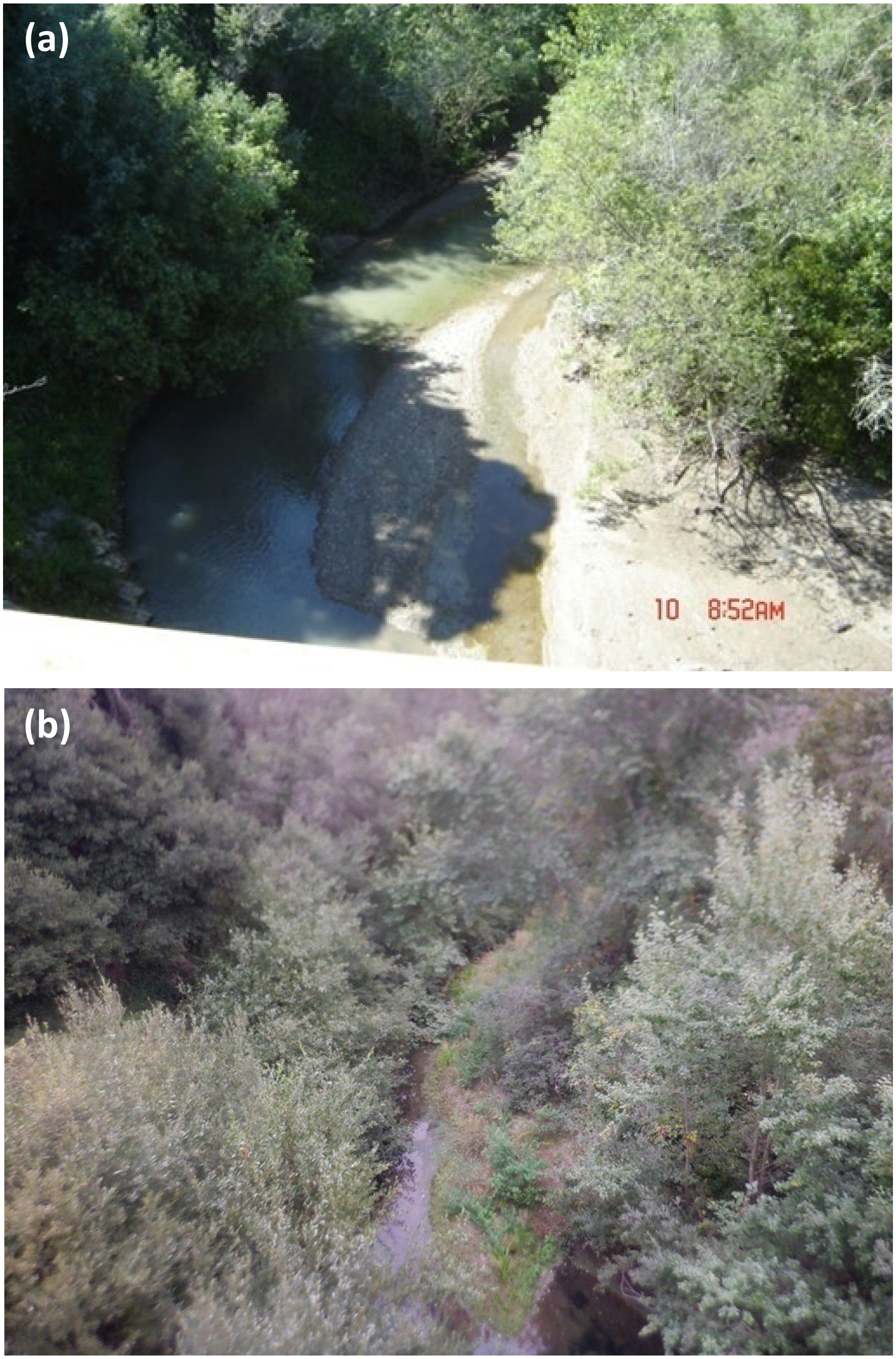


Figure 65: Photo point (T-42) collected at Salsipuedes Creek at Jalama Road Bridge in May 2005 and (b) September 2025.

3.4 Migrant Trapping

Table 7: WY2025 migrant trap deployments.

Location	Date Traps Deployed	Date Trap Removed	Date Traps Removed	Date Traps Installed	# of Days Not Trapping	Functional Trapping Days	Functional Trapping %
	(dates)	(dates)	(dates)	(dates)	(days)	(days)	(days)
Hilton	2/3/2025	4/8/2025	02/13/25	02/18/25	5		
			03/05/25	03/07/25	2		
			03/12/25	03/13/25	1		
	Total:	65		**Total:**	7	58	89%
Salsipuedes	2/18/2025	4/7/2025	03/05/25	03/14/25	9		
	Total:	49		**Total:**	9	40	82%
Mainstem	Not Trapped in 2025						
	Total:			**Total:**	0	0	

Table 8: WY2025 *O. mykiss* Catch Per Unit Effort (CPUE) for each trapping location.

Location	Upstream Captures	Downstream Captures	Functional Trap Days	Trap Season	Trapping Effeciency	CPUE Upstream	CPUE Downstream	CPUE (Total)	Avg Flow	Median Flow
	(#)	(#)	(days)	(days)	(%)	(Captures/day)	(Captures/day)	(Captures/day)	(cfs)	(cfs)
Hilton	79	104	58	65	89.2	1.36	1.79	3.16	6.4	6.3
Salsipuedes	1	8	40	49	81.6	0.03	0.20	0.23	3.7	2.2
LSYR Mainstem	Traps not deployed in 2025									

Table 9: Number of *O. mykiss* migrant captures, including recaptures but not young-of-the-year, associated with each trap check at each trapping location over 24-hours in WY2025.

Location	Trap	Trap Check					Total
		1st AM	2nd AM	1st PM	2nd PM		
		(05:00-10:00)	(10:01-13:00)	(17:00-22:00)	(22:01-01:00)		
Hilton	Upstream	36	14	18	11		79
	Downstream	24	8	44	28		104
	Total:	60	22	62	39		183
Salsipuedes	Upstream	0	0	1	0		1
	Downstream	4	0	4	0		8
	Total:	4	0	5	0		9
Mainstem	Upstream	No Trapping Conducted					
	Downstream						
	Total:						

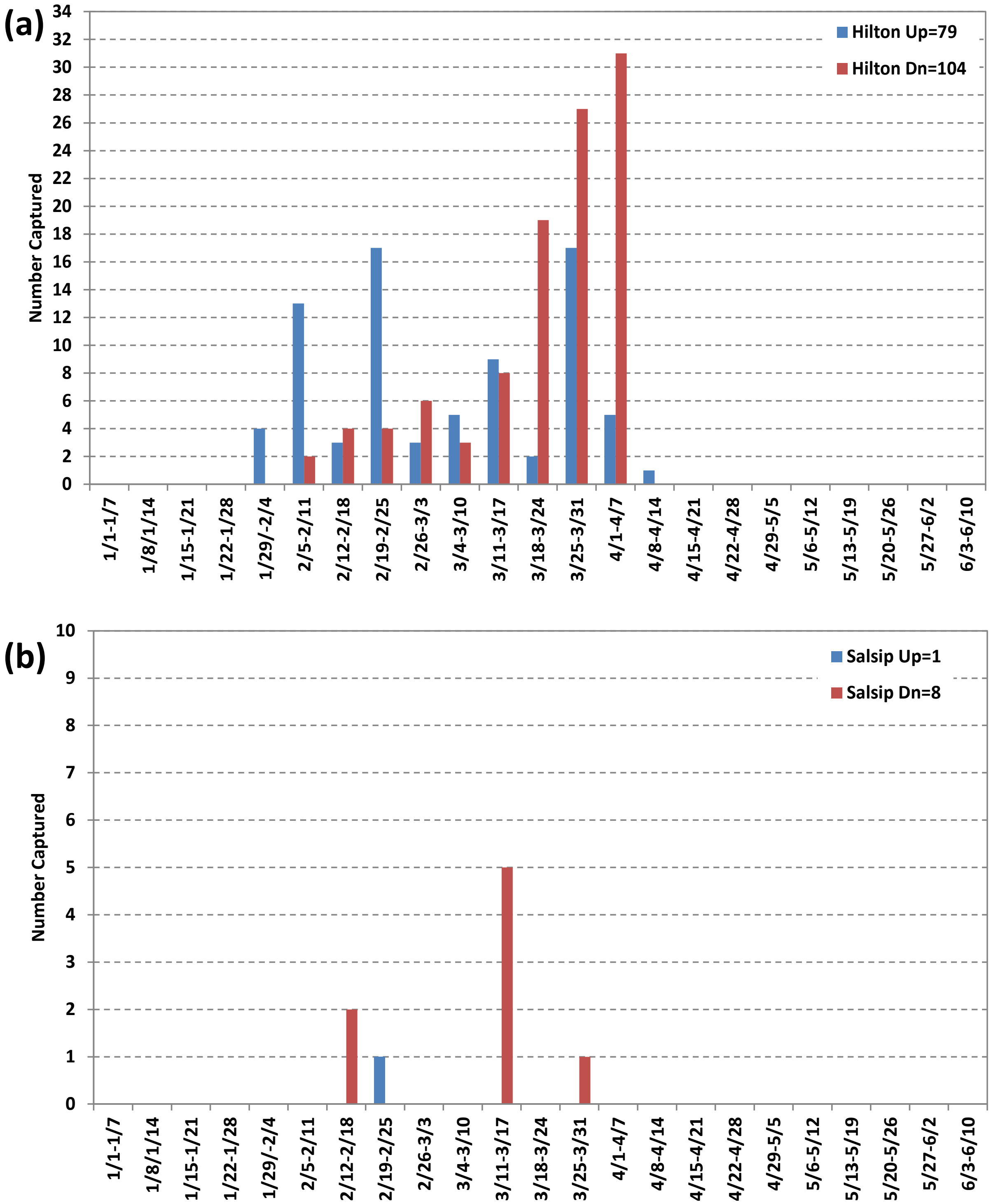


Figure 66: WY2025 paired histogram of weekly upstream and downstream *O. mykiss* captures by trap site for (a) Hilton Creek and (b) Salsipuedes Creek.

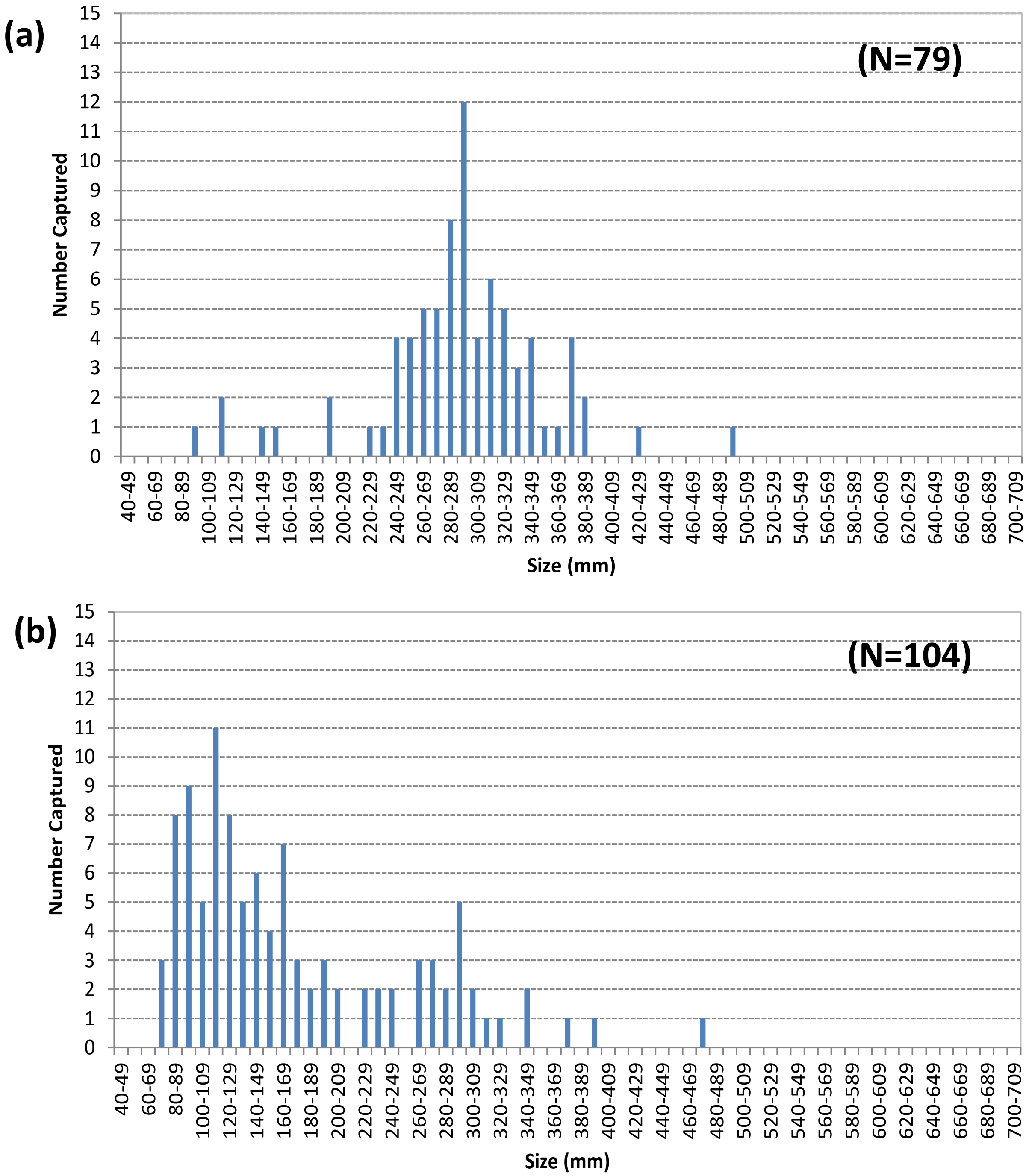
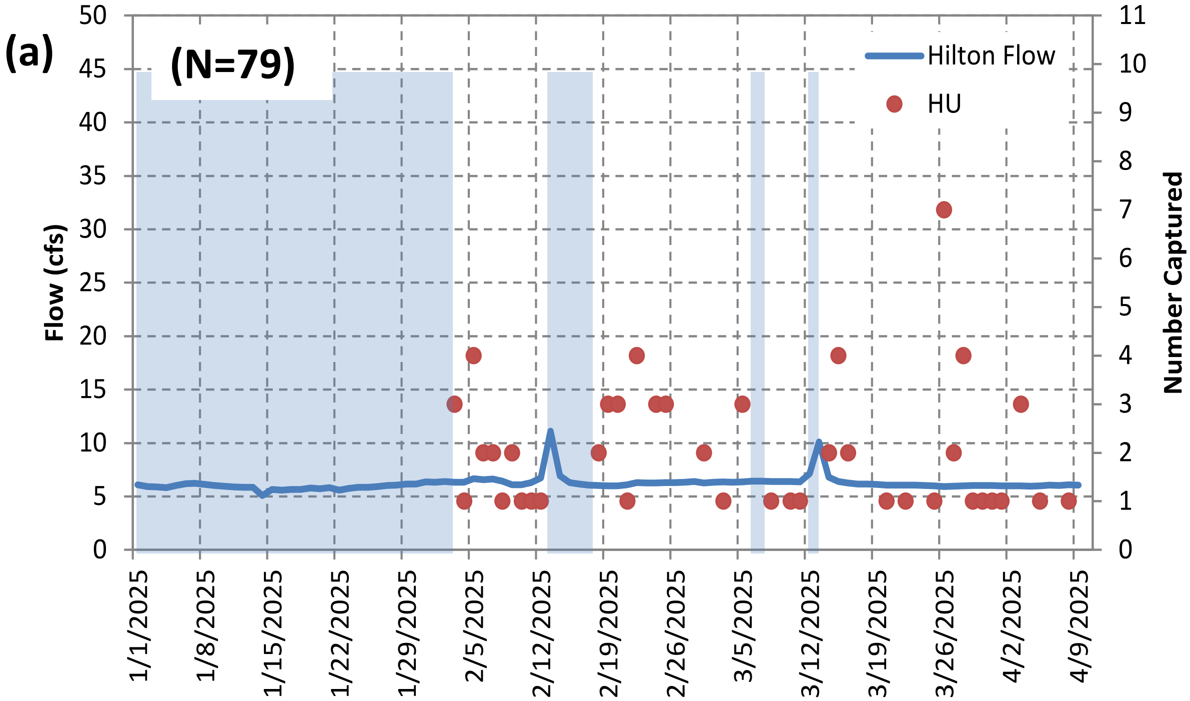


Figure 67: WY2025 Hilton Creek trap length-frequency histogram in 10-millimeter intervals for (a) upstream and (b) downstream *O. mykiss* migrant captures.



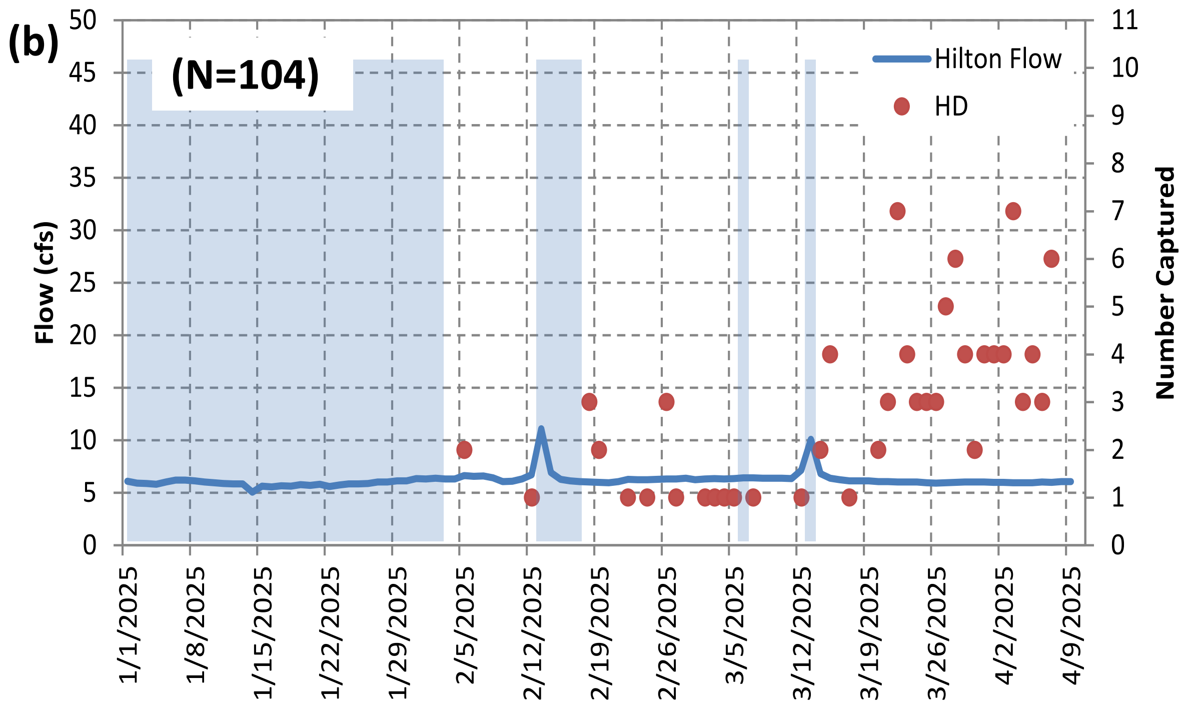


Figure 68: WY2025 Hilton Creek *O. mykiss* migrant captures (red dots) vs. flow for (a) upstream migrant captures and (b) downstream migrant captures. Blue shading shows times the traps were not deployed. Traps were installed on 2/3/25 and removed on 4/8/25.

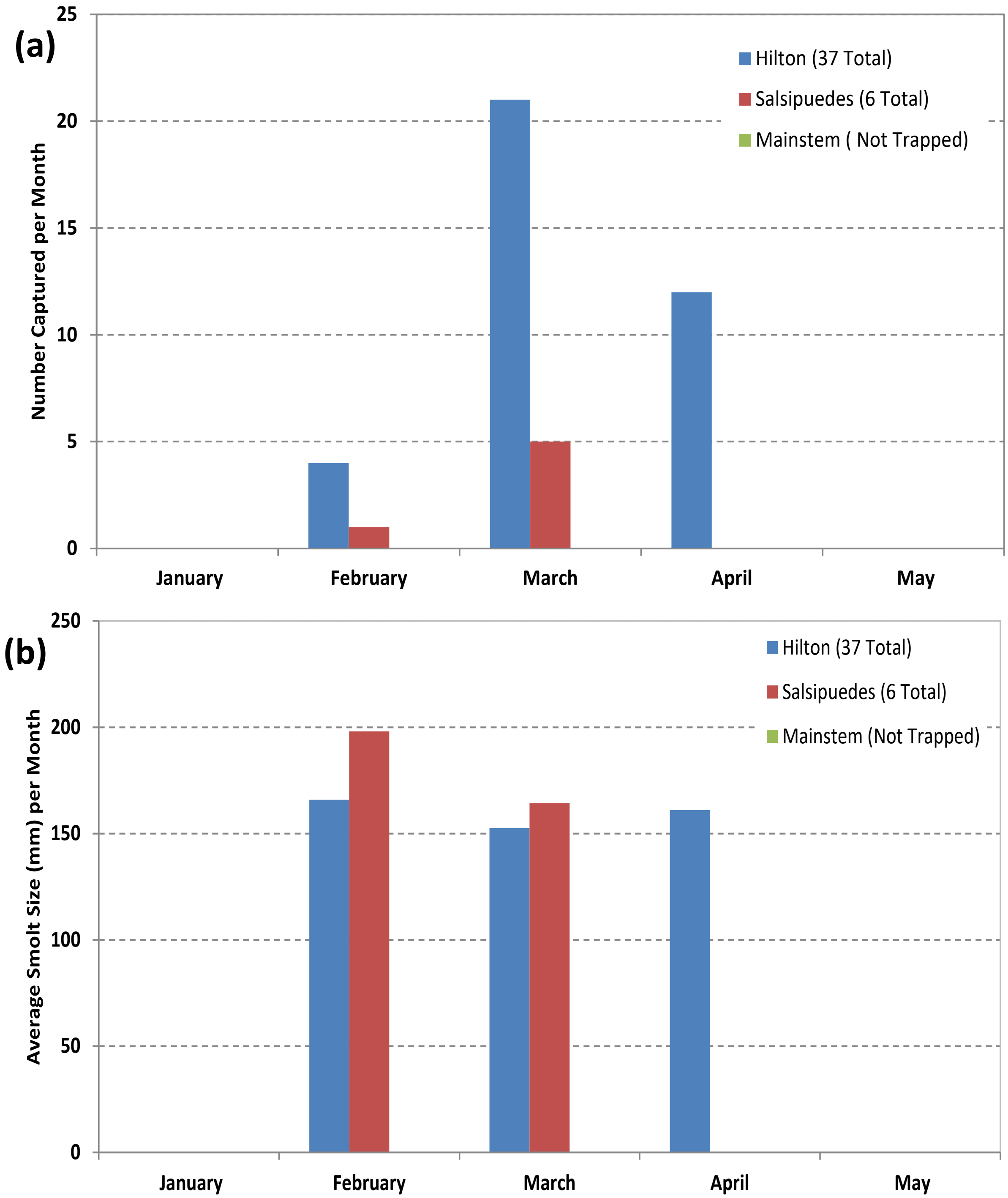


Figure 69: Monthly *O. mykiss* smolts captured at the Hilton Creek, Salsipuedes Creek, and LSYR mainstem traps in WY2025 showing: (a) number of smolts captured and (b) average size of smolts captured at each site by month.

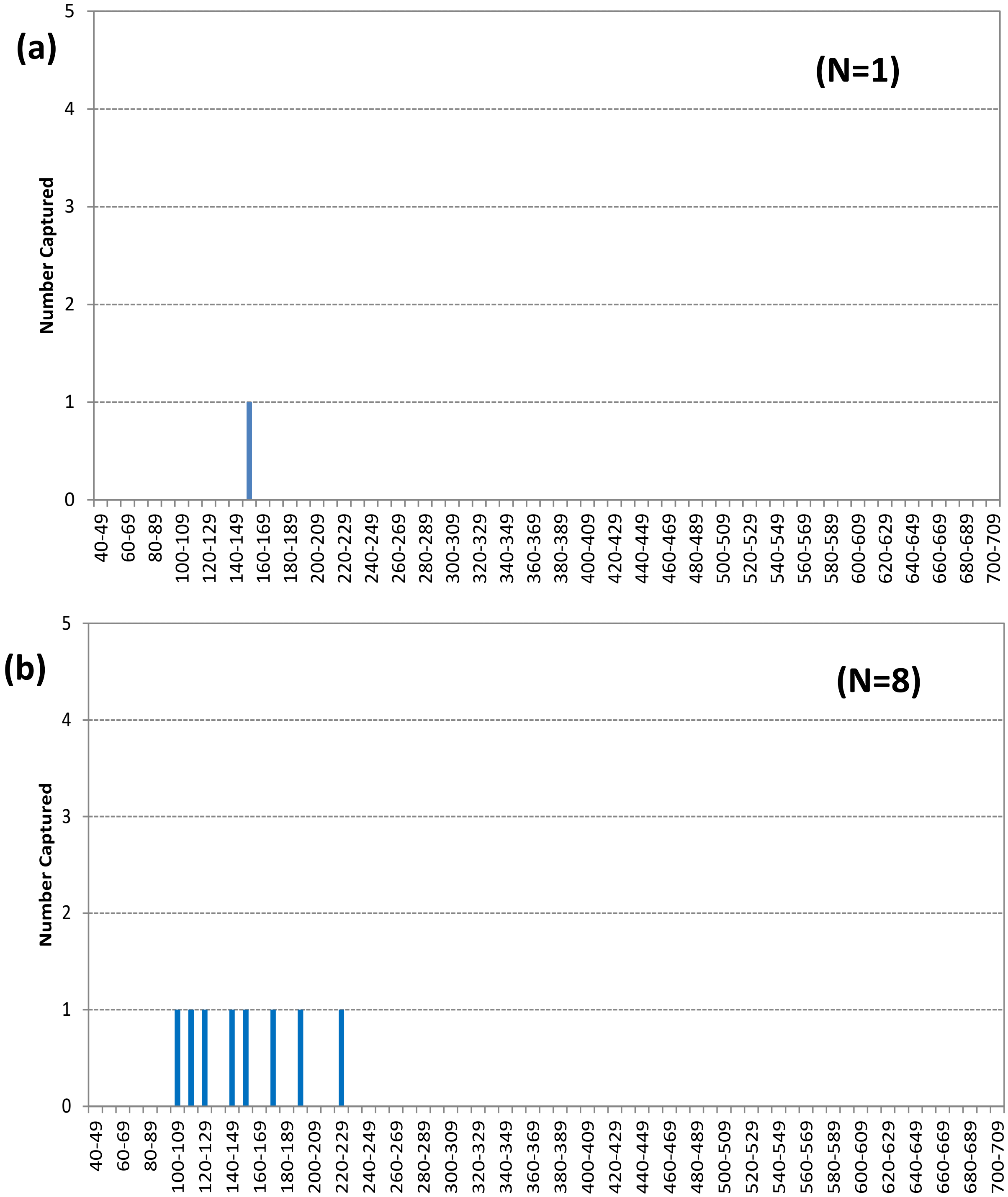


Figure 70: WY2025 Salsipuedes Creek trap length-frequency histogram in 10-millimeter intervals for (a) upstream and (b) downstream *O. mykiss* migrant captures.

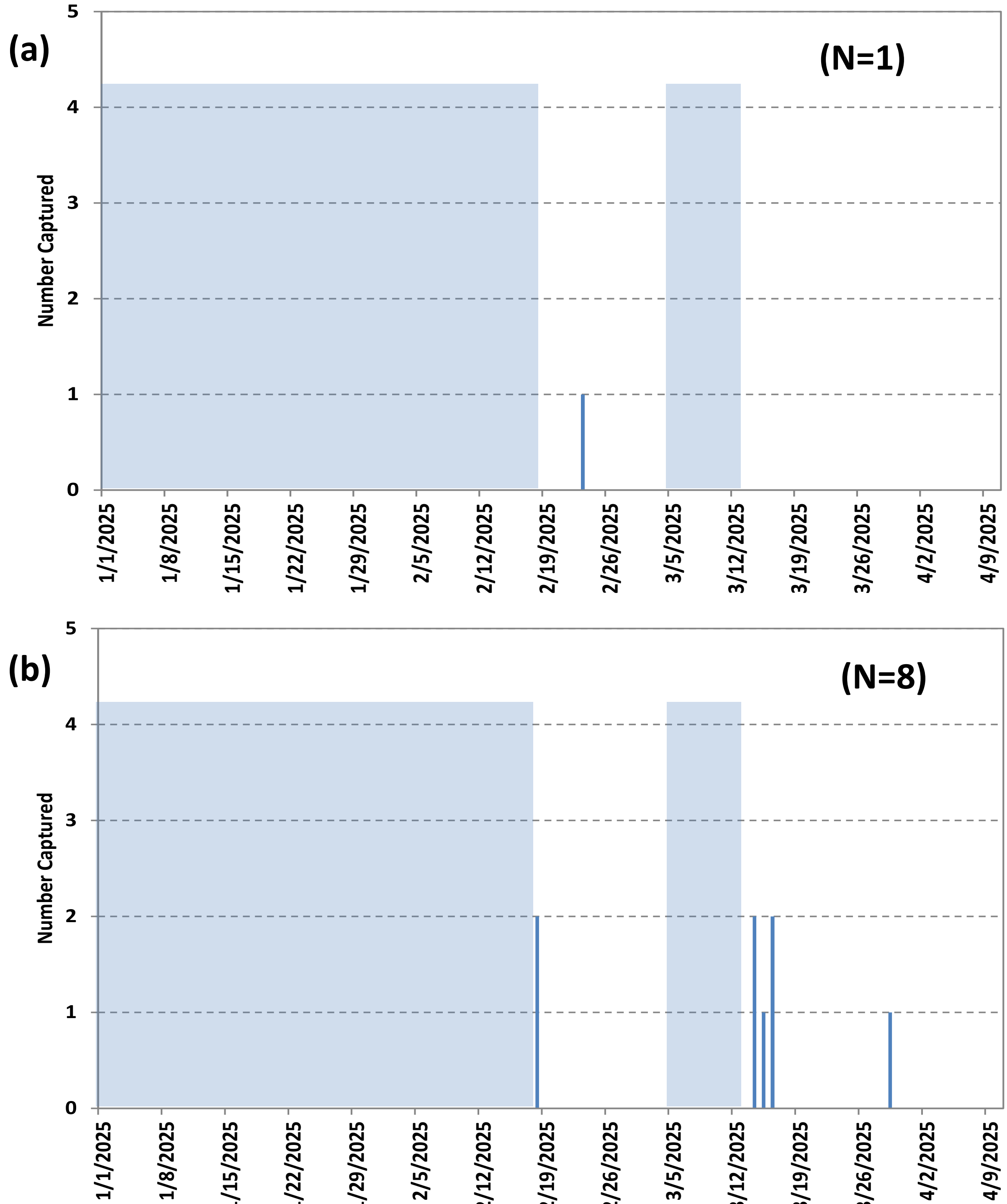


Figure 71: WY2025 Salsipuedes Creek *O. mykiss* migrant captures (red dots) vs. flow for (a) upstream migrant captures and (b) downstream migrant captures. Blue shading shows times the traps were not deployed. Traps were deployed on 2/18/25 and removed on 4/7/25.

Table 10: Tributary upstream and downstream *O. mykiss* migrant captures for Hilton Creek and Salsipuedes Creek and the Santa Ynez River mainstem in WY2025; blue lettering represents breakdown of smolts, pre-smolts, and resident trout for each size category.

