USFS, Gifford Pinchot National Forest

Mount St. Helens Ranger District. 2012

Project Title	Muddy River Side Channel Restoration
Agency	US Forest Service Gifford Pinchot National Forest Mount St. Helens Ranger District
Project Manager	Adam Haspiel (360) 449-7833 ahaspiel@fs.fed.us
Project Approved By	Aquatic Coordination Committee
Project Funding	ACC Funding $39,000 USFS Funding $32,000 Partner Funding $ 2,000 **Project Total $73,000**
Project Description (work completed)	In 2012 the Gifford Pinchot National Forest used funds from PacifiCorp and Cowlitz PUD to furnish equipment, operators, and labor for construction of a habitat restoration project on two side channels associated with tributaries on the Muddy River. Restoration work occurred wholly on US Forest Service lands. Work included placing approximately 200 logs, most with rootwads attached, to create 34 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 • Improve holding pools for juvenile salmonids • Improve overwintering habitat for salmonids • Collect gravel and improve spawning

habitat for coho salmon and steelhead trout

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 rootwad. Trees were transported via log trucks to a staging area at the end of a road near the Muddy River Picnic Site. Trees were transported to the project sites from the staging area with a rubber tired skidder.

Approximately 5 to 10 pieces of large woody material (LWM) were used at each structure location to form complex habitat. Structures were placed along margins protruding no more than 35 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 30 feet long, and bury the wood. Other pieces of LWM were interwoven into these key pieces and riparian vegetation.

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

Partners

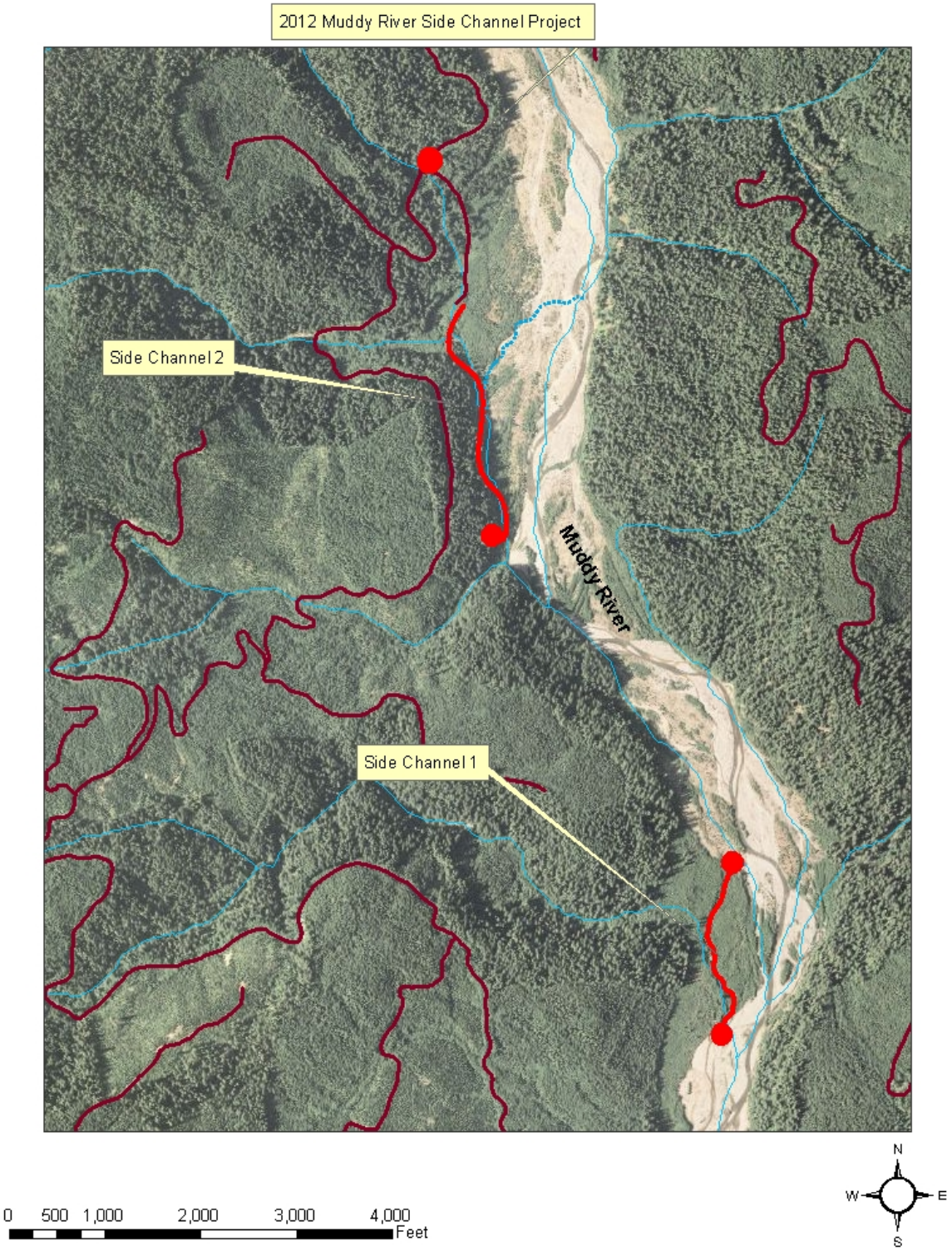
Mount St. Helens Institute. The Mount St. Helens Institute established baseline data for sediment and cross-sectional morphology in 2012.

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	Twin Peaks Carson, WA
Problems Encountered	The stream channels were narrow with areas of dense alder stands, because of this the excavator had difficulty maneuvering in several sites. The excavator got stuck in mud/ash in one location and needed to be pulled out with another machine.

USFS, Gifford Pinchot National Forest

Mount St. Helens Ranger District. 2012



Muddy Side Channel #2 Restoration-Baseline Report

Prepared by Abigail Groskopf
Mount St. Helens Institute
Reviewed by Adam Haspiel, Mount St. Helens National Volcanic Monument

Project Summary

To restore and enhance habitat complexity for salmonids in the Muddy River Watershed, the Mount St Helens National Volcanic Monument (MSHNVM) and the Mount St. Helens Institute (MSHI) with the help of local contractors installed 19 log structures in a Muddy River side channel with associated tributary, named for the purpose of this report *Muddy Side Channel #2*, in August of 2012. The Muddy River Watershed was identified as a priority system by the Gifford Pinchot National Forest Stream Restoration Plan in order to help the greater Lewis River salmonid reintroduction efforts. The installed log structures were designed to create rearing pools, increase instream complexity and increase overall stream sinuosity. Two additional Muddy River side channels with associated tributaries also received restoration treatments as part of the Muddy River restoration efforts; these channel restoration projects received funding from PacifiCorp, Cowlitz PUD, and Ecotrust. Similar to Muddy Side Channel #2, restoration on these channels was designed to increase instream complexity and provide rearing pools for reintroduced salmonids.

