

# Post-implementation Status Report Little Creek Fish Habitat Restoration 2015

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**Partnership between Mount St. Helens Institute and USFS Gifford Pinchot National Forest**

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**December 2015**

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## Project Summary

The Little Creek Fish Habitat Restoration Project resulted in the construction of 22 complex Large Woody Material (LWM) structures over 0.5 miles of stream. These LWM structures are designed to increase diversity in Little Creek, provide winter refuge from high flows and increase spawning habitat for Chinook salmon, coho salmon, and Steelhead trout.

Construction of the structures occurred during the summer of 2015. Approximately 300 trees with root wads were harvested from Forest Service land and flown to Little Creek. Trees were flown and stored at strategic locations to minimize soil erosion and to be in close proximity to structure areas. Trees were moved into place using a skidder and excavator and then 10-15 trees per structure were anchored using an excavator to bury one-half or more of the stem into streambanks with root wads projecting into the stream channel. In 2016 conifer saplings will be planted to provide future natural LWM and increase inner riparian shade. Areas around the stream will also be treated to remove noxious weeds.



LWM being dropped by helicopter

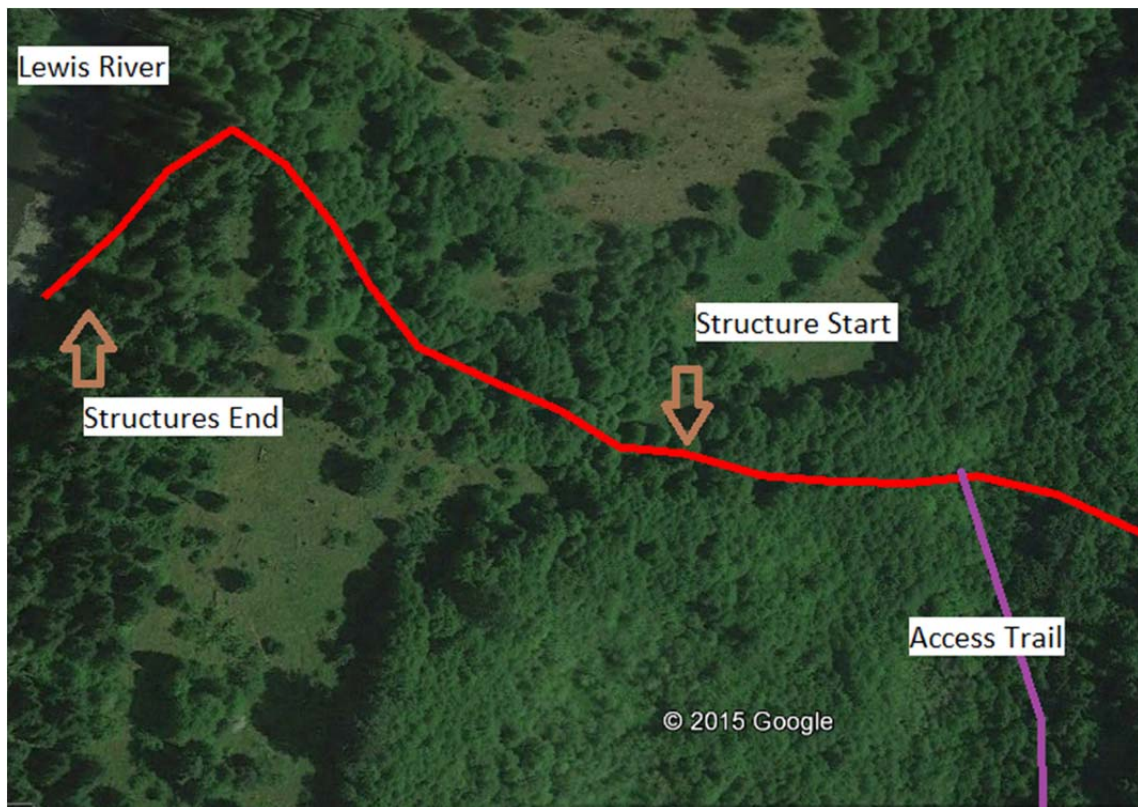
This report summarizes the data collected in monitoring efforts. Longitudinal profiles, cross-section profiles, Wolman Pebble Counts are used to quantify changes in the stream channel. Photographs were also taken to visually monitor changes in the stream channel. Analysis and documentation of stream channel modifications is used to determine if the project goals outlined in the Lewis River Aquatic Coordination Committee (ACC) Project Proposal have been accomplished. Baseline monitoring of the project occurred in 2015 before and after project implementation. Post installation monitoring will occur in 2016.

## Site Location and Description

Little Creek, located in the Gifford Pinchot National Forest, is located approximately 5.5 miles upstream of Swift Reservoir between Rush Creek and Big Creek. Access to the site is by parking at a decommissioned road to the east of the Rush Creek Bridge on FR 90. Little Creek is 0.5 miles down the decommissioned road.

Water flows year round in Little Creek and the stream channel varies between 15 to 30 feet in width. The stream channel braids in multiple locations. The section of Little Creek where the restoration project was implemented flows through a meadow and the riparian area is predominately alders with occasional conifers. There is a fish migration barrier upstream of the restoration project and downstream from FR 90.





1: Map of project area. Little Creek is identified by the red line.

## Priorities and Goals

The Aquatic Coordination Committee has three priorities for restoration projects in the Lewis River Basin:

1. Benefit fish recovery throughout the North Fork Lewis River, with priority to federal ESA-listed species.
2. Support the reintroduction of anadromous fish throughout the basin.
3. Enhance fish habitat in the Lewis River Basin, with priority given to the North Fork Lewis River.

The three goals of this project to address these priorities include,

1. Improving habitat complexity and diversity in Little Creek using Large Woody Material
2. Providing refugia during winter flows for juvenile salmonids.
3. Providing increased spawning opportunities for adult salmonids.

The Mount St. Helens Institute monitored the structure in 2015 with support from the Forest Service and will conduct monitoring again in 2016 in order to determine if these goals have been met.

## Community Outreach

The Mount St. Helens Institute provides internships for undergraduate students studying fisheries science. Interns gain experience surveying and monitoring restoration projects. This experience is a stepping stone for a career in fisheries management. In addition, the Mount St. Helens Institute trains school age youth in watershed dynamics, monitoring and water quality analysis.

## Monitoring Methodology

A baseline longitudinal profile was conducted prior to project implementation in 2015. Immediately following project installation, baseline cross-sectional surveys and pebble counts were conducted. In 2016 these measurements will be taken again to determine how the structures have changed stream morphology.

### Cross-sections

To capture the effects of the LWM restoration structures a cross-section was established at key points within the structure. Only structures that were designed to alter geomorphology (pools, gravel-beds) were monitored with a cross section. A benchmark was placed on each side of the channel. Benchmarks are identified by either a nail in a tree or rebar in the ground. A measuring tape is then stretched across the channel and attached to each benchmark. A laser level is used to take height from ground measurements (elevation) along the tape (distance). For benchmarks in trees the height was taken at the end of the nail and the height from the ground to the nail was recorded in the notes.

### Wolman Pebble Count

Each structure has an accompanying Wolman Pebble Count (WPC). Counts were taken upstream of each structure where gravel recruitment is expected. A gravel-o-meter was used to measure substrate that can be picked up. Larger substrate was measured with a ruler on the side of the gravel-o-meter. A minimum of 100 pieces of substrate were counted for each WPC.

### Longitudinal Profile

A longitudinal profile was created for the entire stream channel. A longitudinal profile measures the elevation changes following the thalweg. The thalweg is 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 ratio can be assessed.

The benchmark for the longitudinal profile is a nail in a tree, located in a tree overhanging the stream at the upstream start of the project area. A laser level is used to take height off ground measurements. A range finder is used to measure the distance between each point. The creek channel is too long to be surveyed from one placement of the laser. When the laser had to be moved a height was taken before and after the laser move

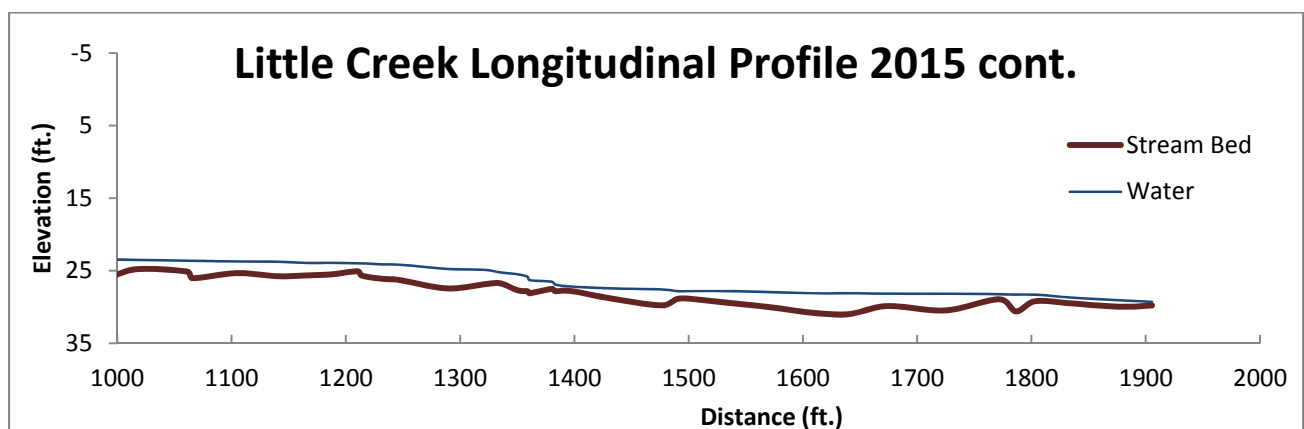
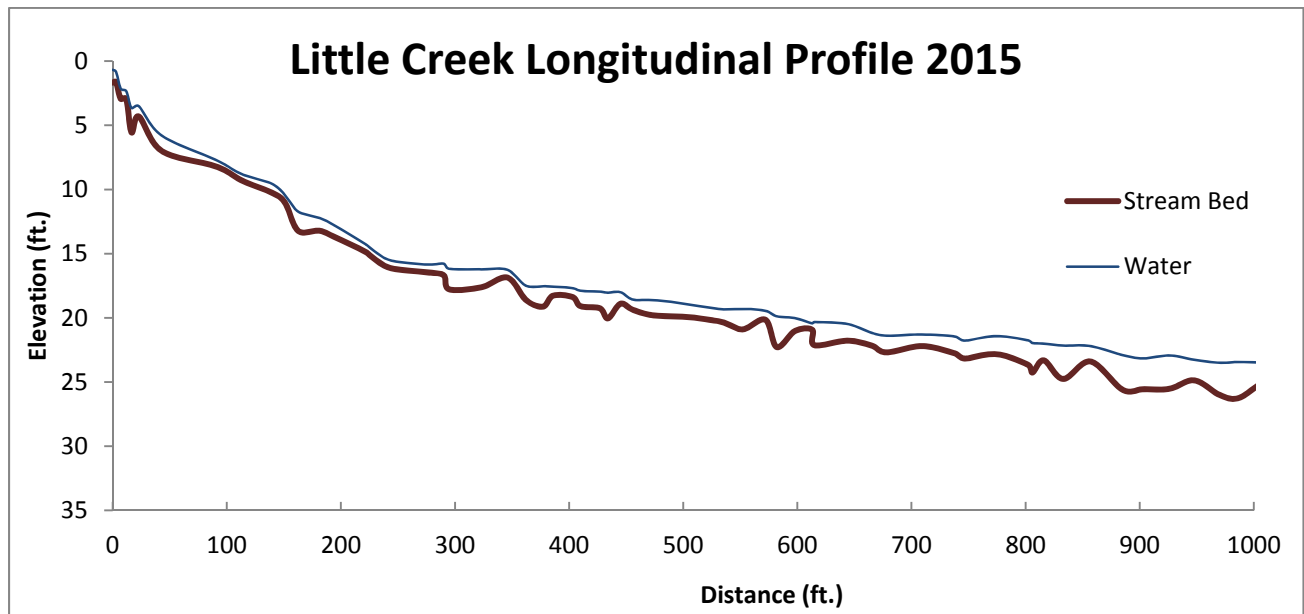
## Photos

Photos were taken at all structures above the structure looking downstream, opposite the structure, and below the structure looking upstream.

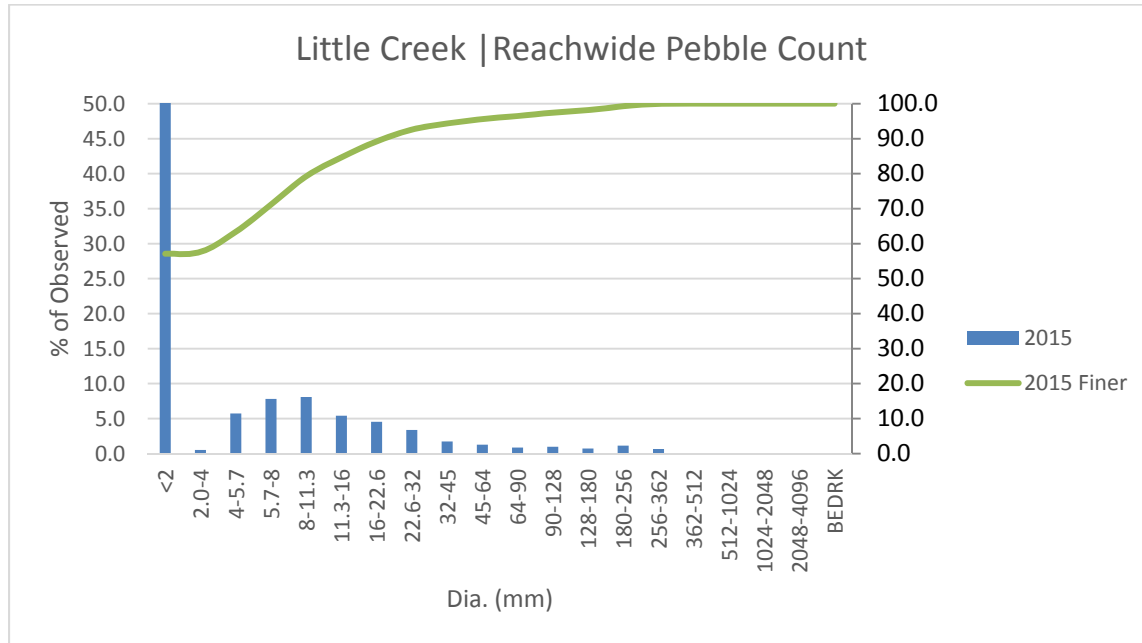
## Results and Analysis

Analysis will be conducted following the 2016 monitoring season. The restoration reach-level longitudinal profile and substrate assessment are included below.

