# Lewis River Aquatic Fund Projects (SA 7.5.3.2)
# Project Closeout Report

| | |
|---|---|
| **Project Title:** | **Lewis River Hydroelectric Project**<br>**Cedar Creek Reach 1A Restoration** |
| **Project Approved By:** | Aquatic Coordination Committee<br>March 27, 2013 |
| **Original Project Sponsor:** | Lower Columbia Fish Enhancement Group |
| **Project Funding** | Aquatic Coordination Committee<br>- $53,000 + $12,931.00 (insurance expense)<br>- |
| **Project Description (work completed):** | • Installed 150+ pieces of large wood in stream channel<br>• Installed 15+ logjams<br>• Installed 4 floodplain roughness logs<br>• Excavated a 100' long alcove rearing channel<br>• Re-directed perennial tributary to increase habitat function<br>• Removed/ controlled 2 acres of invasive non-native vegetation<br>• Installed 2,000 native trees and shrubs<br>• Installed boater safety sign upstream of project site |
| **Workforce:**<br>o **Personnel (by craft)**<br>o **Contractors:** | • Bill Norris, P.E. Interfluve<br>• Peter Barber, LCFEG Project Manager<br>• Tony Meyer, LCFEG Project Oversight<br>• Tammy Weisman, LCFEG Billing<br>• Glen Saastad, LCFEG Crew Supervisor<br>• WA DOC and Cowlitz County Offender crew labor<br>• Kysar-Koistenen, contractor |
| **Schedule Summary:** | Planned Completion Date: October – December 2015<br>Actual Completion Date: October 2015 |
| **Problems Encountered:** | • Permitting delayed construction, had to acquire extension of in water work window. Otherwise no problems encountered. |
| **Things that went well:** | • Piling were easy to install<br>• Pool/ riffle sequences formed as desired<br>• Fish responded as desired<br>• High potential for 2nd phase to restore entire reach. |
| **Work Not Completed:** | • N/A; all tasks completed |

**Lessons Learned:**

- Installing piling was easier than anticipated indicating un-embedded substrate conditions.
- A second phase of restoration is necessary to restore natural land forms and channel conditions in the project reach. Currently channel conditions are degraded by historical log drives, sediment deposition and remnants of a channel spanning concrete dam. The deposition of fine sediments on top of coarse sediments significantly reduces habitat function including ground water upwelling, formation of a braided multi-thread channel and native riparian plant succession.

*** Attachments (Photo Documentation):**

- See attached as-builts

*(<u>Per National Marine Fisheries Service's Biological Opinion for Relicensing of the Lewis River Hydroelectric Projects):</u>

Identify process or methodology the project will include and provide photo documentation of habitat conditions at the project site **before, during, and after** project completion.

a. Include general views and close-ups showing details of the project and project area, including pre- and post-construction.
b. Label each photo with date, time, project name, photographer's name, and documentation of the subject activity.

Lower Columbia Fish Enhancement Group
Project: Cedar Creek Reach 1A Habitat Restoration Project
**Planting Plan**
Updated: 10/2/2015

**Background:**

This project location acts as spawning grounds for chinook (Spring and Fall), coho, and steelhead and also hosts an established beaver population. By installing large woody debris (LWD) structures into the floodplain, we have increased the spawning capacity by creating refuge for adults in the scoured pools under the LWD structures and by re-establishing natural gravel migration patterns. Beaver also utilize the structures for protection from predators and to assist them in building dams. LCFEG has observed both of these activities at this site. By planting shrubby plant species, we can quickly increase the amount of cover for spawning and rearing salmonids as well as provide browse and structural material for beaver to forage on and build their dams.

**Planting Approach:**

LCFEG has planted about 2,000 native shrubs comprised of about 70% willow (*Salix spp*.), 20% red-osier dogwood (*Cornus stolonifera)*, and 5% Pacific ninebark (*Physocarpus capitatus)*. These shrubs were planted in larger pockets between the LWD structures along the creek bank and in a few smaller pockets closer to the toe of the southern slope. The larger pockets will provide cover for fish, forage and structure for beaver, and help stabilize the soft, sandy sediments along the banks of Cedar Creek. The smaller pockets will act as islands of established shrubby vegetation that beaver will have to seek out. These islands were strategically chosen based on soil conditions and likelihood of success.

