

Muddy Creek Fish Passage and Habitat Enhancement

State(s): Oregon

Managing Agency/Organization: Lake County Umbrella Watershed Council

Type of Organization: Nonprofit

Project Status: Ongoing

Project type: WNTI Project

Project action(s): Riparian or Instream Habitat Restoration, Barrier Removal, Watershed Connectivity, Monitoring, Education/Outreach, Watershed Planning. Project removes three barriers and restores 1.5 miles below a reservoir, opening 6 miles of stream.

Trout species benefitted: Interior Redband Trout

Population: Goose Lake Redband Trout

Project summary: Muddy Creek is a 12-mile system located in the Goose Lake Watershed, South-Central Oregon. The Goose Lake Watershed is a closed basin where the season's snowpack is a critical component to stream flows and lake fill. Seasonal flows can be extreme, from flooding in the spring to low flows mid and late summer. Goose Lake is home to nine native fish species, four of which are listed as "species of concern" by the US Fish and Wildlife Service (USFWS) due to vulnerability within this challenging system. These four species of concern (Goose Lake Redband Trout, Goose Lake lamprey, Goose Lake sucker, and the California Pit Roach) are adapted to the alkaline lake waters, the ever-fluctuating seasonal flows, and periods of drought. Historically, the lake has been subject to severe drought – going dry five times in the last century. Goose Lake native fish species have been able to survive through drought by seeking refuge in the upstream tributaries, a critical component to survival in this closed basin watershed.

In 1965 Juniper Reservoir was constructed to store water which separated the upper creek from the lower creek, diminishing the connected watershed and ultimately impacting species resilience. The upper system has maintained stream function and habitat integrity as a viable fishery for Goose Lake Redband trout, but the lower habitat is fragmented and degraded by instream flow structures, dams and diversions. Concurrently, historical stream modifications to reduce flooding and improve agricultural conditions substantially impacted channel function and habitat conditions. These modifications have led to channel degradation, bank erosion, groundwater drawdown, and impaired fish passage. Goose Lake Redband Trout are distributed as isolated populations above and below the reservoir. Aquatic species thrive in the reservoir; however, fish passage barriers preclude adfluvial fish from reaching the lower stream system except during spring and early summer flows, when the reservoir spills into lower Muddy Creek. The project will improve 1.5 miles of stream habitat below the reservoir and provide volitional passage for Goose Lake native fish species to access the entire length of the creek for spawning, rearing, and refuge. The project aligns with WNTI priorities in striving to reconnect a system that has been divided for the last 55 years while improving instream fish habitat that will: protect and enhance multiple populations, enhance the viability of the Goose Lake Redband Trout, and supports fish habitat, diversity, life history and genetic attributes in this closed basin watershed.

Problem the Project Addresses: Muddy Creek headwaters originate on the Fremont-Winema National Forest and flows southwest through private land before reaching Cottonwood Creek, which is one of Goose Lakes largest tributary streams. Muddy Creek is a divided system, separated by a reservoir that was installed in 1965. The upper system has maintained stream function and habitat integrity as a viable fishery for Goose Lake Redband Trout, but the lower habitat is fragmented and degraded by instream flow structures, dams and diversions. Concurrently, historical stream modifications to reduce flooding and improve agricultural conditions substantially impacted channel function and habitat conditions. These modifications have led to channel degradation, bank erosion, groundwater drawdown, and impaired fish passage.

The primary fish species in this system is Goose Lake Redband Trout, which are distributed as isolated populations above and below the reservoir. Aquatic species thrive in the reservoir; however, fish passage barriers preclude adfluvial fish from reaching the lower stream system except during spring and early summer flows, when the reservoir spills into lower Muddy Creek. Fish passage barriers on Muddy Creek are related to the reservoir spillway, irrigation diversion structures, and channel headcuts. Currently, Oregon Department of Fish and Wildlife (ODFW) notes that lower Muddy Creek fails three of the six criteria for population health. Primary concerns are species abundance, productivity, and habitat distribution. Addressing stream corridor conditions and fish passage barriers will improve watershed condition, continuity, and fish species population persistence. Expanding the amount of habitat available to adfluvial Redband Trout life history will increase population stability and productivity over time.