Hilton Captures (#)		Size (mm)		Salsipuedes Captures (#)
		Upstream Traps		
0		>700		0
0		650-699		0
0		600-649		0
0		550-599		0
0		500-549		0
1		450-499		0
1		400-449		0
30		300-399		0
40		200-299		0
6		100-199		1
1		<99		0
79		**Total**		**1**
		Downstream Traps		
0		>700		0
0		650-699		0
0		600-649		0
0		550-599		0
0		500-549		0
1		450-499		0
0		400-449		0
8		300-399		0
21		200-299		1
	3	***Smolts***	***1***	
	0	***Pre-Smolt***	***0***	
	18	***Res***	***0***	
54		100-199		7
	13	***Smolts***	***5***	
	21	***Pre-Smolt***	***0***	
	20	***Res***	***2***	
20		<99		0
	0	***Smolts***	***0***	
	0	***Pre-Smolt***	***0***	
	0	***Res***	***0***	
104		**Total**		**8**

Table 11: The results of WY2025 scale analyses of *O. mykiss* migrant captures, and mortalities and carcasses found over the monitoring period aggregated by 10 mm size classes.

		Age:														
Size (mm)	**Amount**	**0+**	**1**	**1+**	**2**	**2+**	**3**	**3+**	**4**	**4+**	**5**	**5+**	**6**	**6+**	**7**	**7+**
<120	3			3												
120-129	11			11												
130-139	5			5												
140-149	8			8												
150-159	6			3	3											
160-169	6			3	3											
170-179	4			1	3											
180-189	2				2											
190-199	5				1	4										
200-209	0															
210-219	0															
220-229	4				2	2										
230-239	3				1		2									
240-249	6				4	1	1									
250-259	4				2	1	1									
260-269	7				5		2									
270-279	7				4	1	2									
280-289	9				1		7	1								
290-299	14				1	2	8	3								
300-309	4					1	2			1						
310-319	5						2	2		1						
320-329	3					2	1									
330-339	2						1	1								
340-349	4							2	2							
350-359	0															
360-369	1								1							
370-379	2									2						
380-389	2								1	1						
390-399	1								1							
400-409	1								1							
410-419	0															
420-429	1									1						
430-439	0															
440-449	0															
450-459	0															
490-499	1									1						
550-559	1															1
Total:	**132**	**0**	**0**	**34**	**32**	**14**	**29**	**9**	**6**	**7**	**0**	**0**	**0**	**0**	**0**	**1**

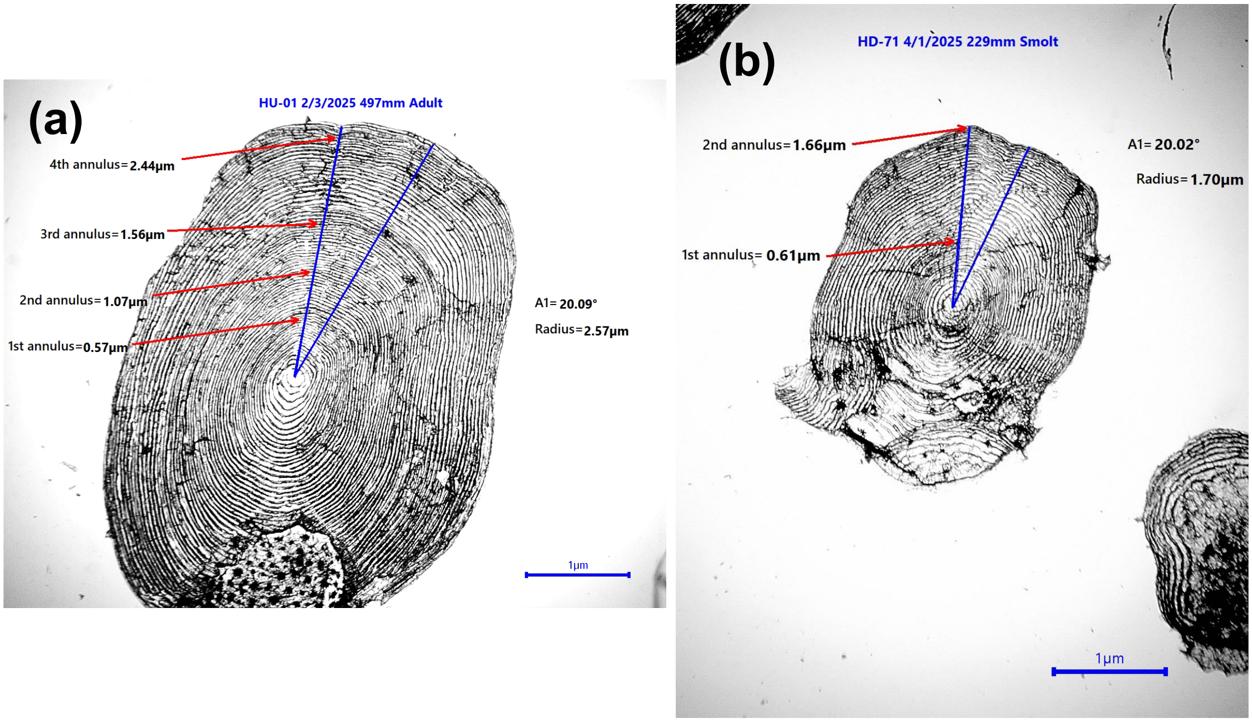


Figure 72: Hilton Creek *O. mykiss* scale analyses for (a) a 4+ year old 497 mm adult caught heading upstream on 2/3/25 and (b) a 2 year old 169 mm smolt caught heading downstream on 4/1/25.

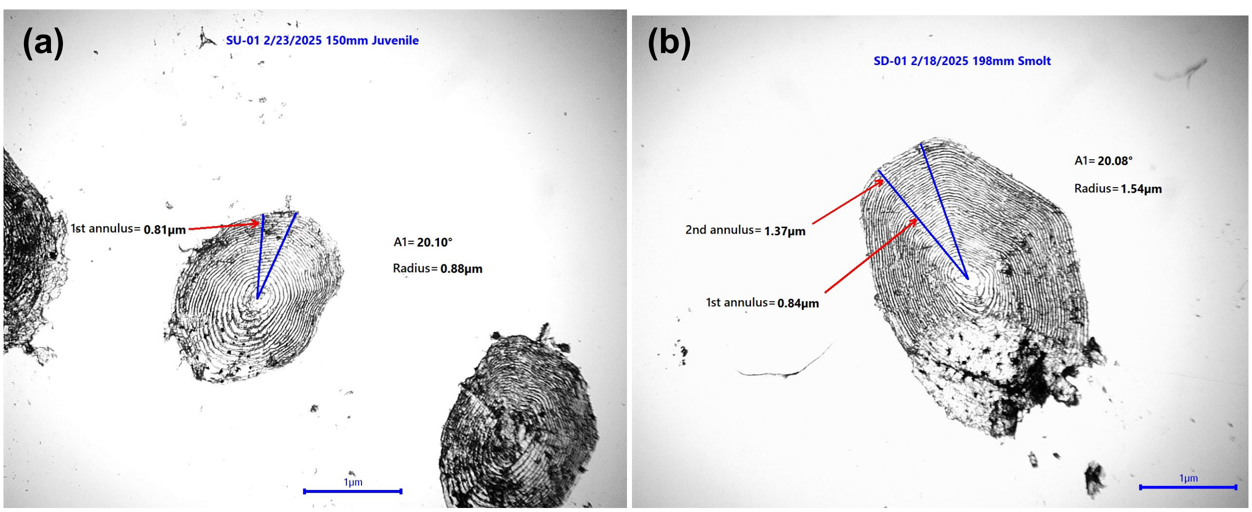


Figure 73: Salsipuedes Creek *O. mykiss* scale analyses for (a) a 1+ year-old 150 mm juvenile caught heading upstream on 2/23/25 and (b) a 2+ year old 198 mm smolt caught heading downstream on 2/18/25.

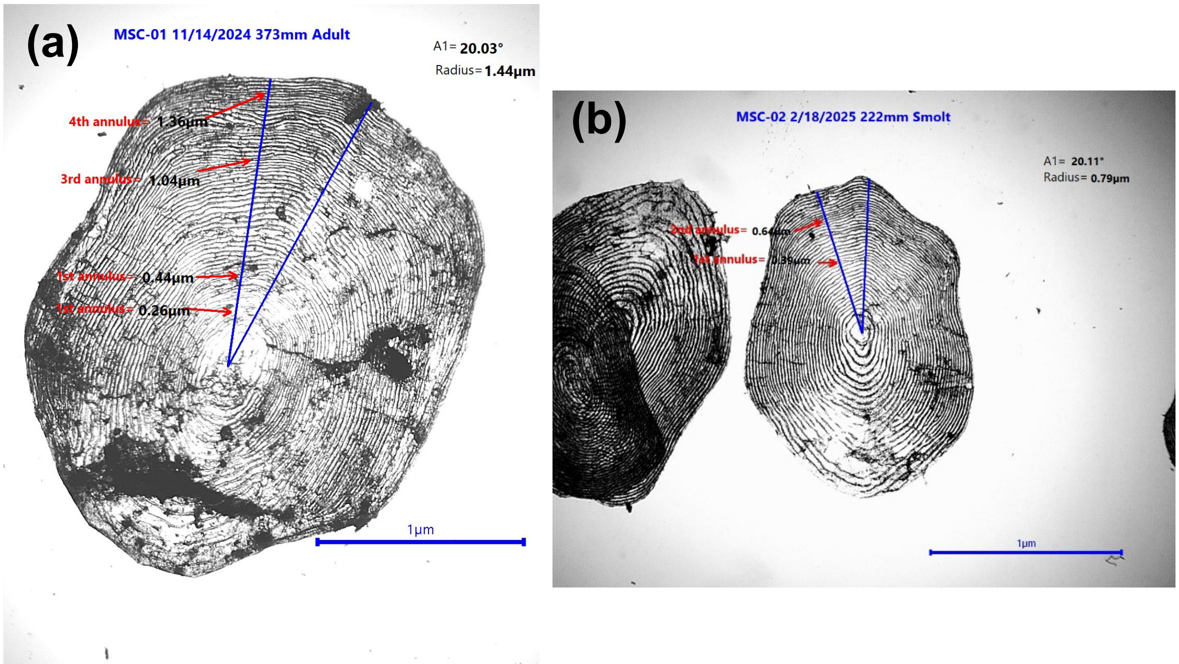


Figure 74: LSYR mainstem carcass *O. mykiss* scale analyses for (a) a 4+-year old 373 mm resident adult found on 11/14/24 and (b) a 2+ year old 222 mm smolt found on 2/18/25.

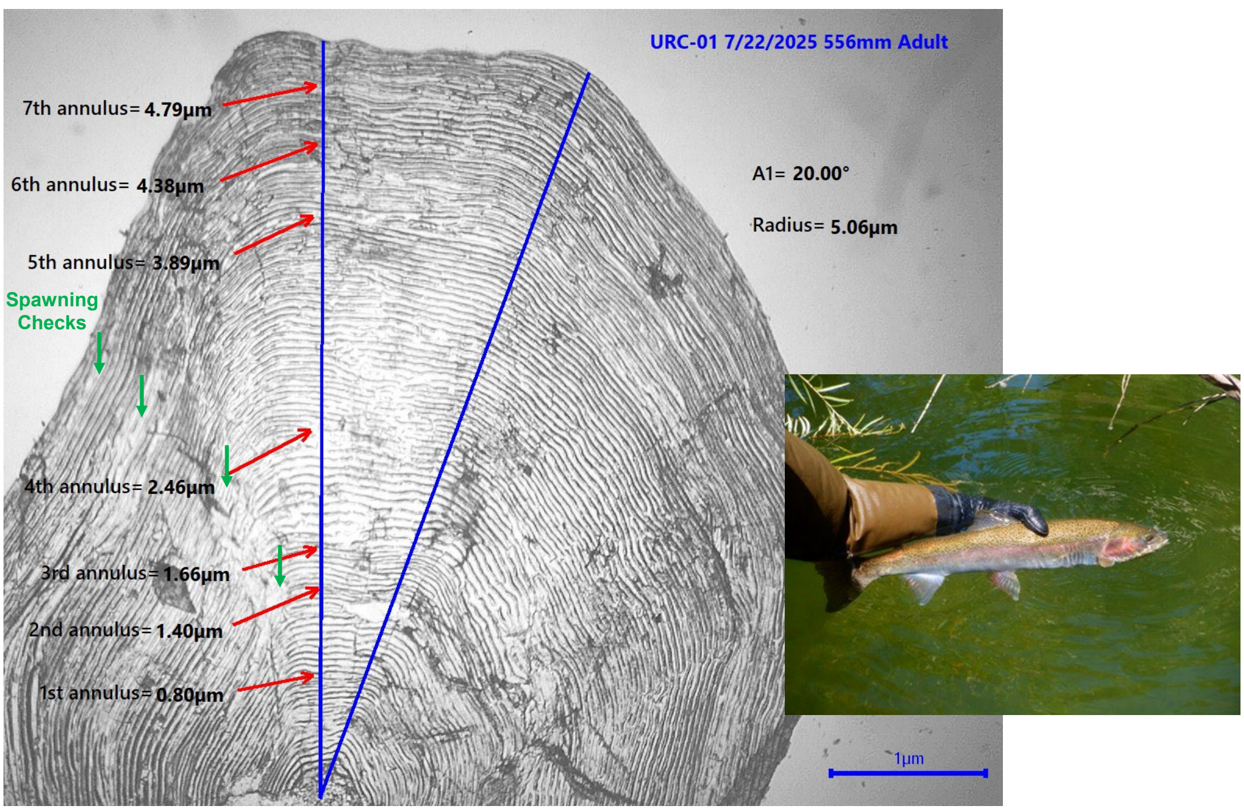


Figure 75: LSYR mainstem carcass *O. mykiss* scale analyses for a 7+ year old 556 mm resident adult found on 7/22/25, showing spawning checks in green and a photo of the fish.

Table 12: WY2025 redd observations by month within the (a) tributaries and (b) LSYR mainstem.

(a) Tributaries:

	January	February	March	April	May	Total
Hilton Ck	2	10	1	2	n/s	15
Quiota Ck	n/s	6	7	6	n/s	19
Salsipuedes Ck	n/s	2	9	1	n/s	12
El Jaro Ck	n/s	n/s	5	n/s	n/s	5
Los Amoles CK	n/s	n/s	1	n/s	n/s	1
Ytias Ck	n/s	n/s	n/s	n/s	n/s	0
					Total:	**52**

n/s - not surveyed due to trubid conditions or low water level.

(b) LSYR Reaches:

	January	February	March	April	May	Total
Highway 154	0	0	0	n/s	n/s	0
Refugio Reach	16	2	10	n/s	n/s	28
Alisal Reach	n/s	9	4	n/s	n/s	13
Narrows Reach	n/s	1	0	n/s	n/s	1
					Total:	**42**

n/s - not surveyed due to trubid conditions and/or high water level.

Table 13: WY2025 *O. mykiss* redd survey results for the (a) tributaries and the (b) LSYR mainstem; lengths and widths are given in feet.

(a) Tributaries:

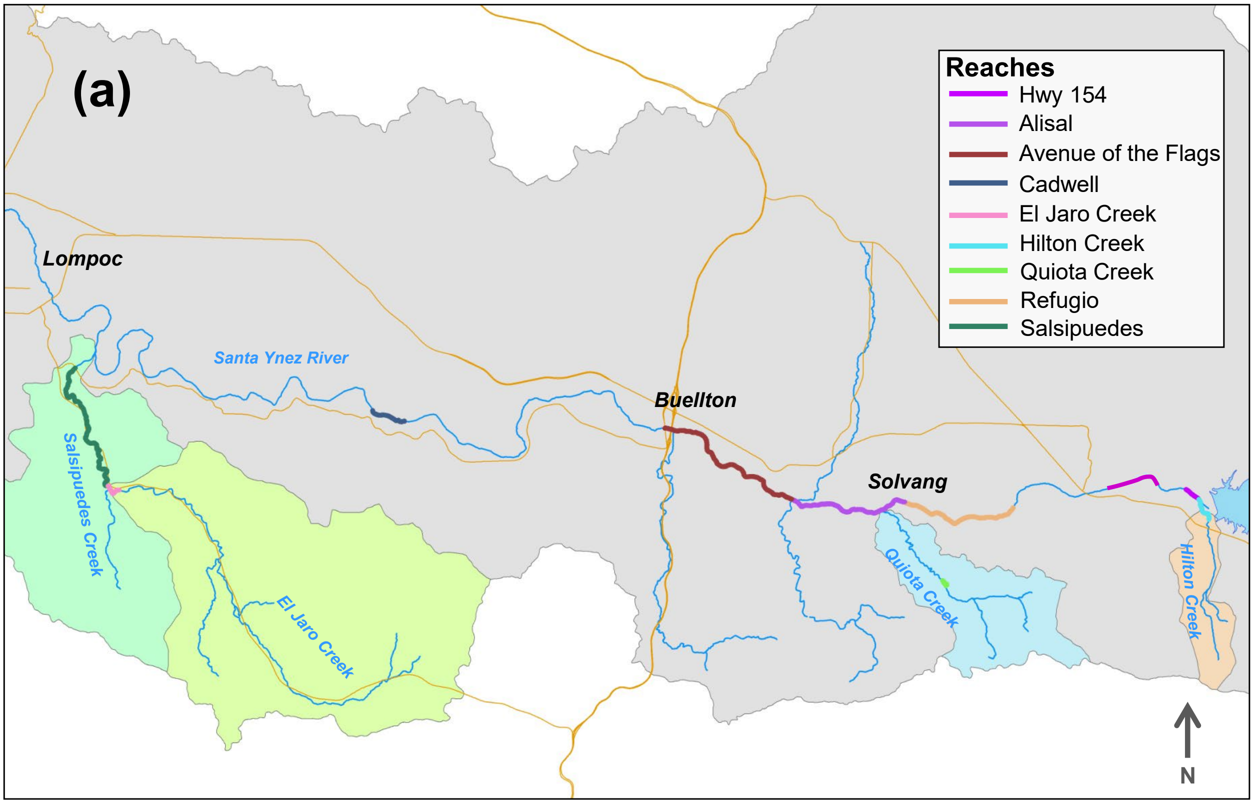
Location	Date	Redd #	Length*	Width**
Hilton Creek	1/28/2025	1	4.3	2.7
	1/28/2025	2	3.1	2.0
	2/6/2025	3	5.0	3.4
	2/6/2025	4	5.2	2.8
	2/6/2025	5	4.1	2.2
	2/12/2025	6	4.3	2.7
	2/12/2025	7	2.6	1.3
	2/24/2025	8	2.9	1.4
	2/24/2025	9	4.3	1.8
	2/24/2025	10	2.7	1.3
	2/24/2025	11	2.8	1.3
	2/24/2025	12	4.0	1.5
	3/18/2025	13	3.4	1.4
	4/15/2025	14	6.5	2.4
	4/15/2025	15	3.9	1.7
Quiota Creek	2/25/2025	1	2.2	0.9
	2/25/2025	2	3.6	1.4
	2/25/2025	3	1.7	0.8
	2/25/2025	4	2.2	0.8
	2/26/2025	5	1.6	0.8
	2/27/2025	6	3.2	1.8
	3/19/2025	7	4.3	2.0
	3/19/2025	8	3.8	2.2
	3/19/2025	9	2.8	1.1
	3/26/2025	10	2.1	0.9
	3/26/2025	11	2.1	0.8
	3/26/2025	12	2.5	1.6
	3/26/2025	13	4.1	1.8
	4/3/2025	14	2.3	1.0
	4/3/2025	15	2.9	1.4
	4/3/2025	16	2.5	1.3
	4/3/2025	17	3.3	1.6
	4/23/2025	18	2.1	0.8
	4/28/2025	19	2.2	0.8
Salsipuedes Creek	2/28/2025	1	3.6	1.4
	2/28/2025	2	2.7	1.3
	3/4/2025	3	4.4	1.7
	3/4/2025	4	4.6	2.0
	3/4/2025	5	3.2	2.4
	3/4/2025	6	2.6	1.6
	3/4/2025	7	4.6	1.2
	3/10/2025	8	4.9	1.9
	3/10/2025	9	3.4	1.8
	3/17/2025	10	4.0	1.6
	3/17/2025	11	2.5	1.0
	4/16/2025	12	4.0	1.4
El Jaro Creek	3/19/2025	1	2.4	1.0
	3/19/2025	2	3.9	1.7
	3/19/2025	3	4.1	1.7
	3/19/2025	4	2.5	1.2
	3/19/2025	5	2.8	1.8
Los Amoles Creek	3/24/2025	1	2.5	1.2

(b) LSYR Reaches:

Location	Date	Redd #	Length*	Width**
Upper Refugio	1/8/2025	1	5.4	2.0
	1/8/2025	2	5.8	2.2
	1/8/2025	3	5.0	2.3
	1/29/2025	5	5.0	2.3
	1/29/2025	6	4.7	2.3
	1/29/2025	7	3.9	2.1
	1/29/2025	8	4.1	1.9
	1/29/2025	9	6.2	3.4
	1/29/2025	10	5.1	2.1
	1/29/2025	11	9.5	4.1
	1/29/2025	12	4.7	2.4
	1/29/2025	13	6.3	2.8
	1/29/2025	14	7.5	3.4
	1/29/2025	15	4.7	2.1
	1/29/2025	16	2.9	1.3
	3/10/2025	19	3.4	1.7
	3/10/2025	20	5.6	2.7
	3/10/2025	21	4.2	2.1
	3/10/2025	22	5.7	2.8
Refugio	1/16/2025	4	4.5	2.5
	2/11/2025	17	4.1	1.8
	2/11/2025	18	4.4	1.5
	3/11/2025	23	4.5	2.5
	3/11/2025	24	4.7	2.8
	3/12/2025	25	4.6	2.2
	3/12/2025	26	6.2	3.2
	3/12/2025	27	4.7	2.3
	3/12/2025	28	4.6	2.1
Alisal Reach	2/3/2025	1	4.2	1.5
	2/3/2025	2	5.1	1.9
	2/5/2025	3	5.1	2.3
	2/5/2025	4	4.2	2.0
	2/5/2025	5	3.7	1.7
	2/5/2025	6	6	2.5
	2/5/2025	7	4	2.0
	2/5/2025	8	4	2.2
	2/5/2025	9	7.2	3.3
	3/11/2025	10	6.9	2.9
	3/11/2028	11	4.6	1.7
	3/12/2025	12	3.2	1.2
	3/12/2025	13	2.3	1.2
Narrows	2/28/2025	1	6.6	3.1

* Pit length plus tailspill length.

** Average of pit width and tailspill widths.



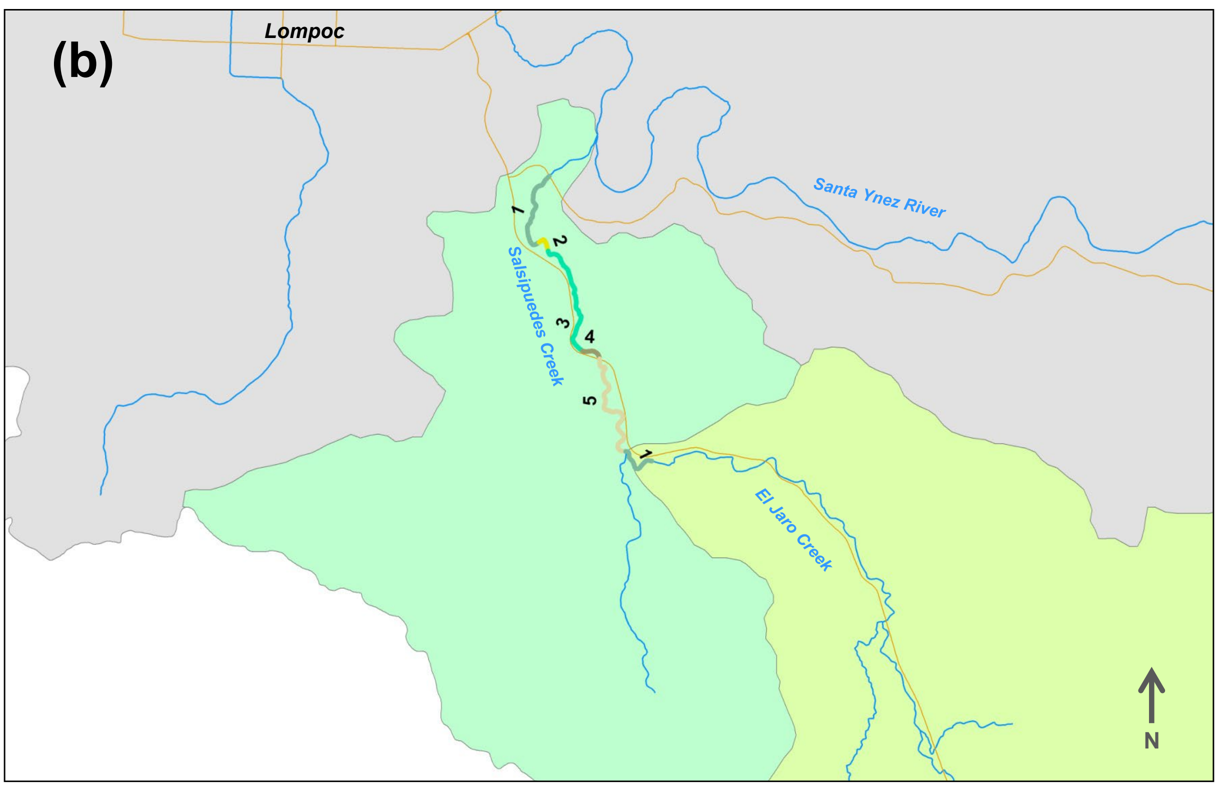


Figure 76: Stream reaches snorkel surveyed in 2025 with suitable habitat and where access was granted within the (a) LSYR mainstem and its tributaries, and (b) Salsipuedes/El Jaro Creek.

Table 14: 2025 LSYR mainstem snorkel survey schedule.

Mainstem/Stream Miles	Season	Survey Date
Hwy 154 Reach	Spring	n/s
(LSYR-0.2 to LSYR-0.7)	Summer	n/s
	Fall	n/s
Upper Refugio Reach	Spring	7/21/25 - 7/24/25
(LSYR-4.08 to LSYR-4.9)	Summer	
	Fall	10/7/25 - 10/8/25
Refugio Reach	Spring	6/30/25 - 7/21/25
(LSYR-4.9 to LSYR-7.8)	Summer	
	Fall	9/25/25 - 10/3/25
Alisal Reach	Spring	6/25/25 - 6/30/25
(LSYR-7.8 to LSYR-10.5)	Summer	
	Fall	9/24/25 - 9/25/25
Avenue Reach	Spring	n/s
(LSYR-10.5 to LSYR-13.9)	Summer	n/s
	Fall	n/s
Reach 3 Downstream of Avenue (including Cadwell)	Spring	n/s
(LSYR-13.9 to LSYR-25.0)	Summer	n/s
	Fall	n/s
*n/s - not surveyed due to turbidity or lack of water.		

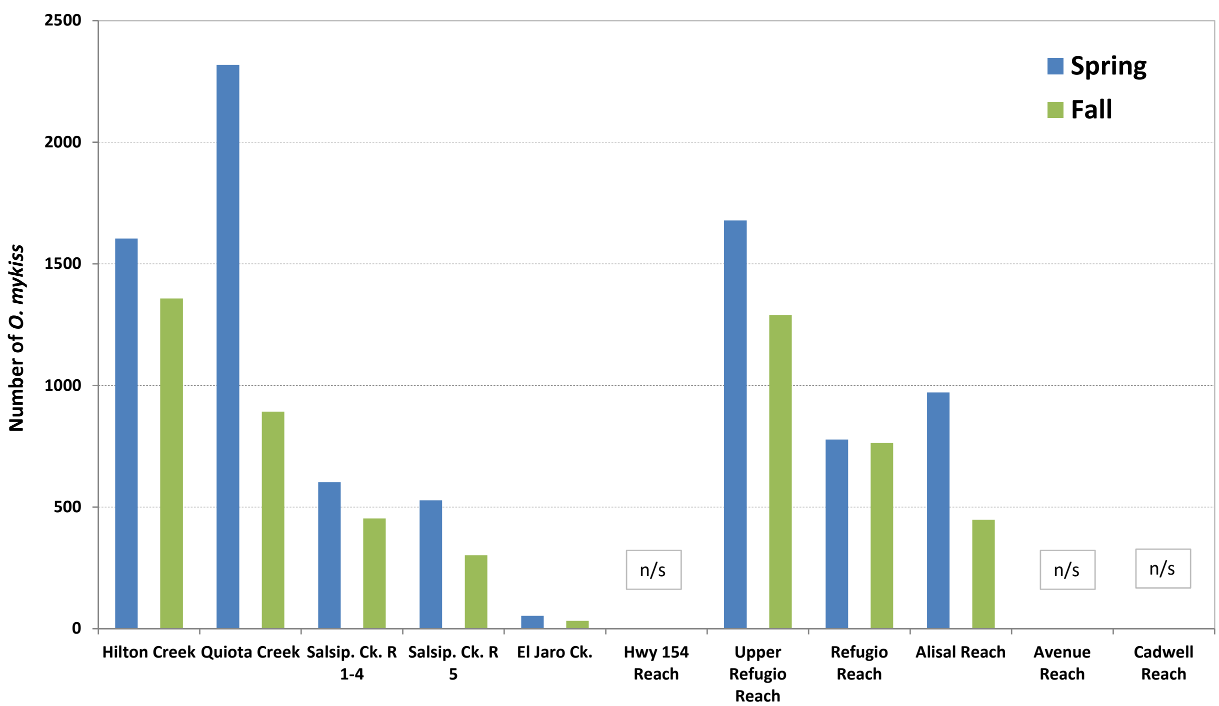


Figure 77: 2025 LSYR *O. mykiss* observed during spring and fall snorkel surveys.

Table 15: LSYR mainstem spring, summer, and fall snorkel survey results in 2025 with the miles surveyed; the level of effort was the same for each snorkel survey.

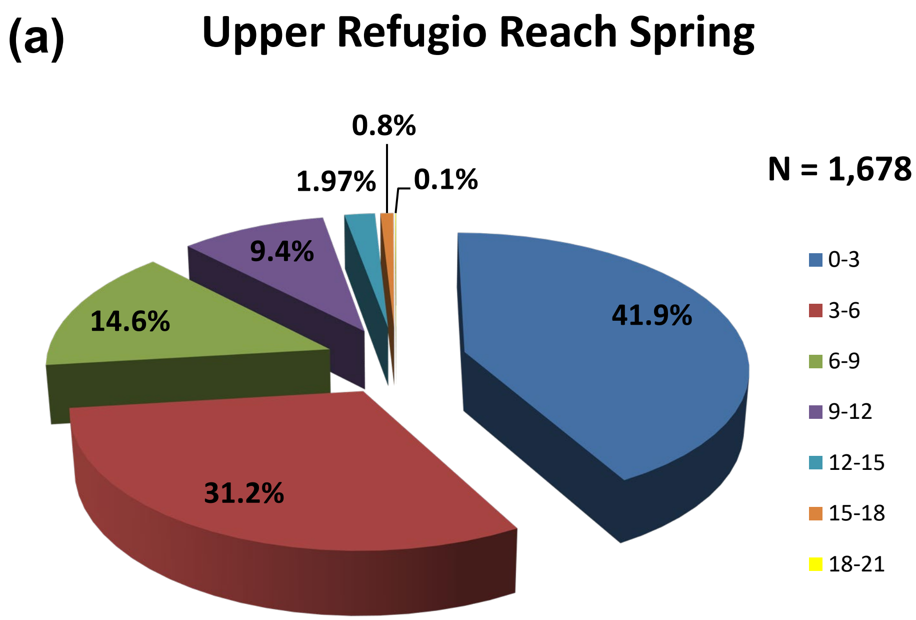
LSYR Mainstem	Spring (# of *O. mykiss*)	Summer (# of *O. mykiss*)	Fall (# of *O. mykiss*)	Survey Distance (miles)
Hwy 154 Reach				0.26
Upper Refugio Reach	1,678		1,289	0.82
Refugio Reach	778		763	2.95
Alisal Reach	971		448	2.80
Avenue of the Flags Reach				3.4
Cadwell Reach				0.3

Table 16: LSYR mainstem spring, summer, and fall snorkel survey results in 2025 broken out by three-inch size classes.