This report was designed to provide background information and baseline data. PacifiCorp and Cowlitz PUD provided funding for the instream work. Monitoring was done using grant funds and in-kind contributions.

Site Description and Location

The project is located off Forest Roads 8322 and 8322700 in Skamania County, WA.

During the 1980 eruption of Mount St. Helens a mudflow moved down the Muddy River scouring the landscape and depositing volcanic materials. The flood of 1996 additionally influenced the Muddy River, by widening the channel, transporting large wood and sediment downstream and into the Swift Reservoir.

After the 1996 flood, a number of restoration projects occurred to help stabilize banks, increase habitat complexity and decrease sediment run-off. These included: road decommissioning, culvert replacements, landslide removal, and tree plantings.

Monitoring Methodology

A benchmarked longitudinal profile of the restoration reach was completed. Benchmarked cross-sections at each structure were completed; pebble counts at every other cross-section and photographs of each structure were collected to form the post-installation baseline data on the restoration project. Surveyors used *Stream Channel Reference Sites* (Harrelson et. al., 1994) as the standard stream surveying protocol. Benchmarks were nails, painted blue or yellow at the base of riparian trees. Trees were clearly flagged and labeled with the structure number from 1 to 19; ST1 is upstream and ST 19 is downstream, just upstream from the side channel confluence with the Muddy River. We did not install a benchmarked cross-section at structure 17 (ST17) due to a cliff face on one bank and an unstable bank on the opposite side. In addition, structure 8 was partially constructed and abandoned due to the difficulty maneuvering machinery. The longitudinal profile will show changes in pool frequency, depth, and overall sinuosity. Cross-sections were installed to capture the intent of the structure; if a pool was dug, then the cross-section runs through the pool, or if a structure was designed to induce meandering, the cross-section was

installed to capture lateral change. Photographs were taken above and/or below each structure and from the opposite bank of the structure; photographs were taken to show the structure within the context of the reach as best possible; and will ideally be able to be used to visually track changes over time. Arrows indicating stream flow and benchmark locations were added where appropriate.

Photographs and Graphs

Figure 1: Longitudinal Profile Upper Benchmark (on RB)

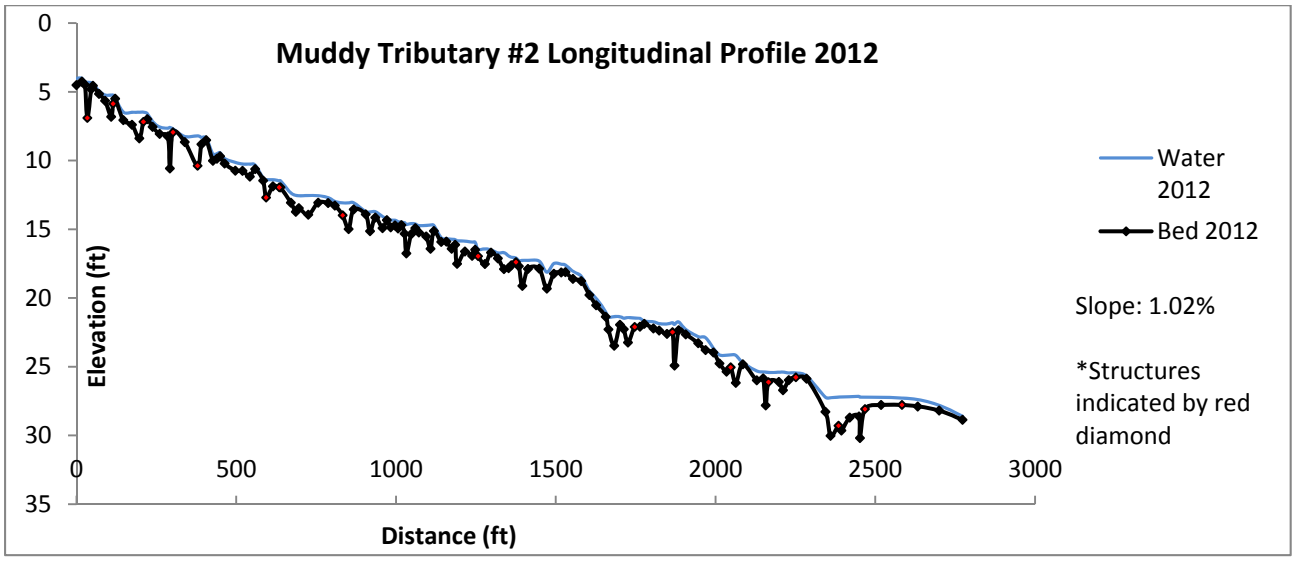


Figure 2: 2012 Muddy Tributary #2 Longitudinal Profile. 15 pools are associated with installed structures. Slow and fast water count ratio is 1:1 (or 28:28 units) and slow and fast water length is 1189.5 ft. to 1583.5 ft.

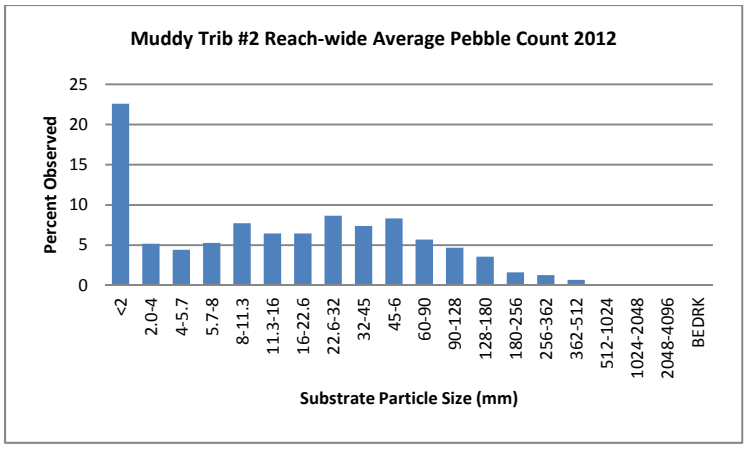


Figure 3: Reach-wide Pebble Count Averaged; note the high % of fines (<2mm); these may be a result of earth moving required in structure installation.

