



California Department of Fish and Wildlife
Fisheries Restoration Grant Program
 Restoration Project Case Study



P1610504 James Creek Coho Stream Habitat Enhancement Project

Project Objective(s) – This project improved the quality and quantity of spawning and rearing habitat for Coho Salmon and steelhead trout via installation of 28 instream features using 93 pieces of large wood along a total of 4,646 feet (0.88 miles) of James Creek. The structures improved habitat complexity, frequency, and depth of pools, and provides refugia for migrating salmonids.

Project Location(s) – James Creek; tributary to North Fork Big River; tributary to Big River near the town of Willits; in Mendocino County.

Project Description – Instream work was completed over two seasons, from September 25 through October 16, 2019, and September 23 through October 29, 2020. Plans were modified from the original proposal of 28 to 29 instream structures using 91 pieces of large wood.

Photo Credit: K. Boozel, Fisheries Biologist (PSMFC)



Figure 1. Untreated stream with narrow, shallow flatwater habitat.
 Pre-treatment photo date: 09/17/2019

Photo Credit: N. Harris, Fisheries Biologist (PSMFC)



Figure 2. After the addition of large wood wetted width, depth, and cover increased.
 Post-treatment photo date: 06/14/2023

Project Monitoring

Pre-Treatment

Date(s): 09/16 - 09/17/2019

Implementation

Date(s): 11/15/2019

Post-Treatment

Date(s): 06/14 - 06/15/2023



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Post-Treatment Project Rating and Summary

Twenty-five of the 26 features monitored at pre-treatment received post-treatment effectiveness monitoring in June 2023, following three winter flow seasons. Large wood features consisted mainly of one to three logs anchored with rebar and cable or wedged between live trees. Features were predominately functioning as intended by adding cover complexity. Twenty-one features had increased residual pool depth at post-treatment monitoring.

Five pools were snorkeled at pre- and post-treatment, though different pools were sampled because of lack of depth. Trout densities were calculated lower at post treatment (0.097 fish/ft² to 0.024 fish/ft²), and Coho Salmon densities increased (0.099 fish/ft² to 0.191 fish/ft²).

Project Funding & Cost

- California Department of Fish and Wildlife Fisheries Restoration Grant Program \$173,133.44
- California Conservation Corps \$65,316.00
- Cal Fire \$46,230
- **Total Project Cost** **\$284,679.44**

Report prepared by Nate Harris and Kori Roberts, Fishery Biologists for Pacific States Marine Fisheries Commission (PSMFC), 01/24/24. For permission to use with proper citation, contact CDFW Monitoring and Evaluation of Salmonid Habitat Restoration (MESHR) -1-(707) 834-4358, 1455 Sandy Prairie Ct, Suite J, Fortuna, CA 95540



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P1710529 Little Springs Migration Barrier Removal

Project Objective(s) – The objective of this project was to improve passage for Coho Salmon by replacing an undersized metal pipe culvert on East Louie Road. A natural bottom multi-plate crossing and grade control structures were installed to maintain the existing stream profile and prevent incision upstream of the crossing.

Project Location(s) – Little Springs Creek; tributary to Big Springs Creek; near the town of Grenada in Siskiyou County.

Project Description – Construction began on August 6th, 2020. Rock and streambed materials were installed prior to placement of the arch plates over the channel. Once footings were installed and bedload was in place, the Siskiyou County Department of Public Works Bridge Crew assembled and set the multi-plate arch on the road. Final road reconstruction (surfacing) was completed in November 2020.

Photo Credit: Five Counties Salmonid Conservation Program



Figure 1. Pre-construction view of 30" CMP culvert outlet.
 Pre-treatment photo date: 2014

Photo Credit: Five Counties Salmonid Conservation Program



Figure 2. Post-construction view of 10' X 36" multi-plate arch culvert outlet.
 Post-treatment photo date: 2020

Project Monitoring

Pre-Treatment

Date(s): 9/11/2019;
 7/14/2020

Implementation

Date(s): Not completed

Post-Treatment

Date(s): 06/27/2023



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Post-Treatment Project Rating and Summary

Post-treatment monitoring was completed on June 27, 2023. The crossing was in good condition and functioning as intended with no fish passage issues remaining. Minnow trapping was conducted during pre-treatment and post-treatment monitoring visits with traps set upstream and downstream of the crossing. No salmonids were trapped during either visit. Speckled dace were caught at pre-treatment above and below the crossing. No fish were captured at post-treatment, but small fish were observed from the surface and presumed to be Speckled dace.