Survey	Reach	Size Class (inches)									Total
		0-3	3-6	6-9	9-12	12-15	15-18	18-21	21-24	24-27	
Spring	Hwy 154										n/s
	Upper Refugio*	703	524	245	158	33	14	1			1678
	Refugio	334	191	83	108	51	8	2	1		778
	Alisal	561	215	118	58	14	3	1	1		971
	Avenue										n/s
	Cadwell										n/s
Summer	Hwy 154										n/s
	Upper Refugio										n/s
	Refugio										n/s
	Alisal										n/s
	Avenue										n/s
	Cadwell										n/s
Fall	Hwy 154										n/a
	Upper Refugio	388	528	240	112	19	2				1289
	Refugio	158	268	156	137	40	3	1			763
	Alisal	151	162	94	33	6	2				448
	Avenue										n/s
	Cadwell										n/s

* Upper Refugio (LSYR-4.08-4.90) is a new reach with COMB-FD granted access in WY2023

n/s - not surveyed.



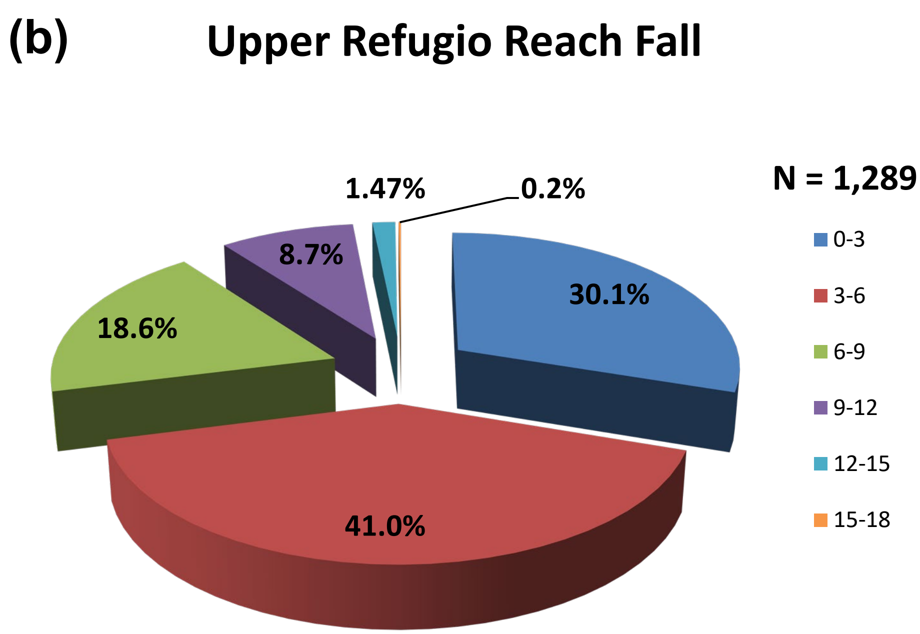
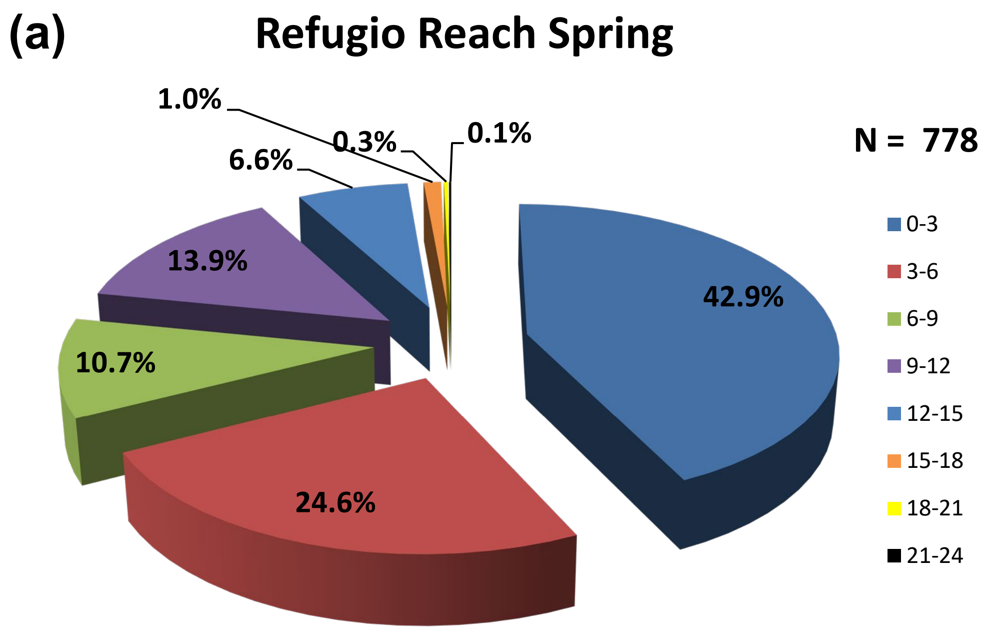


Figure 78: 2025 LSYR mainstem Upper Refugio Reach snorkel survey results of *O. mykiss* proportioned by size class in inches in (a) spring; this new reach is located between LSYR-4.08 and LSYR-4.90.



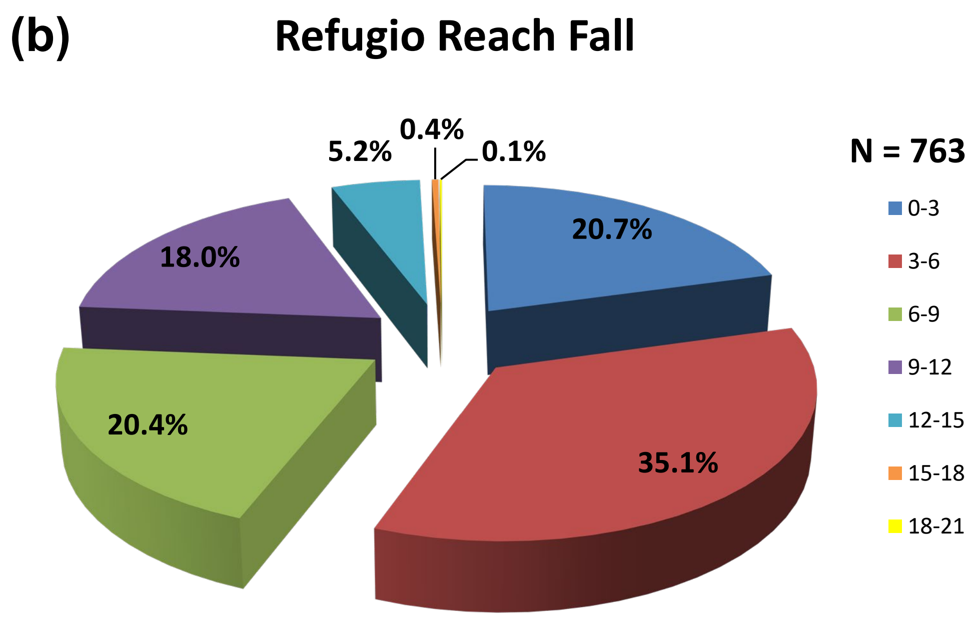


Figure 79: 2025 LSYR mainstem Refugio Reach snorkel survey results of *O. mykiss* proportioned by size class in inches in the (a) spring and (b) fall.

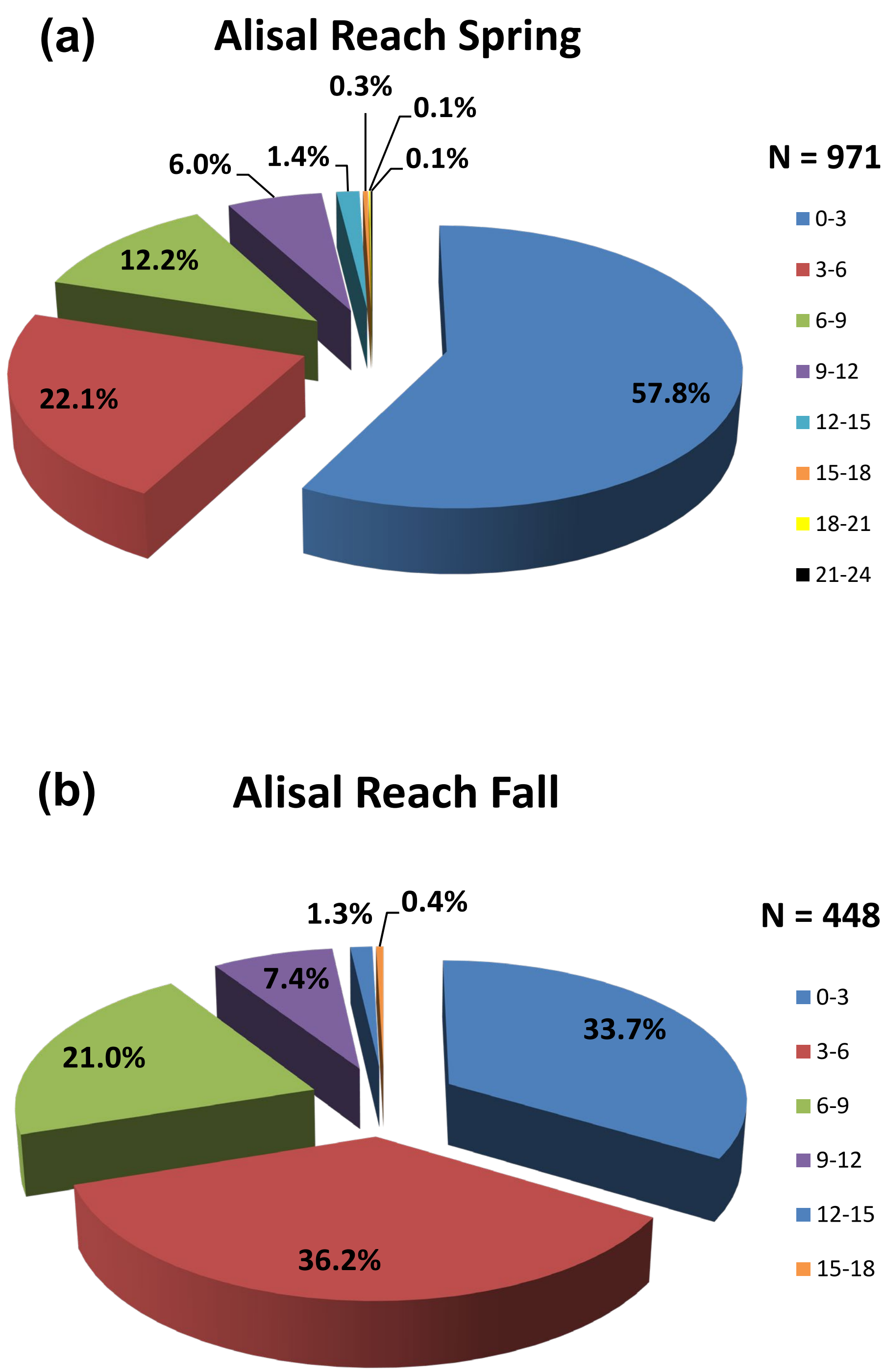


Figure 80: 2025 LSYR mainstem Alisal Reach snorkel survey results of *O. mykiss* proportioned by size class in inches in the (a) spring and (b) fall.

Table 17: 2025 tributary snorkel survey schedule; no summer surveys were conducted in 2025.

Tributaries/Stream Miles	Season	Survey Date
Hilton Creek	Spring	8/26/25 - 8/27/25
(HC-0.0 to HC-0.54)	Summer	n/s
	Fall	10/29/25 -10/30/25
Quiota Creek	Spring	6/23/25 - 7/14/25
(QC-1.92 to QC-3.30)	Summer	n/s
	Fall	9/22/25 - 9/23/25
Salsipuedes Creek	Spring	7/29/25 - 7/30/25
(Reach 1-4)	Summer	n/s
	Fall	10/16/25 - 10/21/25
Salsipuedes Creek	Spring	7/31/2025
(Reach 5)	Summer	n/s
	Fall	10/22/2025
El Jaro Creek	Spring	7/31/25 - 8/5/25
(ELC-0.0 to ELC-0.4)	Summer	n/s
	Fall	10/22/25
*n/s - not surveyed.		

Table 18: *O. mykiss* observed and miles surveyed during all tributary snorkel surveys in 2025; the level of effort was the same for each survey.

Tributaries	Spring (# of *O. mykiss*)	Summer (# of *O. mykiss*)	Fall (# of *O. mykiss*)	Survey Distance (miles)
Hilton Creek				
Reach 1	434	n/s	255	0.133
Reach 2	175	n/s	133	0.050
Reach 3	104	n/s	56	0.040
Reach 4	275	n/s	203	0.075
Reach 5	616	n/s	710	0.242
Reach 6	0	n/s	0	0.014
Total:	1604	n/s	1357	0.554
Quiota Creek (X1 - X9)	2318	n/s	892	1.38
Salsipuedes Creek (Reach 1-4)	602	n/s	453	2.85
Salsipuedes Creek (Reach 5)	528	n/s	302	0.45
El Jaro Creek	53	n/s	32	0.35
n/s - not surveyed.				

Table 19: 2025 tributary spring and fall snorkel survey results broken out by three-inch size classes.

Survey	Reach	Size Class (inches)									Total
		0-3	3-6	6-9	9-12	12-15	15-18	18-21	21-24	24-27	
Spring	Hilton	829	575	174	21	4	1				1604
	Quiota (All X's)	2231	81	6							2318
	Salsipuedes (R 1-4)	437	128	22	9	3	3				602
	Salsipuedes (R-5)	428	87	12	1						528
	El Jaro	30	16	5	1	1					53
Summer	Hilton										n/s
	Quiota										n/s
	Salsipuedes (R 1-4)										n/s
	Salsipuedes (R-5)										n/s
	El Jaro										n/s
Fall	Hilton	780	475	92	8	2					1357
	Quiota (All X's)	842	44	6							892
	Salsipuedes (R 1-4)	301	134	11	3	4					453
	Salsipuedes (R-5)	163	114	22	2	1					302
	El Jaro	19	8	3	1	1					32
n/s - not surveyed.											

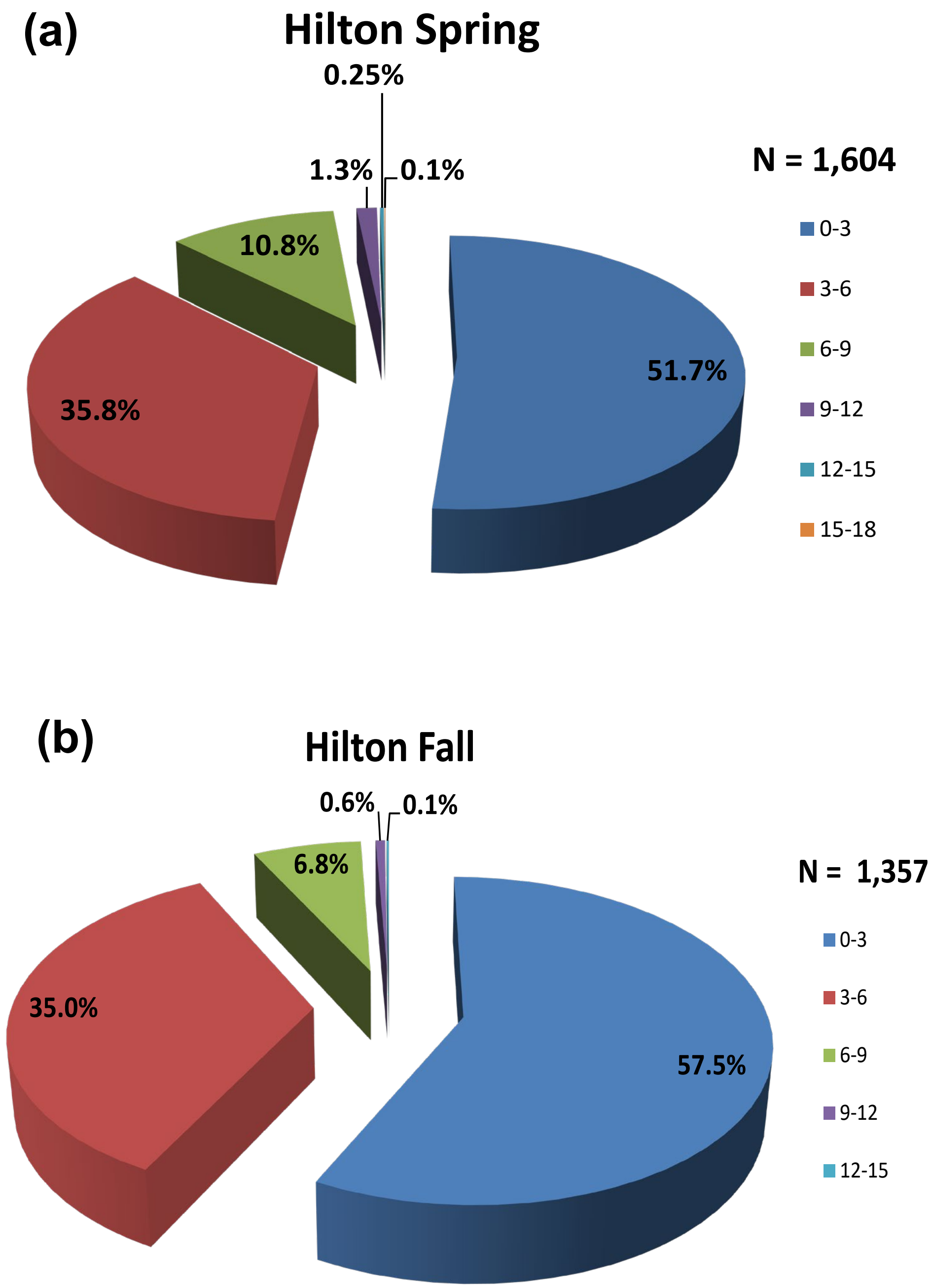
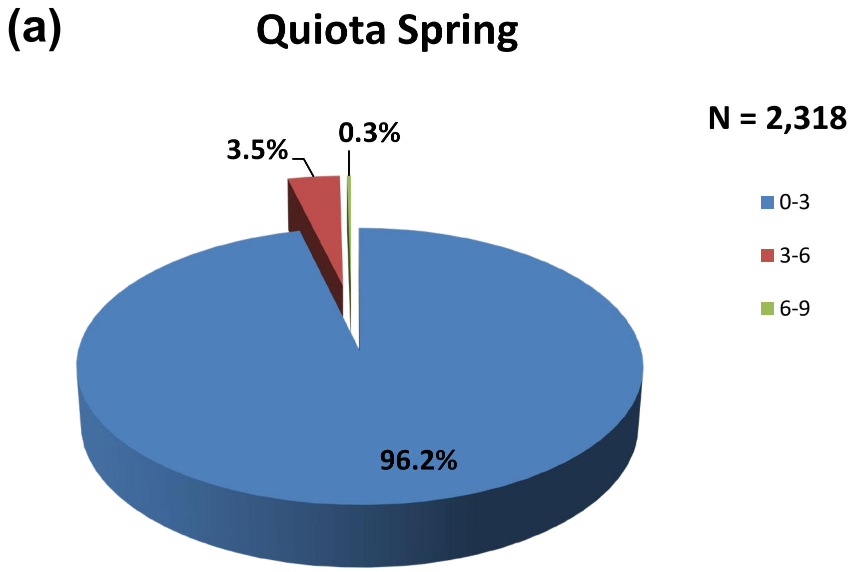


Figure 81: 2025 Hilton Creek snorkel survey results of *O. mykiss* proportioned by size class in inches in the (a) spring, and (b) fall.



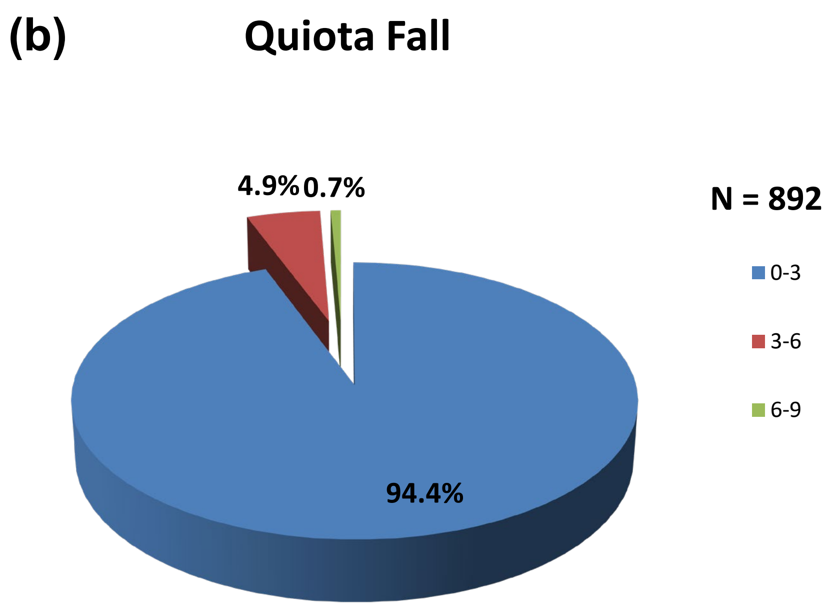
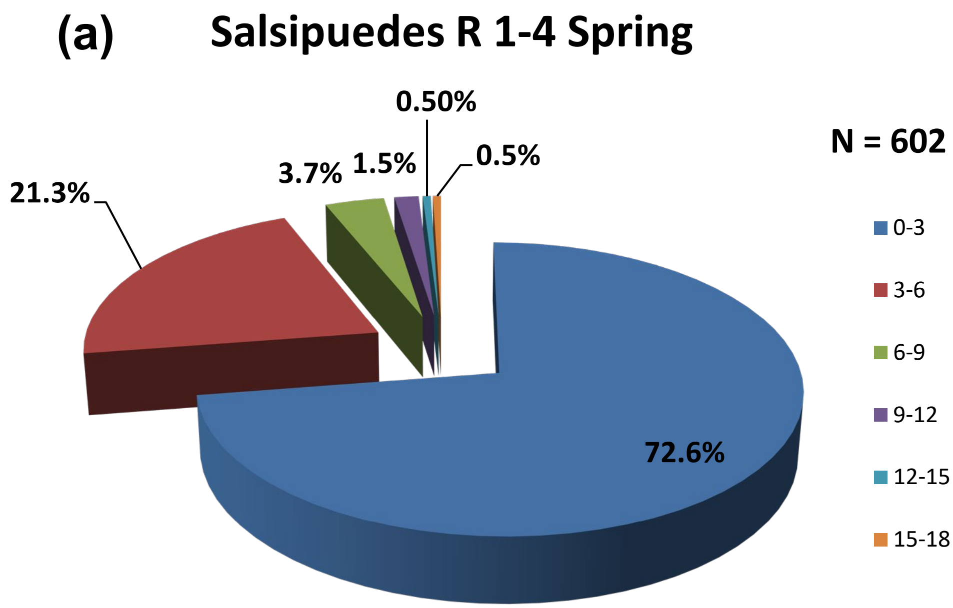


Figure 82: 2025 Quiota Creek snorkel survey results of *O. mykiss* proportioned by size class in inches in the (a) spring, and (b) fall.



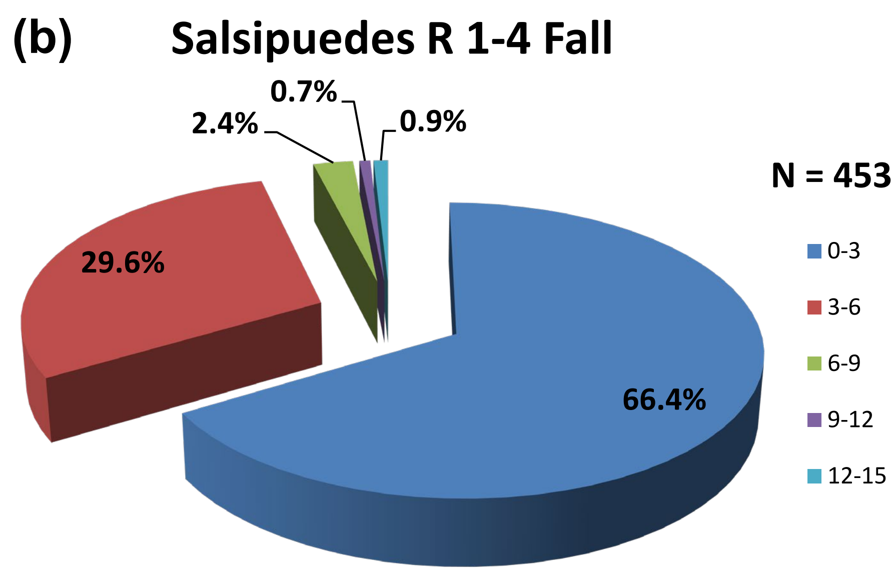
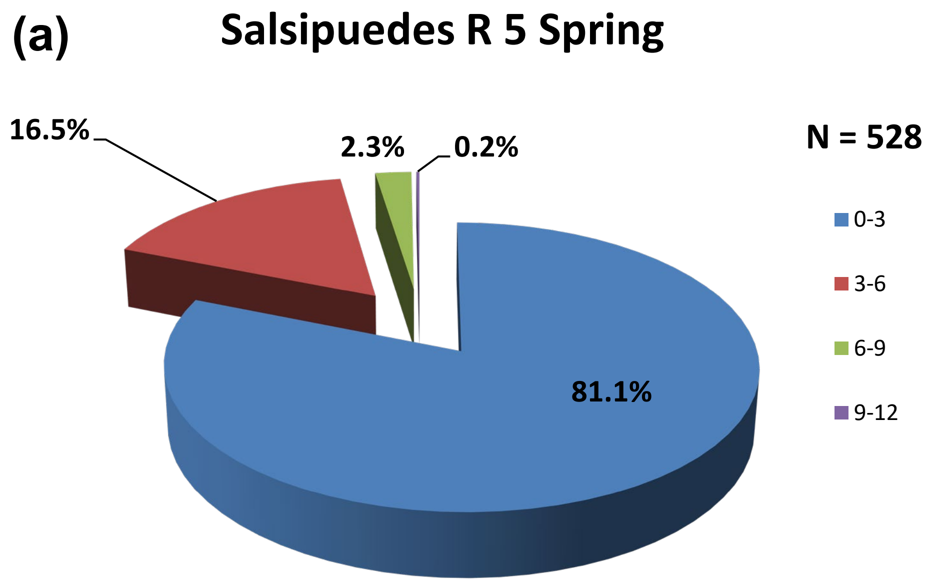


Figure 83: 2025 Salsipuedes Creek Reaches 1-4 snorkel survey results of *O. mykiss* proportioned by size class in inches in the (a) spring and (b) fall.



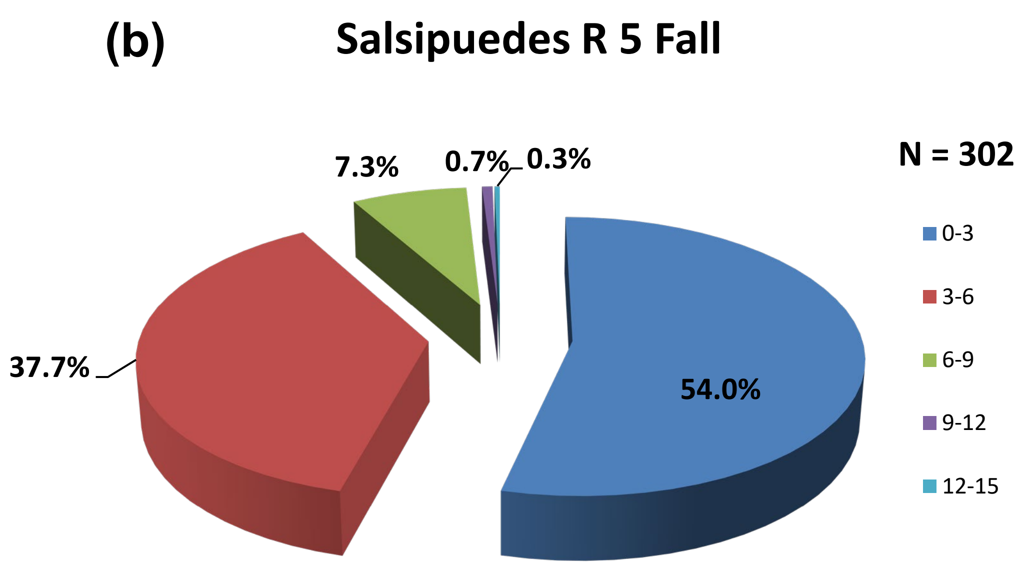


Figure 84: 2025 Salsipuedes Creek Reach 5 snorkel survey results of *O. mykiss* proportioned by size class in inches in the (a) spring and (b) fall.

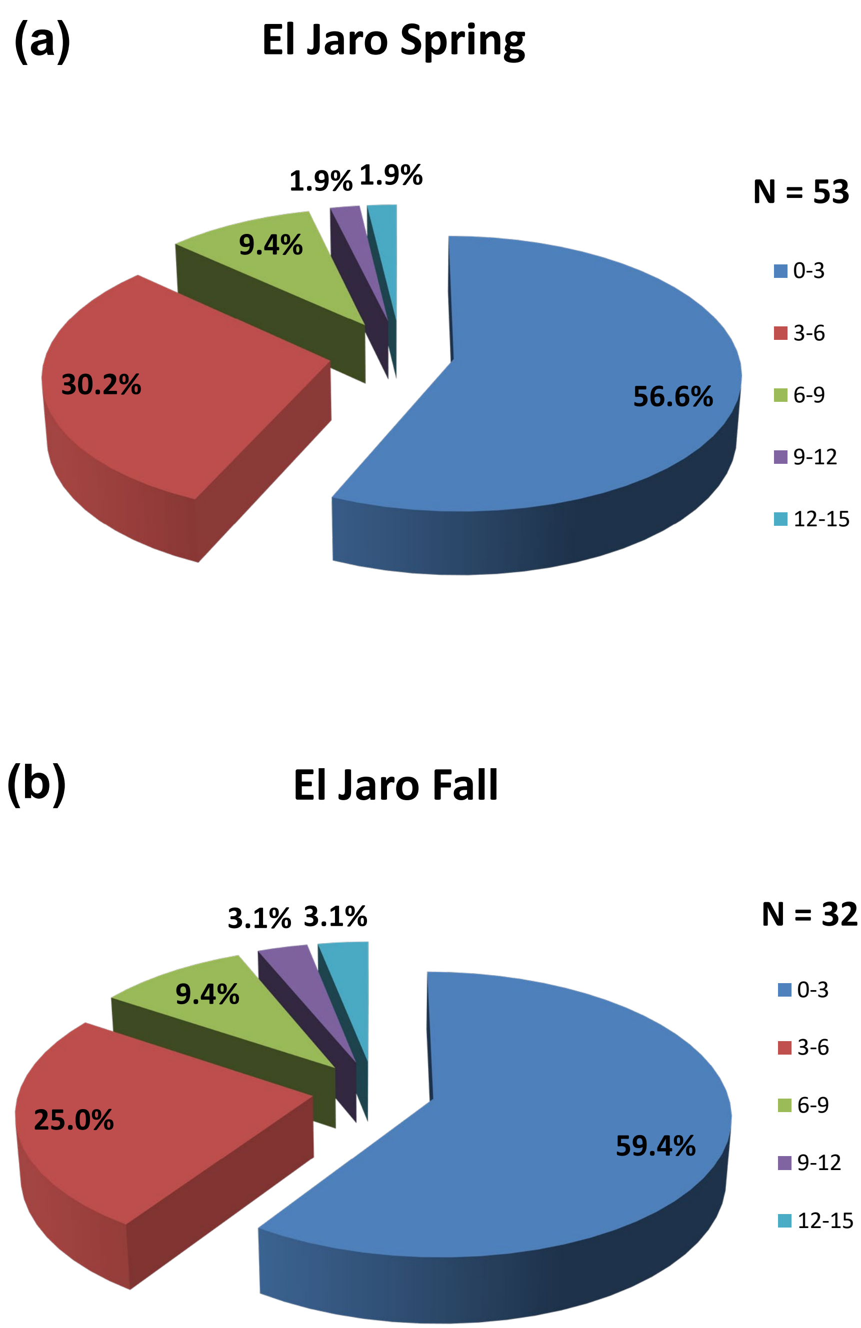


Figure 85: 2025 El Jaro Creek snorkel survey results of *O. mykiss* proportioned by size class in inches in the (a) spring and (b) fall.