### Longitudinal Profile



## Pebble Counts



ST	2015	
	D50	D84
1	6	9
2	7	15
3	12	35
5	Fines	65
6	80	207
7	3	8
8	Fines	6
9	3	6
10	Fines	4
11	Fines	Fines
13	Fines	11
14	Fines	Fines
16	Fines	4
17	15	25
19	5	16
20	Fines	Fines
21	Fines	Fines
22	Fines	7
Reach-wide	Fines	13

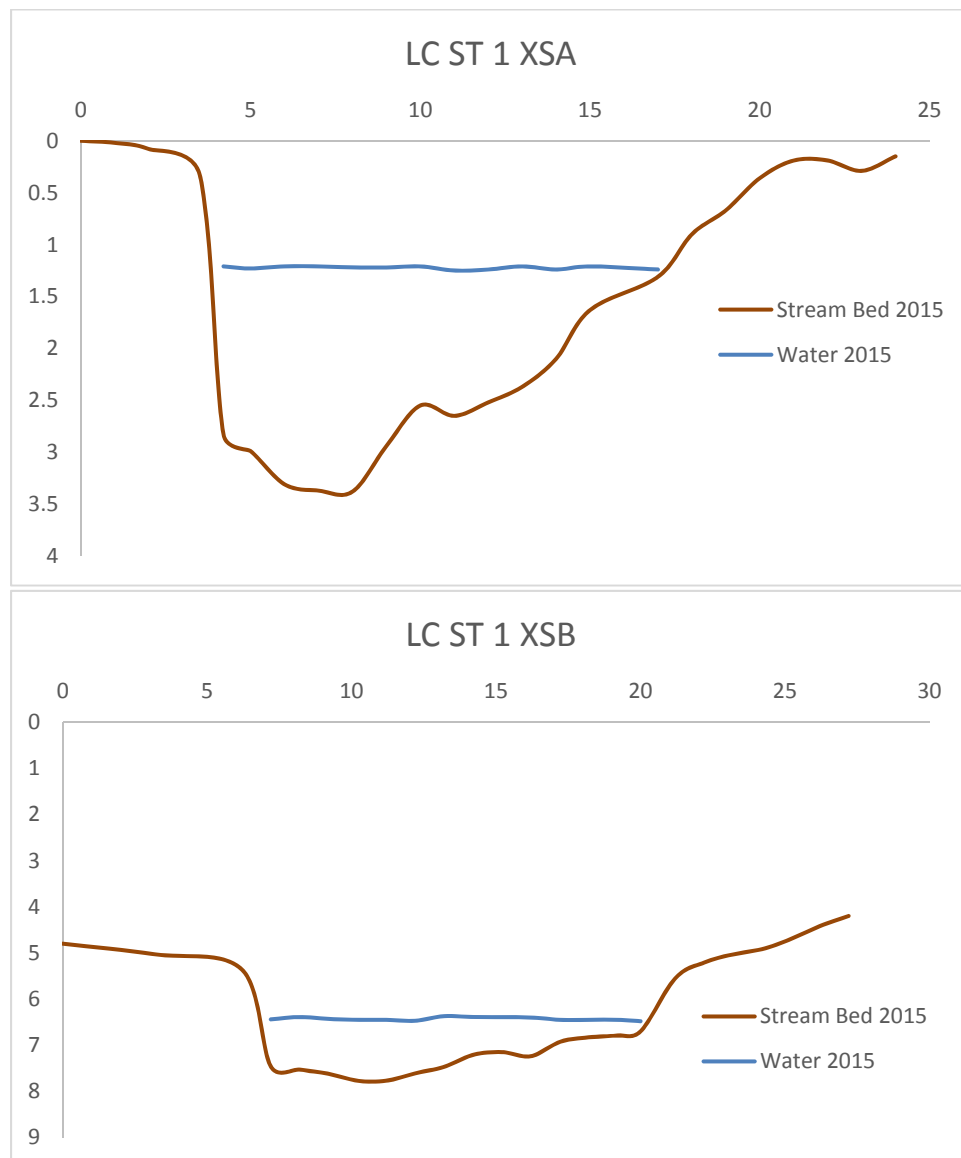
## Conclusions

Conclusions on the project's three main goals will be included in the 2016 final report. The project goals are:

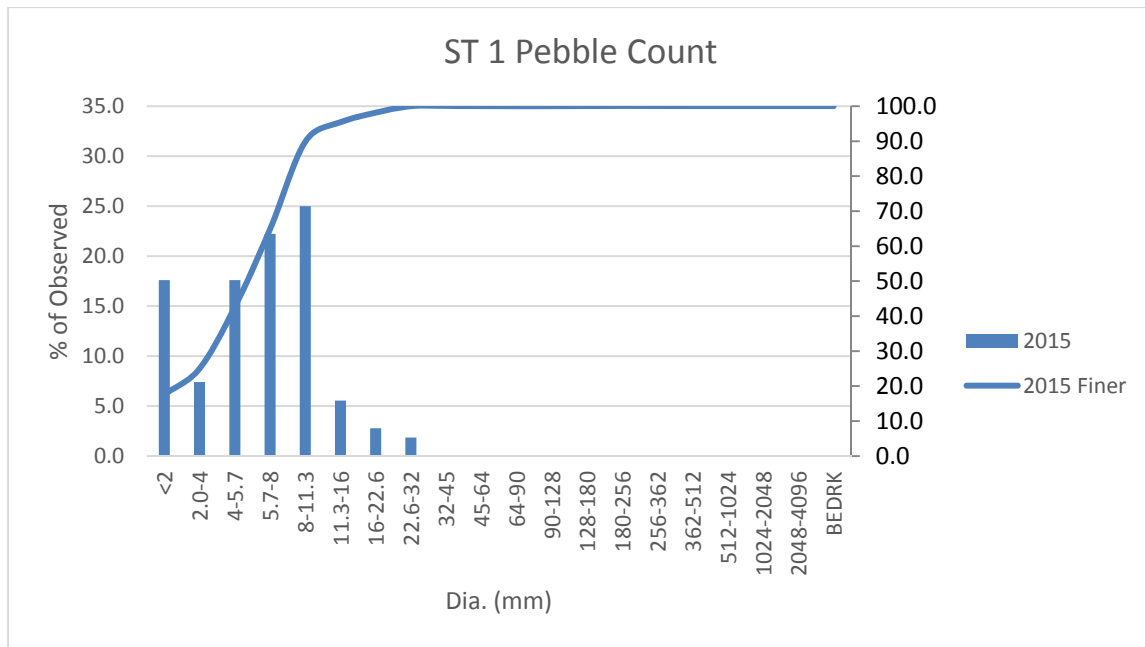
1. Improving habitat complexity and diversity in the creek channel using LWM
2. Provide refuge during winter flows for juvenile salmonids.
3. Providing increased spawning opportunities for adult salmonids.

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

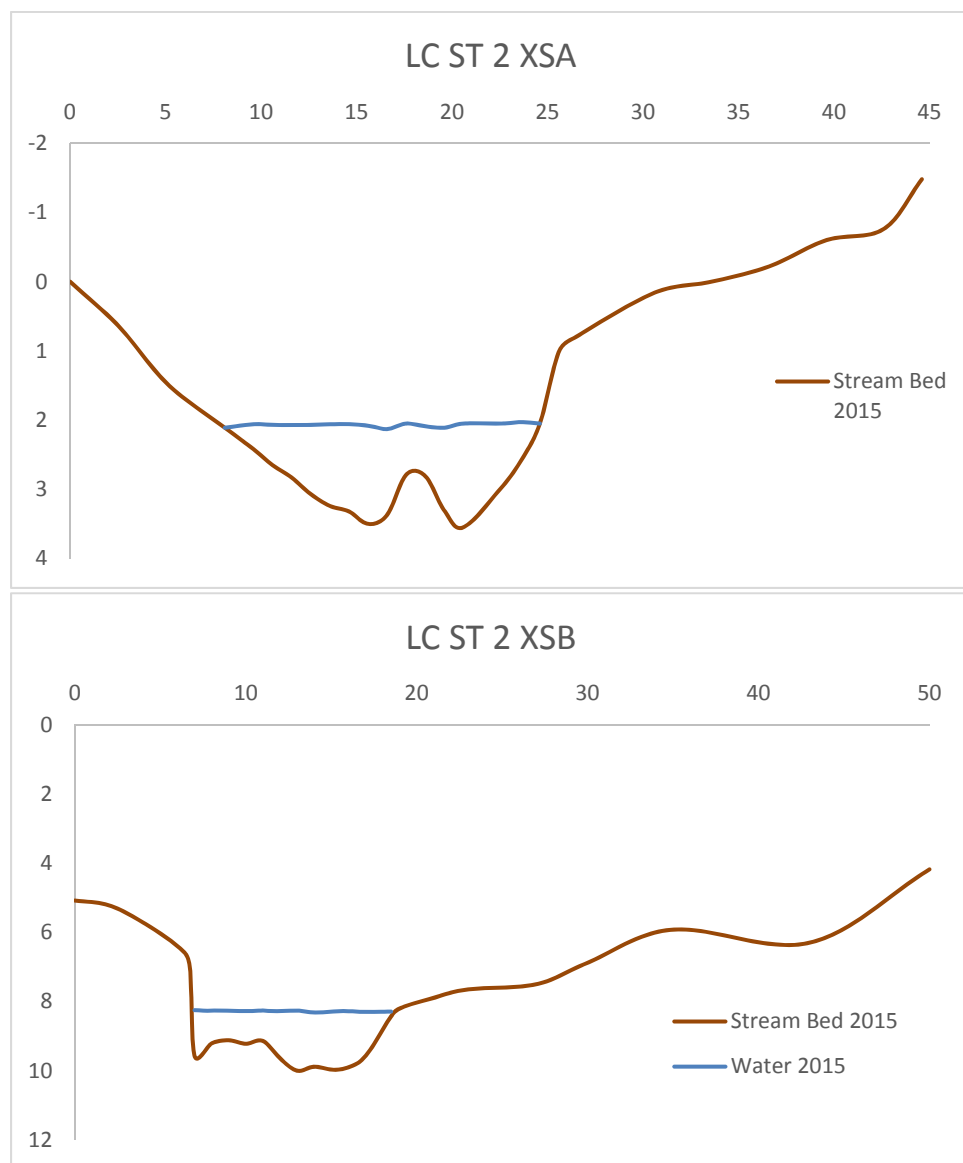
Included for each complex structure are baseline cross-sectional graphs and well as post-installation photographs. Substrate graphs and additional site photos are available upon request. Photos of bank stabilization structures are available on request.



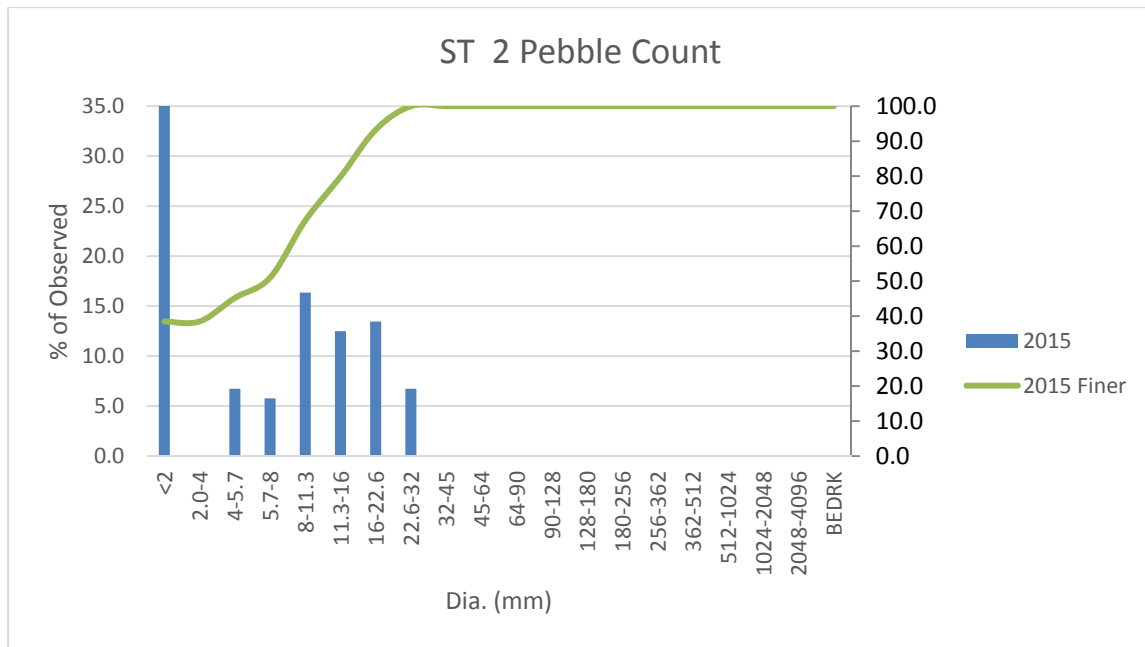




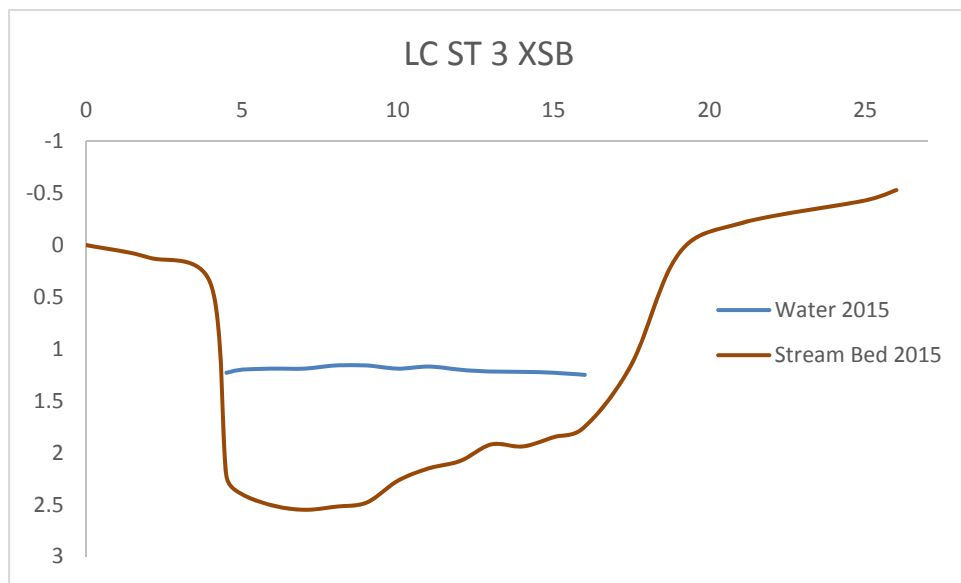
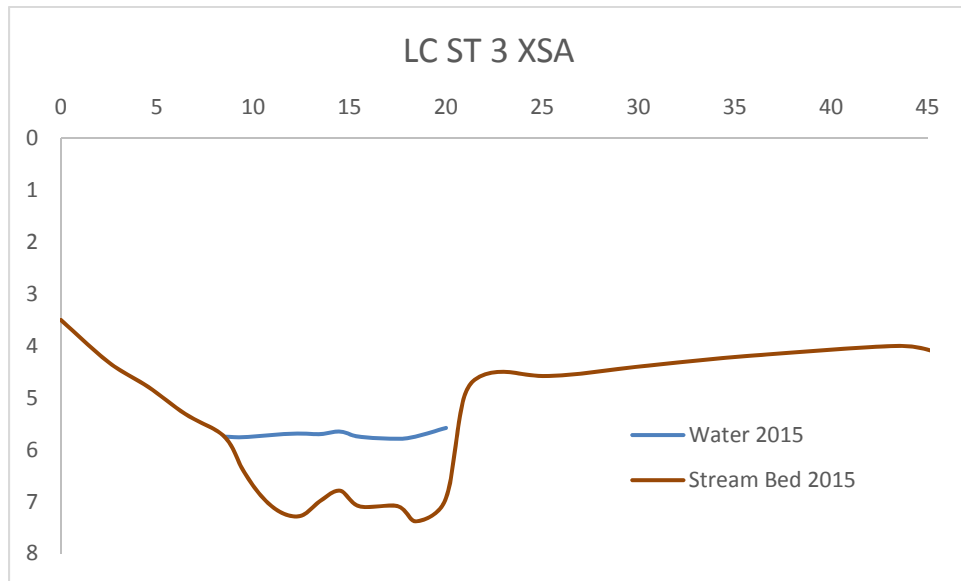
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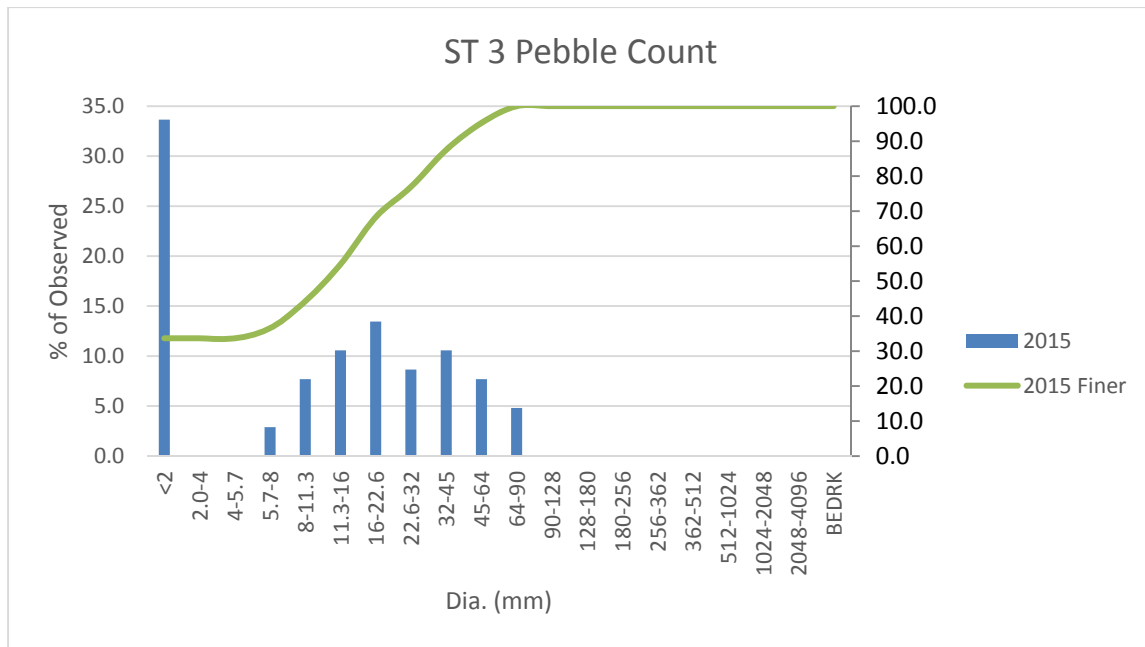