STRUCTURE 1

Figure 4: ST 1, standing on LB, note cross section is upstream from structure

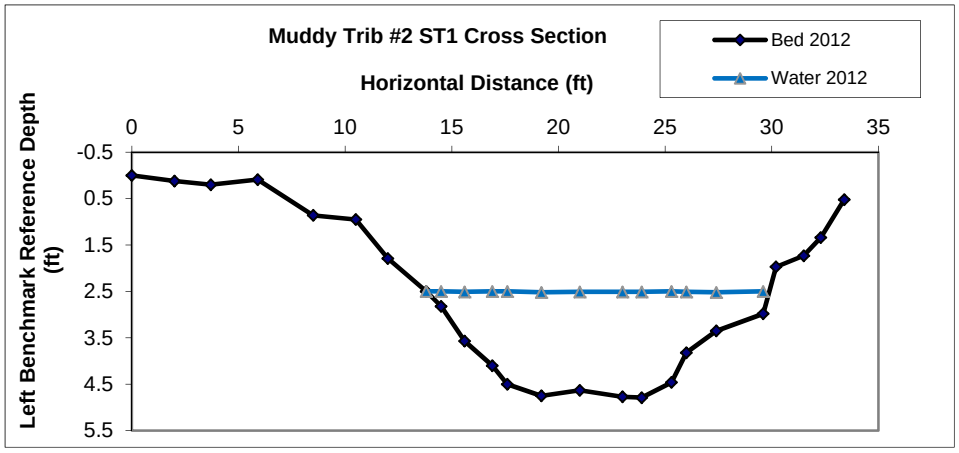


Figure 5: ST1 cross section

STRUCTURE 2

Figure 6: ST 2, on LB, cross-section through structure

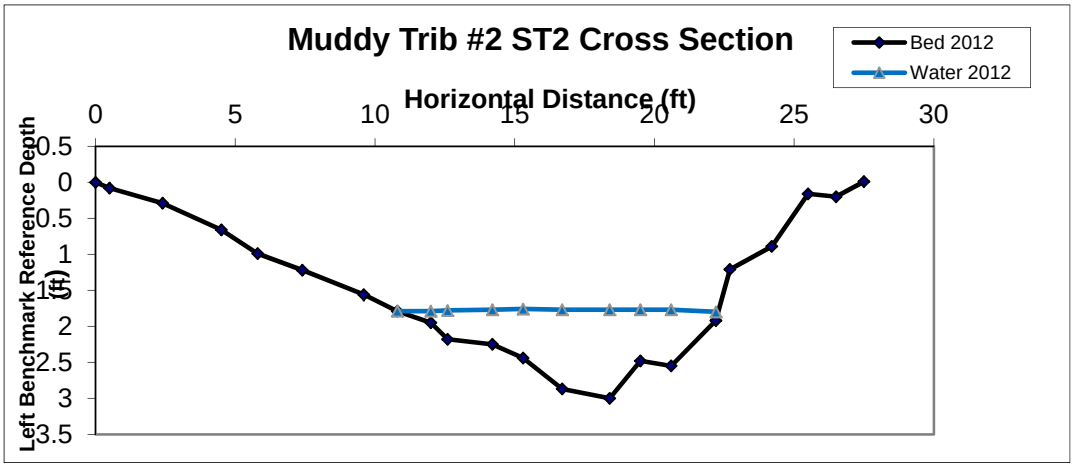
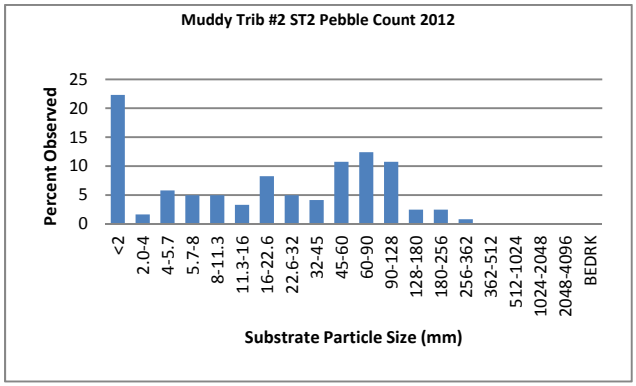


Figure 7: Structure 2 X-section. Note the high number of fines in the pebble count graph below.



STRUCTURE 3

Figure 8: ST 3 on RB

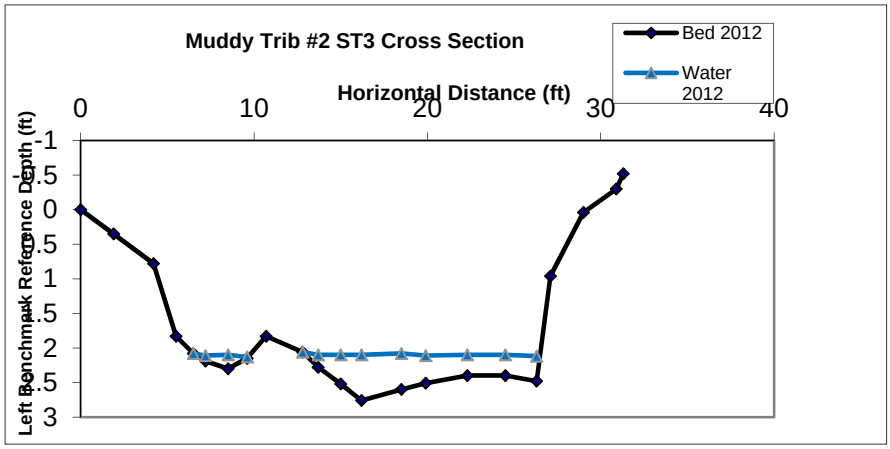
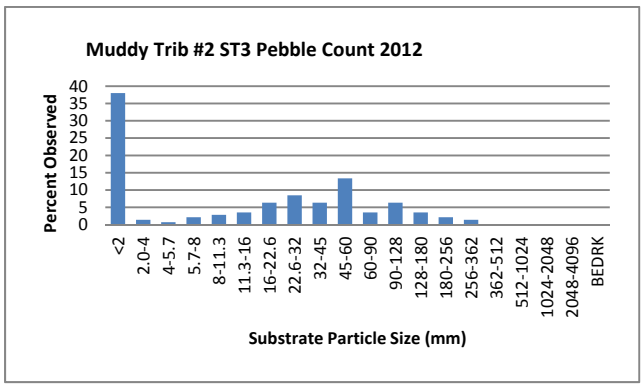


Figure 9: ST 3 Cross-section. LB at 0 horizontal feet.



