

Green Valley Ranch-Wallowa River Fish Passage Project

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Table of Contents

A. Introduction/Background Information:	3
B. Discussion of Completed Work:.....	4
C. Lessons Learned & Adaptive Management	9

A. Introduction/Background Information:

1. History of the project.

The Green Valley Ranch Fish Passage Project is located on a side channel of the Willowa River approximately 1.5 miles upstream of Enterprise, Oregon. The site includes the side channel and a portion of the mainstem, at the downstream project limits, as well as an existing irrigation diversion and privately-owned diversion structure. At this site, the current diversion structure made up of trash, railroad ties, and random pieces of wood threatens upstream passage for ESA listed spring/summer run Chinook Salmon (*Oncorhynchus tshawytscha*), steelhead (*O. mykiss*) and Bull Trout (*Salvelinus confluentus*). Additionally, a passage barrier at this site could also threaten migrations of reintroduced Coho Salmon (*O. kisutch*) and future reintroduction of Sockeye Salmon (*O. nerka*).

Restoration potential is high throughout the Willowa River (Northwest Power and Conservation Council 2004) and the Green Valley Ranch site is designated as a Tier 1 restoration site in the Willowa River Atlas (Atlas Partners 2019). Restoration of fish passage through removal of anthropogenic barriers is identified as a high priority within Tier 1 areas (Atlas Partners 2019). The project vision is to restore the productivity, abundance, and distribution of four focal fish species: spring/summer Chinook salmon, summer steelhead, Pacific Lamprey (*Lampetra tridentata*), and Bull Trout within the Willowa watershed by protecting and restoring connectivity of functioning habitats and protecting high quality habitat (Atlas Partners 2019). The outcome of this project will improve the resiliency of maintaining year-round fish passage for all life history stages of the focus fish species while maintaining access to irrigation water for current water users.

Approximately 1,000 feet upstream of the site, the Willowa River is split into two main channels. The channels flow roughly parallel to each other with approximately 60 to 200 feet of floodplain separating the two channels. The channels rejoin near the Green Valley Ranch irrigation diversion return. The Green Valley Ranch existing irrigation POD is located on the eastern channel. The diversion includes a dam-like structure made up of sandbags, lumber, t-posts and other debris spanning the side channel. A scour hole has formed on the downstream side of the structure creating a 3.5-foot drop from the top of the structure to the bottom of the scour hole, limiting fish passage through the side channel. The dam is periodically maintained by the landowners to create water surface elevations needed to deliver water to two downstream water users through a gravity-fed irrigation ditch.

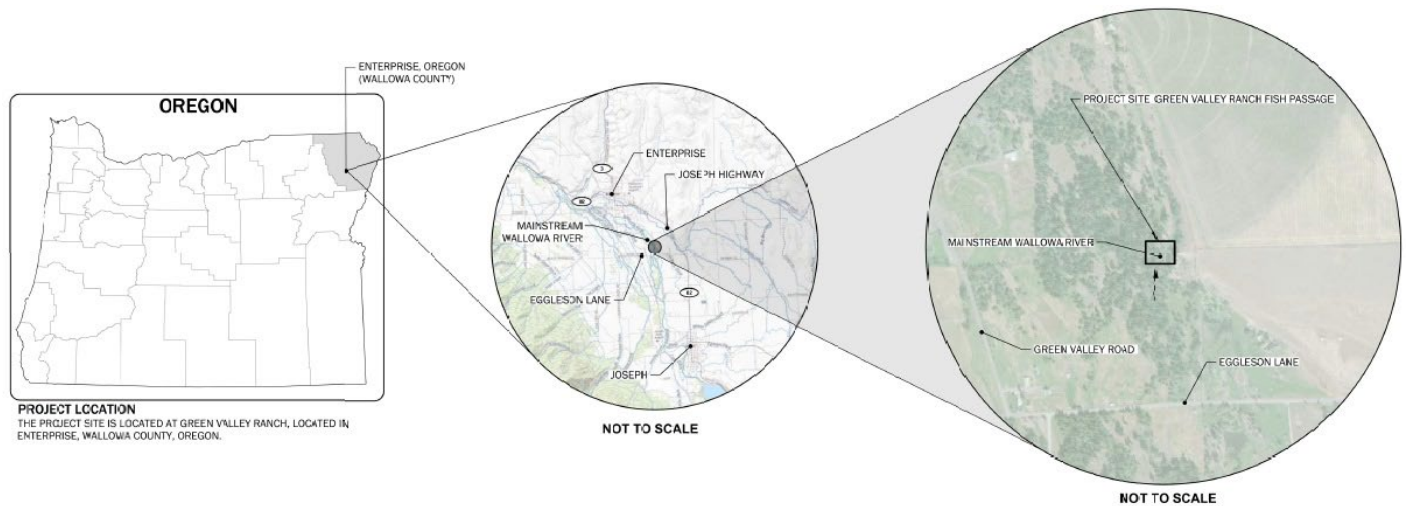
The POD is currently configured as a surface ditch flowing to an irrigation pump that has a poorly functioning and out of compliance plate screen. Under current operations the pump pulls 3.7 cfs of water from the irrigation ditch and pumps water uphill to adjacent fields. Approximately 20 feet downstream of the irrigation pump is a rotating drum screen with a piped fish return. Water leaving the drum screen feeds a second 0.6 cfs water right that is gravity fed. There are no headgates or flow measurements devices in use at the site. An overflow channel returns water from the irrigation ditch back to the side channel, near the confluence with the main channel.

