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**THE ISSUE** Throughout the Columbia Watershed, habitat for steelhead trout has been simplified and degraded. In streams where high volumes and densities of large woody debris (LWD) once forced numerous pools and bars and provided critical predation and energy refugia, highly simplified channels dominated by armored substrate and homogenous planebeds are now the norm. Although restoration efforts for the past thirty years have focused on adding LWD back into streams to promote complexity, many of these efforts are over-engineered, lack an appreciation of fluvial processes that recruit and rework wood in streams, and are so expensive that only short reaches (i.e. <0.5 km) are typically treated. Given the threats limiting steelhead production, the widespread simplification and degradation of their habitats, and the chronically low levels of LWD left in these streams we urgently need more cost-effective ways of getting LWD back in streams and letting the streams do the work to maintain these conditions.



### BACKGROUND



The Asotin Intensively Monitored Watershed (IMW) in the southeastern corner of Washington (Map 1) is part of a larger group of IMWs throughout the Pacific Northwest with the broader goal of testing the effectiveness of stream restoration at increasing the production of salmon and steelhead. Data gathered from the Asotin IMW will be used to improve planning and implementation of restoration in other similar watersheds. We are adding high densities of large woody debris (hdLWD) to tributaries of Asotin Creek because wood can help create pools and other habitats required by salmon and steelhead. Since 2008, 400 LWD structures have been added within 12 km of stream length to maximize our ability to detect if the production of steelhead increases. The project will run through 2018 and involve a total of 600 LWD structures to capture the life cycle of several generations of steelhead.

### APPROACH

We are using a non-invasive, inexpensive method to add wood at high densities to Asotin Creek. Logs and branches left over from nearby timber harvest operations are being placed in the creek and temporarily held in place with wooden fence posts that are driven into the streambed with a hydraulic post driver (Figure 1). hdLWD structures are placed to invoke specific hydraulic and geomorphic responses, which carve forced pools, promote forced bars and build riffles. A high density of structures are built so that if a structure is mobilized by a flood, the LWD from that mobilized structure has a high probability of accumulating on other intact structures downstream, hence maintaining a high degree of habitat heterogeneity within the treatment reach. This restoration method also promotes regular exchanges with the adjacent riparian forest by creating new surfaces to be colonized by riparian vegetation and recruiting wood from the existing riparian forest.

