



Lostine Wetland and Side Channel Complex

COMPLETION REPORT

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INTRODUCTION/BACKGROUND INFORMATION

With the cooperation of the landowner and the Wallowa Land Trust, the Nez Perce Tribe (NPT) successfully implemented the downstream half of the Lostine Wetland and Side Complex project. Located on the Lostine River, at and immediately upstream of the confluence with the Wallowa River, the hired contractor – Northwest Watershed Restoration, completed all portions of this phase of implementation between July and November 2021. NPT was responsible for all contracting and daily construction oversight, and GeoEngineers supplied final designs, bid documents, construction engineering, construction oversight, and inspection. The resulting project entailed a light touch restoration approach including selective levee breaching at pilot channel inlets/outlets, alcove excavation, mainstem, side channel and alcove large wood placement, vertical post array placement within the floodplain, and riparian and wetland planting and seeding to improve floodplain connection, wetland conditions, and local fish habitat for a variety of species including Spring Chinook and Coho salmon, steelhead, Bull Trout, Pacific Lamprey, and other native aquatic and terrestrial animals.

Project partners include Nez Perce Tribe (NPT), Grande Ronde Model Watershed, BPA, Wallowa Land Trust, and the Wolfe family.

Project History

This project is located roughly 2 miles southeast of the town of Wallowa, Oregon on a private ranch that encompasses approximately 6,000 feet of the Lostine River and an estimated 1,500 feet of the Wallowa River and the associated left bank floodplain of both rivers. The property is a family run Century farm. The current parcel was purchased in 2004 and within just over a decade's time has been enrolled in two separate permanent easements with the Wallowa Land Trust, totaling over 450 acres. The landowner, Land Trust, and project partners share a long-term vision involving the restoration of fisheries, terrestrial, and wetland habitats through the utilization of less agriculturally productive ground.

Like many rivers in the region, the lower Lostine River has been largely channelized and leveed to accommodate agricultural and residential infrastructure. At this site, past modifications and land use management activities have included levee construction, floodplain grading, cattle grazing, irrigation development and riparian clearing. Consequently, this has resulted in

ecosystem-scale degradation, which includes a simplified river channel, disconnected floodplain, narrowed riparian extent, reduction of off-channel rearing areas and reduced wetland area and function.

The ESA Recovery Plan for Northeast Oregon Snake River Spring and Summer Chinook Salmon and Snake Basin Steelhead Populations (National Marine Fisheries Service, 2017), the Grande Ronde Subbasin Plan (Nowak, 2004), and the Wallowa Atlas restoration prioritization process (Bonneville Power Administration, 2019), all identify this reach of the Lostine River as deficient for habitat quantity and quality; impaired for water quality; and lacking in stream complexity, and floodplain connectivity. The NEOR Recovery Plan suggests that improving access to habitat and restoring degraded habitat will benefit Northeast Oregon Snake River spring/summer Chinook salmon and steelhead during spawning and rearing life stages. Achieving population viability, habitat restoration focusing on increasing habitat complexity, reconnecting floodplains, improving riparian vegetation, increasing summer flows, and decreasing sediment input are essential. The lower Lostine River corridor, where this project is located, is listed as a priority area for these restoration actions.

The Wallowa Atlas identifies WLL-3 (Lower Lostine: Forest boundary to the mouth) as a Tier 1 and is among the highest priorities for restoration in Wallowa County. Channel Modification – Pool Development, Floodplain Reconnection, Side Channel/Off-Channel Habitat Restoration, Riparian Restoration, Instream Structures - LWD Placement, Water Quality – Improve Thermal Refugia are all listed as “High” priority Restoration Actions for WLL-3 to be addressed through restoration within 1 - 5 years.

Within the project reach there are some areas where high-flow channels, waterward of the confining levee, offer a template of what ideal habitat conditions could be. These template high-flow channels cut through the forested riparian area and have abundant overhead cover, shade, and LWM structures. The intent of this project was to expand these template conditions, landward of the current levee, by allowing the river access to the broader floodplain and relic channels already within it.

The primary goal of this project is to promote natural river and floodplain conditions by removing levees, reconnecting floodplain channels, and enhancing floodplain wetlands. The

project seeks to minimize disturbance through “light-touch” construction methods to maintain existing mature on-site vegetation. Specifically, the objectives of this project include:

- 1) Increase mainstem habitat complexity through large wood placement
- 2) Increase off-channel habitat through alcove creation and side channel wood placement
- 3) Construct preferential flow paths to encourage floodplain interaction and connection
- 4) Breach levees in key locations at pilot channel inlets and outlets
- 5) Create and enhance wetlands in the floodplain through floodplain inundation using vertical post arrays
- 6) Improve riparian vegetation species composition and distribution

Key restoration actions will improve habitat and water quality including increased pool abundance; increased low-velocity off-channel alcove and side channel habitat; increased Large Woody Material (LWM) for mainstem habitat complexity; and a more diverse mosaic of floodplain wetlands. These enhancements will benefit existing populations of ESA listed Chinook, steelhead, and Bull Trout, as well as reintroduced Coho, Pacific Lamprey, and a variety of other aquatic and terrestrial species.