**Planting Plan Maps:**


*Figure 1: Aerial Image of site from 4/17/2015 showing LWD structures*

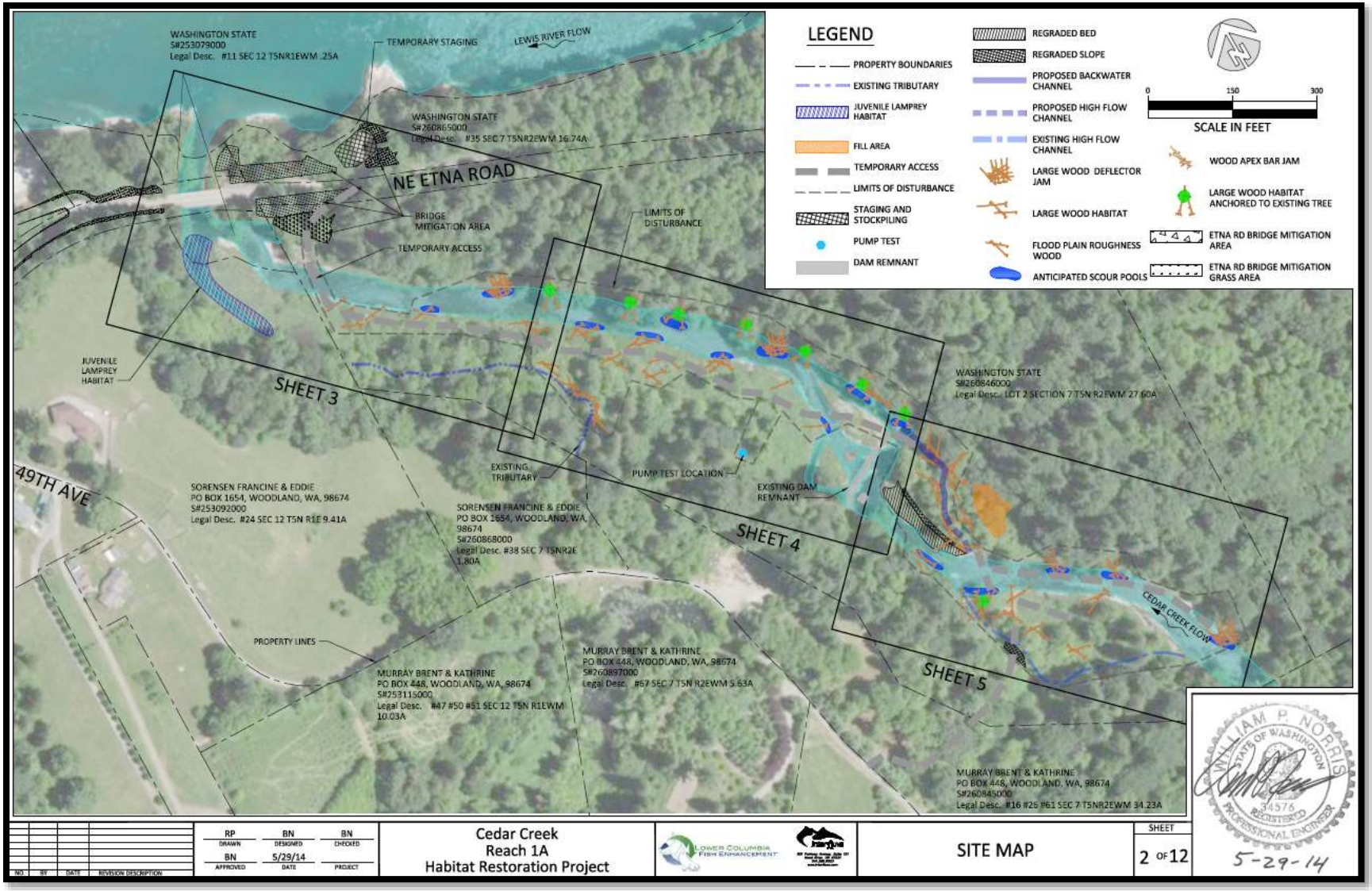



*Figure 2: Design plans from engineer*

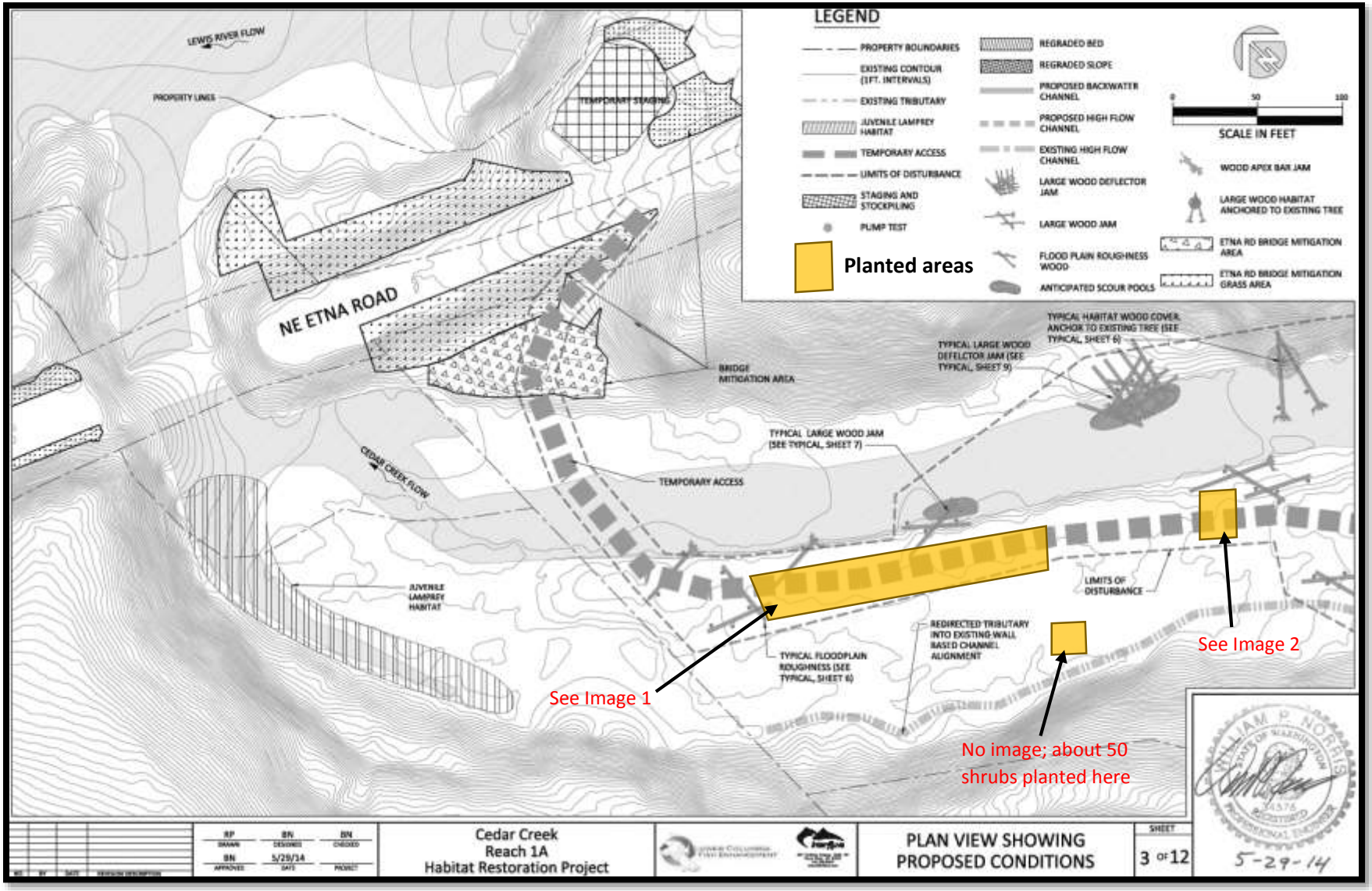



*Figure 3: Proposed LWD placement with **actual** planting areas*

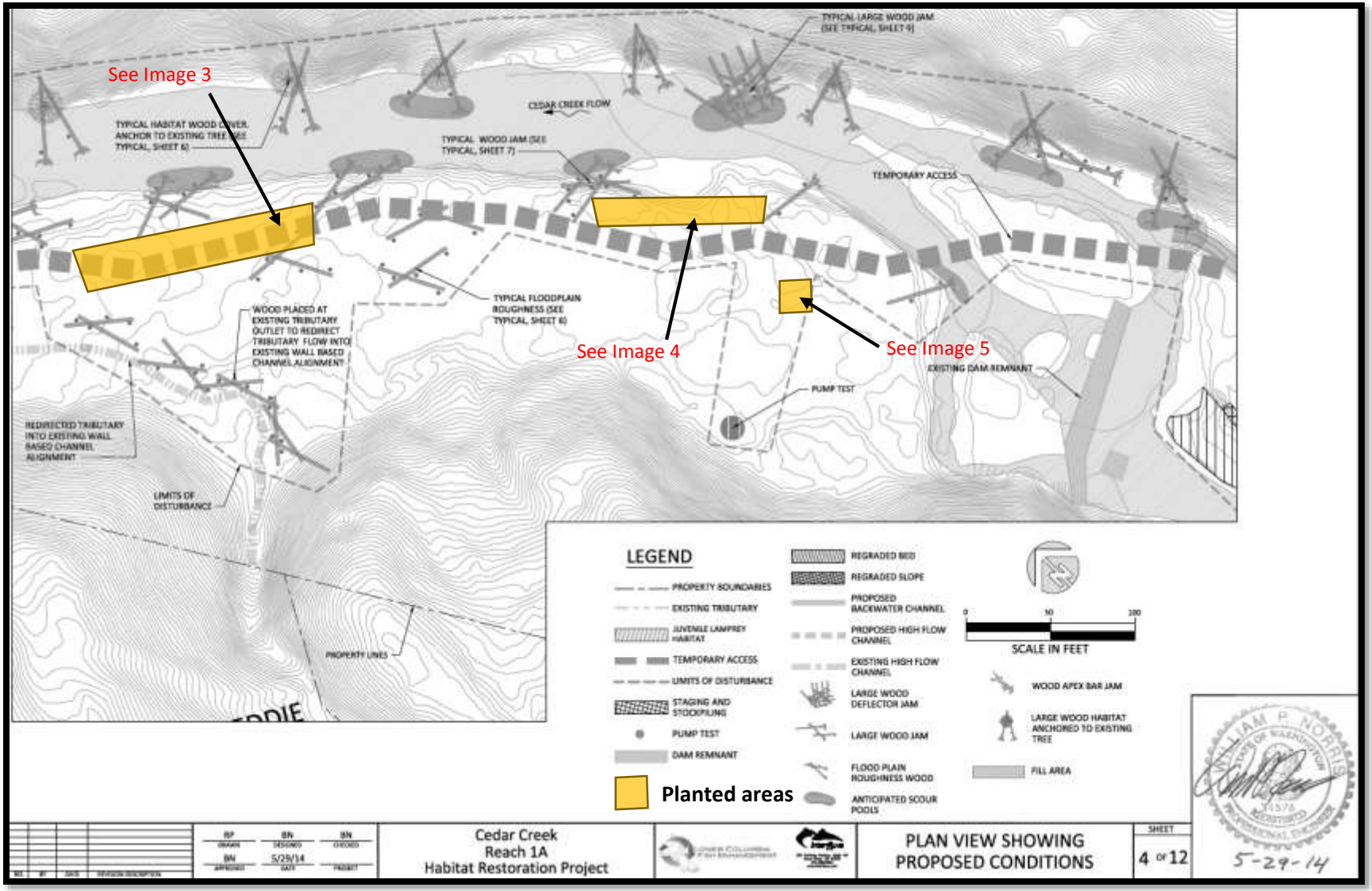



*Figure 4: Proposed LWD placement with **actual** planting areas*

*Image 1: Furthest downstream planting area (~750 willow, dogwood, and ninebark)*

*Image 2: ~50 Red-Osier dogwood planted in the shade of an Alder*

*Image 3: ~750 shrubs including willow spp., dogwood, and ninebark*

*Image 4: ~350 shrubs comprised of willow spp., dogwood, and ninebark*

*Image 5: Small plot of about 50 shrubs including dogwood and willow*

# As-Built and ground photos for Lower Cedar Creek Restoration project 12-1170

This project is located on WDFW property, was funded by Salmon Recovery Funding Board, designed by Bill Norris, P.E. Interfluve and constructed by Kysar-Koistenen in late summer 2014. The project goal was to increase access between the mainstem NF Lewis and lower Cedar creek, and to increase spawning and rearing habitat for multiple salmonid species including spring and fall Chinook, coho, chum, cutthroat and steelhead. Pacific lamprey juveniles are present within the project area which excluded the lower portion of the site in order to protect their habitat. USFWS personnel reviewed the design prior to construction to insure construction would not impact the lamprey ammocetes or their habitat.