Construction of the reservoir resulted in less water flowing to the lower three miles of stream. In high precipitation years water spills to lower Muddy Creek, but in years of drought, stream water is limited. In

addition, a past surface water right triggered potential screening requirements by ODFW and Oregon Water Resources. In an effort to address the conditions described above and prevent fish from entering irrigation diversion ditches, a group of partners (ODFW, DU, NRCS, and Lake County Umbrella Watershed Council) began working on a solution in 2015. At the time, a simple solution was recommended, which was to avoid the lower system all together and focus entirely on screening diversion ditches to prevent entrainment and entrapment associated with the irrigation network. Ducks Unlimited acquired an OWEB Technical Assistance grant and began design efforts to screen the diversion ditches. These good intentions led to a design project that was quite costly to implement. The overall cost and resource benefit that would be achieved through implementation just didn't have enough benefit to the resource. Ultimately, this project was a band-aid fix to a much larger issue. In seeking Oregon Watershed Enhancement Board dollars for implementation, reviewers concurred that the screening solution was not the right treatment for this much larger and complex issue.

As project partners considered future treatment options, the group assessed alternatives to improve the stream as a whole for fish passage and habitat enhancement. ODFW led a reconnaissance effort to re-evaluate the lower stream reach. In doing so, biologists determined that providing fish passage and improving stream corridor conditions would benefit Redband Trout, more so than screening the ditch. They also felt that very few fish would ever enter the pipe connection between the reservoir and the irrigation network, where they were previously concerned about entrainment issues. During years of high precipitation, the reservoir releases water for 75+ days, which if passable, could greatly benefit both juvenile and adult life histories of the Goose Lake Redband Trout species. In addition, stream channel conditions could be enhanced through restoration treatments that would improve overall stream function. With flow and passage through the spillway, Redband Trout could migrate down Muddy Creek to reach Cottonwood Creek and finally Goose Lake.

Objectives: The overarching goal for the Muddy Creek Fish Passage and Habitat Enhancement Project is to improve 1.5 miles of stream habitat and provide volitional passage for Goose Lake native fish species to access the entire length of the creek for spawning, rearing, and refuge.

Objective 1. Provide fish passage at the spillway into Juniper Reservoir: Remove existing concrete spillway and replace with an ODFW approved roughened channel rock ramp/roughened channel fishway.

Objective 2. Provide fish passage along the stream channel below the reservoir: Remove the upper earthen dam, replace an undersized culvert, and create a bypass channel for fish passage on the downstream dam.

Objective 3. Reactivate 950 ft of degraded stream channel to improve flow conveyance and habitat conditions: Excavation work will include moderate grading of channel to restore instream flow. Woody material, gravels, and willows will be installed to improve habitat.

Objective 4. Stabilize a series of knick points through the lower meadow stream reaches: Willow bunches and woody material will be placed at specific locations to prevent further erosion while reversing the current degradation affects.

Objective 5. Reduce livestock impact along the stream and allow stream banks to stabilize and mend: Construct water crossings at key locations for livestock and farm equipment to cross. Riparian fencing will be constructed along the creek to allow willow plants and other vegetation to take hold along the banks.

Objective 6: Post project monitoring and assessment to determine success and modifications.

Partners:

- Lake County Umbrella Watershed Council
- Cascade Stream Solutions
- Oregon Department of Fish and Wildlife
- Shine Brothers Ranches LLC
- Oregon Watershed Enhancement Board (OWEB)
- Ducks Unlimited
- Oregon Water Resources Department
- US Fish and Wildlife Service
- Western Native Trout Initiative

Project Monitoring: The success of this project will tie directly to the challenges we are trying to address along the Muddy Creek System and in the Goose Lake Watershed - specifically fish passage, connectivity, and species resilience. Success will be evaluated by:

1. Engagement and participation between partners, stakeholders, and funders. This could be quantified through website and social media analytics, number of news articles, presentations, and tours related to the project.
2. Implementation of each project task combined with the number of fish passage solutions resolved and connected miles of stream.
3. Monitoring data that supports fish passage and habitat enhancement results. This can be quantified through annual spawning and fish counts along with annual photos points taken to demonstrate health of the stream and streambanks post project.

Funding Source(s): Resources Legacy Fund

Project cost: \$90,000

Start Date: 06/2022 **Completion Date:** 11/2024

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