Monitoring and Evaluation of Salmonid Habitat Restoration

2024 Annual Validation Monitoring Report for the South Coast

California Department of Fish & Wildlife

Contract No. P2396002

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February 2025

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INTRODUCTION

The Monitoring and Evaluation of Salmonid Habitat Restoration (MESHR) team conducts effectiveness, validation, and Before-After-Control-Impact (BACI) monitoring on restoration projects funded through the California Department of Fish and Wildlife (CDFW) Fisheries Restoration Grant Program (FRGP). Each grant cycle, MESHR selects 10% minimum of funded projects to receive effectiveness monitoring to comply with the United States Army Corps of Engineers (USACE) permitting requirements of the regional general permits (RGP-12 for the north coast of California and RGP-78 for the south coast). This report summarizes validation monitoring completed by MESHR staff in Southern California within the area covered by the RGP-78 permit, which includes coastal watersheds from San Luis Obispo County through San Diego County (hereinafter referred to as South Coast).

Projects are selected using a stratified random sampling design stratified by USACE geographic area and FRGP project type. Projects are randomly selected until the 10% minimum is achieved. Final sampling rates are above 10% as additional projects are selected until one to three projects from each area/project type stratum is represented. Due to the low numbers of FRGP projects implemented annually within the region covered by RGP-78, 100% of projects are commonly selected for monitoring. Additionally, Proposition 1 Restoration Grant Program (Prop 1) projects within the South Coast region may be selected for monitoring if they align with FRGP project types and monitoring abilities.

Three project types receiving effectiveness monitoring also receive validation monitoring: instream habitat improvement (HI), fish passage at stream crossings (FP), and instream barrier modification for fish passage (HB). An upslope watershed restoration (HU) project can also include validation monitoring if it has an instream component. A subset of HI projects with validation monitoring also receive BACI monitoring to monitor habitat metrics, fish response, and overall effectiveness of large wood (LW) treatments. Due to the limited number of HI projects implemented in the South Coast region, none have been selected for BACI monitoring as of 2024.

Validation monitoring assesses salmonid response to instream treatments or fish barrier remediation. Snorkel surveys are used to estimate salmonid distribution, relative abundance, and stream habitat availability. Spawning surveys are used to estimate salmonid spatial structure. If conducted as a complete census of available spawning habitat, spawning surveys can be used to provide an index of effective population size. This report summarizes validation monitoring efforts conducted by South Coast MESHR staff from January 1, 2024, to December 31, 2024.

The only anadromous salmonid species present within the RGP-78 region is steelhead trout (*Oncorhynchus mykiss*). Steelhead located within the region belong to two Distinct Population Segments (DPSs): the South-Central California Steelhead DPS and the Southern California Steelhead DPS. The South-Central California Steelhead DPS, occurs from the Pajaro River watershed in Monterey County to (but not including) the Santa Maria River watershed in Santa Barbara County. It is currently listed as threatened under the federal Endangered Species Act (ESA). The Southern California Steelhead DPS, occurs from the Santa Maria River watershed in Santa Barbara County through the Tijuana River at the U.S.-Mexico border. It is currently listed as endangered under the ESA (NOAA 1997).

METHODS

Validation monitoring consists of summer juvenile snorkel surveys and winter adult spawning ground surveys. All three project types that receive validation monitoring receive snorkel surveys, while adult spawning surveys are limited to fish passage projects (FP and HB). Monitoring of HI projects is typically conducted three years after implementation to allow LW features to scour over three winter flow periods. However, FB and HB projects can be monitored one to three years after implementation for fish or redd presence above former barriers. If recolonization by salmonids is not documented upstream of a former barrier within the first three years of post-treatment monitoring, additional monitoring can be done.

Snorkel Surveys

MESHR biologists follow snorkeling protocols adapted from Duffy (2005) and O'Neal (2007) to conduct snorkel validation surveys to determine the presence or absence and density of juvenile salmonids in stream reaches directly associated with instream features or barrier removal locations. For HB and FP projects, one to five pool units upstream and downstream of the project barrier location are snorkeled. For HI projects, up to five randomly selected pool and/or run habitat units adjacent to instream structure locations are selected for snorkeling. South Coast MESHR staff snorkel additional units, up to the length of CDFW's previously established California Coastal Monitoring Program (CMP) reaches. This is to collect data that can be used by both projects and be comparable with past data collected by CMP. This will also help determine the most effective snorkel survey methods for MESHR validation data collection in South Coast streams. Additionally, the stream habitat within and near project sites often dries during the summer snorkel season, making it unlikely that fish

will be observed in pools surrounding project sites. So, all upstream available habitat should be snorkeled to effectively determine whether steelhead have repopulated these streams following fish passage barrier removals.

