

Columbia River Salmon and Steelhead Endorsement Recreational Anglers Board
Project Title: Lower Cowlitz River Tributary Resistance Board Weir Operation 2011-2015

Project Description/Objectives: Approximately 625,000 non-native summer steelhead smolts are released into the Cowlitz River annually. The Cowlitz River provides an extremely popular summer steelhead fishery and is considered one of the largest steelhead fisheries in the state. During 2010 through 2012, an average of 8,600 summer steelhead was harvested in the Cowlitz River. To maintain the current production levels, harvest rates should remain high and stray rates of adult fish onto spawning grounds need to be tightly controlled to keep summer steelhead from spawning with native steelhead listed under the Endangered Species Act (ESA). One method of controlling abundance of hatchery fish reaching spawning grounds is installing weirs in tributaries to capture, enumerate, and remove hatchery fish at weir sites thus minimizing interaction with wild fish. The original objective for these weirs was to exclude non-indigenous (Skamania stock) hatchery summer steelhead from straying into lower Cowlitz River tributaries and interacting (i.e., spawning and competing) with natural-origin winter steelhead. Once established, the weirs have served multiple purposes: monitoring and evaluation of fall Chinook salmon, coho salmon and steelhead, fish management (e.g., control proportion of hatchery-origin spawners), and brood stock collection (winter-run steelhead). Currently weirs are installed and operated in four major lower Cowlitz tributaries to accomplish these objectives: Olequa, Delameter, Lacamas, and Ostrander Creeks (Figure 1).

Methods: Resistance board weirs were operated on four tributaries to the lower Cowlitz River in 2013 (Figure 1). Once installed, weirs were operated daily twelve months of the year. Weir installation was completed: September 4, 2013 on Ostrander Creek (entering the Cowlitz River at RM 8.7), July 15, 2011 on Delameter Creek (entering the Cowlitz River at RM 16.6) , June 1, 2011 on Olequa Creek (entering the Cowlitz River at RM 29.8) , and December 20, 2013 on Lacamas Creek (entering the Cowlitz River at RM 27.6) . The Delameter and Olequa weirs were operated throughout the summer-run and winter-run steelhead return (spawn year 2013) and were used to make mark-recapture estimates of spawner abundance for this species. The Ostrander, Delameter, and Olequa weirs were operated throughout the coho salmon return (spawn year 2013) and were used to make mark-recapture estimates of spawner abundance for this species. After spawn year 2013, four weirs were used to: collect natural origin winter-run steelhead broodstock, make mark-recapture estimates of spawner abundance for summer-run steelhead, winter-run steelhead, and coho salmon, and estimate proportion of hatchery origin spawners (pHOS) for these species. Although a weir was originally installed on Salmon Creek in 2011, this weir was removed in July 2013 due to adverse flow regimes and unsuitable site conditions.

Weirs were installed at a location as low as practical in each tributary so that the majority of available spawning habitat was above the weir site. Weir locations were selected based on numerous criteria including accessibility, landowner agreement, stream width, hydrology, substrate, and streambed uniformity. Each weir was comprised of a series of joined panels

anchored to a substrate rail (Figure 2). The downstream end of each panel floats at the water surface due to resistance boards positioned perpendicular to the current and empty 55-gallon blue formalin barrels attached to the underside of the panels for additional buoyancy. Fish travelling upstream are guided along the substrate rail into a live box. A set of cod fingers contains the fish once they have entered the live box. Live fish travelling in a downstream direction were funneled into a downstream live box or seined from holding areas above the weir. Carcasses travelling in a downstream direction washed up on the weir panels and were removed for processing.

Weir traps were checked daily. All fish were identified to species. Biological data collected from salmonids included: fork length (FL), age (scale sample), sex (jack, male, female), run type (summer versus winter steelhead), mark status (adipose-clipped, unmarked), coded-wire tag status (positive, negative), and capture type (maiden, recapture). Jack coho were assigned when less than 47-cm FL (age data for validation were collected but have not yet been analyzed). A genetic sample (fin tissue) was collected from all steelhead. Tag status (floy tag numbers, opercle punch) was noted for recaptures. After processing, live salmonids were floy tagged (two tags with sequential numbers) and opercle punched to indicate that they had been sampled. Natural-origin fish (unmarked salmonids and all other species) were released in the direction of travel. Hatchery-origin fish (adipose-clipped salmonids) were returned to the creek downstream of the weir.