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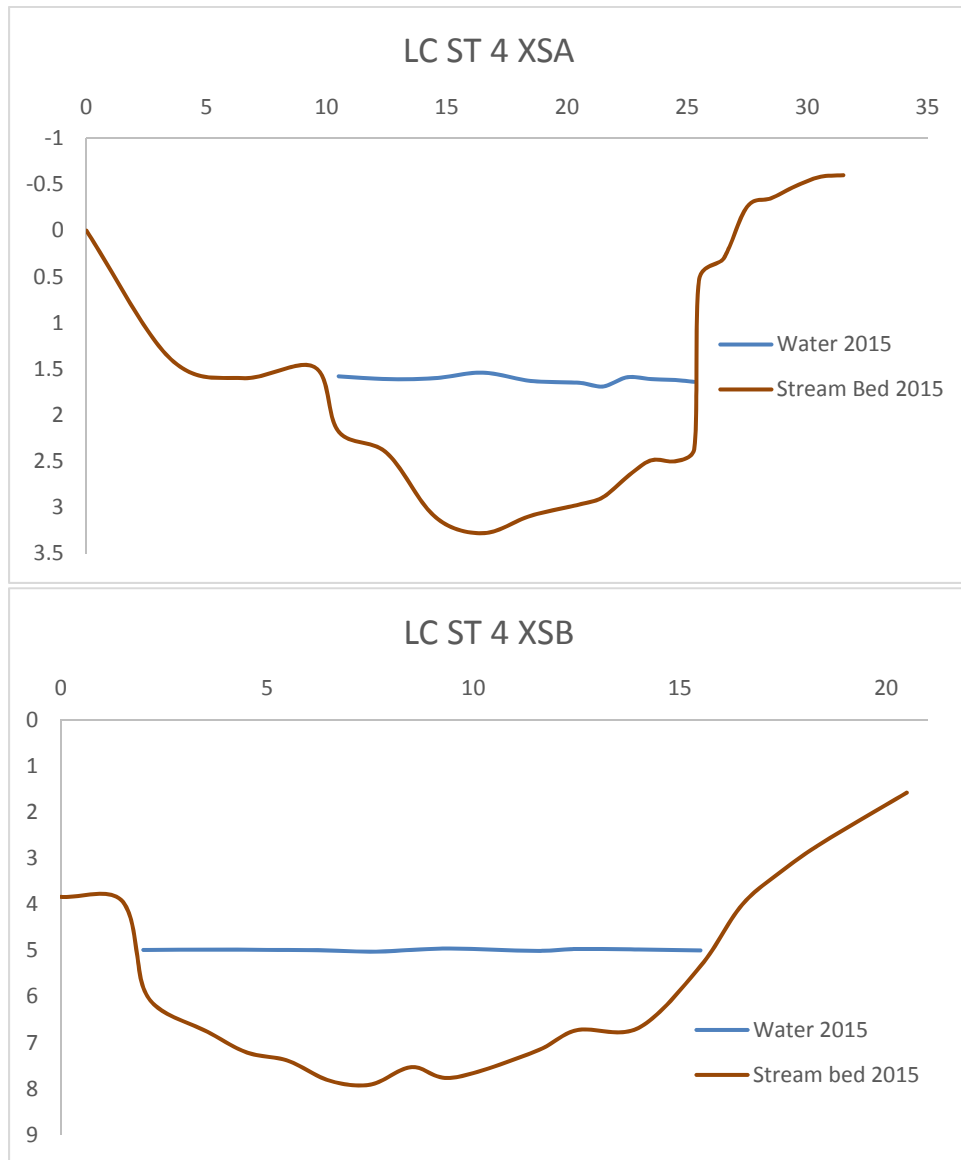






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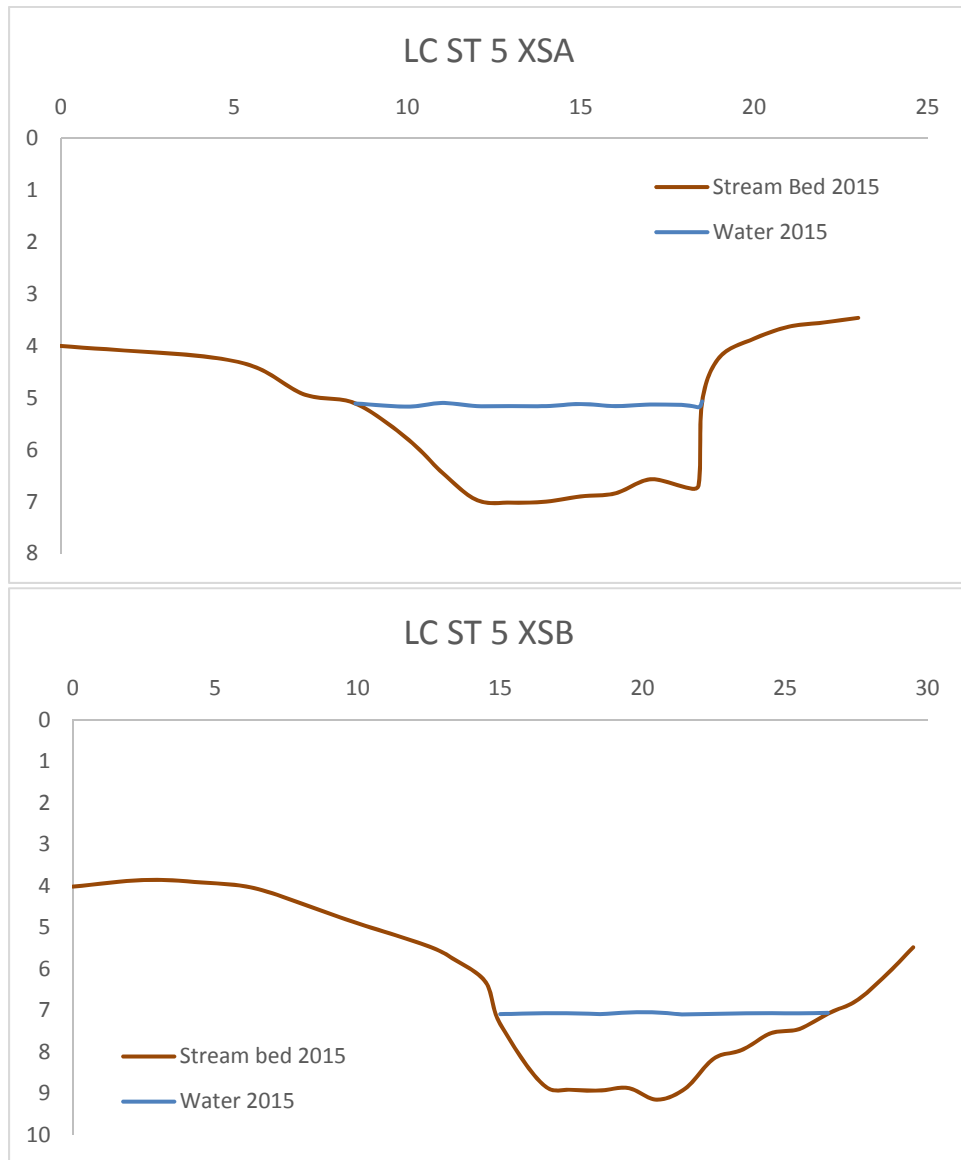




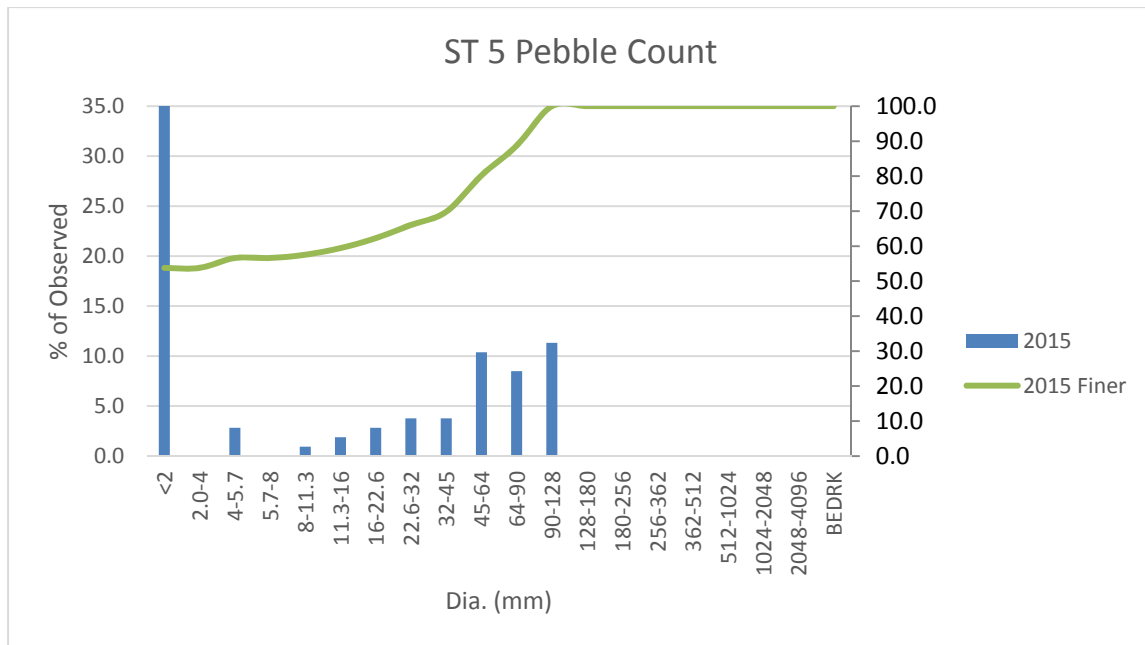
***Water is too deep/swift for accurate pebble count***



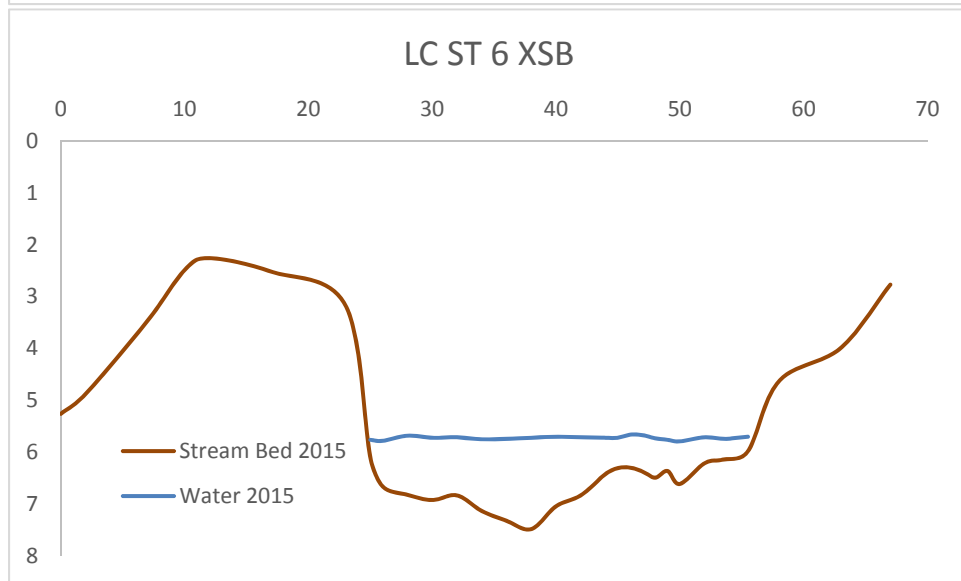
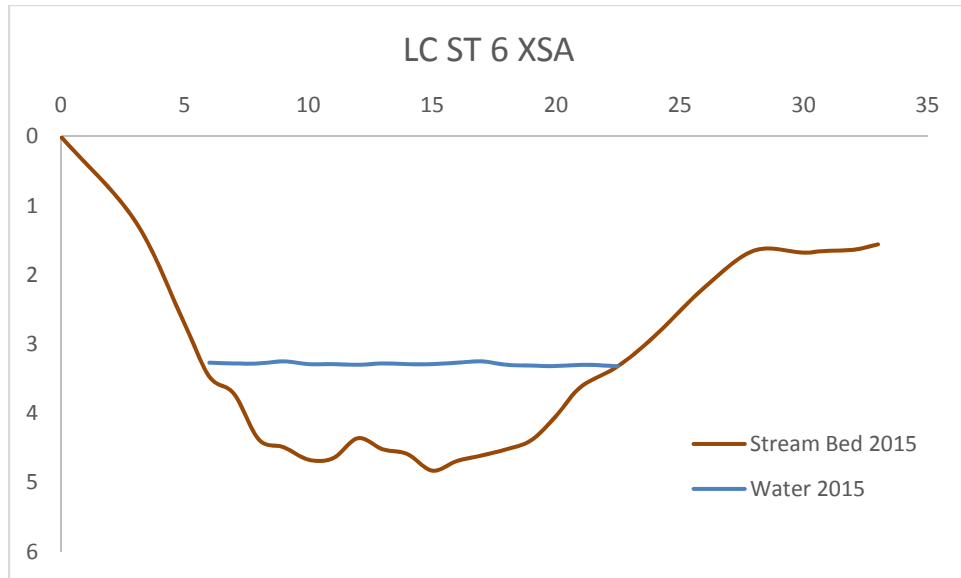
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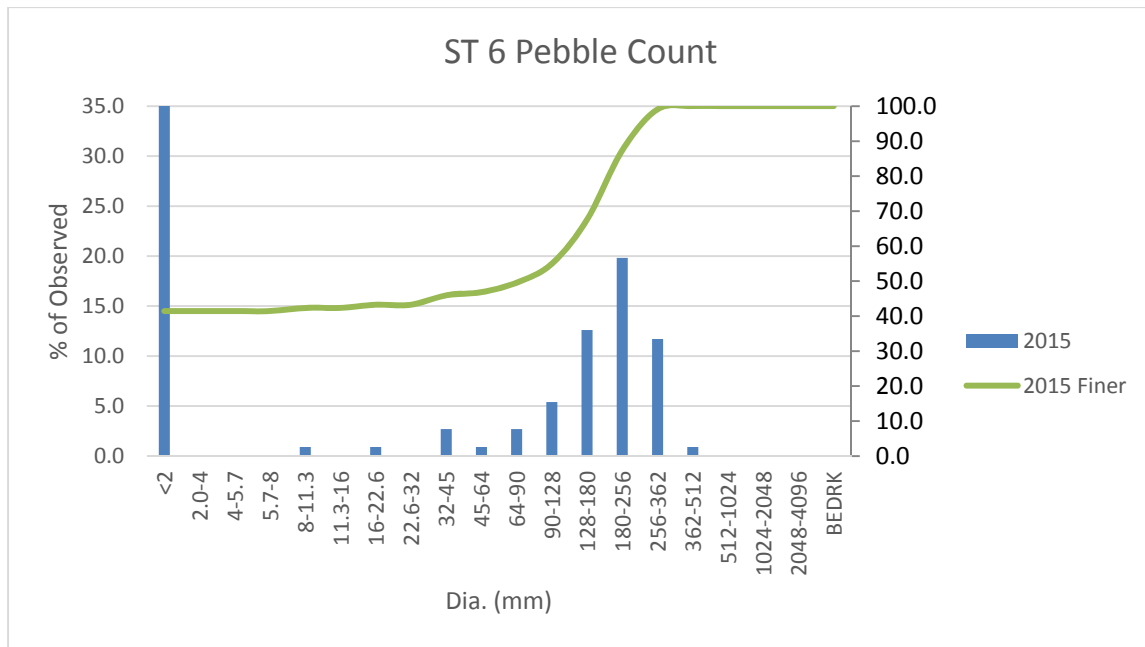