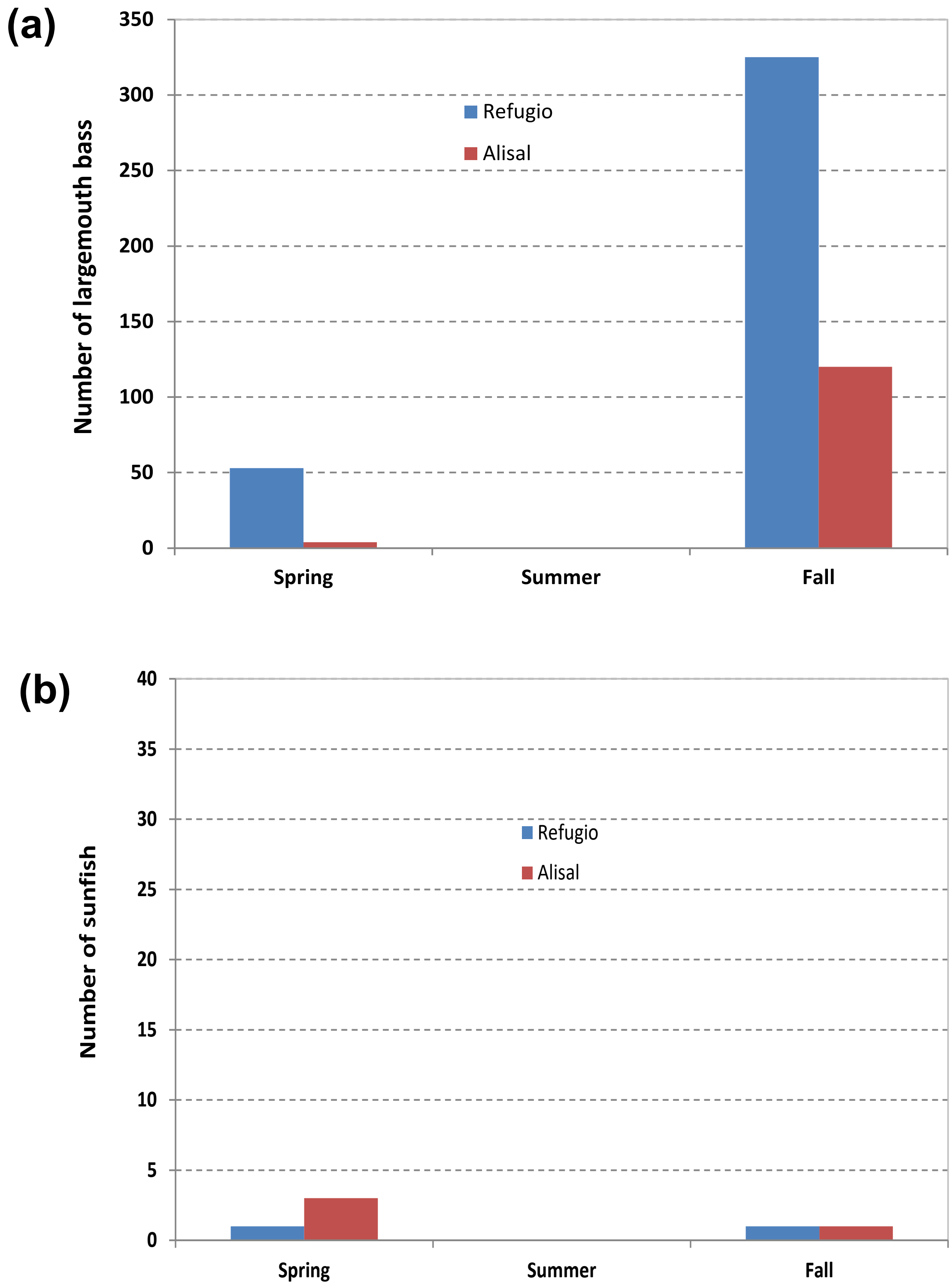


Figure 86: Count of warm water predators, (a) largemouth bass and (b) sunfish, observed in Refugio and Alisal reaches during spring and fall snorkel surveys in 2025.

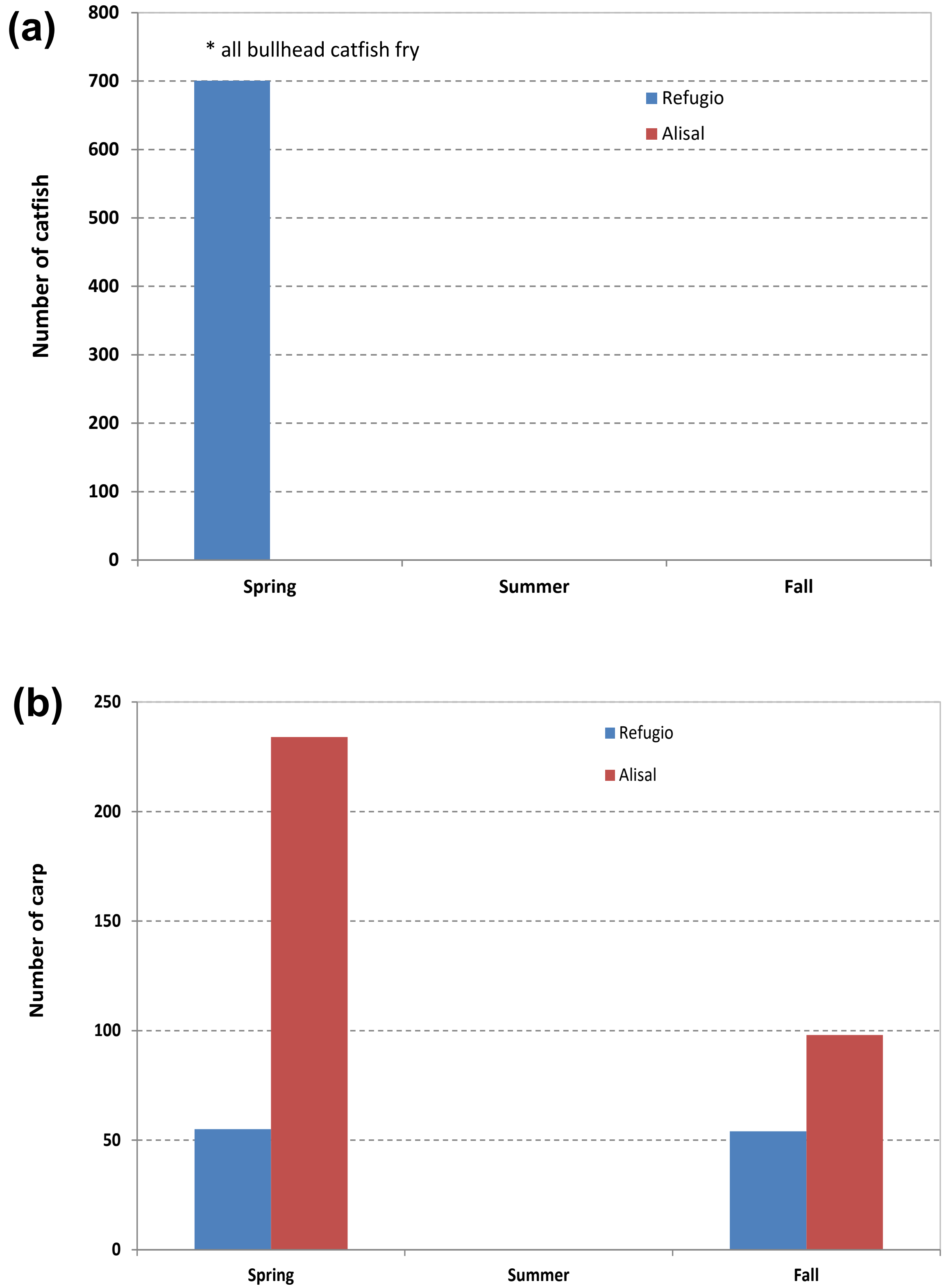
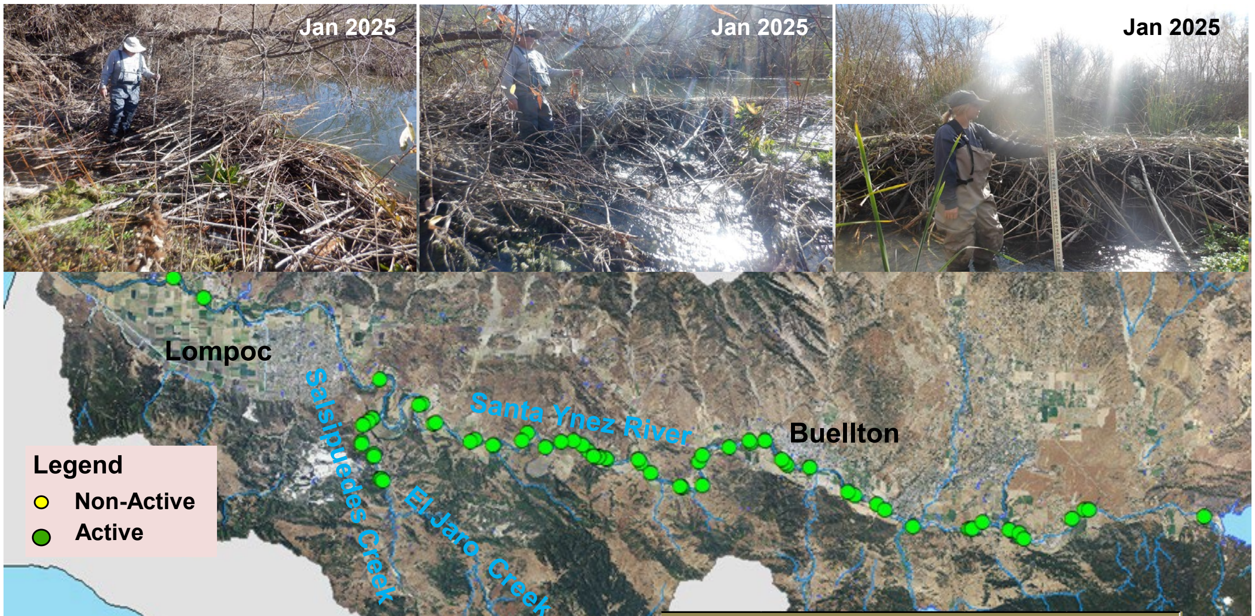


Figure 87: Count of warm water predators, (a) catfish and (b) carp, observed in Refugio and Alisal reaches during the spring and fall snorkel surveys in 2025.



LSYR Mainstem Activity Classification				
	Active	Non-Act	No Data	Σ
WY2010	128	0	0	128
WY2011	10	1	71	82
WY2012	9	0	67	76
WY2013	-	-	132	132
WY2014	-	-	121	121
WY2015	21	87	0	108
WY2016	16	29	0	45
WY2017*	14	52	0	66
WY2018	37	10	0	47
WY2019	42	3	0	45
WY2020	43	15	0	58
WY2021	73	7	0	80
WY2022	76	3	0	79
WY2023	73	1	0	74
WY2024	33	4	0	37
WY2025	61	0	1	62
* Additional reaches surveyed from previous year.				
- Indicates limited attribute data taken at each dam site.				

Tributary Activity Classification				
	Active	Non-Act	No Data	Σ
WY2010	25	0	0	25
WY2011	2	0	3	5
WY2012	-	-	14	14
WY2013	-	-	35	35
WY2014	-	-	36	36
WY2015	6	15	0	21
WY2016	1	7	0	8
WY2017	0	8	0	8
WY2018	0	2	0	2
WY2019	0	0	0	0
WY2020	2	0	0	2
WY2021	11	0	0	11
WY2022	3	1	0	4
WY2023	4	1	0	5
WY2024	7	0	0	7
WY2025	14	0	0	14
- Indicates limited attribute data taken at each dam site.				

Figure 88: Spatial extent of beaver dams from the WY2025 survey within the LSYR drainage where 62 dams (61 active) were observed in the LSYR mainstem and 14 dams (all active) observed in the Salsipuedes/El Jaro Creek watershed.

Table 20: Annual count of WY2010 - WY2025 beaver dams in the LSYR mainstem and Salsipuedes/El Jaro watershed broken out by dam height.

	LSYR Mainstem Beaver Dams							Tributary Beaver Dams						
Height Year	0.0-1.0 (ft)	1.1-2.0 (ft)	2.1-3.0 (ft)	3.1-4.0 (ft)	> 4.0 (ft)	No Data	Σ	0.0-1.0 (ft)	1.1-2.0 (ft)	2.1-3.0 (ft)	3.1-4.0 (ft)	> 4.0 (ft)	No Data	Σ
WY2010	3	65	40	17	3	0	128	0	17	5	3	0	0	25
WY2011	5	34	31	10	2	0	82	3	1	1	0	0	0	5
WY2012*	9	38	23	4	0	0	74	5	6	3	0	0	0	14
WY2013	23	75	27	7	0	0	132	8	23	4	0	0	0	35
WY2014	21	48	36	15	1	0	121	10	24	2	0	0	0	36
WY2015	19	52	32	4	1	0	108	9	10	2	0	0	0	21
WY2016	7	21	14	3	0	0	45	1	6	1	0	0	0	8
WY2017	8	29	28	1	0	0	66	1	5	2	0	0	0	8
WY2018	13	24	9	1	0	0	47	2	0	0	0	0	0	2
WY2019	7	24	12	2	0	0	45	0	0	0	0	0	0	0
WY2020	13	30	13	2	0	0	58	1	1	0	0	0	0	2
WY2021	10	31	35	4	0	0	80	6	4	1	0	0	0	11
WY2022	6	46	23	4	0	0	79	1	3	0	0	0	0	4
WY2023	2	22	28	6	3	13	74	0	3	1	0	0	1	5
WY2024	1	15	19	2	0	0	37	0	3	4	0	0	0	7
WY2025	17	26	11	6	1	1	62	2	5	2	5	0	0	14

WY2025 Annual Monitoring Summary
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Table 21: Monthly rainfall totals at Bradbury Dam from WY2000-WY2025.

Month	Water Years:													
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Oct	0	2.64	0.62	0	0	6.38	0.48	0.16	0.34	0.15	2.2	2.24	0.47	0.12
Nov	1.62	0	3.27	2.5	1.2	0.33	1.64	0.2	0.06	3.39	0	1.42	2.82	1.34
Dec	0	0.09	2.66	6.73	2.03	13.25	0.73	1.59	2.39	2.46	3	9.48	0.35	2.95
Jan	1.94	8.4	0.87	0.06	0.32	10.3	7.82	1.3	16.57	0.65	10.34	1.84	1.58	1.75
Feb	10.37	5.71	0.24	3.56	6.52	9.22	3.06	3.03	2.33	5.7	4.92	3.36	0.43	0.4
Mar	2.76	13.44	0.79	2.4	0.48	3.08	4.31	0.15	0.46	0.85	0.26	11.85	3.63	0.8
Apr	4.73	1.35	0.13	2.15	0	1.27	4.89	0.81	0.06	0.19	3.15	0.14	3.21	0.19
May	0.01	0.06	0.12	2.33	0	0.51	1.56	0	0.38	0	0.05	0.42	0.02	0.02
Jun	0.04	0	0	0.02	0	0.04	0	0	0	0.16	0	0.34	0	0
Jul	0	0.06	0	0.01	0	0	0	0	0	0	0	0	0	0
Aug	0	0	0	0	0	0	0	0	0	0.03	0	0	0	0
Sept	0	0	0.08	0	0	0.03	0	0.17	0	0.08	0	0	0.18	0
Totals:	***21.47***	***31.75***	***8.78***	***19.76***	***10.55***	***44.41***	***24.49***	***7.41***	***22.59***	***13.66***	***23.92***	***31.09***	***12.69***	***7.57***

Month	Water Years:												**Total**	**%/**
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**/Mon**	**Mont**
Oct	0.34	0	0.3	1.13	0.00	0.17	0.00	0.00	1.79	0.03	0.01	0.07	19.6	3.9
Nov	1.14	0.87	0.73	1.21	0.07	1.86	1.52	0.31	0.12	1.60	0.64	0.50	30.4	6.1
Dec	0.18	5.88	1.12	1.92	0.00	0.68	7.19	2.00	8.33	5.34	5.16	0.38	85.9	17.3
Jan	0.02	0.82	4.03	8.81	3.75	8.07	0.48	8.39	0.44	16.21	1.87	0.37	117.0	23.5
Feb	4.11	0.51	1.65	10.61	0.16	8.26	0.06	0.10	0.08	9.09	15.99	3.89	113.4	22.8
Mar	3.52	0.08	3.01	0.83	4.85	3.06	8.13	1.02	2.10	7.17	5.90	3.83	88.8	17.8
Apr	0.65	0.36	0	0.2	0.09	0.11	3.58	0.02	0.25	0.03	2.91	0.33	30.8	6.2
May	0	0.26	0	0.32	0.40	1.57	0.07	0.00	0.00	0.30	0.10	0.07	8.6	1.7
Jun	0	0.42	0	0	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	1.2	0.2
Jul	0	0.03	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.1	0.0
Aug	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.3	0.1
Sept	0	0.15	0	0.45	0.00	0.01	0.00	0.00	0.02	0.03	0.03	0.25	1.5	0.3
Totals:	***9.96***	***9.38***	***10.84***	***25.48***	***9.32***	***23.79***	***21.03***	***11.84***	***13.13***	***40.23***	***32.61***	***9.69***	***497.4***	***100.0***

Table 22: Monthly average stream discharge at the USGS Solvang and Narrows gauges during WY2001-WY2025.

Month	WY2001		WY2002		WY2003		WY2004		WY2005		WY2006	
	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)
Oct	n/d	20.6	n/d	2.06	23.3	18.8	0	0	31.1	29.4	6.05	9.41
Nov	n/d	14.8	n/d	12.3	8.11	15.2	0	0	6.35	14.2	6.94	16
Dec	n/d	14.9	n/d	25.2	22.3	55.5	0	0.02	293.2	478.5	10.7	20.1
Jan	37.3	75.3	n/d	24.6	10.7	26.7	1.6	1.54	2556	2765	40	79.4
Feb	n/d	321	n/d	21.6	12.7	27	8.96	38.4	2296	2555	12.2	28
Mar	n/d	3378	n/d	13.4	24	70.2	4.25	12.4	776.6	929.3	51.2	86.1
Apr	n/d	207.3	n/d	3.93	14.9	22.3	0.295	1.46	206.8	300.8	1317	1053
May	n/d	57.5	n/d	1.44	9.83	19.5	0	0.10	104.3	150.7	131.9	139.6
Jun	n/d	13.6	n/d	0.515	1.64	3.97	0	0	13.8	32.7	20.1	26.5
Jul	n/d	5.08	n/d	0.09	0.01	0.64	53.2	3.69	9.15	14	7.83	4.76
Aug	n/d	2.53	64.8	24.2	0	0.11	59.4	30.9	6.35	2.86	4.69	0.98
Sep	n/d	2.15	37.2	28.9	0	0	39.3	24	6.02	4.15	5.7	1

Month	WY2007		WY2008		WY2009		WY2010		WY2011		WY2012	
	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)
Oct	7.29	0.996	24.9	17.5	2.97	0	6.84	0	19.8	18.3	7.6	4.28
Nov	5.8	1	7.43	8.56	5.78	0	1.61	0	6.95	12.8	8.3	11.1
Dec	7.73	10	6.59	13.2	7.02	1.02	6.89	0	53.1	203.3	7.92	14.6
Jan	9.4	15.2	265	496.2	6.14	5.12	72.8	183.6	27.6	85.8	7.98	16.9
Feb	10.5	18.6	401.1	490.1	17.8	33.4	72.1	180.6	24.1	100.3	7.45	14.1
Mar	8.81	10.7	93.8	158.4	12.2	18.6	26.4	67.7	1441	1266	6.04	11.7
Apr	4.5	1.43	8.52	18.8	4.39	5.25	34.9	50.9	321.4	422	8.82	14.7
May	1.47	0.475	6.29	6.78	5.05	0.651	6.07	12.6	39	70.8	5.56	5.53
Jun	1.94	0.13	5.03	2.49	7.1	0.275	1.28	1.85	13.9	29.4	4.74	0.52
Jul	35.8	1.41	7.07	0.421	3.51	0	0.346	0.447	9.27	10.7	4.58	0.03
Aug	55.2	30.9	3.67	0.069	3.72	0	52.7	21.6	7.8	3.05	4.87	0
Sep	31	23.4	3.76	0	4.08	0	29.7	19.2	8.5	2.22	6.60	0

Month	WY2013		WY2014		WY2015		WY2016		WY2017		WY2018	
	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)
Oct	4.5	0	42.6	28.8	13.2	0	0.65	0	0.002	0	35	28.2
Nov	2.7	0	22.7	17.1	5.21	0	0	0	0.01	0	8.63	9.67
Dec	5.8	0	8.9	8.1	7.1	0	0	0	0.069	0	2.28	0.586
Jan	6.3	0	4.3	2.2	5.1	0	0.22	0	12.4	29.9	2.63	2.9
Feb	6	3.6	6	3.6	4	0	2.14	0	193.2	432.4	0.649	1
Mar	4.8	4.5	10.6	12.3	1.5	0	2.39	0	12.7	50.5	3.09	9.5
Apr	1.7	0.54	3	1.8	0	0	0.09	0	2.98	9.83	0.138	3.5
May	0	0	0	0	0	0	0	0	0.2	1.99	0	0.38
Jun	0	0	0	0	0	0	0	0	0	0.66	0	0
Jul	51	3	0	0	0	0	54.8	0	0	0	0	0
Aug	59.1	27	0	0	79	0	69.4	34.8	28.9	0	88.8	15
Sep	47.9	28	2.7	0	42	0.77	0.67	2.86	74.1	37.2	10.9	8.4

Month	WY2019		WY2020		WY2021		WY2022		WY2023		WY2024	
	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)	Solvang (cfs)	Narrows (cfs)
Oct	0	0.017	0	0	38.5	22.4	5.98	0	7.61	7.48	12.7	10.9
Nov	0	0	0	0	24	17.5	3.03	0	2.5	0.68	10.2	10.0
Dec	0	0	3.88	0.135	7.82	7.92	14.4	12.1	11.2	24.6	15.5	29.1
Jan	14.4	61.7	7.48	0.043	22.8	91.6	7.76	13.9	501.4	1220.1	15.4	34.9
Feb	139.9	414.5	5.39	0	15.8	45.2	4.65	6.2	1211	1282.1	2043	2188
Mar	68.7	208	22.8	28.9	8.1	15.9	2.46	2.8	2415	2732	709	765
Apr	13.3	35.7	87	114.4	2.37	4.73	1.24	1.61	579	738.2	644	856
May	5.79	14.6	15.7	22.2	0.224	0.676	0.077	0.01	153.4	186.7	186	250
Jun	1.91	5.21	3.42	1.13	0	0	0	0	70.4	86.6	68.5	87.4
Jul	0.653	0.875	1.8	0	0	0	0	0	49.6	50.3	35.6	38.4
Aug	0	0	0.527	0	22.6	0	52.5	0	33.5	29.1	27.8	23.6
Sep	0	0	77.5	20.9	9.07	0	67.4	30.7	31.4	24.1	29.9	21.2

Month	WY2025	
	Solvang (cfs)	Narrows (cfs)
Oct	21.2	18.6
Nov	14.6	17.1
Dec	14.4	20
Jan	12.9	18
Feb	20.9	35.1
Mar	20.0	33.2
Apr	13.6	17.0
May	8.0	7.3
Jun	5.9	1.3
Jul	6.8	0.03
Aug	5.6	0
Sep	8.4	0

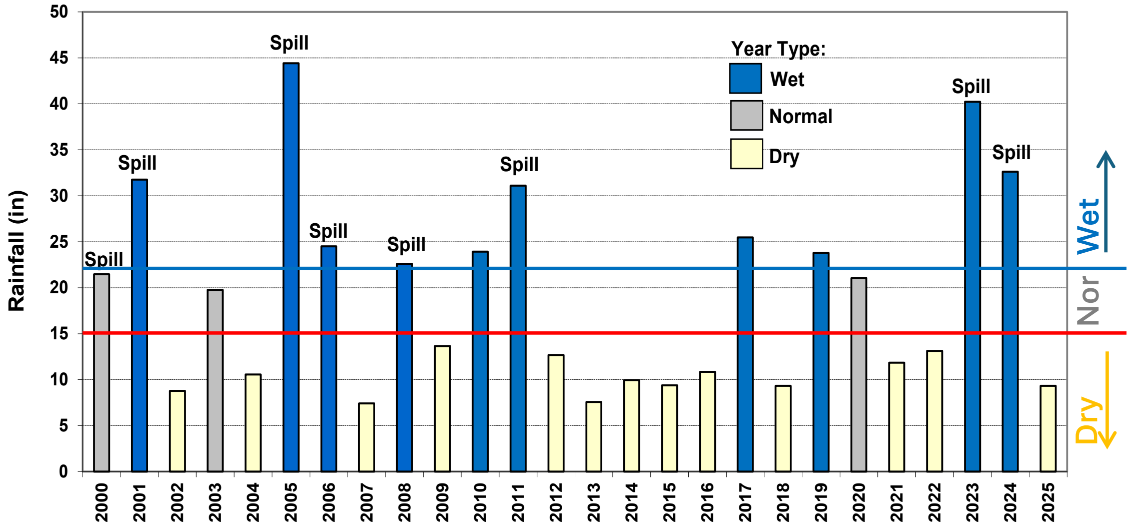


Figure 89: Water year type (wet, normal and dry) and spill years since the issuance of the BO in 2000 through 2025. Year types are defined as Dry (< 15 inches), Normal (15 to 22 inches) and Wet (> 22 inches) at Bradbury Dam.

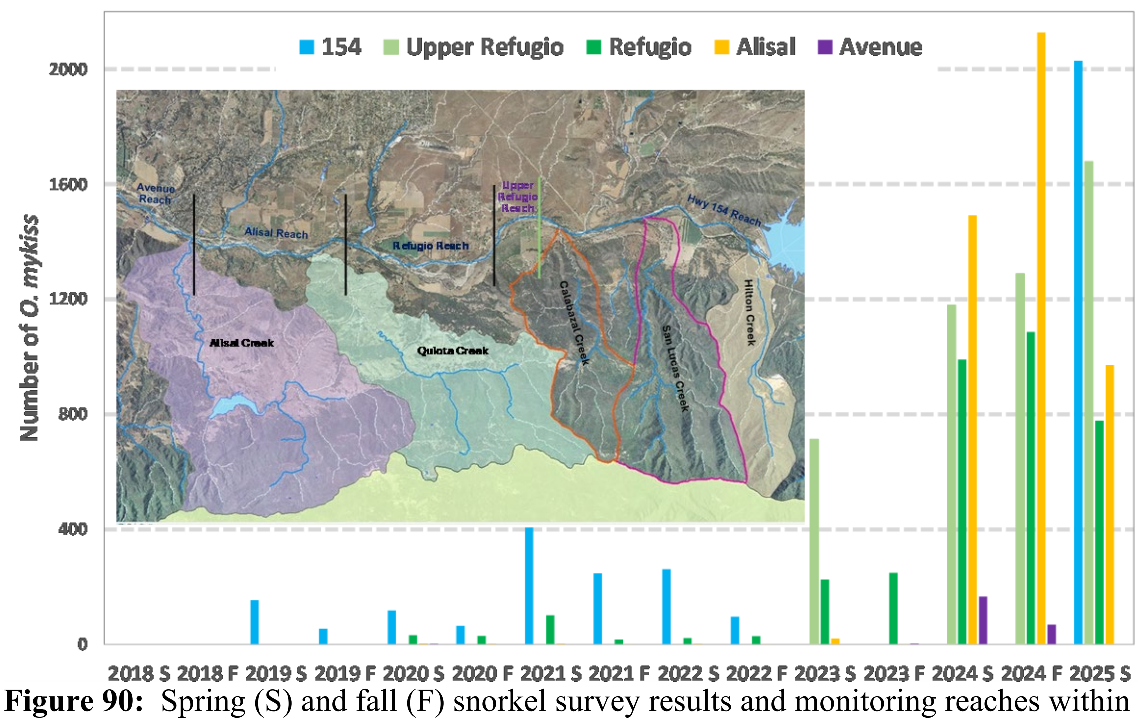


Figure 90: Spring (S) and fall (F) snorkel survey results and monitoring reaches within the LSYR mainstem from WY2018 through WY2025 in the Hwy 154, Upper Refugio, Refugio, Alisal, and Avenue reaches showing the dramatic increase in WY2023 and WY2024 then decrease in WY2025.

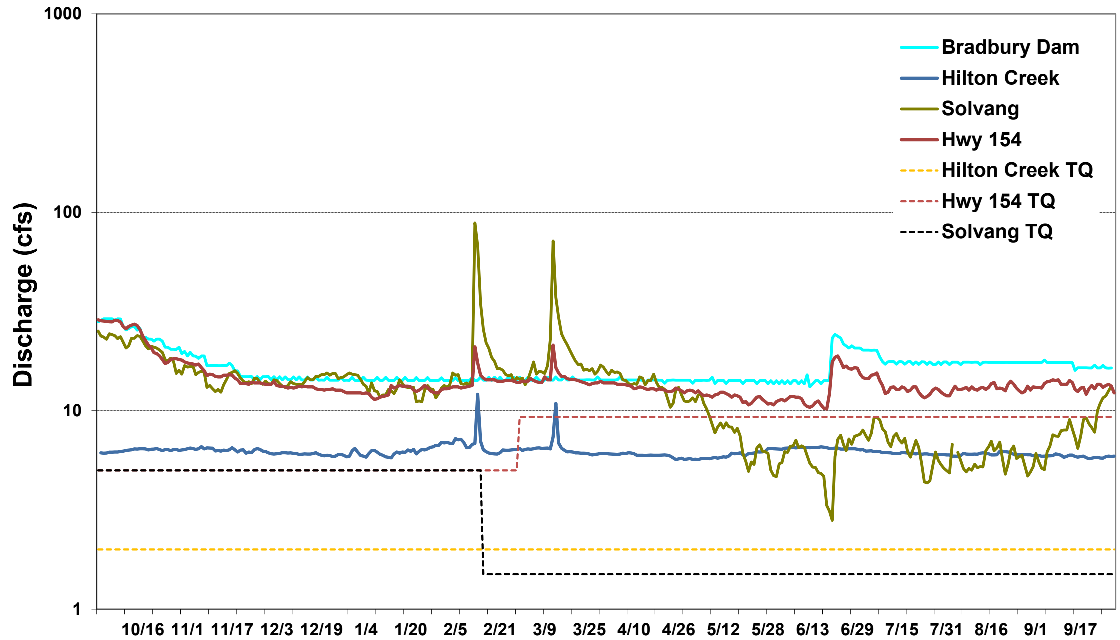


Figure 91: USGS recorded discharge at the Alisal (Solvang) Bridge, Hwy 154, and Hilton Creek plus Bradbury Dam releases, showing target flow (TQ) compliance throughout WY2025 (source: USBR Operations Reports and USGS).