Figure 1. Lostine Wetland and Side Channel project vicinity map.



Figure 2. Pre-implementation photo taken mid-channel in the Lostine River, looking downstream toward the confluence with the Wallowa River. Photo shows existing intact riparian and instream habitat, taken October 2020.

DISCUSSION OF WORK COMPLETED

Completed objectives include:

- 3 large apex jams installed in the mainstem Lostine River to improve stream structure and channel complexity through increased sediment sorting, pool formation, and hydraulic diversity for ESA listed salmonid and Pacific lamprey rearing and spawning habitat.
- 4 small apex jams installed in the pilot channel inlets/outlet and alcove to increase structure and cover for fish as well as maintain/stabilize openings to maximize connection and inundation at a variety of flows.
- 1 alcove inlet and outlet excavated (375 CY) in the mainstem Lostine River to improve stream structure and channel complexity for ESA listed salmonid and Pacific lamprey rearing habitat.

- Levee breaching and grading of two pilot channel inlets and one pilot channel outlet, connecting relic side channels to allow main channel flows above 1-year discharge events to inundate the floodplain and maximize rearing habitat for juvenile fish (Figure 3).
- 19 vertical post arrays installed within the alcove, pilot channels, and floodplain swales to maximize floodplain inundation, enhancing existing wetland conditions and riparian vegetation (Figure 4).
- >1,000 willow cuttings (various species) and >200 slough sedge (*Carex obnupta*) 10-cubic inch wetland plugs were planted in association with large wood structures, alcove and pilot channel graded areas to compete with invasive species like Reed Canary Grass, and provide native vegetative cover and bank stability (Figure 5). A wetland/riparian seed mix including Nebraska sedge, Tufted hairgrass, American sloughgrass, and Basin Wildrye was spread over ~1.8 acres, while an upland seed mix containing native varieties of Orchardgrass, Fescue, Ryegrass, Meadow brome, and Clover was spread over ~2.4 acres.



Figure 3. Looking downstream from river left at Pilot Channel 2-Inlet grading and associated small apex jam, taken during construction on August 4.



Figure 4. Vertical post array installed in floodplain swale, taken during construction on August 5.



Figure 5. In-progress containerized wetland plug and willow stake planting in Pilot Channel 1-Outlet, taken October 27.

Contract Objectives

1. Coordination – NPT was the primary project sponsor, coordinating funding, environmental compliance oversight, and communication with stakeholders.
2. Design & Engineering – NPT contracted GeoEngineers for design engineering complete with construction specification, cost estimate, bid schedule, and construction oversight (see Appendix D for Final Design Drawings).
3. Environmental compliance – ESA Section 7 Consultation was completed through the HIP programmatic, covering consultation for both U.S. Fish & Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). NPT contracted with GeoEngineers to complete

removal/fill permit applications. The first deliverable was biological clearance for the project as stated in the letter of concurrence from both NMFS and USFWS complete with terms and conditions of project construction. The second deliverable was removal/fill permits from both Oregon Department of State Lands (DSL) and Army Corps of Engineers (Corps) complete with terms and conditions of project construction. A cultural resources survey was conducted by NPT archeologist's and consultation was completed spring, 2020.

NPT staff conducted fish salvage operations to remove/relocated fish from isolated work areas – see Appendix B for Fish Salvage Data.

Leading up to, during, and following construction, the contractor adhered to all permit and HIP programmatic required conservation measures.

4. Contracting – NPT contracted solely with BPA for all project implementation funds (see Appendix A for Project Funding). Northwest Watershed Restoration won the construction bid through a standard competitive RFP process.

5. Construction – Following delivery/staging of large wood on site by a sub-contracted wood source (trees inspected by NPT staff on 6/9/22), the contractor mobilized equipment on site from 7/28 – 7/31. On 8/1, with the assistance of the engineer representative, the contractor surveyed in/staked the project and began construction. All excavation, wood placement, the initial seeding and mulching, and site rehabilitation/demobilization was completed by 8/5 under the direct observation of GeoEngineers representatives and/or NPT project staff. Due to the presence of several naturally formed large wood jams in the main channel and the desire to preserve intact mature vegetation, the location of several features were field fit with the approval of the overseeing engineer.

Between contractor demobilization and fall planting, a sub-contractor completed the replacement of two on-site gates, per specifications agreed to by the landowner and the Land Trust.

The remainder of the planting and seeding/mulching was completed by the contractor on 10/26-10/27, which included additional willow stakes, wetland plugs, and riparian and upland seed mixes.