Snorkel surveys are conducted in teams of two or more, which include at least one data recorder and one snorkeler. During surveys, the wetted stream channel is delineated into discrete, natural units of similar habitat (Hankin 1984). Units are classified as either riffles, pools, or flatwaters according to certain defining characteristics. These habitat types are adopted from definitions outlined in Flosi et al. (2010).

For these surveys, all units with a maximum depth of 0.7 feet (ft) or greater are deemed snorkelable and are snorkeled in one pass. The snorkeler enters the water at the downstream end of each habitat unit while being careful to minimize disturbance to the water and sediment. Once in the water, the snorkeler moves in a zig-zag pattern towards the upstream end of the unit making sure to visually search the entire area of the unit. The snorkeler searches the margins of the unit, boulder crevices, and other areas of potential fish cover using a waterproof flashlight. Cover is defined as any natural or artificial stream feature capable of hiding a 3-inch trout from the surface. To avoid duplicate counts, fish are counted as the snorkeler moves past them.

For each salmonid observed, the associated cover and estimated length are recorded. Fish sizes are estimated by 2-inch size bins (0-1.99 inches, 2-3.99 inches, 4-5.99 inches, etc.). The snorkeler assesses the total trout cover available in each unit by estimating the percent of surface area containing trout cover and surface area containing no cover. The snorkeler also estimates the percentage of total cover each cover type in the unit comprised.

All habitat units are measured for length, mean width, mean depth, maximum depth, and maximum residual depth. Length is measured along the thalweg (line of lowest elevation within a valley or watercourse) and mean unit width is measured perpendicular to the length (thalweg) line. The percentage of surface area that contained exposed substrate (usually comprised of gravel, boulders, or bedrock) is estimated for each unit. Exposed substrate included areas of dry exposed substrate not accounted for in measurements of unit length or mean width. This allows for a more accurate surface area calculation of the available wetted habitat.

Water visibility is recorded on a scale of zero to three. A value of zero indicates the snorkeler is unable to perform the survey due to a lack of visibility, one is poor visibility, two is adequate visibility, and three is clear visibility. Water and air temperatures are measured with a thermometer at the beginning of each survey day and subsequently after every tenth unit surveyed. Stream flow is measured using OTT MF Pro flow meter or recorded from a nearby USGS gauge.

Spawning Surveys

Adult spawning surveys record counts of total redds, live fish, and carcasses in reaches immediately upstream and downstream of a barrier removal location. Spawner surveys

are conducted based on the methods outlined in *California Department of Fish & Game's Salmonid Spawning Survey Personal Digital Assistant Data Entry Protocol* (2011) and the *National Marine Fisheries Service's Southern California Steelhead DPS Redd Survey Protocols* (2012 and 2015). The minimum standard survey reach length is approximately 20 bankfull channel widths, though survey lengths further upstream of the standard 20 bankfull channel widths can be established if a surveyed reach does not contain suitable spawning habitat. In addition to MESHR minimum standard survey reach length, the South Coast MESHR team generally surveys the full length of previously established CMP redd survey reaches when restoration projects occur in streams with CMP survey reaches. This allows for more accurate comparison of data collected by MESHR with historical data collected by CMP. Surveys are conducted during the spawning season from January through May. Survey reaches are planned to be surveyed again every two weeks after the initial survey date if weather and time permit. Approximately two weeks is the accepted minimum amount of time redds remain detectable in South Coast stream systems. Some creeks may only be surveyed once depending on time available, stream flows and/or weather conditions.

At the start of the survey, air temperature, water temperature, and velocity/flow measurements are recorded. A GPS unit is used to determine survey start and endpoints and coordinates of all recorded observations.