The POD on the Willowa River at Green Valley Ranch has historically served 4.3 cfs of water to downstream water users. The existing screen was designed by the Oregon Department of Fish and Wildlife (ODFW) and is an 8-foot-long, 24-inch-diameter drum screen (ODFW Reference #S-08-8022)

that will screen 4.8 cfs at 80 percent submergence level and meet current ODFW and NMFS criteria (Chuck Simpson, personal communication November 1, 2021).

Project partners include Oregon Department of Fish & Wildlife (ODFW) Oregon Water Resources Department (OWRD), Grande Ronde Model Watershed (GRMW) and Bonneville Power Administration (BPA).

2. Project location map.



B. Discussion of Completed Work:

This project was implemented as designed in April through November of 2023 by hired contractors to address identified limiting factors that affect ESA listed salmonids in the Wallowa River. Restoration actions for this project target critical salmonid life stages and limiting factors, and included: fish passage barrier removal, side channel and off-channel habitat restoration, LWD placement in channel and on floodplain, riparian vegetation planting, prevention of potential fish impediment.

Project Element 1: Removal of Existing Debris Dam (HIP Category 1a)

This included removal of the debris dam that spanned the existing side channel to allow for complete fish passage for all life stages.

Project Element 2: Re-align Existing Channel and Create Roughened Channel (HIP Category 1c)

Project Element 2 included approximately 120 feet of grading to realign one of the flow paths of the Wallowa River. The existing diversion dam structure was removed, and the channel alignment is now revised to be a roughened channel that is in the location of the previous irrigation ditch. The existing channel was partially filled to drain into the realigned channel and surrounding floodplain was graded and filled with LWM.

The roughened channel is comprised of an engineered streambed material designed to transport bedload sediment and remain stable during the 100-year discharge. Habitat boulders were placed within the roughened channel for hydraulic complexity and roughness. The roughened channel is approximately 60 feet long and has a maximum longitudinal gradient of 4.9 percent. Segments of the

mainstem channel upstream and downstream of the roughened channel include an engineered streambed mix and allow for a gradual transition to the background channel slope. Collectively, these transition segments are approximately 46 feet total (approximately 24 feet upstream and 22 feet downstream). A low-flow channel thalweg was further refined and is located in the approximate center of the channel. The channel cross section provides sufficient depth at low-design flow to meet ODFW and the National Oceanic and Atmospheric Administration (NOAA) Fisheries criteria for fish passage. Irrigation water continues to be collected through the existing irrigation diversion ditch.