LESSONS LEARNED & ADAPTIVE MANAGEMENT

Lessons Learned

What Did and Did Not Work

Overall, the project was a success with only minor setbacks. Due to their extensive experience, Northwest Watershed Restoration was thorough and consistent in their application of the engineered designs. There was some initial difficulty locating the hubs for the purpose of staking the project, however, once located, the contractor was able to stake the project in an efficient and timely manner. After project staking and associated elevations were established, the contractor used a laser level to assess and achieve all design specified grading. As mentioned, NPT staff was onsite for all in-water work and, with the exception of the last day (8/5), GeoEngineers was present to oversee construction, provide field fit direction, and inspect completed work throughout the entire project.

An intense windstorm hit the project area and nearby town of Wallowa on August 11, just six days following construction demobilization. This storm dropped dozens of large cottonwood trees throughout the project footprint, within the main Lostine River and on top of constructed wood structures within and outside of the main channel (Figure 6 and 7). This unexpected disturbance and large wood recruitment event is anticipated to improve and advance the project objectives of increasing in stream complexity (e.g., pool formation, substrate sorting, fish cover/holding water, etc.), and water conveyance and inundation on the floodplain.



Figure 6. Looking toward Losine River at Small Apex Jam in Pilot Channel 2-Inlet during construction (top) and after windstorm wood addition (bottom).



Figure 7. Looking across and upstream of Large Apex Jam 1 at large mature cottonwood cluster present during construction (top) and following large windstorm (bottom).

Lesson Learned

Despite extensive efforts by NPT and GeoEngineer staff to meet with, discuss, and negotiate a feasible implementation plan, the landowner across the river – outside of the project boundaries, unexpectedly became unamenable to the project adjacent to and upstream of their property. Normally an uninvolved landowner would have no real bearing on project implementation off their property, however, due to longstanding family relations and history, the owner of the Lostine Wetland project property decided to honor their neighbor's objection. This ultimately resulted in NPT and GeoEngineers choosing to reduce the project extent by roughly half, and constructing only the downstream portion of the design plan set in 2022. The remaining engineered design for the upstream half of the project will continue to be considered for future implementation if/when the opportunity arises.

Exchange of Information

Other than the aforementioned experience, direct and frequent communication by phone, at technical team meetings, one-on-one, and on-site during construction with the project engineer, contractors, landowner and project sponsor, information exchange served the project greatly. Through a consistent and open dialog with the landowner, the project sponsor was able to address all potential issues related to on-site spoils, large wood storage, site restoration, and gate reconstruction in an agreeable fashion, preventing any misunderstandings or discontent.

Related to information exchange, to date NPT staff has guided several site tours for various local partners, including the local Natural Resources Advisory Committee (NRAC), Wallowa Atlas Implementation Team, and the Land Trust. The project was also featured in the Land Trust's newsletter and will also be highlighted on the NRAC's page of the Wallowa County website.

Adaptive Management

Applying Lessons Learned: Past Work Practices

Although this project was the second floodplain restoration project implemented by the project sponsor, the scope of the project and the habitat issues being addressed are similar to past projects completed, therefore past experience and lessons learned largely contributed to its successful completion. Prior lessons learned by the project sponsor that helped with successful

implementation include but are not limited to, working through a variety of design and landowner challenges, budgeting for adequate engineer construction observation time to enable field fitting as needed, construction bid evaluations and contractor selection, etc.

Applying Lessons Learned: Other Projects

Through monthly Wallowa Atlas Implementation Team meetings and other similar discussions with restoration practitioner partners, we are continually learning from not only our own growing implementation experience, but also other project implementer's experiences and lessons learned on similar and often even larger scale projects. We are not only talking to and learning from other restoration practitioners within Wallowa County, but have also coordinated with and attended project tours with partners conducting large scale habitat projects in Union County (NE OR) and in the Tucannon River drainage in (SE WA). This extended coordination has resulted in much shared on-the-ground knowledge from various partners.

RM&E Adjustments

In addition to standard photo point documentation, we look forward to comparing pre and post implementation drone imagery collected by the GRMW biannually in our project area. Similarly, past and future LiDAR imagery will be useful to compare overtime for change detection through the project reach.

Pending funding availability, mainstem Lostine River snorkel and habitat surveys conducted through the project reach by ODFW Research staff in 2022 will be repeated in 2023, and potentially beyond. This data collection effort will provide information about changes in presence and absence of various fish species and life stages, and various relevant habitat metrics (e.g., channel habitat characterization, pool size and quantity, large wood quantity, etc.).

Ongoing annual geospatially recorded spring Chinook and Coho redd surveys through the project reach will be compared pre- and post-implementation to detect changes in use by spawning adults.

