

2025 Juvenile Steelhead Densities in the Corralitos Creek and Casserly Creek Watersheds



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Executive Summary

The City of Watsonville operates two surface water diversion facilities in the Corralitos Creek watershed in the Salsipuedes Creek basin of the lower Pajaro River valley. The Pajaro Valley Water Management Agency has begun producing water at its surface water diversion facility at College Lake within the Salsipuedes Creek basin. The two entities jointly fund an annual juvenile steelhead population assessment within the basin as part of countywide steelhead monitoring efforts. Fish surveys and habitat assessments are conducted in late summer/early fall at seven sampling sites in the Corralitos Creek watershed and one site in the Casserly Creek watershed upstream of College Lake.

Water year 2025 was classified as a dry year, but after a month without precipitation in January, several moderate runoff events in February and March 2025 provided steelhead adult migration and spawning opportunities without excessive scouring conditions. Total juvenile densities in 2025 were slightly lower than in 2024 at the four mainstem Corralitos Creek sampling sites, substantially higher in Shingle Mill Creek and the two Browns Creek sites, and largely unchanged (i.e., remaining high) in Casserly Creek. Age 0 densities followed essentially the same trend. Sampling site BR-2, located on Browns Creek upstream of the City of Watsonville's repaired fish ladder, had the highest age 0 density recorded at the eight sampling sites in 2025.

Across the eight sampling sites, a total of 69 juvenile steelhead were implanted with passive integrated transponder (PIT) tags during the 2025 population surveys. Per project permit conditions, PV Water installed a PIT tag detection array at the College Lake intake facility in December 2025 to track the movement of tagged steelhead past the facility.

Background

The City of Watsonville (City) owns and operates water diversion facilities on Corralitos Creek and Browns Creek in the Salsipuedes Creek watershed, tributary to the Pajaro River in Santa Cruz County. As part of prior permit obligations for the operation of the diversion facilities, the City has been funding annual assessments of juvenile steelhead (*Oncorhynchus mykiss*) densities in the watershed. Since 2020, the City has voluntarily continued its commitment toward countywide steelhead monitoring efforts.

The Pajaro Valley Water Management Agency (PV Water) has reached the commissioning phase of the College Lake Integrated Resources Management Project and began producing water in June 2025 while continuing to undergo testing. When fully operational, the project will divert up to 3,000 acre-feet of water annually from College Lake, located on Salsipuedes Creek, for treatment, transmission, and distribution for agricultural irrigation. College Lake is a naturally occurring, seasonally wet depression that receives water inflows from the Green Valley, Casserly, and Hughes creeks sub-watersheds. College Lake provides seasonal juvenile steelhead rearing habitat (Podlech, 2011) and Casserly Creek is known to support a steelhead population (Smith, 2010; Alley 2017). In an effort to build upon existing baseline steelhead population data upstream of College Lake, PV Water has been funding fish surveys at a previously sampled site on Casserly Creek since 2020. This report summarizes the results of the 2025 juvenile steelhead densities assessments in the Corralitos Creek and Casserly Creek watersheds.

Methods

Sampling Sites

Fish surveys were conducted at seven sampling sites in the Corralitos Creek watershed and one site in the Casserly Creek watershed between September 23 and September 29, 2025 (see Table 2 for specific sampling dates). Sampling sites were selected in 2018 and are located in the vicinity of sites previously sampled by D. W. Alley & Associates (Alley) as part of Santa Cruz County's *Juvenile Steelhead & Stream Habitat* (JSSH) monitoring program. Individual sampling sites were selected to be representative of overall stream reach characteristics. Sampling site locations are summarized in Table 1 and depicted in Figures 1 and 2.

TABLE 1
2025 SAMPLING SITES IN THE CORRALITOS CREEK AND CASSERLY CREEK WATERSHEDS

Sampling Site	Site ID	Coordinates (UTM)	Alley Site ID
Corralitos Creek below Browns Creek confluence	CO-0	10 N 0606456 4094453	Corralitos #0
Corralitos Creek downstream of diversions site	CO-1	10 N 0606093 4096068	Corralitos #1
Corralitos Creek upstream of diversions site	CO-3	10 N 0605739 4096633	Corralitos #3
Corralitos Creek downstream of Shingle Mill Gulch	CO-9	10 N 0605083 4100092	Corralitos #9
Browns Creek downstream of diversions site	BR-1	10 N 0607660 4097304	Browns Valley #1
Browns Creek upstream of diversions site	BR-2	10 N 0608348 4098264	Browns Valley #2
Shingle Mill Gulch downstream of Grizzly Flat	SM-3	10 N 0606599 4100478	Shingle Mill #3
Casserly Creek downstream of Mt Madonna Rd.	CA-3	10 N 0612189 4094311	Casserly #3

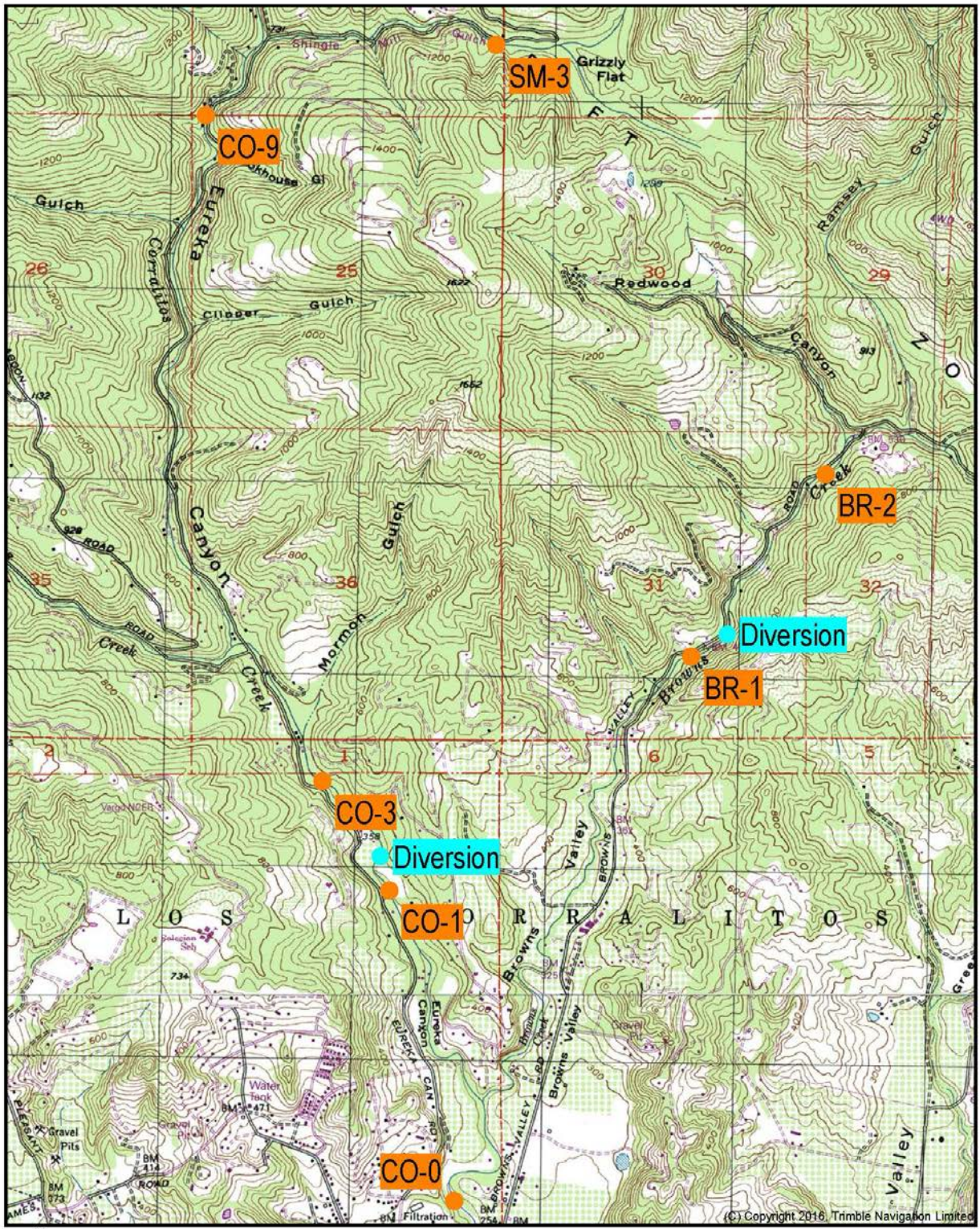


Figure 1. Sampling Sites in the Corralitos Creek Watershed

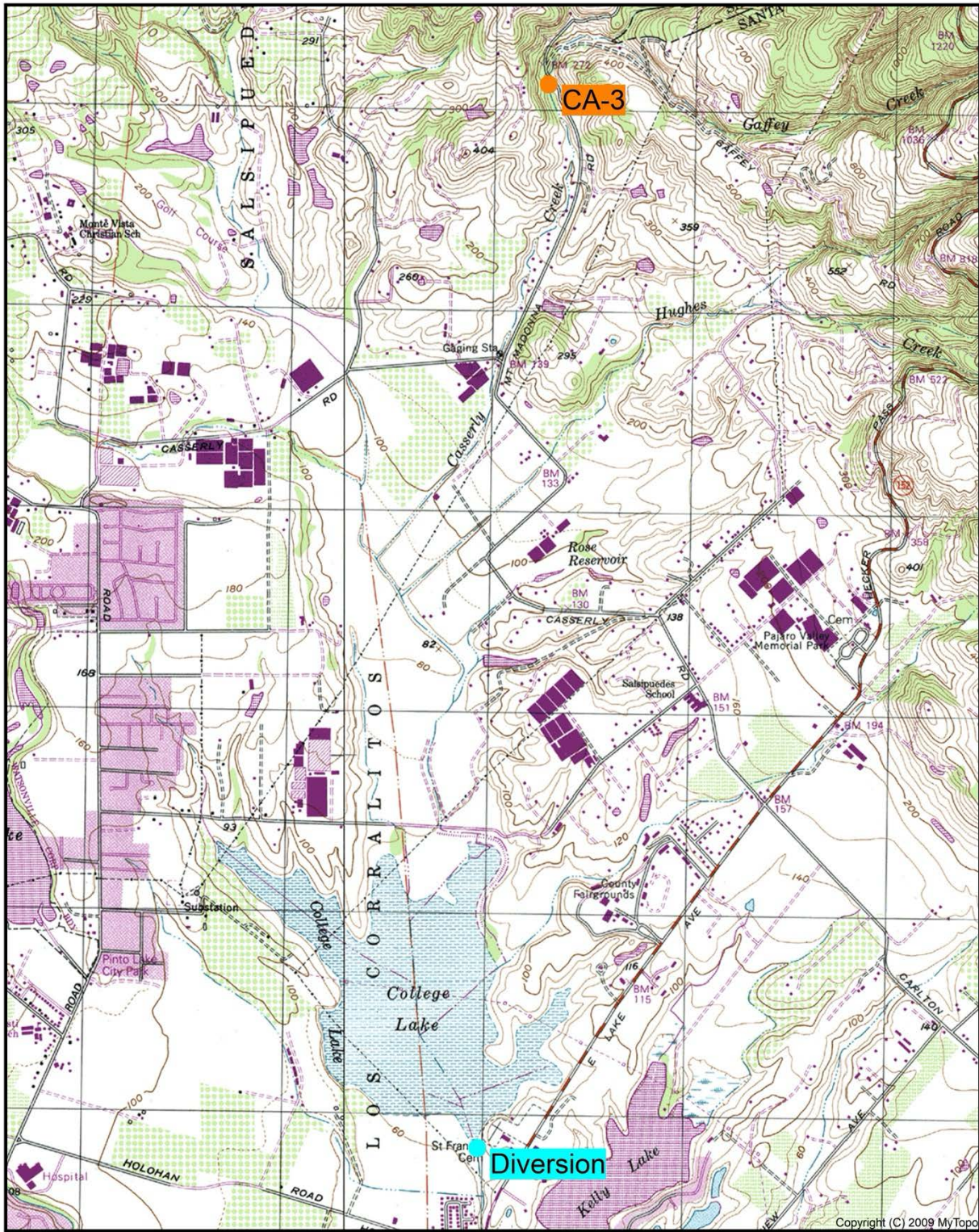


Figure 2. Sampling Site in the Casserly Creek Watershed

Habitat Assessments

Basic aquatic habitat assessments were conducted at each site using the Level II habitat typing protocol described in the *California Salmonid Stream Habitat Restoration Manual* (Flosi *et al.* 2010). Level II habitat typing simply classifies habitat units into riffles, flatwater, and pools, which are the three broad habitat types offering different ecological function for fisheries resource (see *Habitat Type and Stream Dimension* below).

Habitat Type and Stream Dimension

The habitat inventory assesses the amount and quality of different habitat types within each reach. Habitat dimensions (depth, area) and type (pool, riffle, flatwater) influence the ability of a stream to support salmonid populations. Riffle habitats are important for production of aquatic insects and other organisms used as food sources. Riffles can also provide habitat for younger age classes of salmonids and can be good foraging areas if they are sufficiently deep. Flatwater runs and glides can also be used for foraging and can support greater numbers of rearing juveniles depending on depth and cover characteristics. Flatwater habitats also tend to have areas where velocity and substrate characteristics are suitable for spawning. Pools are important because they provide habitat during the summer low flow period and during periodic droughts. Deeper pools with good cover characteristics provide important habitat for adult resident trout and yearling-and-older juvenile steelhead. Although these fish may inhabit pools with mean depths in the range of 0.5 to 1.5 ft in small streams, they generally occur at greater densities in streams with more pools in the 1.5 to 2.5-ft or deeper mean depth range. Pool tail-outs serve as important spawning sites if conditions are suitable (i.e., gravel/cobble substrates with low levels of embeddedness).

Shelter Characteristics

There are numerous potential predators on juvenile salmonids inhabiting streams, and the presence of adequate cover, or shelter, can greatly influence survival rates. Instream and overhead cover in the form of undercut banks, tree trunks and branches (whether alive or dead), grasses, herbs, and shrubs, floating or rooted aquatic vegetation, cobbles and boulders, bedrock ledges, and surface turbulence can inhibit the ability of predators to see and capture juvenile salmonids. The proportion of each pool unit that was influenced by some type of shelter was estimated as a percentage of the total surface area of the unit. Shelter ratings range from 0-300 and are expressed as mean values by habitat types within a stream. A pool shelter rating of at least 100 is desirable for salmonids.

Substrate Conditions

Substrate conditions influence spawning and egg incubation, cover for juveniles, and production of aquatic invertebrates important in the aquatic food chain. Steelhead rely on relatively loose, clean gravel substrate with low amounts of fine sediments for reproduction. Larger substrate such as cobbles and boulders can provide hiding areas for juveniles of many species including trout. Fine sediments (silt and sand) present in excessive amounts fill spaces between the larger substrate elements and reduce its ability to support invertebrate production, spawning, and escape cover. A number of criteria are used to describe substrate compositions occurring in streams and assess suitability for different life stages of anadromous salmonids. The most detailed methods involve bulk sampling of the streambed and characterization of the complete range of sediment size classes. A simpler method, included in the Flosi

et al. (2010) habitat assessment protocol, involves estimating cobble embeddedness, which is defined as the average proportion of individual cobbles embedded in fine substrate materials. Embeddedness is typically estimated in pool tail-outs, the preferred spawning location of adult salmonids. Fish density, particularly for juvenile salmonids, is generally reduced as embeddedness increases, but steelhead appear to be less sensitive than some other species. Embeddedness is rated on a scale of 1 to 4 in 25% ranges. Embeddedness measured to be 25% or less (i.e., rating of 1) is considered best for the spawning needs of steelhead. Additionally, a value of 5 is assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size (e.g., boulder).

