Asotin Creek Intensively Monitored Watershed:
Summary of Monitoring October 1, 2015 – August 1, 2016
Progress Report: 15-1443
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Introduction

The Asotin Creek Intensively Monitored Watershed (IMW) is located in southeast Washington and began in 2008. The Asotin Creek IMW is determining the effectiveness of large woody debris treatments at increasing the productivity and capacity of Snake River Evolutionary Significant Unit (ESU) naturally reproducing steelhead. Asotin Creek is a tributary of the Snake River within the Columbia Plateau and Blue Mountains level III ecoregions. The area is dominated by deep narrow canyons cut into underlying basalt lithology and surrounded by semi-arid sagebrush steppe and grasslands at lower elevations and open conifer dominated forests at higher elevations (Figure 1). Monitoring and restoration is taking place in the lower 12 km of three study streams (Charley, North Fork, and South Fork Creeks) – total study area length 36 km (Figure 2). Pre-treatment monitoring has been conducted from 2008 to 2012. Post-treatment monitoring is ongoing and expected to run until at least 2019. Restoration treatments began in 2012 and will be finalized by September 2016. One 4 km long treatment section was treated in each study stream (2012-2014). Large wood was added mostly by hand using a method called high density large woody debris ($_{HD}$LWD) whereby many small wood structures are built using woody debris held in place by wooden posts driven into the stream bottom. These wood structures are called post-assisted log structures (PALS). We are currently implementing one final ~ 2 km treatment in South Fork Creek and once complete approximately 700 PALS will have been built in the study area. Upon completion of the 2016 restoration, 14 km (39%) of the study area will be treated with 22 km remaining as control areas. The following is a progress report for the period October 1, 2015 to August 1, 2016.

- **Monitoring**
  - We PIT tagged a total of 5,211 juvenile steelhead in the fall (September and October) of 2015 and the summer (July) of 2016 at the 12 permanent sites (four in each study stream). We have analyzed these data and now have a time series of abundance, growth, and survival from 2008-2016 and will be continuing to work to on assessing the effectiveness of restoration actions.
  - We conducted mobile PIT tag surveys at all 12 fish sites in the winter of 2016 (December and January) and spring of 2016 (March and April) to allow the calculation on seasonal survival at each fish site.

- We maintained and downloaded two IMW water height gages and loaded these data into an IMW discharge database for use in analysis of habitat use and movement of both adult and juvenile steelhead.
- We downloaded ~ 25 temperature loggers and loaded these data into an IMW temperature database. Temperature data collected at each CHAMP habitat site is also uploaded to champmonitoring.org.
- PIT tag interrogation sites at the town of Asotin, Cloverland Bridge, the confluence of North Fork and South Fork Asotin Creeks, and Charley Creek were maintained with the assistance of WDFW under a separate contract with RCO but supported by IMW funds.
- We uploaded all PIT tag detections to PIT Tag Information System (PTAGIS).
- We completed our annual effectiveness monitoring of large woody debris (LWD) structures using customized IPad applications (~ 550 large woody debris structures total). All three existing 4 km long treatment areas were visited and each structure was assessed for its effect on hydraulic and geomorphic conditions (Figure 3 and 4).

- **Coordination, Planning, and Analysis**
  - We coordinated with WDFW and Snake River Salmon Recovery Board (SRSRB) on all aspects of the IMW
  - We assisted SRSRB in the Expert Panel process as it related to Asotin Creek.
  - We maintained and managed databases for stream discharge, water temperature, fish capture and detection, and habitat surveys throughout the reporting period.
  - We completed a revised study plan for review by the Salmon Recovery Funding Board Monitoring Panel
  - We updated our analyses of juvenile steelhead survival by age class using the Barker model from 2008-2016. The current model allows the estimation of survival by age class, year, season, stream, and site pre and post restoration.
  - We developed a database to calculate the efficiency of each PIT tag antenna array in the IMW study area to allow us to estimate the number of juvenile and smolt migrants from each restoration and control area throughout the life of the project
  - We filled in the data gaps in our array efficiency, discharge and temperature databases caused by periodic loss of data loggers using regression analyses to aid in identification of factors related to changes in juvenile abundance, growth, movement, survival, and production.
  - We have planned, coordinated, designed, and began implementing the final LWD restoration treatment on the South Fork Asotin Creek and expect to complete implementation by mid-August 2016.