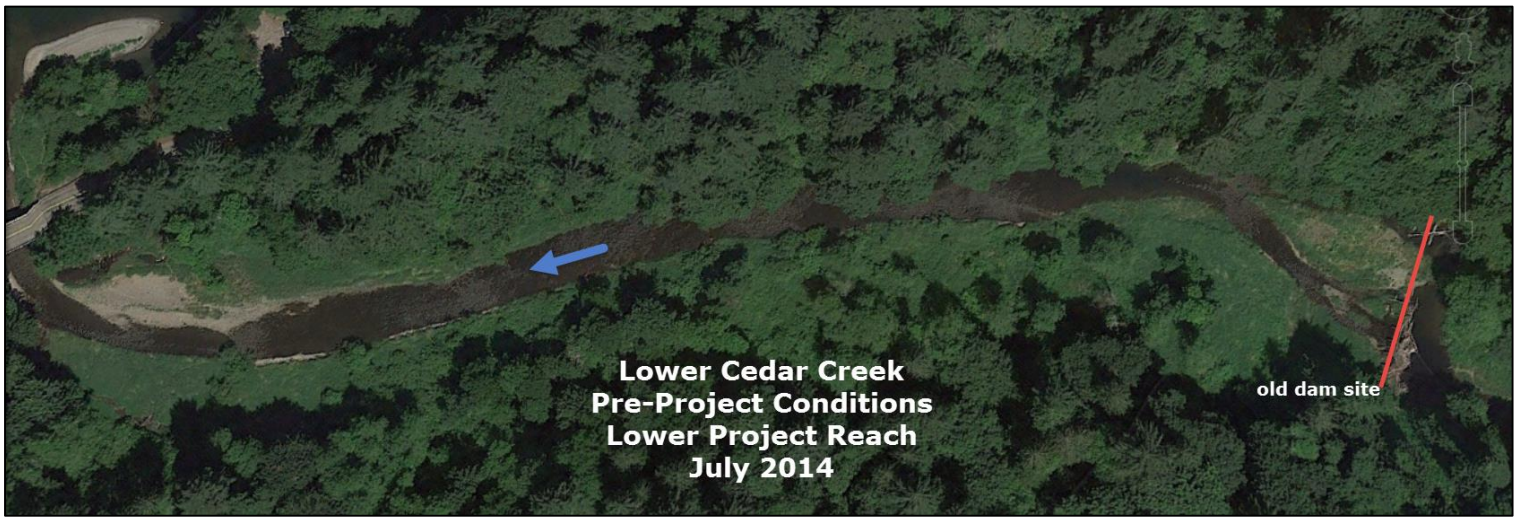
The design of the project entailed use of large wood to create a mosaic of structures placed on the stream bed, stream banks and floodplain. Construction over sight was completed by LCFEG project manager Peter Barber and Interfluve engineer Bill Norris. The project design included more elements than we had funds available to complete. The as-built shows which elements were constructed, which were not and a brief note explaining why changes occurred to the design. Changes to the design were approved by the project engineer during construction. A boater safety sign was installed several hundred yards upstream of the upper most structure to warn boaters of the wood structures obstructing the channel.

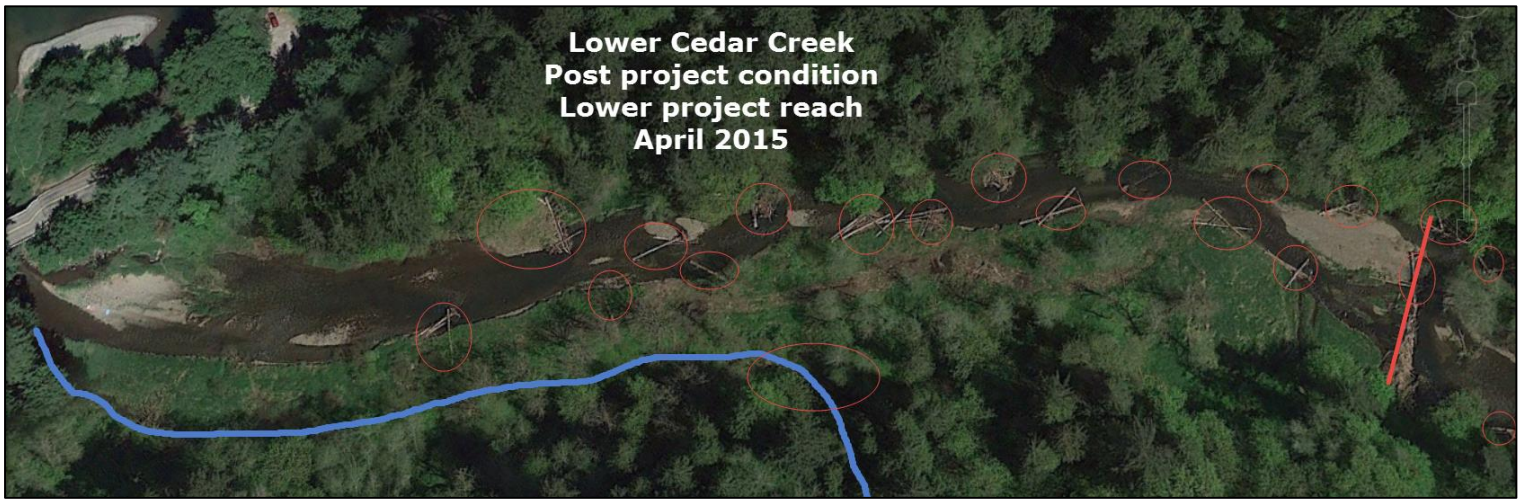
The project installed hundreds of pieces of wood resulting in significant sediment sorting in 2,200' of channel. New pools were scoured out and the coarse sediments created new bars all the way downstream to Lewis River. The structures also instigated significant lateral movement into the relic floodplain surface which was created as a result of a dam and fine sediments deposited during the log drive era. This floodplain terrace is perched above the water level approximately 6' and is vegetated in reed canary grass, Himalayan blackberry and Japanese knotweed along with patches of native alder, maple, cedar, willow and dogwood. LCFEG installed 2,000 native potted shrubs and trees on this terrace to re-vegetate areas disturbed by construction. See riparian as-built uploaded to PRISM.