Riparian Conditions

The condition of the riparian corridor adjacent to a stream is an important factor in salmonid habitat quality. Riparian vegetation helps support some of the insects consumed by juveniles, provides cover from predators, and limits solar radiation to streams, keeping water temperatures cool. Tree roots stabilize streambanks and create habitat structure, and fallen trees create instream cover and refugia for juvenile fish to reside during high velocity flows. During the habitat assessment, the proportion of the channel shaded by deciduous and coniferous tree canopy was estimated. In general, canopy densities of 80% or more are desirable. However, limited openings in the canopy provide important foraging habitat, particularly for salmonid fry.

Fish Surveys

Fish surveys were conducted using standard electrofishing techniques (e.g., Temple and Pearsons 2007) and in accordance with the *Guidelines for Electrofishing Water Containing Salmonids Listed Under the Endangered Species Act* (NMFS 2000) and conditions set forth in the County's Endangered Species Act Section 10(a)(1)(a) scientific research permit #15824-3R. Block nets were set at the upstream and downstream ends of the sampling reaches, and standard water quality parameters (water temperature, dissolved oxygen, and specific conductivity) were measured using a YSI model 85 digital multipurpose meter. Using a standard multi-pass depletion method, repeated (2-3) electrofishing passes were made with a Smith-Root Model LR-24 backpack electrofisher and dipnets. Captured fish were placed in 5-gallon buckets containing stream water and battery-powered aerators. All captured salmonids were counted, measured to fork length (FL), and returned to the same stream reach where they were caught. Qualitative abundance estimates were noted for non-salmonid fish and amphibian species. Standard lengths (SL) of all captured steelhead were also measured for comparison to previous sampling conducted by Alley (2017).

Statistical population estimates for each sampling site were calculated using the Microfish 3.0 software (Van Deventer and Platts 1989). Total densities (number of fish/100 ft of channel) of juvenile steelhead were calculated based on the statistical population estimates and sampling site lengths. Densities of age 0 (young-of-the-year) and age 1+ (yearling-and-older) steelhead were calculated from the statistical population estimates based on their respective proportion (percentage) of occurrence within the sample.

Accurate age determinations of juvenile salmonids require scale analysis, which was beyond the scope of this effort. However, age class thresholds can also be determined fairly accurately from bimodal length-frequency distributions if a sufficiently large sample size is available. As this was not the case at

some sites (e.g., Shingle Mill Gulch #3), age class cutoffs were determined based on a combination of bimodal length-frequency distributions, professional experience conducting other long-term steelhead monitoring programs, and methods applied by other researchers in Santa Cruz County (e.g., Alley 2017; Sogard *et al.* 2009). For example, Alley (2017) generally classifies juvenile steelhead from non-mainstem San Lorenzo River sites as age 0 if SL is less than 75 mm. In a multi-year study of seasonal patterns of abundance, growth, and site fidelity of juvenile steelhead in the Soquel Creek watershed, Sogard *et al.* (2009) found that age 0 steelhead were generally less than 90 mm FL in October. Based on our observed length-frequency distributions and Sogard *et al.* (2009), we classified juvenile steelhead in the more open, low-gradient sites (i.e., Corralitos Creek #0 through #3) as age 0 if they were less than 90 mm FL, but in the more shaded upper watershed sites (i.e., Shingle Mill Gulch #3, and Brown Creek #1 and #2), 85 mm FL was generally used as the breakpoint between age 0 and age 1+ unless clear bimodal distributions suggested otherwise. This age classification scheme compares favorably to the bimodal distributions of standard-length frequencies and the Alley (2017) 75 mm SL breakpoint. In most cases, there was a clear demarcation between size modes of age 0 and age 1+ fish, but a presumably small number of fish may have been incorrectly aged. Due to limited sample sizes, no attempt was made to segregate older fish into age 2 or age 3 categories and these fish were instead classified into the age 1+ category.

Per PV Water's *Steelhead Monitoring Plan* for the College Lake Integrated Resources Management Project (Podlech 2022a), passive integrated transponder (PIT) tags were implanted in a subset of juvenile steelhead captured during the 2025 population surveys. In compliance with its project permit conditions, PV Water installed a PIT tag detection array at in December 2025 to track the movement of tagged steelhead into and out of College Lake. Juvenile steelhead with fork lengths exceeding 65 millimeters (mm) were selected for implanting 12-millimeter half duplex (HDX) PIT tags. Fish selected for PIT tagging were anesthetized in sodium bicarbonate (e.g., Alka Seltzer™ Gold) dissolved in stream water and weighed using a portable electronic scale. PIT tags were be implanted into the body cavity between the posterior tip of the pectoral fin and the anterior point of the pelvic girdle using sterilized syringes fitted with 12-gauge veterinary-grade needles. Scale samples were also collected from all tagged fish using standard salmonid research protocols (Johnson et al 2007). After handling, fish were returned to holding buckets containing stream water and an aerator until recovered from the anesthesia and released to the same stream reach where they were captured.

Results

The results of the September 2025 habitat assessments and fish surveys are presented below. Table 2 summarizes the results of basic water quality measurements collected immediately prior to fish sampling at each site. Table 3 summarizes habitat conditions at the sampling sites, and Table 4 lists juvenile steelhead density estimates. Figure 3 depicts the relative proportions of age 0 and age 1+ steelhead captured at each site, and Figure 4 presents length-frequency histograms for each site. Figures 5 and 6 compare total juvenile and age 0 densities, respectively, for 2016 through 2025. The 2016 and 2017 density estimates are derived from Alley (2017, 2018). Absolute juvenile steelhead density estimates for 2018 through 2025 may not be directly comparable to 2016-2017 estimates due to slight differences in sampling methodology and site locations, but overall density trends across the eight sampling years accurately reflect actual population dynamics. Representative photographs of the sampling sites are

provided in Appendix A.

Across the eight sampling sites, a total of 69 juvenile steelhead, ranging between 88-213 mm in fork length and 7.7 – 103.8 grams (g) in mass, were implanted with PIT-tags in 2025 (Appendix B).

Water year 2025 was characterized by only one major precipitation event in mid-February 2025 and several moderate events throughout the winter and spring season. The California Data Exchange Center (CDEC 2024) Watsonville Water (WTW) site reports a total of 16.09 inches of precipitation for the water year. PV Water (2025) classifies water years with total precipitation between 12.93 inches and 17.54 inches as “dry”. Streamflow in Corralitos Creek was well below the long-term average throughout January 2025, a month during which much of the adult steelhead migration typically occurs.

Corralitos Creek #0 (CO-0)

Sampling site CO-0 is located on Corralitos Creek downstream of the Browns Creek confluence (Figure 1) at the head of a low-gradient (1-2%) alluvial valley that typically dries out during summer months. The total channel length of the assessment reach in 2025 was 207 ft (Table 3). Based on percent total length, CO-0 consisted of 10% riffle, 24% flatwater (glide), and 66% flatwater (step-run) with some interspersed riffles. A pool previously located at the downstream end of the sampling reach as become filled with sediment and now consists of a glide (flatwater category) and a short riffle. Based on the total length and mean widths of the habitat units, the total wetted area of the sampling site at the time of the assessment was estimated at 2,409 ft², essentially unchanged from the 2024 wetted area of 2,504 ft². Three Level II habitat units (two flatwaters and one riffle) were sampled at CO-0. Large cobbles were the dominant substrate type throughout the sampling reach. Canopy cover was estimated at 30% and composed entirely (100%) of hardwood species.

The overall juvenile steelhead population estimate for CO-0 was 49, for a total juvenile steelhead density of 23.7 fish/100 ft (Table 4), representing a 25% decrease from the 2024 estimate of 31.4 fish/100 ft, but nevertheless the second highest density recorded at this site in since 2019 (Figure 5). Of the juvenile steelhead captured at CO-0, 88.1% were age 0 fish (71.7% in 2024) and 11.9% were age 1+ fish (28.3% in 2024) (Figure 3). Estimated age class densities (Table 4) were 20.9 fish/100 ft for age 0 steelhead (22.5 fish/100 ft in 2024) and 2.8 fish/100 ft for age 1+ steelhead (8.9 fish/100 ft in 2024), indicating continued strong production at this lower watershed site. The notable increases in steelhead densities at CO-0 over the past two years likely resulted from a combination of factors, including favorable streamflow conditions (i.e., elevated but not excessive) throughout the spawning, incubation, emergence and juvenile rearing phases of the life cycle.

Sculpins (*Cottus* sp.) were again relatively abundant at CO-0 and appeared to be represented by two species, riffle sculpin (*C. gulosus*) and coastrange sculpin (*C. aleuticus*). Sacramento suckers (*Catostomus occidentalis*), a species that has been moderately abundant within the previous pool habitat unit, was absent from the sampling reach in 2025. Similarly, no Pacific lamprey (*Entosphenus tridentatus*) ammocoetes were captured at CO-0 in 2025 (nor 2024 or 2023). Non-native signal crayfish (*Pacifastacus leniusculus*) were again present at CO-0.

Corralitos Creek #1 (CO-1)

Sampling site CO-1 is located within a low-gradient (1-2%) reach of Corralitos Creek downstream of the City's diversion facility (Figure 1). In 2024, substantial treefall into the regular sampling reach necessitated an upstream shift in the sampling site by approximately 130 ft, such that the upstream end of the reach in 2023 formed the downstream end in 2024. For 2025, the original sampling reach had been cleared of wood and was accessible and surveyable again. This reach of Corralitos Creek frequently undergoes marked morphologic changes (e.g., Podlech 2023).

The total channel length of the assessment reach in 2025 was 110 ft (Table 3) of which 56% consisted of pool habitat, 21% riffles, and 27% flatwater. Based on the total length and mean widths of the habitat units, the wetted area of the reach at the time of the assessment was estimated at 1,332 ft², a 51% decrease from the 2024 estimate of 2,732². However, the 2024 sampling reach was approximately 20 ft longer and substantially (9-12 ft) wider than the 2025 reach. Three Level II habitat units (one pool, one riffle, one flatwater) were sampled at CO-1. The pool had a mean depth of 1.5 ft, a maximum depth of 3.0 ft. Residual depth could not be determined as the pool tailout (hydrologic control) was located approximately 30 ft downstream of the sampling reach. The pool's shelter rating is very low (10 out of 300), consisting primarily of shallow bedrock ledges and a few large boulders. While these features provide excellent shelter, they occupy only a small fraction of the overall surface area/volume of the pool, thereby resulting in a low rating. Sand was the dominant substrate type in the pool and boulders were the dominant substrate in the flatwater and riffle. Average canopy cover was estimated at 65% and composed almost entirely (95%) of hardwood species.

The overall juvenile steelhead population estimate for CO-1 in 2025 was 18, and the total juvenile steelhead density was 16.4 fish/100 ft (Table 4), a 44% decrease from the 2024 density estimate of 29.5 fish/100 ft, but a 66% increase over the 2023 estimate of 9.9 fish/100 ft recorded within the same sampling reach as the 2025 survey. Of the juvenile steelhead captured at CO-1 in 2025, only 44.4% were age 0 fish (22.9% in 2024) and 55.6% were age 1+ fish (77.1% in 2024) (Figure 3). Estimated age class densities (Table 4) were 7.3 fish/100 ft for age 0 steelhead (6.8 fish/100 ft in 2024) and 9.1 fish/100 ft for age 1+ steelhead (22.8 fish/100 ft in 2024). Deep pool habitat sampled at the temporarily relocated 2024 sampling site favored larger, older juveniles more than young-of-the-year fish (Podlech 2025), and the return to the original sampling reach in 2025 likely accounted for the substantial reduction in the observed age 1+ density.

Sculpins were moderately abundant at CO-1 and several large (200+ mm SL) Sacramento suckers were present at this sampling site. As in 2024, one Sacramento pikeminnow (*Ptychocheilus grandis*) was also present in 2025. Although known to occur in the lower Pajaro River watershed, pikeminnows had not been observed in the Corralitos Creek subbasin during prior monitoring surveys. For the second year in a row, no lamprey ammocoetes were captured at CO-1 in 2025.

Corralitos Creek #3 (CO-3)

Sampling site CO-3 is located within a moderate gradient (2-3%) reach of Corralitos Creek upstream of the City's diversion facility (Figure 1). The total channel length of the assessment reach in 2025 was 272

ft (Table 3), up from the 2024 total length of 231 ft but comparable to the 2023 total of 270 ft in 2023. Based on percent total length, CO-3 in 2025 consisted of 62% pool habitat, 19% riffles, and 19% flatwater. Based on the total length and mean widths of the habitat units, the total wetted area of the reach at the time of the assessment was estimated at 3,745 ft², an approximately 16% increase from the 2024 estimate of 3,233 ft² resulting from the longer sampling reach in 2025. Five Level II habitat units (two riffles, two pools, one flatwater) were sampled at CO-3. The two pools in the 2025 sampling reach had a combined mean depth of 1.5 ft, and a maximum depth of 2.9 ft, indicative of moderate aggradation since 2024. Dominant pool tail-out substrates consisted of sand and large cobbles. The mean shelter rating for the pools was 30, representative of low shelter abundance. Shelter at CO-3 consists of undercut banks and root masses providing complex refuge habitat where present, but the relative proportion of pool habitat with available shelter is highly limited (see Photo 5 in Appendix A). Sand and large cobbles were the dominant substrate types in the pools while the riffles are dominated by large cobbles and boulders. Canopy cover was estimated at 70%, consisting of approximately 60% hardwood and 40% conifer species.

The overall juvenile steelhead population estimate for CO-3 was 36, and the total juvenile steelhead density was 13.2 fish/100 ft (Table 4), a 41% decrease from the 2024 estimate of 22.5 fish/100 ft (Figure 5). Of the juvenile steelhead captured at CO-3, 26.5% were age 0 fish and 73.5% were age 1+ fish (Figure 3). Estimated age class densities in 2025 were 3.5 fish/100 ft for age 0 steelhead (13.0 in 2024) and 9.7 fish/100 ft for age 1+ steelhead (9.5 in 2024) (Table 4). The large decrease in the age 0 steelhead density at this site suggest lower reproductive success and/or lower survival. It should be noted that two Sacramento pikeminnows were captured within the CO-3 sampling reach in 2025, the second consecutive year this species has been observed at this site upstream of the City's intake structure and fish ladder. Although native to the Pajaro River watershed, pikeminnows are voracious and efficient predators of juvenile salmonids, including steelhead.

In addition to steelhead and two pikeminnows, sculpins were present in moderate numbers and Sacramento suckers in low numbers. As in 2024, no lamprey ammocetes were observed at CO-3 in 2025. Non-native signal crayfish were present.

It should be noted that staff from the National Oceanic and Atmospheric Administration Fisheries (NOAA) Fisheries and the Monterey Bay Salmon and Trout Project (MBSTP) conducted a juvenile steelhead rescue operation on lower Corralitos Creek upstream of East Lake Avenue on August 15, 2025. A total of 107 juvenile steelhead (or rainbow trout) and six lamprey ammocetes were captured and relocated to Corralitos Creek approximately one-quarter mile upstream of the Rider Creek confluence (Casagrande 2025), which is located approximately 0.5 mile upstream of sampling site CO-3. Most (58%) of the relocated steelhead were estimated to be age 0 juveniles. As in prior years, the 2025 juvenile steelhead density estimate at CO-3 may have been raised somewhat if some of the relocated fish dispersed into the sampling reach prior to our September 29, 2025 survey.

