USFS, Gifford Pinchot National Forest

Mount St. Helens Ranger District. 2012

Project Title	Pine Creek Instream 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 $65,000 USFS Funding $41,000 Partner Funding $ 1,000 **Project Total $107,000**
Project Description (work completed)	In 2012 the Gifford Pinchot National Forest used funds from PacifiCorp and Cowlitz PUD to supply equipment, operators, and labor for construction of a pilot project for habitat restoration on mainstem Pine Creek on US Forest Service lands. Work included placing approximately 200 logs, most with rootwads attached, to create 15 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 bull trout and steelhead • Improve holding pools for juvenile bull trout and steelhead • Improve overwintering habitat for resident species • 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 rootwad. 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. Large legacy logs from Swift Reservoir cleaning operations were used in conjunction with the Peppercat trees to create diverse and complex structures.

Approximately 10 to 20 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 20 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

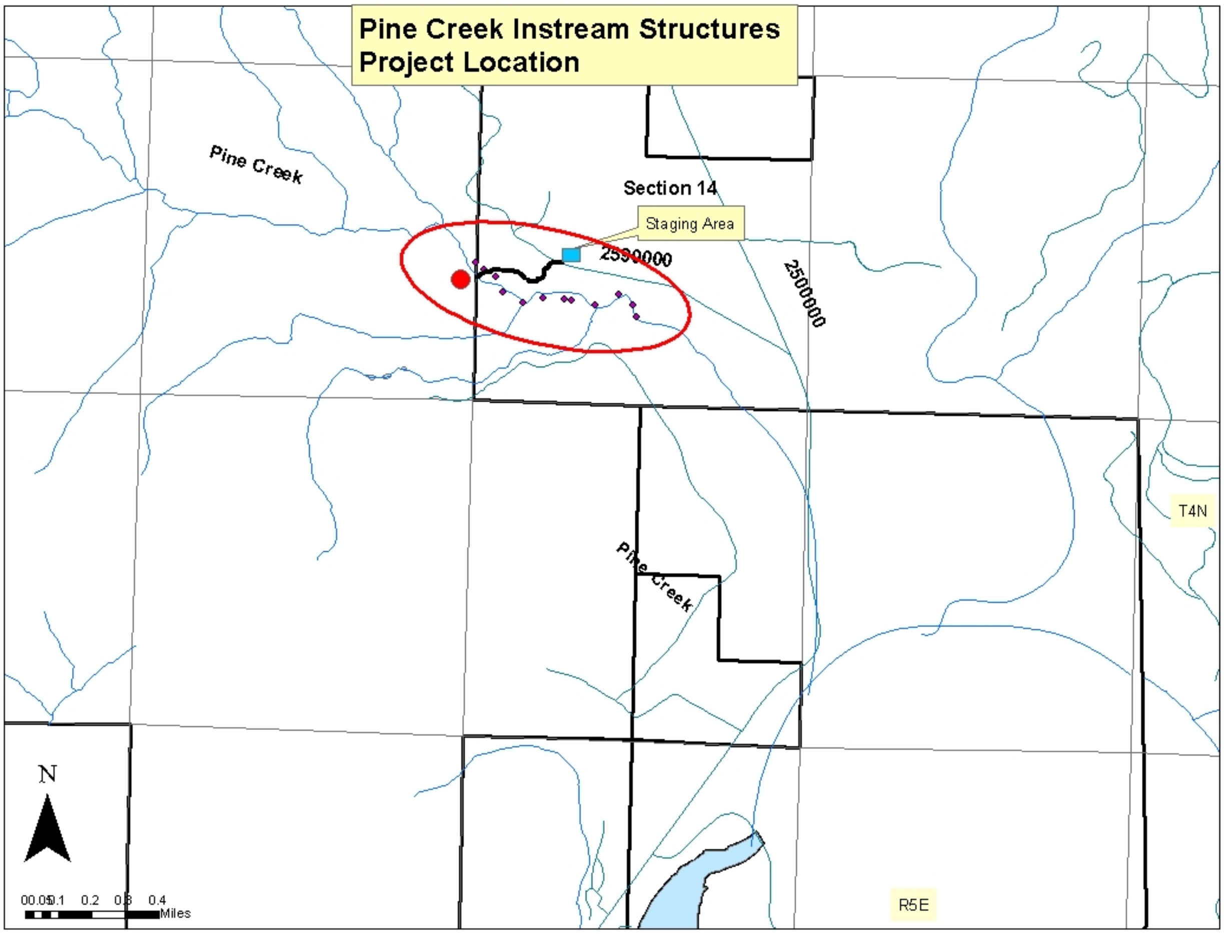
Mount St. Helens Institute. The Mount St. Helens Institute established baseline data for sediment and cross-sectional morphology in 2012.

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	O'Malley Brothers Corporation Gresham Oregon
Problems Encountered	Some equipment used for logging was old and thus broke down more often than desired. The stream was extremely rough on equipment, The rubber tired skidder was better in this type of substrate than the tracked excavator. The tracked excavator had to carefully pick its route to avoid throwing or breaking a track. This led to slow travel times between structures.

Figure 1. Picture of Structure 4

Figure 2. Adult bull trout using new structure on Pine Creek



Pine Creek Instream Structures
Project Location
Pine Creek
Section 14
Staging Area
2500000
2500000
Pine Creek
T4N
R5E
N
0.4
Miles

Pine Creek Instream Habitat Restoration

Monitoring Report February 2013

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Mount St. Helens Institute
For the Mount St. Helens National Volcanic Monument
Gifford Pinchot National Forest

This report was designed to present 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

Habitat restoration efforts occurred on the mainstem of Pine Creek. The site was accessed from a spur road to the west of USFS Rd 2590.

The site was selected for restoration work based on previous surveys, and the location of the stream on USFS managed lands.

Project Description

The project objectives were to:

- Improve habitat complexity
- Create resting areas for spawning adult bull trout and steelhead
- Improve holding pools for juvenile bull trout and steelhead
- Improve overwintering habitat for resident species
- Collect gravel and improve spawning habitat

In 2012 the Gifford Pinchot National Forest used funds from PacifiCorp and Cowlitz PUD to supply equipment, operators, and labor for construction of a pilot project for habitat restoration on mainstem Pine Creek on US Forest Service lands. Work included placing approximately 200 logs, most with rootwads attached, to create 15 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.

