

# **Washington Department of Ecology Desire to Widen the Chelan River Reach 4 Habitat Channel To Enhance Steelhead Spawning**

## **Issue Paper**

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### **Issue**

Since final construction and initial function of the Chelan River Reach 4 Habitat Channel in October 2009, Chelan River Fishery Forum (CRFF) representatives from the Washington Department of Ecology (Ecology) have asserted that the channel was not constructed properly. This assertion is based upon measurements taken by Ecology and Washington Department of Fish and Wildlife (WDFW) staff of water depth, water velocity, and substrate size on 16 transects established in the habitat channel. Ecology staff has stated, repeatedly since 2009, that several areas of the Habitat Channel need to be widened in order to be compliant with the Lake Chelan Hydroelectric Project 401 Water Quality Certification. Ecology staff assert that the amount of Habitat Channel area meeting State of Washington Habitat Suitability Index values for steelhead spawning, specifically water velocity of 2 feet per second and depth of 2 feet, is insufficient and, therefore, sections of the Habitat Channel need to be widened.

### **Background**

The Natural Sciences Work Group (NSWG) agreed during relicensing negotiations that a minimum flow of 80 cfs, with additional flows of 320 cfs during the spawning periods for summer Chinook salmon and steelhead, along with construction of a sinuous habitat channel, would provide spawning and rearing habitat equivalent in function to what would occur at a minimum flow of 650 cfs if there were no stream channel modifications. The NSWG consisted of representatives from the following entities: National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Washington Department of Ecology (Ecology), Washington Department of Fish and Wildlife (WDFW), the USDA Forest Service, the National Park Service (NPS), the Colville Tribes (Colville), the Yakama Nation (YN), and the Lake Chelan Sportsman's Association (LCSA). In addition, the NSWG reviewed and approved Chapter 7: Chelan River Biological Evaluation and Implementation Plan (CRBEIP) of the Lake Chelan Comprehensive Plan, which is a significant component of the Lake Chelan Comprehensive Settlement Agreement (SA). The CRBEIP was incorporated into the current operating license for the Lake Chelan Project and many elements of the plan became requirements of the 401 Water Quality Certification from Ecology.

The intent of the CRBEIP is to: a) evaluate the biological effects of the minimum flows and other actions from all perspectives, seeking a balance between the biological requirements and other beneficial uses of the Lake Chelan watershed; and b) maintain, support, and protect existing beneficial uses as required by state and federal laws (CRBEIP p. 7-2). Section 2.8 Review of Biological Objectives and Site Limitations of the CRBEIP contains the following language:

The biological objectives developed by the NSWG for the Chelan River include the following:

- Establish a functional aquatic ecosystem, throughout the Chelan River
- Provide spawning and rearing habitat for Chinook salmon in Reach 4 and the tailrace
- Provide spawning and rearing habitat for steelhead in Reach 4 and the tailrace
- Provide rearing habitat suitable for cutthroat trout and other native species in Reaches 1-3, consistent with natural site potential (natural water temperatures may be a limiting factor).

Table 7-10: Other Criteria for Achievement of Biological Objectives in the Chelan River in the CRBEIP contain the following biological objectives for steelhead spawning habitat use in Reach 4 and the tailrace:

- Areas developed to support spawning meet design habitat characteristics (depth, velocity, and substrate) at the design flow (as-built functionality). The Measured Parameter for this objective is field measurement to confirm achievement of physical parameters.
- Distribution of spawning use reflects distribution of constructed spawning habitat. The Measured Parameter for this objective is spawning use, numbers, distribution and habitat characteristics of selected redds.

Section 4.1.3 Fish Community - Reach 4 and Tailrace of the CRBEIP under Salmon and steelhead Spawning Habitat contains the following language:

*“Salmon and steelhead spawning habitat will be created in Reach 4 and in the tailrace, as described previously. The objective of the minimum flows and Reach 4 pumped flows are to create suitable depth, cover, velocity and substrate conditions for these fish. ... These physical parameters can be measured independently of fish use, although fish use is the best evidence of achievement.”*

Additionally, the CRBEIP contains the following language in section 5.2:

*“The objective for Reach 4 is creation of approximately 2 acres (the amount available for Chinook spawning at 320 cfs per the Bypassed Reach Flow Releases Study Report, IA and R2, 2000) of useable spawning and rearing habitat based on studies that have been conducted (Preference Curve Development for Fall Chinook Salmon, 2001) on water depth, velocity, and substrate size and permeability, and results of ongoing temperature studies.”*