Project Funding & Cost

- California Department of Fish and Wildlife Fisheries Restoration Grant Program \$72,483.86
- Northwest California Resource Conservation & Development Council \$1,594
- Siskiyou County Public Works Department \$14,799.97
- **Total Project Cost \$88,877.83**

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P1730411 Fish Passage and Off-Channel Habitat Restoration at Roy's Pools

Project Objective(s) – This project restored access to 3.5 miles of upstream habitat on San Geronimo Creek to adult and juvenile Coho Salmon and steelhead trout by removing a concrete and metal dam and a narrow fish ladder. The project also added 250 feet of side channel habitat for winter rearing, a major limiting factor for Coho Salmon survival in the watershed.

Project Location(s) – San Geronimo Creek; tributary to Lagunitas Creek; near the community of Lagunitas; in Marin County.

Project Description – Project construction occurred from August through October in 2020 and 2021. All man-made structures, including the dam, weirs, and fish ladder, were removed. A series of rock grade control and a mix of engineered streambed material was placed on top of and between the rock vanes. The streambed extended 250 feet upstream of the barrier to accommodate grade change after dam removal. A stream segment was moved north to aid alignment and long-term stability. The old main channel became a seasonal side channel with flows during flood events. Two instream wood structures and living willow clusters were placed in two pools upstream of the former dam. A temporary irrigation system was installed to maintain revegetation. A failing pedestrian bridge across the dam site was removed and replaced with a full-span pedestrian bridge.

Photo Credit: J. Guczek, Fisheries Technician (PSFMC)



Figure 1. Concrete dams create Roy's pools with the former fish ladder on the left.

Pre-treatment photo date: 06/30/2022

Photo Credit: K. Roberts, Fisheries Biologist (PSMFC)



Figure 2. Reconstructed channel after dam removal with new spanning pedestrian bridge.

Post-treatment photo date: 06/21/2023



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Photo Credit: J. Guczek, Fisheries Technician (PSMFC)



Figure 3. Concrete fish ladder next to the former dam and pools.
 Pre-treatment photo date: 06/30/2020

Photo Credit: K. Roberts, Fishery Biologist (PSMFC)



Figure 4. Reconstructed channel following removal of the fish ladder.
 Post-treatment photo date: 06/21/2023

Project Monitoring

Pre-Treatment

Date(s): 06/30/2020

Implementation

Date(s): 10/16/2020

Post-Treatment

Date(s): 06/21/2023

Post-Treatment Project Rating and Summary

Post-Treatment monitoring was conducted in June 2023. The concrete dam, four sheet metal weirs and fish ladder were removed successfully. The newly graded roughened stream channel was implemented as proposed, and the original main channel became a narrow side channel. The four revegetation features along the main and side channel had good growth and high survival.

No validation snorkeling was done at post-treatment due to poor water quality and large volumes of filamentous algae. However, fish were observed from the surface throughout the treatment reach and looked like a mix of threespine stickleback and salmonids, but species could not be confirmed. Large numbers of trout and Coho Salmon were observed in pools above the dam at pre-treatment, so it is likely these salmonids were present through the work area at post-treatment.



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Project Funding & Cost

- California Department of Fish and Wildlife Fisheries Restoration Grant Program \$2,115,704.64
- Salmon Protection and Watershed Network \$186,532
- **Total Project Cost** **\$2,302,236.64**

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P1810503 Gulch C Coho Salmon Fish Passage Improvement Project

Project Objective(s) – The project restored access for adult and juvenile Coho Salmon and steelhead trout to approximately 1.3 miles of spawning and rearing habitat upstream of two salmon migration barriers and improved the geomorphic function of Gulch C.

Project Location(s) – Gulch C; tributary to the Noyo River; near the town of Fort Bragg; in Mendocino County.

Project Description – Construction was completed between June 15, 2020, and October 31, 2021. Two old culverts were removed, the stream channel was excavated, and nine large wood log step weirs and four rootwads were installed. The lower crossing was replaced with a 20-foot diameter steel plate culvert, and the upper crossing was replaced with a 50-foot spanning bridge. Rock slope protection was added at both crossing features, willow staking and erosion control materials were added, and 500 redwood saplings were planted.