Monitoring Results

Baseline data was collected several weeks after the initial installation of the structures. This enabled us to take cross sections at appropriate locations and document structures using photographic techniques. The pool rifle ratio was 8 percent pool habitat to 92 percent riffle habitat. We were able to record maximum pool depths at each structure location as documented in Table 1. A longitudinal profile was taken of the restored reach that documented structure placement, gradient of stream and stream length Figure 1. Several other tables follow that document general basin characteristics. Cross sectional data was collected at most structure locations. Structures were also documented by taking photos from various angles. A photograph of each structure is included as part of this report. Pebble counts were initially undertaken, but were impossible to obtain due to high flow characteristics of Pine Creek.

2012 Max Pool Depth	
Structure	**Max Depth**
1-First Cluster	3.8
1-Second Cluster	1.1
2	3.3
3	3
4	2.2
5	3.4
6	3.6
8	4.3
9	2.9
10	2.7
11	2.2
13	3.5
14-First Cluster	4
14-Second Cluster	3.1
15-First Cluster	3.2
15-Second Cluster	3

Table 1

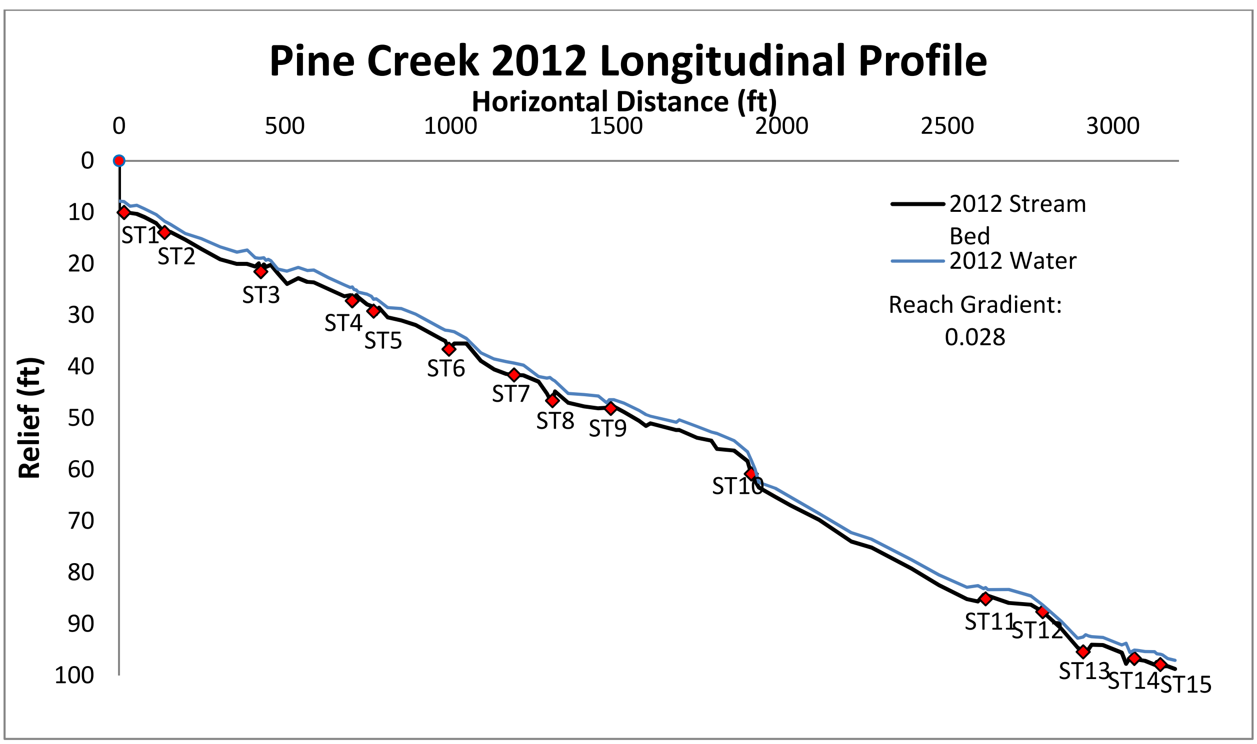


Figure 1

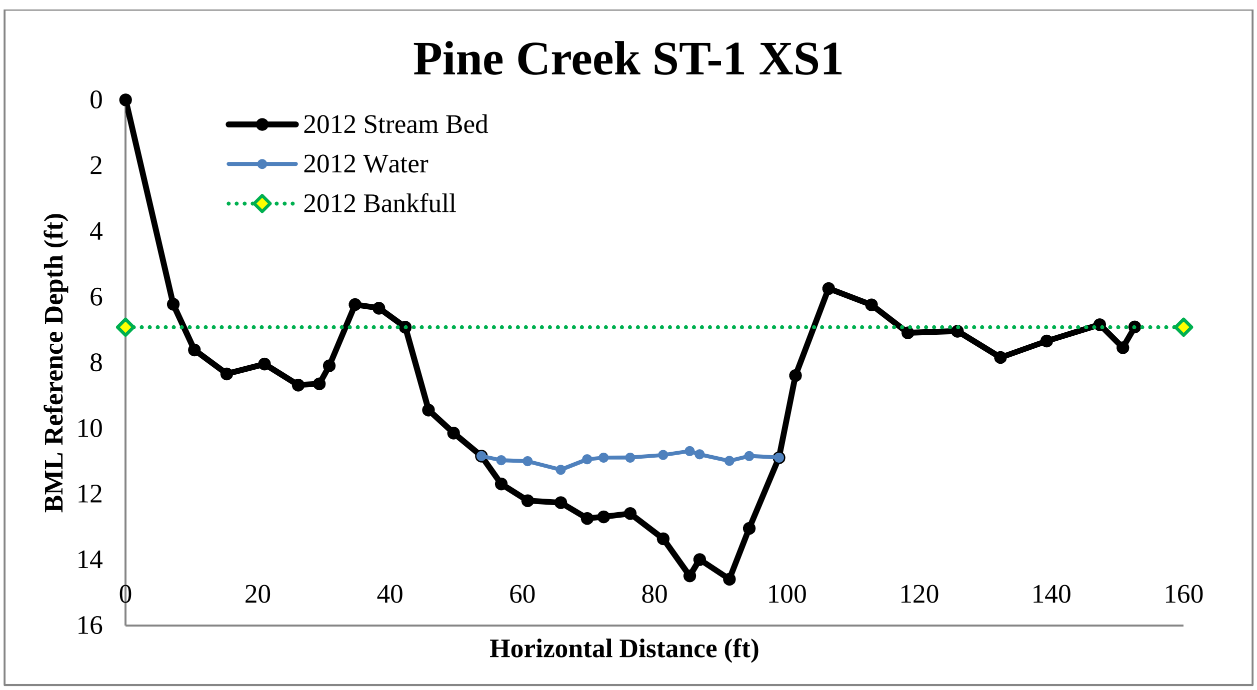
Basin Characteristics Report, Provided by USGS StreamStats _Delineated from bottom of restoration reach_	
Parameter	**Value**
Area drained to bottom of restoration reach	23.07 square miles
Mean basin elevation	2,740 feet
Minimum basin elevation	1,230 feet
Maximum basin elevation	8,250 feet
Relief	7,020 feet
Mean basin slope	20.50%
Percent of area with slope greater than 30%	21.10%
Percent of area with slope greater than 30% and facing North	2.95%
Average Flow during monitoring 2012	380 CFS
Area-weighted forest canopy, NLCD 2001	68.10%
Mean annual precipitation	131 inches