Teams of at least two surveyors walk the reaches in an upstream direction and record observations. Fish observations are identified to species. For each salmonid observation, a total length estimate, location, condition, and life history stage (when possible) are recorded. When redds are observed, measurements of pot and tailspill dimensions are taken. Pot length, width, and depth relative to the adjacent streambed are measured. For tailspill dimensions, the tailspill length and two width measurements (taken at 1/3 and 2/3 the distance along the tailspill from the pot) are recorded. Dominant substrate size is also recorded for both the pot and tailspill. Redds are marked with a flag denoting the redd record number, distance and bearing of redd from the flag location, date of initial recording, and redd age. Redd ages and significant changes to redd measurements are updated and recorded during subsequent observations. Redds are re-measured when pot and tailspill dimensions have noticeably changed following their initial observation.

Data Analysis

All validation monitoring data is collected using either paper datasheets or a tablet with custom Pendragon forms and subforms. Data is then entered into Excel workbooks and later undergoes quality control methods to correct any potential errors.

Snorkel survey data are analyzed to calculate salmonid size distributions and densities, and total and mean habitat measurements. To examine trout relative abundances, trout density is calculated as the mean number of trout per square foot. To evaluate trout life stage diversity, the total number of trout per size class are calculated. To examine wetted habitat the total length surveyed, mean unit length, total unit area, mean unit area,

mean unit depth, mean unit maximum depth, total unit volume, and mean unit volume are calculated. For each mean the standard error (± SE) is calculated. All analyses are completed using R (version 4.4.1, R Core Team 2024) and R Studio (version 2024.9.0, RStudio, Inc 2024).

Spawning survey data are analyzed to determine salmonid distribution and redd area. Total redd length is calculated as the sum of the pot and tailspill lengths and redd area is calculated as the sum of pot and tailspill areas per Gallagher et al. (2007). These measurements are used to compare the relative sizes of all redds observed to evaluate whether a redd was produced by anadromous or resident *O. mykiss*. We examine *O. mykiss* distribution by calculating total *O. mykiss* observation counts by reach. All analyses are completed using R software.

RESULTS

Validation Monitoring Project Selection

From the 2024 effectiveness monitoring selection, no new projects were available to select for pre-treatment validation monitoring. Two projects were selected the previous year to receive pre-treatment validation monitoring in the South Coast region (Table 1). Both projects received another season of pre-treatment spawner validation surveys, and one received pre-treatment snorkel surveys.

Table 1. 2024 restoration projects that received pre-treatment validation monitoring.

Grant #	Project Type	Project Title	Grantee	Status
Q2250406	FP	Maria Ygnacio Creek Fish Passage Project Implementation – Patterson Ave Bridge	Earth Island Institute	Pre-treatment snorkel and spawner surveys conducted
Q2296016	Prop 1	Wheeler Gorge Campground Fish Passage Project--Implementation	Earth Island Institute	Pre-treatment spawner surveys conducted

Additionally, three projects were surveyed for post-treatment monitoring. None of these projects received snorkel validation surveys, though all had spawner surveys conducted to confirm successful fish passage. These post-treatment projects are included in 2024 validation efforts (Table 2).

Table 2. Restoration projects from previous years that received post-treatment validation monitoring in 2024.

Grant #	Project Type	Project Title	Grantee	Status
D1450006	FP	Leo Carrillo State Park, Arroyo Sequit Steelhead Trout Barrier Removal	California Department of Parks and Recreation	Post-treatment snorkel and spawner surveys conducted
P1450010	FP	Circle G Ranch Fish Passage Restoration	Earth Island Institute/South Coast Habitat Restoration	Post-treatment spawner surveys conducted
Q1950902	FP	Davy Brown/Munch Creek Fish Passage Construction Project	Earth Island Institute	Post-treatment spawner surveys conducted

This report covers validation monitoring for 2024 and includes data collected from January 1, 2024, to December 31, 2024.

Pre-Treatment Snorkel Survey Observations

The following project received pre-treatment snorkel validation monitoring in 2024:

- Q2250406 - Maria Ygnacio Creek Fish Passage Project Implementation – Patterson Ave Bridge

Maria Ygnacio Creek Fish Passage Project Implementation – Patterson Ave Bridge (FP)

This project will modify an existing fish passage barrier along Maria Ygnacio Creek below the Patterson Ave Bridge to allow for juvenile and adult southern steelhead fish passage at the site. The barrier is located within the Goleta Slough Complex, at the confluence of Atascadero and Maria Ygnacio creeks, approximately 1.5 miles upstream of the mouth of the estuary.