STRUCTURE 4

Figure 10: ST 4, above ST looking downstream

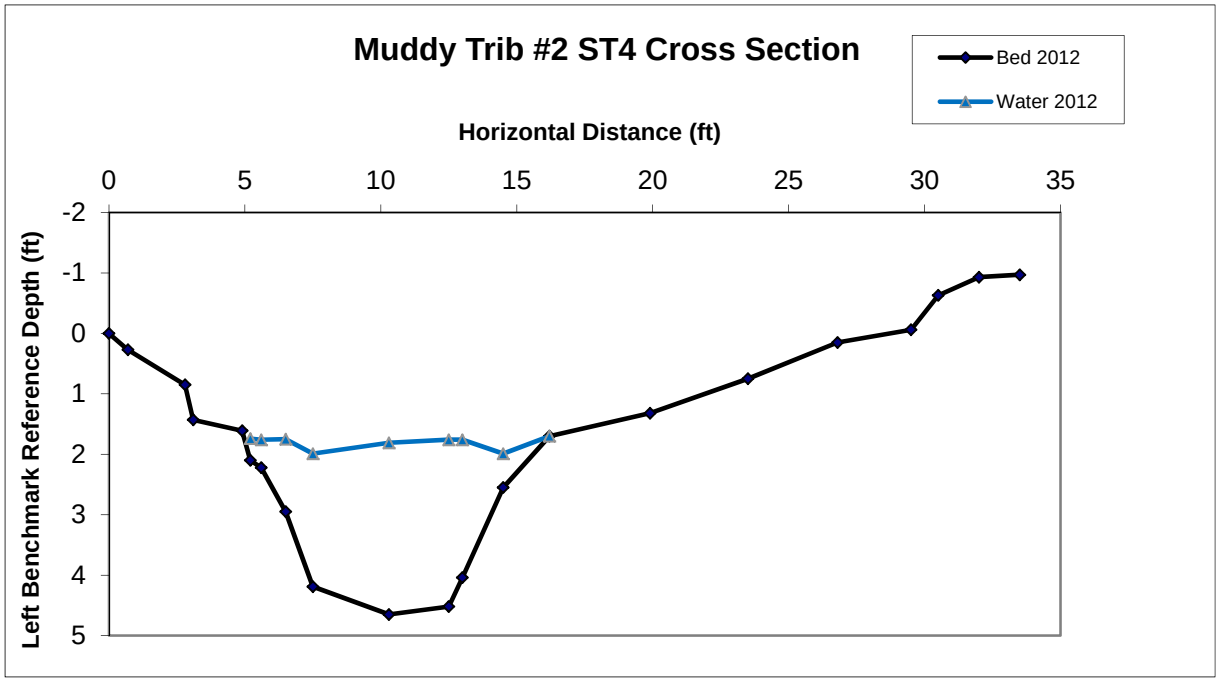


Figure 11: ST 4 Cross-section; xs through the structure

STRUCTURE 5

Figure 12: ST 5 above ST looking downstream

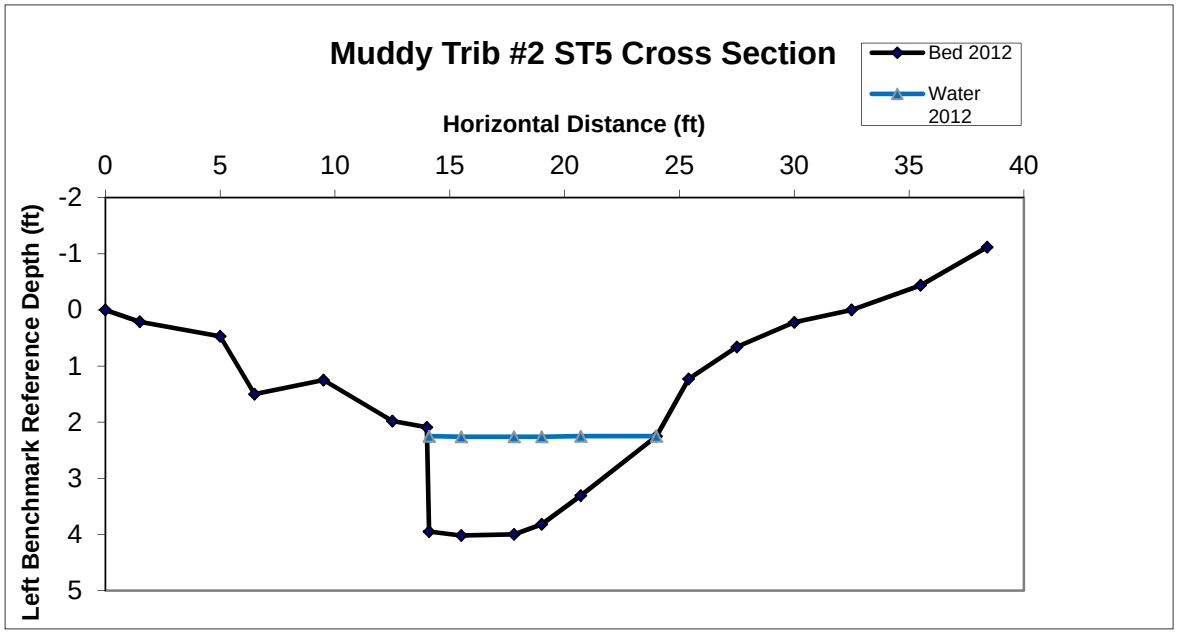


Figure 13: ST5 cross section; cross-section through the structure to capture pool form

STRUCTURE 6

Figure 14: ST 6 above ST looking downstream

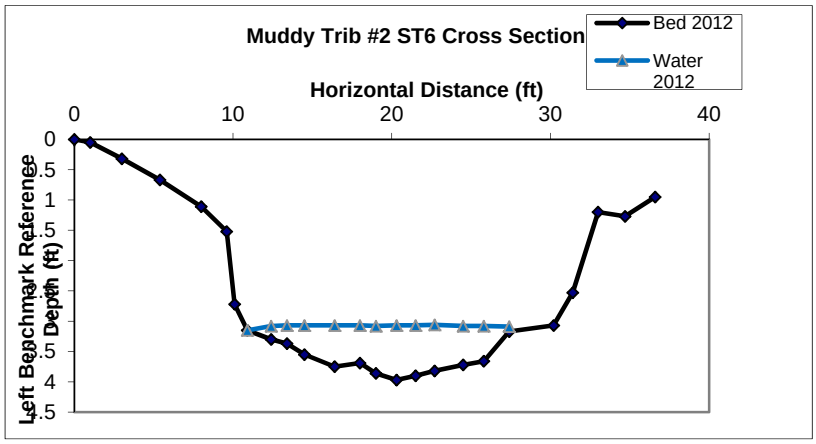
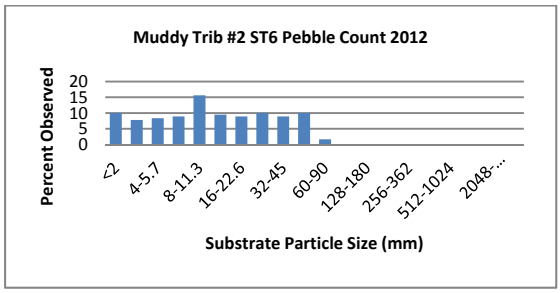