Photo Credit: T. Lucas, Fisheries Biologist (PSMFC)



Figure 1. Outlet of perched culvert prior to removal.
 Pre-treatment photo date: 02/26/2020.

Photo Credit: K. Bencomo, Fisheries Technician (PSMFC)



Figure 2. Culvert installed to allow for fish passage.
 Post-Treatment photo date: 05/30/2023

Project Monitoring

Pre-Treatment

Date(s): 02/26/2020

Implementation

Date(s): 10/15/2020

Post-Treatment

Date(s): 05/30/2023



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Post-Treatment Project Rating and Summary

The upgraded crossings, bank stabilization, and instream work were monitored for effectiveness on May 30, 2023. The crossings were no longer barriers to fish passage, but at low flows the lower crossing had subsurface flow within the culvert. Rock armoring along the lower crossing had also eroded at points, especially on the downstream and right bank. Rock weirs scoured out pools and fish were visible from the surface below the lower crossing. Logs and rootwads were stable and keyed in, but the uppermost rootwad was mostly out of the active channel.

Five pools were snorkeled at pre-treatment and six pools at post-treatment. Pool locations changed due to the newly reconstructed channel and placement of log weirs. At post-treatment three pools were snorkeled downstream of the first railroad crossing, which were formed by the grade control log weirs. One pool was snorkeled between the two crossings and three above the second bridge on Soper Wheeler Rd. At pre-treatment only one Coho Salmon was observed below the first culvert, which was a total barrier to fish passage. At post-treatment Coho Salmon numbers increased from one to 135 and trout numbers increased from two to a hundred, though no fish were observed above the lower crossing.

Project Funding & Cost

- California Department of Fish and Wildlife Fisheries Restoration Grant Program \$1,135,980.81
- NOAA Restoration Center \$141,658.00
- The Nature Conservancy \$10,000
- Salmon Restoration Association \$30,000
- National Fish and Wildlife Foundation - California Department of Fish and Wildlife Office of Spill Prevention and Response \$50,000
- Soper Wheeler Company \$85,905
- Mendocino Railway \$663,981
- **Total Project Cost \$1,975,866.81**

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Q1910507 Middle Slough Restoration Project - Phase 2

Project Objective(s) – This project aimed to improve winter and summer rearing habitat at the upper tidal margin of the Mattole River estuary and increase refugia from high flows and temperatures for juvenile Chinook Salmon, Coho Salmon, and steelhead trout. Eight hundred feet of off channel habitat were restored to create connectivity to the Mattole Estuary and Lower Bear Creek. The Middle Slough channel was excavated and 12 wood structures and three alcoves were installed. The project also enhanced riparian habitat on the floodplain adjacent to the Middle Slough through installation of 3,000 feet of willow baffles, 4,000 tree plantings, and 4,000 wetland plants.

Project Location(s) The Middle Slough project is located within the estuary of the Mattole River; near the town of Petrolia; in Humboldt County.

Project Description – Construction began on June 12, 2020, and ended September 17, 2020. A total of 1,501 feet of slough and alcove channel was excavated, and 3,142 feet of trenched willows were planted on the river terraces floodplain and in the slough alcoves. Revegetation work continued from September 2020 until January 10, 2021. The excavated alcove and slough created areas of low velocity through a network of wetlands and off-channel features. These features have had summer water temperatures consistently five degrees and up to ten degrees Celsius cooler than the main estuary. Survival of plantings is above 60% for all areas and up to 97% in the slough.

Project Monitoring

Pre-Treatment

Date(s): 6/4/2020

Implementation

Date(s): 11/4/2020

Post-Treatment

Date(s): 07/19/2023



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Photo Credit: J. Guzek, Fishery Technician (PSMFC)



Figure 1. Main channel site C2 prior to excavation.
Pre-treatment photo date: 06/04/2020

Photo Credit: K. Roberts, Fishery Biologist (PSMFC)



Figure 2. Eight hundred feet of excavated slough and alcove at site C2.
Post-treatment photo date: 07/19/2023

Photo Credit: J. Guzek, Fisheries Technician (PSMFC)



Figure 3. Left bank river terrace before treatment.
Pre-treatment photo date: 06/04/2020

Photo Credit: K. Roberts, Fisheries Biologist (PSMFC)



Figure 4. Willow baffles planted at treatment site.
Post-treatment photo date: 07/19/2023

Post-Treatment Project Rating and Summary

Post-treatment monitoring was completed on July 19, 2023. Unanchored large wood structures in the newly excavated channel created shallow pools, 2-4 inches in depth. Vegetation covered the banks and there was no sign of erosion. Willow



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plantings on the left bank floodplain terrace of the Mattole River had high survival, looked healthy and had good growth.