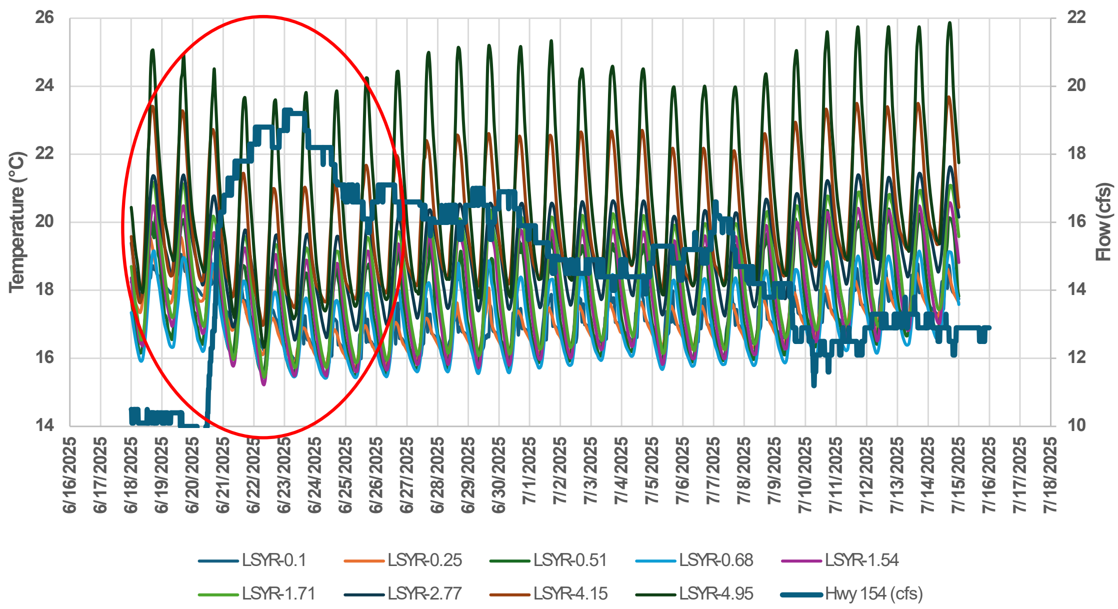


Figure 92: June 2025 pulse flow releases from the Bradbury Dam Outlet Works with surface thermograph stream water temperatures at monitoring sites within 5 miles of Bradbury Dam; shown in red is the specific area of interest.

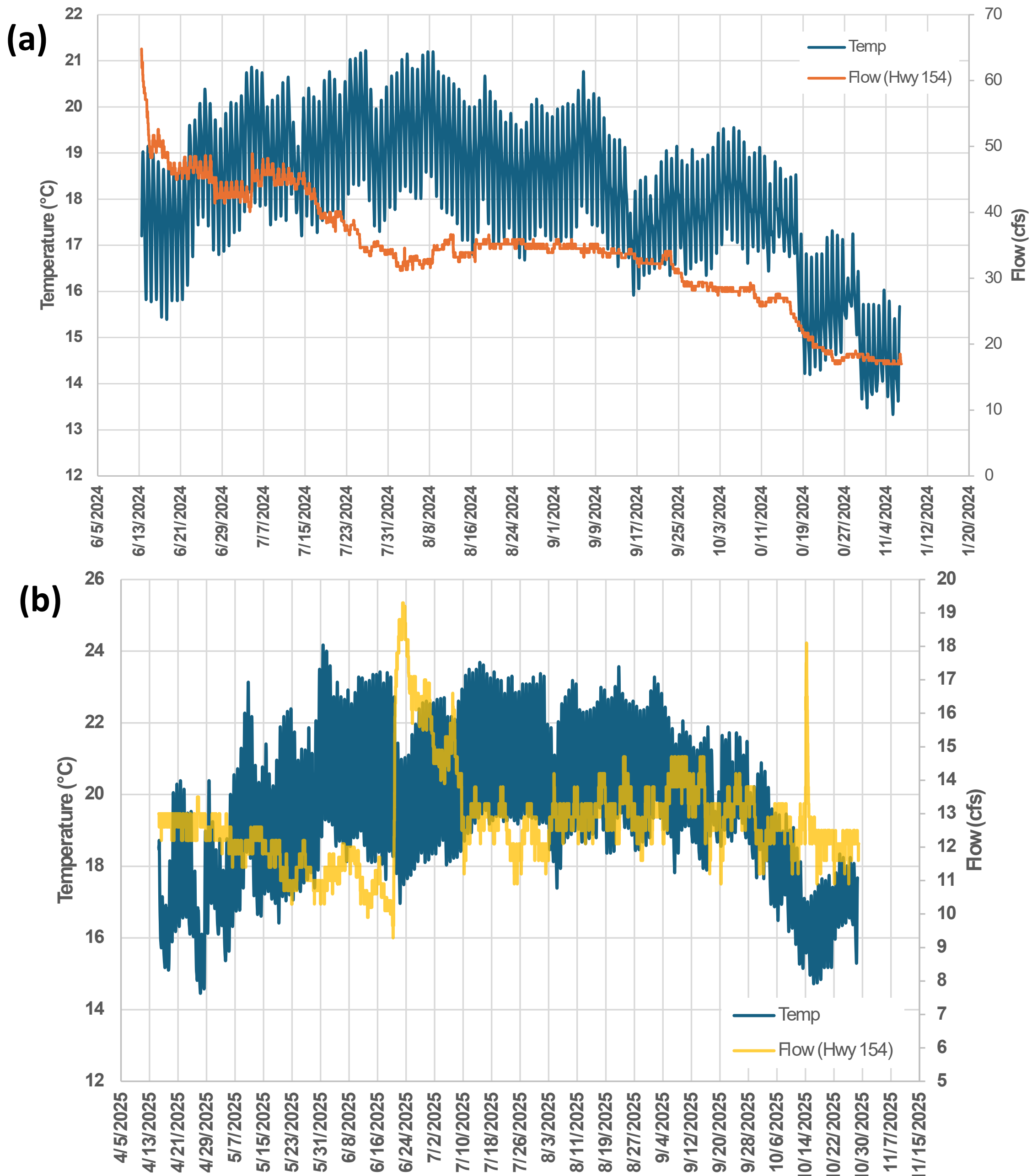


Figure 93: A comparison of stream water temperatures from Upper Refugio Reach (LSYR-4.15) and river discharge recorded at the USGS Hwy 154 gage in (a) 2024 and (b) 2025.

Figure 94: Quiota Creek fish rescue and relocation efforts showing (a) pre-rescue habitat and water quality measuring in an isolated pool, (b) CDFW/COMB seining a pool habitat, (c) electrofishing a shallow pool, and (d) rescued *O. mykiss* in aerated cooler prior to release.

Figure 95: Quiota Creek fish rescue and relocation efforts showing (a) electrofishing team, (b) scanning a PIT tag, (c) inserting a PIT tag into an *O. mykiss*, and (d) releasing rescued fish into the lower Hwy 154 Reach.

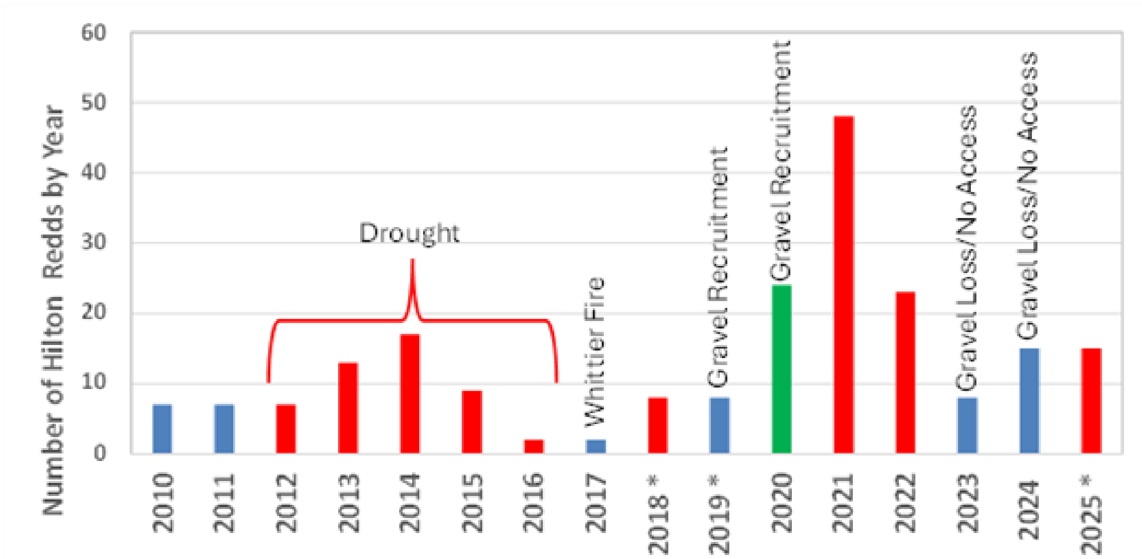
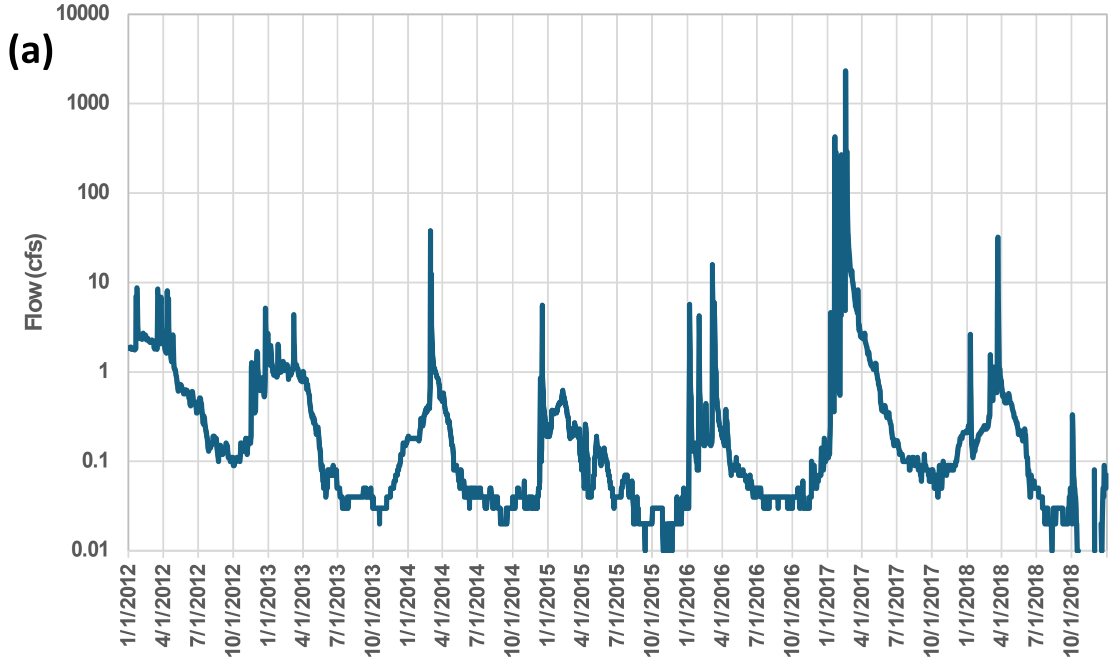


Figure 96: Hilton Creek redd survey results from WY2010 to WY2025 showing rain year types (blue=wet, green=average, and red=dry) and * denoting years gravel augmentation was conducted.

Figure 97: Hilton Creek reaches within Reclamation property showing the URP and LRP, and confluence with the LSYR mainstem.



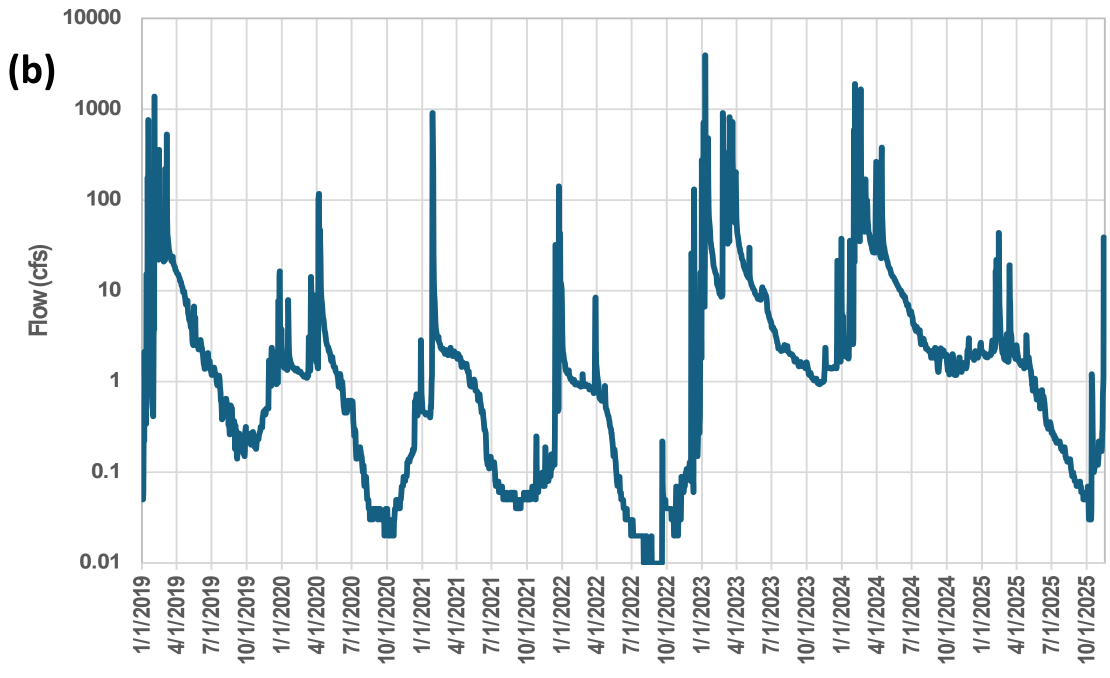


Figure 98: USGS daily average flow at Salsipuedes Creek for (a) the prolonged drought of 2012-2018 and (b) the wetter rainfall period following the drought (2019-2025).

Figure 99: Salsipuedes Creek beaver dams in (a) WY2008 after the 1/4/08 storm that produced stream discharge of 687 cfs and (b) WY2025 that effectively blocked fish passage up into the creek all water year.

Figure 100: Lower Salsipuedes Creek in (a) September 2018 and (b) May 2023 after a wet year and mass wasting.

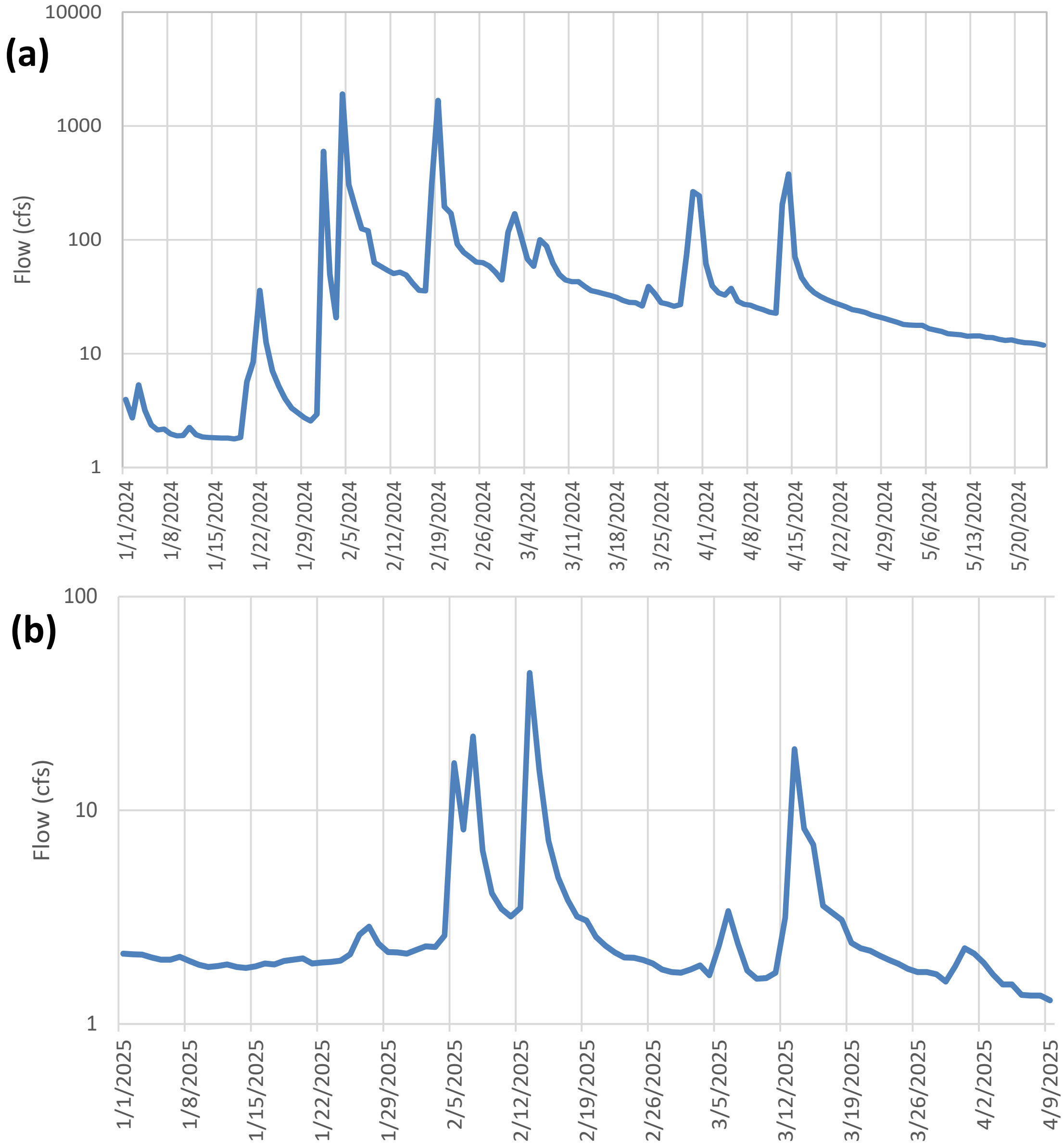


Figure 101: Salsipuedes Creek at the USGS gaging site at Jalama Bridge showing daily mean discharge in (a) WY2024 (wet year) and (b) WY2025 (dry year); note how quickly flows decreased to less than 5 cfs in WY2025.

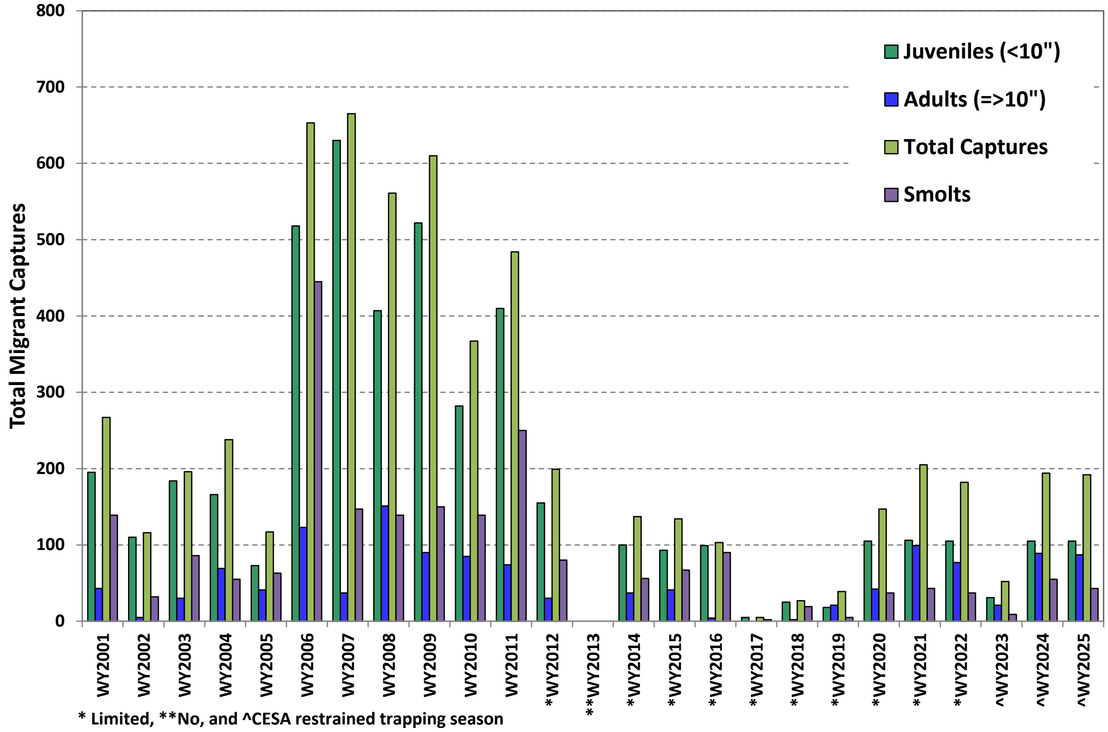


Figure 102: Total number of juveniles, adults and smolts captured at all 3 migrant trapping locations from WY2001 to WY2025.

Table 23: WY2001-WY2025 Hilton Creek upstream and downstream *O. mykiss* migrant captures; year types are indicated by blue for wet, green for normal, and red for dry.

	WY2001	WY2002	WY2003	WY2004	WY2005	WY2006	WY2007	WY2008	WY2009	WY2010	WY2011	*WY2012	*WY2013	*WY2014	*WY2015	*WY2016	*WY2017	*WY2018	*WY2019	*WY2020	*WY2021	*WY2022	^WY2023	*WY2024	*WY2025
	Hilton Creek																								
	Upstream																								
>700	0	0	0	0	0	0	0	0	0	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
650-699	0	0	0	0	0	0	0	4	0	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
600-649	0	0	0	0	0	0	0	0	1	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
550-599	0	0	0	0	0	1	0	2	0	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
500-549	1	0	1	0	2	2	0	2	1	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	1	0
450-499	3	0	0	6	8	9	0	13	1	2	0	0	n/d	0	0	0	0	0	0	0	0	0	0	1	1
400-449	5	0	9	11	9	21	2	6	2	1	11	0	n/d	1	0	0	0	1	1	6	2	0	3	3	1
300-399	2	0	10	24	10	31	11	31	27	11	6	12	n/d	24	7	1	0	0	8	13	22	30	8	14	30
200-299	2	0	2	8	7	10	4	22	29	39	11	12	n/d	12	11	5	0	0	9	7	51	49	6	27	40
100-199	11	38	14	27	4	18	15	63	33	39	34	17	n/d	9	6	1	1	5	2	17	10	16	6	6	6
<99	1	1	0	12	1	17	11	29	24	15	23	4	n/d	0	0	1	0	0	0	6	1	2	0	8	1
Total	**25**	**39**	**36**	**88**	**41**	**109**	**43**	**172**	**118**	**107**	**85**	**45**	**n/d**	**46**	**24**	**8**	**1**	**6**	**20**	**49**	**86**	**97**	**23**	**60**	**79**
	Downstream																								
>700	0	0	0	0	0	0	0	0	0	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
650-699	0	0	0	0	0	0	0	2	0	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
600-649	0	0	0	0	0	0	0	1	0	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
550-599	0	0	0	0	0	0	0	2	1	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
500-549	1	0	1	1	2	3	0	1	0	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
450-499	3	0	1	2	0	5	0	15	1	2	2	0	n/d	0	0	0	0	0	0	0	0	0	0	0	1
400-449	5	0	3	9	5	6	4	12	0	3	7	0	n/d	1	0	0	0	0	2	2	1	0	0	4	0
300-399	2	0	2	7	3	20	16	28	24	9	10	1	n/d	5	7	0	0	0	1	12	24	9	3	14	8
200-299	0	5	1	5	2	15	9	18	26	38	22	14	n/d	6	35	3	0	4	5	7	40	12	8	19	21
Smolts	0	4	0	3	1	11	7	4	7	1	4	6	n/d	1	11	2	0	3	1	1	2	0	0	2	3
Pre-Smolt	0	0	0	1	0	0	0	2	0	1	0	1	n/d	1	3	1	0	1	0	0	1	0	1	3	0
Res	0	1	1	1	1	4	2	12	19	36	18	7	n/d	4	21	0	0	0	4	6	37	12	7	14	18
101-199	22	45	12	46	6	47	369	178	218	84	82	99	n/d	64	68	91	4	14	8	50	34	54	4	52	54
Smolts	2	19	3	28	6	33	96	59	73	41	37	17	n/d	16	30	54	0	7	1	11	12	11	0	27	13
Pre-Smolt	0	5	0	2	0	5	42	21	36	4	16	48	n/d	27	23	32	2	6	2	18	13	25	3	14	21
Res	21	21	9	16	0	9	231	98	109	39	29	34	n/d	21	15	5	2	1	5	19	9	18	1	11	20
<100	1	7	0	16	2	173	200	47	34	15	16	15	n/d	2	0	1	0	0	1	19	2	10	0	6	20
Smolts	0	0	0	1	0	1	0	0	0	0	0	0	n/d	0	0	0	0	0	0	0	0	0	0	0	0
Pre-Smolt	0	0	0	0	1	163	0	1	0	0	2	0	n/d	1	0	1	0	0	0	2	0	1	0	0	0
Res	1	7	0	15	1	9	200	46	34	15	14	15	n/d	1	0	0	0	0	1	17	2	9	0	6	20
Total	**34**	**57**	**20**	**86**	**20**	**269**	**598**	**304**	**304**	**151**	**139**	**129**	**n/d**	**78**	**110**	**95**	**4**	**18**	**17**	**90**	**101**	**85**	**15**	**95**	**104**
	*Abbreviated trapping season due to NOAA take issues																								
	^ Abbreviated trapping season due to California steelhead endangered listing.																								

Table 24: WY2001-WY2025 Salsipuedes Creek upstream and downstream *O. mykiss* migrant captures; year types are indicated by blue for wet, green for normal, and red for dry: no trapping was conducted in WY2013, WY2015, WY2016, and WY2022.

	WY2001	WY2002	WY2003	WY2004	WY2005	WY2006	WY2007	WY2008	WY2009	WY2010	WY2011	*WY2012	*WY2013	*WY2014	*WY2015	*WY2016	*WY2017	*WY2018	*WY2019	*WY2020	*WY2021	*WY2022	^WY2023	*WY2024	*WY2025
	Salsipuedes Creek																								
	Upstream												No trap		No trap	No trap						No Trap			
>700	0	0	0	0	0	0	0	1	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
650-699	1	0	1	0	1	0	0	2	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
600-649	0	0	0	0	0	0	0	3	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	1	0
550-599	1	0	0	0	0	0	0	0	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
500-549	0	0	0	0	0	1	0	0	0	0	3	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
450-499	2	0	0	0	0	0	0	0	0	0	2	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	1	0
400-449	1	0	0	0	0	0	0	0	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	1	0
300-399	7	3	0	1	0	6	0	0	0	0	1	2	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	1	0
200-299	9	3	3	11	0	6	2	7	1	4	7	1	n/d	1	n/d	n/d	0	0	0	1	0	n/d	1	3	0
100-199	10	8	22	9	0	4	5	2	9	2	22	0	n/d	2	n/d	n/d	0	0	0	0	1	n/d	3	1	1
<99	0	0	3	0	0	1	0	3	3	0	5	0	n/d	0	n/d	n/d	0	0	0	1	0	n/d	0	0	0
Total	**31**	**14**	**29**	**21**	**1**	**18**	**7**	**18**	**13**	**6**	**40**	**3**	**n/d**	**3**	**n/d**	**n/d**	**0**	**0**	**0**	**2**	**1**	**n/d**	4	8	1
	Downstream																								
>700	0	0	0	0	0	0	0	0	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
650-699	0	0	0	0	0	0	0	0	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
600-649	1	0	0	0	0	0	0	0	0	1	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
550-599	0	0	0	0	0	0	0	0	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
500-549	1	0	0	0	0	0	0	0	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
450-499	3	0	0	0	0	0	0	1	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
400-449	0	0	0	0	0	0	0	0	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	6	0
300-399	6	0	0	1	0	4	1	1	0	0	3	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	11	0
200-299	21	2	2	2	9	19	3	13	2	20	13	0	n/d	1	n/d	n/d	0	1	1	0	1	n/d	4	11	1
Smolts	8	1	2	0	9	10	0	9	1	18	2	0	n/d	1	n/d	n/d	0	0	0	0	0	n/d	0	2	1
Pre-Smolt	0	0	0	1	0	2	0	1	0	0	1	0	n/d	0	n/d	n/d	0	0	0	0	1	n/d	1	4	0
Res	13	1	0	2	0	7	3	3	1	2	10	0	n/d	0	n/d	n/d	0	0	1	0	0	n/d	3	5	0
101-199	144	4	98	20	46	193	12	41	60	50	160	10	n/d	9	n/d	n/d	0	2	1	0	16	n/d	5	3	7
Smolts	124	3	55	9	45	135	1	31	16	48	100	1	n/d	3	n/d	n/d	0	0	0	0	10	n/d	0	3	5
Pre-Smolt	2	0	21	2	1	50	1	10	13	1	57	7	n/d	6	n/d	n/d	0	2	1	0	4	n/d	5	0	0
Res	18	1	22	9	0	8	10	0	31	1	3	2	n/d	0	n/d	n/d	0	0	0	0	2	n/d	0	0	2
<100	1	0	11	20	0	24	1	6	111	2	24	12	n/d	0	n/d	n/d	0	0	0	1	0	n/d	1	0	0
Smolts	0	0	0	5	0	4	0	0	0	0	0	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	0	0	0
Pre-Smolt	0	0	5	3	0	17	0	0	2	0	17	0	n/d	0	n/d	n/d	0	0	0	0	0	n/d	1	0	0
Res	1	0	6	12	0	3	1	6	109	2	7	12	n/d	0	n/d	n/d	0	0	0	1	0	n/d	0	0	0
Total	**177**	**6**	**111**	**43**	**55**	**240**	**17**	**62**	**173**	**73**	**200**	**22**	**n/d**	**10**	**n/d**	**n/d**	**0**	**3**	**2**	**1**	**17**	**n/d**	10	31	8
	*Abbreviated trapping season due to NOAA take issues																								
	^ Abbreviated trapping season due to California steelhead endangered listing.																								

Table 25: Total migrant captures from WY2001 through WY2025 at all three trap sites.

	WY2001	WY2002	WY2003	WY2004	WY2005	WY2006	WY2007	WY2008	WY2009	WY2010	WY2011	WY2012*	WY2013**	WY2014*	WY2015*	WY2016*	WY2017*	WY2018*	WY2019*	WY2020*	WY2021*	WY2022*	WY2023^	WY2024	WY2025	Total
Year Type:	Wet	Dry	Normal	Dry	Wet	Wet	Dry	Wet	Dry	Wet	Wet	Dry	Dry	Dry	Dry	Dry	Wet	Dry	Wet	Normal	Dry	Dry	Wet	Wet	Dry	
Hilton	59	96	56	174	61	378	641	476	422	258	224	174	0	124	134	103	5	24	37	139	187	182	38	155	183	4330
Mainstem	nd	nd	nd	nd	nd	17	nd	5	2	30	20	0	0	0	0	0	0	0	0	5	nd	nd	nd	nd	nd	79
Salsipuedes	208	20	140	64	56	258	24	80	186	79	240	25	n/d	13	n/d	n/d	0	3	2	3	18	nd	14	39	9	1481
Total Captured:	**267**	**116**	**196**	**238**	**117**	**653**	**665**	**561**	**610**	**367**	**484**	**199**	**0**	**137**	**134**	**103**	**5**	**27**	**39**	**147**	**205**	**182**	**52**	**194**	**192**	**5890**

* Abbreviated trapping season due to NOAA take limits enforced. ** No trapping conducted. ^ Abbreviated trapping season due to California steelhead endangered listing.

Table 26: Total juvenile and adult migrant captures from WY2001 through WY2025 at all three trap sites.