Table 2

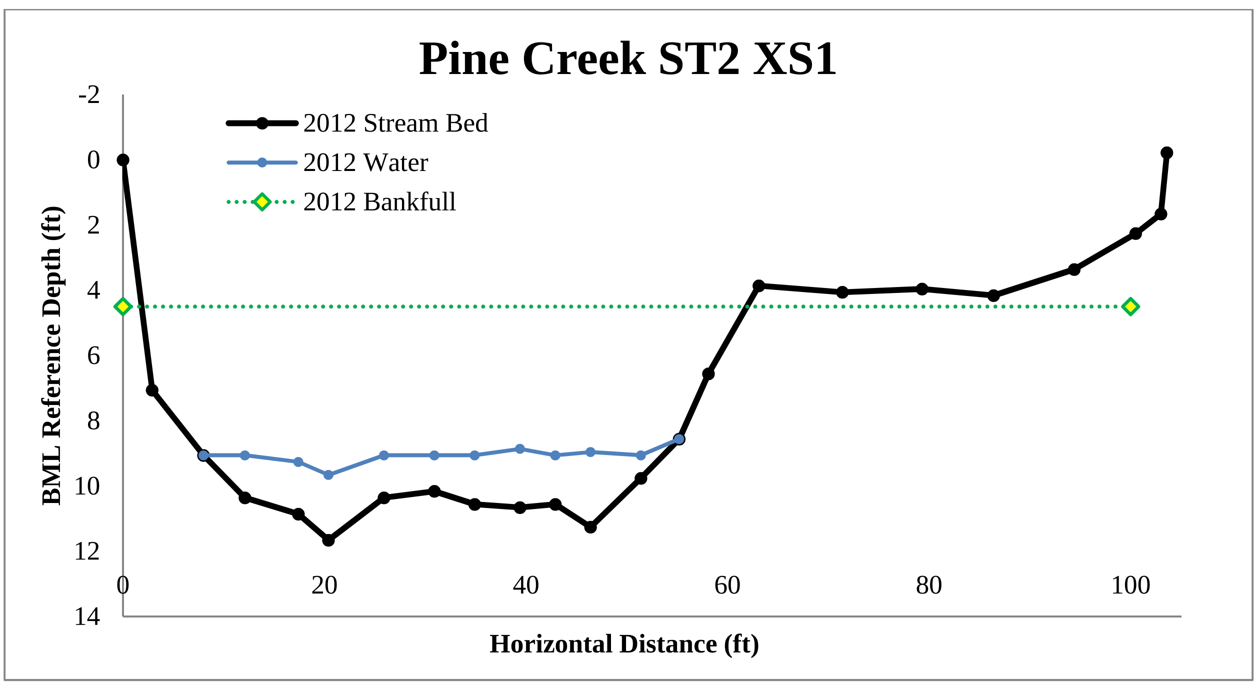
Peak-Flow Streamflow Statistics			
Statistic	**Flow (cfs)**	**Standard Error %**	**Confidence Interval (cfs)**
2 Year	_1850_	57	796-2905
10 Year	_3410_	55	1535-5286
25 Year	_4250_	54	1955-6545
50 Year	_5010_	54	2305-7715
100 Year	_5740_	55	2583-8897