Corralitos Creek #9 (CO-9)

Sampling site CO-9 is located in the upper Corralitos Creek watershed approximately 0.3 miles downstream of the Shingle Mill Gulch confluence (Figure 1). The gradient in this reach is considerably

steeper (6%) than at CO-0 through CO-3. The total channel length of the assessment reach in 2025 was 125 ft (Table 3), comparable to 2024. Based on percent total length, CO-9 consisted of 55% flatwater (step-run) and 45% pool habitat. The total wetted area of the reach at the time of the assessment was estimated at 1,464 ft², comparable to the 2024 estimate of 1,307 ft². Two Level II habitat units (one flatwater, one pool) were sampled at CO-9. The pool in this reach had a mean depth of 1.3 ft (1.5 ft in 2024), a maximum depth of 2.0 ft (1.8 in 2024), and a residual depth of 1.8 ft (1.6 ft in 2024). The pool tail-out continues to be comprised of boulders and therefore does not provide spawning habitat. The mean shelter rating for the pool was 25, representative of relatively low shelter availability. Shelter consisted entirely of large boulders that, combined with the depth of the pool, provided high quality habitat for age 1+ steelhead. Canopy cover was estimated at 75%, composed almost entirely (95%) of hardwood species.

The overall juvenile steelhead population estimate for CO-9 was 51, and the total juvenile steelhead density was 40.8 fish/100 ft (Table 4), a slight (15%) decrease from the 2024 estimate of 48.0 fish/100 ft, but essentially identical to the 2023 density of 40.5 fish/100 ft (Figure 5). This represents the seventh consecutive year that CO-9 has had the highest total juvenile density of the eight sampling sites. Of the steelhead captured at CO-9 in 2025, 53.3% were age 0 fish (61.5% in 2024) and 46.7% were age 1+ fish (38.5% in 2024) (Figure 3). Estimated age class densities were 21.8 fish/100 ft for age 0 steelhead (29.5 in 2024) and 19.0 fish/100 ft for age 1+ steelhead (18.5 in 2024) (Table 4). Age 0 steelhead densities in 2025 represented a second consecutive year of slight decreases from the highest density at this site observed in 2023 (Figure 6). The age 1+ density remained essentially unchanged from 2024. As noted previously, the large pool at this site provides high quality habitat for older fish, some of which may assume a resident life history tactic.

Sculpins were rare at CO-9 in 2025. Two native amphibian species, California newt (*Taricha torosa*) and California giant salamander (*Dicamptodon ensatus*), previously observed at this site were absent in 2025.

Shingle Mill Gulch #3 (SM-3)

Sampling site SM-3 is located on Shingle Mill Gulch, tributary to Corralitos Creek, upstream of the third Eureka Canyon Road crossing and downstream of Grizzly Flat (Figure 1). Although located in the upper Corralitos Creek watershed, the gradient of the sampling reach is relatively low at approximately 2%. The total channel length of the assessment reach in 2025 was 119 ft (Table 3), compared to 140 ft in 2024. Based on percent total length, SM-3 consisted of 28% riffle and 72% pool habitat. In past years, a long riffle separated two pools, but much of this riffle was deepened into a flatwater in 2023, and in 2024, this area further deepened into a shallow pool. Based on the total length and mean widths of the habitat units, the total wetted area of the reach at the time of the assessment was estimated at 831 ft², a modest (11%) decrease from the 2024 estimate of 935 ft² resulting from the shorter reach length. Four Level II habitat units (two riffles, two pools) were sampled at SM-3. The pools in the reach had a combined mean depth of 0.9 ft, a maximum depth of 1.7 ft, and a residual depth of 1.5 ft, representative of approximately 0.5 ft of aggradation since September 2024. Dominant pool tail-out substrates at both pools consisted of small cobble with embeddedness ratings of 0-25% and 25-50%, representative of continued good to fair spawning conditions. The combined mean shelter rating for the pools was 50, comprised primarily of root masses and small woody debris. Coarse substrates dominate the riffles while

small cobbles and sand are the dominant substrate types in the pools. Canopy cover was estimated at 85%, composed primarily (90%) of conifer species.

The overall juvenile steelhead population estimate for SM-3 was 12, and the total juvenile steelhead density was 10.1 fish/100 ft (Table 4), more than double the 2024 density of 4.3 fish/100 ft. In 2024, SM-3 was the only sampling site at which the total juvenile density of steelhead decreased compared to the previous year, and in 2025 it was the only of the five Corralitos Creek sites where the density estimate increased (Figure 5). Of the juvenile steelhead captured at SM-3 in 2025, 83.3% were age 0 fish (50.0% in 2024) and 16.7% were age 1+ fish (50.0% in 2024) (Figure 3). Estimated age class densities were 8.4 fish/100 ft for age 0 steelhead (2.1 in 2024) and 1.7 for age 1+ steelhead (2.1 in 2024) (Table 4). Age 0 densities at SM-3 were very low in 2021 and 2022 (only one individual each year), but increased substantially in 2023, suggesting that anadromous spawning may only extend this far up the watershed in very wet years and that the Shingle Mill population may be sustained by low levels of resident trout spawning during drought and normal water years (Podlech 2023). The fact that SM-3 was the only sampling site at which densities decreased in 2024 compared to 2023, but then quadrupled in 2025 compared to 2024, supports this assumption.

One larval California giant salamander was observed at SM-3 in 2025, but California newts were absent. Non-native signal crayfish were present in low numbers.

Browns Creek #1 (BR-1)

Sampling site BR-1 is located on a moderate gradient (2-3%) reach of Browns Creek downstream of the City's diversion facility (Figure 1). The total channel length of the assessment reach in 2025 was 172 ft (Table 3). Based on percent total length, BR-1 consisted of 60% flatwater and 40% pool habitat. Significant sediment deposition in 2023 resulted in the near-complete filling of a previously large bedrock-dominated pool at the downstream end of the survey reach as well as the complete filling of a previously shallow, smaller pool at the upstream end of the reach. As a result, flatwater habitat availability increased by about 75% in 2023 and pool habitat decreased by a similar margin. Conditions remained relatively unchanged in 2024 and 2025, but we shortened the total sample reach length to reduce the over-dominance of flatwater habitat within the sample site. The estimated total wetted area of the sampled reach was 2,176 ft² in 2025. Two Level II habitat units (one long flatwater, one pool) were sampled at BR-1. The pool in this reach had a mean depth of 1.0 ft, a maximum depth of 2.2 ft, and a residual depth of 2.0 ft, indicative of continued sediment deposition. The tail-out at the pool consisted of large cobbles with 50-75% embeddedness, providing relatively poor adult steelhead spawning conditions. The shelter rating for the pool was 20, representative of very low shelter within this habitat unit. The limited shelter was dominated by boulders and bedrock ledges. Canopy cover was estimated at 70%, composed almost entirely (85%) of hardwood species.

The overall juvenile steelhead population estimate for BR-1 was 40, and the total juvenile steelhead density was 23.3 fish/100 ft (Table 4), almost double the 2024 density of 12.3 fish/100 ft. Of the juvenile steelhead captured at BR-1 in 2025, 59.0% were age 0 fish (56.3% in 2024) and 41.0% were age 1+ fish (43.8% in 2024) (Figure 3), representative of an age class structure that is comparable to 2023 and 2024. Estimated age class densities in 2025 were 13.7 fish/100 ft for age 0 steelhead (6.9 in 2024) and 9.5

fish/100 ft for age 1+ steelhead (5.4 in 2024) (Table 4). Steelhead densities at BR-1 declined substantially from 2019 through 2022, but have been increasing steadily over the past three sampling years (Figure 5), suggesting a continuing recovery in the Browns Creek steelhead population after low abundances during drought years.

Sculpins were again abundant, and some non-native signal crayfish were present at BR-1. No amphibians were observed in the sampling reach in 2025.

Browns Creek #2 (BR-2)

Sampling site BR-2 is located on a moderate gradient (2-3%) reach of Browns Creek upstream of the City's diversion facility (Figure 1). The total channel length of the assessment reach in 2024 was 225 ft (Table 3), comparable to 2024. Based on percent total length, BR-2 consisted of 52% flatwater and 48% pool habitat, which is largely unchanged from 2024. The total wetted area of the reach at the time of the 2025 assessment was estimated at 2,475 ft², approximately 12% lower than the 2024 estimate of 2,804 ft², which is primarily due to an approximately 1.5-ft decrease in the average wetted width of the reach from 2024 to 2025. Three Level II habitat units (one flatwater, two pools) were sampled at BR-2. The pools in this reach had a combined mean depth of 1.5 ft, a maximum depth of 2.6 ft, and a residual depth of 2.3 ft. The tail-outs at both pools consisted of very large cobbles and boulders that are not suitable for spawning by adult steelhead. The mean shelter rating for the pools was 70, representative of moderately low shelter abundance. The limited shelter was dominated by boulders in one pool and by a complex root mass in the other. Canopy cover was estimated at 80%, composed of 75% hardwood and 25% conifer species.

The overall juvenile steelhead population estimate for BR-2 was 77, and the total juvenile steelhead density was 34.2 fish/100 ft (Table 4), a 157% increase over the total density of 13.3 fish/100 ft in 2024. Of the juvenile steelhead captured at BR-2, 87.3% were age 0 fish (39.3% in 2024) and 12.7% of captured fish were classified as age 1+ (60.7% in 2024) (Figure 3). Estimated age class densities were 29.9 fish/100 ft for age 0 steelhead (5.2 in 2024) and 4.3 fish/100 ft for age 1+ steelhead (8.1 in 2024) (Table 4), indicative of a second consecutive significant increase in spawning success compared to 2023 (Figure 6) upstream of the City's diversion. The City completed emergency repairs to its Browns Creek diversion structure and fish ladder in fall 2023 and the documented 2024-2025 age 0+ densities are likely the result of improved adult migration access to the site.

Sculpins were moderately abundant and some non-native signal crayfish were present at BR-2.

Casserly Creek #3 (CA-3)¹

Sampling site CA-3 is located within a moderate-gradient (3%) reach of Casserly Creek approximately 250 ft downstream of Mt. Madonna Road bridge and 2.5 miles upstream of College Lake (Figure 2). The total channel length of the assessment reach in 2025 was 177 ft (Table 3), comparable to 2024. Based

¹ Note that the *2019 Juvenile Steelhead Densities in the Corralitos Creek and Casserly Creek Watershed* report (Podlech 2019) misidentified this sampling site as "Casserly Creek #1 (CA-1)" due to inconsistencies in site-naming by Alley (2017). However, the location of the Casserly Creek sampling site has remained consistent during all survey years.

on percent total length, CA-3 consisted of 80% flatwater, 15% shallow pool, and 5% riffle. CA-3 exhibits a relatively dynamic channel morphology with frequent shifts in habitat types and structure (e.g., Podlech 2023). Based on the total length and mean widths of the habitat units, the total wetted area of the reach at the time of the 2025 assessment was estimated at 1,037 ft², a 36% increase over the 2024 estimate of 761 ft², but comparable to the 2023 estimate of 1,005 ft². Three distinct Level II habitat units (one flatwater, one pool, one riffle) were sampled at CA-3 in 2025 compared to 2024 when the reach contained five habitat units (two flatwater, two pool, one riffle). By 2025, one of the two pools had been completely filled with sediment and transformed into a flatwater that, combined with the two flatwater units that previously bordered the pool, has now become one long (141 ft) flatwater. The remaining pool in the reach had a mean depth of 0.4 ft, a maximum depth of 0.8 ft, and a residual depth of 0.7 ft in 2025, comparable to 2024. The dominant pool tail-out substrate in 2025 consisted of gravel with a high embeddedness rating of 75-100%. The shelter rating for the pools was 140, reflective of moderately dense cover availability but largely a function of the small pool size (26 ft long, 4.5 ft wide) within which one small woody debris accumulation covered 70% of the wetted surface area of the habitat unit. Sand was the dominant substrate type in the pool while gravels dominated the flatwater and riffle. Canopy cover was estimated at 50%, consisting of approximately 80% hardwood and 20% conifer species.

The overall juvenile steelhead population estimate for CA-3 was 39, and the total juvenile steelhead density was 22.1 fish/100 ft, a slight decrease from the 2024 density of 24.1 fish/100 ft and the second consecutive year of total densities exceeding 20 fish/100 ft the lowest ever density (2.1 fish/100) observed at this site in 2023. Also for the second consecutive year, almost all (94.3%) of the juvenile steelhead captured at CA-3 in 2025 were age 0 fish (94.6% in 2024) and only two (5.7%) were age 1+ fish (5.4% in 2024) (Figure 3). Estimated age class densities were 20.8 fish/100 ft for age 0 steelhead (22.8 in 2024) and 1.3 fish/100 ft for age 1+ steelhead (also 1.3 in 2024) (Table 4).

In 2019, the high proportion and density of age 0 steelhead suggested successful spawning in Casserly Creek, and therefore successful adult migration through College Lake (Podlech 2019). However, in 2020 through 2022, the relative abundances of age 0 fish were greatly reduced, a trend that was consistent with observations in Shingle Mill Creek during that period and indicative of limited adult migration opportunities during drought years (Podlech 2022b). In 2023, however, the population decline at CA-3 was in stark contrast to the substantial increase at SM-3 and may have been the result of channel bed scour/deposition in Casserly Creek and/or challenging fish passage conditions at Paulson Road on the north side of College Lake (Podlech 2023). The significant increases in total and age 0 densities in 2024 and 2025 suggest suitable migratory and spawning conditions in Casserly Creek.

No amphibians or crayfish were observed at CA-3 in 2025.

Discussion

Many factors influence intra- and interannual fish population fluctuations. These include among others the magnitude and timing of streamflows, water quality conditions, the ability of adult steelhead to pass natural barriers, spawning success, food production (i.e., benthic macroinvertebrate abundance), and sedimentation. Direct cause-and-effect relationships are difficult to establish since fish populations, even in an undisturbed area, can fluctuate due to natural variations in the biotic and abiotic components of

the environment. For anadromous salmonids such as steelhead, ocean conditions also play an important factor in maturation and recruitment of adults.

Droughts create low-flow conditions that are positively correlated with overall population declines, especially in age 0 juvenile salmonids. Low flows impede upstream migration of adult steelhead, limit streambed substrate for spawning, and tend to result in higher water temperatures that may adversely affect summer survival. Low juvenile steelhead densities in the Corralitos Creek watershed were reported by Alley (2018) in 2014 and 2016. After experiencing near-record precipitation and stream discharges during water year 2017, and a concomitant improvement in juvenile steelhead densities in the Corralitos Creek watershed (Alley 2018), water year 2018 saw a return to below-average rainfall in coastal central California and juvenile steelhead densities decreased at all sampling sites in the Corralitos Creek watershed² except CO-1, where a high density of age 0 juveniles accounted for the highest total juvenile density (Figure 5).

For salmonids, the timing of runoff events is more important than the total or mean annual discharge. In water year 2018, only one minor runoff event occurred in early January 2018, then streamflows in Corralitos Creek remained below the long-term average through the end of March, significantly limiting adult steelhead access to the watershed during the typical peak of the spawning migration season, before several additional moderate runoff events occurred in March in early April toward the tail end of the adult migration and spawning season. The fact that only the lower watershed sites of CO-0 and CO-1 supported high proportions of age 0 steelhead in 2018, while age 1+ fish were far more abundant than age 0 fish in the upper watershed sites of CO-9, BR-1, and BR-2, supported the hypothesis that the late arrival of adult migration opportunities largely limited adult access to the lower watershed (Podlech 2018).