Data were entered into the Washington Department of Fish and Wildlife’s (WDFW) standardized Traps-Weirs-Surveys (TWS) Microsoft Access database used to archive all adult monitoring data for all lower Columbia tributaries. Ages were determined from scale samples by the WDFW Ageing Lab (Olympia, WA). Steelhead genetic samples were archived with the WDFW Genetics Lab (Olympia, WA).

Results:

Table 1: Weir Sampling Results to Date

Results of Maiden Captures on the Cowlitz River, August 2011 through July 2015.							
Weir	Hatchery Origin (downstream release)				Wild Origin (upstream release)		
	Summer Steelhead	Winter Steelhead	Fall Chinook	Coho	Winter Steelhead	Fall Chinook	Coho
Olequa Creek	1	35	4	33	202	20	772
Delameter Creek	3	25	8	31	282	12	521
Ostrander Creek ¹	1	26	11	20	99	8	182
Salmon Creek ²	0	2	0	5	5	1	42
Lacamas Creek ³	2	8	0	19	23	2	1278
Totals	7	96	22	108	611	43	2795

¹ Installed August 2013

² Removed July 2013

³ Installed December 2013

Economic, Angling, and Resource Benefits: The Cowlitz River steelhead sport fishery is very important economically to Lewis and Cowlitz counties and the State of Washington. This fishery provides significant benefit to local communities such as Longview, Kelso and Toledo along the Cowlitz River and also provides employment for a number of fishing guide services throughout the state. By controlling straying of hatchery steelhead onto native steelhead spawning grounds the present high level of production of hatchery steelhead can be maintained, which in turn will help maintain one of the largest tributary summer steelhead sport fisheries in the state. Genetic studies have shown the presence of a unique stock of wild steelhead in the lower Cowlitz River. Reducing the interaction of hatchery and wild steelhead on the spawning grounds will assist the recovery of ESA-listed steelhead in the lower Cowlitz River. From 2010 through 2012, an average of 86,000 angler trips generated a harvest of approximately 8,600 summer steelhead annually. The estimated minimum value of this fishery is \$4,988,000 per year (TCW 2008).

Summary/Conclusion: Resistance board weir operations on lower Cowlitz tributaries began in 2011 when WDFW was funded by the Columbia River Salmon and Steelhead Endorsement (CRSSE) fund to construct, install, and operate four resistance board weirs on select lower Cowlitz River tributaries. As of 2012, the operation and maintenance of the weirs were funded jointly by Tacoma Power and CRSSE (5 months and 7 months respectively) to operate weirs year around.