Table 3

Structure 1

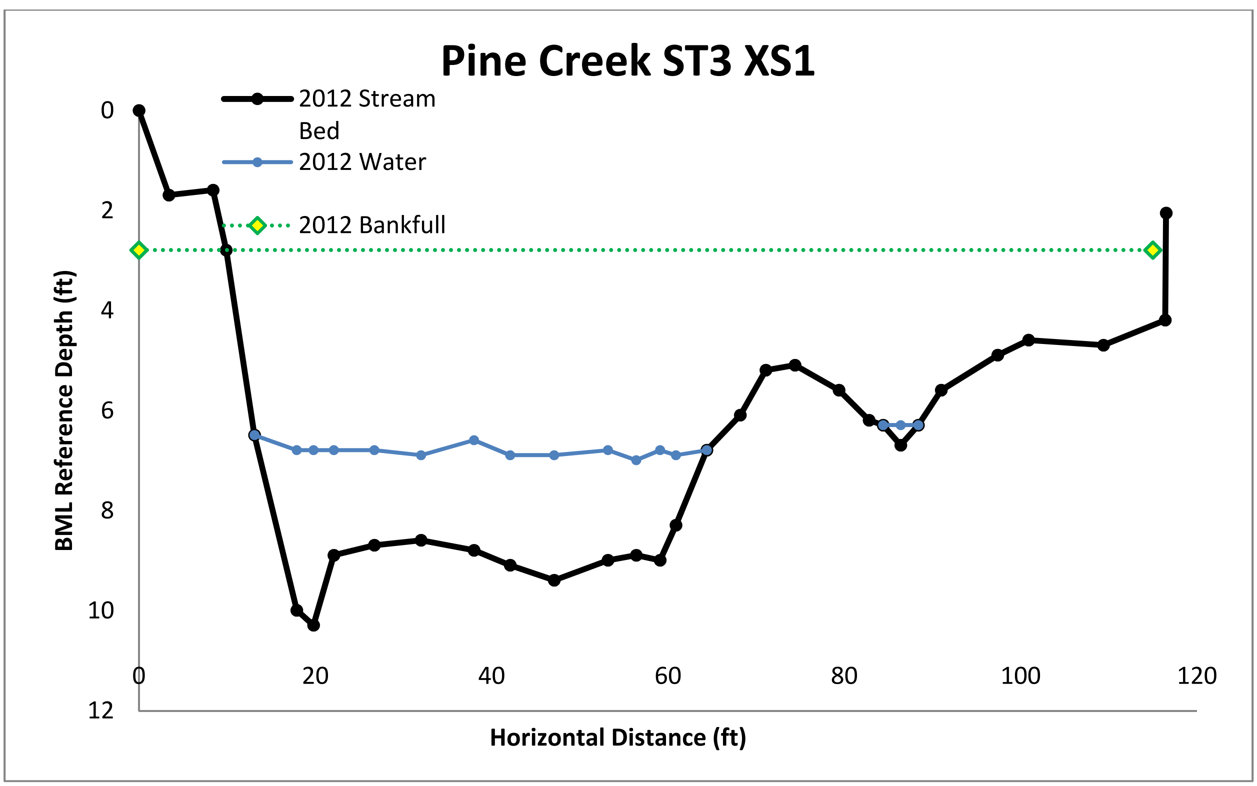

Pine Creek ST-1 XS1
2012 Stream Bed
2012 Water
2012 Bankfull
BML Reference Depth (ft)
Horizontal Distance (ft)
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120
140
160

Structure 2

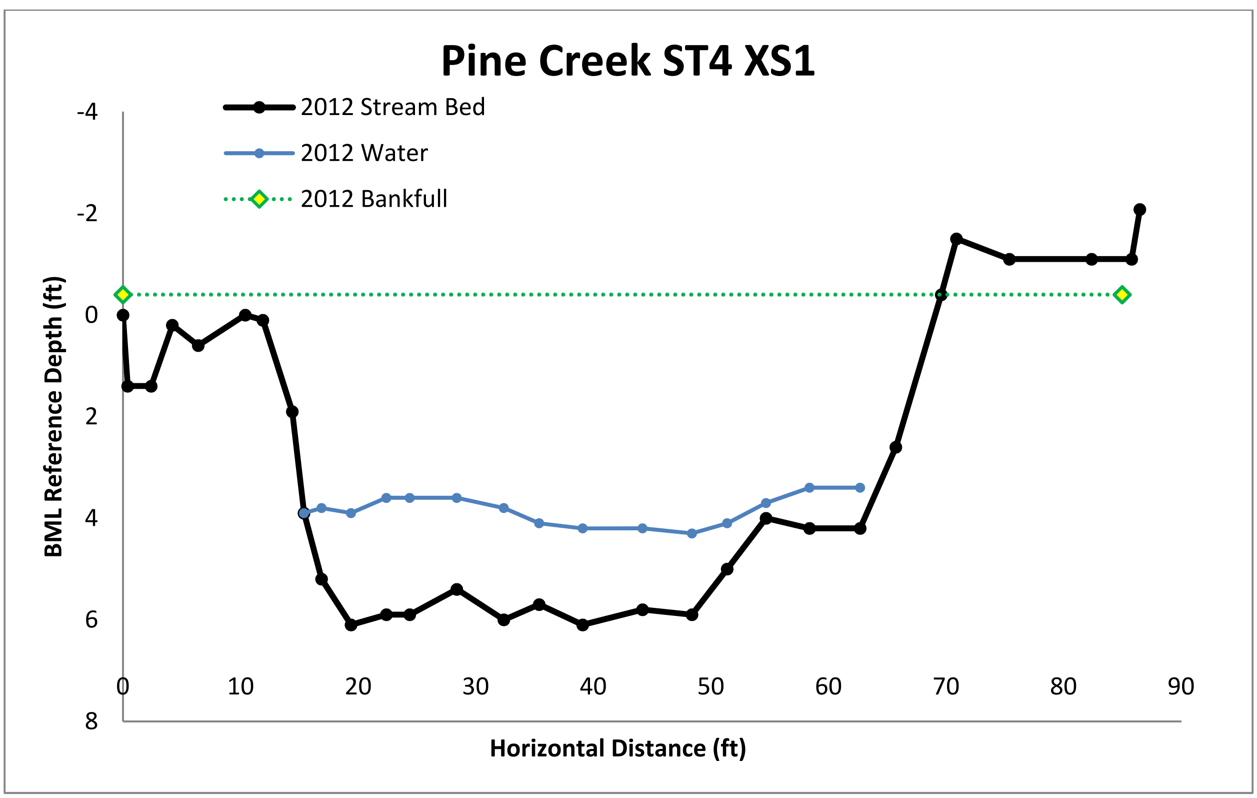


Pine Creek ST2 XS1
2012 Stream Bed
2012 Water
2012 Bankfull
BML Reference Depth (ft)
Horizontal Distance (ft)
-2
0
2
4
6
8
10
12
14
0
20
40
60
80
100