Water year 2019 resulted in Corralitos Creek streamflows consistently remaining above the long-term average through the entire adult steelhead migration and spawning season and smolt outmigration season. Hydrologically, 2019 was an almost ideal water year for steelhead as streamflows remained elevated but did not reach levels that would be expected to result in redd (egg nest) scour and/or significant flushing of age 0 fish. It appears that higher flows in water year 2019 provided adult steelhead access higher up in the watershed, as reflected by substantial increases in age 0 juvenile densities at CO-9, SM-3, BR-1, and BR-2 compared to 2018 (Figure 5). Conversely, age 1+ densities decreased moderately at most sites and substantially in Shingle Mill Gulch (SM-3). The favorable 2019 smolt outmigration conditions (i.e., sustained, moderate spring flows), combined with the relatively low age 0 densities (<10 fish/100 ft) in 2018 likely resulted in the weaker age 1+ densities at these sites in 2019 (Podlech 2019).

Water years 2020 through 2022 were characterized by drought conditions throughout the central California coast region and steelhead trout densities the Corralitos and Casserly creeks drainages generally declined (Figure 5). The importance of the timing of the limited precipitation events was even more evident during drought years. Water year 2021 had only one meaningful precipitation event in late January during the peak steelhead migration and spawning season. This relatively brief event enabled adult steelhead to enter the Corralitos Creek basin and spawn in the lower reaches of the watershed (CO-0, CO-1, CO-3) where age 0 steelhead densities were substantially higher in 2021 compared to the

² Casserly Creek (CA-3) was not sampled in 2018.

other drought years of 2020 and 2022 (Figure 6) (Podlech 2023).

It is important to note that the City of Watsonville did not operate its filter plant in 2020, 2021, or 2022. Lower creek flows combined with a lack of late rain events and a lack of overall total rain accumulation, rendered extended diversion periods infeasible. As such, 2020 through 2022 represent control years from the perspective of a fisheries effects analysis. As described above, the three non-diversion years were drought years, yet juvenile steelhead population trends differed based on differences in the timing of runoff events and the location of sampling sites.

Water year 2023 was characterized by substantial and extended precipitation. Multiple atmospheric rivers maintained streamflows along the central California coast well above long-term averages during much of December 2022 through spring and summer 2023 (Figure 7). These elevated flows likely provided numerous and prolonged migration and spawning opportunities for adult steelhead throughout much of the Corralitos-Casserly Creek subbasin. However, several peak flow events in Corralitos Creek in late December and mid-January approached or exceeded 2,000 cubic feet per second (cfs) (Figure 7), resulting in major sediment transport events as evidenced by substantial geomorphic changes at some sampling sites. Significant sediment transport events have the potential to scour or bury active spawning redds, resulting in loss of incubating eggs and/or alevins. In March 2023, a time when newly emerged fry are present in the streams, streamflows remained above 100 cfs for much of the month and again peaked at approximately 2,000 cfs (Figure 7). In addition to potentially flushing fry, turbidity and suspended sediment levels were qualitatively very high throughout this time. High and prolonged turbidity concentrations can lower dissolved oxygen in the water column, reduce respiratory function, disrupt normal feeding behavior and efficiency, reduce growth rates, lower disease tolerance, and cause fish mortality. These effects are more pronounced in smaller fish such as steelhead fry. The lower portion of a watershed typically experiences higher flow rates and turbidity/suspended sediment levels, and age 0 steelhead densities at sites CO-0, CO-1, and CO-3 in 2023 were among the lowest recorded during nine years of population surveys (Figure 6). Casserly Creek (CA-3) underwent substantial geomorphic changes, including the loss of feeding (riffle) and rearing (pool) habitat. Densities of total and age 0 juveniles remained as low as during recent drought years. Conversely, upper watershed sites such as CO-9 and SM-3 saw some of the highest total juvenile densities recorded at these sites (Figure 5), driven largely by substantial increases in age 0 densities (Figure 6). In Browns Creek, the lower site (BR-1) had the highest density of age 0 steelhead in the past four years while the upper site (BR-2) had the second lowest density in the past eight years even though total densities remained largely unchanged. Damage to a weir at the Browns Valley diversion site may have adversely affected adult fish passage opportunities through the fish ladder in water year 2023 (Podlech 2023).

Precipitation patterns in water year 2024 were similar to water year 2019 described above. Although 2024 was “only” an average water year in terms of total precipitation, Corralitos Creek streamflows consistently remained above the long-term average through the entire adult steelhead migration, spawning, and emergence periods. Like 2019, 2024 was an almost ideal water year for steelhead as streamflows remained elevated but did not reach levels that would be expected to result in significant redd (egg nest) scour and/or significant flushing of age 0 fish. Total juvenile densities increased at seven of eight sampling sites from the prior year, with some of the increases being multiple-fold (Podlech 2023).

Water year 2025 was classified as a dry year, but after a month without precipitation in January, several moderate runoff events in February and March 2025 again provided steelhead adult migration and spawning opportunities without excessive scouring conditions. Total juvenile densities in 2025 were slightly lower than in 2024 at the four mainstem Corralitos Creek sampling sites, substantially higher in Shingle Mill Creek and the two Browns Creek sites, and largely unchanged (i.e., remaining high) in Casserly Creek (Figure 5). Age 0 densities followed essentially the same trend, but it should be noted that BR-2, located upstream of the City’s repaired fish ladder, had the highest age 0 density recorded at the eight sampling sites in 2025 (Figure 6).

TABLE 2
WATER QUALITY RESULTS AT EIGHT SAMPLING SITES IN THE CORRALITOS CREEK
AND CASSERLY CREEK WATERSHEDS, SEPTEMBER 2025

Parameter	CO-0	CO-1	CO-3	CO-9	SM-3	BR-1	BR-2	CA-3
Date	9/29	9/26	9/29	9/23	9/23	9/24	9/24	9/25
Time	1400	930	930	1200	930	1230	945	1215
Weather	clear	clear	clear	clear	clear	clear	clear	clear
Air Temp (°C)	18.5	17.4	17.7	18.8	17.6	18.8	17.6	21.9
Water Temp (°C)	17.2	16.3	16.3	16.4	15.6	16.6	16.3	17.8
Conductivity (µmhos/cm)	439	414	434	488	435	571	578	1111
DO Conc. (mg/l)	8.7	9.1	9.3	10.1	8.7	9.7	9.0	7.6
DO Sat. (%)	82	90	96	97	91	99	93	82

TABLE 3

SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS AT EIGHT SAMPLING SITES IN THE CORRALITOS CREEK AND CASSERLY CREEK WATERSHEDS, SEPTEMBER 2025

Site ID	Habitat Unit Type	# of Units	Total Length (ft.)	% of Reach Length	Mean Width (ft.)	Mean Depth (ft.)	Max. Depth (ft.)	Residual Pool Depth (ft.)	Estimated Total Area (sq. ft.)	Dominant Substrate Types	Dominant Pool Tail Substrate	Mean Tail Embeddedness	Mean Shelter Value
CO-0	R	1	20	10	9.1	0.4	0.8	---	182	LC	---	---	---
	F	1	50	24	12.2	0.8	1.0	---	610	LC	---	---	---
	F/R	1	137	66	11.8	0.5	1.1	---	1,617	LC	---	---	---
	TOTAL		207						2,409				
CO-1	P	1	62	56	12.9	1.5	3.0	NA	800	SA	NA	NA	10
	F	1	27	25	13.7	0.8	1.3	---	370	BO	---	---	---
	R	1	21	19	7.7	0.6	0.8	---	162	LC	---	---	---
	TOTAL		110						1,332				
CO-3	P	2	170	62	14.5	1.5	2.9	NA	2,465	SA/LC	NA	NA	30
	R	2	51	19	11.3	0.3	0.7	---	576	LC/BO	---	---	---
	F	1	51	19	13.8	0.6	1.2	---	704	LC	---	---	---
	TOTAL		272						3,745				
CO-9	P	1	56	45	14.8	1.3	2.0	1.8	829	BO	BO	NA	25
	F	1	69	55	9.2	0.6	1.0	---	635	BO	---	---	---
	TOTAL		125						1,464				
SM-3	P	2	86	72	7.9	0.9	1.7	1.5	679	SC/SA	SC/SC	1.5	50
	R	2	33	28	4.6	0.1	0.4	---	152	GR/SC	---	---	---
	TOTAL		119						831				
BR-1	P	1	68	40	11.2	1.0	2.2	2.0	762	LC	SC	3.0	20
	F	1	104	60	13.6	0.4	1.2	---	1,414	LC	---	---	---
	TOTAL		172						2,176				
BR-2	P	2	109	48	11.0	1.5	2.6	2.3	1,199	BO/SA	BO/BO	NA	70
	F	1	116	52	11.0	0.4	1.0	---	1,276	BO	---	---	---
	TOTAL		225						2,475				
CA-3	P	1	26	15	4.5	0.4	0.8	0.7	117	SA	GR	4.0	140
	F	1	141	80	6.3	0.2	0.7	---	888	GR	---	---	---
	R	1	10	5	3.2	0.1	0.2	---	32	GR	---	---	---
	TOTAL		177						1,037				

NOTE: Habitat type codes: R = riffle; F = flatwater; P = pool.
 Substrate type codes: SI = silt; SA = sand; GR = gravel; SC = small cobble; LC = large cobble; BO = boulder; BR = bedrock.
 NA = not applicable

TABLE 4

JUVENILE STEELHEAD DENSITIES (# FISH/100 FT) AT EIGHT SAMPLING SITES IN THE CORRALITOS CREEK AND CASSERLY CREEK WATERSHEDS, SEPTEMBER 2025

Metric	CO-0	CO-1	CO-3	CO-9	SM-3	BR-1	BR-2	CA-3
Total Density	23.7	16.4	13.2	40.8	10.1	23.3	34.2	22.1
Age 0 Density	20.9	7.3	3.5	21.8	8.4	13.7	29.9	20.8
Age 1+ Density	2.8	9.1	9.7	19.0	1.7	9.5	4.3	1.3

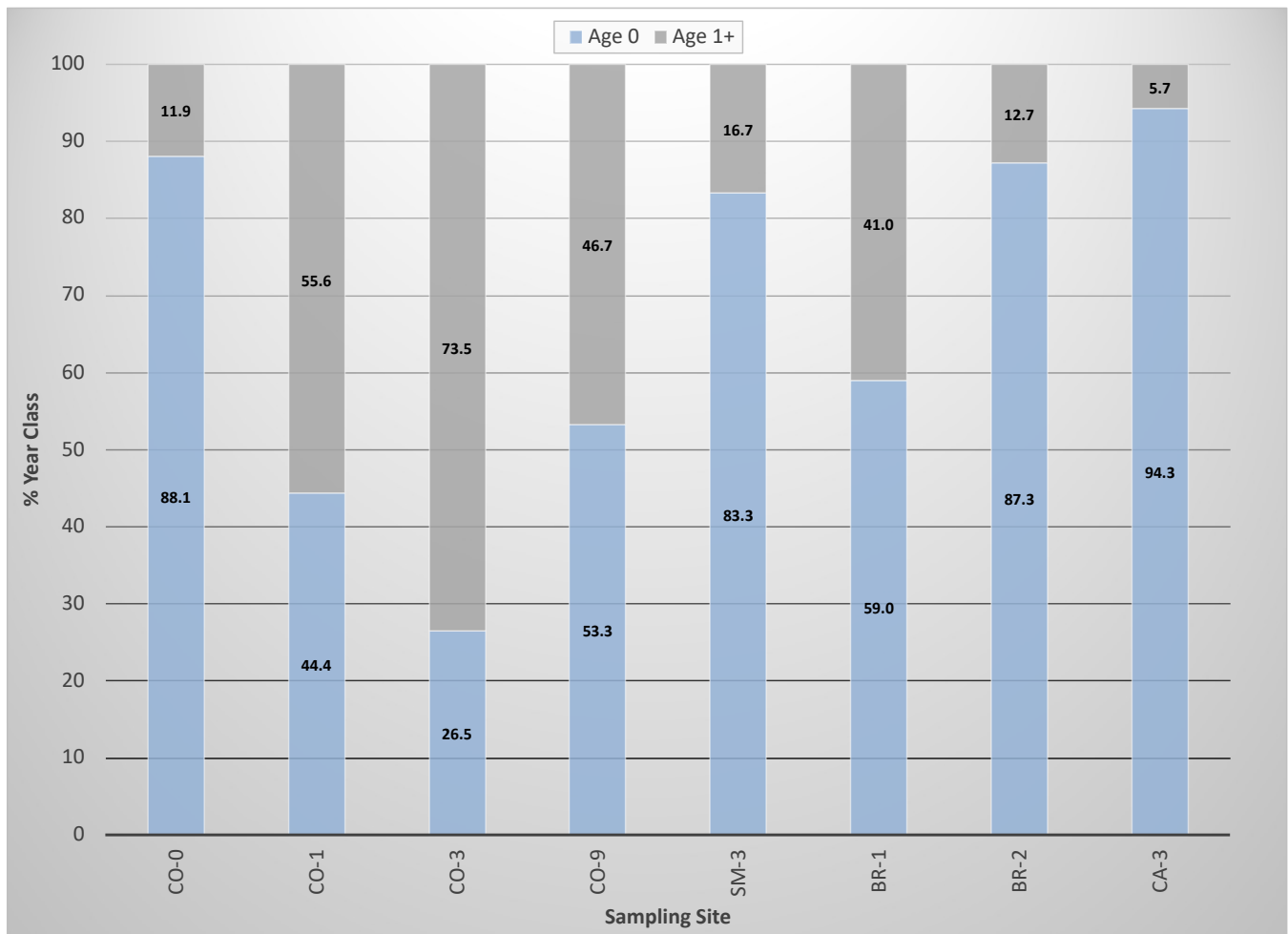


Figure 3. Relative Proportion (%) of Juvenile Steelhead Age Classes at Eight Sampling Sites in the Corralitos Creek and Casserly Creek Watersheds, September 2025