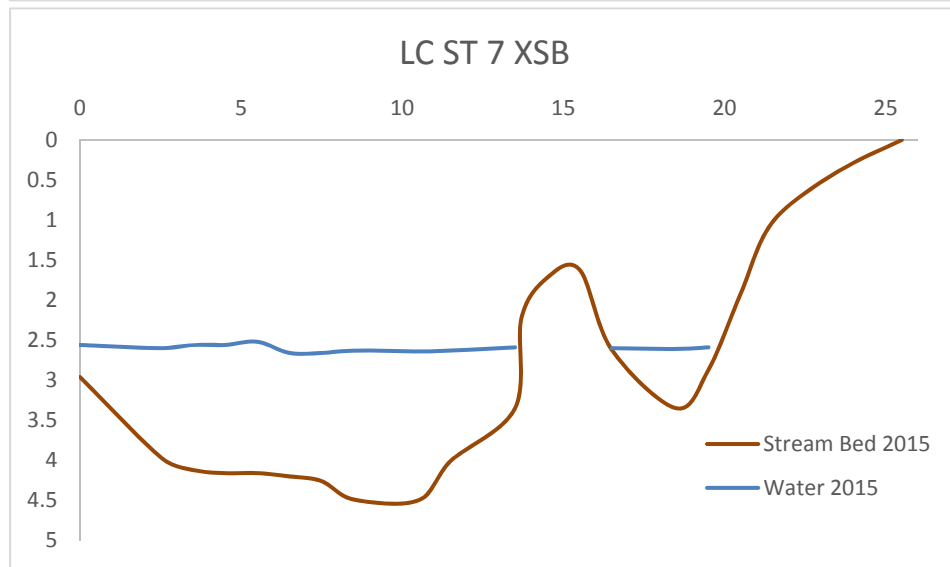
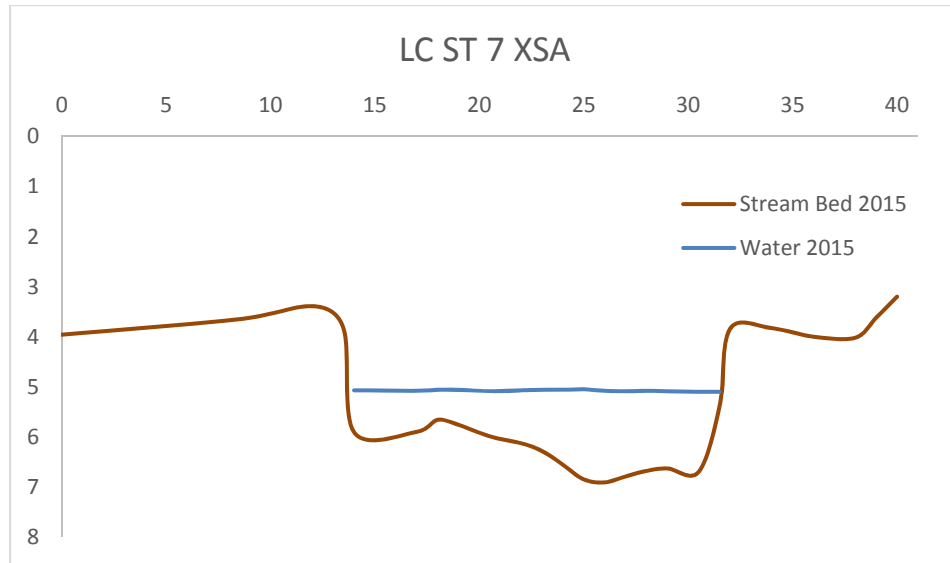
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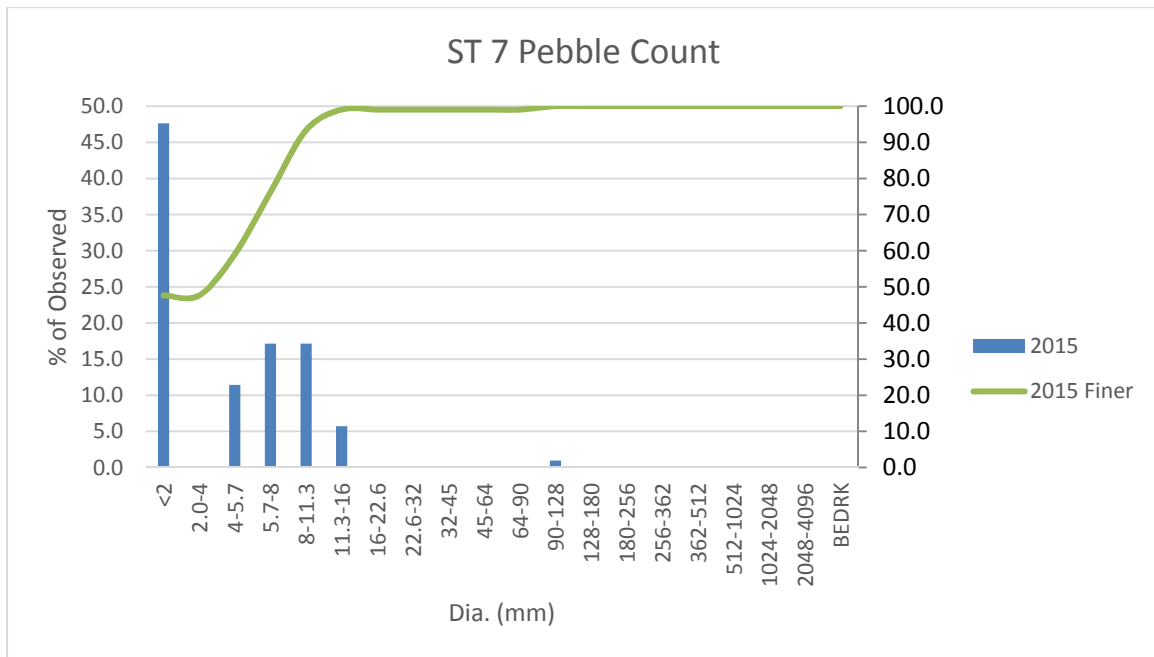




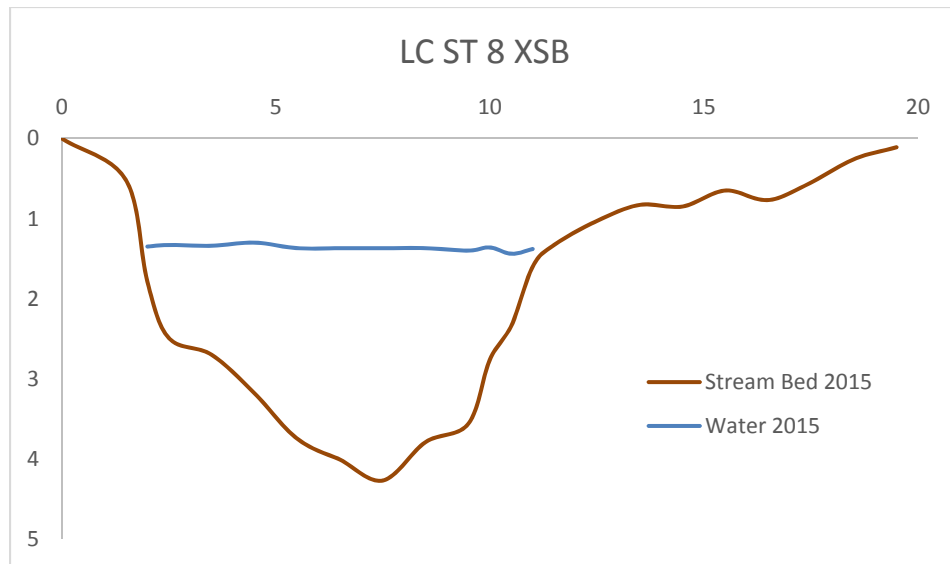
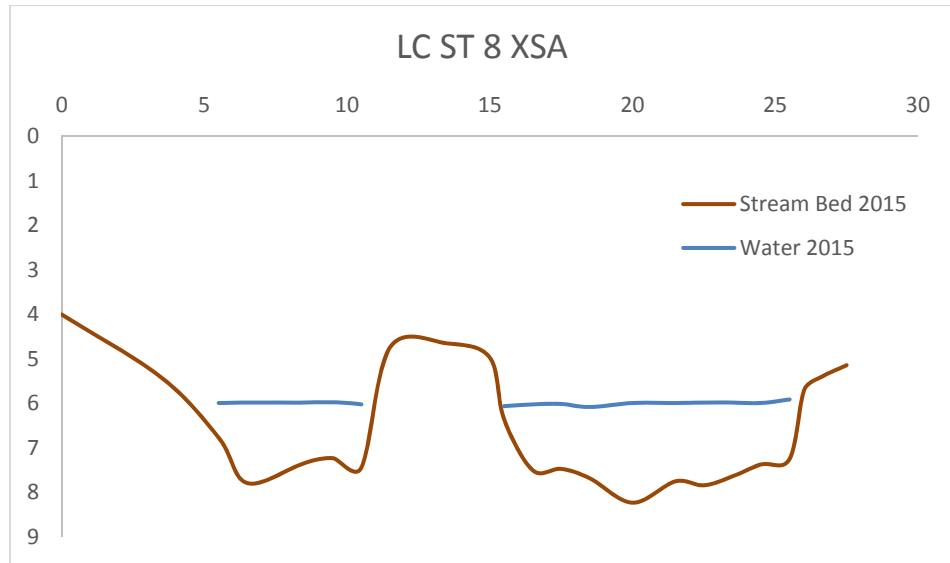


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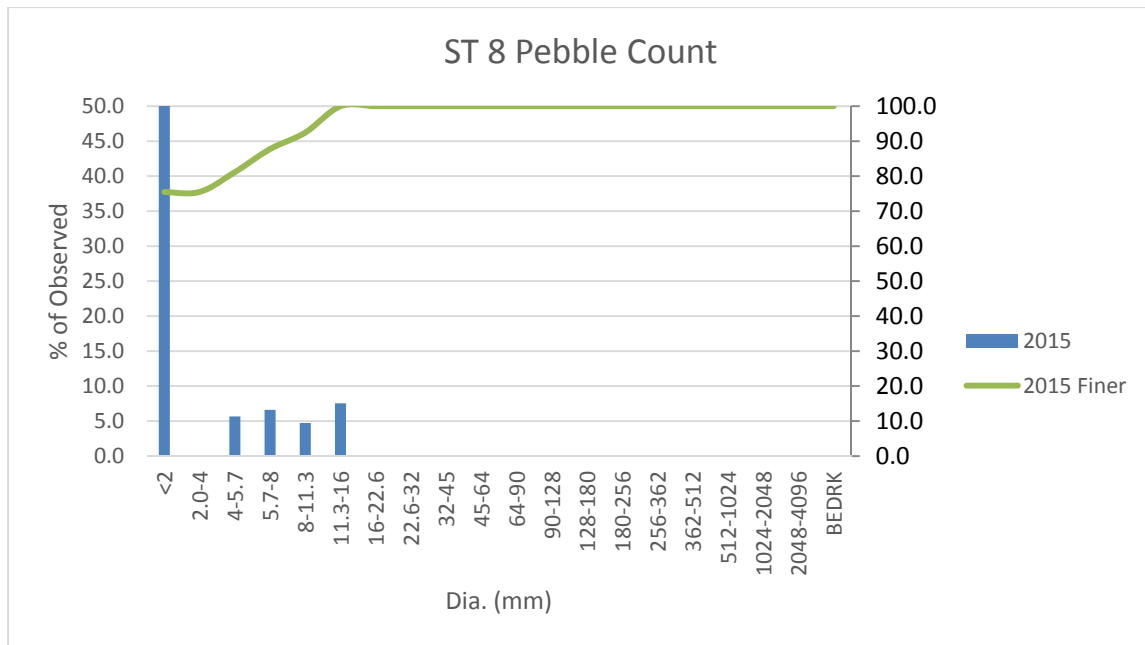




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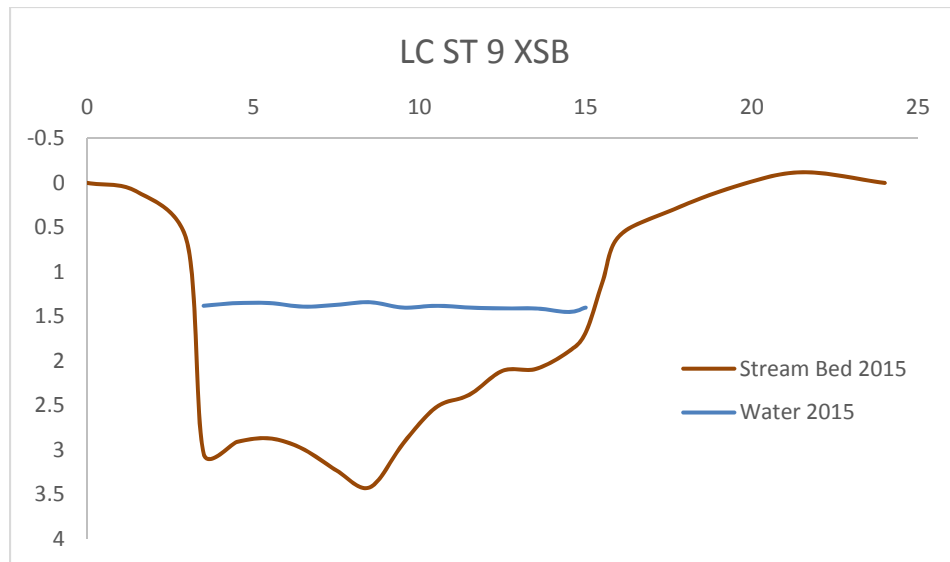
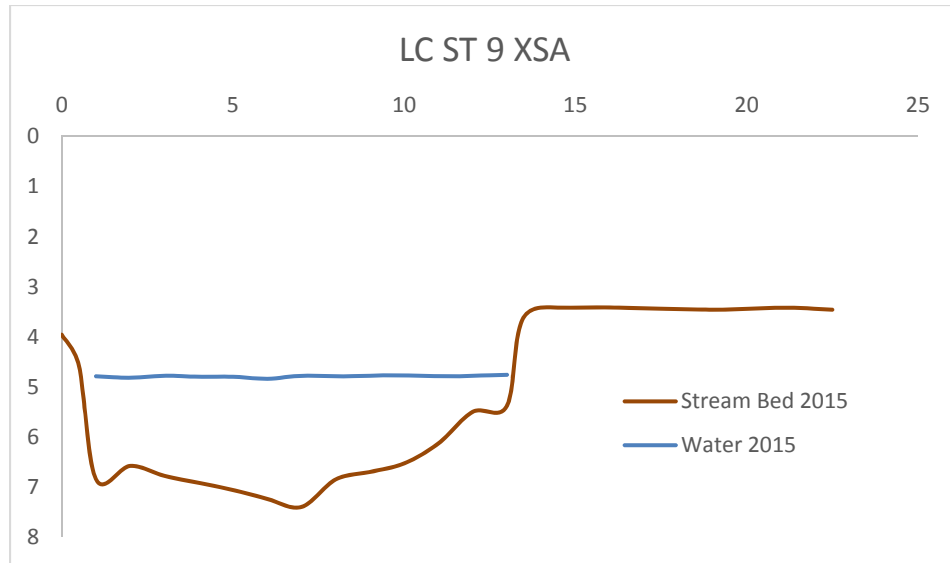