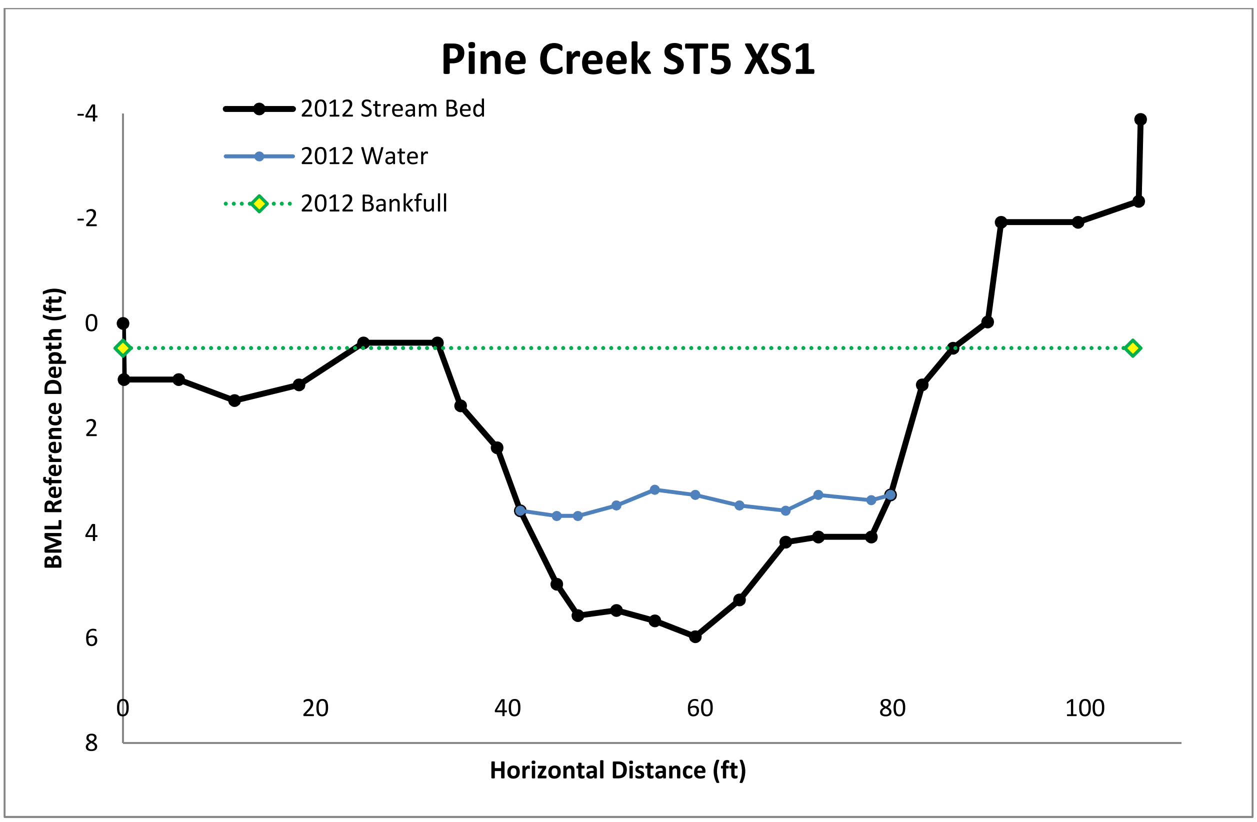
Structure 3


Pine Creek ST3 XS1
2012 Stream Bed
2012 Water
2012 Bankfull
BML Reference Depth (ft)
0
2
4
6
8
10
12
0
20
40
60
80
100
120
Horizontal Distance (ft)

Structure 4

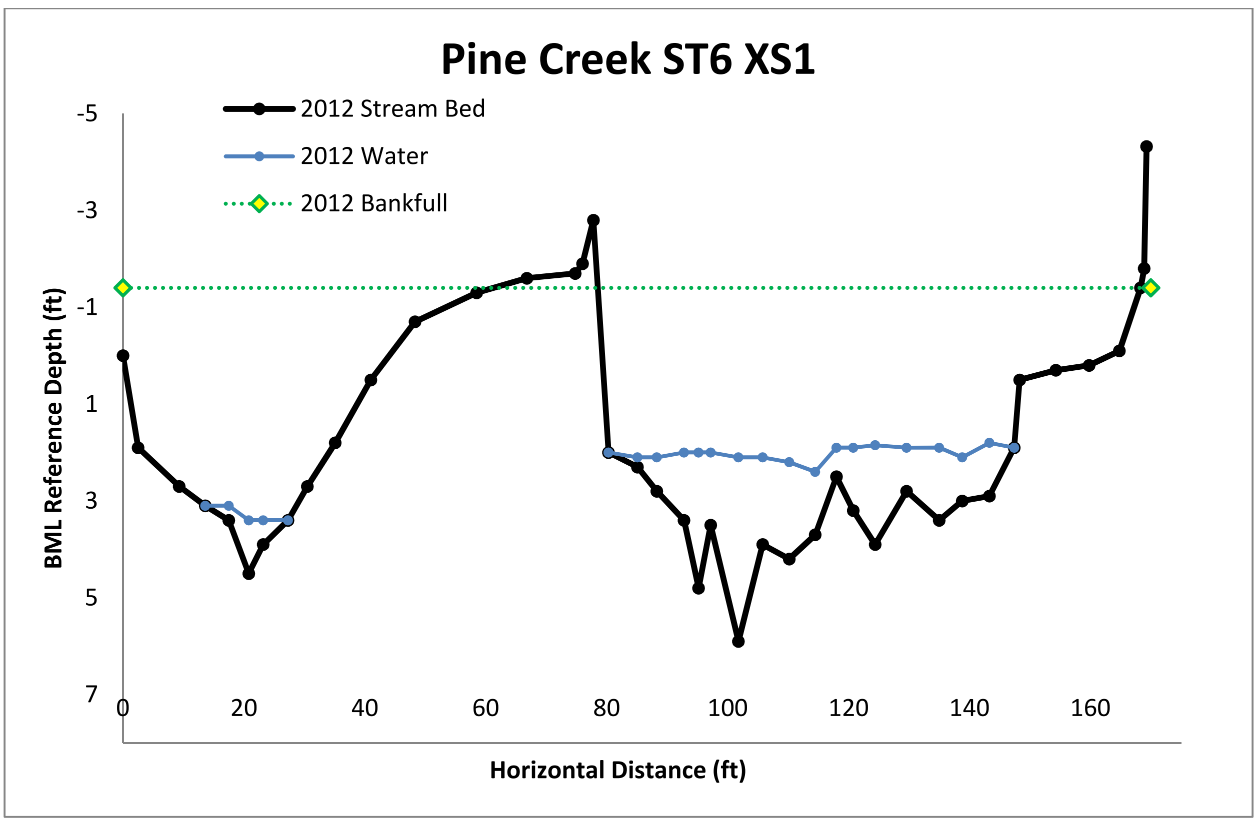

Pine Creek ST4 XS1
2012 Stream Bed
2012 Water
2012 Bankfull
BML Reference Depth (ft)
-4
-2
0
2
4
6
8
0
10
20
30
40
50
60
70
80
90
Horizontal Distance (ft)