Project Funding & Cost

- California Department of Fish and Wildlife Fisheries Restoration Grant Program \$305,744.22
- Mattole Salmon Group \$6,525
- Department of Water Resources \$179,625
- Bureau of Land Management \$11,000
- Pacific Marine Estuarine Fish Habitat Partnership \$48,000
- Bella Vista Foundation \$11,000
- Mattole Restoration Council \$27,789
- **Total Project Cost \$589,683.22**

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Q1910513 East Branch North Fork Big River Coho Habitat Enhancement Project - Large Wood Installation

Project Objective(s) – This project improved the quality and quantity of spawning and rearing habitat for Coho Salmon and steelhead trout via installation of 38 instream features using 95 pieces of large wood along a total of 5,455 feet (1.03 miles) of East Branch North Fork (EBNF) Big River.

Project Location(s) – EBNF Big River; tributary to North Fork Big River; tributary to Big River near the town Fort Bragg; in Mendocino County

Project Description – Instream work was completed between July 15 and September 16, 2020, and between June 17 and July 26, 2021. The California Conservation Corps installed a total of 38 instream features within 5,455 feet (1.03 miles) of EBNF Big River. Ninety-five pieces of large wood (10 with rootwads), and nine extra seed piece logs with a diameter under 12 inches were installed. During construction, project feature designs were modified with approval from the CDFW Grant Manager. Three features were not implemented due to material quality at the proposed locations. The proposed number of logs for these features were installed in other locations within the project reach.

Photo Credit: J. Guczek, Fisheries Technician (PSMFC)



Figure 1. EBNF Big River prior to addition of large wood showing low diversity habitat.
Pre-treatment photo date: 06/08/2020

Photo Credit: N. Harris, Fisheries Biologist (PSMFC)



Figure 2. Large wood placed in the wetted channel of EBNF Big River redirected flow to scour a pool, provide cover and improve salmonid habitat.
Post-treatment photo date: 08/29/2023



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Project Monitoring

Pre-Treatment

Date(s): 06/08 -
06/09/2020

Implementation

Date(s): 08/11/2021

Post-Treatment

Date(s): 08/29 -
08/30/2023

Post-Treatment Project Rating and Summary

Twenty-nine features monitored at pre-treatment received post-treatment effectiveness monitoring on August 29, 2023. All large wood structures were in their original position and in good condition. All features created pool habitats and added cover complexity. Twenty-seven pools increased residual depth, while two stayed the same.

The same five pools were snorkeled at pre- and post-treatment. Overall trout densities decreased from 0.008 fish/ft² to 0.005 fish/ft², while Coho Salmon densities increased slightly from 0.019 fish/ft² to 0.025 fish/ft². Total salmonid densities remained unchanged at 0.03 fish/ft².

Project Funding & Cost

- California Department of Fish and Wildlife Fisheries Restoration Grant Program \$206,288.91
- California Conservation Corps \$57,568
- Mendocino Redwood Company \$88,060
- **Total Project Cost \$51,916.91**

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Q1910528 Julias Creek Sediment Reduction and Salmonid Recovery Project

Project Objective(s) – This project reduced sediment delivery from a legacy timber riparian road system and normalized the hydrology within the Julias Creek watershed by addressing 48 sediment source features, decommissioning 5.23 miles of abandoned road, and upgrading two stream crossings. In all, this project treated a total of 14,445 cubic yards of road related sediment that would otherwise have eroded or failed and been delivered to Julias Creek and Usal Creek.

Project Location(s) – Julias Creek; tributary to South Fork Usual Creek; tributary to Usual Creek; near the town of Leggett; in Mendocino County.

Project Description – Work began August 19, 2020, and was completed January 2022. Crews used heavy equipment to open access roads and to decommission and upgrade identified erosion features and associated road reaches. Fill was excavated by bulldozer from designated project features along with opening roads and managing spoils. Woody material placed on the side slopes of decommissioned stream crossings provided erosion control, added fluvial geomorphic complexity to small stream channels, and improved instream and riparian habitat conditions. All disturbed and bare soil surfaces on treated erosion features were mulched using local vegetation as slash. Seedlings of 1,270 redwood (*Sequoia sempervirens*) trees were planted on equipment access routes and other disturbed work areas in December 2020 and January 2022.