Figure 15: ST 6, cross-section upstream from structure



Note: equal fines, gravels and small cobbles

STRUCTURE 7

Figure 16: ST 7 above ST looking downstream

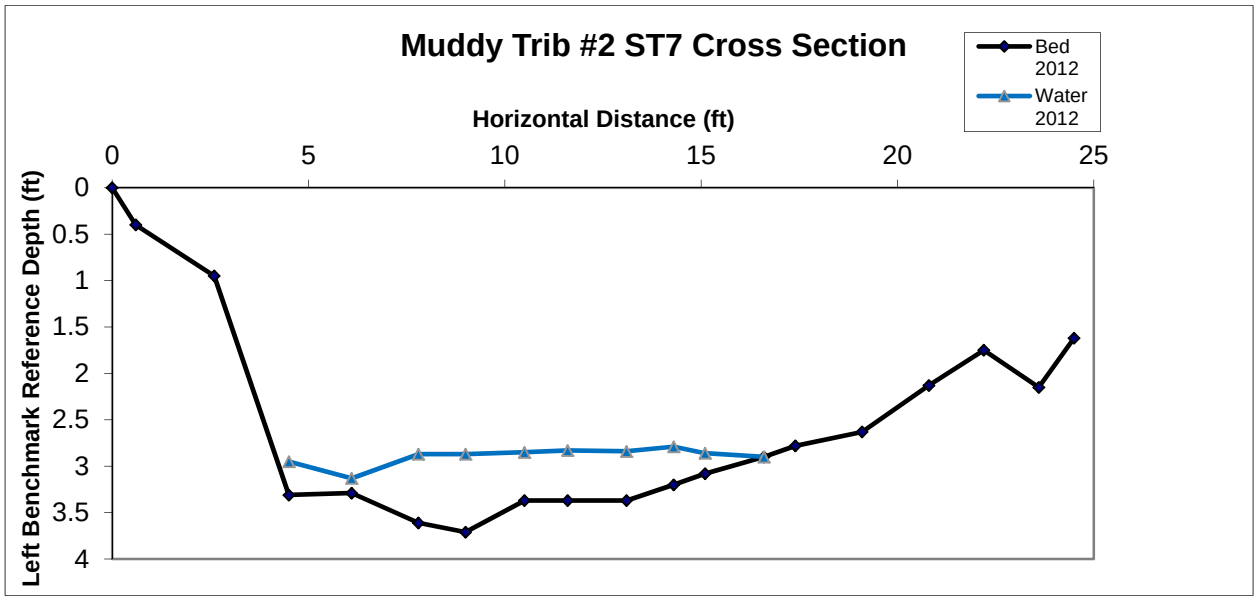


Figure 17: ST 7, cross section above the structure

STRUCTURE 9

Structure 8 was not installed due to channel conditions

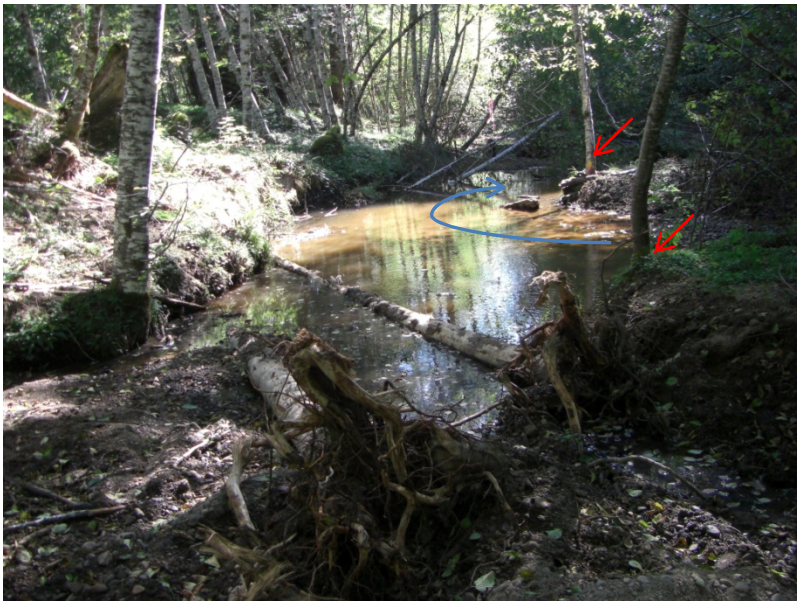


Figure 18: ST 9 above ST looking downstream. Red arrows indicate cross section benchmarks

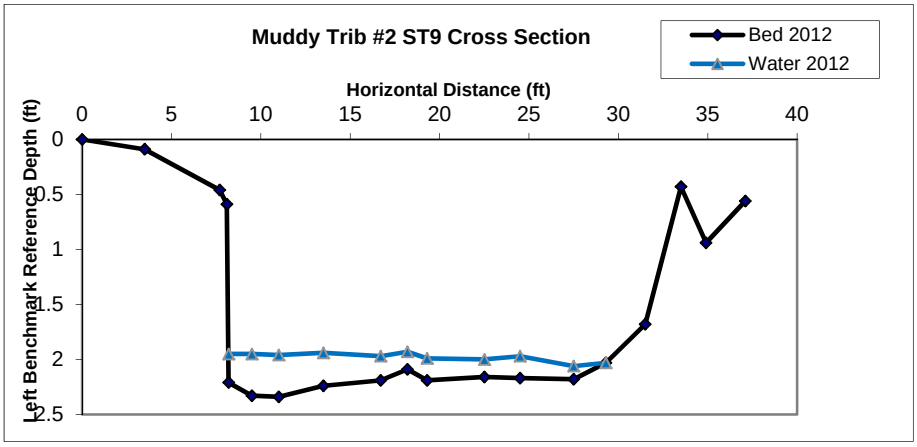
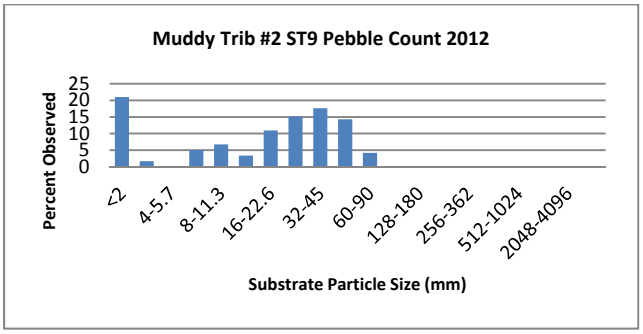


Figure 19: ST 9 Cross section



STRUCTURE 10

Figure 20: ST 10, below ST looking upstream

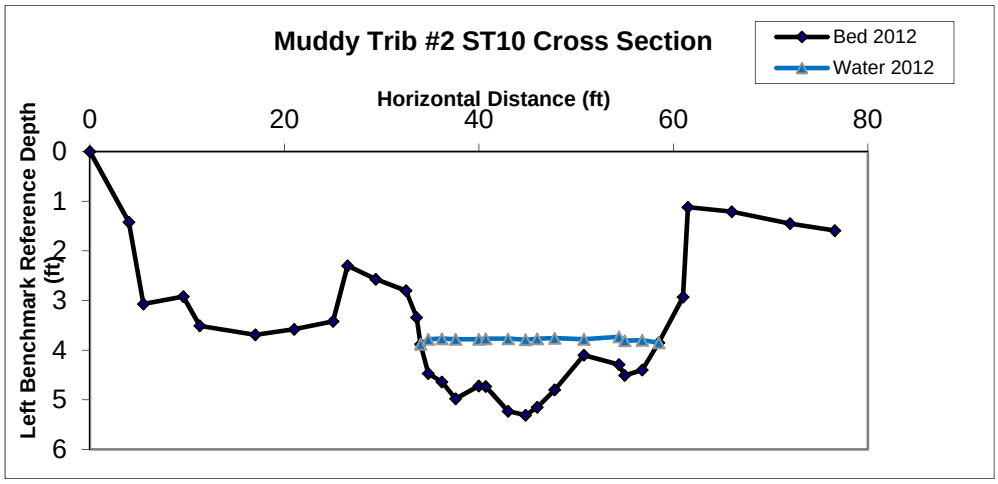


Figure 21: ST 10, the depression between 10 and 30 ft. corresponds to the fill in the center right of the photo above