Structure 5



Pine Creek ST5 XS1
2012 Stream Bed
2012 Water
2012 Bankfull
BML Reference Depth (ft)
-4
-2
0
2
4
6
8
0
20
40
60
80
100
Horizontal Distance (ft)

Structure 6

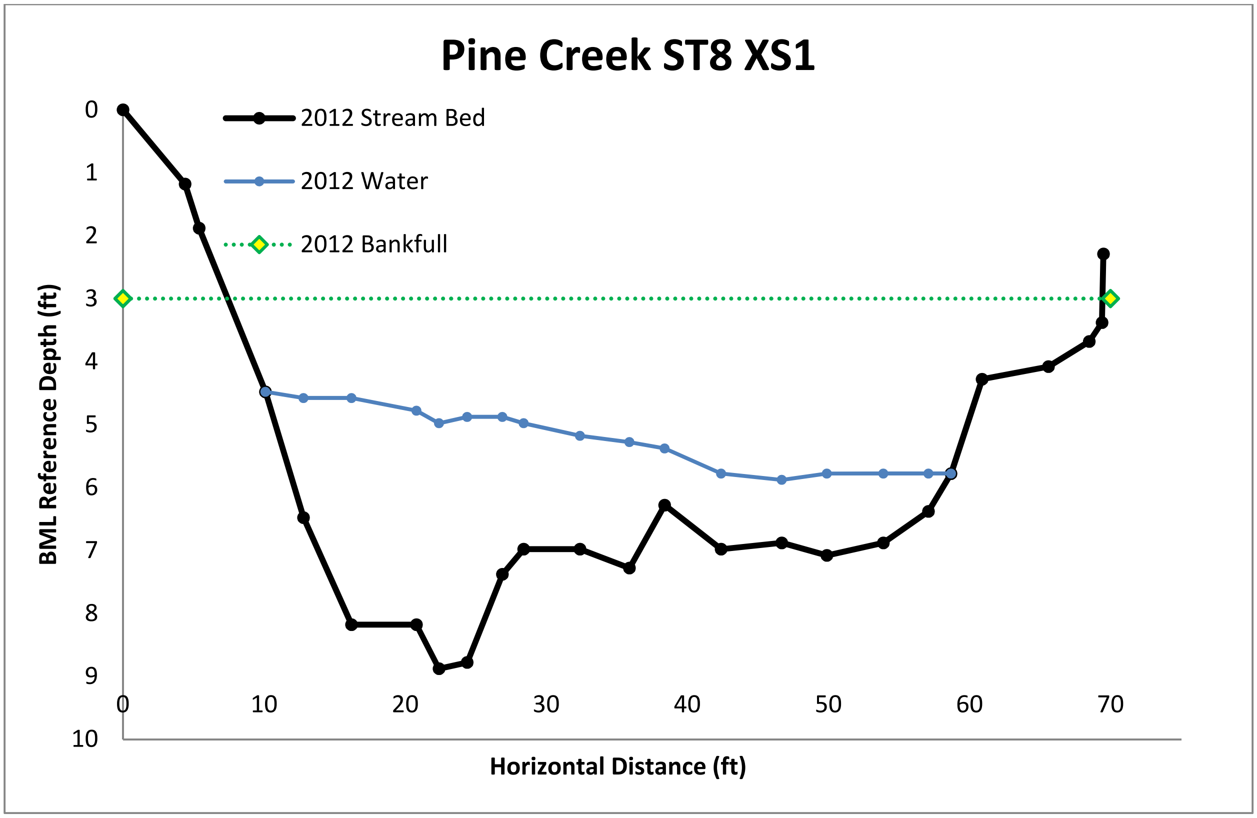


Pine Creek ST6 XS1
2012 Stream Bed
2012 Water
2012 Bankfull
BML Reference Depth (ft)
-5
-3
-1
1
3
5
7
0
20
40
60
80
100
120
140
160
Horizontal Distance (ft)

Structure 7

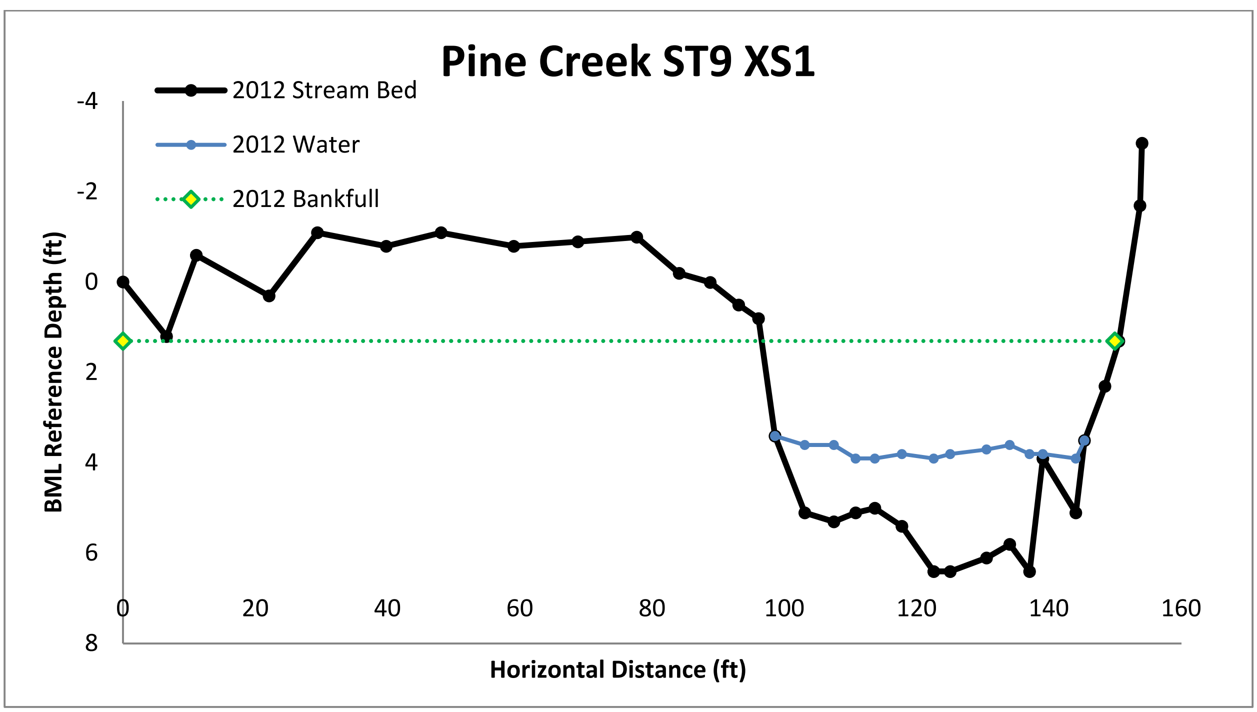
Structure 7 had no cross sectional information taken because it was more of a bank protection structure than a pool forming structure.