In 2024, 3 miles of Maria Ygnacio Creek were surveyed during pre-treatment validation snorkel surveys. This survey reach covered from the confluence with Atascadero Creek (which is also the location of the project site) up to the confluence with East Fork Maria Ygnacio Creek. A total of 47 habitat units met the requirements to be considered snorkelable, all of which were upstream of the project site. A total area of 59,614.1 ft^2 of stream habitat was snorkeled. Snorkeled habitat units had an average area of 1,268.4± 172.26 ft^2 (mean ± SE) and an average maximum residual depth of 2.1 ± 0.19 ft. A total of 185 *O. mykiss* were observed during the survey, with a calculated fish density of 0.003 ± 0.001 fish/ft^2 (Table 3).

Table 3. Maria Ygnacio Creek Fish Passage Project Implementation – Patterson Ave Bridge, pre-treatment snorkel validation survey data.

Date(s)	No. of Units Surveyed	Avg Unit Area (ft^2)	SE (ft^2)	Avg Max Residual Depth (ft)	SE (ft)	*O. mykiss* observations	Density fish/ft^2	SE (ft^2)
8/5/2025-8/13/2025	47	1,268.4	172.26	2.1	0.19	185	0.003	0.001

This survey reach was selected because much of the lower portion of Maria Ygnacio Creek, including part of the area within and upstream of the project site, seasonally dries each year. Summer refugia is mostly located within the upper watershed. Atascadero Creek downstream of the project site was not snorkeled due to water quality and safety concerns.

Adult Spawning Survey Observations

The following projects received spawning survey validation monitoring in 2024:

- D1450006 - Leo Carrillo State Park, Arroyo Sequit Steelhead Trout Barrier Removal
- P1450010 - Circle G Ranch Fish Passage Restoration
- Q1950902 - Davy Brown/Munch Creek Fish Passage Construction Project
- Q2250406 - Maria Ygnacio Creek Fish Passage Project Implementation – Patterson Ave Bridge
- Q2296016 - Wheeler Gorge Campground Fish Passage Project--Implementation

<u>Leo Carrillo State Park, Arroyo Sequit Steelhead Trout Barrier Removal (FP)</u>

This project removed two stream crossing barriers to upstream fish passage along Arroyo Sequit. The first crossing is located approximately 0.1 miles upstream of the mouth of the estuary and the second is located approximately 0.65 miles upstream of the first barrier. The barriers were removed, and fish passage restored by late 2015, while overall project construction was completed in early 2017.

During the 2024 spawning season, Arroyo Sequit was split into two survey reaches which combined cover 2.72 stream miles, from the estuary to a private property boundary. Three spawning surveys were conducted by MESHR and CDFW staff during the 2024 spawning season. No steelhead or redds were observed during any of these surveys (Table *4*).

Table 4. Leo Carrillo State Park, Arroyo Sequit Steelhead Trout Barrier Removal: observations from adult spawning surveys conducted after barrier removal.

Reach Length (mi.)	Date Surveyed	Live Fish	Carcasses	Redds
1.65 (SQT1)	2/29/2024	0	0	0
1.07 (SQT2)	3/11/2024	0	0	0
2.72 (SQT 1+2)	4/9/2024	0	0	0

Annual spawning surveys have been conducted in Arroyo Sequit since 2010. The Resource Conservation District of the Santa Monica Mountains conducted monthly surveys during spawning seasons from 2010 through 2019. Over the course of all these surveys, only two steelhead were recorded and no redds or spawning activity were observed (Dagit et al. 2019). CDFW conducted bi-weekly spawning surveys during the 2020 and 2021 spawning seasons and observed no steelhead or redds during any survey. MESHR staff have conducted spawner surveys in partnership with the CMP since 2022, and again no steelhead or redds have been observed.

Circle G Ranch Fish Passage Restoration (FP)

This project, completed in 2016, removed a barrier along Carpinteria Creek, located approximately 2.9 miles upstream of the mouth of the estuary. The barrier, consisting of approximately 100 feet of concrete lined channel and banks and an undersized bridge, was removed. It was replaced with a larger free spanning bridge and regraded and reconstructed channel consisting of engineered streambed materials. Additionally, the banks were reconstructed and revegetated with native plants.

Carpinteria Creek was surveyed for 4.2 miles, the entire part of the stream from the estuary to a natural barrier to fish passage that is accessible to anadromous fish. During the 2024 spawning season, four spawning surveys were conducted by MESHR and CDFW staff. No steelhead or redds were observed during these surveys (Table *5*).