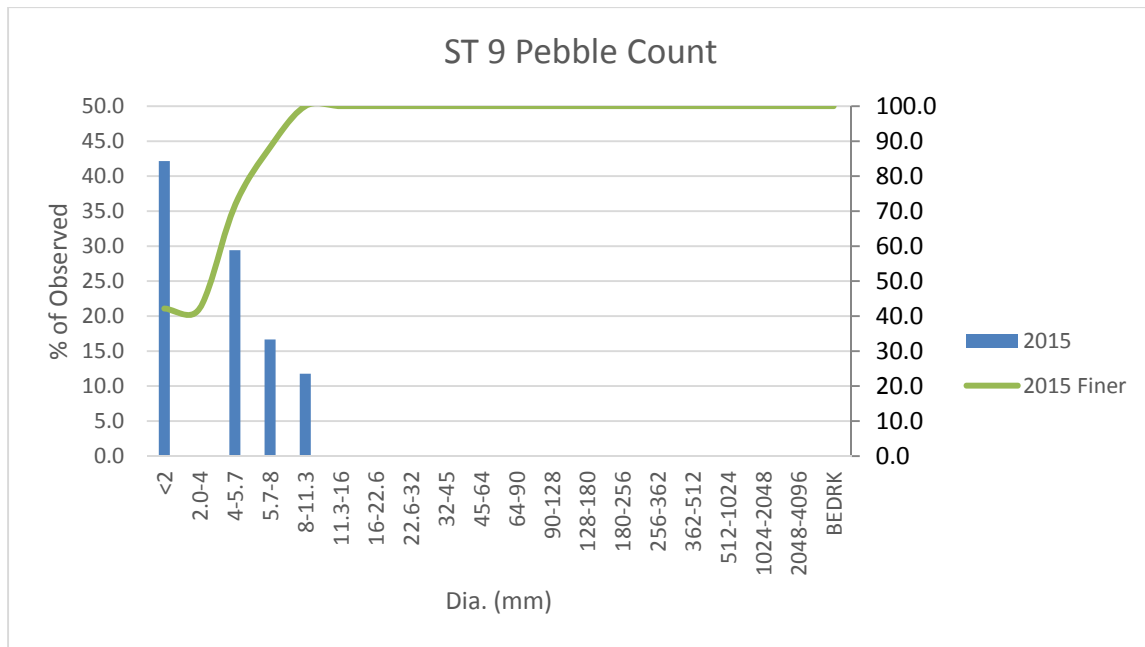




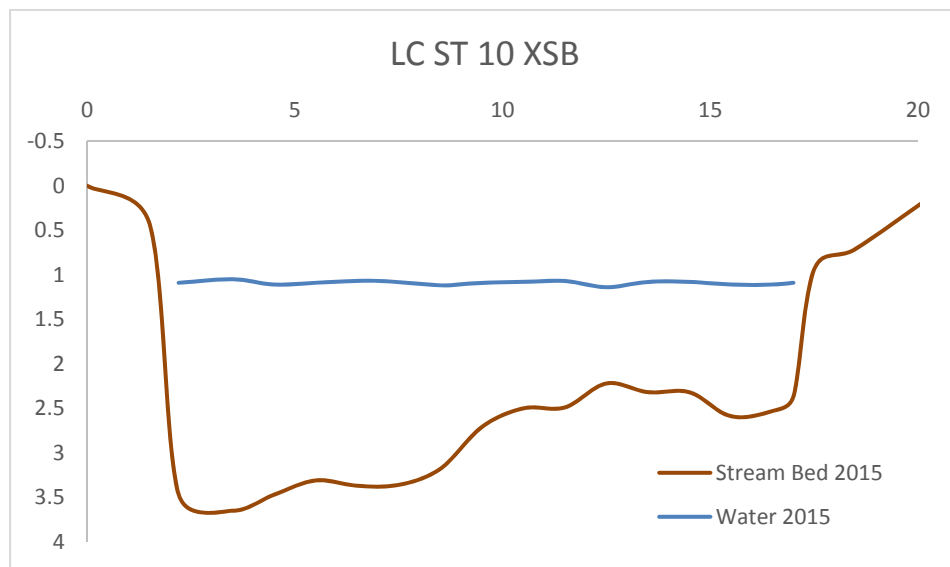
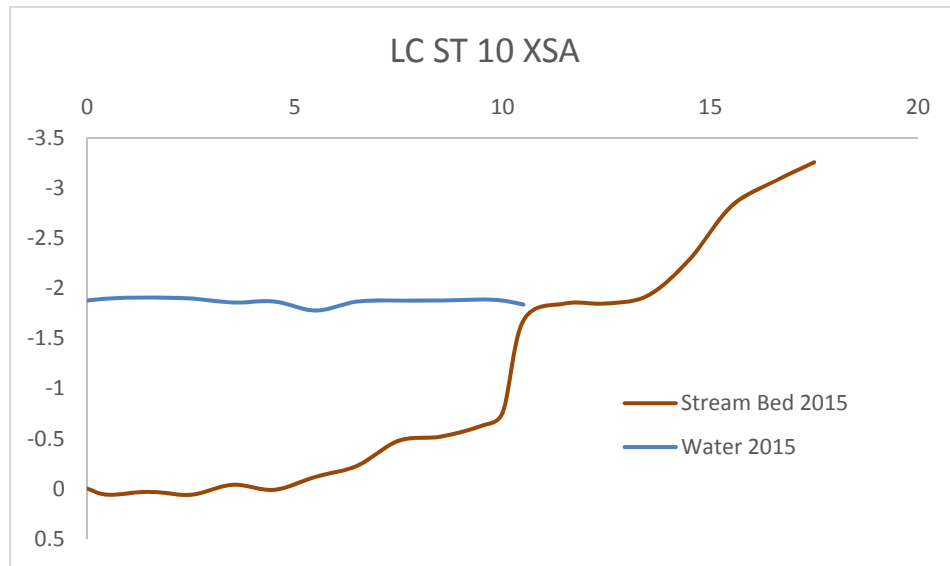
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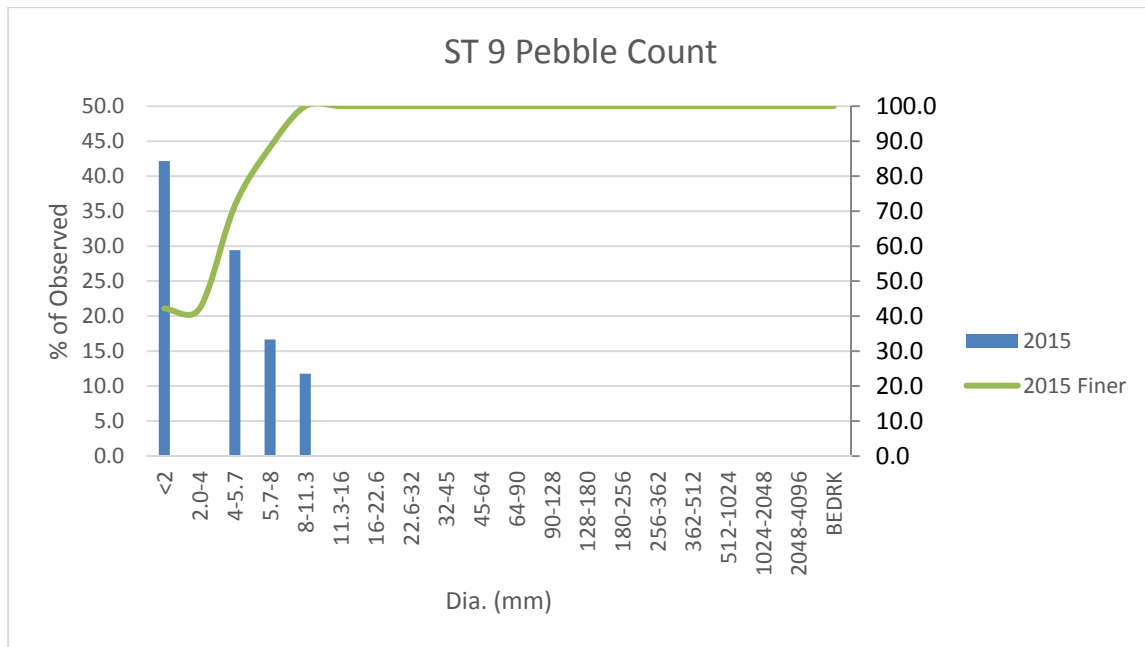




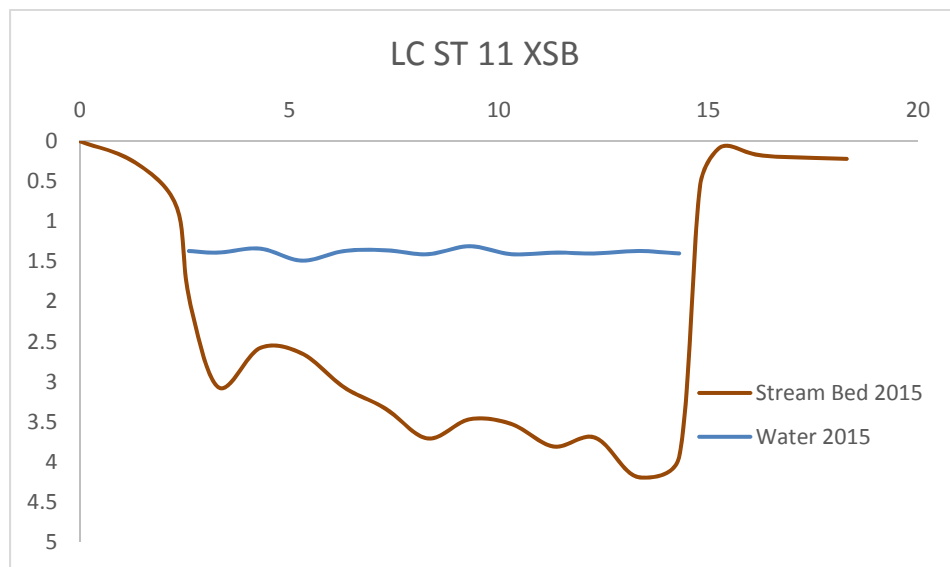
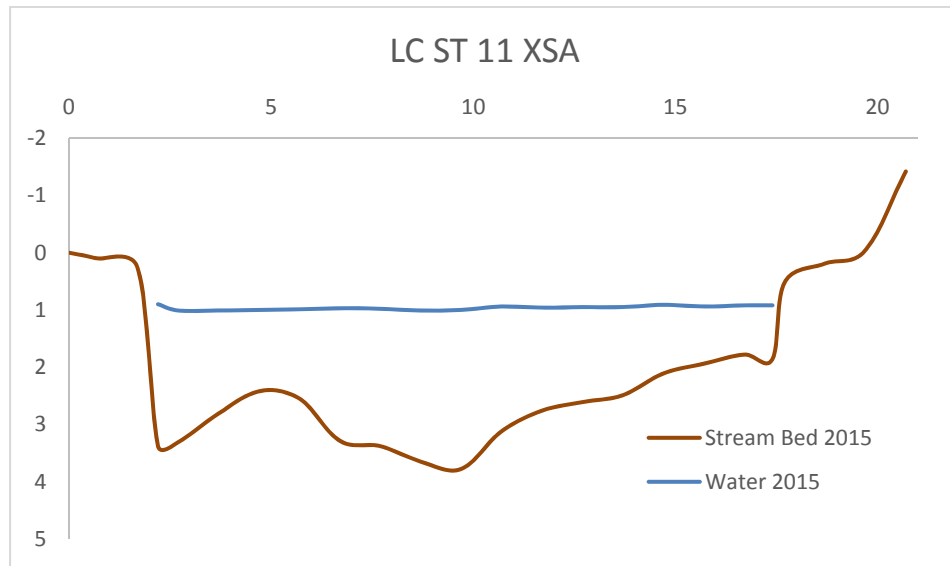
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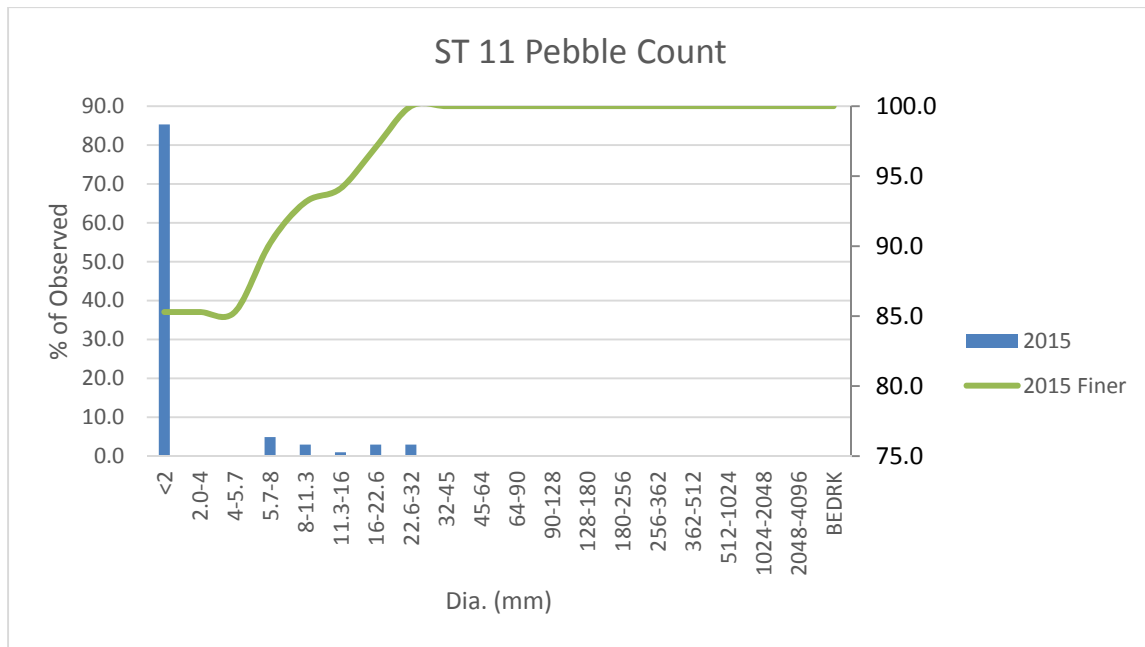




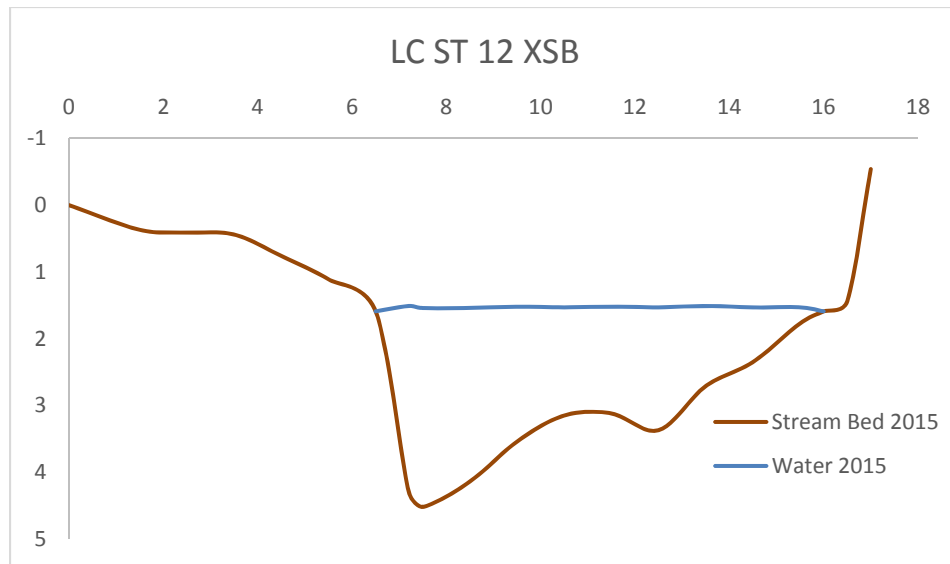
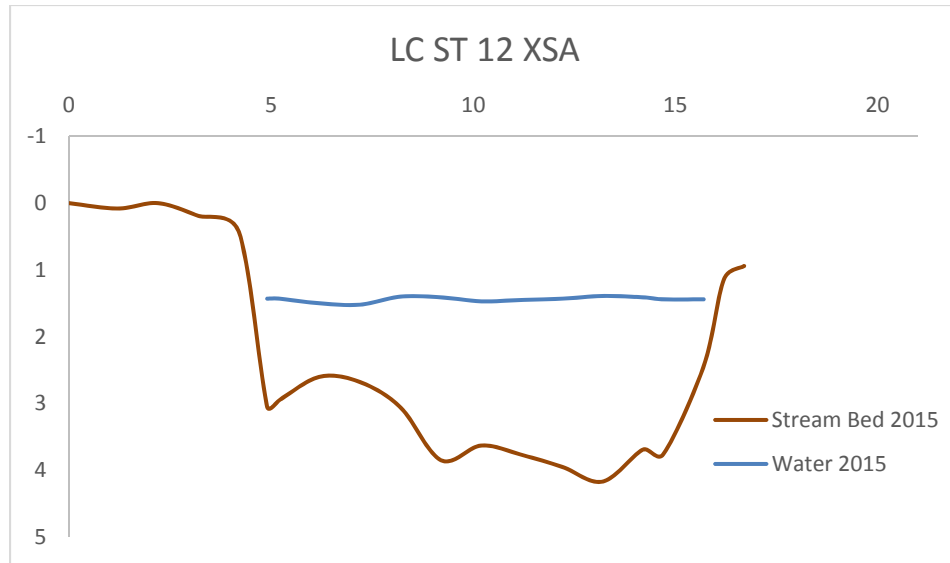
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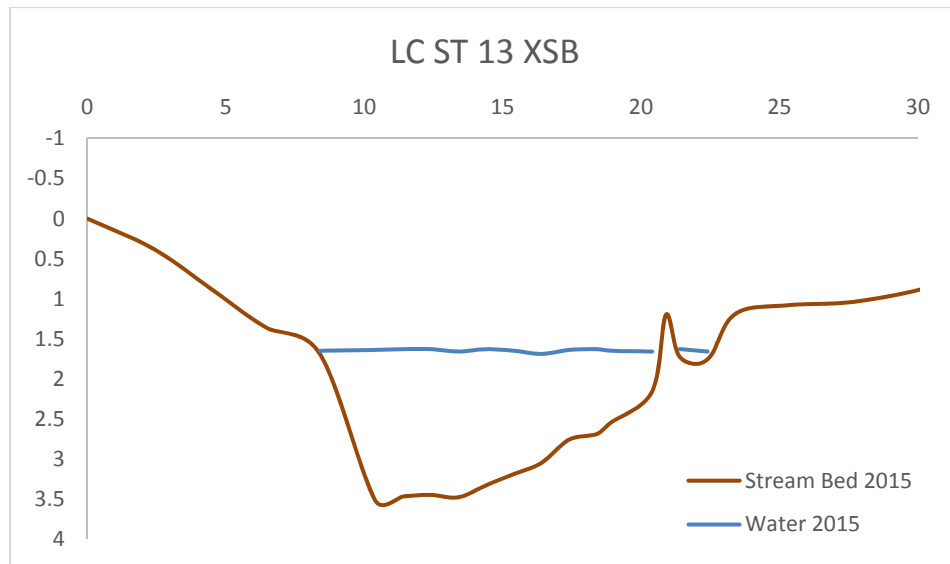
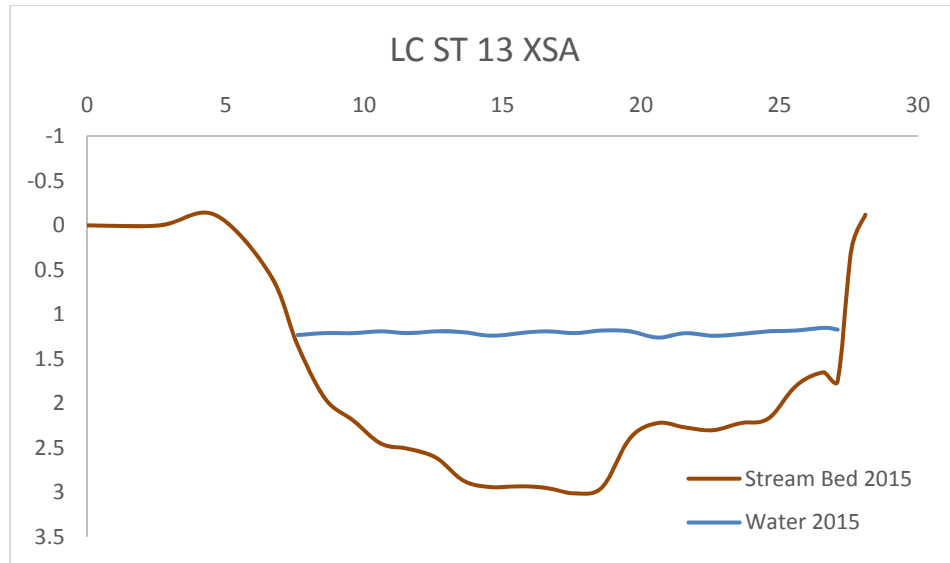