Structure 8

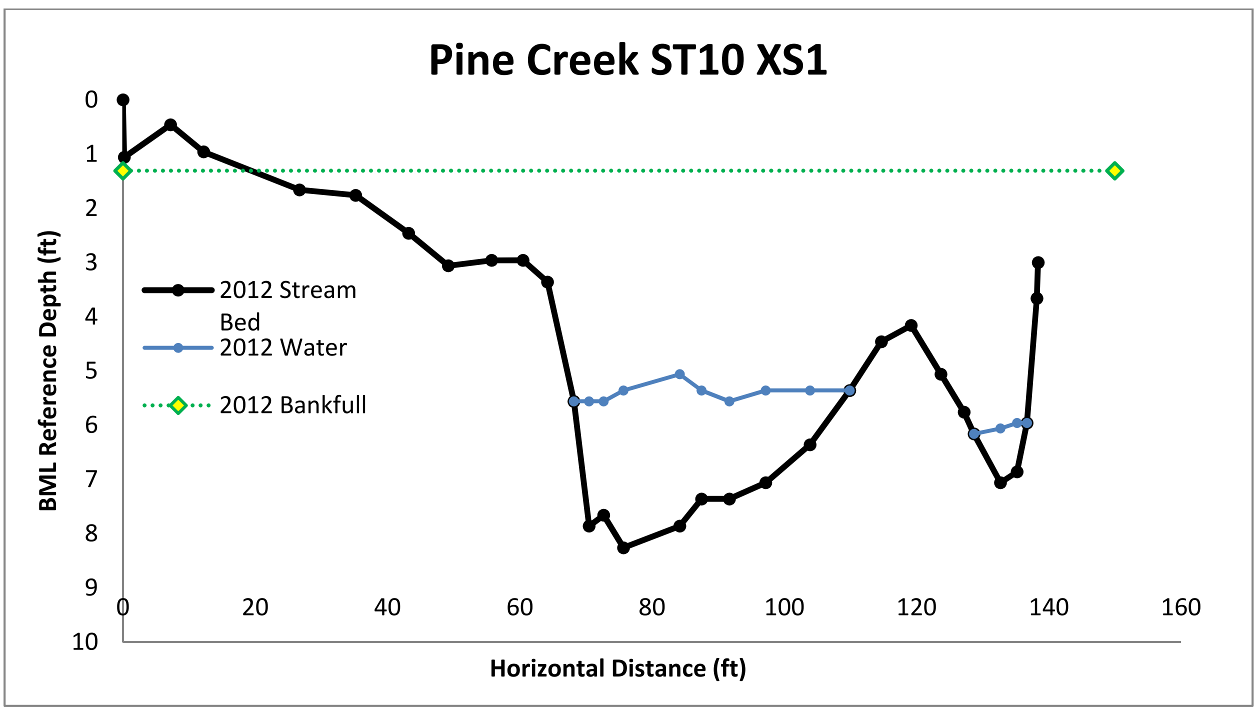


Pine Creek ST8 XS1
2012 Stream Bed
2012 Water
2012 Bankfull
BML Reference Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30
40
50
60
70
Horizontal Distance (ft)

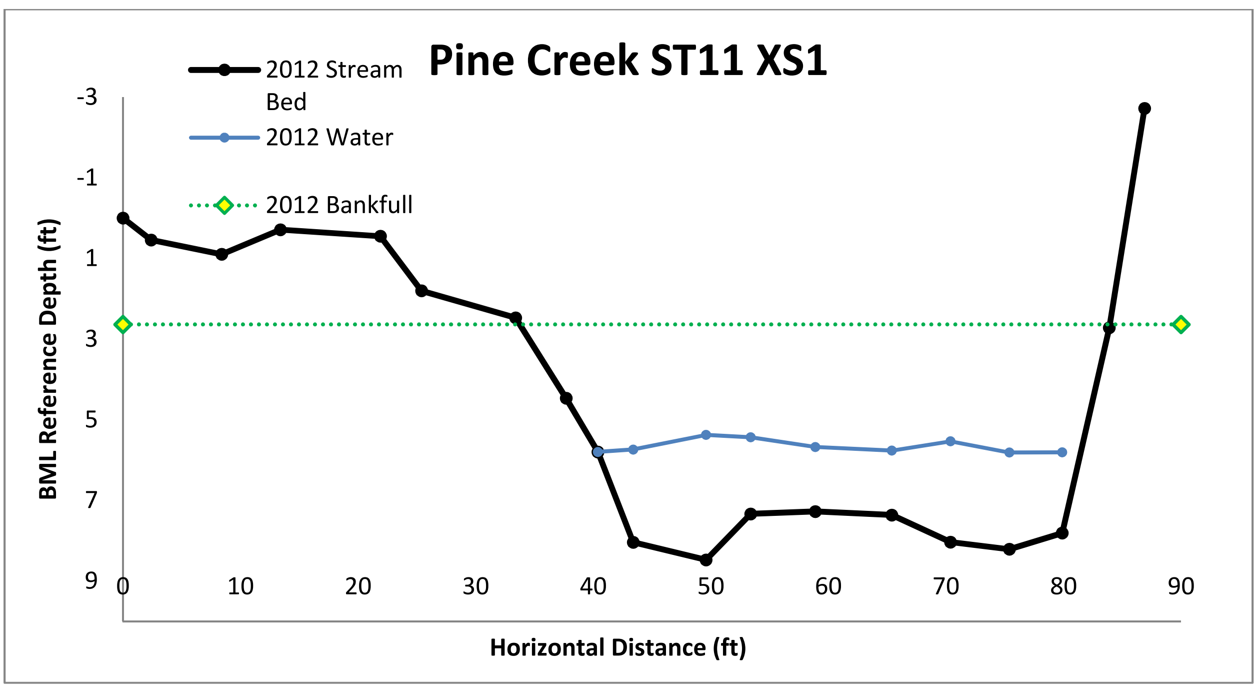
Structure 9


Pine Creek ST9 XS1
2012 Stream Bed
2012 Water
2012 Bankfull
BML Reference Depth (ft)
-4
-2
0
2
4
6
8
0
20
40
60
80
100
120
140
160
Horizontal Distance (ft)