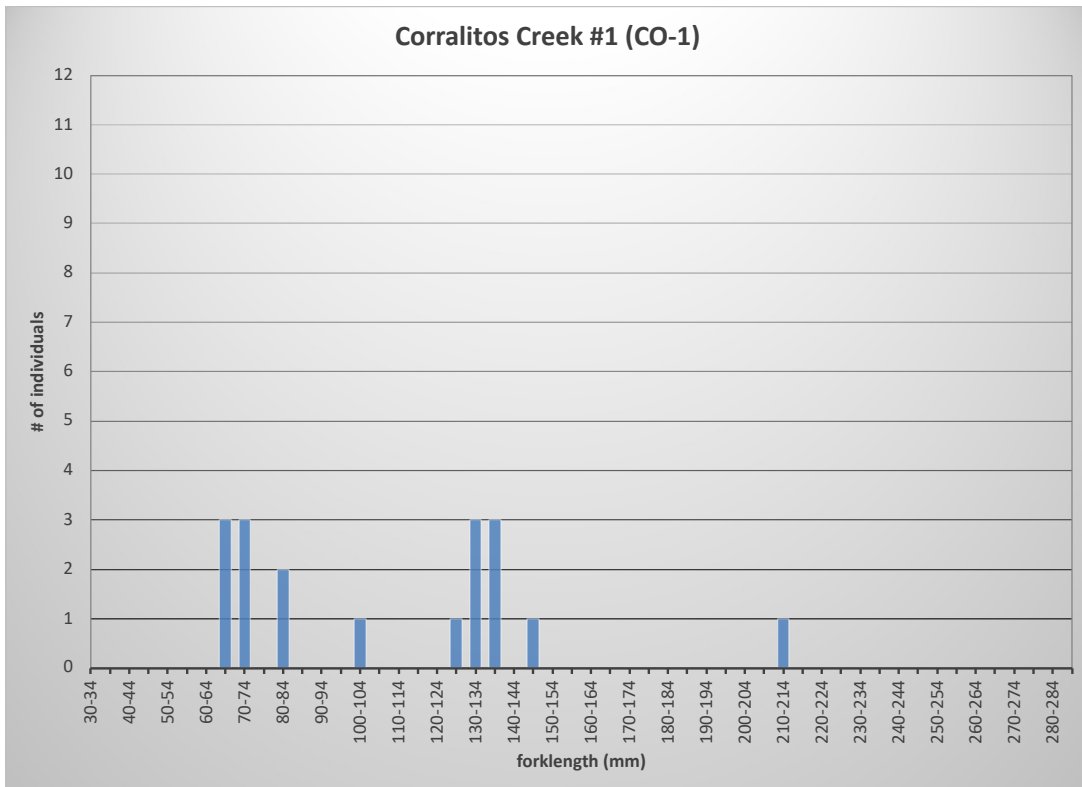
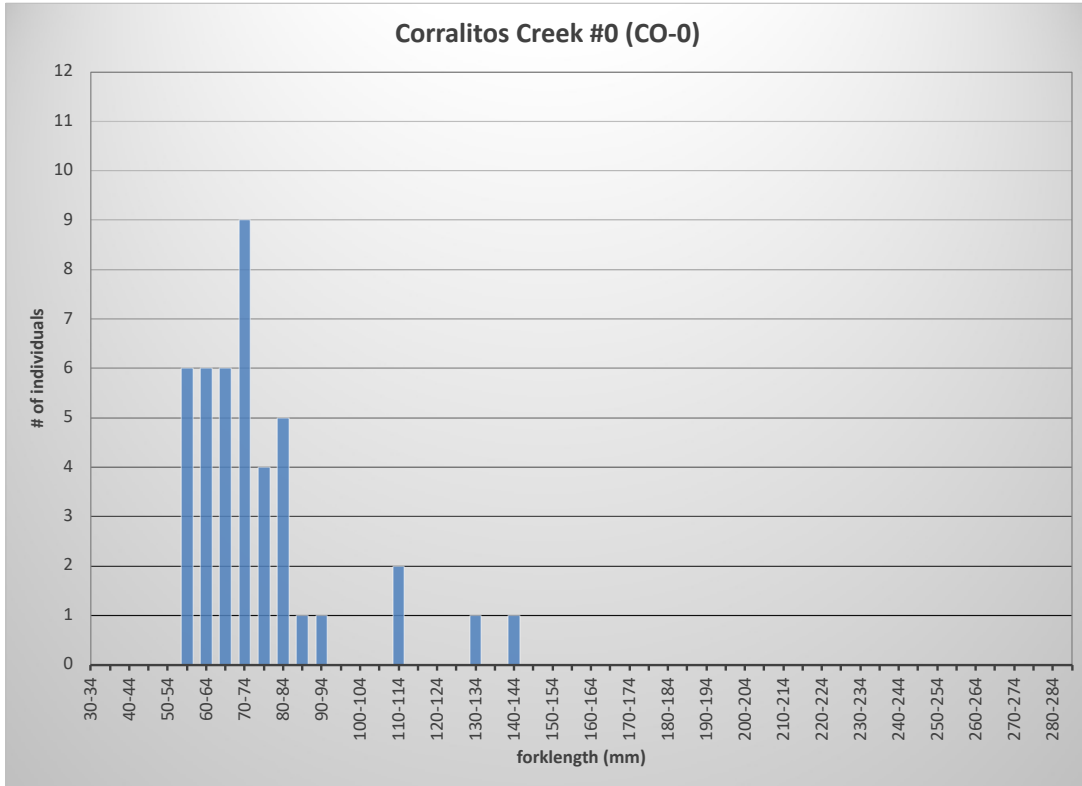


Figure 4. Fork length distributions of juvenile steelhead at eight sampling sites in the Corralitos Creek and Casserly Creek watersheds, September 2025

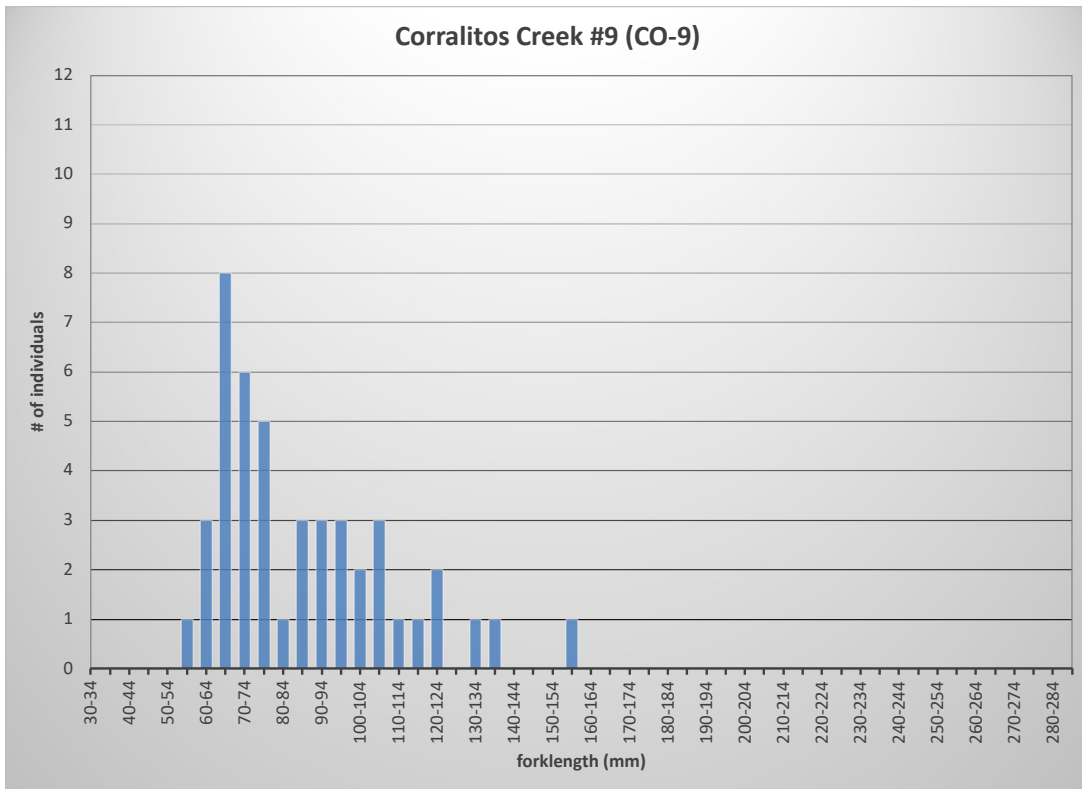
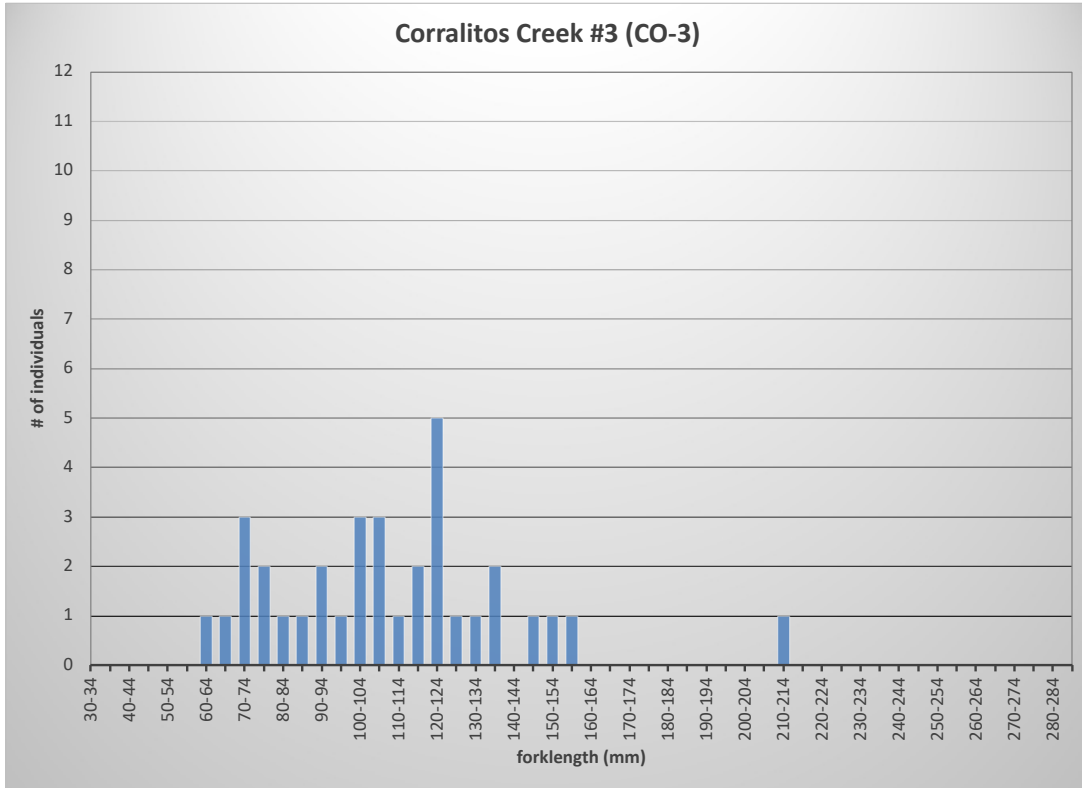


Figure 4 (cont.). Fork length distributions of juvenile steelhead at eight sampling sites in the Corralitos Creek and Casserly Creek watersheds, September 2025

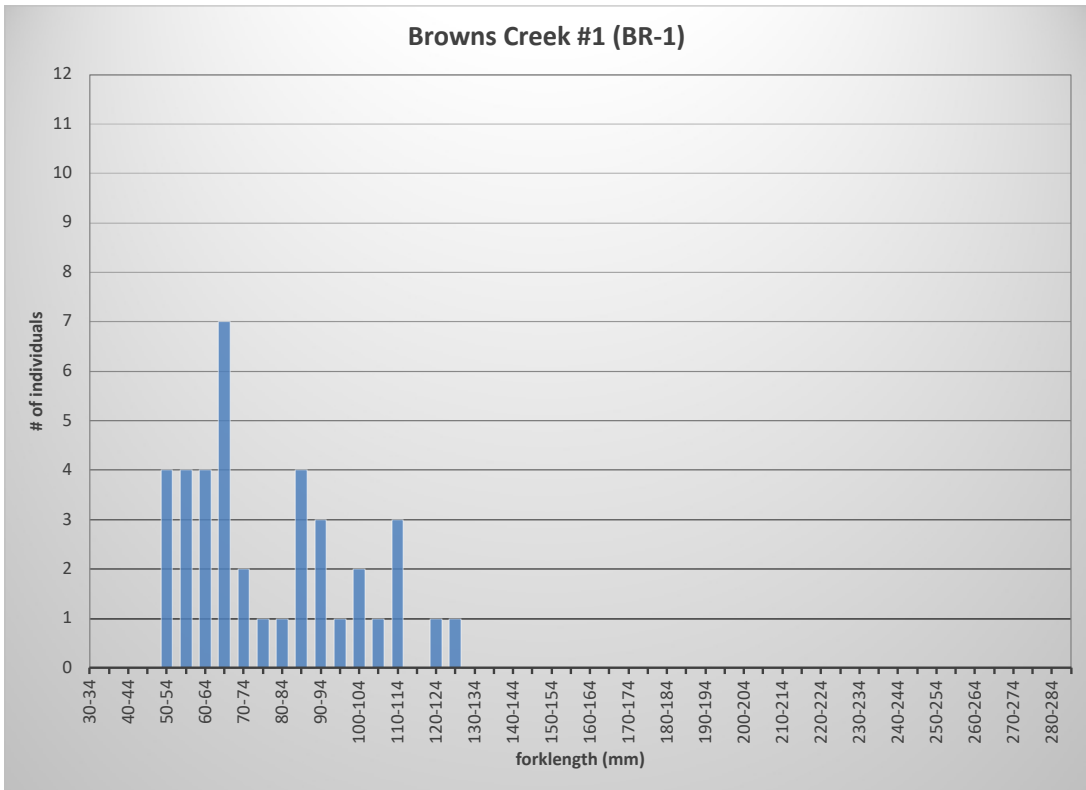
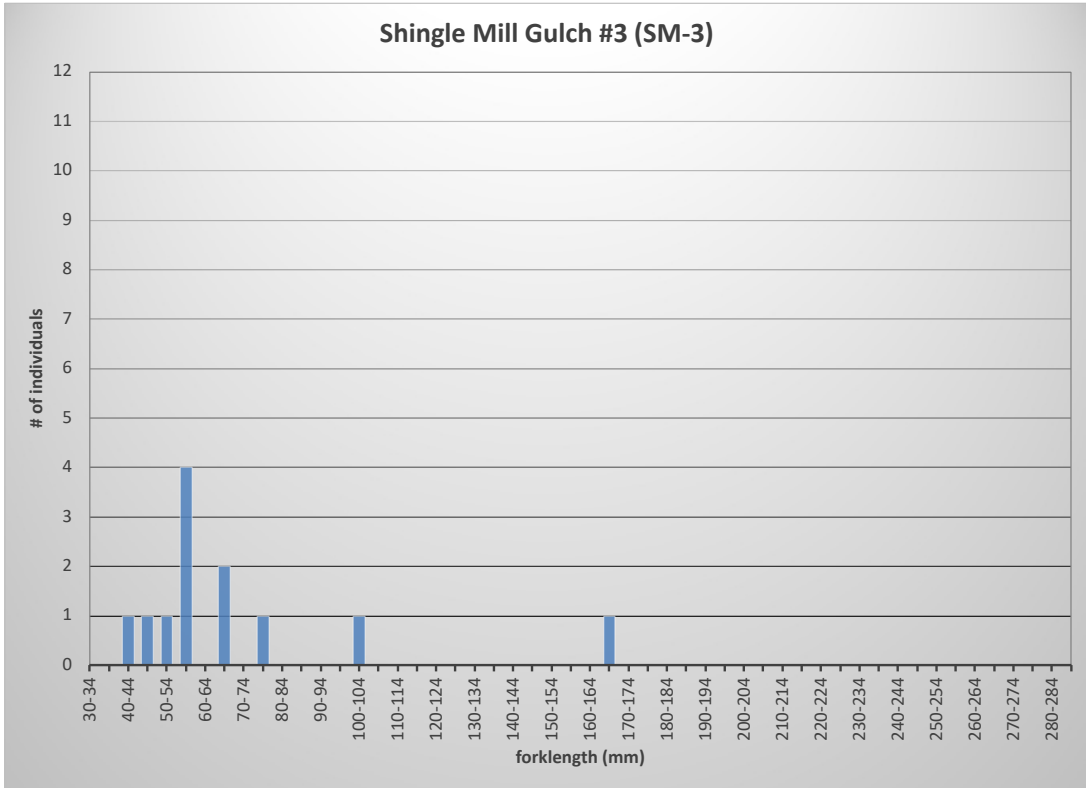


Figure 4 (cont.). Fork length distributions of juvenile steelhead at eight sampling sites in the Corralitos Creek and Casserly Creek watersheds, September 2025