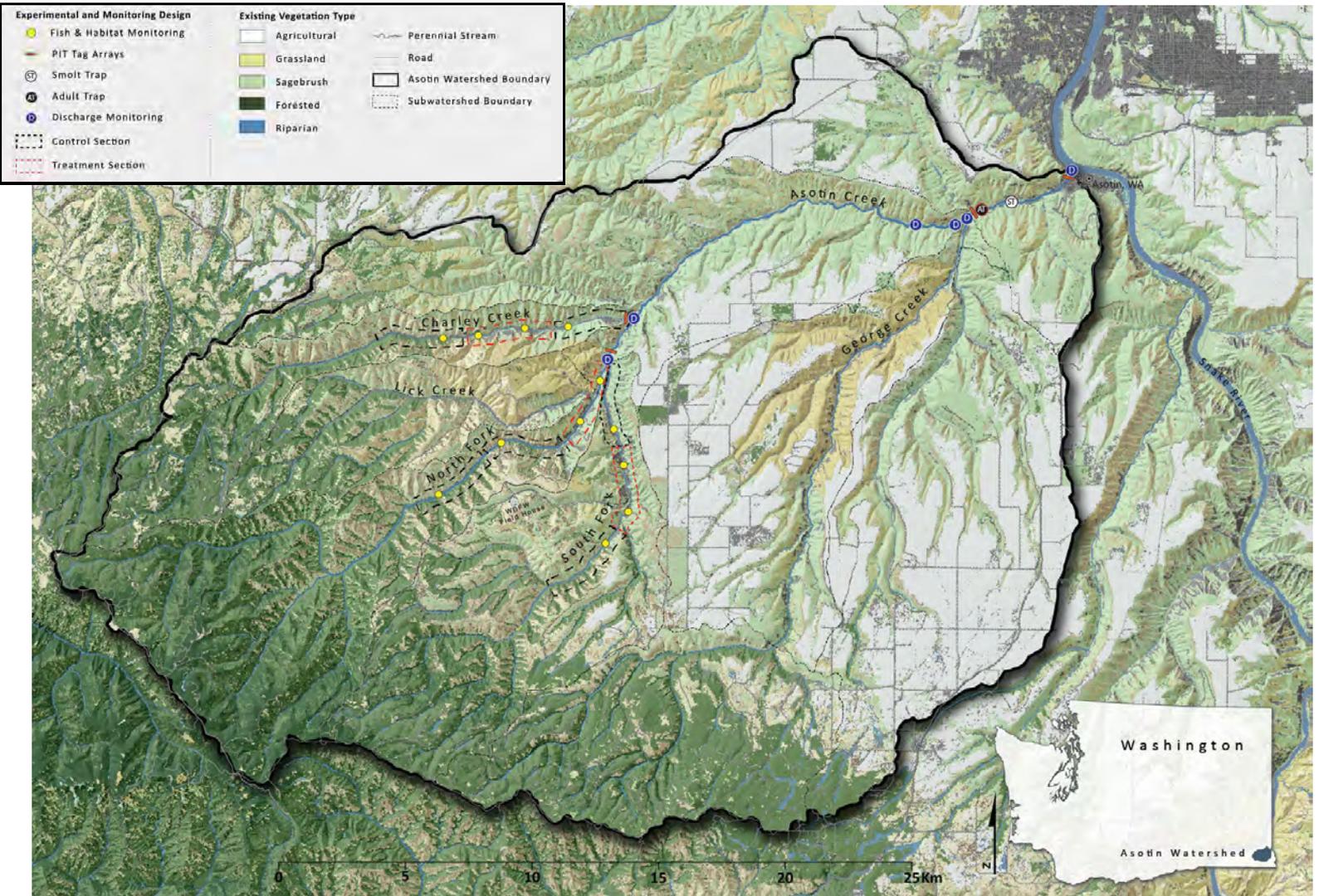
### KEY QUESTIONS

- Can we develop inexpensive techniques for getting hdLWD back into these streams?
- Will restoring hdLWD in these streams kick start self-sustaining fluvial processes, which will maintain high-quality fish habitat and increase the production of wild steelhead?



Figure 1. Top Photos: Wooden posts are driven into the streambed to hold logs and branches in place long enough to create fish habitat. Bottom photo: Wood structures help to create new pools, fish cover, spawning areas, and resting places for steelhead and other species. Wood will naturally fall into the streams as the riparian forests bordering the creeks mature.

# Cheap & Cheerful Steelhead Restoration with HDLWD : Asotin Creek IMW



Map 1. A map of the fish and habitat monitoring locations in Charley Creek, North Fork, and South Fork Asotin Creek in the Asotin Watershed in southeastern Washington.

## RESULTS & DISCUSSION

After installing over 400 structures we have documented increases in pools, spawning areas, and fish cover. Observations during spring floods also indicate the structures are providing energy refugia for young steelhead to rest from fast water. Determining if restoration is increasing steelhead production in Asotin Creek has just begun and data will be reported annually from 2013 to 2018.

## TAKE AWAY

- HDLWD structures are a cheap alternative to traditional methods of installing LWD (e.g. engineered large woody debris) in streams and is cheerful in that it appears effective at invoking the desired physical habitat responses.
- Within a few flood events of adding LWD to Asotin Creek, the amount and the quality of pools, spawning areas, and fish cover have all significantly increased.
- Ongoing monitoring efforts will be compared with intensive monitoring of steelhead populations and habitat from five years prior to the restoration that began in 2008 to determine how steelhead production changes.

## FOR MORE INFORMATION:



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