

## USFS Region 6, Gifford Pinchot National Forest, Mount St. Helens National Volcanic Monument 2014

---

<b>Project Title</b>	Lewis River Side Channel Near Muddy River Instream Habitat Restoration.								
<b>Agency</b>	US Forest Service Gifford Pinchot National Forest Mount St. Helens Ranger District								
<b>Project Manager</b>	Adam Haspiel (360) 449-7833 <a href="mailto:ahaspiel@fs.fed.us">ahaspiel@fs.fed.us</a>								
<b>Project Approved By</b>	Aquatic Coordination Committee (March 29, 2011)								
<b>Project Funding</b>	<table><tr><td>ACC Funding</td><td>\$42,000</td></tr><tr><td>USFS Funding</td><td>\$30,000</td></tr><tr><td><u>Partner Funding</u></td><td><u>\$ 5,000</u></td></tr><tr><td><b>Project Total</b></td><td><b>\$77,000</b></td></tr></table>	ACC Funding	\$42,000	USFS Funding	\$30,000	<u>Partner Funding</u>	<u>\$ 5,000</u>	<b>Project Total</b>	<b>\$77,000</b>
ACC Funding	\$42,000								
USFS Funding	\$30,000								
<u>Partner Funding</u>	<u>\$ 5,000</u>								
<b>Project Total</b>	<b>\$77,000</b>								

### Project Description (work completed)

In 2014 the Gifford Pinchot National Forest used funds from PacifiCorp and Cowlitz PUD to supply equipment, operators, and labor for construction of the Lewis River Side Channel Near Muddy River Instream Habitat Restoration project. This was a side channel located on private lands adjacent to US Forest Service lands. Work included placing approximately 120 pieces of Large Woody Material, to create 12 complex structures to restore fish habitat. The structures were designed to alter stream flows and modify stream morphology, including pool depth, overhanging banks, and by slowing water to drop and capture mobile sediment.

The project objectives were to:

- Improve habitat complexity
- Create resting areas for spawning adult salmon and steelhead
- Improve holding pools for juvenile salmon, steelhead and bull trout.
- Improve overwintering habitat for juvenile fish
- Collect gravel and improve spawning habitat

A 35 acre logging unit was developed as part of the Peppercat timber sale for instream restoration activities. The unit was thinned for the project using standard logging techniques such as chainsaws for cutting trees down, and pushing trees over with a logging shovel to keep the tree bole intact with rootwads. Trees were transported via

---

---

log trucks to a staging area at the beginning of a spur road off the 2590 road, about ¼ mile from the project area. Trees were transported to the project site from the staging area with a rubber tired skidder. Numerous large legacy logs from Swift Reservoir cleaning operations were used in conjunction with the Peppercat trees to create diverse and complex structures.

Approximately 5 to 15 pieces of large woody material (LWM) were used at each structure location to form complex habitat. Structures were placed along stream margins, protruding no more than 40 percent into the stream channel to minimize excessive water shear stress and create a meandering thalweg. Key pieces of wood at each location were anchored into the streambanks using an excavator to dig trenches up to 40 feet long, and bury the wood. Other pieces of LWM were interwoven into these key pieces and riparian vegetation. A small side channel had several small structures placed in it as part of the overall project.

Structures were built to address specific needs and improve the conditions at each location, such as pool creation or collection of spawning gravels.

## Partners

**Mount St. Helens Institute.** The Mount St. Helens Institute established baseline data for sediment and cross-sectional morphology in 2014.

Surveyors used Stream Channel Reference Sites (Harrelson et. al., 1994) as the standard surveying protocol. Cross-sectional benchmarks were established above margin structures to capture the effect of pool formation or gravel capture depending on the structure intent.

**PacifiCorp and Cowlitz PUD.** The utilities provided funding for the project.

## Workforce

Adam Haspiel, USFS Fisheries Biologist  
Bryce Michaelis, USFS Fisheries Technician

---

---

**Contractors**

O'Malley Brothers Corporation  
Gresham Oregon

**Problems Encountered**

Working on private land was more challenging than expected because three landowners were involved, and property government authority using the Wyden Agreement was more involved than anticipated.



Figure 1. Picture of Structure 12



Figure 2. Structure 7



Figure 3 Map of Project Area



Figure 4 Project Area

# Post-implementation Status Report Lewis River Side Channel Near Muddy River

---



**Partnership between Mount St. Helens Institute and USFS Region 6, MSHNVM**

**Prepared by: Abigail Groskopf, MSHI Science Education Director and Jacob Sleasman, MSHI Fisheries Lead**

**November 2014**

## Table of Contents

Project Summary.....	2
Site Location and Description.....	2
Goals and Objectives .....	3
Community Outreach.....	3
Monitoring Methodology.....	4
Results and Analysis .....	4
Conclusions.....	5
Appendix A: Site level cross-sections and photo-documentation.....	7

## Project Summary

The Lewis Side Channel near Muddy River Instream Habitat Restoration project resulted in the construction of 12 complex Large Woody Material (LWM) structures over 1000 ft. of the entire length of the side channel. These LWM structures are designed to increase diversity in the side channel, provide winter refuge from high flows and increase spawning habitat for Chinook, Coho, and Steelhead Trout.