Table 5. Circle G Ranch Fish Passage Restoration: observations from adult spawning surveys conducted after barrier removal.

Reach Length (mi.)	Date Surveyed	Live Fish	Carcasses	Redds
4.21	1/25/2024	0	0	0
4.21	2/14/2024	0	0	0
4.21	3/13/2024	0	0	0
4.21	4/25/2024	0	0	0

Bi-weekly spawning surveys have been conducted by CDFW and previous Pacific States Marine Fisheries Commission (PSMFC) project staff along this same survey reach annually from 2016 through 2021 and by CDFW and MESHR staff from 2022 through 2024. No steelhead or redds have been observed during these surveys.

Davy Brown/Munch Creek Fish Passage Construction Project (FP)

This project removed three barriers to fish passage within the Davy Brown Creek sub watershed. Two concrete Arizona crossings along Davy Brown Creek were removed and replaced with free spanning bridges. The lower crossing is located just 120 ft upstream of the start of Davy Brown Creek at the confluence with Manzana Creek. The upper crossing is located approximately 1.2 miles upstream of the lower crossing. On Munch Creek, one concrete Arizona crossing, located approximately 0.1 miles upstream of the confluence with Davy Brown Creek, was decommissioned and removed. Additionally, the channel was regraded and reconstructed with native streambed material at all three crossing locations. Access was restored to a total of 3.13 miles of anadromous habitat.

During the 2024 spawning season, surveys began in March following strong winter storms in previous months. Davy Brown Creek was surveyed for 2.12 miles, from the confluence with Manzana Creek to a natural waterfall barrier to anadromy. Munch Creek was surveyed for 0.5 miles from the confluence with Davy Brown Creek to a natural fish passage barrier. Davy Brown and Munch Creeks were each surveyed three times during the 2024 spawning season (Table 6).

Table 6. Davy Brown/Munch Creek Fish Passage Restoration Project observations from adult spawning surveys in 2024 following barrier removal. Both Davy Brown Creek (DVB) and Munch Creek (MCH) were surveyed.

Reach Length (mi.)	Date Surveyed	Live Fish	Carcasses	Redds
0.5 (MCH)	3/11/2024	24	0	0
2.12 (DVB)	3/12/2024	44	0	3
2.12 (DVB)	4/2/2024	19	0	0
0.5 (MCH)	4/4/2024	19	0	0
2.12 (DVB)	4/22/2024	285	0	0
0.5 (MCH)	4/23/2024	85	0	0

A total of 3 redd and 348 trout observations were made during the three surveys conducted this season on Davy Brown Creek. Of the 348 trout observed, 82 were of an indeterminate life stage, with estimated sizes from 3 - 14 inches, and 266 were young-of-year (YOY) trout (< 2 inches). Previous studies using redd surveys have demonstrated that anadromous and resident trout redds can be distinguished by size (Zimmerman and Reeves 2000; Kendall et al. 2015). Redd size criteria outlined in Fish Bulletin 182 classifies redd size less than 0.95 m^2 as rainbow trout (Boughton et al. 2022). All three redds recorded in Davy Brown Creek would be classified as likely resident trout redds. Two of the redds had measured areas of 0.12 m^2 and 0.18 m^2. The third redd was unable to be measured as resident trout were observed on the redd during the survey and no measurements were taken to avoid disturbing the fish.

A total of 128 trout were observed during the three surveys during the 2024 spawning season on Munch Creek. Of the 128 trout observed, 62 were of an indeterminate life stage, with estimated sizes from 3 - 13 inches, and 66 were YOY trout (< 2 inches). Individuals were not marked or tagged, resulting in the potential for redundant fish counts in subsequent surveys. No adult anadromous steelhead (≥ 16 inches) or redds large enough to be attributed to anadromous adult steelhead were observed.

Previous spawning surveys had been conducted by a PSMFC monitoring project in 2017 along the same survey reaches used by MESHR starting in 2022. Surveys were conducted approximately once every two weeks throughout the spawning season from January through May. Numerous resident trout were recorded on both Davy Brown and Munch Creeks upstream of the barriers. No anadromous adult steelhead or anadromous redds were observed during previous spawner surveys.