***Water is too deep/swift for accurate pebble count***

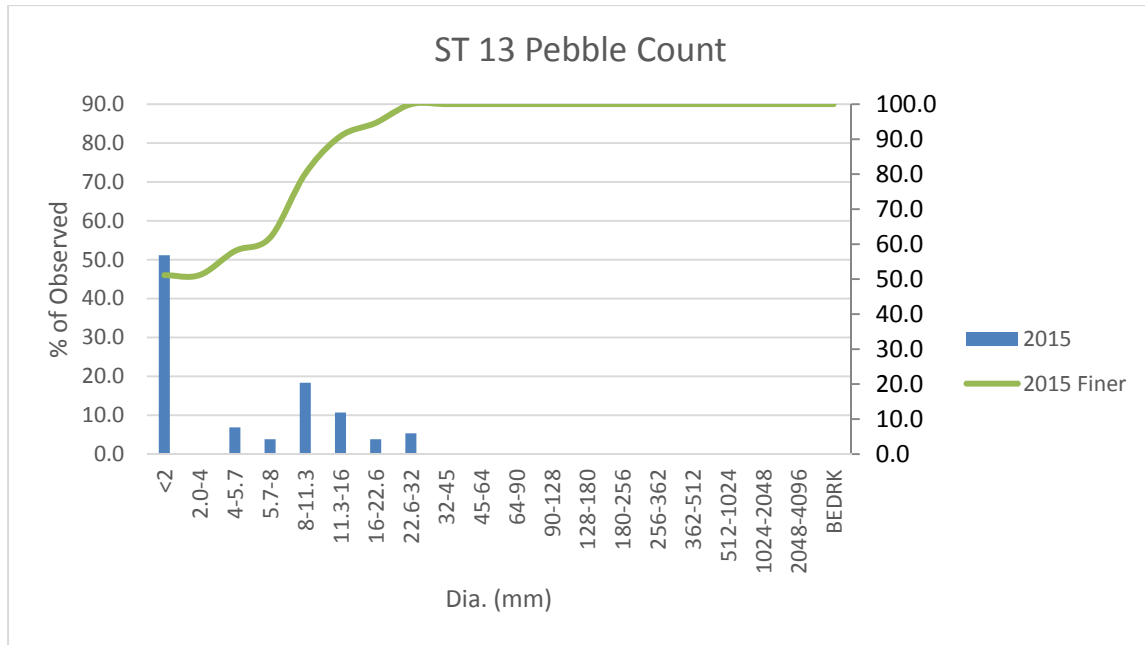




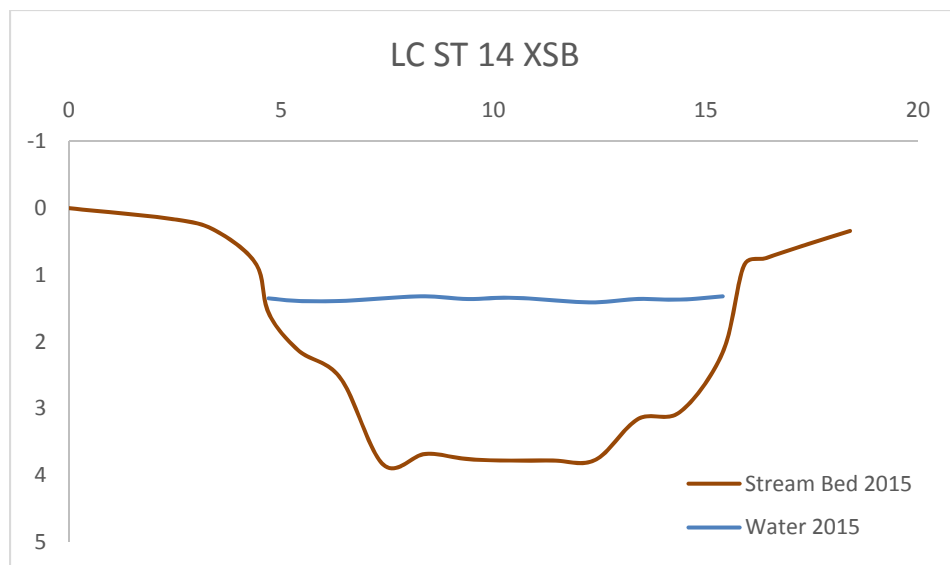
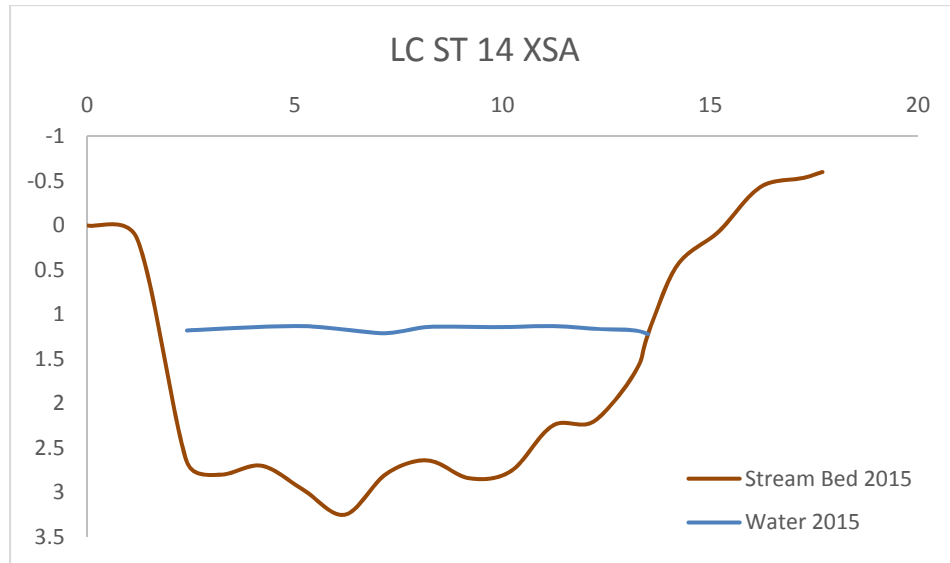
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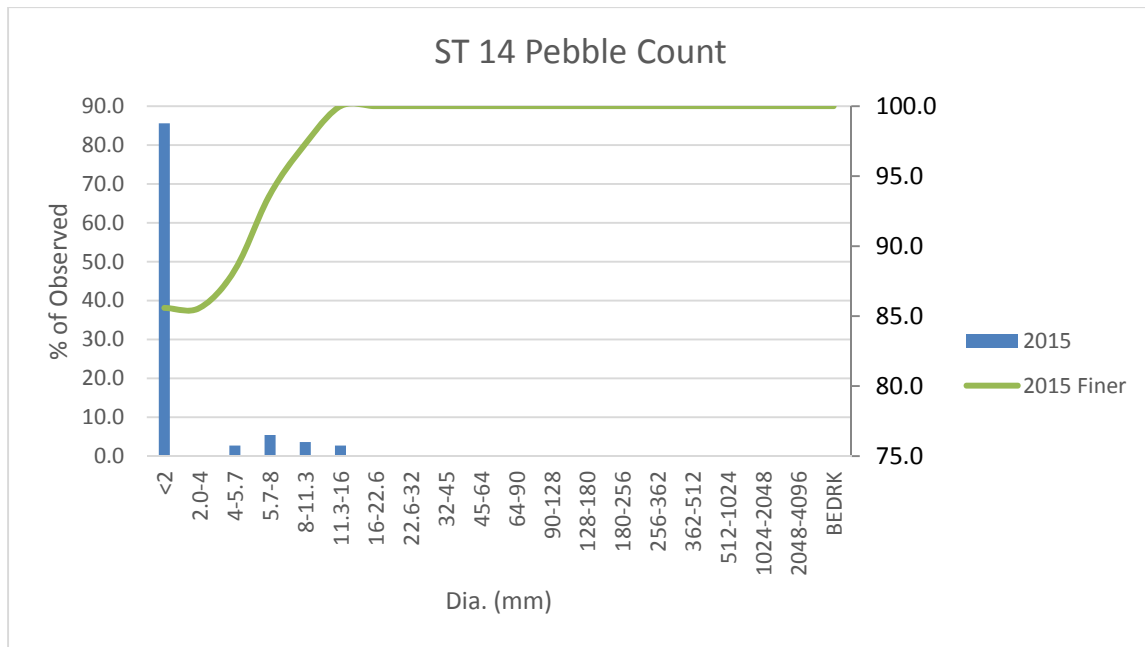






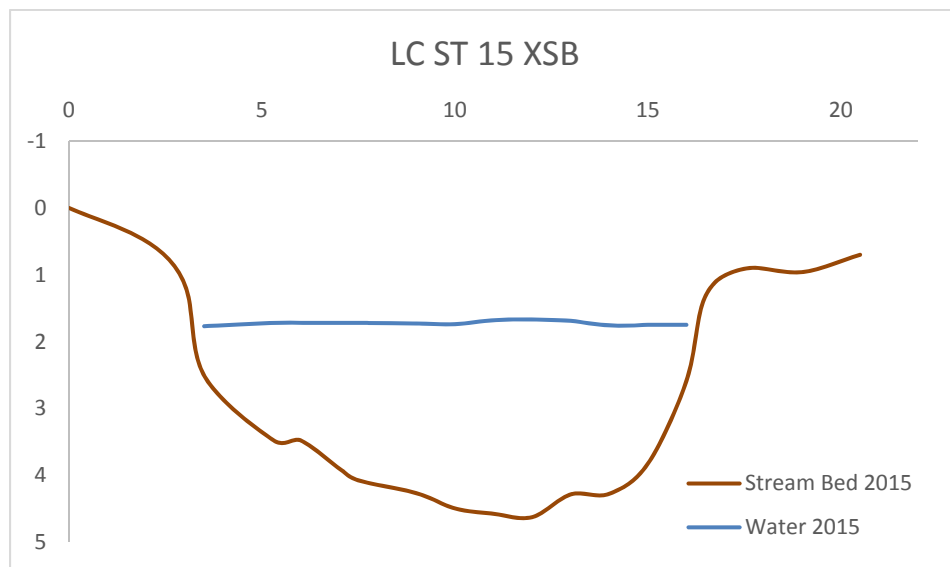
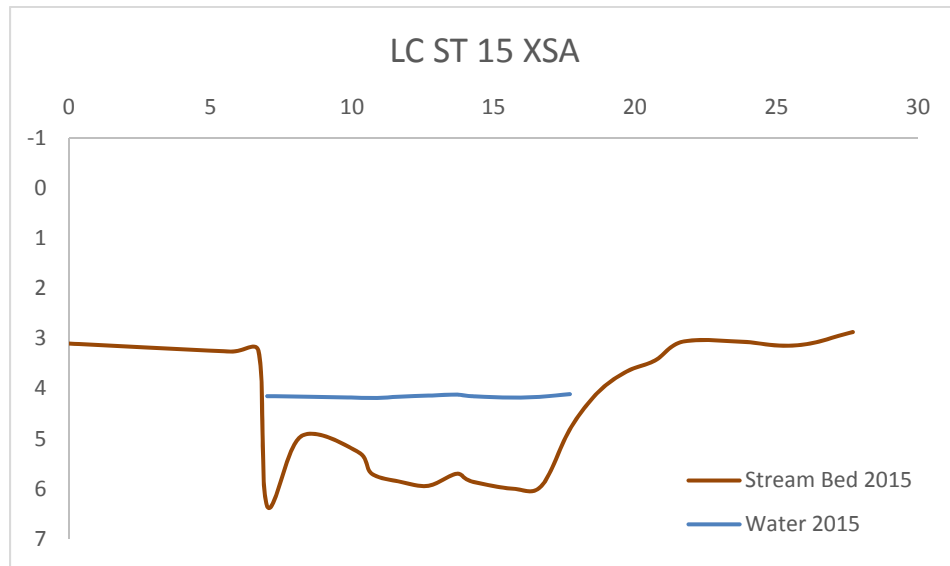
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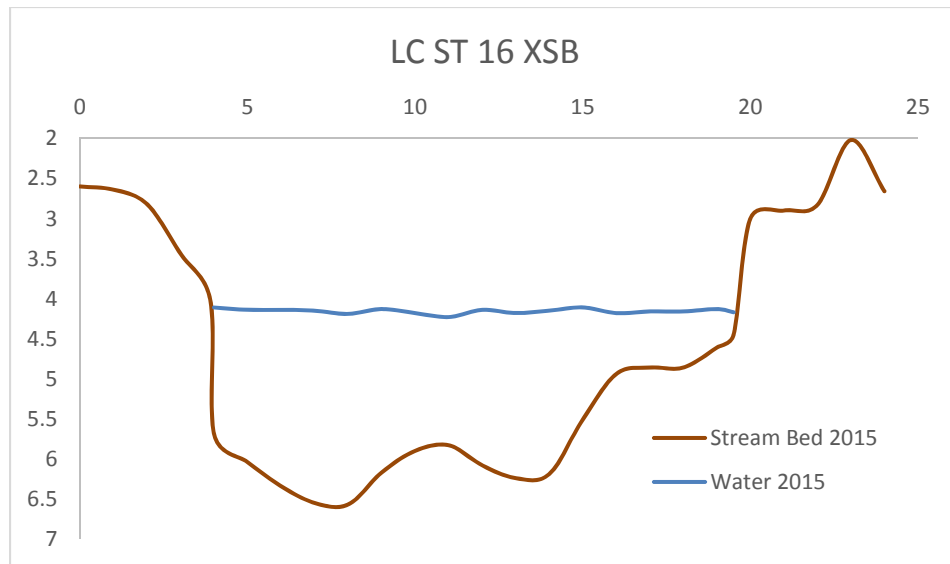
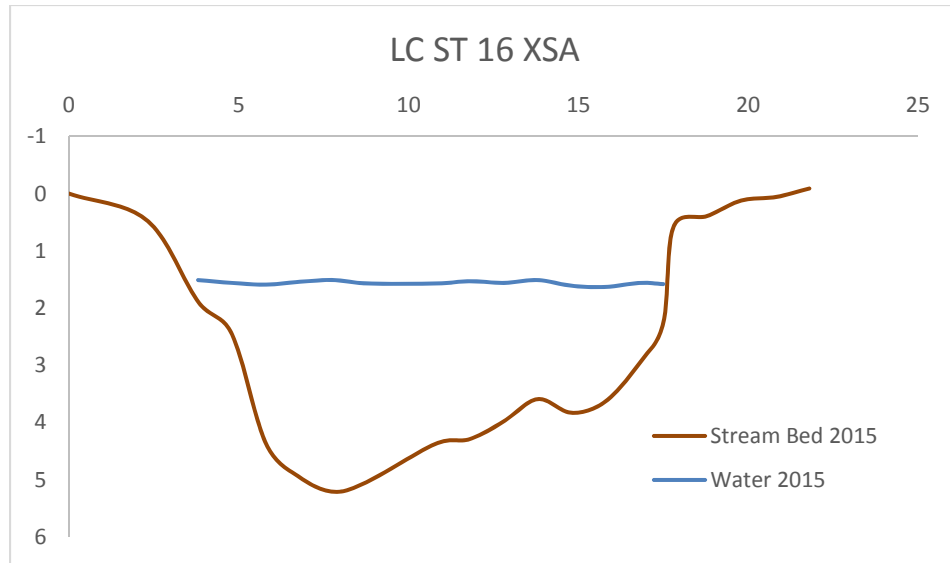


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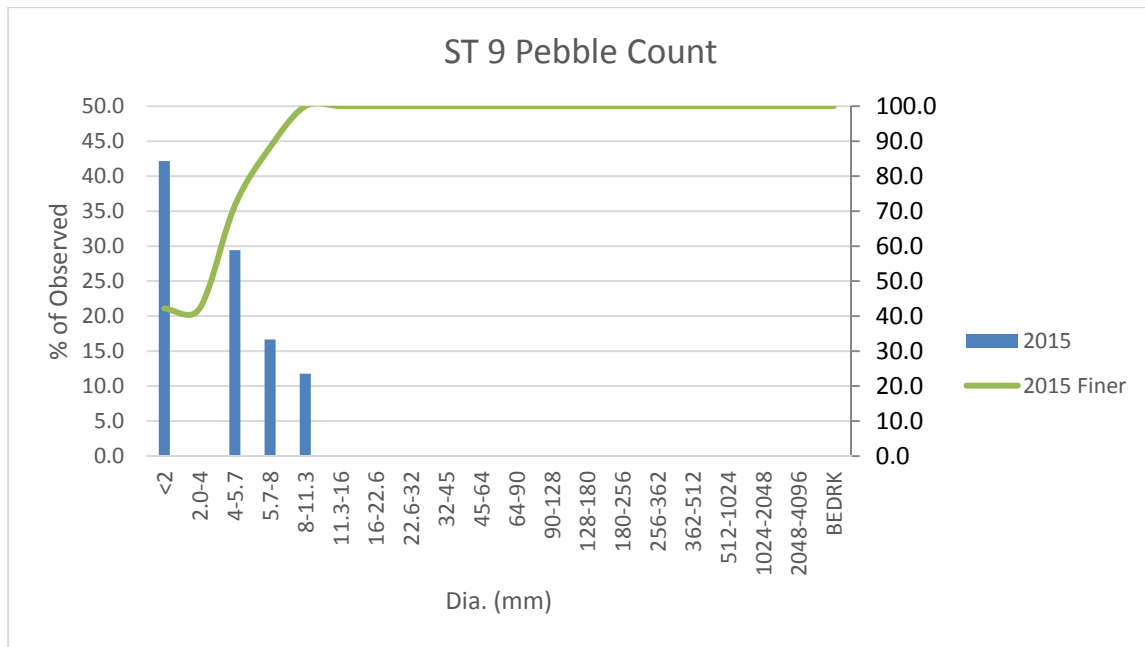