Reconnaissance surveys conducted for this project occurred during July, August September, October and November of 2010. Water flows into the side channel from the river year round, the amount is controlled by a large log jam at the head of the channel, and an outlet to the river is always present, providing easy access into and out of the side channel. The side channel varies between 30 and 20 feet in width, and is well protected by a stable island. In November 1956 Chambers (WDFW) found Coho redds in this side channel. This island and side channel have been a stable feature of the Lewis River for over 50 years.

EDT analyses concludes habitat diversity and side channel habitat is one of the highest concerns in this reach and should respond well to restoration activities. Concerns include high habitat diversity, moderate hatchery fish competition, food availability, and sediment concerns. The ACC Synthesis Matrix rated this section of the river as having medium restoration potential and as a Primary Coho population area.

This project is funded by PacifiCorp Aquatic Coordination Committee.

## Site Location and Description

Lewis Side Channel near Muddy River Instream Habitat Restoration project located on private land, is a 1000 ft. long side channel around 2.0 miles upstream of the Swift Reservoir near the confluence of the Muddy River. Access to the site is by driving across the Curly Creek Bridge on FR 9039. After several miles there is a turn off on to private land. The road goes all the way down to the restoration site.





Figure 5: Map of project area

## Goals and Objectives

Project goals include:

1. 12 structures using 120 pieces of Large Woody Material.
2. Formation of 12 stable quality pools over 3 feet in depth with cover elements associated with each structure.
3. Spawning gravel bed formed at structures.

## Community Outreach

The Mount St. Helens Institute provides community outreach in a number of different ways. The Youth Stream program engages underserved youth, ages 8-18 in watershed education and introduces youth to restoration and monitoring in the Gifford Pinchot National Forest. Through engaging hands-on lessons, youth learn about water quality, fish biology, watershed dynamics and the effects of the 1980 eruption on the riverine ecosystems.

The Mount St. Helens Institute provided an internship for an undergraduate student. The Intern gained surveying, monitoring and education skills that equip them for an active career in science and/or education and have an opportunity to make a visible difference on their public lands.

Table 1: 2014 Community Engagement

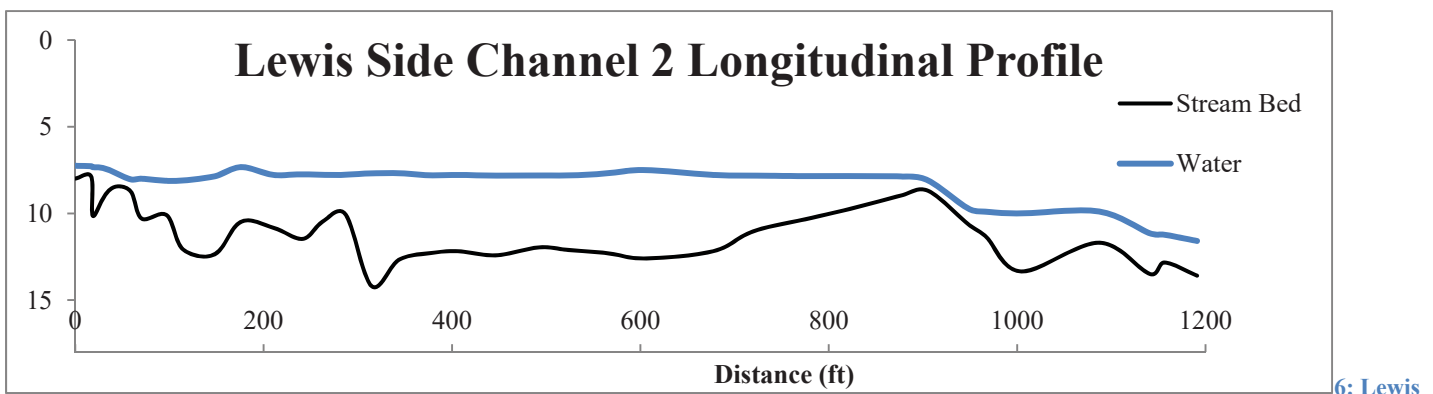
Community Type	Individuals Participating	Actual Hours Served
Youth Stream Team	15	35
Adult (undergraduate) Volunteer	0	0
MSHI Interns	2	35
<b>Total</b>	17	70