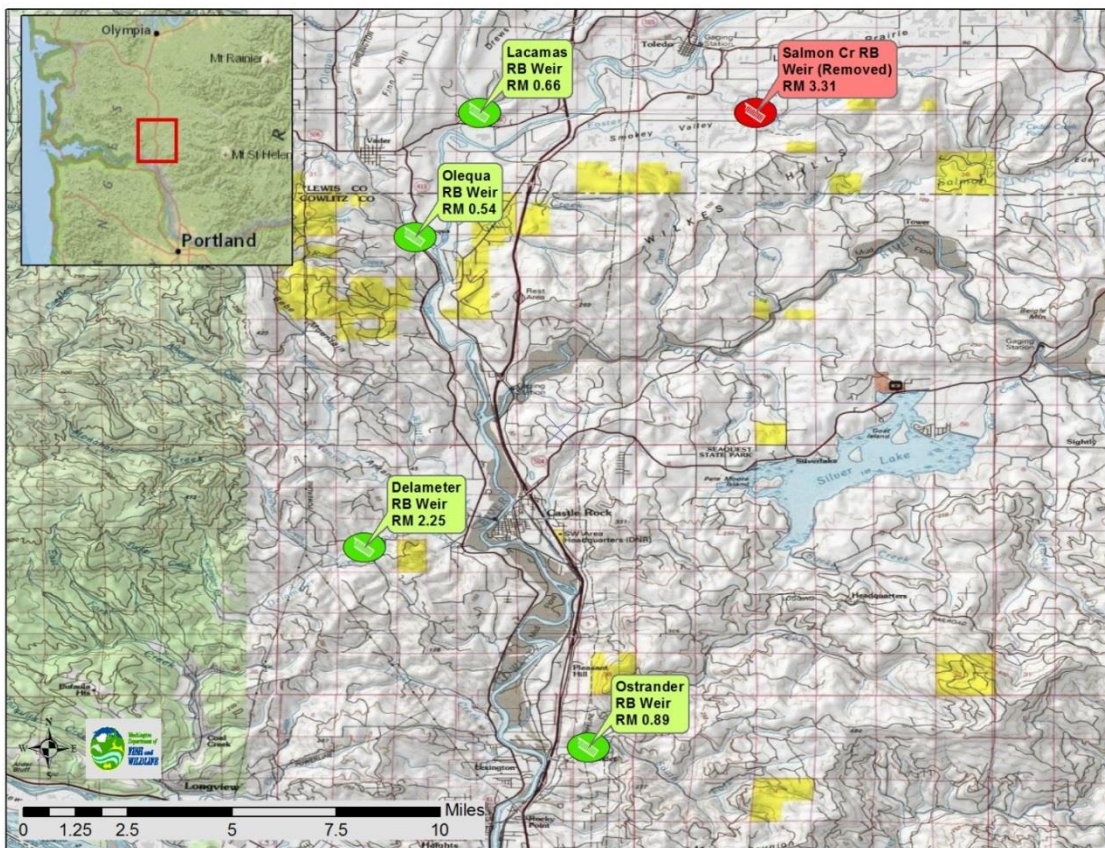


Figure 1. Location of lower Cowlitz River tributary weirs.

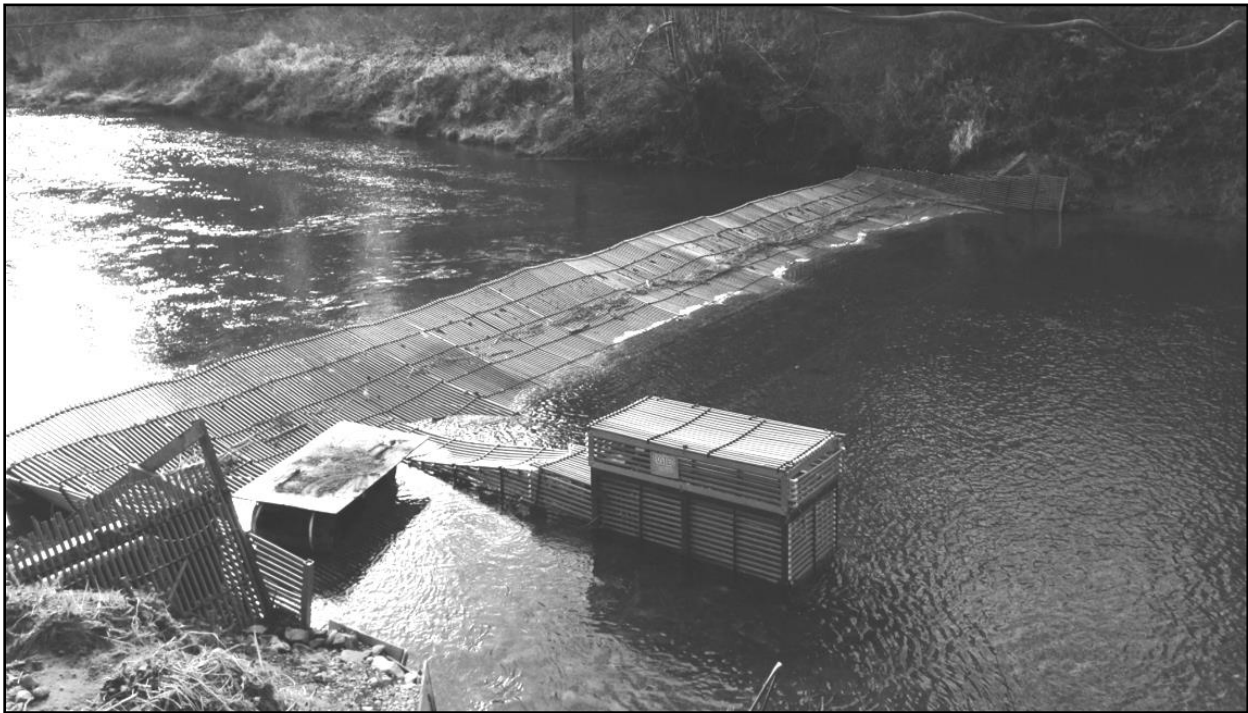


Figure 2. Resistance board weir on Olequa Creek, a lower Cowlitz River tributary. Floating panels are anchored to a substrate rail at their upstream end and lifted by a series of resistance boards fastened to the underside of the panels on their downstream end. Live box shown in this picture captures fish moving in an upstream direction.

References

TCW Economics. 2008. Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries in Washington State. Prepared for: Washington Department of Fish and Wildlife. With Technical Assistance from: The Research Group Corvallis, OR. TCW Economics, Sacramento, CA. December 2008.