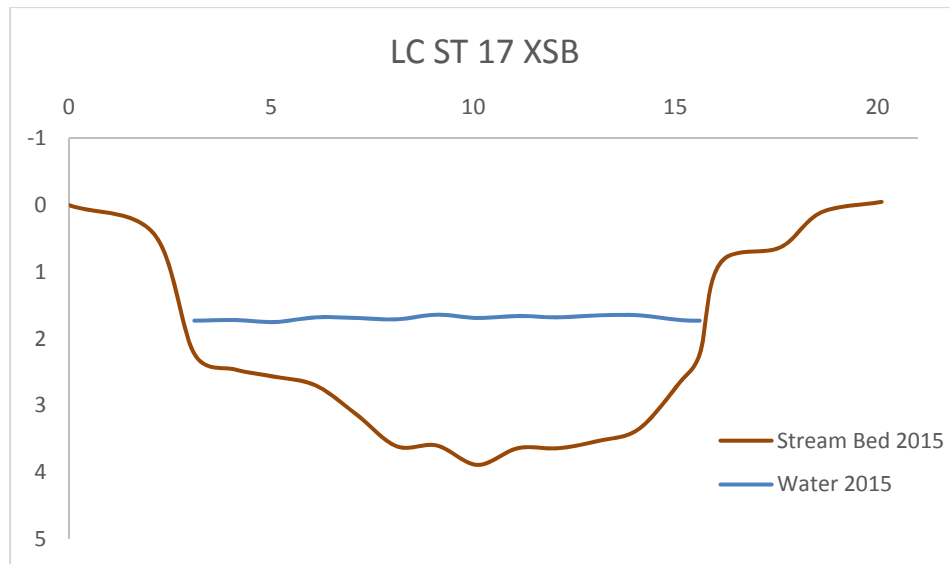
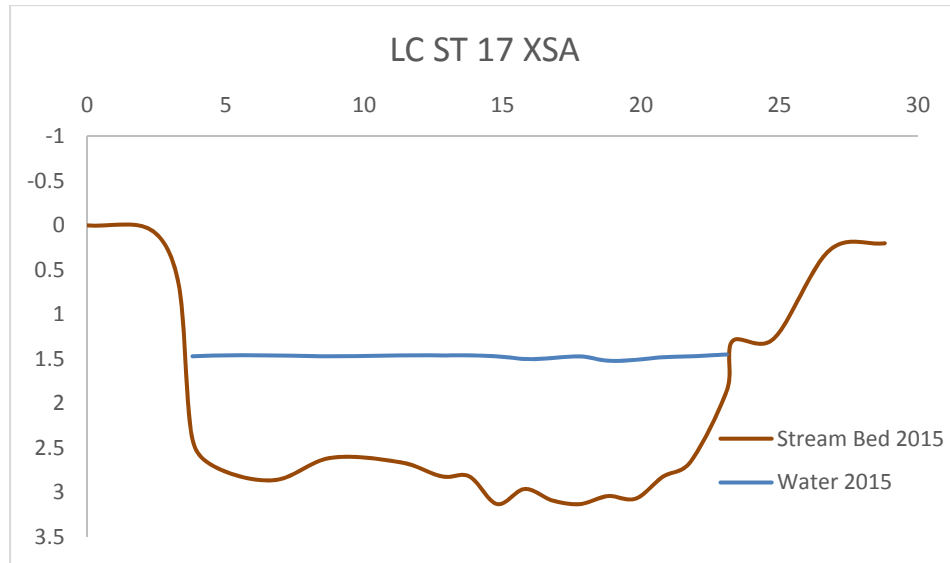
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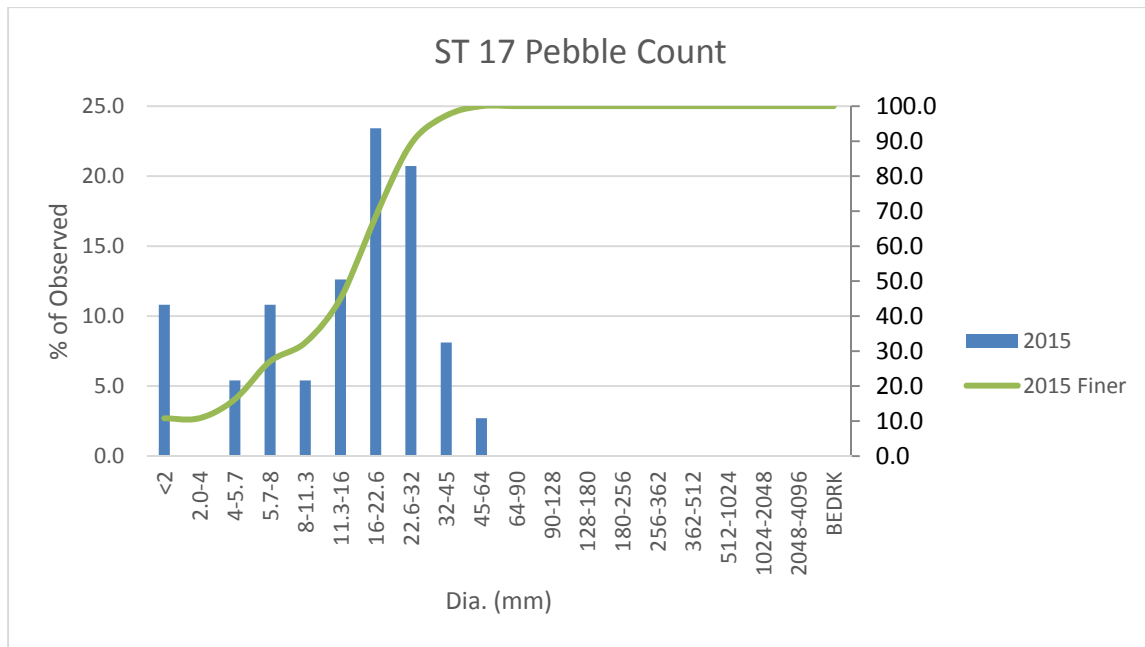




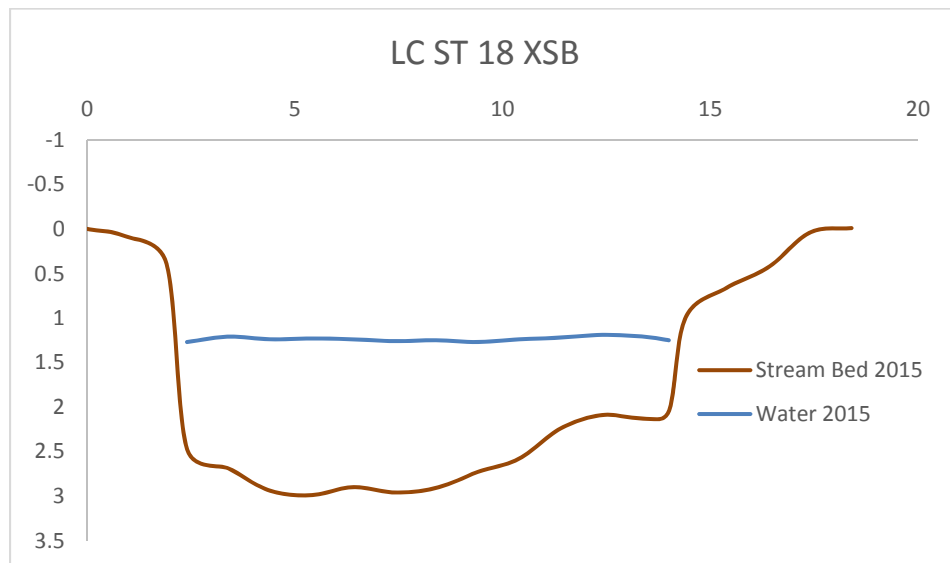
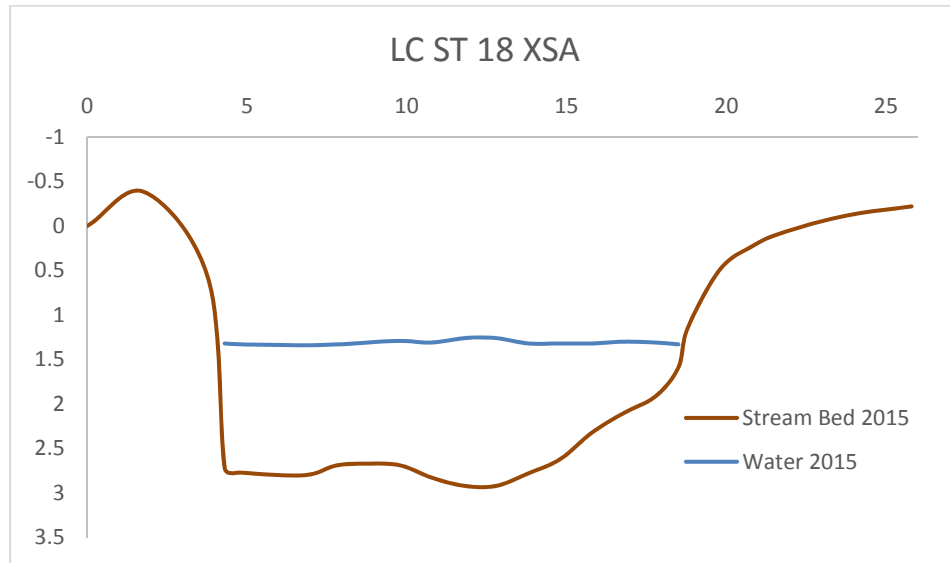
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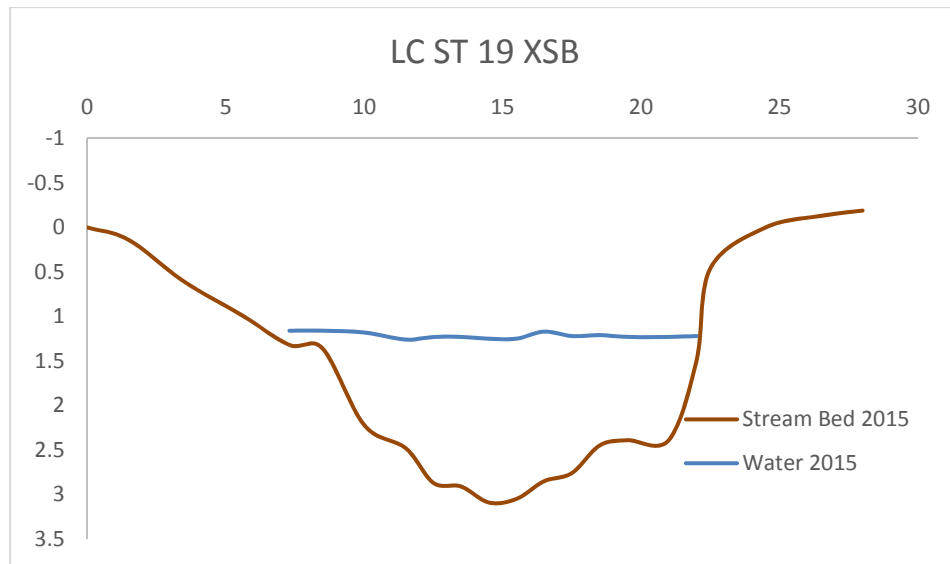
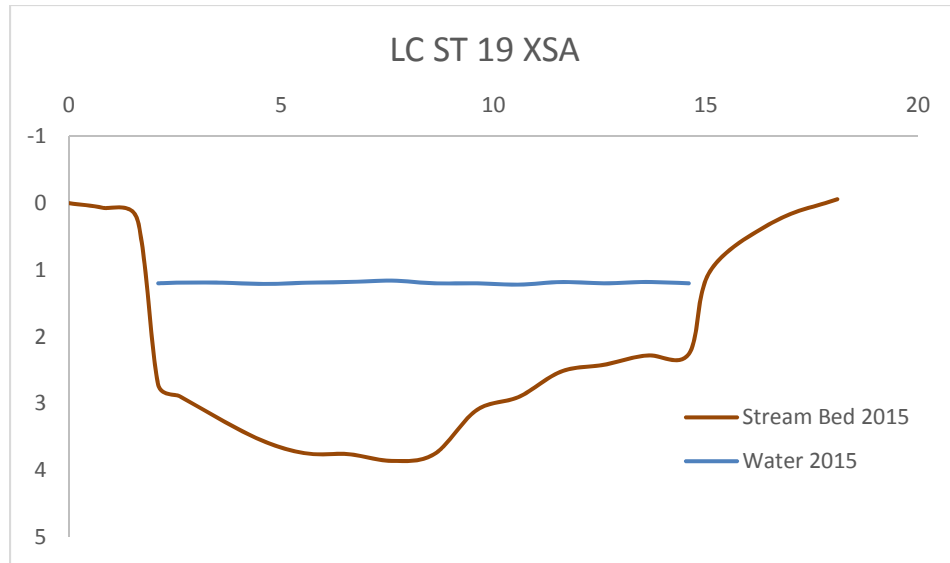


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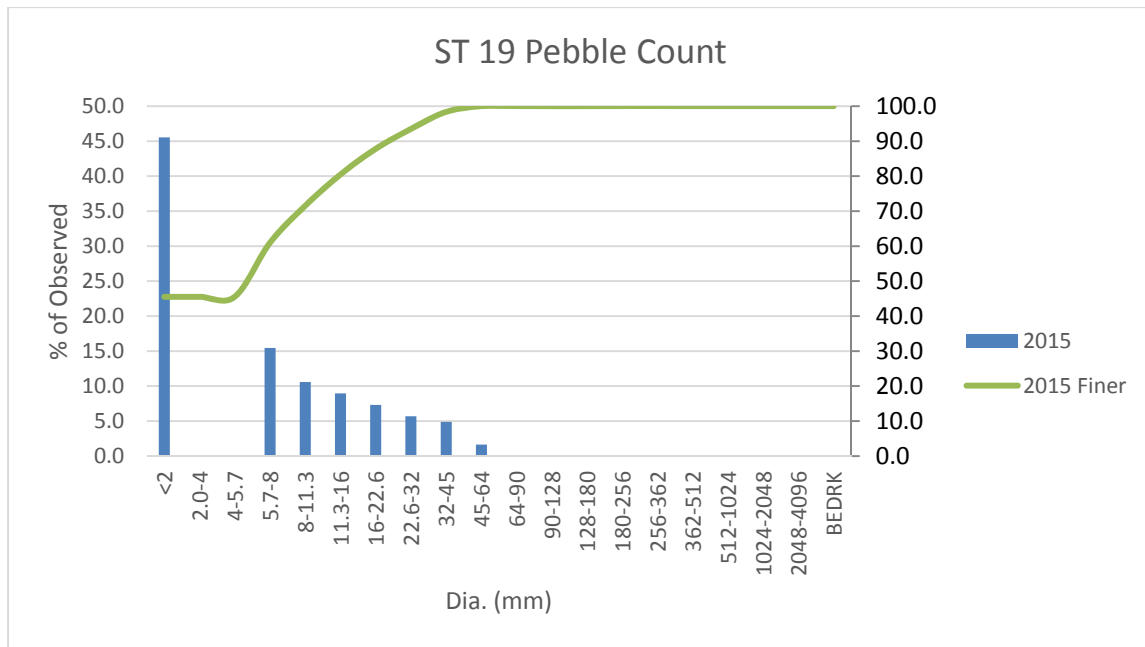