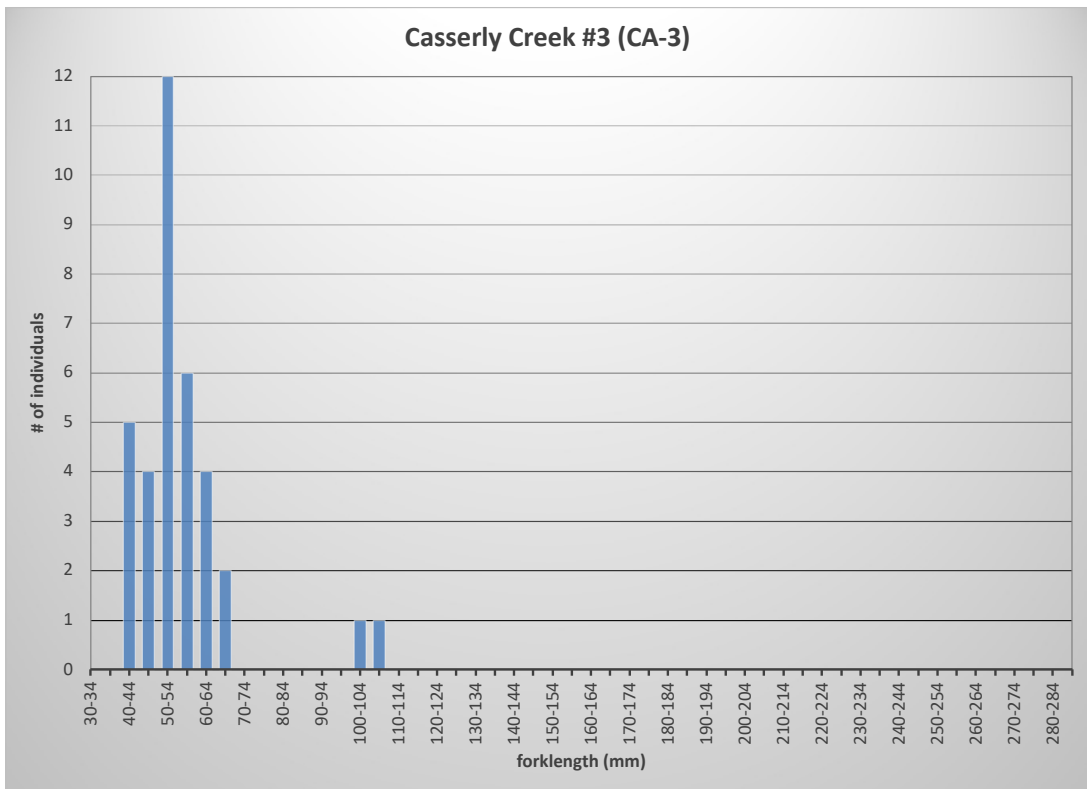
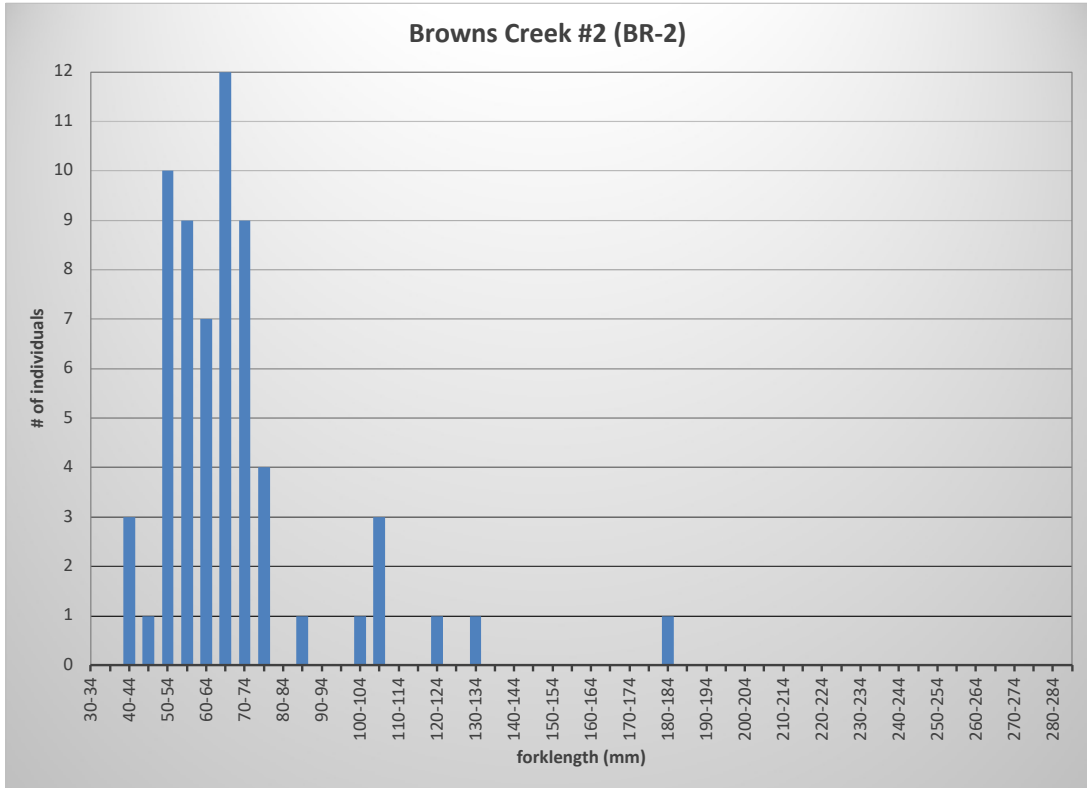


Figure 4 (cont.). Fork length distributions of juvenile steelhead at eight sampling sites in the Corralitos Creek and Cassery Creek watersheds, September 2025

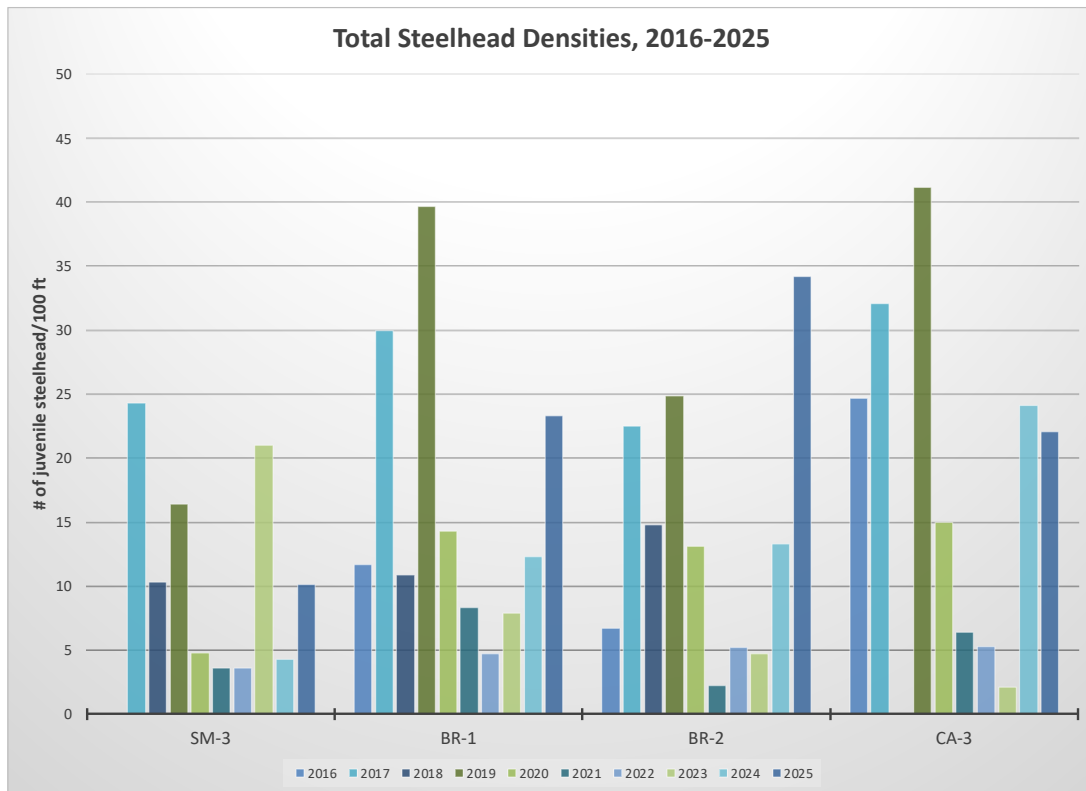
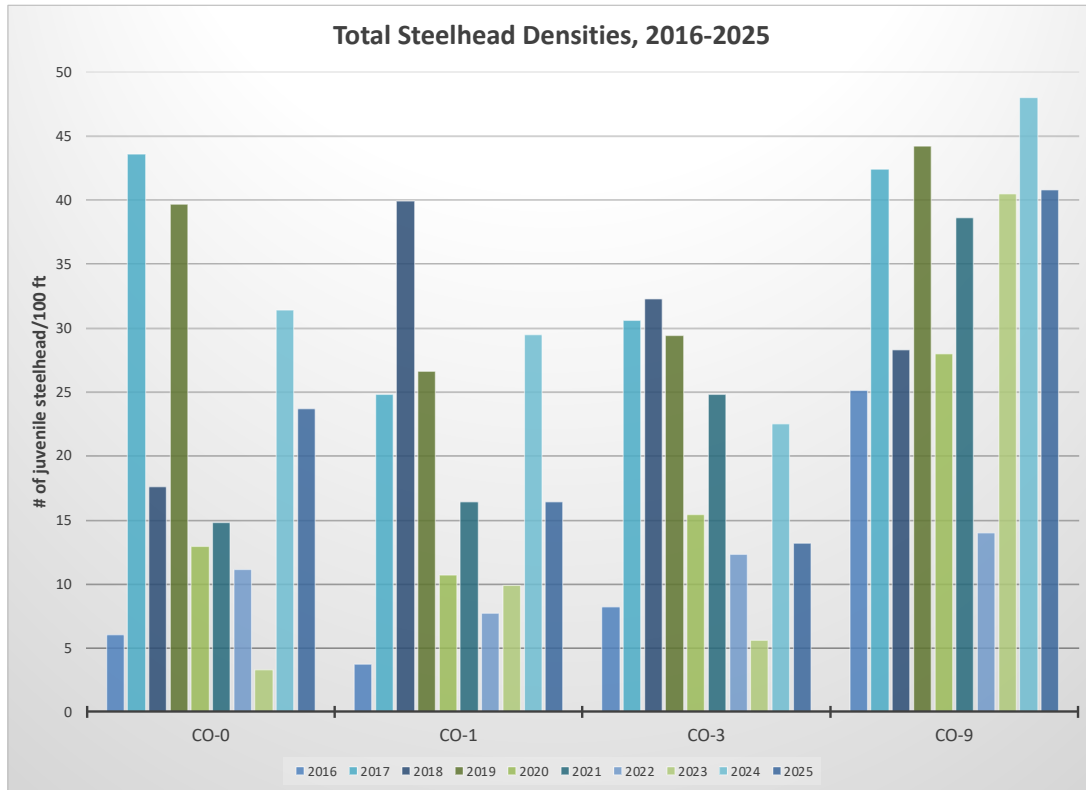


Figure 5. Total Juvenile Steelhead Densities at Eight Sampling Sites in the Corralitos and Casserly Creeks Watersheds, 2016-2025 (data for 2016-2017 adapted from Alley [2017, 2018])