STRUCTURE 11

Figure 22: ST 11 below ST looking upstream

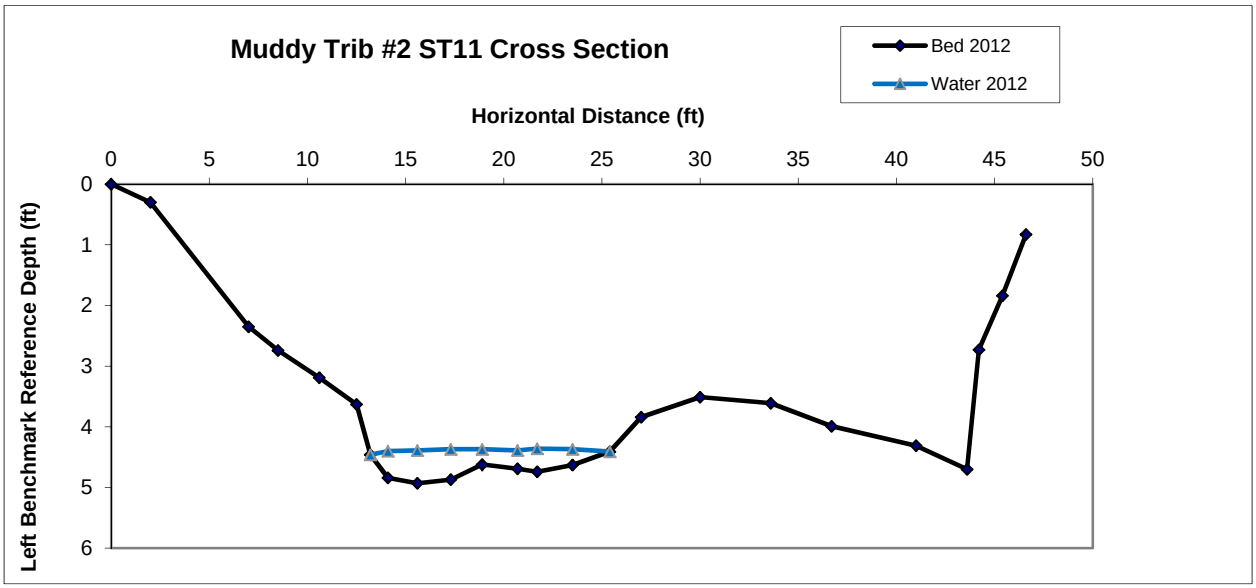


Figure 23: St 11 cross-section from LB (0 ft) to RB)

STRUCTURE 12

Figure 24: ST 12 above ST looking downstream; red arrow indicate approximate location of benchmarks

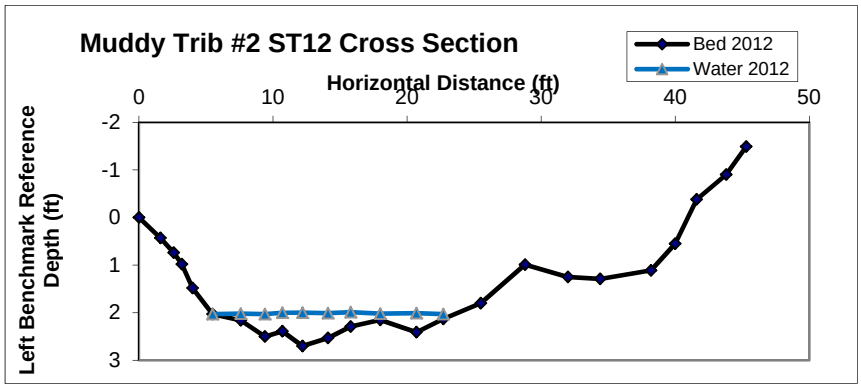
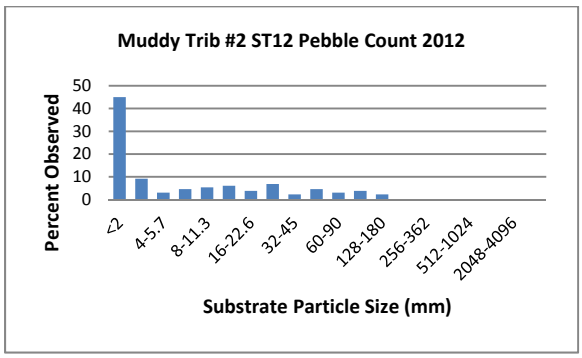