	WY2001	WY2002	WY2003	WY2004	WY2005	WY2006	WY2007	WY2008	WY2009	WY2010	WY2011	*WY2012	**WY2013	*WY2014	*WY2015	*WY2016	*WY2017	*WY2018	*WY2019	*WY2020	*WY2021	*WY2022	^WY2023	^WY2024	^WY2025
	Wet	Dry	Normal	Dry	Wet	Wet	Dry	Wet	Dry	Wet	Wet	Dry	Dry	Dry	Dry	Dry	Wet	Dry	Wet	Normal	Dry	Dry	Wet	Wet	Dry
Juveniles (<10")	195	110	184	166	73	518	630	407	522	282	410	155	n/d	100	93	99	5	25	18	105	106	105	31	105	105
Adults (=>10")	43	5	30	69	41	123	37	151	90	85	74	30	n/d	37	41	4	0	2	21	42	99	77	21	89	87
Total Captures	267	116	196	238	117	653	665	561	610	367	484	199	0	137	134	103	5	27	39	147	205	182	52	194	192
Smolts	139	32	86	55	63	445	147	139	150	139	250	80	0	56	67	90	2	19	5	37	43	37	9	55	43

Table 27: Total anadromous fish captures from WY2001 through WY2025 at all three trap sites.

Fish #	Date	Time	Size (mm)	Size (in)	Sex	Type	Assignment	Score (%)	Watershed	Age (scales)
SU-04	3/20/2001	0:05	560	22.0	F	Steelhead	failed genotyping	-	-	2.2
SU-11	3/23/2001	19:35	650	25.6	~	Steelhead	no record	-	-	2.3
SD-48	3/25/2001	23:00	625	24.6	F	Steelhead	Salsipuedes	95.383	Salsipuedes Creek (SYR)	ns
SD-149	4/22/2001	12:27	547	21.5	M	Steelhead	Salsipuedes	100	Salsipuedes Creek (SYR)	2.2
SU-17	3/20/2003	22:15	686	27.0	F	Steelhead	Salsipuedes	100	Salsipuedes Creek (SYR)	2.3
SU-01	4/12/2005	23:00	675	26.6	M	Steelhead	SLTjeraB	99.48	Tassajera Creek (Sta. Margarita C, Salinas R)	ns
SU-10	4/15/2006	22:09	515	20.3	F	Steelhead	SCLionB	98.874	Lion Canyon Creek (Sespe C, Santa Clara R)	ns
HU-74	2/7/2008	0:46	659	25.9	F	Steelhead	SLSAntA (AGLBerB)	55.30% (32.66%)	San Antonio River (Salinas R)	ns
HU-100	2/16/2008	6:14	691	27.2	F	Steelhead	SLTjaraB (Quiota)	88.11% (8.46%)	Tassajara Creek (Arroyo Seco, Salinas R)	2.3
HU-119	3/5/2008	6:01	563	22.2	F	Steelhead	Hilton	100%	Hilton Creek (SYR)	5
HU-123	3/7/2008	0:00	660	26.0	F	Steelhead	SLTjaraB	99.10%	Tassajara Creek (Arroyo Seco, Salinas R)	2.3
HU-142	3/23/2008	23:58	688	27.1	F	Steelhead	Hilton (AGMainB)	90.25% (9.34%)	Hilton Creek (SYR)	2.3
HD-109	2/11/2008	6:47	578	22.8	F	Steelhead	Hilton	99.91%	Hilton Creek (SYR)	ns
HD-147	3/4/2008	23:34	617	24.3	F	Steelhead	Hilton	100.00%	Hilton Creek (SYR)	ns
SU-03	2/4/2008	20:58	640	25.2	F	Steelhead	AGLopzA (AGMainB)	74.59% (25.33%)	Arroyo Grande Creek (SLO)	2.2+
SU-04	2/5/2008	7:53	701	27.6	F	Steelhead	AGLopzA (Hilton)	56.19% (43.73%)	Arroyo Grande Creek (SLO)	2.2
SU-08	2/17/2008	7:38	635	25.0	F	Steelhead	Salsipuedes	100.00%	Salsipuedes Creek (SYR)	2.3
SU-11	3/25/2008	21:36	663	26.1	F	Steelhead	Salsipuedes	99.82	Salsipuedes Creek (SYR)	2.3+
SU-12	3/29/2008	9:00	675	26.6	F	Steelhead	Salsipuedes	96.43	Salsipuedes Creek (SYR)	1.3
SU-14	4/14/2008	8:43	608	23.9	F	Steelhead	Salsipuedes	99.86%	Salsipuedes Creek (SYR)	2.3
SD-06	2/7/2008	22:47	496	19.5	F	Steelhead-Lagoon	Salsipuedes	98.33%	Salsipuedes Creek (SYR)	1.4
MU-01	2/10/2008	11:22	678	26.7	F	Steelhead	AGMainB (AGLopzA)	70.04% (24.80%)	Arroyo Grande Creek (SLO)	ns
MU-02	3/18/2008	7:13	600	23.6	F	Steelhead	Quiota	99.99%	Quiota Creek (SYR)	2.2
HU-89	3/22/2009	23:23	605	23.8	F	Steelhead	Hilton	97.22	Hilton Creek (SYR)	1.2.2*
SD-23	3/5/2010	6:18	634	25.0	F	Steelhead	Salsipuedes	100	Salsipuedes Creek (SYR)	ns
SU-05	1/24/2011	18:46	315	12.4	~	Steelhead	Salsipuedes	78.53	Salsipuedes Creek (SYR)	1.2+
SU-24	3/5/2011	1:01	528	20.8	F	Steelhead	Salsipuedes	98.33	Salsipuedes Creek (SYR)	3.2
SU-29**	3/11/2011	6:28	481	18.9	M	Steelhead	Quiota (Hilton)	47.14% (39.87%)	Quiota Creek (SYR)	2.1
HUR-06	4/1/2011	20:40	482	18.9	M	Steelhead	Quiota (Hilton)	47.14% (39.87%)	Quiota Creek (SYR)***	2.1
SU-31	4/2/2011	0:05	510	20.1	F	Steelhead	Salsipuedes	99.34	Salsipuedes Creek (SYR)	2.1+
SU-33	4/8/2011	8:25	485	19.1	M	Steelhead	BigMont	94.193 (5.78%)	Big Mountain Creek (Big Sur)	2.1
SU-35	4/10/2011	6:26	507	20.0	M	Steelhead	BigMont	99.44% (0.48%)	Big Mountain Creek (Big Sur)	3.1
SU-36	5/6/2011	6:40	298	11.7	~	Steelhead-Lagoon	Salsipuedes	99.604	Salsipuedes Creek (SYR)	1.1
SU-37	5/6/2011	13:10	242	9.5	M	Steelhead-Lagoon	Salsipuedes (BigMont)	57.87% (39.72%)	Salsipuedes Creek (SYR)	1.1
SU-01	3/22/2024	7:29	608	23.9	F	Steelhead	Arroyo Grande Creek	77.10%	Salsipuedes Creek (SYR)	2.2+
SU-08	4/17/2024	20:55	458	18.0	F	Steelhead	Salsipuedes (AGLB)	53.49%	Salsipuedes Creek (SYR)	4

ns - no scales taken.
* 1.2.2: 1F.2S.2F (F - fresh water, S - saltwater).
** SU-29: This Salsipuedes Creek fish was later recaptured in Hilton Creek (HUR-06), both marked in tan.
*** Awaiting genetic results.

Table 28: Total smolt captures from WY2001 through WY2025 at all three trap sites.

	WY2001	WY2002	WY2003	WY2004	WY2005	WY2006	WY2007	WY2008	WY2009	WY2010	WY2011	WY2012*	WY2013**	WY2014*	WY2015*	WY2016*	WY2017*	WY2018*	WY2019*	WY2020*	WY2021*	WY2022*	WY2023^	WY2024	WY2025	
Year Type:	Wet	Dry	Normal	Dry	Wet	Wet	Dry	Wet	Dry	Wet	Wet	Dry	Dry	Dry	Dry	Dry	Wet	Dry	Wet	Normal	Dry	Dry	Wet	Wet	Dry	**Total**
Hilton	4	28	3	35	8	213	145	87	116	47	59	72	0	46	67	90	2	17	4	32	28	37	2	46	37	**1225**
Mainstem	-	-	-	-	-	14	-	1	2	25	14	0	nd	nd	nd	0	0	0	0	5	nd	nd	nd	nd	nd	**61**
Salsipuedes	135	4	83	20	55	218	2	51	32	67	177	8	nd	10	nd	nd	0	2	1	0	15	nd	7	9	6	**902**
Total:	139	32	86	55	63	445	147	139	150	139	250	80	0	56	67	90	2	19	5	37	43	37	9	55	43	**2188**

* Abbreviated trapping season due to NOAA take limits enforced. ** No trapping conducted. ^ Abbreviated trapping season due to California steelhead endangered listing.

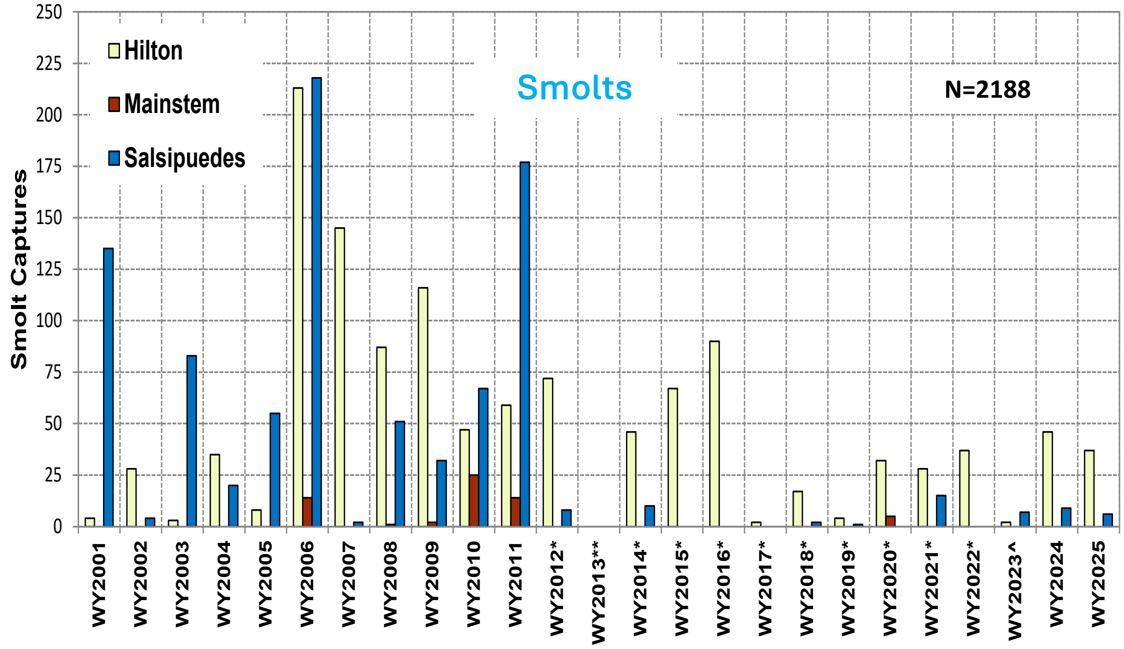


Figure 103: Total smolt captures at all three trap sites from WY2001 through WY2025.

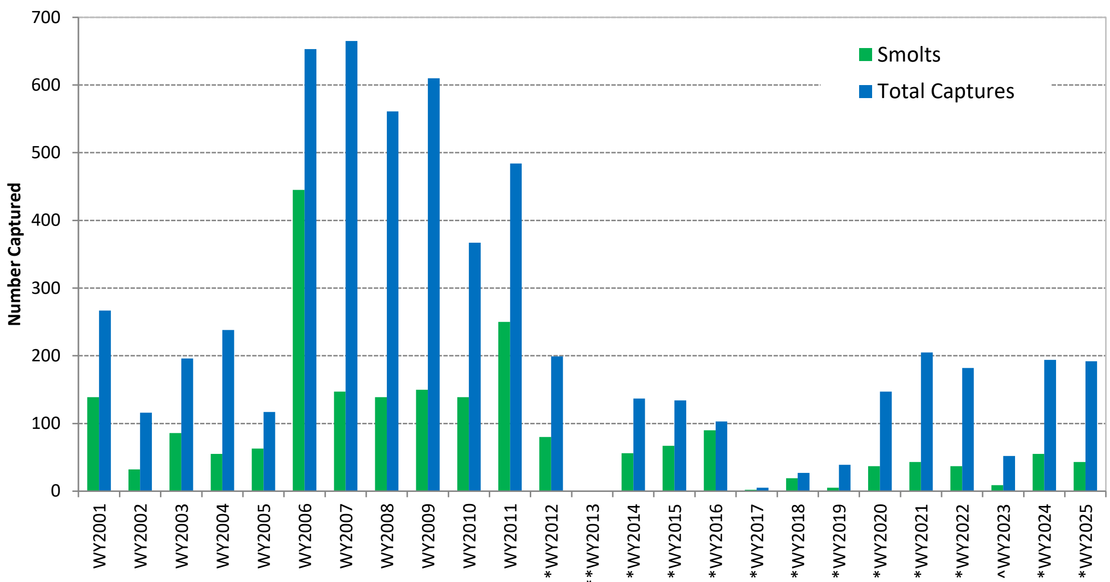


Figure 104: Total captures versus smolt captures 2001-2025

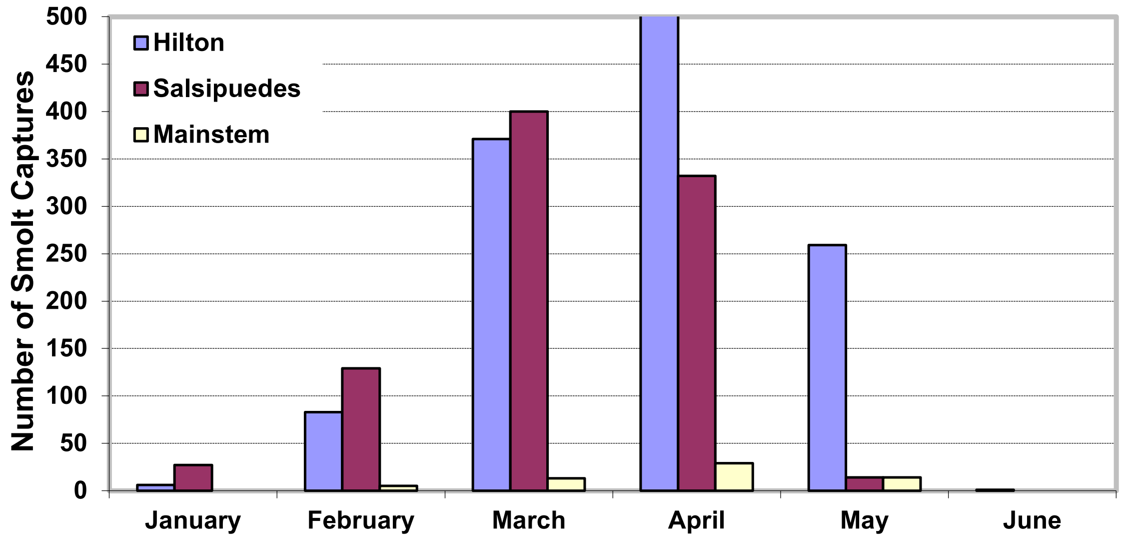


Figure 105: Timing of smolt captures at all three trap sites from WY2001 through WY2025.

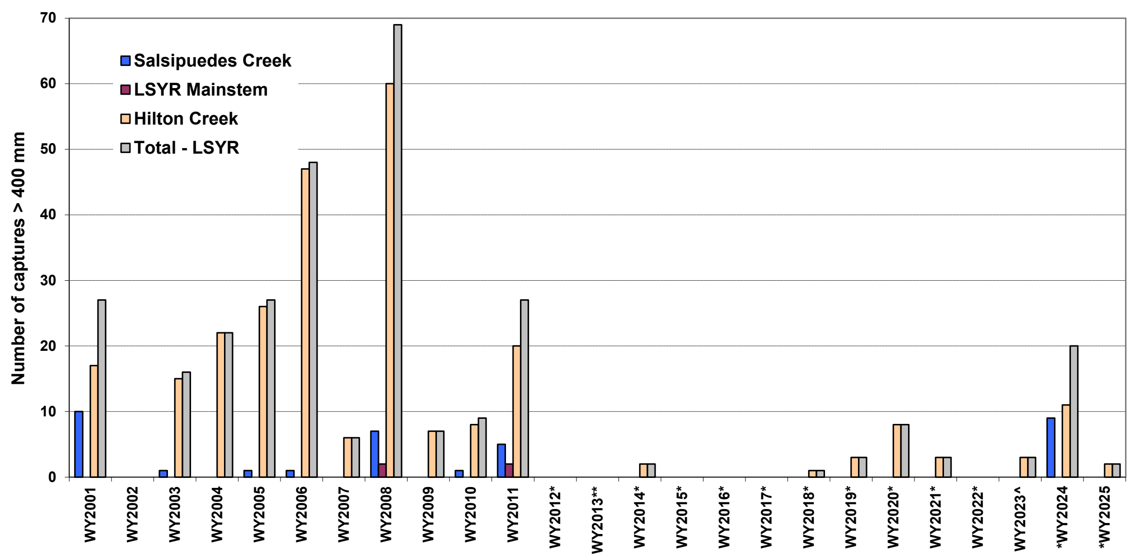
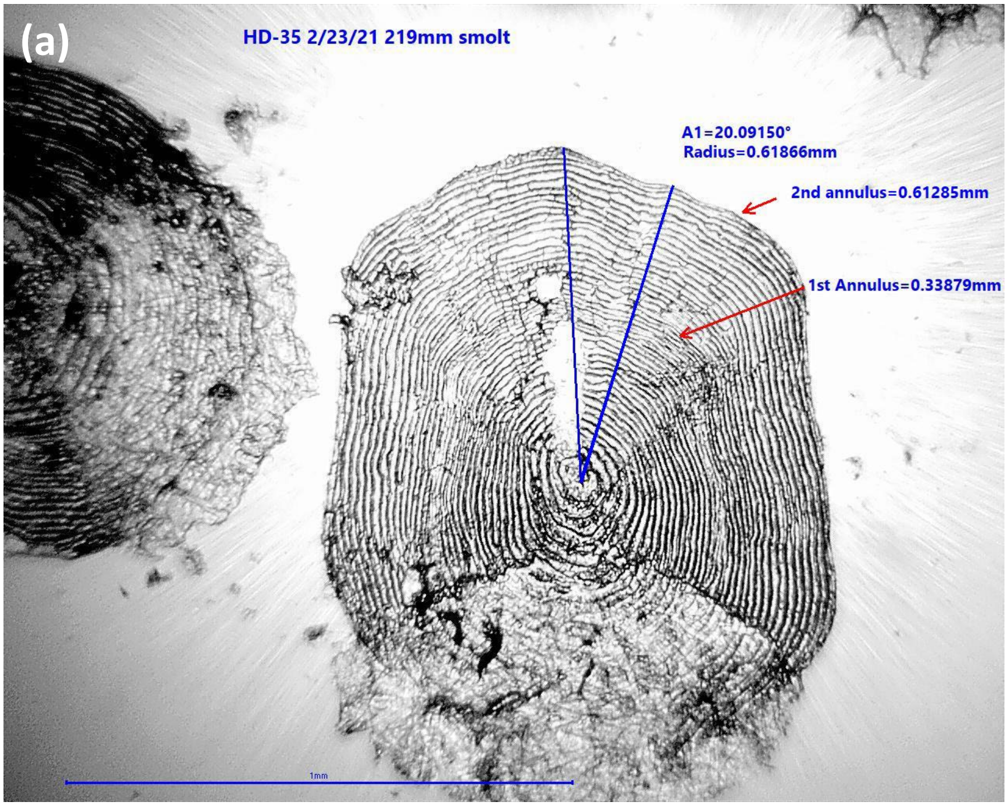


Figure 106: Migrant *O. mykiss* captures equal to or larger than 400 mm (15.7 inches) observed at the 3 trap sites from WY2001 through WY2025; the LSYR Mainstem trap was first installed in WY2006 and was not deployed in WY2007, WY2012, WY2013, WY2014, WY2015, WY2021, WY2022, WY2023, WY2024 or WY2025 due to low flow or high flow conditions.



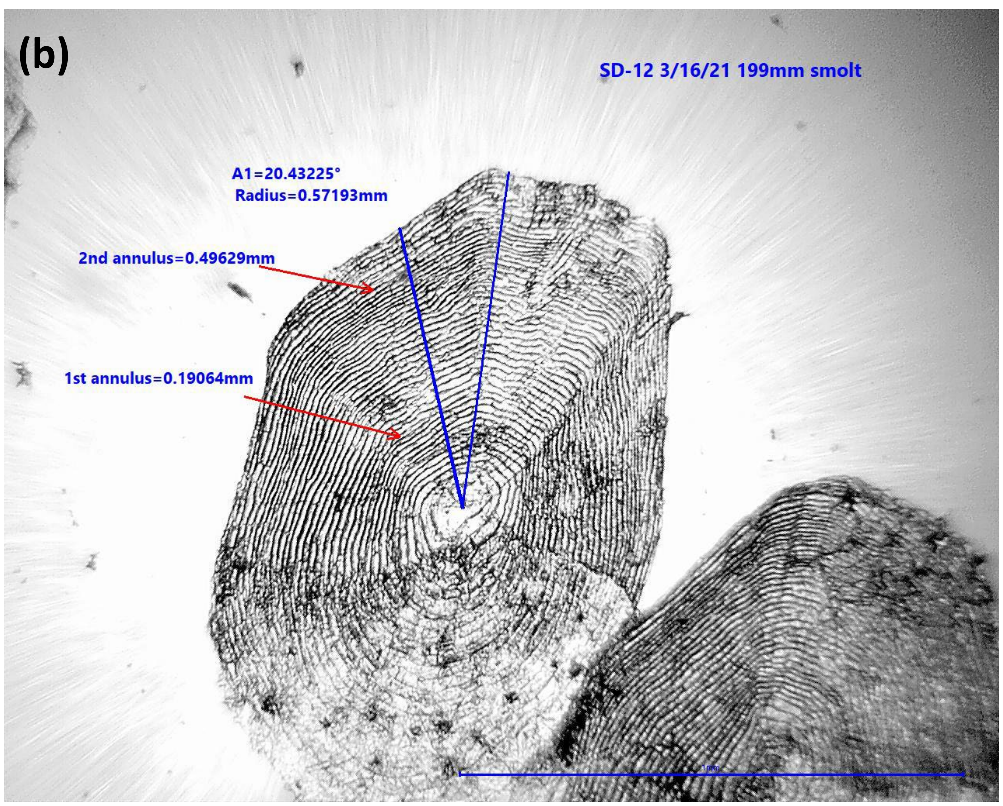


Figure 107: Smolt comparison between Hilton Creek and Salsipuedes Creek in WY2021 showing (a) HC-35 219 mm smolt aged at 2 years and a (b) SC-12 199 mm smolt aged at 2+ years.

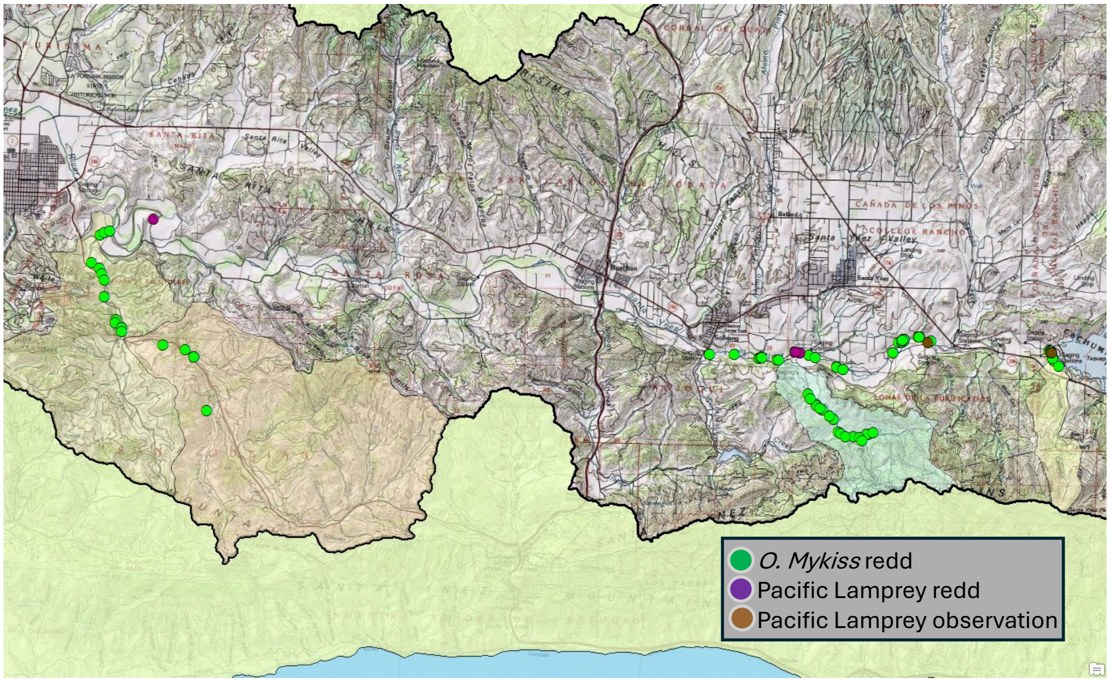


Figure 108: Locations of Pacific lamprey with *O. mykiss* redds (for comparison) observations in WY2025.

Figure 109: Pacific lamprey observations within the Hilton Creek trap, redd construction within the LSYR Refugio Reach , and resting within the gravels..

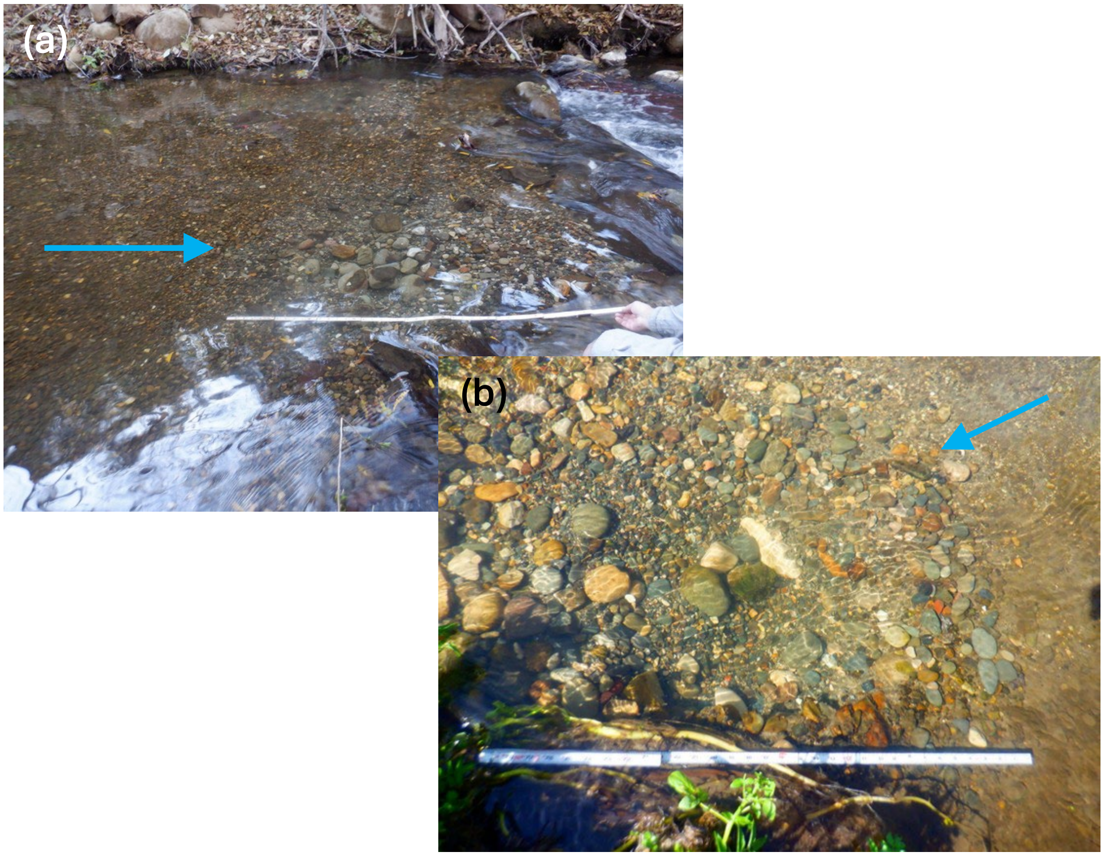


Figure 110: Comparison of a (a) Hilton Creek *O. mykiss* redd and a (b) LSYR Pacific lamprey redd (notice the cobble placement around the redd) observed in WY2025.

Figure 111: Turbidity in and downstream of the Stilling basin in WY2023, WY2024, and WY2025 showing water clarity differences compared to Hilton Creek.

Figure 112: Examples of beaver dams in WY024 and WY2025.

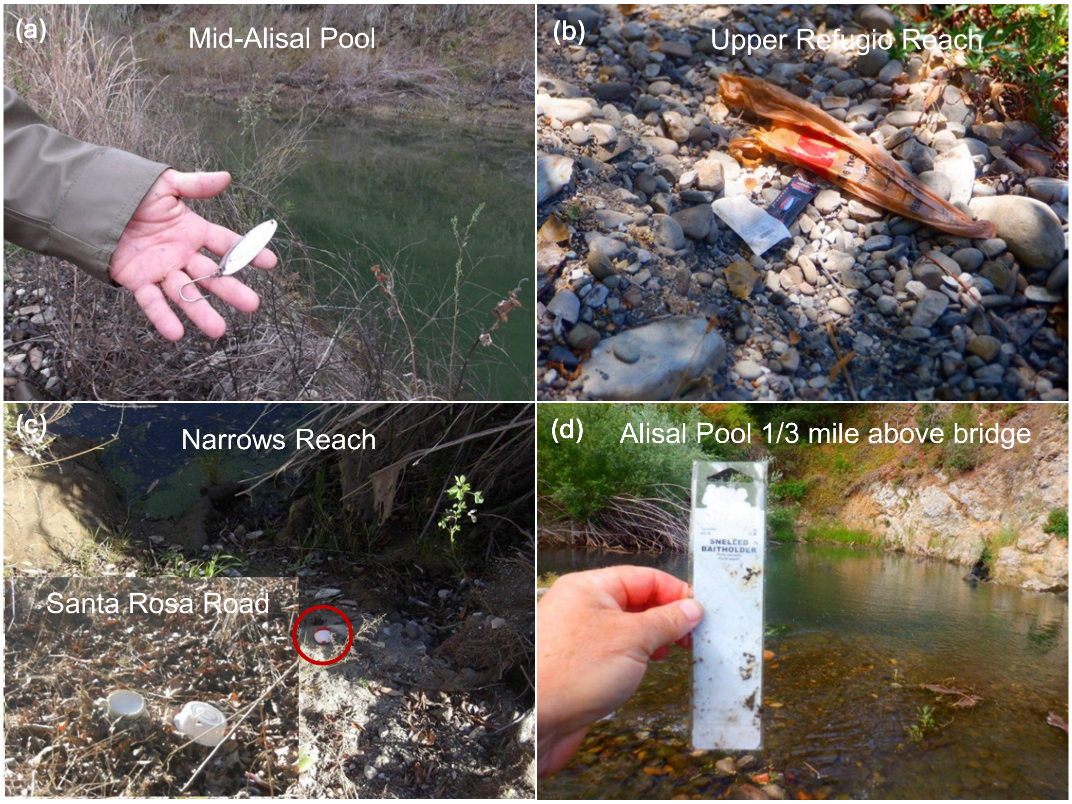


Figure 113: Poaching evidence found on the LSYR mainstem showing (a) a lure in the Alisal Reach, (b) fishing tackle in the Upper Refugio Reach, (c) a bobber and nightcrawler containers in the Narrows Reach, and (d) bait hooks above Alisal Bridge.