With an overall lack of both monitoring funding and staff time/training to collect monitoring data, the project sponsor will continue to coordinate with the GRMW and other project partners

to opportunistically collect data and conduct modeling to analyze changes in biological and physical parameters as a result of project implementation.

Anticipated Future Critical Landmarks and Challenges

Until the newly constructed project experiences flows in spring 2023, project staff have yet to see all project features functioning as intended since the channels were connected at base flow conditions. Orthomosaic drone imagery taken in June 2023, along with site visits in the spring, will be indicative of how closely the project functions to modeled conditions. It will also be interesting to observe how the additional wood that fell within the project area will interact with the constructed features on the project.

Another critical landmark moving forward will be whether it will become feasible to implement the second half (upriver portion) of the designs to increase habitat and floodplain inundation benefits in this reach of the Lostine River. This may become possible if there is a change in landownership to someone who is amenable to restoration actions occurring adjacent to their property. If this occurs, it would then be possible to incorporate any lessons learned as a result of the 2022 construction into the second phase, creating even more ecological uplift.

REFERENCES

Bonneville Power Administration. (2019). *Wallowa Atlas Implementation Guidelines*. Portland: Bonneville Power Administration.

National Marine Fisheries Service. (2017). *ESA Recovery Plan for Northeast Oregon Snake River Spring and Summer Chinook Salmon and Snake River Steelhead Populations*. Portland, Oregon: National Marine Fisheries Service.

Nowak, M. (2004). *Grande Ronde Subbasin Plan*. Portland, Oregon: Northwest Power and Conservation Council.

APPENDICES

Appendix A: Project Funding

Construction:

Funding sources (Construction) include:

1. BPA = \$410,033 (Cash)
2. NPT Project Management = \$7,200 (In-Kind)
3. NPT Watershed Monitoring = \$12,426 (In-Kind)
4. WLT Monitoring = \$8,400 (In-Kind)
 - Total secured contribution = \$438,059

Funding Source	Cash Amount Contributed	Amount Spent
BPA	\$410,033	\$228,496.49
NPT (In-Kind)	\$0	\$19,626
WLT (In-Kind)	\$0	\$8,400
Total		\$256,522.49

Technical Assistance:

OWEB TA funds were applied for, obtained, and used to procure project design, specification, permitting, ESA consultation, and was an essential step towards implementation of this project. OWEB Technical Assistance project #219-5018-16328 in the amount equal to \$60,275 with \$16,815 in kind cost share. Contributions by:

1. BPA = \$58,594.39 (Cash)
2. OWEB = \$60,275 (Cash)
3. NPT Project Management & Travel = \$11,900 (In-Kind)
4. GRMW Project Coordination = \$1,800 (In-Kind)
5. BPA Engineer = \$3,000 (In-Kind)
 - Total = \$135,569.39

Funding Source	Cash Amount Contributed	Amount Spent
BPA	\$58,594.39	\$58,594.39
OWEB	\$60,275	\$42,606.79
NPT (In-Kind)	\$0	\$11,900
GRMW (In-Kind)	\$0	\$1,800
BPA (In-Kind)	\$0	\$3,000
Total		\$117,901.18

Project Grand Total Technical Assistance and Construction = **\$374,423.67**.

Appendix B: Fish Salvage Data

Fish Salvage Data Collection: Lostine River - Lostine Wetland and Side Channel Project							
8/2/22 - 8/4/22							
Type of take	Coho	Chinook	Steelhead	Bull Trout	Dace	Sculpin	Lamprey Ammocoetes
Number Captured	3	9	30	0	110	57	0
Number Injured	0	0	0	0	0	0	0
Number Killed	3	1	11	0	3	0	0
Type of take	Interior Columbia Basin	Bull Trout					
Number of salmonids Captured	42	0					
Number of salmonids Injured	0	0					
Number of salmonids Killed	15	0					

Appendix C: Pre and Post Implementation Photos

Lostine Wetland and Side Channel Complex: Pre & Post-Project Photos & Map

Photo Point 1:

Looking NW from Lostine River mainstem, downstream at proposed (a) and actual (b) Alcove 1-Outlet.

(a)



(b)



Photo Point 2:

Looking N downstream from left bank of Lostine River at proposed (a) and actual (b) PC2-Inlet.

(a)



(b)



Photo Point 3:

Looking SE upstream from left bank of Lostine River at proposed (a) and actual (b) Large Apex Jam (A3).

(a)



(b)



Photo Point 4:

Looking N downstream from right bank of Lostine River at proposed (a) and actual (b) Large Apex Jam (A1) to the right and Pilot Channel 1 Inlet to the left.

(a)



(b)



Photo Point 5:

Looking N towards the Wallowa River at proposed (a) and actual (b) Vertical Post Arrays and Small Apex Jam in Pilot Channel 1 Outlet.

(a)



(b)



Corresponding Photo Point Map