Photo Credit: J. Guczek, Fisheries Technician (PSMFC)



Figure 1. Perched culvert prior to decommissioning on logging road 4200. Pre-treatment photo date: 06/15/2020

Photo Credit: K. Roberts, Fisheries Biologist (PSMFC)



Figure 2. Excavated stream crossing, stream sides laid back at 2:1 slope. Post-treatment photo date: 07/31/2023



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Project Monitoring

Pre-Treatment

Date(s): 6/15 - 6/18/2020

Implementation

Date(s): 9/24/2020,
12/16/2020

Post-Treatment

Date(s): 07/31 - 08/1/2023

Post-Treatment Project Rating and Summary

Post-treatment effectiveness monitoring was conducted over two days: July 31 and August 1, 2023. The two road and culvert upgrades on logging road 4000 were functioning as intended with minor bank erosion and did not seem to be contributing sediment to the creek. The decommissioned stream crossing features were well covered with slash and had good regrowth of vegetation to prevent erosion and sediment delivery to Julias Creek. All monitored upslope stabilization features were treated as planned.

Decommissioned road segments were so successfully treated with slash and vegetation regrowth that reaching features by foot was very difficult and slow. Consequently, only three of seven decommissioned roads and eight of 27 decommissioned stream crossings were monitored at post-treatment.

Project Funding & Cost

- California Department of Fish and Wildlife Fisheries Restoration Grant Program \$530,828.91
- NOAA Restoration Center \$40,000
- Redwood Forest Foundation/Usal Redwood Forest Company \$36,896
- **Total Project Cost** **\$607,724.91**

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Q2010527 Mid-Klamath Tributary Fish Passage Improvement Project

Project Objective(s) – This project improved fish passage on 74 tributaries of the Klamath, Salmon, and lower Scott rivers. Tributaries were evaluated to prioritize passage issues and construct pathways near the stream mouths to increase access for juvenile and adult salmonids to thermal refugia during low flows.

Project Location(s) – Multiple tributaries of the middle Klamath, Salmon, and lower Scott rivers; tributaries to the mainstem Klamath and the Pacific Ocean; along Highway 96; in Siskiyou and Humboldt Counties.

Project Description – Work began in early summer of both 2021 and 2022 when flows were low with little chance of more rain. Temporary passageways were built near stream mouths by removing barriers or concentrating flow to allow juveniles unimpeded movement between the stream and river to access thermal refugia. Resting pools were added along lower stream sections to facilitate movement and cut willows were added to confluence pools for cover. Over both seasons, 119 tributaries were evaluated for passage work, 85 were treated, and a total of 126 impediments were removed or altered.

Photo Credit: K. Roberts, Fisheries Biologist (PSMFC)



Figure 1. Slate Creek, tributary to the Klamath River, during high spring flows. No current need for modification. Pre-treatment photo date: 5/16/2022.

Photo Credit: M. Anderson, Fisheries Technician (PSMFC)



Figure 2. Slate Creek when flows are low and shallow. Implementation work concentrated flow and added rock baffling and resting pools. Post-treatment photo date: 10/5/2022.



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Project Monitoring

Pre-Treatment

Date(s): 05/24 -
 05/26/2021; 05/16 -
 05/18/2022

Implementation

Date(s): June –
 September 2021; May –
 September 2022

Post-Treatment

Date(s): 7/26 – 7/28/2021;
 10/04 - 10/05/2022

Post-Treatment Project Rating and Summary

This project was unique because implementation was repeated annually for fish passage. Consequently, both pre and post monitoring had to be done in the same year instead of waiting three years after construction to evaluate changes from high winter flows.

In 2021, seven of 12 sites monitored at pre-treatment were evaluated for fish passage and an eighth site for added cover at the mouth of Methodist Creek. In 2022, 14 of 15 sites evaluated at pre-treatment received alterations (passage improvement or added cover) and were revisited for post-treatment monitoring. Three tributaries (Camp, Slate, and Nordheimer creeks) had major work done by adding resting pools and extended meanders for slower grade and flow.

Project Funding & Cost

- California Department of Fish and Wildlife Fisheries Restoration Grant Program 98,217
- Mid Klamath Watershed Council \$15,000
- **Total Project Cost** **\$113,217**

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