Maria Ygnacio Creek Fish Passage Project Implementation – Patterson Ave Bridge (FP)

This project proposes to modify the existing Patterson Ave Bridge fish passage barrier to allow for fish passage at the site for juvenile and adult southern steelhead. The barrier is located within the Goleta Slough Complex, at the confluence of Atascadero and Maria Ygnacio creeks, approximately 1.5 miles upstream of the mouth of the estuary. Removal of the barrier will restore access to 0.77 miles of upstream migratory habitat, to the next impassible barrier. Other upstream barriers within Maria Ygnacio Creek have had designs for removal completed, so this project is the first step in a larger effort to remove all barriers within the watershed.

In 2023, several survey reaches were established along Maria Ygnacio Creek by the CMP. The first survey reach begins at the Patterson Ave. Bridge barrier and the rest are further upstream. The fourth reach is inaccessible due to landowner access issues. The lower three reaches were surveyed together three times in 2024 by MESHR and/or CDFW staff. Spawning surveys along the three accessible survey reaches were conducted three times during the 2024 spawning season (Table 7).

Table 7. Maria Ygnacio Creek Fish Passage Project Implementation – Patterson Ave Bridge: observations from adult spawning surveys conducted in 2024 prior to barrier removal. Maria Ygnacio Creek (MYG) was delineated into 4 CMP survey reaches, the downstream-most three of which were surveyed during the 2024 spawning season.

Reach Length (mi.)	Date Surveyed	Live Fish	Carcasses	Redds
3.5 (MYG 1,2,3)	3/20/2024	1	0	0
3.5 (MYG 1,2,3)	4/8/2024	0	0	0
3.5 (MYG 1,2,3)	4/24/2024	100	0	0

A total of 101 trout were observed during these surveys on Maria Ygnacio Creek. Of the 101 trout observed, 3 were of an indeterminate life stage, with estimated sizes ranging from 5 - 7 inches, and 98 were YOY trout (< 2 inches). No anadromous steelhead (≥ 16

inches) or redds were observed during these surveys. As no signs of anadromous steelhead were observed and adult resident trout are known to be present, it is likely that these YOY were the product of resident spawning activity.

Wheeler Gorge Campground Fish Passage Project – Implementation

This project proposes to remove a total of four low flow stream crossings, two on North Fork Matilija Creek and two on Bear Creek. Two of the four crossings will be replaced with vehicular bridges while the remaining two will be removed and the area restored. This project will restore access to approximately 13 additional miles of spawning and rearing habitat.

North Fork Matilija Creek was surveyed for 4.7 miles, from the confluence with Matilija Creek to the total barrier to fish passage at Wheeler Gorge Campground. Bear Creek was surveyed for 1.7 miles, from the confluence with North Fork Matilija Creek to a total natural barrier to fish passage. In 2024, ten surveys were conducted on North Fork Matilija Creek and five surveys were conducted on Bear Creek. No trout or redds were observed during any of these surveys (Table 8).

Table 8. Wheeler Gorge Campground Fish Passage Project – Implementation: observations from adult spawning surveys conducted in 2024 prior to barrier removal. Two reaches on North Fork Matilija Creek (NFM) were surveyed and one reach on Bear Creek (BER) was surveyed.

Reach Length (mi.)	Date Surveyed	Live Fish	Carcasses	Redds
2.5 (NFM1)	1/11/2024	0	0	0
2.2 (NFM2)	1/16/2024	0	0	0
1.7 (BER)	1/23/2024	0	0	0
2.5 (NFM1)	2/15/2024	0	0	0
2.2 (NFM2)	2/15/2024	0	0	0
1.7 (BER)	2/15/2024	0	0	0
2.5 (NFM1)	3/5/2024	0	0	0
2.2 (NFM2)	3/5/2024	0	0	0
1.7 (BER)	3/5/2024	0	0	0
2.5 (NFM1)	3/26/2024	0	0	0
2.2 (NFM2)	3/26/2024	0	0	0
1.7 (BER)	3/26/2024	0	0	0
2.5 (NFM1)	4/18/2024	0	0	0
2.2 (NFM2)	4/18/2024	0	0	0
1.7 (BER)	4/18/2024	0	0	0

Bi-weekly spawning surveys have been conducted by CDFW and PSMFC (from the MESHR project and/or previous projects) along these same survey reaches annually

from 2013 through the 2024 spawning season. Several resident trout and resident redds were observed in these reaches in past years, though no adult steelhead or steelhead redds have been observed since surveys began in 2013. Additionally, a 1.4-mile reach of North Fork Matilija Creek from the total barrier in Wheeler Gorge up to the total natural barrier to anadromy has been surveyed several times in past years, most recently in 2018. No trout or redds have been observed during those surveys. Regular surveys of this reach will begin after the barriers are removed following project implementation.