## Monitoring Methodology

To capture the effects of the complex structures a cross-section was established at a key point within the structure. Only structures that were designed to alter geomorphology (pools, gravel-beds) were surveyed. Two benchmarks for each cross-section were placed in live trees so they will last for many years. Throughout the reach there are several structures in close proximity, which warranted one benchmark on the non-structure side of the stream being used for two separate cross-sections. Each structure has an accompanying Wolman Pebble Count. A longitudinal profile was determined from an established benchmark at the upper extent of the project area. A longitudinal profile measures the elevation changes following the thalweg (the deepest continuing line in the stream channel). It is important to note that due to stream/thalweg meandering the longitudinal profile is not only a measure of distance and elevation, but also of sinuosity. From the longitudinal profile pool depths and pool:riffle counts can be assessed. Surveyors used *Stream Channel Reference Sites* (Harrelson et. al., 1994) as the standard surveying protocol. Photos were taken at all structures above the structure looking downstream, opposite the structure, and below the structure looking upstream. Results and Analysis

A baseline longitudinal survey was conducted prior to the restoration installations. Immediately following the installations, baseline cross-sectional surveys and pebble counts were conducted.

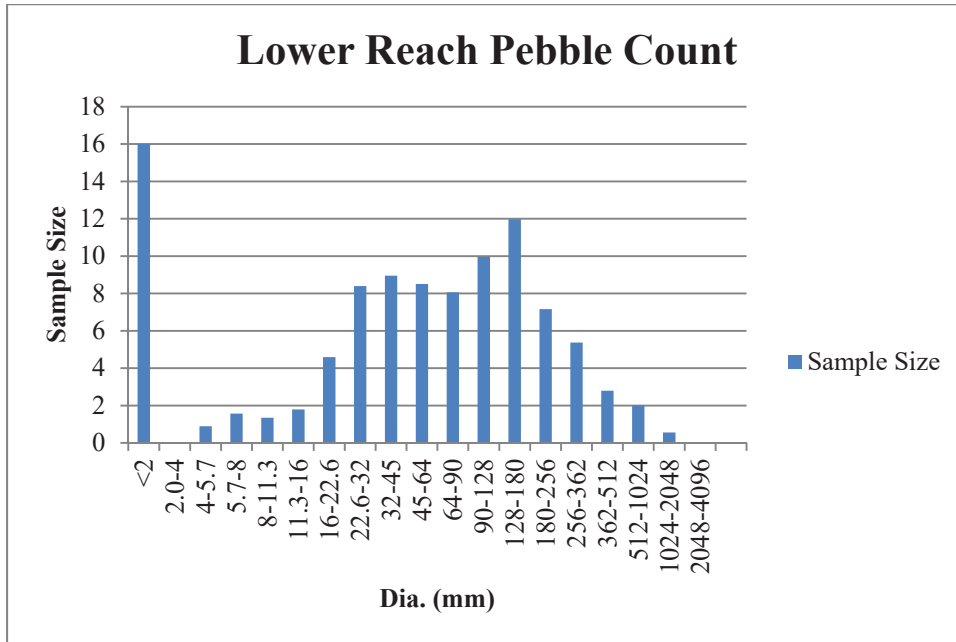
The baseline longitudinal project is shown in Figure 2. Within the project reach there are 2 distinct pools with a base flow water depth of 3 feet or deeper, and a residual pool depth of at least 1.0 feet. The first pool covers the majority of the entire reach. The pool was too deep to measure a max depth which is over 5 ft. The pool: riffle ratio is 4.05:1, Slope is 0.47%.



Side Channel 3 2014 Longitudinal Profile (0-2000 ft.)

Due to the depth of the two most upstream structures pebble counts were not performed there. All pebble counts were taken below the large pool tail out. Baseline post-installation survey of substrate size distribution confirms previous data

and reconnaissance reports. Throughout Lewis Side Channel near Muddy River Instream Habitat Restoration project restoration reach substrate size is moderate, with an average median substrate size of 51 mm and a D84 of 171 mm.



3: Lewis Side Channel 2 Lower Reach Substrate Size Distribution

ST #	D50	D84
1 & 2	36	131
3	47	436
4	35	83
5	15	47
6	87	166
7	75	160
8	29	145
9	66	169
10	63	155

4: Table showing median and 84 percentile substrate sizes for each restoration structure.

## Conclusions

Overall the project was successfully implemented. 12 complex structures were constructed, including structures designed to provide rearing habitat and spawning beds. By engaging both underserved youth and undergraduate students in on-the-

ground data collection, the Mount St. Helens Institute not only more efficiently collects data but students of all ages gain invaluable job-training skills necessary in today highly competitive market.

## Appendix A: Site level cross-sections and photo-documentation

Included for each complex structure are baseline cross-sectional graphs and well as post-installation photographs. Substrate graphs and additional site photos are available upon request. Photos of bank stabilization structures are available on request.