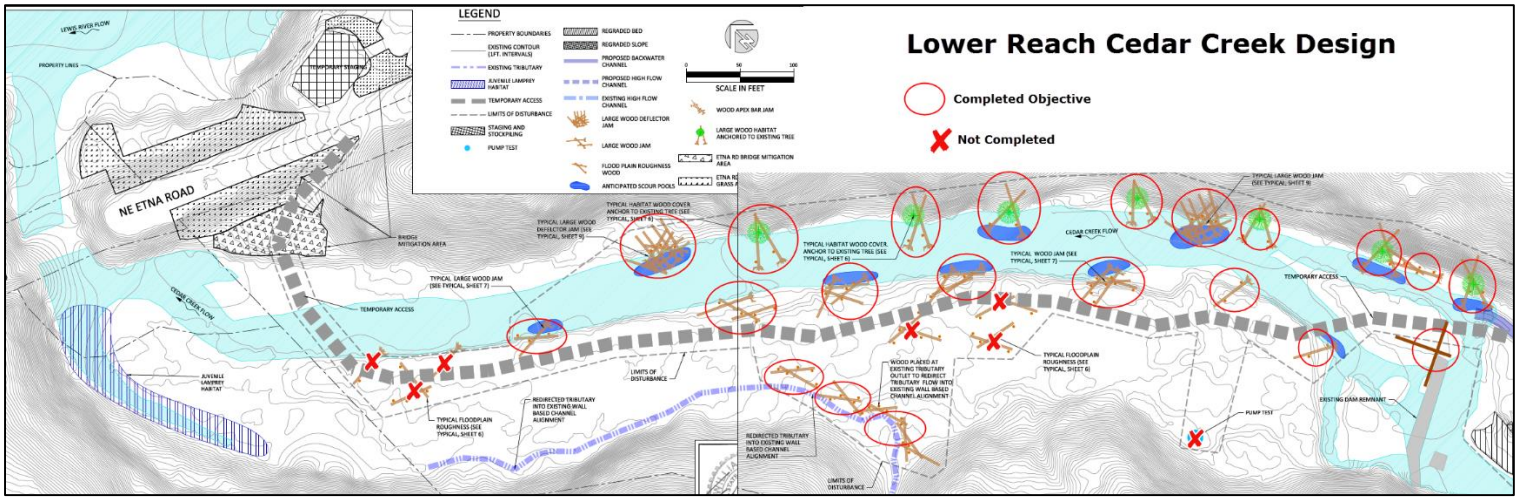
Lateral migration (erosion) has revealed a significant deposit of coarse gravels under the relic floodplain terrace which we believe should be exposed as they represent a much higher opportunity to improve salmon habitat. Additional wood structures could be installed to accelerate erosion of the fine sediments and over time create a braided channel network composed of deep pools and extensive spawning areas. This would potentially increase both chum and Chinook spawning success as well as steelhead, coho and cutthroat rearing success. In addition, removal of all or a portion of the relic concrete dam would also increase desirable erosion at the upstream end of the perched terrace and restore a more natural floodplain function.

In 2015, during the peak of the drought in mid-August, water conditions were extremely low and very warm. Despite these poor water conditions LCFEG staff was able to document extensive numbers of juvenile coho salmon using the new pools. Adult spring and fall Chinook and coho are spawning in the new gravel bars that have formed in response to new hydraulic conditions. We anticipate additional changes will occur over the next few years in response to changed hydraulic conditions in the project area. These changes should be purposely accelerated to instigate removal of the relic terrace and formation of a braided channel network that maximizes spawning and rearing habitat for use by multiple salmon and steelhead populations.