DISCUSSION

Juvenile Snorkel Validation Surveys

For HB and FP projects, juvenile snorkel survey data can determine if projects restored or improved fish passage upstream of a barrier via fish presence or increased densities. Pre-treatment validation monitoring is essential to document baseline biological productivity prior to restoration to compare to post-treatment data. Pre-treatment snorkel validation monitoring was completed on one project in 2024 located in Maria Ygnacio Creek. No projects received post-treatment snorkel validation monitoring during 2024.

Maria Ygnacio Creek was surveyed by MESHR staff in the summer of 2024 for 3 miles, from the confluence with Atascadero Creek to an upstream tributary confluence and private property boundary. Along this survey reach, approximately 52.8% of the instream habitat surveyed was wetted at the time. Forty-seven habitat units met the depth requirements to snorkel. Throughout the 59,614.1 ft² of habitat snorkeled, 185 *O. mykiss* were observed, with a density of 0.003 ± 0.001 fish/ft². The trout observed ranged in size from from the 2-4 inch size bin to the 14-16 inch size bin. Of the 185 trout observed, 116 were in the 2-4 inch size bin and most were likely YOY trout. The results of this survey indicate that there is a resident trout population within Maria Ygnacio Creek upstream of the project location. Post-treatment snorkel surveys will be conducted following project implementation.

Small changes in fish density based on individual surveys can be due to daily, seasonal, or annual variability in fish abundance in a particular stream or stream reach. Larger sample sizes over a longer period are necessary for statistical analyses to determine if variability in fish densities is significant. Using available resources MESHR conducts pre- and post-treatment surveys under similar conditions (e.g., flow, temperature, visibility, or seasonal re-distribution of salmonids) to reduce variability in fish densities, but additional factors may affect salmonid distribution.

Adult Spawning Validation Surveys

Documenting fish response to barrier removal or modification using spawner surveys is more critical for complete barrier removals than for partial or temporal barrier modifications or large wood addition projects. No evidence of fish above a barrier at pre-treatment followed by observed fish upstream after barrier removal suggests new habitat was opened by the project. However, confidence in re-occupation above the

barrier increases with more surveys conducted during both pre- and post-treatment monitoring.

Pre-treatment spawning surveys were conducted for two Fish Passage type projects, Maria Ygnacio Creek Fish Passage Project Implementation and Wheeler Gorge Campground Fish Passage Project. Though these projects have not yet been implemented, surveys were conducted to collect baseline spawner data before the proposed barrier removals. While evidence of resident trout spawning was observed on Maria Ygnacio Creek, no anadromous salmonid spawning activity was observed during these surveys. Spawning surveys will continue at these project locations following treatment to attempt to document spawning activity above the removed barriers.

Post-treatment spawning surveys were conducted during the 2024 spawning season following project implementation at three project locations: Leo Carrillo State Park, Arroyo Sequit Steelhead Trout Barrier Removal, Circle G Ranch Fish Passage Restoration, and Davy Brown/Munch Creek Fish Passage Restoration Project. No anadromous adult salmonid spawning activity was observed upstream of removed barriers during any of these surveys, though resident trout spawning activity was observed within Davy Brown and Munch creeks. If time and availability permit, post-treatment spawning surveys will continue to be conducted at these project sites that have not yet had a recorded fish response upstream of former barrier sites.

Multiple factors such as human error and surveys with unclear or turbulent water during elevated flows could explain the lack of observations. Also, rain events that occur following spawning activity may lead to destruction of redds and the displacement of eggs. With above average precipitation this water year, the heavy rain and high stream flows made it difficult or impossible to conduct regular spawning surveys at most sites. Even when reaches were accessible, high flows and turbid water can conceal salmonids or spawning activity. The low frequency of spawning surveys at many sites was likely a major factor in the lack of spawning activity observations. Conducting spawning surveys every two weeks should allow for detection of new redds before they degrade until they are no longer visible. In practice, however, this is complicated by high flow events that may erase redds before observation.

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