Project Element 3: Consolidate Irrigation Infrastructure Downstream of the Fish Screen and Add Head Gates Upstream of the Irrigation Ditch and Upstream of High Flow Channel (HIP Category 1b)

Project Element 3 includes consolidation of irrigation infrastructure. A gravity fed irrigation ditch is graded from the realigned channel, upstream of the roughened channel, to the existing irrigation ditch and fish screen. A newly installed head gate controls the rate of flow into the irrigation ditch and staff plates were installed to measure flow in the ditch. The existing rotating drum screen and existing fish return remained in place and the irrigation pump was relocated downstream of the drum screen. The existing overflow channel remains in place to allow water to return to the Wallowa River.

Project Element 4: Large Wood Habitat Structures (HIP Category 2b)

This element includes installation of large wood habitat structures. A collection of LWM structures were installed within the channel and floodplain upstream of the point of diversion. The LWM structures are comprised of several log types designed to increase channel complexity, channel stability, and create diverse fish habitat. The log types installed with the LWM structures include:

- Floodplain Roughness Logs—Single logs placed within the side channel to add complexity and diverse habitat. These structures increase roughness within the side channel.
- Multi-Log Bank Rootwads—Bank rootwads create diverse fish habitat along the abandoned channel within the bank and set the grade for the high flow channel.

Project Element 5: Riparian Vegetation Planting (HIP Category 2e)

This includes riparian vegetation planting. The revegetation plan was planted to include all disturbed areas, the banks of the channel and associated floodplain. Temporary access routes and staging areas were seeded with a native seed mix following construction.

These implemented project elements were guided by the Wallowa County Atlas prioritization document, the Northwest Power and Conservation Council's (NPCC) 2014/2020 Columbian River Basin Fish and Wildlife Program, and NOAA's Recovery Plan for Northeast Oregon Snake River Spring and Summer Chinook Salmon, and Snake River Steelhead Populations. Fish passage, riparian condition, water quality, side channel and wetland conditions, and floodplain condition are identified as priority limiting factors that were addressed with the project implementation.



Figures 1 and 2. Top picture is the push up dam before removal, bottom picture is the push up dam removed also featuring large wood structure installation in channel and on floodplain.



Figures 3 and 4. Top picture is looking downstream of completed roughened riffle and headgate installation. Bottom picture is looking upstream at completed roughened riffle and headgate.



Figures 5 and 6. Top picture shows completed move and installation of turbine pump behind ODFW fish screen. Bottom picture shows completed large wood structure diverting flow to irrigation infrastructure, also shown is the high flow channel behind the structure in the pool where the debris dam use to be

C. Lessons Learned & Adaptive Management

There were three primary lessons learned from this project. The first being funding challenges due to the bid item of moving the pump was not representative of the actual cost to complete this. The second being the river creating more sidechannels and outlets near the debris dam than were originally identified. The last being the infrastructure installation and fully understanding the best way to maintain the headgate through time.

Moving a turbine pump of this size turned out to be much more of a challenge than originally anticipated by the engineering firm due to the time and cost of this task. There are very few contractors willing to take on something like this, and thus the market is in their favor. The original engineering estimate was \$2,000 and the lowest price to move the pump was nearly \$60,000. This caused the project to be well over what the total allocated amount was to fund this project, luckily we were able to find additional funding to get this component completed before the landowner needed water for irrigation.

Another challenge to this project surrounded the debris dam and all of the different ways the river flowed through this section. It became difficult to dewater what was necessary to install the large wood structure meant to aid in diverting water towards the headgate and irrigation ditch. Since the original design of this project, conditions had changed in this location, so it may be helpful in the future to reexamine the areas that need dewatered and filled to help the process go smoother once the fish salvage and dewatering is to occur.

The last consideration for adaptive management involves the headgate infrastructure that was installed. Everything was installed and checked off as built as designed from the engineer onsite. We noticed at a site visit this fall that the head walls on each side of the head gate seemed to have water trickling through the rocks keeping the headwall in place. We have reached out to the engineer to clarify that if the headgate is mostly closed, should this be a concern. Adaptive management may need to occur to either keep the headgate somewhat open to allow the water to be slow moving and above the area that water trickles through, or perhaps more reinforcement in these areas. The engineer is determining the best course of action at this time.

While just completed, the sponsors recognize the need for adaptive management as it relates to projects. As mentioned, as implementors we have related lessons learned from this project to our regional Implementation Team partners. It is anticipated that regional monitoring efforts may also inform the partnership and will guide implementation into the future.