Figure 25: ST 12 Cross section from LB to RB



Note: high percentage of fines

STRUCTURE 13

Figure 26: ST 13 above ST looking downstream

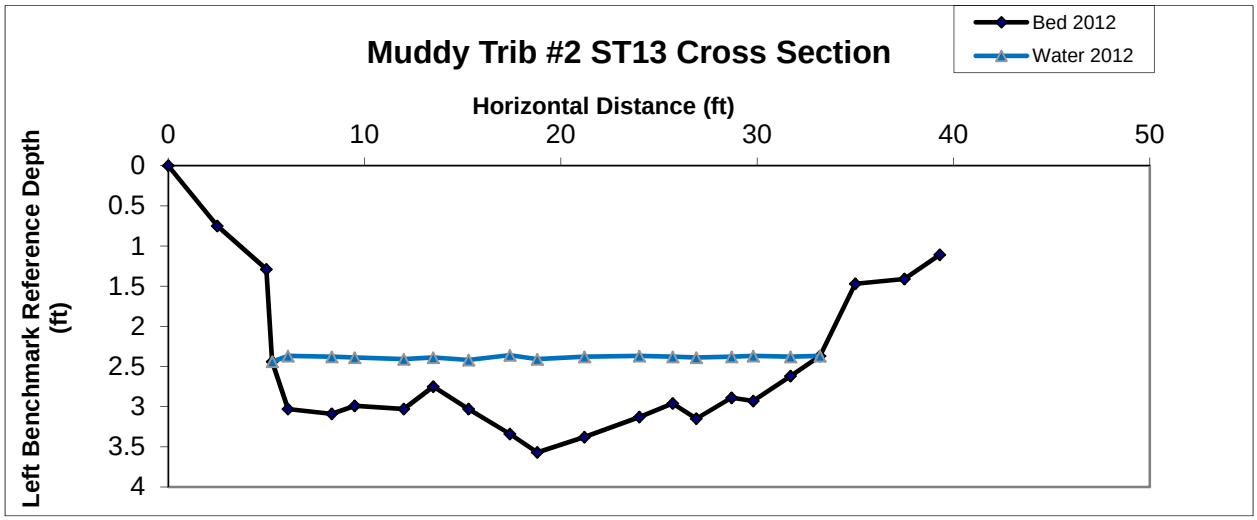


Figure 27: ST 13 Cross section; cross-section above logs

STRUCTURE 14

Figure 28: ST 14 above ST looking downstream

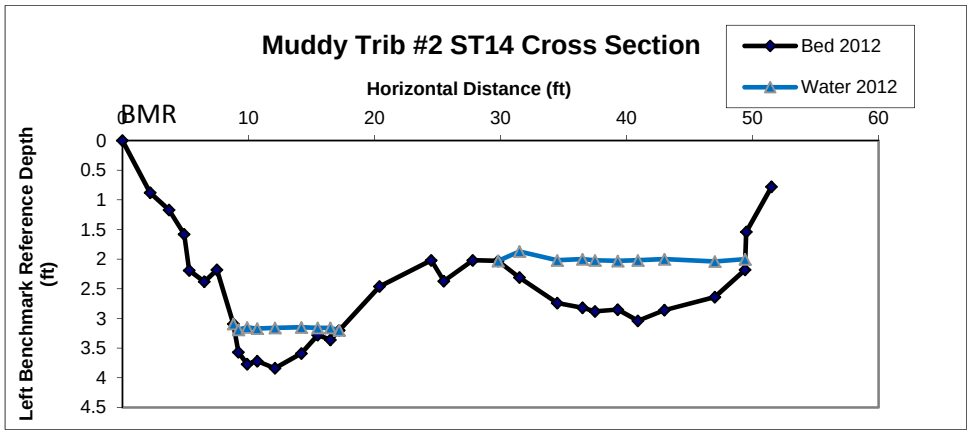
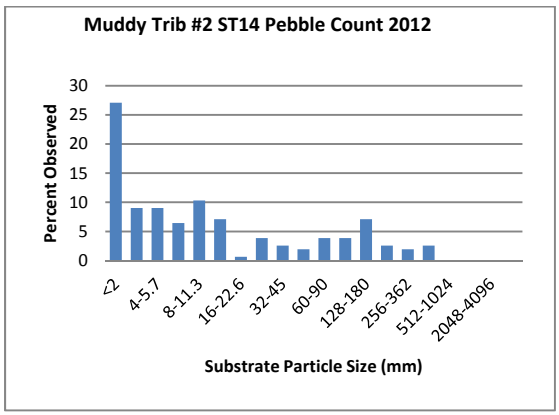


Figure 29: Structure 14; cross-section above structure



STRUCTURE 15

Figure 30: ST 15 above ST looking downstream

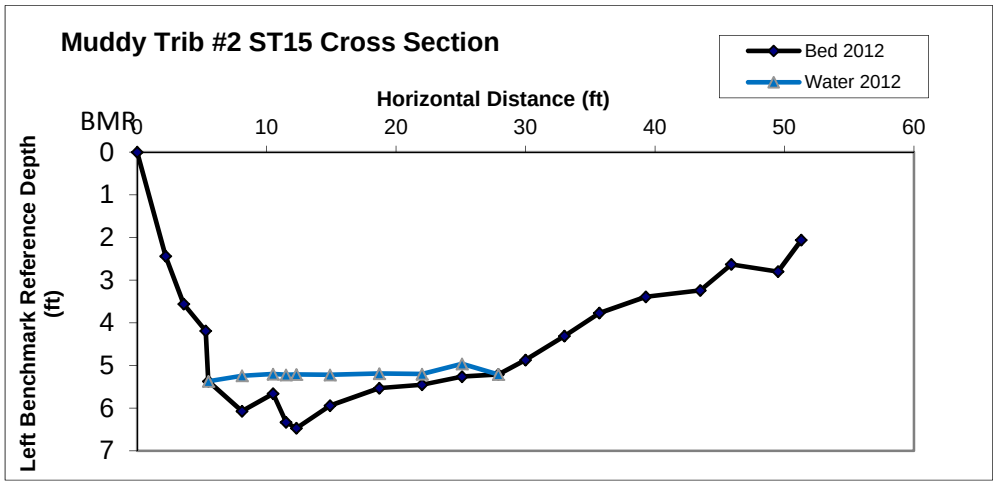
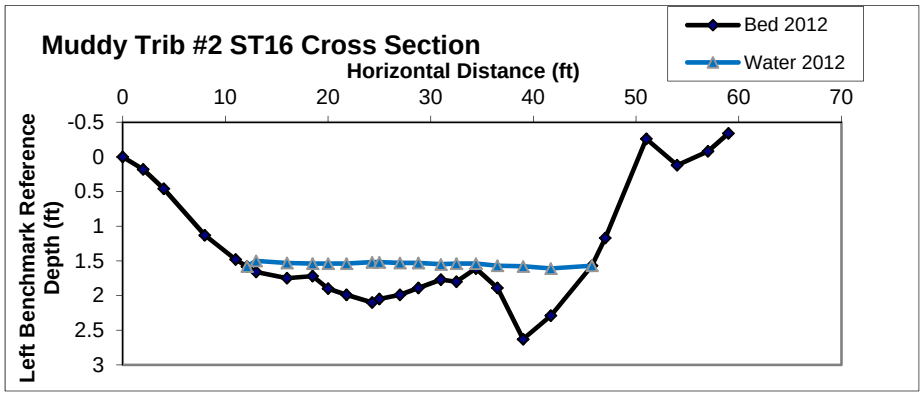
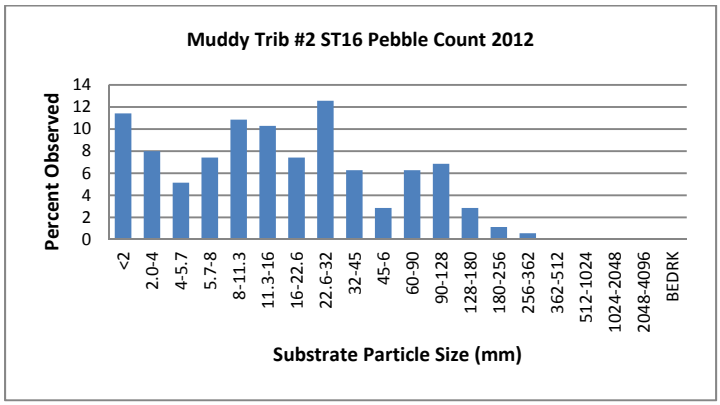