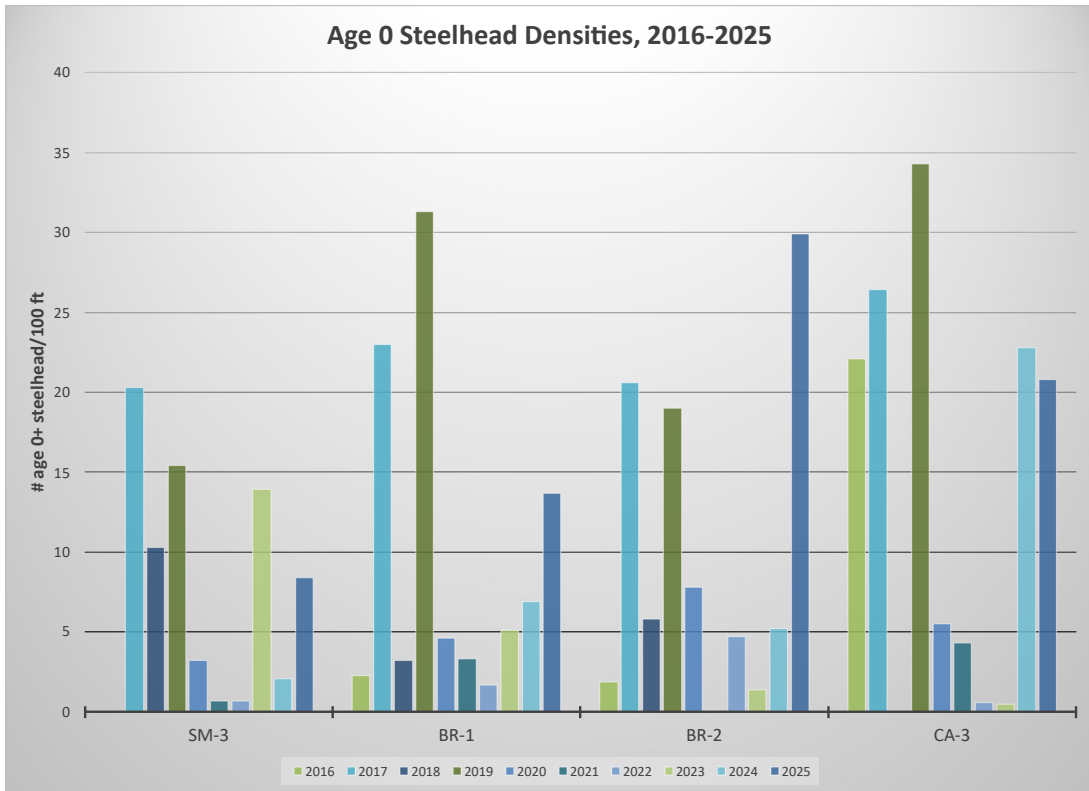
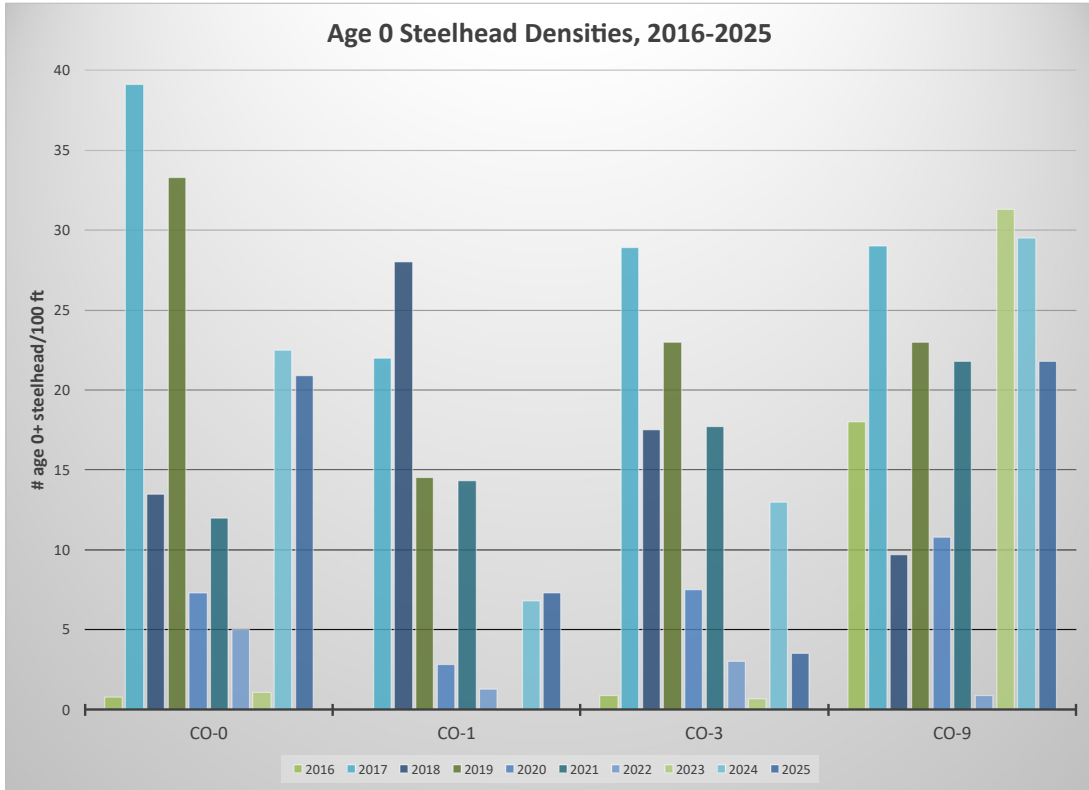
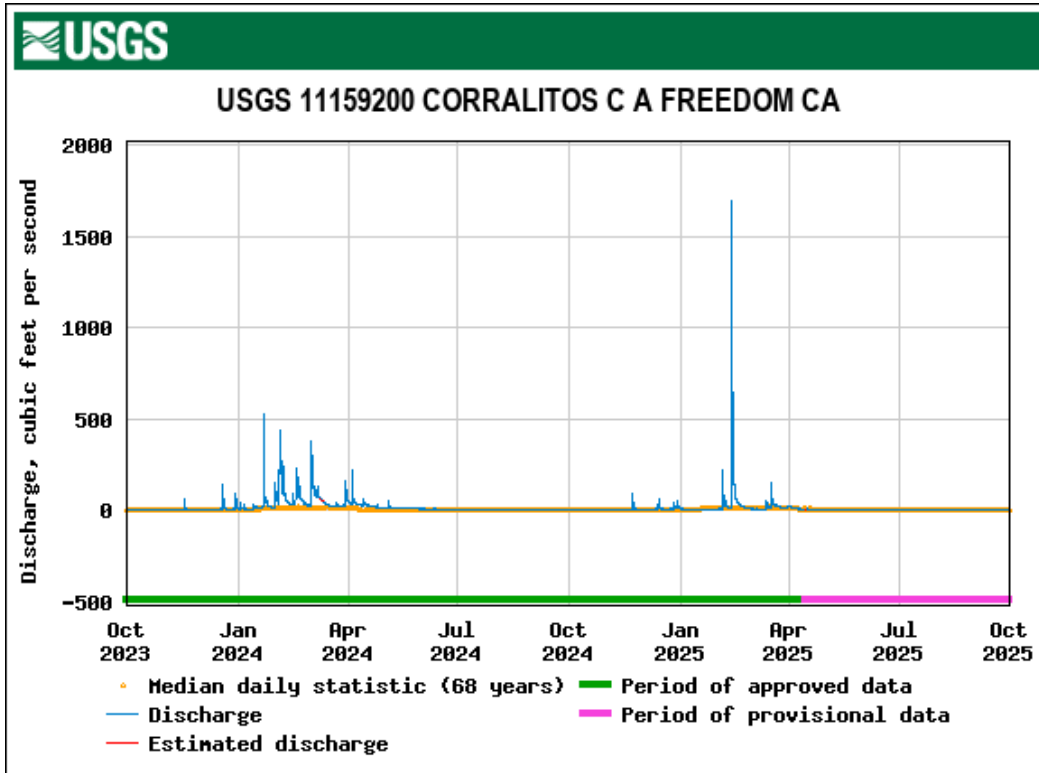
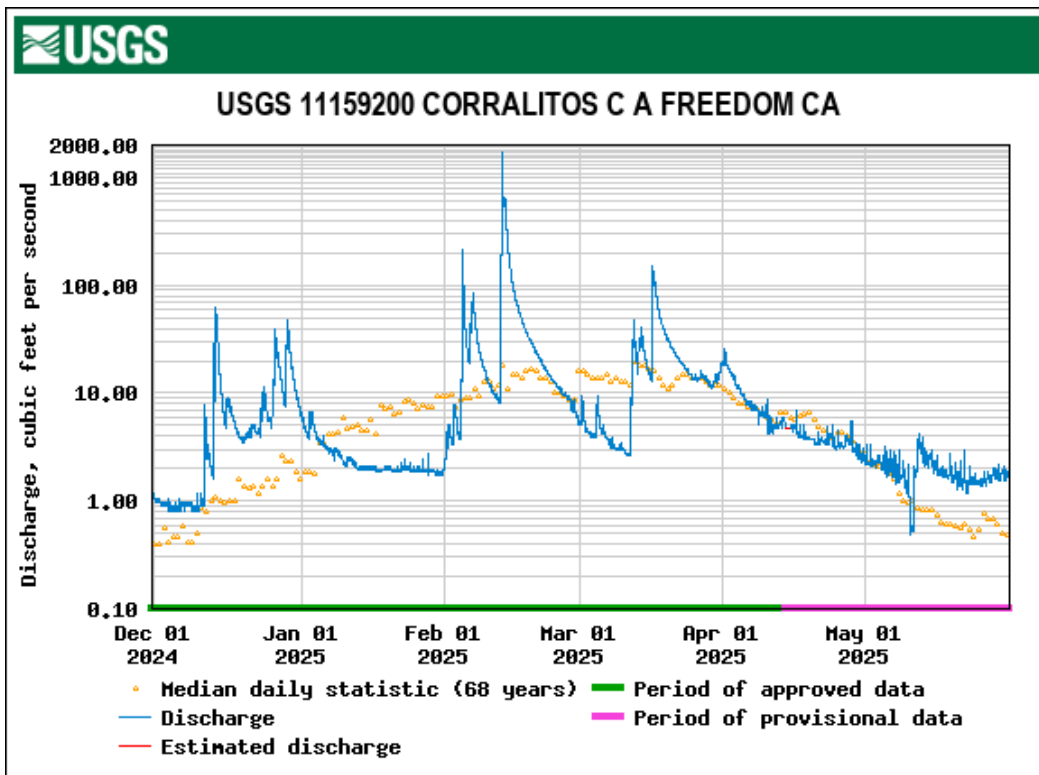


Figure 6. Age 0 Steelhead Densities at Eight Sampling Sites in the Corralitos and Casserly Creeks Watersheds, 2016-2025 (data for 2016-2017 adapted from Alley [2017, 2018])



SOURCE: U.S. Geological Survey, 2026

Figure 7. Mean Daily Discharge in Corralitos Creek at Freedom, USGS 11159200, Water Years 2024-2025



SOURCE: U.S. Geological Survey, 2026

Figure 8. Mean Daily Discharge in Corralitos Creek at Freedom, USGS 11159200, December 2024-May 2025

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Appendix A

Photographs of Eight Sampling Sites in the Corralitos Creek and Casserly Creek Watersheds September 2025