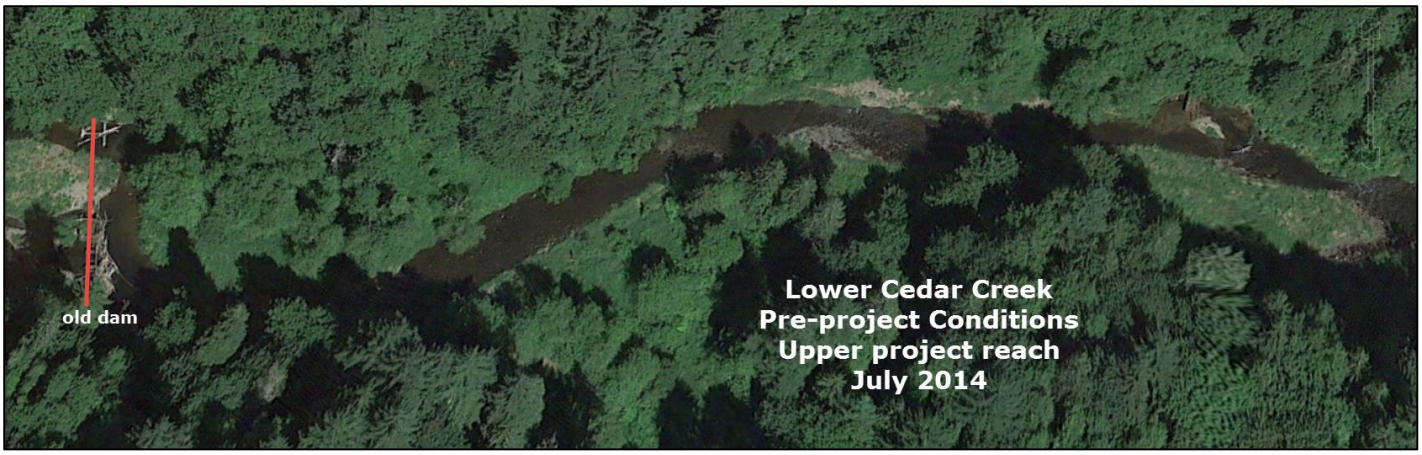
AS-BUILT



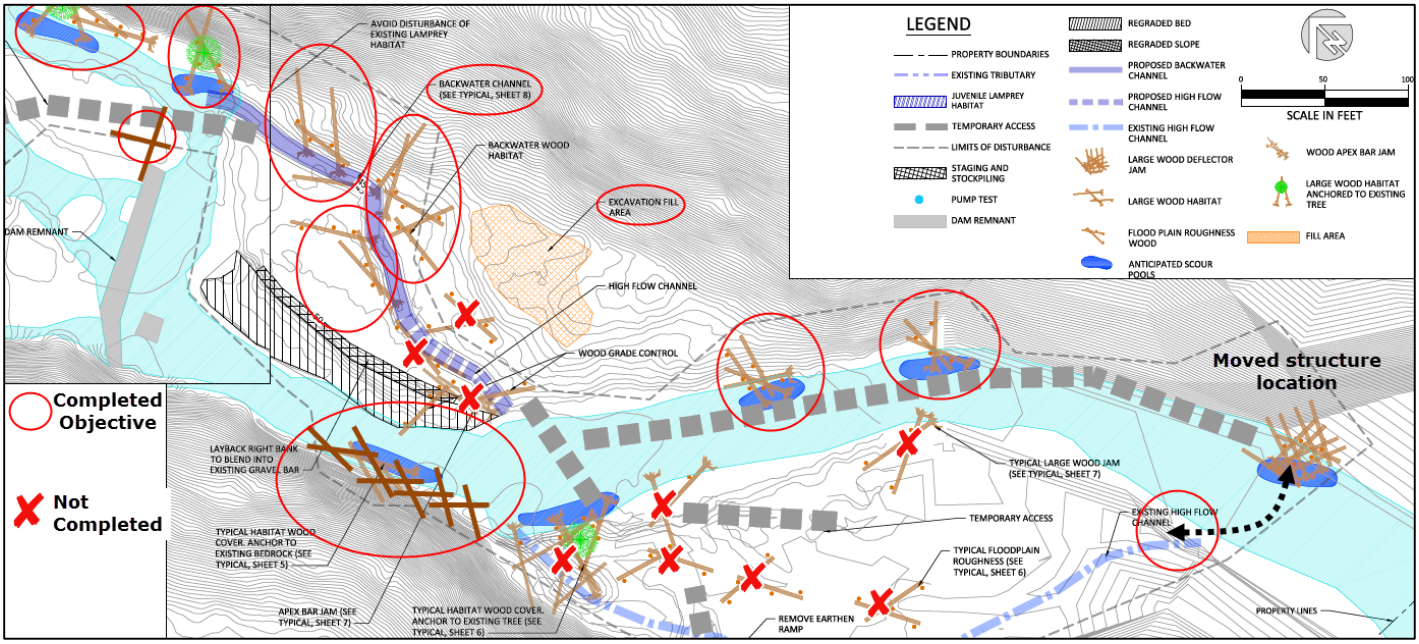




- Deleted floodplain roughness wood due to cost
- Added 1 log on end of dam to direct flow, added 1 root-wad to increase scour
- Deleted lower left bank structures due to concern with lamprey habitat
- Did not complete pump test due to cost, vegetation impact and low likelihood of future need








Lower Reach- Cedar Creek Design

- Deleted floodplain roughness logs due to cost and level of disturbance to floodplain
- Deleted 3 left bank instream structures due to cost & boater safety concerns
- Added logs to lower left bank structure and dam
- Added boater beware sign upstream of project