Figure 31: ST 15 cross-section above ST

STRUCTURE 16

Figure 32: ST 16 below ST looking upstream





STRUCTURE 17

*No cross-section or pebble count due to RB cliff, LB instability and pool depth

Figure 33: ST 17 below ST looking upstream

STRUCTURE 18

Figure 34: ST 18 below ST looking upstream

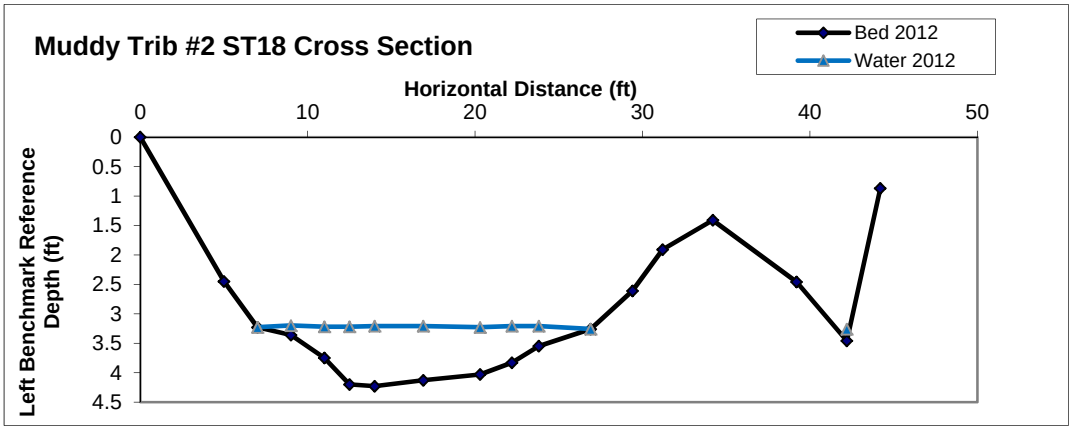
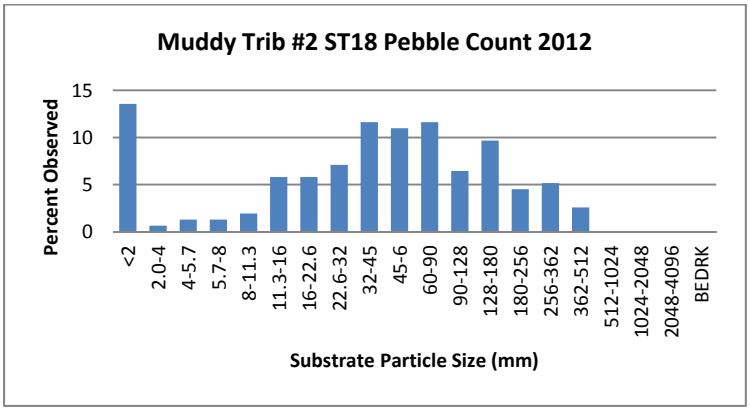


Figure 35: ST 18 cross section; cross section downstream from structure



STRUCTURE 19

Figure 36: ST 19 above ST looking downstream

Figure 37: ST 19 on LB to ST on RB

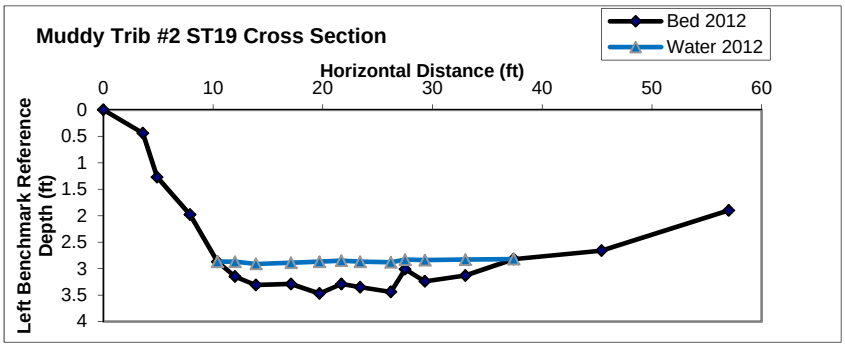


Figure 38: ST 19 cross section, between structures

Muddy River Side Channel 1 Restoration Baseline Monitoring Report

Prepared by Bryce Michaelis
USFS
with assistance of
Abigail Groskopf
Mount St. Helens Institute
Reviewed by Adam Haspiel, Mount St. Helens National Volcanic Monument

February 2013

Project Summary

To restore and enhance habitat complexity for salmonids in the Muddy River Watershed, the Mount St Helens National Volcanic Monument (MSHNVM) and the Mount St. Helens Institute (MSHI) with the help of local contractors installed 15 structures composed of approximately 90 logs in a Muddy River side channel with associated tributary, named for the purpose of this report *Muddy Side Channel #1,* in August of 2012. The Muddy River Watershed was identified as a priority system by the Gifford Pinchot National Forest Stream Restoration Plan in order to help the greater Lewis River salmonid reintroduction efforts. The installed log structures were designed to create rearing pools, increase instream complexity and increase overall stream sinuosity. Two additional Muddy River side channels with tributaries also received restoration treatments as part of the Muddy River restoration efforts; these channel restoration projects received funding from PacifiCorp, Cowlitz PUD, and Ecotrust. Similar to Muddy Side Channel #1, restoration on these channels was designed to increase instream complexity and provide rearing pools for reintroduced salmonids.

This report was designed to provide background information on the project, the installations, the monitoring strategy and most importantly the baseline data collected in September and October of 2012. This baseline data will be used as a reference for future monitoring and to assess the success of the project.

Site Description and Location

The project location is off Forest Road 25 road about 0.75 miles upstream of the Muddy River Picnic Site, in Skamania County, WA.

During the 1980 eruption of Mount St. Helens a mudflow moved down the Muddy River scouring the landscape and depositing volcanic materials. The flood of 1996 additionally influenced the Muddy River, by widening the channel, transporting large wood and sediment downstream and into the Swift Reservoir.

After the 1996 flood, a number of restoration projects occurred to help stabilize banks, increase habitat complexity and decrease sediment run-off. These included: road decommissioning, culvert replacements, landslide removal, and tree plantings.

Monitoring Methodology

This side channel was monitored differently than Muddy Side Channel 2. Sites were clearly flagged and labeled with the structure numbers from 1 to 14; Structure1 is furthest downstream, and located several hundred feet upstream from the confluence of the side channel with the Muddy River. Photos of each structure were taken, and the maximum depth of each pool was recorded.

Structure 1A

Maximum Pool Depth 1.9 Feet

Structure 1

Maximum Pool Depth 2.0 Feet

Structure 39

Maximum Pool Depth 2.7 Feet

Structure 40

Max Depth 2.8 Feet

Structure 4

Bank Stabilization Structure

Structure 41

Max Depth 3.2 Feet

Structure 42

Maximum Pool Depth 3.0 Feet

Structure 43

Maximum Pool Depth 3.6 Feet

Structure 44

Maximum Pool Depth 3.5 Feet

Structure 45

Maximum Pool Depth 3.9 Feet

Structure 46

Maximum Pool Depth 3.0 Feet

Structure 47

Maximum Pool Depth 2.8 Feet

Structure 48

Log Deflectors

Structure 49

Maximum Pool Depth 3.8 Feet

Structure 50

Maximum Pool Depth 2.8 Feet