During discussions on design and construction of the Reach 4 Habitat Channel, the CRFF, the existing body that succeeded the NSWG, agreed upon the following objectives for the Habitat Channel that are captured in meeting minutes from January 2004 through June 2007:

- The Forum will be a recommending body. (1/16/04)
- The PUD will make final decisions. (1/16/04)
- The enhanced channel is to include as much spawning habitat as possible in the minimum 2 acres of total spawning channel, yet it is to look like a natural river. (1/26/04)
- The channel must also include area for rearing. Anchor is to develop a conceptual design that includes an enhanced channel with spawning and rearing areas yet incorporates the look of a natural river. (1/26/04)
- Reach 4 habitat modifications is an experimental process with risk and may require adjustments once built. (6/22/04)
- “Restore Chelan River to a functioning aquatic ecosystem” will be added as a settlement objective/goal. (6/22/04).
- The Forum would like to see designs with a more natural look. (6/22/04)
- Forum members decided that the channel section not focus on two acres of spawning area only, but spawning and rearing. Decision gives greater flexibility to have a geomorphically appropriate channel design and still meet license requirements. (3/28/07)
- The habitat channel criteria should focus more on steelhead spawning and rearing than summer Chinook. (3/28/07)

- The group concurred with the preliminary 60% design drawings with provision that Anchor incorporate the results of the day’s decisions in the updated 60% design drawings due the end of July 2007. (6/28/07)

**Monitoring Results**

Steelhead spawning ground surveys conducted in the Chelan River Habitat Channel have provided the following results to date:

<b>Year</b>	<b>Total No. Redds</b>	<b>Redds/Mile</b>
2010	11 – 16 <sup>1</sup>	34 - 50
2011	21	65
2012	7	22
2013	20	62

1 – Multiple surveyors provided differing counts

Steelhead spawning ground survey data for the highest producing steelhead streams in the vicinity of the Chelan River are shown below:

<b>Stream</b>	<b>Year</b>	<b>Total Redds (range)</b>	<b>Redds/Mile (range)</b>
Nason Creek	2001 - 2011	27 - 410	1.8 – 26.6
Wenatchee River	2001 - 2011	46 - 456	2.5 – 24.5
Icicle Creek	2001 - 2011	6 - 180	1.5 – 45.0
Mad River	2001 - 2011	9 - 51	1.3 – 7.3

**Conclusion**

The objectives for design and construction of the Habitat Channel developed by the Natural Sciences Work Group (NSWG), as identified in the previous Background Section, were broad criteria focusing on restoring the Chelan River to a “functioning aquatic ecosystem,” constructing spawning and rearing habitat, primarily for steelhead, based on Habitat Suitability Index (HSI) values for water depth and velocity and substrate size as guidelines, constructing the Habitat Channel to resemble a natural river, and measuring success by physical measurements and, more importantly, fish use. The NSWG worked diligently over several years in a collaborative manner to provide guidance for and approval of designs for the Habitat Channel that would achieve the desired objectives and criteria. Chelan PUD engineers, project managers, and biological staff, in addition to an outstanding contractor, Goodfellow Brothers, were involved heavily with construction of the habitat Channel to ensure that the Habitat channel was constructed according to NSWG design specifications.

Comparing the monitoring results from the Chelan River to the highest producing steelhead streams in the Chelan River vicinity demonstrate that fish use of the Habitat Channel, specifically steelhead spawning, is equal to or greater than steelhead spawning use in all high producing steelhead streams in the vicinity of the Chelan River. This is a clear indication that suitable HSI values for water depth and velocity and substrate size for steelhead spawning were constructed in the Habitat Channel, and are available and being used extensively by adult steelhead. Due to the fact that these HSI values are available and being used extensively by adult steelhead, the following conclusions can be made:

1. The Habitat Channel physical function satisfies the criteria contained in the CRBEIP of the Lake Chelan SA and the Lake Chelan Hydroelectric Project 401 Water Quality Certification;
2. Recognizing it is possible to measure the physical parameters of the habitat channel independent of fish use, the ultimate indication of the habitat channel meeting the steelhead spawning needs versus physical criteria is in the evidence of actual fish use. Based upon the evidence of actual

fish use, the Habitat Channel meets the criteria for steelhead spawning success developed by the NSWG;

3. The Habitat Channel is functioning as well or better than local natural rivers for steelhead spawning;
4. The assertion that the Habitat Channel is not built properly and needs to be widened is not supported by the documented success the new habitat channel has had to date in meeting the biological objectives;
5. Subsequently, Chelan PUD does not recommend widening or physical manipulation of the Habitat Channel.