Table 29: Fish passage enhancement and stream restoration projects successfully completed within the LSYR watershed since 2000.

Creek	Impediment Name	Barrier: Status	Type
Salsipuedes	Highway 1 Bridge (concrete apron)	Fixed (2002)	-
Salsipuedes	Jalama Bridge (concrete apron)	Fixed (2004)	-
Salsipuedes	Upper Salsipuedes (natural cascade)	Active	Partial – natural
El Jaro	Cross Creek Ranch (low flow crossing)	Fixed (2009)	-
El Jaro	San Julian Ranch entrance bridge (concrete apron)	Fixed (2008)	-
Nojoqui	Nojoqui Creek – Highway 101 Culvert (culvert)*	Active	Total
Nojoqui	Nojoqui Creek – Folded Hills Ranch Bridge (concrete apron)	Active	Partial
Nojoqui	Nojoqui Creek (culvert)	Active	Partial
Nojoqui	Nojoqui Falls (natural, waterfall)	Active	Total – natural
Quiota	Quiota Creek Crossing 0A (low flow crossing)	Fixed (2016)	-
Quiota	Quiota Creek Crossing 0B (low flow crossing)	Fixed (2024)	-
Quiota	Quiota Creek Crossing 1 (low flow crossing)	Fixed (2013)	-
Quiota	Quiota Creek Crossing 2 (low flow crossing)	Fixed (2011)	-
Quiota	Quiota Creek Crossing 3 (low flow crossing)	Fixed (2015)	-
Quiota	Quiota Creek Crossing 4 (low flow crossing)	Fixed (2016)	-
Quiota	Quiota Creek Crossing 5 (low flow crossing)	Fixed (2018)	-
Quiota	Quiota Creek Crossing 6 (low flow crossing)	Fixed (2008)	-
Quiota	Quiota Creek Crossing 7 (low flow crossing)	Fixed (2012)	-
Quiota	Quiota Creek Crossing 8 (low flow crossing)	Fixed (2019)	-
Quiota	Quiota Creek Crossing 9 (low flow crossing)	Fixed (2018)	-
Quiota	Upper Quiota Creek natural barrier (natural cascade)	Active	Partial – natural
Hilton	Cascade Chute (natural cascade)	Fixed (2005)	-
Hilton	Highway 154 culvert 4200' upstream (culvert)*	Active	Total
	* Project requested to be removed from the BO.		

Table 30: BiOp tributary project inventory with the completion date specified in the BiOp and their status to date. Completed projects are listed by calendar year.

Tributary Projects	BiOp Expected Completion Date	Current Status (as of February 2026)
Hwy 1 Bridge on Salispuedes Creek	2001	Completed (2002)
Cross Creek Ranch on El Jaro Creek	2005	Completed (2009)
Hwy 101 Culvert on Nojoqui Creek	2005	Proposed removal from BiOp[1]
Quiota Creek Crossing 1	2003	Completed (2013)
Quiota Creek Crossing 3	2003	Completed (2015)
Quiota Creek Crossing 4	2003	Completed (2016)
Quiota Creek Crossing 5	2003	Completed (2018)
Quiota Creek Crossing 7	2003	Completed (2012)
Quiota Creek Crossing 9	2003	Completed (2018)
Cascade Chute Passage on Hilton Creek	2000	Completed (2005)
Hwy 154 Culvert on Hilton Creek	2002	Proposed removal from BiOp[1]
Total:	**11**	
Projects completed or funded:	***9***	
Projects suggested to be removed:	***2***	
1. Project proposed for removal from the BiOp.		

Table 31: Non-BiOp tributary projects already completed or proposed with their status to date. Completed projects are listed by calendar year.

Tributary Projects	Current Status (as of February 2026)
Jalama Road Bridge on Salsipuedes Creek	Completed (2004)
San Julian Ranch on El Jaro Creek	Completed (2008)
Quiota Creek Crossing 0A	Completed (2015)
Quiota Creek Crossing 0B	Completed (2024)
Quiota Creek Crossing 2	Completed (2011)
Quiota Creek Crossing 6	Completed (2008)
Quiota Creek Crossing 8	Construction (2019)
Total:	**7**
Projects completed:	***7***
Projects remaining:	***0***

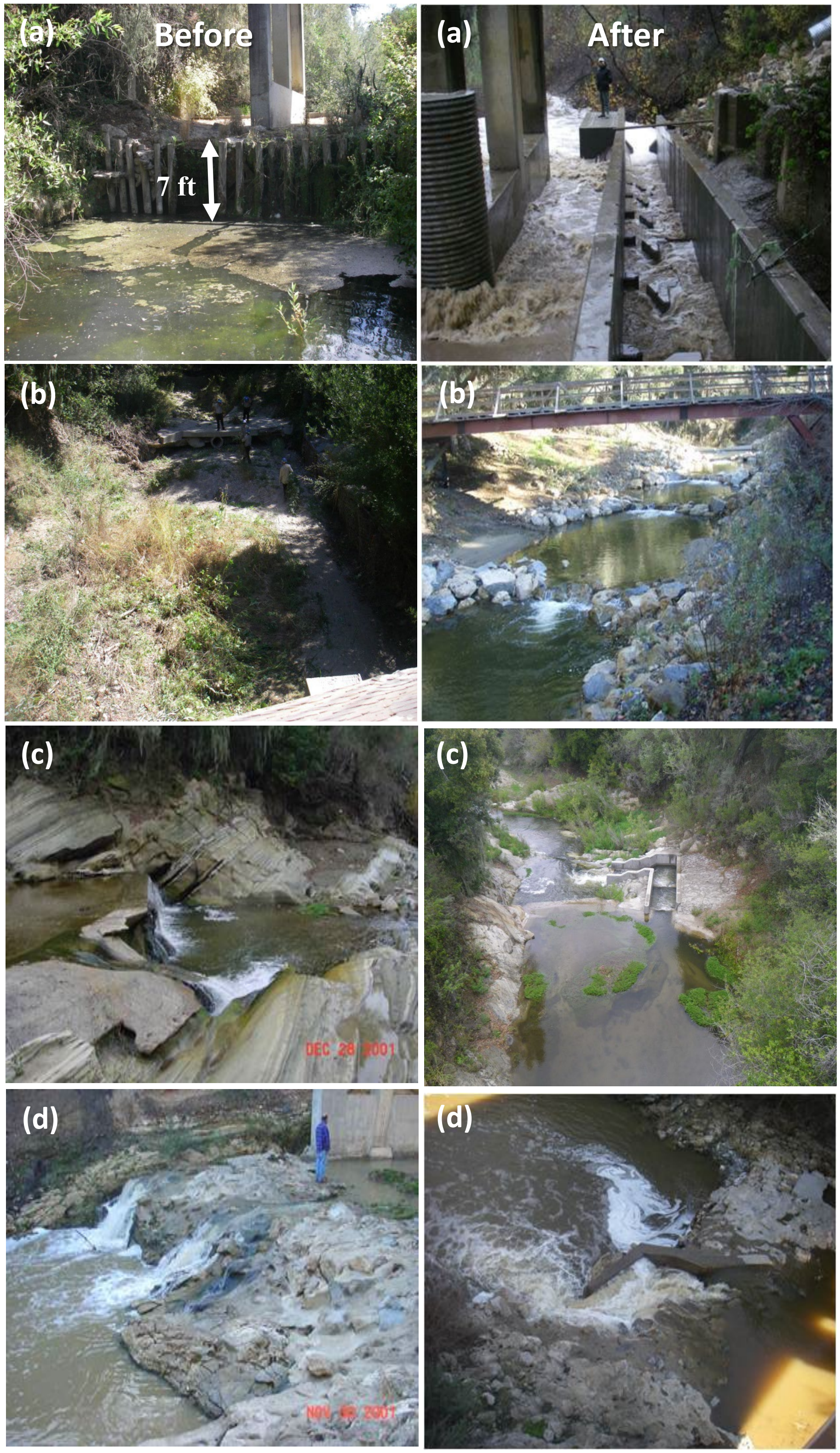


Figure 114: Fish passage and habitat restoration at: at (a) Rancho San Julian Bridge on El Jaro Creek (2008), (b) Cross Creek Ranch on El Jaro Creek (2009), (c) Jalama Road Bridge on Salsipuedes Creek (2004), and (d) Highway 1 Bridge on Salsipuedes Creek (2002).

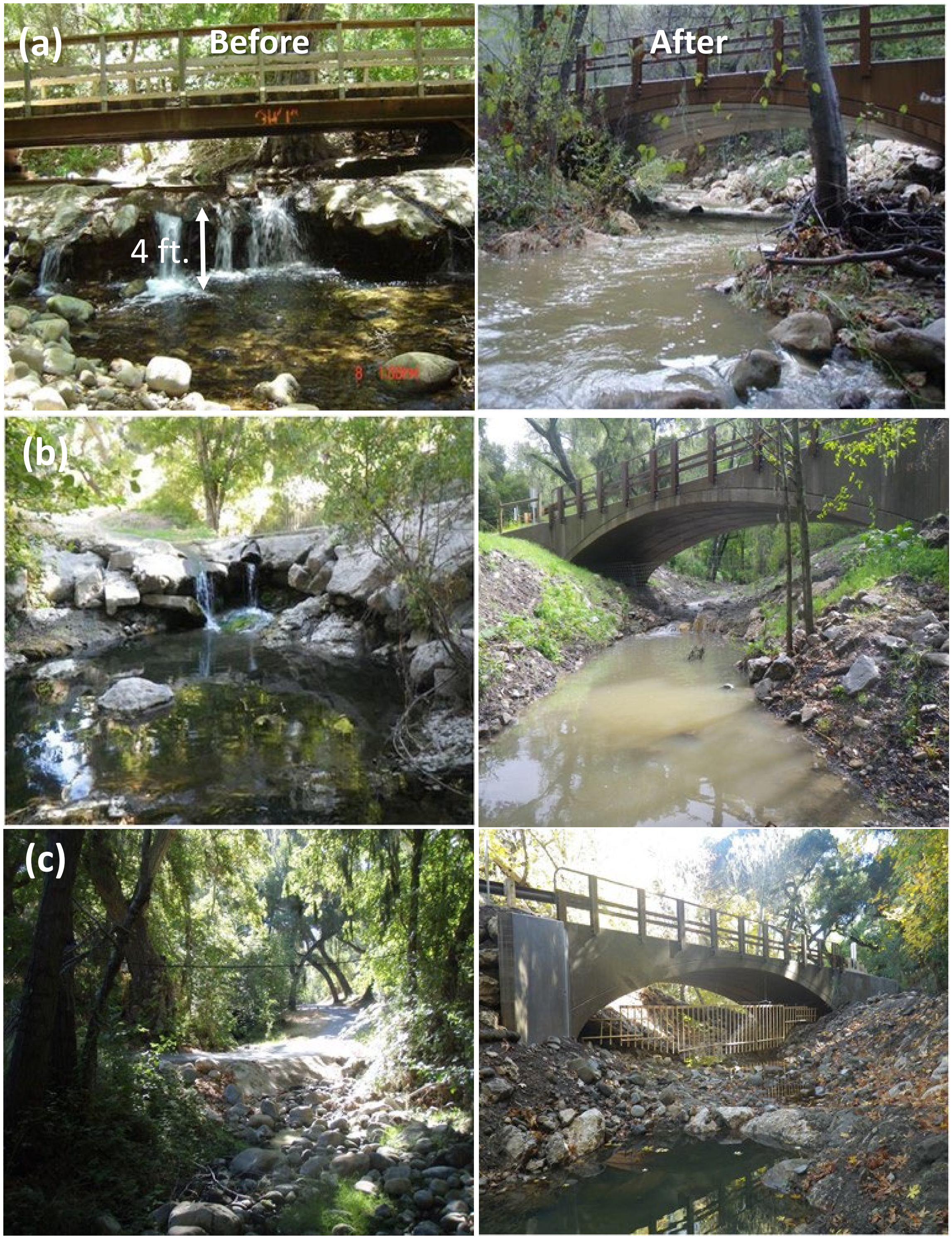


Figure 115: Fish passage and habitat restoration at a) Quiota Creek Crossing 6 (2008), (b) Quiota Creek Crossing 2 (2011), and Quiota Creek Crossing 7 (2012).

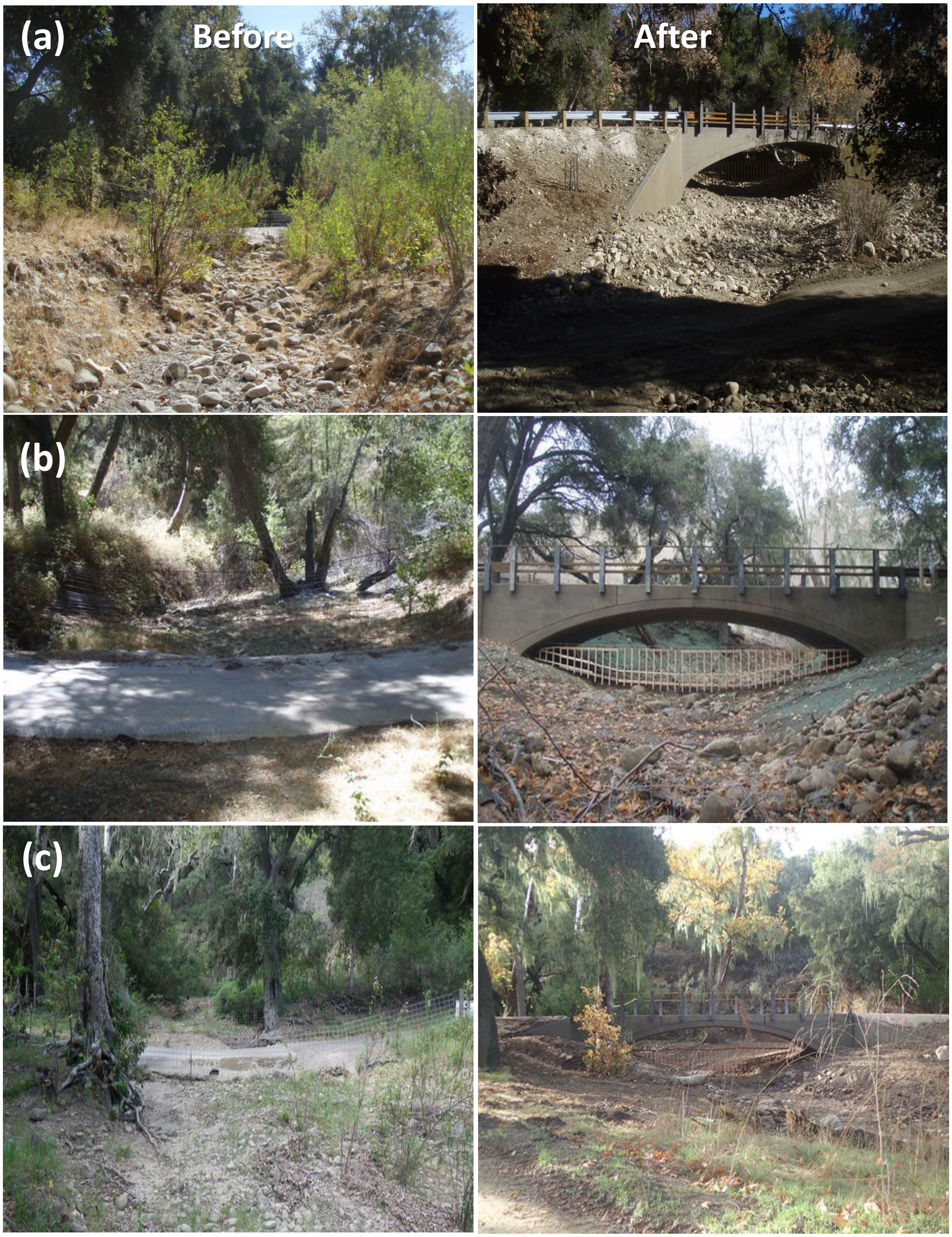


Figure 116: Fish passage and habitat restoration at (a) Quiota Creek Crossing 1 (2013), (b) Quiota Creek Crossing 3 (2015), and (c) Quiota Creek Crossing 4 (2016).

Figure 117: Fish passage and habitat restoration at (a) Quiota Creek Crossing 0A (2015), (b) Quiota Creek Crossing 5 (2018), and (c) Quiota Creek Crossing 9 (2018).

Figure 118: Fish passage and habitat restoration at (a) Quiota Creek Crossing 8 completed in 2019 and (b) South Side Erosion Control and Reforestation Project at Crossing 8 (completed in 2020).

Figure 119: Fish passage and habitat restoration at Hilton Creek at the Cascade Chute Project that was completed in 2005.

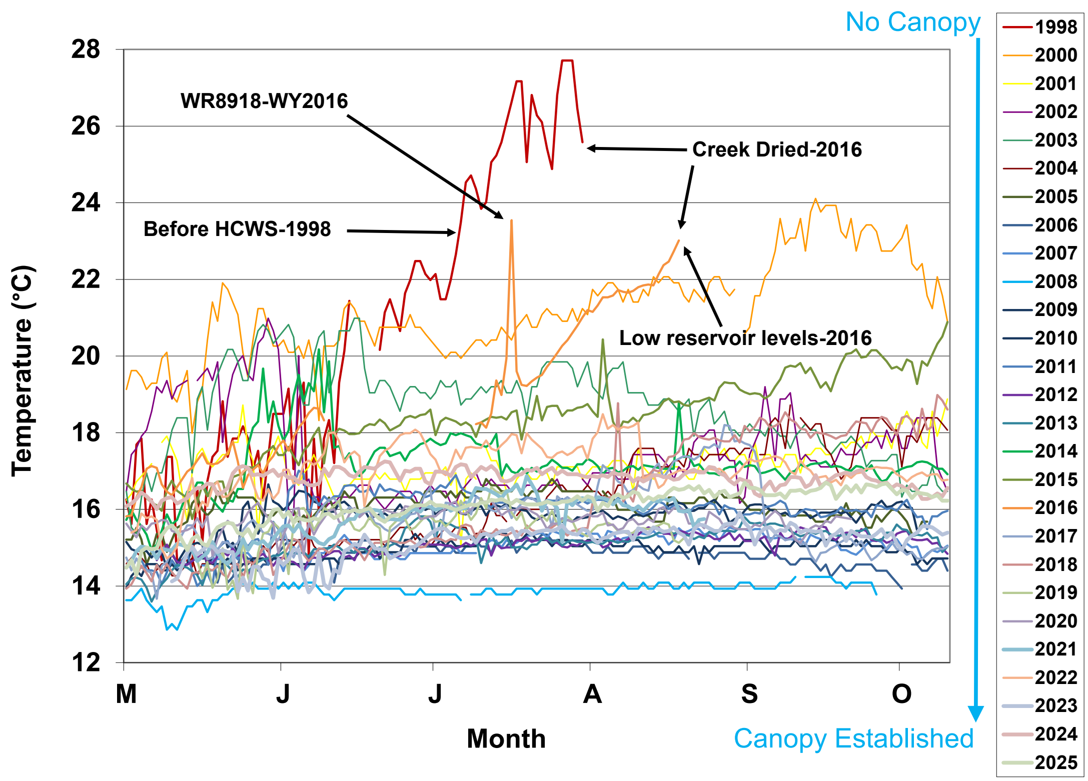


Figure 120: Lower Hilton Creek thermograph maximum water temperature data from 1998 to 2025, the last 3 years are shown with a wider line.

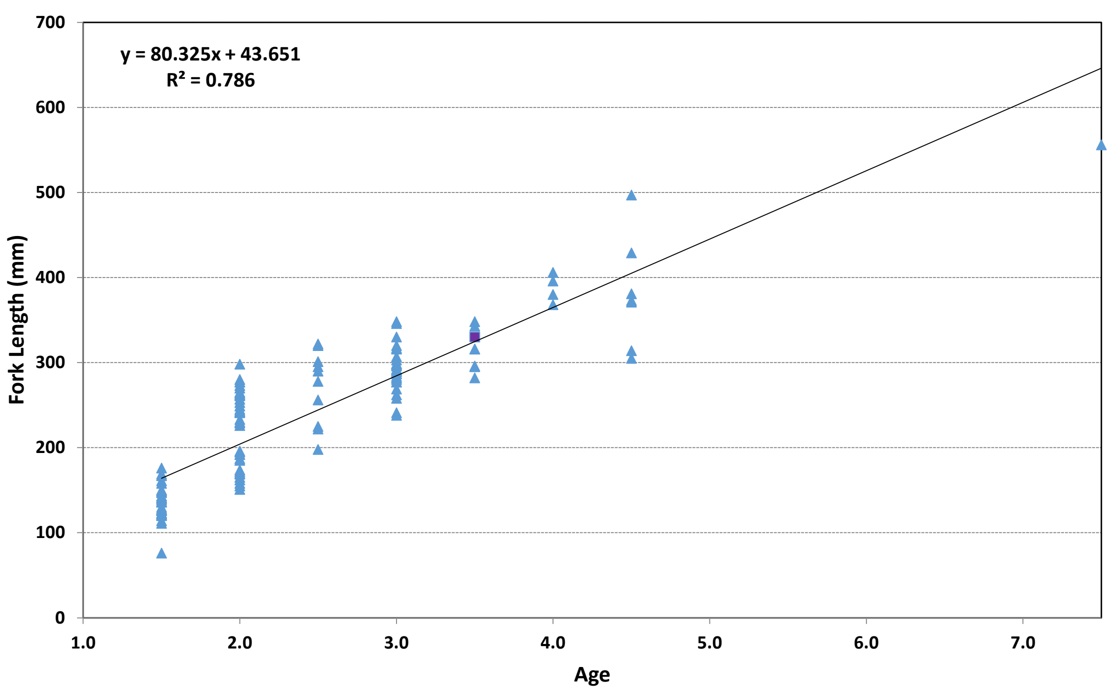


Figure 121: WY2025 scale analyses, age-length relationship with a trend line and R^2 value.

Table 32: The results of WY2011 scale analyses of *O. mykiss* migrant captures found over the monitoring period aggregated by 10 mm size classes.

		Age:												
Size (mm)	**Amount**	**0+**	**1**	**1+**	**2**	**2+**	**3**	**3+**	**4**	**4+**	**5**	**5+**	**6**	**6+**
<120	30	4	7	19										
120-129	7	1		6										
250-259	9					6	2	1						
260-269	2					1	1							
270-279	2				1		1							
280-289	2					2								
290-299	2						1		1					
300-309	3							2	1					
310-319	4						1	3						
320-329	1								1					
330-339	0													
340-349	1							1						
350-359	1									1				
360-369	2							1		1				
370-379	1						1							
380-389	0													
390-399	3								1	1	1			
400-409	3								1		2			
410-419	1									1				
420-429	4							2		1			1	
430-439	1									1				
440-449	1								1					
450-459	1									1				
460-469	0													
470-479	1							1						
480-489	1						1							
490-499	1								1					
500-509	1								1					
510-519	1								1					
520-529	1										1			
Total:	**263**	**6**	**8**	**139**	**7**	**59**	**11**	**12**	**9**	**7**	**4**	**0**	**1**	**0**

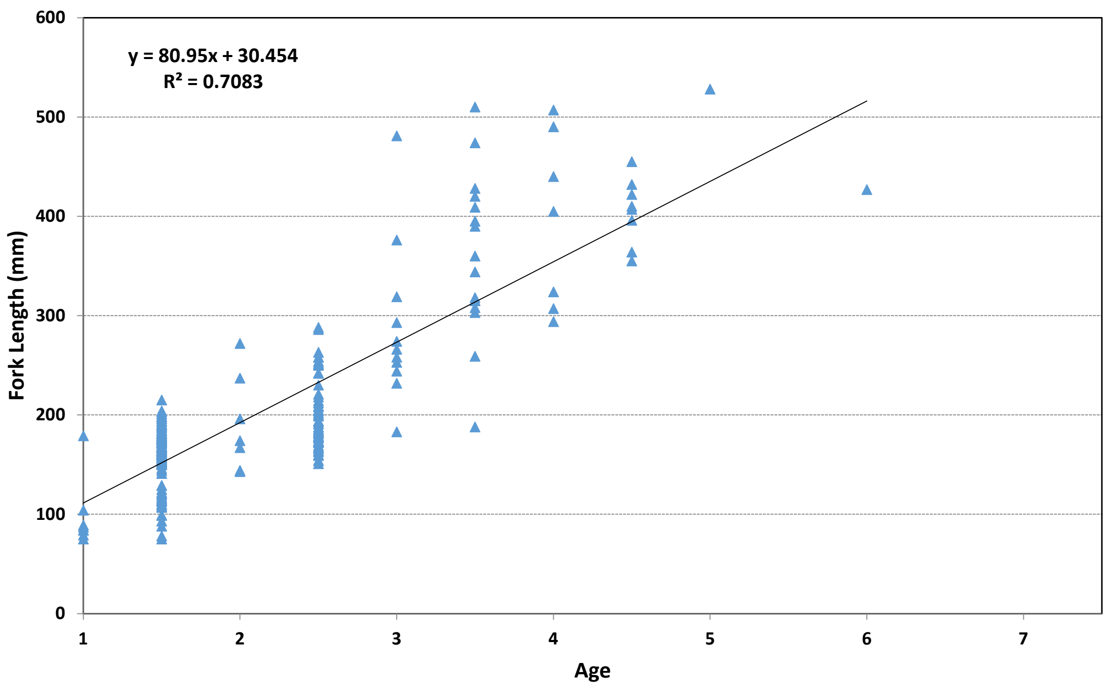


Figure 122: WY2011 scale analyses, age-length relationship with a trend line and R^2 value.

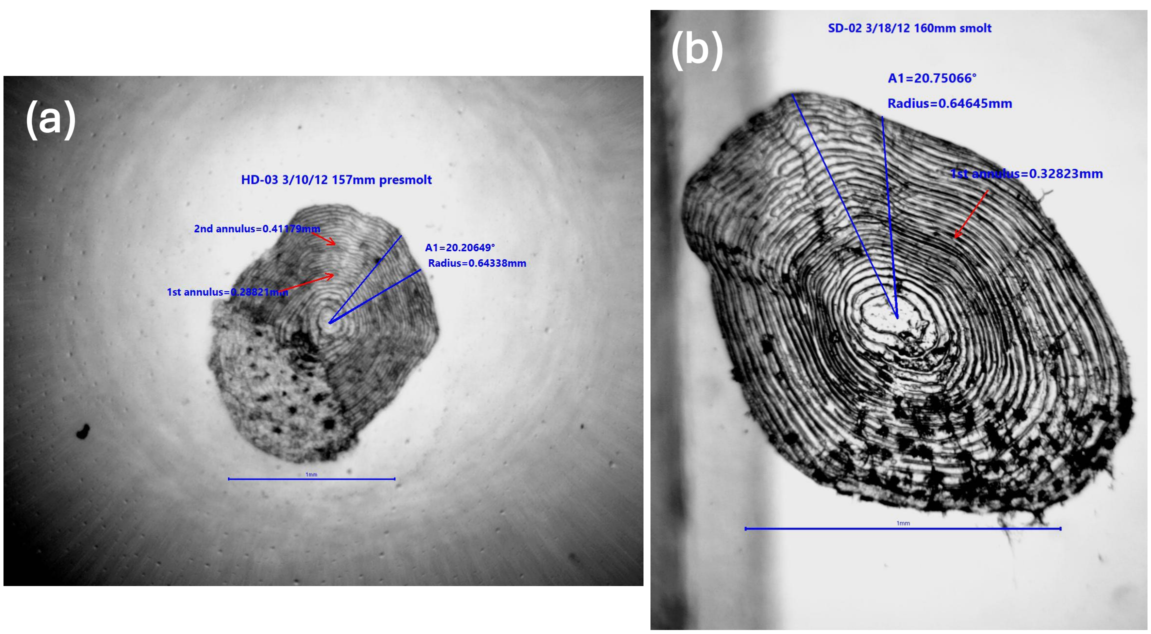


Figure 123: Two WY2011 *O. mykiss*, a (a) Hilton Creek upstream 1+ year old 156 mm resident and a (b) Hilton Creek downstream 6 year old 427 mm resident.

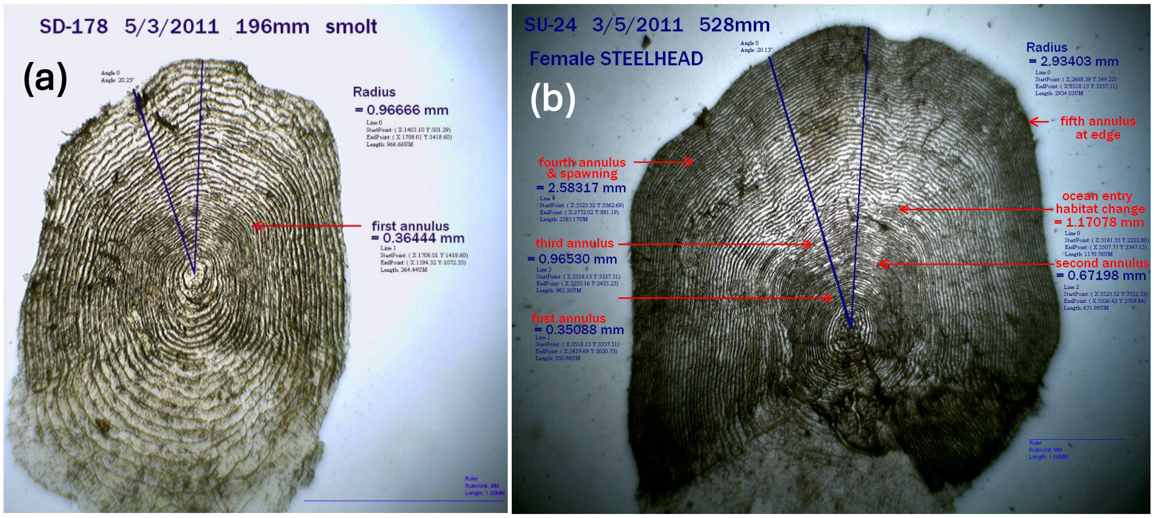


Figure 124: Two WY2011 *O. mykiss*, a (a) Salsipuedes Creek downstream 1+ year old 196 mm smolt and a (b) Salsipuedes Creel upstream 5 year old 528 mm steelhead.

Table 33: 2025 genetic assignment results.