Pre Project Photos

Upper project site at OHW view u/s

Lower project area at OHW, view d/s

Pre & Post Project Photos

Note formation of new mid-channel bar

LWD significantly increased hydraulic complexity, note lateral channel expansion

Pre & Post Project view d/s

Summer 2014

Spring 2015

Excellent spawning and rearing habitat, diverse seasonal flow conditions

View downstream at OHW and OLW

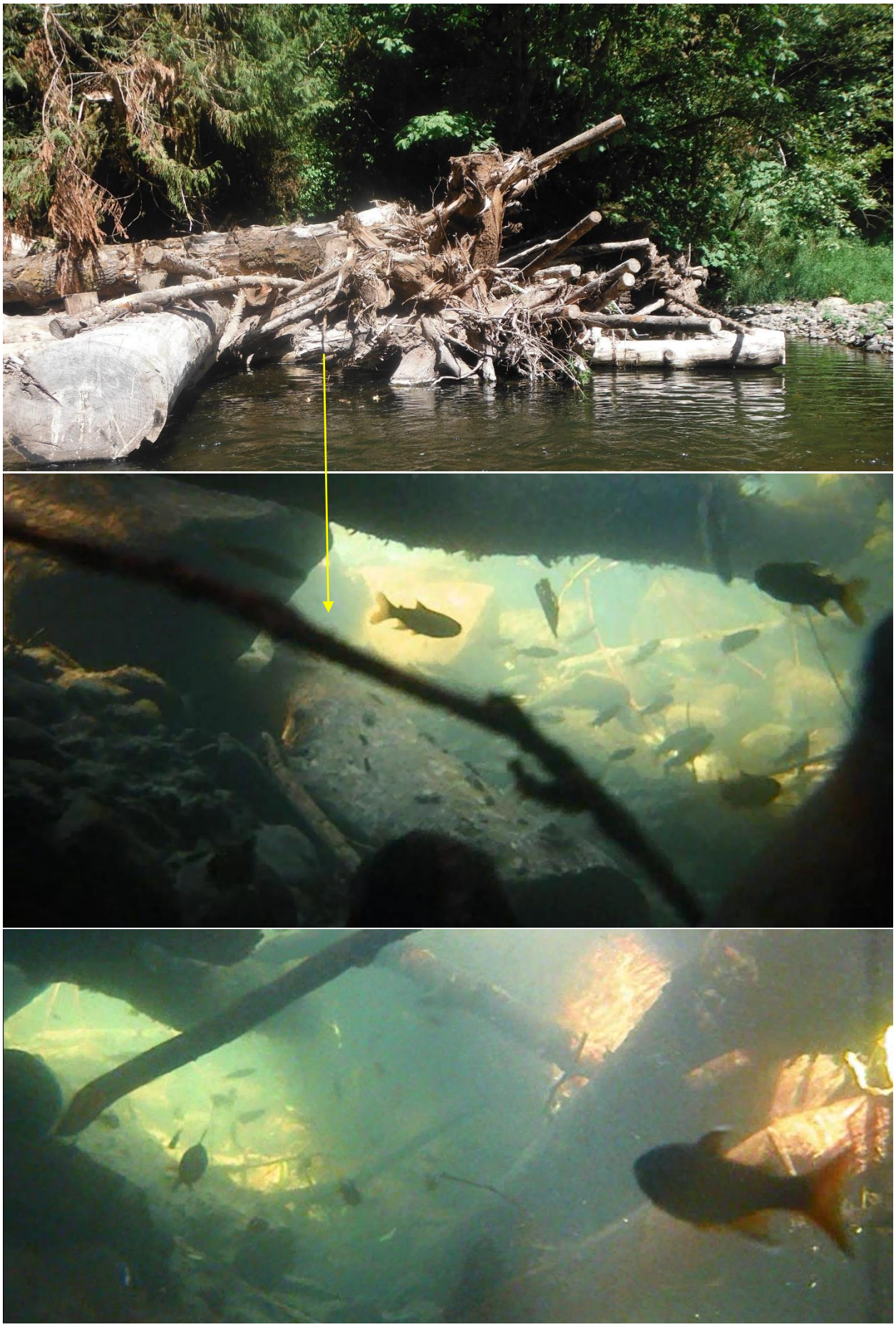
Alcove rearing pond contains juvenile salmon, lamprey and beaver

Checking post project pool depth

Fall Chinook and coho observed spawning on 10-19-2015

Spawned out Chinook

Spawning Chinook



Even with extreme (75F) warm water conditions in lower Cedar creek in 2015 we found large numbers of juvenile salmonids in the pools under the log jams. Water temperatures are lower in the pools due to heavy shade and hyporeic/ ground water upwelling.