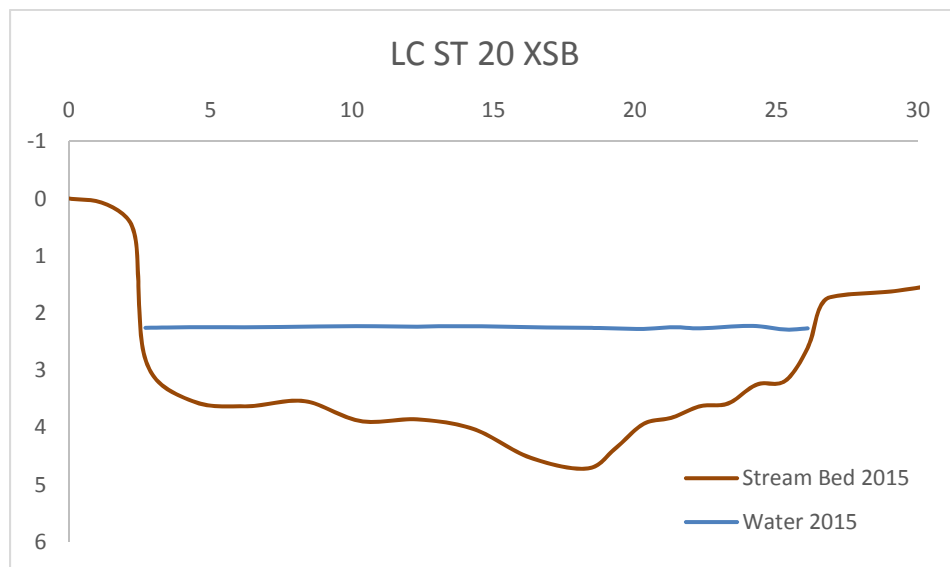
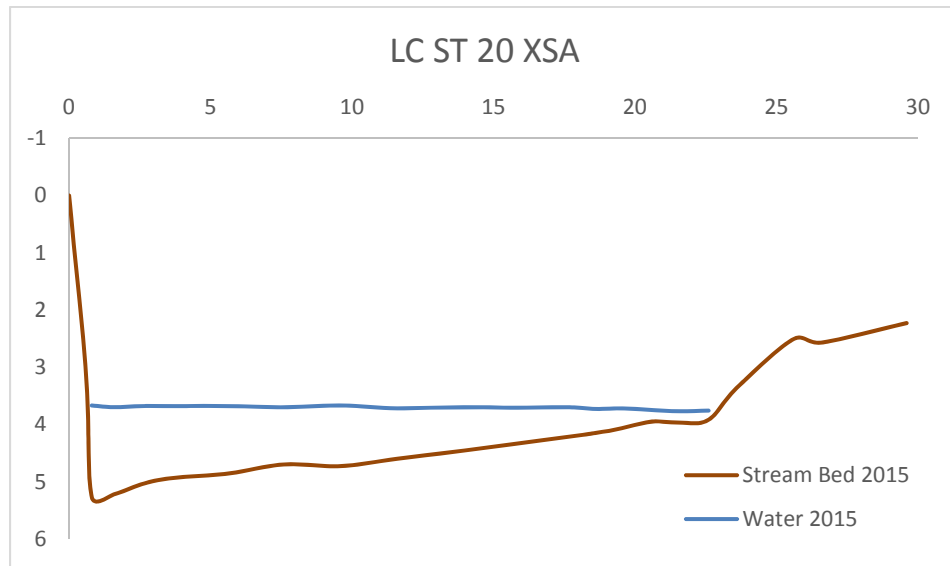
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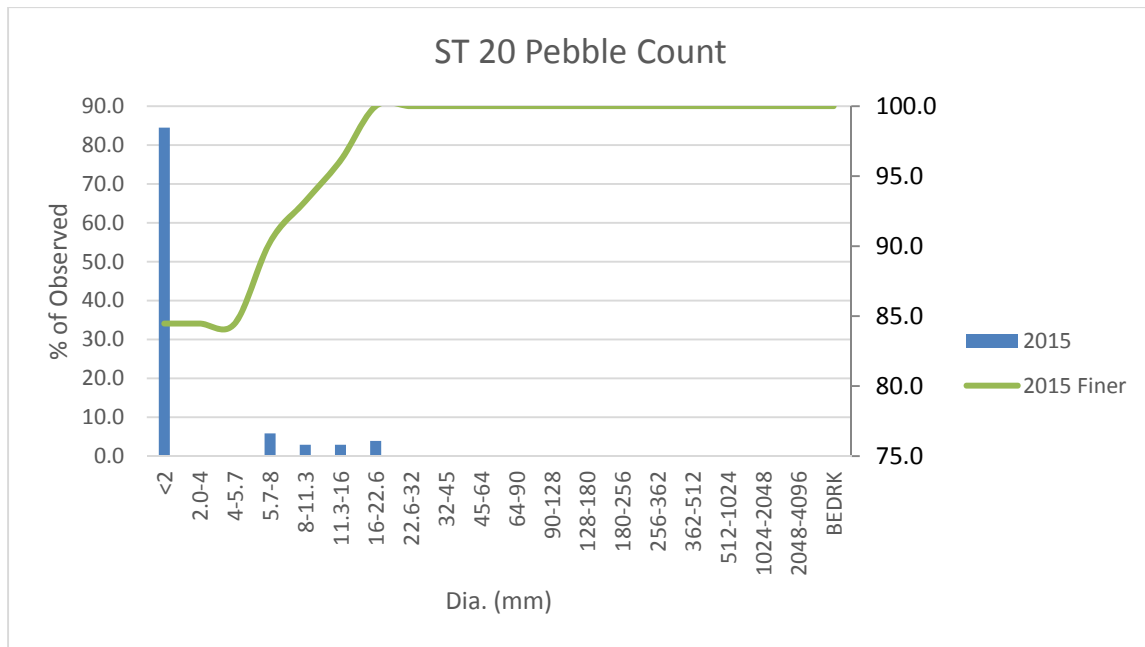




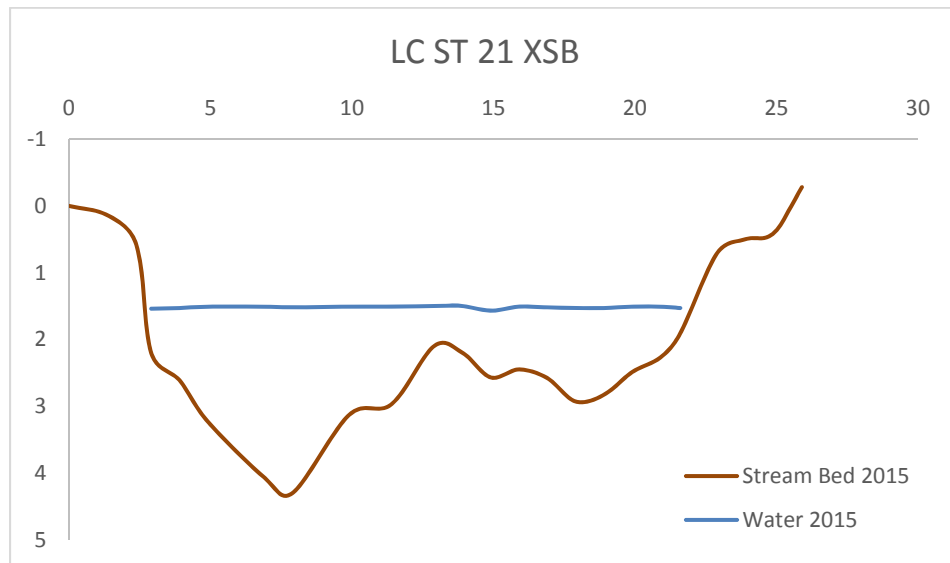
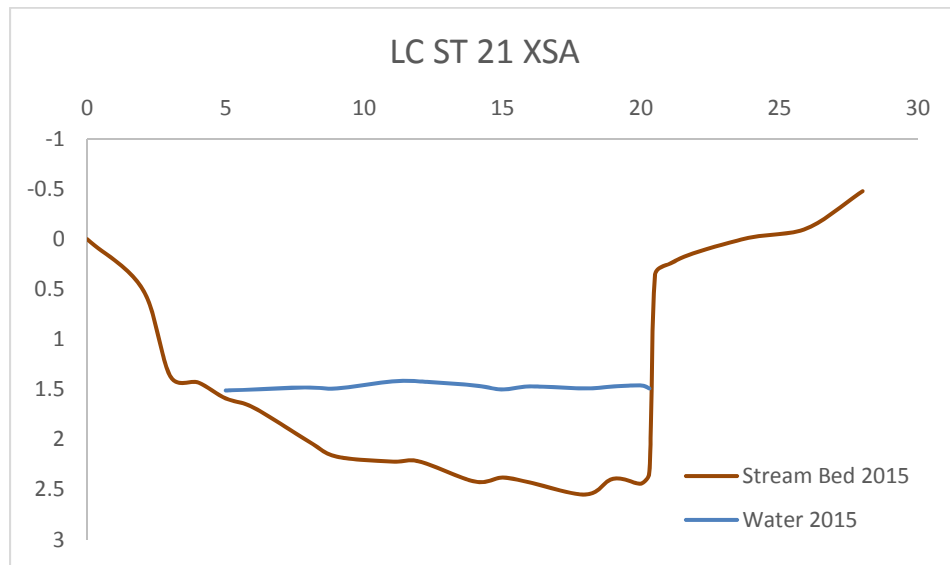


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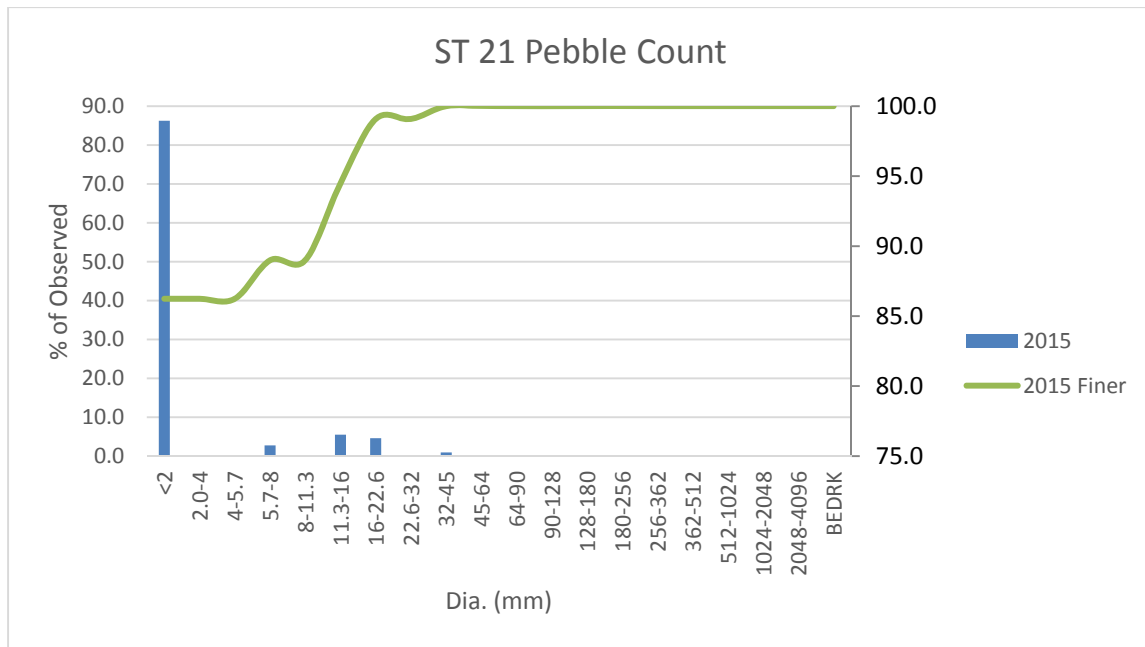




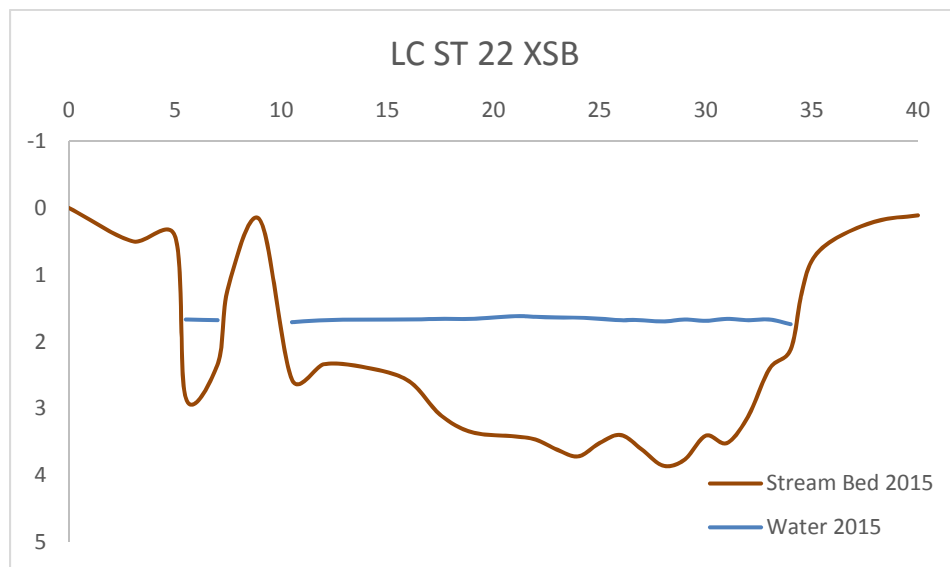
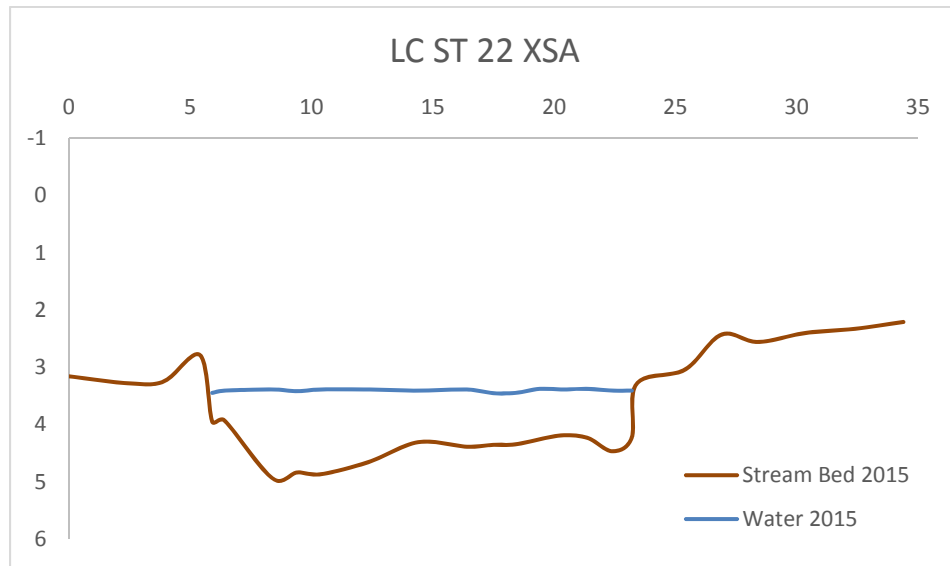
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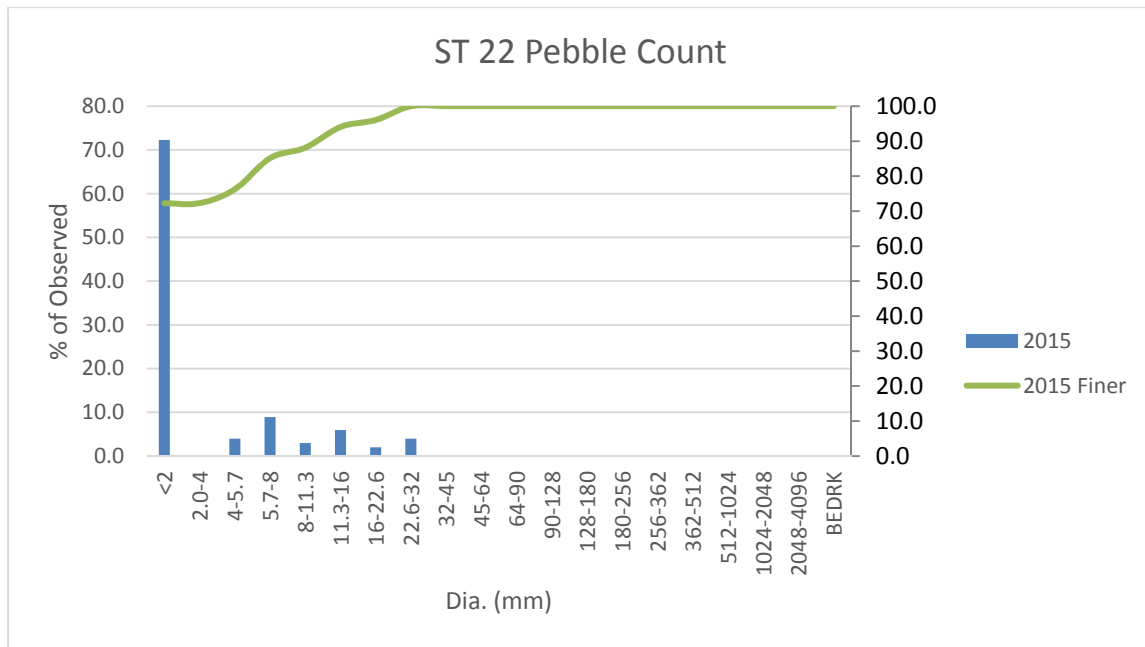






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