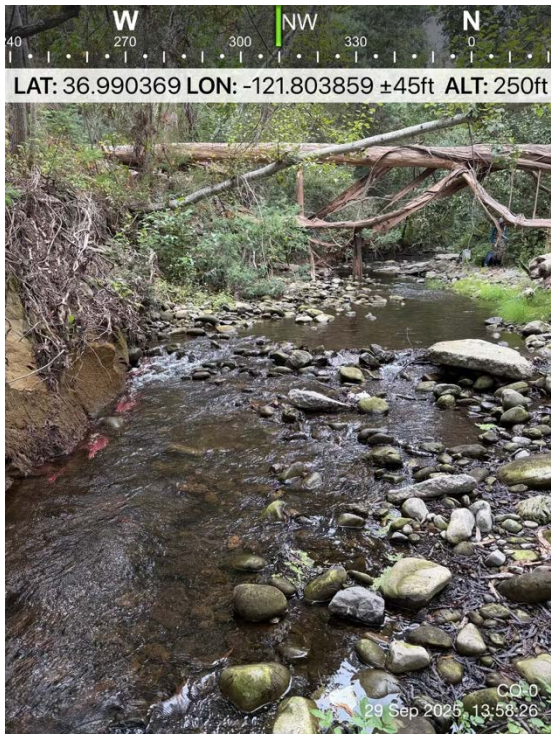


Photo 1. CO-0 flatwater-riffle transition, Sep. 29, 2025

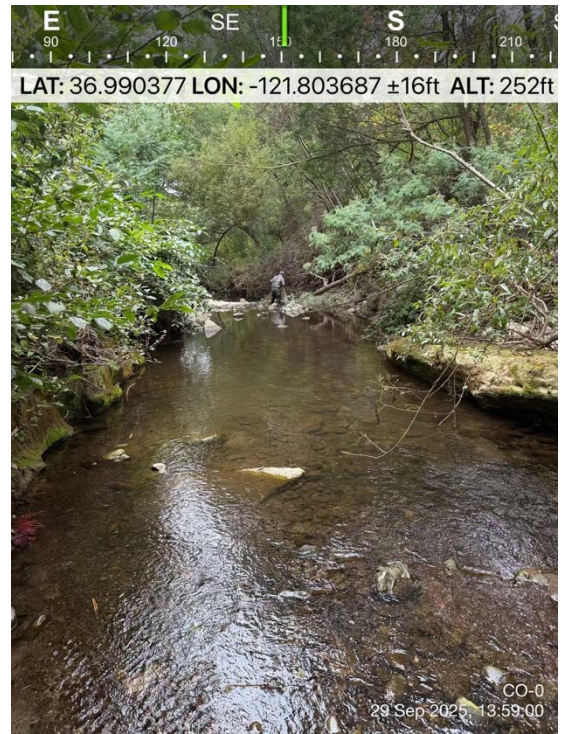


Photo 2. CO-0 flatwater (glide), Sep. 29, 2025

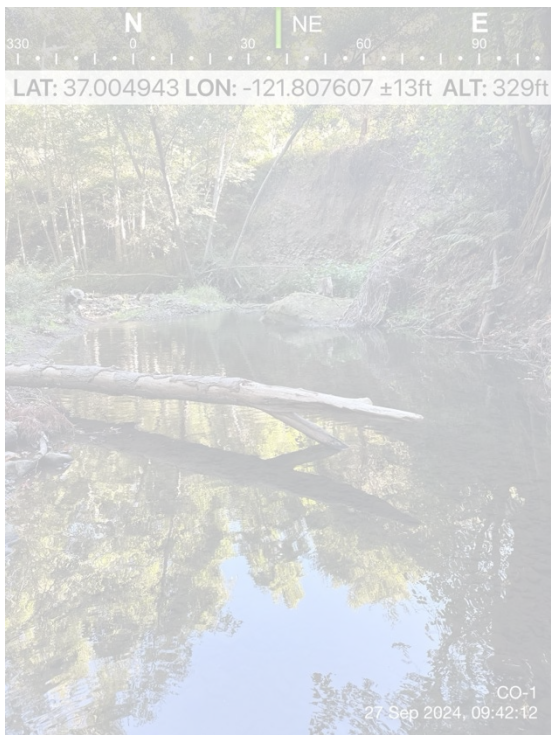


Photo 3. 2025 CO-1 photo not available

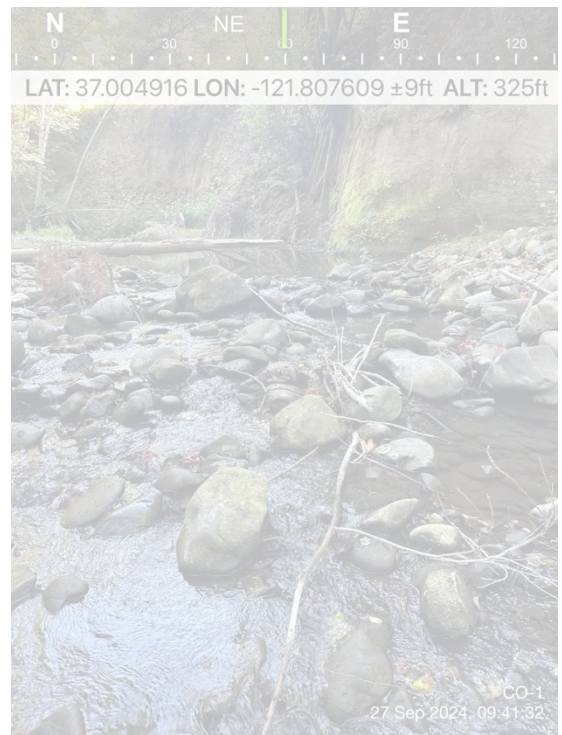


Photo 4. 2025 CO-1 photo not available



Photo 5. CO-3 pool, Sep 29, 2025

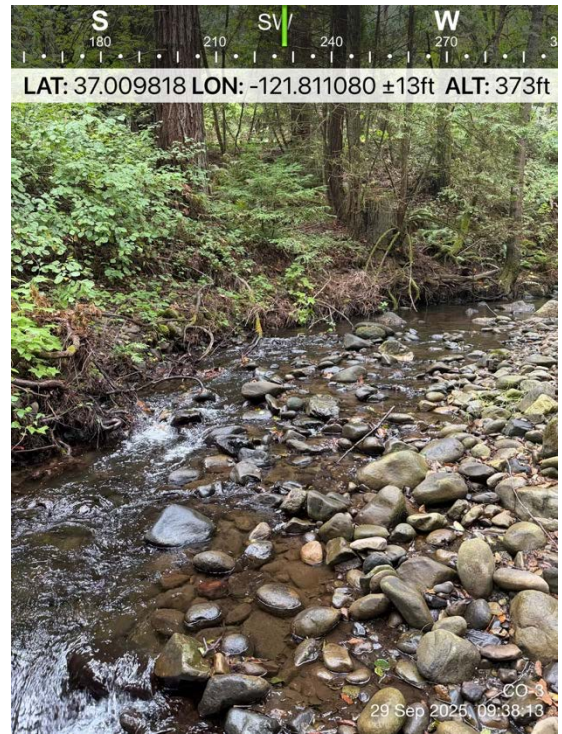


Photo 6. CO-3 riffle, Sep 29, 2025

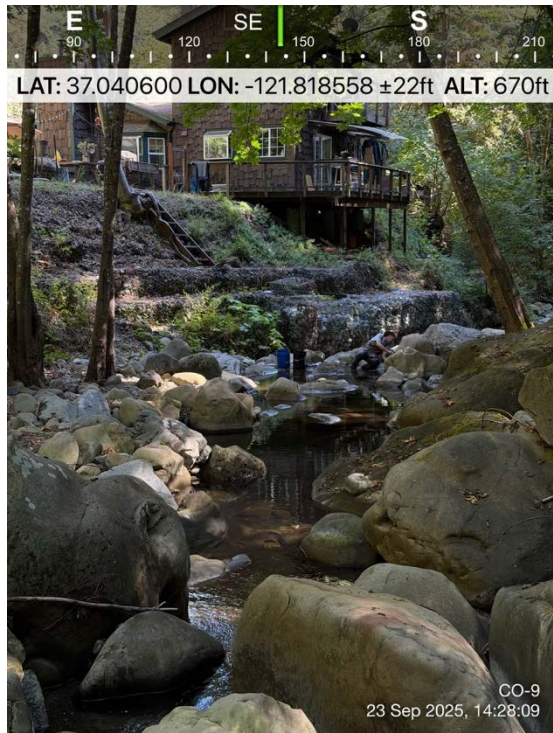


Photo 7. CO-9 pool, Sep. 23, 2025

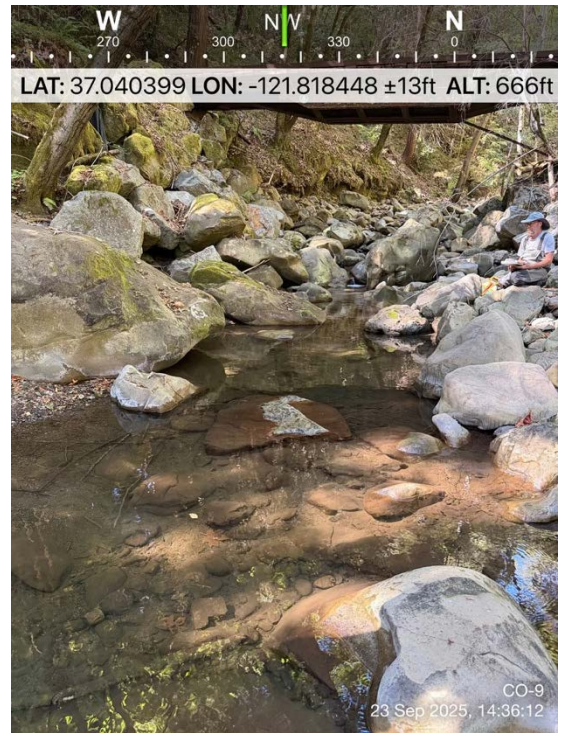


Photo 8. CO-9 flatwater, Sep. 23, 2025



Photo 9. SM-3 pool, Sep. 23, 2025



Photo 10. SM-3 riffle-pool transition, Sep. 23, 2025



Photo 11. 2025 BR-1 photo not available

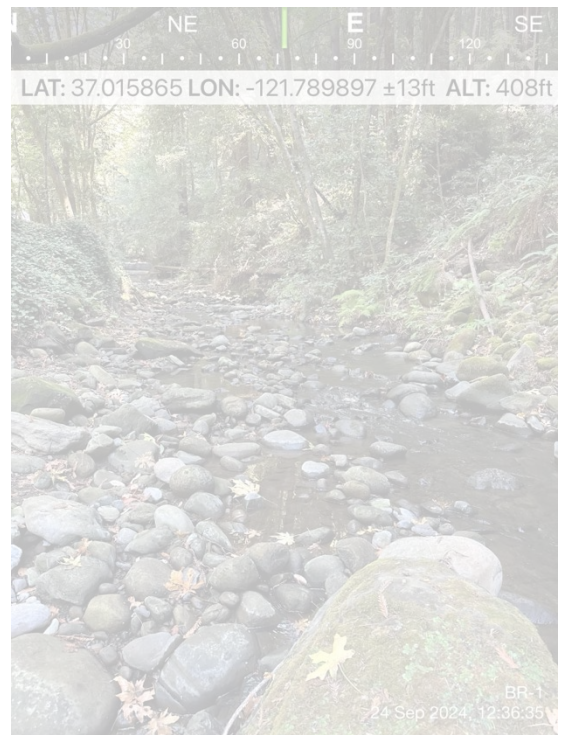


Photo 12. 2025 BR-1 photo not available

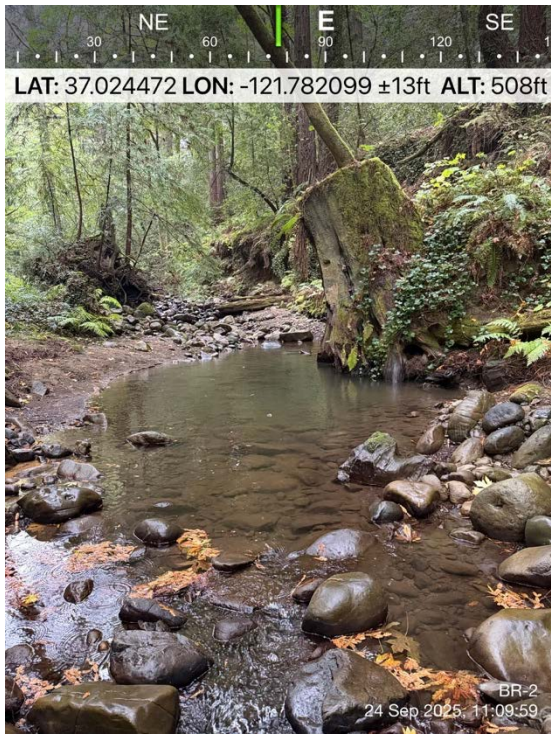


Photo 13. BR-2 pool, Sep. 24, 2025

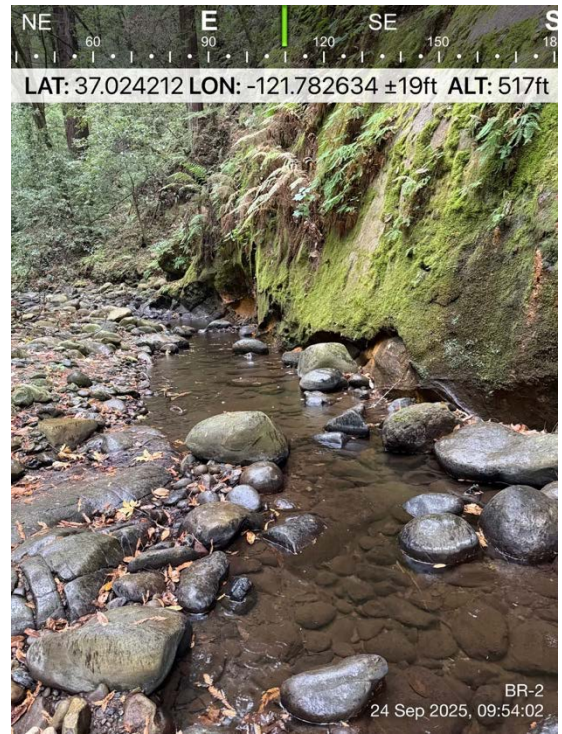


Photo 14. BR-2 flatwater, Sep. 24, 2025

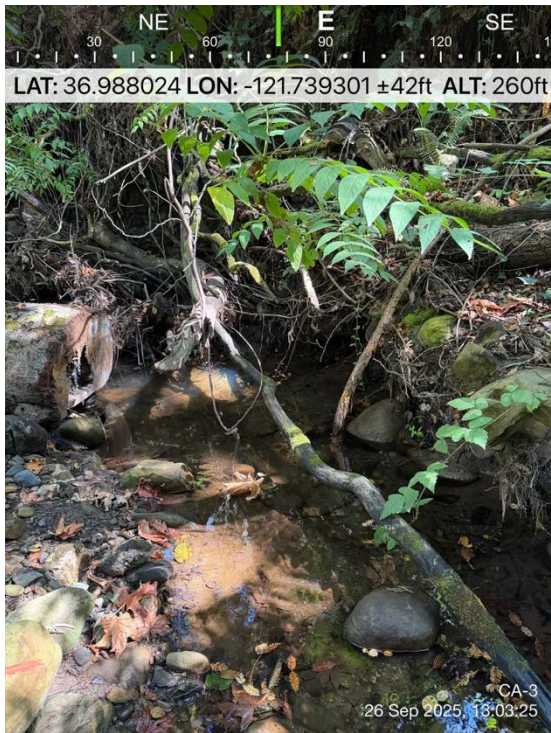


Photo 15. CA-3 pool, Sep. 26, 2025

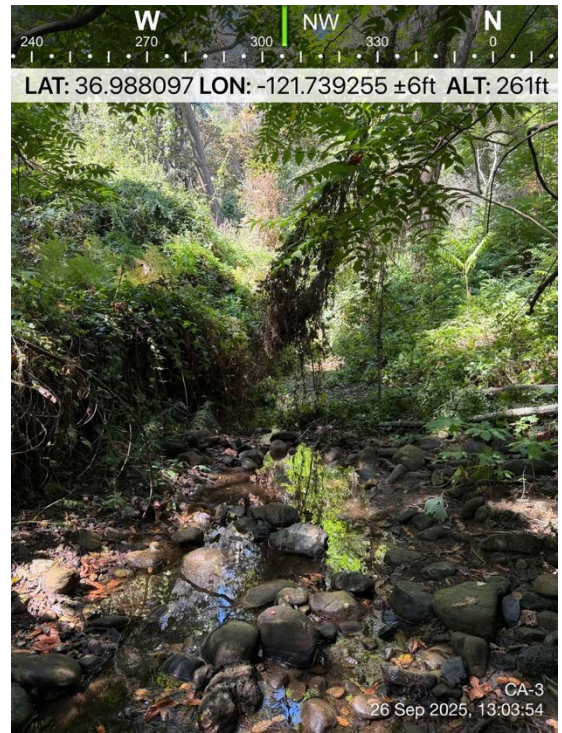


Photo 16. CA-3 flatwater, Sep. 26, 2025

Appendix B

PIT-Tagging Data for the Corralitos Creek and Casserly Creek Watersheds, September 2025

Sample Date	Watershed	Tributary	Tag site	Fish No.	PIT-tag number (full)	Species	Fork Length (mm)	Weight (g)
9/23/25	Salsipuedes	Shingle Mill	SM-3	001	6000530691	ST	169	48.4
9/23/25	Salsipuedes	Shingle Mill	SM-3	002	6000530556	ST	100	11.5
9/23/25	Salsipuedes	Corralitos	CO-9	001	6000530648	ST	119	18.1
9/23/25	Salsipuedes	Corralitos	CO-9	002	6000530732	ST	138	29.1
9/23/25	Salsipuedes	Corralitos	CO-9	003	6000530513	ST	98	10.1
9/23/25	Salsipuedes	Corralitos	CO-9	004	6000530551	ST	121	18.2
9/23/25	Salsipuedes	Corralitos	CO-9	005	6000530554	ST	104	11.4
9/23/25	Salsipuedes	Corralitos	CO-9	006	6000530512	ST	121	19.1
9/23/25	Salsipuedes	Corralitos	CO-9	007	6000530544	ST	157	39.2
9/23/25	Salsipuedes	Corralitos	CO-9	008	6000530670	ST	132	25.8
9/23/25	Salsipuedes	Corralitos	CO-9	009	6000530652	ST	114	16.6
9/23/25	Salsipuedes	Corralitos	CO-9	010	6000530570	ST	108	13.7
9/24/25	Salsipuedes	Browns	BR-2	001	6000530727	ST	132	20.4
9/24/25	Salsipuedes	Browns	BR-2	002	6000530644	ST	105	11.6
9/24/25	Salsipuedes	Browns	BR-2	003	6000530718	ST	103	10.5
9/24/25	Salsipuedes	Browns	BR-2	004	6000530679	ST	123	19.9
9/24/25	Salsipuedes	Browns	BR-2	005	6000530621	ST	183	65.8
9/24/25	Salsipuedes	Browns	BR-2	006	6000530662	ST	109	14.1
9/24/25	Salsipuedes	Browns	BR-1	001	6000530637	ST	128	22.0
9/24/25	Salsipuedes	Browns	BR-2	002	6000530700	ST	113	16.1
9/24/25	Salsipuedes	Browns	BR-3	003	6000530606	ST	121	18.2
9/24/25	Salsipuedes	Browns	BR-4	004	6000530504	ST	112	15.3
9/24/25	Salsipuedes	Browns	BR-5	005	6000530687	ST	100	11.0
9/24/25	Salsipuedes	Browns	BR-6	006	6000530678	ST	103	11.8
9/24/25	Salsipuedes	Browns	BR-7	007	6000530617	ST	109	13.9
9/24/25	Salsipuedes	Browns	BR-8	008	6000530654	ST	95	8.7
9/26/25	Salsipuedes	Corralitos	CO-1	001	6002083193	ST	133	27.3
9/26/25	Salsipuedes	Corralitos	CO-1	002	6002083103	ST	145	28.0
9/26/25	Salsipuedes	Corralitos	CO-1	003	6002083166	ST	136	23.3
9/26/25	Salsipuedes	Corralitos	CO-1	004	6002083157	ST	125	19.8
9/26/25	Salsipuedes	Corralitos	CO-1	005	6002083143	ST	136	32.2
9/26/25	Salsipuedes	Corralitos	CO-1	006	6002083153	ST	131	23.1
9/26/25	Salsipuedes	Corralitos	CO-1	007	6002083142	ST	211	103.8
9/26/25	Salsipuedes	Corralitos	CO-1	008	6002083137	ST	101	10.8
9/26/25	Salsipuedes	Corralitos	CO-1	009	6002083130	ST	134	28.0
9/26/25	Salsipuedes	Corralitos	CO-1	010	6002083154	ST	135	23.6
9/26/25	Salsipuedes	Casserly	CA-3	001	6002083177	ST	101	11.0
9/26/25	Salsipuedes	Casserly	CA-3	002	6002083183	ST	107	13.7
9/26/25	Salsipuedes	Casserly	CA-4	001	6002083152	ST	124	18.6
9/26/25	Salsipuedes	Casserly	CA-4	002	6002083173	ST	90	7.7
9/26/25	Salsipuedes	Casserly	CA-4	003	6002083180	ST	116	16.3
9/26/25	Salsipuedes	Casserly	CA-4	004	6002083197	ST	118	17.0
9/26/25	Salsipuedes	Casserly	CA-4	005	6002083178	ST	154	35.5
9/26/25	Salsipuedes	Casserly	CA-4	006	6002083146	ST	98	9.6
9/26/25	Salsipuedes	Casserly	CA-4	007	6002083192	ST	105	11.9
9/26/25	Salsipuedes	Casserly	CA-4	008	6002083124	ST	95	10.0
9/26/25	Salsipuedes	Casserly	CA-4	009	6002083118	ST	103	10.0
9/26/25	Salsipuedes	Casserly	CA-4	010	6002083174	ST	118	17.1
9/26/25	Salsipuedes	Casserly	CA-4	011	6002083136	ST	111	12.9
9/26/25	Salsipuedes	Casserly	CA-4	012	6002083199	ST	93	8.1
9/26/25	Salsipuedes	Casserly	CA-4	013	6002083189	ST	110	12.3
9/26/25	Salsipuedes	Casserly	CA-4	014	6002083109	ST	91	7.7
9/26/25	Salsipuedes	Casserly	CA-4	015	6002083111	ST	106	
9/26/25	Salsipuedes	Casserly	CA-4	016	6002083131	ST	94	
9/26/25	Salsipuedes	Casserly	CA-4	017	6002083129	ST	100	
9/29/25	Salsipuedes	Corralitos	CO-3	001	6002083185	ST	118	17.5
9/29/25	Salsipuedes	Corralitos	CO-3	002	6002083165	ST	123	19.4
9/29/25	Salsipuedes	Corralitos	CO-3	003	6002083195	ST	139	28.6
9/29/25	Salsipuedes	Corralitos	CO-3	004	6002083128	ST	103	10.8
9/29/25	Salsipuedes	Corralitos	CO-3	005	6002083176	ST	125	22.8
9/29/25	Salsipuedes	Corralitos	CO-3	006	6002083158	ST	131	24.0
9/29/25	Salsipuedes	Corralitos	CO-3	007	6002083120	ST	213	100.0
9/29/25	Salsipuedes	Corralitos	CO-3	008	6002083159	ST	104	12.4
9/29/25	Salsipuedes	Corralitos	CO-3	009	6002083134	ST	114	14.2
9/29/25	Salsipuedes	Corralitos	CO-3	010	6002083105	ST	151	31.6
9/29/25	Salsipuedes	Corralitos	CO-3	011	6002083119	ST	124	18.3
9/29/25	Salsipuedes	Corralitos	CO-3	012	6002083113	ST	92	9.7
9/29/25	Salsipuedes	Corralitos	CO-3	013	6002083121	ST	88	8.0
9/29/25	Salsipuedes	Corralitos	CO-3	014	6002083184	ST	122	20.4