- **Upcoming Work**
    - We are preparing to conduct the Columbia Habitat Monitoring Protocol (CHaMP) at 12-14 sites this summer. These sites are within the fish sites mentioned above to allow us to determine the effect of various habitat variables on fish abundance, growth, movement, survival, and production. All the habitat data will be QAQC'd and loaded to champmonitoring.org.
    - Fall PIT tag surveys in late September and early October
    - Winter and spring mobile PIT tag surveys to allow us to calculate survival during these seasons. Mobile surveys are conducted at all 12 fish monitoring sites.
    - Updated abundance, growth, movement, survival, and production analyses including modeling the effectiveness of restoration actions and identification of causal mechanisms.
    - Ongoing coordination and project management.
    - Summary report of the post-treatment results will be prepared.

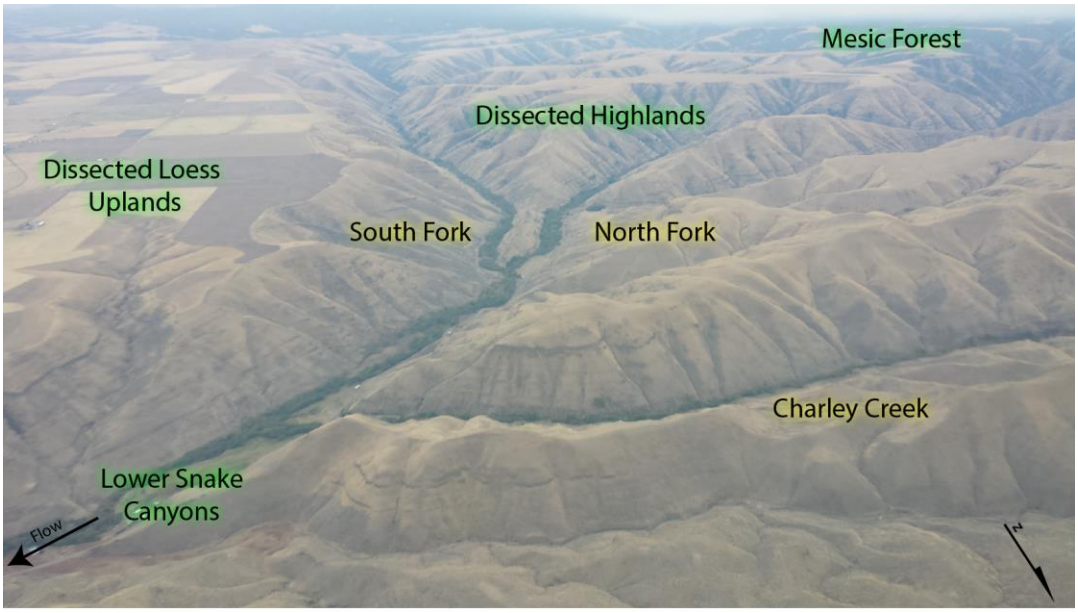

Figure 1. Aerial photo of the IMW study area showing Charley, North Fork and South Fork Asotin Creek.