	2025 Genetic Assignments												
Capture Location	**Hilton Creek**	**Salsipuedes Creek**	**SYR Mainstem**	**Quiota Creek**	**Santa Cruz Creek**	**Juncal Creek**	**Arroyo Grande Creek**	**Santa Maria River**	**Salinas River (Tjera)**	**Ventura River**	**Santa Clara River**	**Hatchery (Fillmore)**	**nd***
Hilton Creek Upstream	59		4	4	2					2			2
Hilton Creek Downstream	44		4				1	1	1		1	1	10
Hilton Creek Mortalitiy/Carcass	1												
Salsipueds Creek Upstream		1											
Salsipuedes Creek Downstream		4			1								1
LSYR(Upper Refugio R.) Mortality/Carcass	1												
LSYR(Mainstem) Mortality/Carcass	1	1	2										
Quiota Creek	8		2	7	3		2		2				2
Quiota Creek Mortality/Carcass	4	1	2	13		1	1		1				
Total Captures:	118	7	14	24	6	1	4	1	4	2	1	1	15
												Total:	**198**

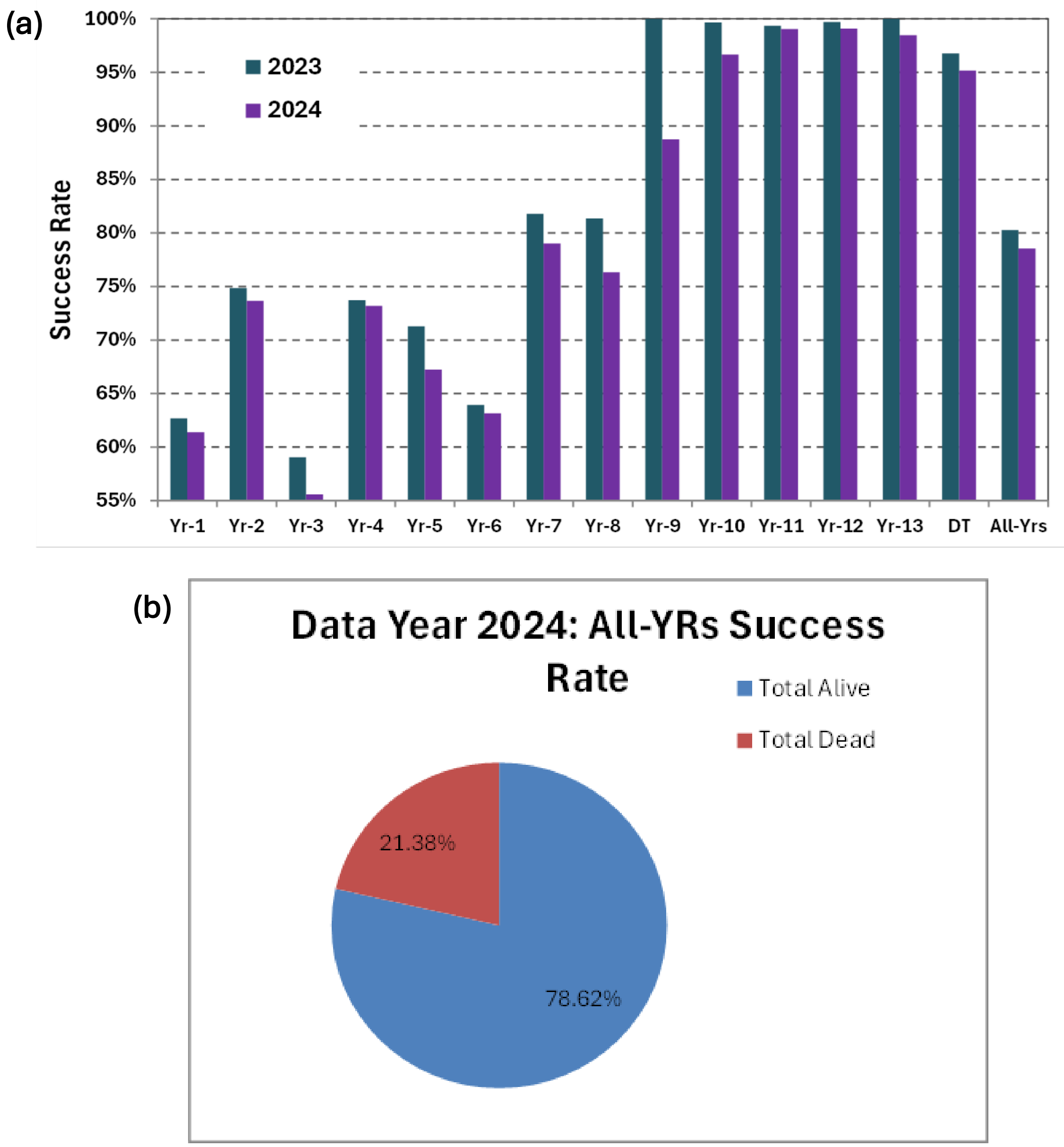


Figure 125: Lake Cachuma Oak Tree Restoration Program success rate, (a) comparison for all planting year classes plus total from 2023 to 2024 and (b) a detail of the survival rate in 2024.

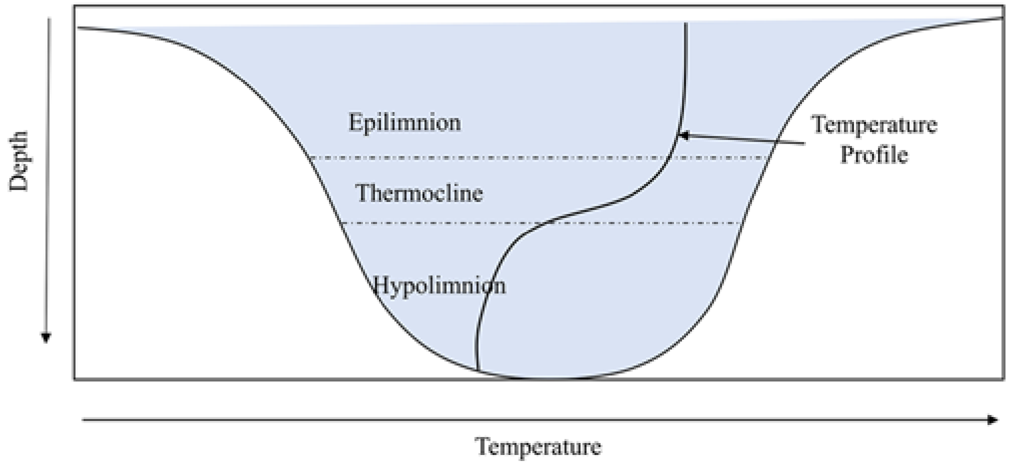


Figure 126: A schematic of the 3 distinctive zones within a stratified lake, displaying typical thermocline behavior that can result in seiching that introduces temperature abnormalities and oscillations.

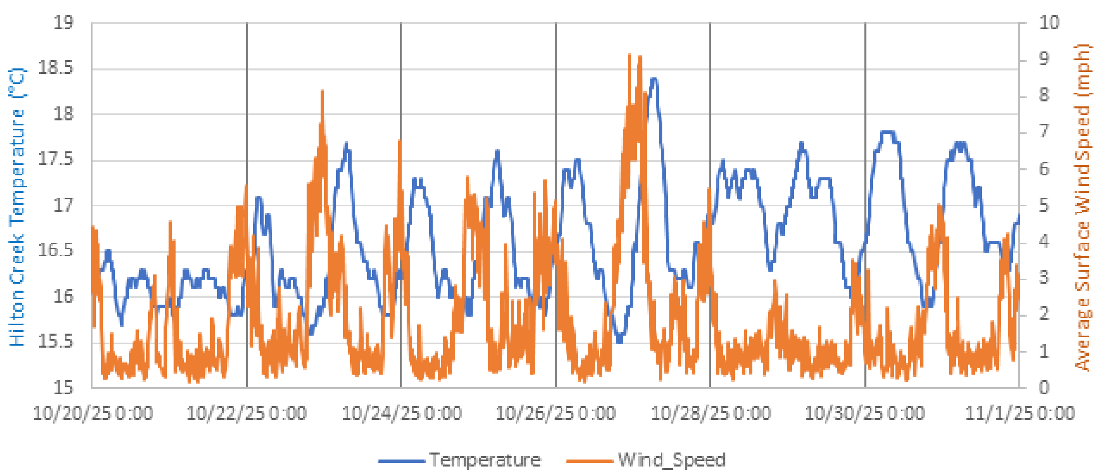


Figure 127: High easterly winds in the afternoon during the summer months cause thermocline seiching that results in oscillation that causes early-morning temperature highs at the HCWS intake.

WY2025 Annual Monitoring Summary
Appendices

A. Acronyms and Abbreviations

AF: Acre Foot
AMC: Adaptive Management Committee
AMR: Annual Monitoring Report
AMS: Annual Monitoring Summary
BA: Biological Assessment
BiOp: Biological Opinion
BPG: Biogeographic Population Group
CCRB: Cachuma Conservation Release Board
CCWA: Central Coast Water Authority
CDFG: California Department of Fish and Game
CFS: Cubic Feet per Second
COMB: Cachuma Operation and Maintenance Board
COMB-FD: COMB Fisheries Division (previously Cachuma Project Biology Staff)
CPUE: Catch Per Unit Effort
CRP: Chute Release Point
DIDSON: Dual Frequency Identification Sonar
DO: Dissolved Oxygen Concentration
Doppler: A sonar situation wherein the target is moving toward the transducer
DPS: Distinct Population Segment
DT: Dam Tender Trees
EJC: El Jaro Creek
HC: Hilton Creek
HCEBS: Hilton Creek Emergency Backup System
HCWS: Hilton Creek Watering System
Hwy: Highway
ID: Improvement District
ITS: Incidental Take Statement
LMB: Largemouth bass
LRP: Lower Release Point
LSYR: Lower Santa Ynez River
NMFS: National Marine Fisheries Service
NOAA: National Oceanic Atmospheric Administration

O. mykiss: *Oncorhynchus mykiss*, steelhead/rainbow trout

ORP: Oxidation Reduction Potential

Parr: Young *O. mykiss* distinguished by dark rounded patches evenly spaced along its sides

PG&E: Pacific Gas and Electric Company

PIT: Passive Integrated Transponder

RPM: Reasonable and Prudent Measure

QC: Quiota Creek

RTDG: Real Time Decision Group

SMC: San Miguelito Creek

SWP: State Water Project

SYR: Santa Ynez River

SWRCB: California State Water Resources Control Board

SYRCC: Santa Ynez River Consensus Committee

SYRTAC: Santa Ynez River Technical Advisory Committee

SYRWCD: Santa Ynez River Water Conservation District

T&C: Terms and Conditions

TDS: Total Dissolved Solids

URP: Upper Release Point

USBR: United States Bureau of Reclamation (Reclamation)

USGS: United States Geological Survey

WR: Water Right

WY: Water Year (October 1 through September 30)

YOY: Young-of-the-year *O. mykiss*.

B. QA/QC Procedures

The Cachuma Operation and Maintenance Board – Fisheries Division (COMB-FD) staff maintains and calibrates water quality and flow meter equipment to collect instream habitat data on the LSYR mainstem and tributaries. Water quality equipment is generally used from the spring (May-June) through the fall (October-November). Flow meters are used throughout the year to gather spot flow information, particularly during periods of stormflow in the winter and spring, as well as during the summertime period to monitor whether target flows are being met within the LSYR mainstem. The calibration procedures and timing for water quality and flow meter equipment can be found in Table B-1 (Calibration). The parameters and specifications of each instrument are listed in Table B-2 (instrument calibration, parameters and specifications). All meters on the multi-parameter Sondes are calibrated by the manufacturer or COMB-FD following manufacturer protocols.

Table B-1: Calibration procedures for thermographs, sonde probes, and flow meters.

Parameter	Instrument	Calibration Frequency	Timing	Standard or Calibration Instrument Used
Temperature	Thermograph	Annually	Spring	Water/ice bath to assure factory specifications and comparability between units.
Dissolved Oxygen	YSI - EXO2 + 6920 (650 MDS) - DO meter	Monthly	Monthly when in use	At a minimum, water saturated air, according to manufacturer's instructions.
pH	YSI - EXO2 + 6920 (650 MDS) - pH meter	Monthly	Monthly when in use	pH buffer 7.0 and 10.0
Conductivity	YSI - EXO2 + 6920 (650 MDS) - Conductivity meter	Monthly	Monthly when in use	Conductivity standard 700 and 2060 µmhos/cm or µS/cm
Redox	YSI - EXO2 + 6920 (650 MDS) - Redox	Monthly	Monthly when in use	Factory calibrated
Turbidity	YSI - EXO2 + 6920 (650 MDS) - Nephelometer	Monthly	Monthly when in use	For clear ambient conditions use an 1.0 NTU standard, for turbid conditions use an 10.0 NTU standard
TDS	YSI - EXO2 + 6920 (650 MDS) - TDS	None	When in use	Conversion from specific conductance to TDS by use of a multiplyer in the instrument
Stream Discharge	SonTek FlowTracker2	When in use	When in use	Software driven calibration
Water Level & Temperature	Solinst Levelogger 3301	Annually	Spring	Factory calibrated
Atmospheric Pressure	Solinst Barologger 3301	Annually	Spring	Factory calibrated

Table B-2: Parameters and specifications for thermographs, sonde probes, and flow meters.

Instrument	Parameters Measured	Units	Detection Limit	Sensitivity	Accuracy/Precision
SonTek FlowTracker2	Stream Velocity	ft/sec	0.003	±0.0003	± 1% of measured velocity
YSI EXO2 + 6920 (650 MDS) Multi-Probe	Temperature	°C	-5	±0.01	± 0.15
	Dissolved Oxygen	mg/l, % saturation	0, 0	±0.01, 0.1	0 to 20 mg/l or ± 0.2 mg/l, whichever is greater. ± 0.2 % of reading or 2 % air saturation, whichever is greater
	Salinity	ppt	0	±0.01	± 1 % of reading or 0.1 ppt, whichever is greater
	pH	none	0	±0.01	± 0.2
	ORP	mV	-999	±0.1	± 20
	Turbidity	NTU	0	±0.1	± 0.5 % of reading or 2 NTU, whichever is greater
	Specific Conductance @ 25°C	mS/cm	0	±0.001 to 0.1, range dependent	± 0.5 % of reading + 0.001 mS/cm
YSI Temperature/Dissolved Oxygen Probe Model 550A	Temperature	°C	-5	±0.1	± 0.3
	Dissolved Oxygen	mg/l, % saturation	0	±0.01, 0.1	± 0.3 mg/l or ± 2 % of reading, whichever is greater. ± 0.2 % air saturation or ± 2 % of reading, whichever is greater
YSI Temperature/Dissolved Oxygen Probe Model 57	Temperature	°C	0.1	±0.1 (manual readout, not digital)	± 0.5 °C plus probe which is ± 0.1 % °C
	Dissolved Oxygen	mg/l	0.1	±0.1 (manual readout, not digital)	± 0.1 mg/l or ± 1%, whichever is greater
Optic Stow-Away (Thermographs)	Temperature	°C	-5	±0.01	0.01, calibration dependent
Solinst Levelogger 3301	Water Level	ft	0.002	.001 % Full Scale	±0.01 ft., 0.3 cm
Solinst Levelogger 3301	Temperature	°C	0.003	0.003	±0.05 °C
Solinst Barologger 3301	Atmospheric Pressure	ft	0.002	.002 % Full Scale	±0.003 ft., 0.1 cm

Hobo Thermographs

Steel cables with ¼ inch u-bolts are used to fasten thermographs to trees, rocks, and root masses when deployed. Single units are deployed in run habitats at the bottom half a foot above the substrate. Vertical arrays are deployed in pool habitats with the surface unit attached to a cable (one foot below the surface), and the bottom unit deployed at the bottom. Precautionary measures are always taken to hide the thermographs from the public, especially in places with high volume traffic. The instruments are downloaded monthly via a remote downloading shuttle and transferred to a computer back at the office where daily maximum, average, and minimum temperatures are calculated using a Visual Basic for Application (VBA) macro run in Excel and displayed in graphical form. If a thermograph shows any unexpected results or data anomalies when the data are reviewed, it is re-calibrated and tested before deployment back into the field. After thermographs are downloaded, each unit is wiped off to reduce algae and sediment buildup.

YSI Sondes - EX02 Multi-parameter Probe

This sonde is used for lake profiles with a 200 foot cable and spot measurements. It is calibrated in the office once a month, or more frequently if under heavy use. Lake profiles are conducted on a calm day and are done from an anchored (stationary) boat. The sonde is lowered on the cable and measurements are taken every meter all the way to the bottom. For spot measurements in a stream, a short cable is used and the sonde is placed usually in the middle of the water column. The data are usually recorded on field datasheets and/or downloaded from the instrument to a desktop computer for analyses and incorporation into the larger dataset.

YSI Sondes 6920 (650 MDS) Multi-parameter Probe

After calibration, the sonde is programmed on site to collect data for a specified amount of time and the calibration cap (attached when the sonde is in standby mode) is replaced by the slotted field cap that protects the water quality instruments from impact damage while allowing water to pass over the instruments. The sonde is then deployed in the lower third of the water column at the deepest point in the pool habitat, typically at the same location where rearing steelhead/rainbow trout are observed. The unit is deployed at a fixed elevation within the water column depending on the objective of the deployment. Precautionary measures are always taken to hide the sonde from the public, especially in places that are easily accessible (i.e., close to road crossings). Once the specified time has elapsed, surveyors return to the deployment location and download the information in the field from the sonde to the YSI 650. The sonde is then reprogrammed and placed in another location or taken back for calibration. If a sonde shows any unexpected results or data anomalies when the data are reviewed, it is re-calibrated and tested before deployment back into the field.

YSI ProSolo Temperature/Dissolved Oxygen/Conductivity Probe

The YSI ProSolo is a handheld water quality probe that is used to collect spot measurement during routine monitoring activities to assess site-specific conditions. The instrument has the capability of logging a single or interval data points depending on the field requirement at the time. The unit has been used to collect water temperature and dissolved oxygen readings at individual *O. mykiss* spawning sites as well as site specific conductivity readings when conducting fish rescue operations in conjunction with California Department of Fish and Wildlife.

SonTek Acoustic Doppler Velocimeter

Flows are measured using a SonTek FlowTracker 2 handheld Acoustic Doppler Velocimeter, an engineer's measuring tape and a top setting rod. This is the same equipment that the U. S. Geological Survey (USGS) uses to measure stream discharge. This unit is a software driven instrument that includes real time plot of point data and QC parameters for each measurement thereby increasing accuracy and minimizing data handling. A minimum of 15 transects are established across and measurements collected in each transect cell. Surveyors keep a constant eye on the probe so that no algae or debris moving downstream blocks the Doppler field by getting caught on the probe. Once each transect is measured, the FlowTracker calculates the transect width, depth, and velocity to determine overall discharge.

ONSET (U-26) DO/Temp Data Logger

These units were added in WY-2013 to accompany other DO measuring devices (sondes) in order to measure and evaluate additional monitoring locations. Steel cables with ¼ inch u-bolts are used to fasten U-26 loggers to trees, rocks, and root masses when deployed. Single units are deployed in run habitats at the bottom half a foot above the substrate. Vertical arrays are deployed in pool habitats with the surface unit attached to a cable (one foot below the surface), and the bottom unit deployed at the bottom. These data loggers require HOBOware software (USB interface cable) and a communication device for downloading. Units are manually calibrated and once initialized, can record DO/temperature for a period of 6 months before being returned to the factory for a new sensor cap.

Solinst Levelogger/Barologger

The levelogger measures surface water levels by recording changes in absolute pressure (water column pressure and barometric pressure). The levelogger also records temperature. The barologger functions and communicates similarly to the levelogger, but is used above the water level to record ambient barometric pressure in order to barometrically correct data recorded by the leveloggers. These units are deployed within Hilton Creek, the LSYR mainstem at various vertical array locations, specific fish passage projects when applicable, and within the Rancho San Julian Fish Ladder. The main purpose of the levelogger and barologger is to establish rating curves at fish passage projects and to record water levels within the LSYR mainstem. The leveloggers are also used to verify/corroborate water temperatures with respect to thermograph deployments within the basin. Both of these units have a lifetime factory calibration and do not require recalibration if used in the specified instrument range. Each unit is tested in the spring (prior to deployment) to verify that each unit is functioning properly.

Data QA/QC and Database Storage

Thermograph deployment in the mainstem and tributaries is done in such a way as to minimize visibility of the units to prevent tampering/vandalism by the public. This methodology has largely succeeded over the many years of monitoring in the lower river. Since 1995, there have only been three instances of tampering, all of them in and around the Refugio Bridge location (LSYR-7.65), an area of high public use. The latest instance occurred during WY2021. No public tampering or vandalism of the thermograph network occurred in WY2022.

Thermograph data transferred to the Optic Shuttle in the field are downloaded to the HOBOWare program, converted to a text file, and then exported to Microsoft Excel. Once the data have been transferred to Excel, outliers and anomalous data are easily seen when put into graphical form and then corrected.

Sonde data that have been transferred to a field PC (650 MDS) are then downloaded to an EcoWatch program. The data are then exported into Microsoft Excel, graphed, and outliers/anomalous data are identified and removed.

ONSET data are transferred to a communication device through a USB interface cable and then downloaded to a HOBOware software program. Once the data have been transferred, the material is converted to a CSV file and then exported to Microsoft Excel. Once the data have been transferred to Excel, outliers and anomalous data are easily seen when put into graphical form.

Spot flow data obtained from flow meters are input directly into Microsoft Excel from the data sheets used in the field.

<u>Outlier resolution</u>

Water quality instruments that are deployed in the field and retrieved at a later date oftentimes have anomalous readings at the very start and end of deployment. This is caused by a unit being out of water just prior to deployment (or the end of deployment) or during the downloads while the unit is out of the water. The other situation causing anomalous data occurs when a wetted habitat becomes dry. This usually takes place in the summer in locations downstream of Bradbury Dam, below target flow areas. When the water quality data are ultimately transferred to a computer, outliers are easily identified and removed.

C. Photo Points/Documentation

Photo points were taken regularly from 2002-2005 in the spring, summer, and fall. After 2005 and continuing through 2024, photo points were scaled down and taken during the spring and fall, typically during May and October. All photo points taken in WY2024 are listed in Tables C-1 and C-2 and were taken at more regular intervals as recommended in the 2010 Annual Monitoring Report. The reasons for discontinuing some photo point locations were that some locations had become so overgrown with vegetation to make yearly evaluation impractical, river course changes, or were no longer showing any visible change.

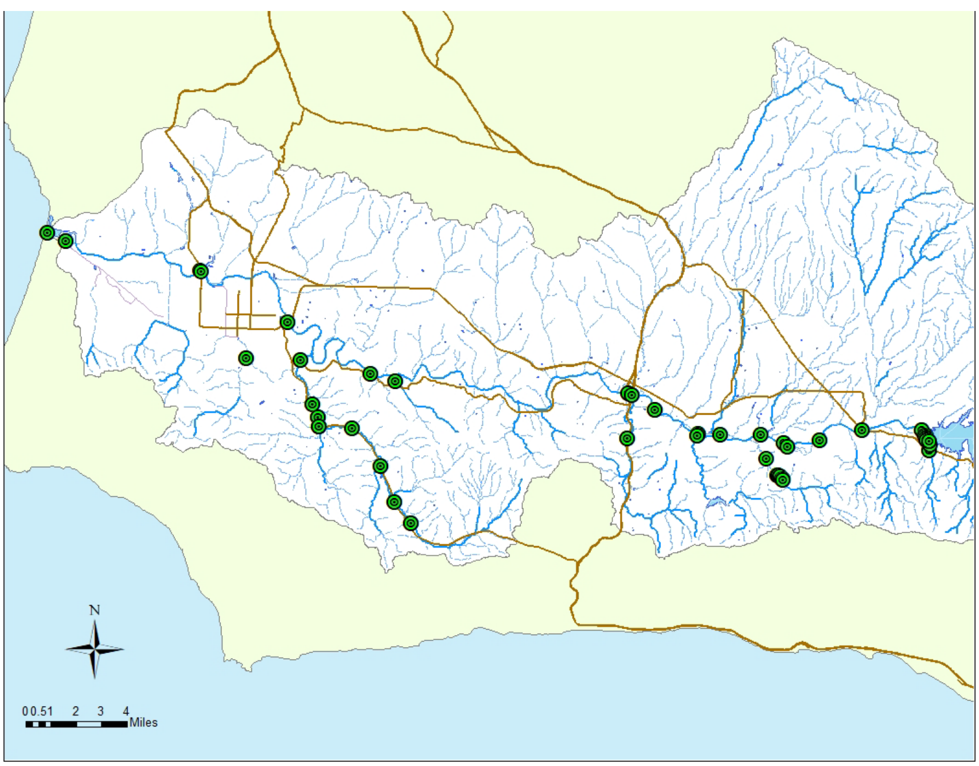


Figure C-1: WY2025 photo point locations.

Table C-1: WY2025 photo points on the LSYR mainstem. "X's" denote photos taken.

LSYR Mainstem Photo Point ID	Location/Description	May	Sept
M1	Lower Hilton Creek, photo d/s at ford crossing	X	X
M2a	Bluffs overlooking long pool, photo u/s	X	X
M2b	Bluffs overlooking long pool, photo d/s	X	X
M3	Highway 154 culvert on Hilton Creek, photo u/s		
M4	Highway 154 culvert on Hilton Creek, photo d/s		
M5	Highway 154 Bridge, photo u/s	X	X
M6	Highway 154 Bridge, photo d/s	X	X
M7	Meadowlark crossing, photo u/s	X	X
M8	Meadowlark crossing, photo d/s	X	X
M9	Lower Gainey crossing, beaver dam, photo u/s		
M10	Lower Gainey crossing, beaver dam, photo d/s		
M11a	Lower Gainey crossing, photo u/s		
M11b	Lower Gainey crossing, photo d/s		
M12	Refugio Bridge, photo u/s	X	X
M13	Refugio Bridge, photo d/s	X	X
M14	Alisal Bridge, photo u/s	X	X
M15	Alisal Bridge, photo d/s	X	X
M17	Mid-Alisal Reach, photo u/s	X	X
M18	Mid-Alisal Reach, photo d/s	X	X
M19	Avenue of the Flags Bridge, photo u/s	X	X
M20	Avenue of the Flags Bridge, photo d/s	X	X
M21	Sweeney Road crossing, photo u/s		X
M22	Sweeney Road crossing, photo d/s		X
M23	Highway 246 (Robinson) Bridge, photo u/s	X	X
M24	Highway 246 (Robinson) Bridge, photo d/s	X	X
M25	LSYR Lagoon on railroad bridge, photo u/s	X	X
M26	LSYR Lagoon on railroad bridge, photo d/s	X	X
M27	LSYR at 35th St. Bridge, photo d/s	X	X
M28	LSYR at 35th St. Bridge, photo u/s	X	X
M29	LSYR Lagoon upper reach, photo d/s		
M30	LSYR Lagoon upper reach, photo u/s		
M31	Slick Gardener, looking across towards highway	X	X
M32	Slick Gardener, looking d/s through culvert	X	X
M33	Slick Gardener, looking u/s through culvert	X	X
	Floradale Br-u/s	X	X
	Floradale Br-d/s	X	X

Table C-2: WY2025 photo points on the LSYR tributaries. "X's" denote photos taken.

Tributary Photo Point ID	Location/Description	May	Sept	Tributary Photo Point ID	Location/Description	May	Sept
T1	Hilton trap site, photo u/s	X	X	T29	Salsipuedes Creek at Santa Rosa Bridge, photo d/s	X	X
T2	Hilton start Reach #2, pt site, photo d/s	X	X	T38-New	Salsipuedes Creek at Hwy 1 looking u/s from bluff	X	X
T3	Hilton at ridge trail, photo d/s	X	X	T39	Salsipuedes Creek at Hwy 1 Bridge, photo d/s	X	X
T4	Hilton at ridge trail, photo u/s	X	X	T40	Salsipuedes Creek at Hwy 1 Bridge, photo u/s	X	X
T5	Hilton at telephone pole, photo d/s			T41	Salsipuedes Creek at Jalama Bridge, photo d/s	X	X
T6	Hilton at telephone pole, photo u/s			T42a	Salsipuedes Creek at Jalama Bridge, photo u/s	X	X
T7	Hilton at tail of spawning pool, photo u/s	X	X	T42b	Pool at Jalama Bridge	X	X
T8	Hilton impediment/tributary, photo d/s	X	X	T43	El Jaro/Upper Salsipuedes confluence, photo u/s		
T9	Hilton impediment/tributary, photo u/s	X	X	T44	Upper Salsipuedes/El Jaro confluence, photo u/s		
T10	Hilton just u/s of URP, photo d/s	X	X	T45	Upper Salsipuedes/El Jaro confluence, photo d/s		
T11	Hilton road above URP, photo d/s	X	X	T48	El Jaro Creek above El Jaro confluence, photo u/s		
T12	Hilton road above URP, photo u/s	X	X	T49	El Jaro Creek above El Jaro confluence, photo d/s		
T14	Hilton from hard rock toe, photo d/s			T52	Ytias Creek Bridge, photo d/s	X	X
T15	Hilton from hard rock toe, photo u/s			T53	Ytias Creek Bridge, photo u/s	X	X
TX1a	Quiota Creek at 1st crossing, photo u/s	X	X	T54	El Jaro Creek 1st Hwy 1 Bridge, photo d/s	X	X
TX1b	Quiota Creek at 1st crossing, photo d/s	X	X	T55	El Jaro Creek 1st Hwy 1 Bridge, photo u/s	X	X
TX2a	Quiota Creek at 2nd crossing, photo u/s	X	X	T56	El Jaro Creek 2nd Hwy 1 Bridge, photo d/s	X	X
TX2b	Quiota Creek at 2nd crossing, photo d/s	X	X	T57	El Jaro Creek 2nd Hwy 1 Bridge, photo u/s	X	X
TX3a	Quiota Creek at 3rd crossing, photo u/s	X	X	T58	El Jaro Creek 3rd Hwy 1 Bridge, photo d/s	X	X
TX3b	Quiota Creek at 3rd crossing, photo d/s	X	X	T59	El Jaro Creek 3rd Hwy 1 Bridge, photo u/s	X	X
TX4a	Quiota Creek at 4th crossing, photo u/s	X	X	T60	San Miguelito Creek at crossing, photo d/s	X	X
TX4b	Quiota Creek at 4th crossing, photo d/s	X	X	T61	San Miguelito Creek at Stillman, photo u/s	X	X
T16	Quiota Creek at 5th crossing, photo d/s	X	X	T62	Rancho San Julian Bridge, photo d/s	X	X
T17	Quiota Creek at 5th crossing, photo u/s	X	X	T63	Rancho San Julian Bridge, photo u/s	X	X
T18	Quiota Creek at 6th crossing, photo d/s	X	X				
T19	Quiota Creek at 6th crossing, photo u/s	X	X				
T20	Quiota Creek at 7th crossing, photo d/s	X	X				
T21	Quiota Creek at 7th crossing, photo u/s	X	X				
T22	Quiota Creek below 1st crossing, photo d/s	X	X				
T23	Alisal Creek from Alisal Bridge, photo u/s	X	X				
T24a	Alisal Creek from Alisal Bridge, photo u/s	X	X				
T24b	Alisal Creek from Alisal Bridge, photo d/s	X	X				
T25	Nojoqui Creek at 4th Hwy 101 Bridge, photo u/s						
T26	Nojoqui Creek at 4th Hwy 101 Bridge, photo d/s						
T27	Nojoqui/LSYR confluence, photo u/s		X				
T28	Salsipuedes Creek at Santa Rosa Bridge, photo u/s	X	X				

D. List of Supplemental Reports and Presentations During WY2025

- WY2024 Annual Monitoring Summary (and Report) (COMB, 2025b).
- WY2025 Migrant Trapping Plan (COMB, 2025c).
- Bradbury Dam 2024 Spill Ramp-Down Event Report (COMB, 2024).
- Lake Cachuma Oak Tree Restoration Program 2024 Annual Report with Fiscal Year 2024-2025 Financials and Water Usage (COMB, 2025a).
- Initial Project Implementation Report for the Hilton Creek Short-Term Gravel Augmentation Action (COMB, 2026).
- SRF Annual Conference, O. mykiss Population Growth after Two Wet Years and Water Quality Tolerances within the Lower Santa Ynez River Basin, Santa Barbara County, CA (Oral Presentation).

E. Appendices References

COMB, 2024. Bradbury Dam Spill Ramp-Down Event Report 2. Cachuma Operation and Maintenance Board (COMB).

COMB, 2025a. Lake Cachuma Oak Tree Restoration Program 2024 Annual Report with Fiscal Year 2024-2025 Finanacials and Water Usage. Cachuma Operation and Maintenance Board (COMB).

COMB, 2025b. WY2024 Annual Monitoring Summary. Prepared by the Cachuma Operation and Maintenance Board (COMB), Fisheries Division. Prepared to be consistent with requirements set forth in the 2000 Cachuma Project Biological Opinion.

COMB, 2025c. WY2025 Migrant Trapping Plan. Cachuma Operation and Maintenance Board (COMB).

COMB, 2026. Initial Project Implementation Report for Hilton Creek Short-Term Gravel Augmentation Action. Interum Report, Cachuma Operation and Maintenance Board (COMB).