Deep Creek - Town Diversion Fish Passage

State(s): Oregon
Managing Agency/Organization: Lake County Umbrella Watershed Council
Type of Organization: Nonprofit
Project Status: Underway
Project type: WNTI Project
Project action(s): Barrier Removal or Construction, Riparian or Instream Habitat Restoration
Trout species benefitted: Redband Trout
Population: Warner Lakes

Project summary: Restoring fish passage for Warner Lakes Redband Trout and Warner Sucker is the focus of this project. The primary limiting factor for fish in the Warner Valley Watershed is passage at irrigation diversion structures, especially on Deep and Honey Creeks. This high priority project will address the highest priority limiting factor in the Warner Watershed for native fish connectivity. The Town Diversion is located on Deep Creek, the largest tributary in the Warner Basin. The diversion will be reconstructed with a rock ramp fishway designed to restore natural streambed conditions and provide passage for all native fish over the irrigation structure.

Problem the Project Addresses: Limited water in the eastern Oregon desert means that Warner Basin streams are a critical water source for both irrigators and native fish. Several Warner Basin streams provide both irrigation water critical to local ranches, and spawning, rearing, and migratory habitat for Warner Basin Redband Trout, Warner sucker, and other native fishes. The low-lying portion of the Warner Basin provides the most fertile agricultural land in the area, as well as stream reaches critical to fish migrating from the large lakes in the valley upstream to high quality spawning and rearing habitats. More than 10 diversions exist in the lower basin that provide water to irrigators and have been identified as fish passage barriers. The diversions make it impossible for large fish that rear in the Warner Lakes to access the prime spawning grounds in the upper basin on lands primarily administered by the Lakeview Bureau of Land Management and the Fremont-Winema National Forest.

For the last decade, the Warner Basin Aquatic Habitat Partnership has both independently and collaboratively worked to restore passage and connectivity for aquatic species in the Warner Basin, specifically the Warner Basin Redband Trout, a state and federal species of concern, and the Warner sucker, an ESA listed threatened species. While each organization's role has been slightly different, (i.e., monitoring, planning, outreach, or implementation) the vision was always the same: species recovery. The key to bringing this vision together is building relationships with the local ranching community of Adel and Plush, Oregon. Agriculturally based, the Warner Basin is primarily managed to produce hay and raise beef cattle. Water is critical to both agriculture and fish habitat in the basin. Irrigation diversions and ditches have been identified as a primary threat to fish recovery in the basin.

Objectives: The Deep Creek - Town Diversion Project will complete a fish passage solution for a diversion dam that has been an upstream fish passage barrier for likely over 100 years. The Town Diversion on Deep Creek is believed to be a complete upstream fish passage barrier due to the vertical height of the irrigation weir relative to the channel elevation downstream from the weir. The proposed fish passage solution has been vetted by a multi- agency and water user stakeholder group that has convened over the past two years to discuss fish passage on Deep Creek and the adjacent Warner Sucker tributaries. Replacement of the existing diversion dam and installation of an engineered roughened channel are expected to provide fish passage, restore watershed connectivity, and be a lower maintenance fish passage solution relative to other fish passage alternatives that were reviewed. The replacement dam and rock ramp will also improve the stability of the diversion structure. The existing dam is currently undermined and the concrete skin is no longer supported by underlying fill. Existing boulders will be repositioned and additional boulders will be imported to maximize rock ramp stability. Specific objectives are:

1. Volitional fish passage will be provided via roughened channel this project will improve access to three additional miles of habitat for spawning and rearing activities.
2. This project will re-establish opportunities for native fish to reach cold water refuge during warm summer months and holding habitat in Deep Creek.
3. The Deep Creek - Town Diversion Project will increase connectivity for Warner Lakes Redband Trout and Warner Sucker. This project will create stable stream channels that provide fish passage solutions and meet Oregon Department of Fish and Wildlife passage guidelines for Warner Lakes Redband Trout and Warner Sucker passage.

The Deep Creek - Town Diversion Project solution includes a 230 ft. long roughened channel. Fish passage solutions will meet the criteria stated in Oregon Administrative Record 635-412-0035. A 1- dimensional hydraulic model (e.g., HEC-RAS) was used to iteratively design and model the roughened channel. To ensure the project designs meet passage criteria for Warner Lakes Redband Trout and Warner Sucker. This type of design is a cost-effective fish passage solution that will have minimal maintenance over time.

The roughened channel design was selected as an effective fish passage solution for native fish. This design will also require minimal maintenance for Adel Water District. The roughened channel will be constructed with a gradation of angular rock designed to resist erosion and provide hydraulic conditions that will meet fish passage criteria. Debris and sediment loading in addition to periodic high magnitude floods are common in the Deep Creek Watershed due to the influence of summer time thunderstorms and spring snowmelt runoff.

Partners:

- Lake County Umbrella Watershed Council
- Bureau of Land Management, Lakeview
- Oregon Department of Fish and Wildlife
- Lakeview Soil and Water Conservation District
- U.S. Fish and Wildlife Partners Program
- U.S. Fish and Wildlife Service
- U.S. Forest Service – Fremont-Winema National Forest
- Adel Water District
- Oregon Watershed Enhancement Board

Project Monitoring: Prior to on-the ground work, baseline data on physical habitat, sediment, flows and fish populations will be established through monitoring efforts by Oregon Department of Fish and Wildlife and River Design Group, Inc. Post-restoration monitoring of fish passage will be conducted by Oregon Department of Fish and Wildlife. Fish passage will be assessed using fixed PIT-tag antennas installed near the downstream and upstream ends of the project. Cross sections will also be established to measure long term stability of the roughened channel. Photo monitoring at permanent points will be conducted annually for three years, and periodically thereafter. Monitoring of riparian vegetation along the roughened channel will also take place through a series of photo-points to visually assess success of plant growth and vigor. Following restoration activities, partners will review monitoring results and assess success of the project.
Specific monitoring methodology is listed below:

- Fish (Warner Sucker and Redband Trout) will be captured in deep pools within the study area using panel hoop nets. This will be completed biweekly (downstream to upstream) mid-April through mid-June.
- Captured fish will be anesthetized using methyl sulfonate buffered with sodium bicarbonate and placed in an aerated bucket until processing.
- Fixed plate PIT antennas will be installed at the upstream and downstream ends of the fishway to evaluate the timing and number of trout and suckers moving upstream and passing through the new fishway.
- Water velocities will be measured at various locations in the roughened channel at various flows to assess whether passage success may be limited by water velocities.
- Stream temperatures will be collected continuously during the study period with a thermograph installed at the fishway. Associations between fish movement and temperatures will be described.

Funding Source(s): National Fish Habitat Action Plan
Project cost: $45,000
Start Date: 09/01/2018 **Completion Date:** 12/31/2019
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