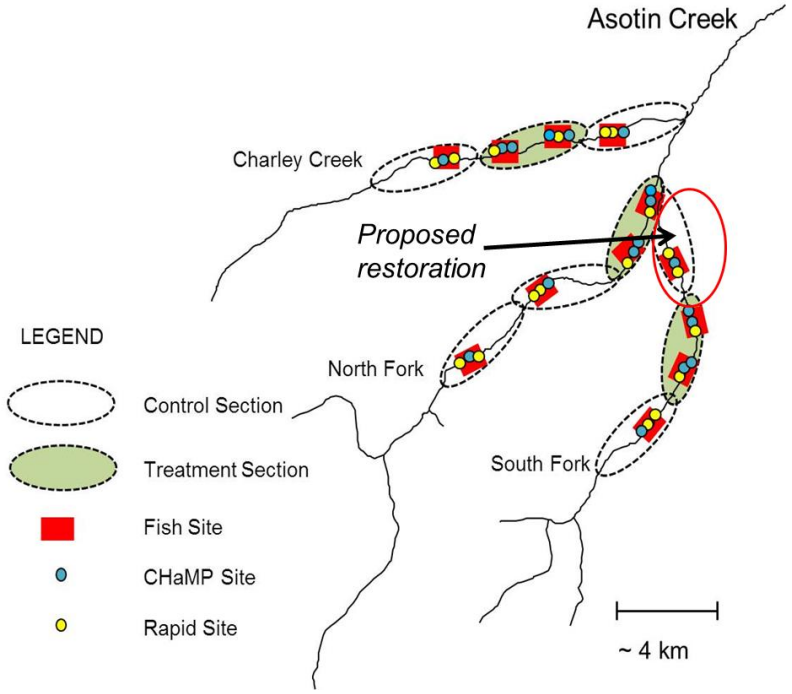

Figure 2. Location of Asotin Creek Intensively Monitored Watershed study creeks, treatment and control sections, restoration locations, and fish and habitat monitoring sites.

a) South Fork Asotin Creek, bank-attached PALS

b) Charley Creek, mid-channel PALS.

c) North Fork Asotin Creek, debris jam PALS.

Figure 3. Examples of the restoration treatment using post-assisted log structures (PALS) installed in a) South Fork (197 structures in 2012), b) Charley Creek (208 structures in 2013), and c) North Fork (135 structures in 2014) to simulate natural large woody debris loading. Approximately 120 new PALS will be built in the summer of 2016 on the lower section of South Fork Asotin Creek to complete the large woody debris restoration.

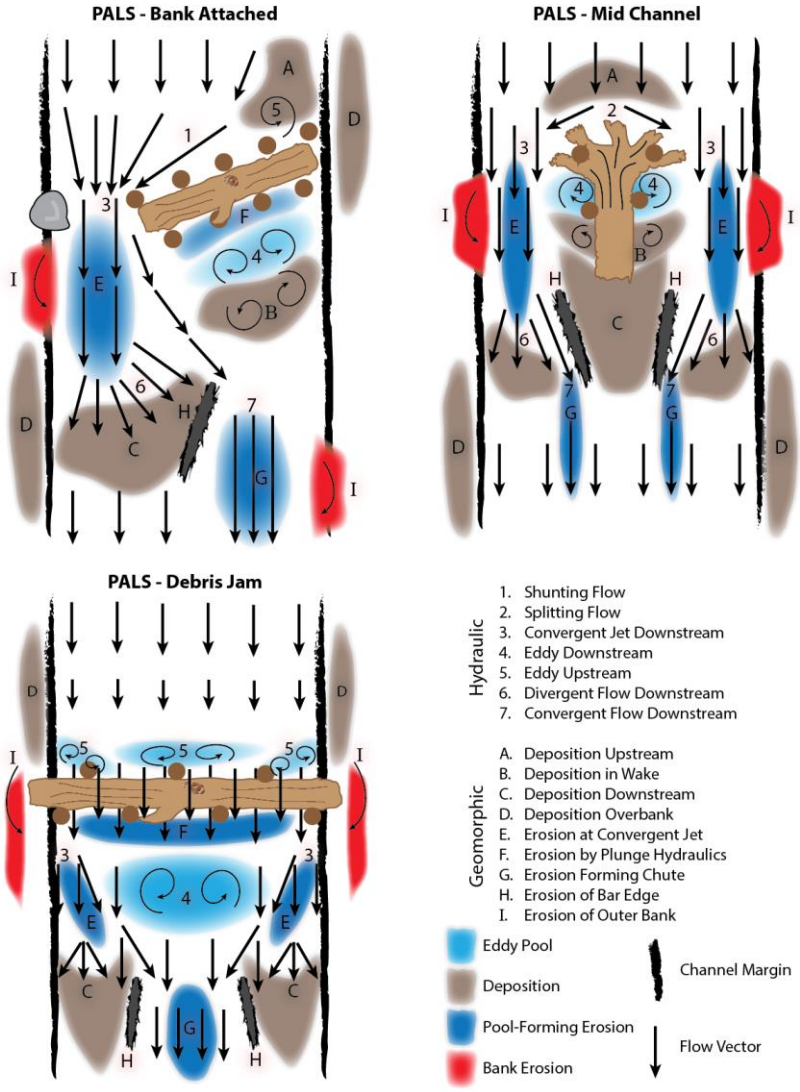

Figure 4. Design hypotheses for the three main post-assisted log structures built in the Asotin IMW.