Structure 10



Structure 11



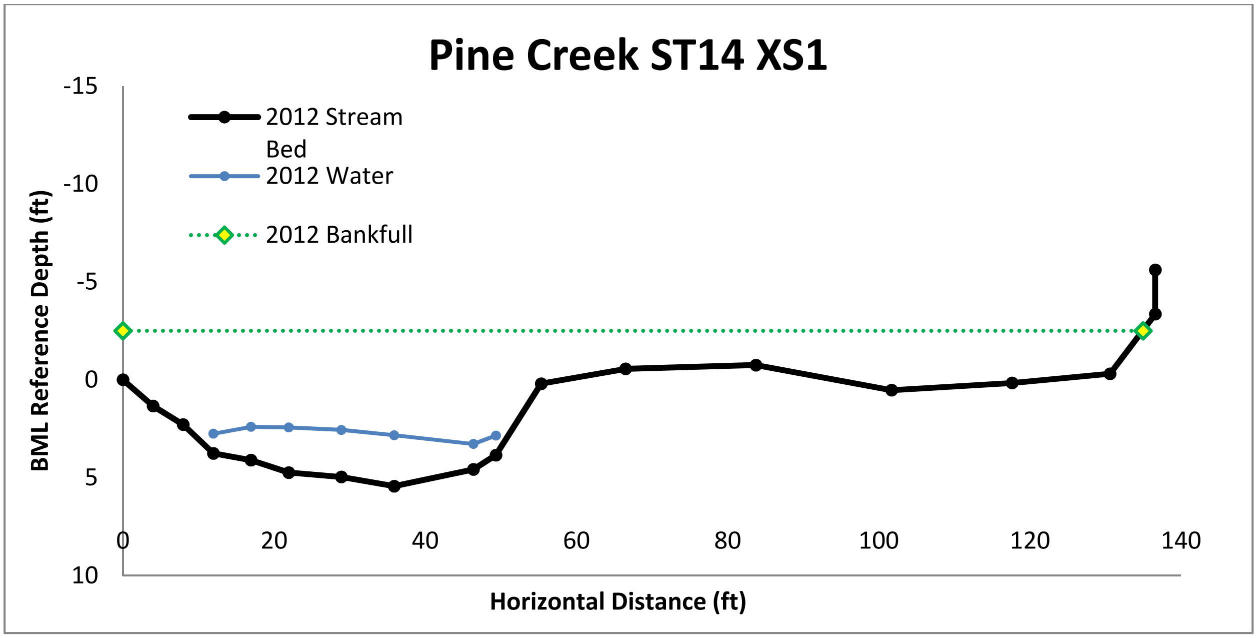
Structure 12

Structure 12 had no cross section information taken because it was mainly a bank protection structure more than a pool forming structure.

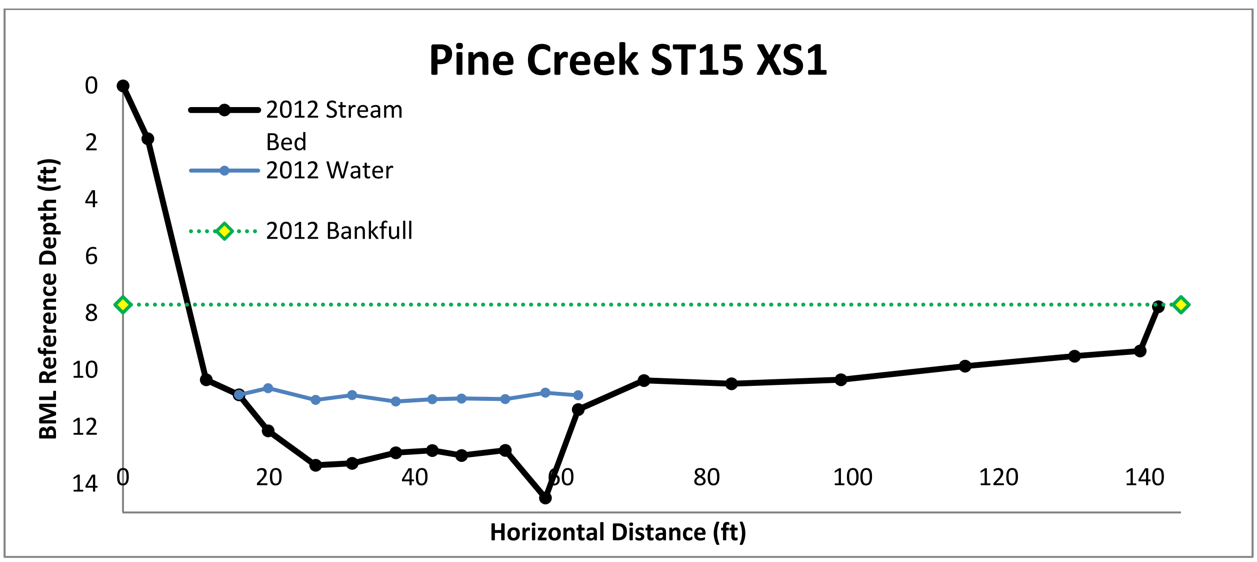
Structure 13

Structure 13 had no cross sectional information taken because of the depth of pool and unsafe conditions.

Structure 14



Structure 15



References

Gerstein, J.M. 2005. *Monitoring the Effectiveness of Instream Habitat Restoration.* University of California, Center for Forestry, Berkeley, CA. 45 pp.

Harrelson, Cheryl C; Rawlins, C. L.; Potyondy, John P. 1994. Stream channel reference sites: an illustrated guide to field technique. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.