

# Black Canyon Hydro Trout Spawning Study

## Introduction

The instream flow requirement for the North Fork Snoqualmie River from March 15 through July 14 is 300 cfs (WAC 173-507-020(1)). This would provide the maximum spawning area (100% WUA) in the Black Canyon Reach as estimated from the 1985 IFIM study. There are two assumptions in this established flow:

- 1) Resident trout spawn in the BCH Project Reach and
- 2) Spawning occurs between March 15 and July 14.

Determining absence of spawning in the Project Reach is a difficult task and not recommended at this time. Determining spawning timing can be accomplished using a standard method of back-calculating spawning from emergence of fry using daily temperature units (DTU). This method has been used in a number of hydro project studies and has been accepted by WDFW and Federal agencies. Using this method, the Calligan Creek Hydro Project has determined trout spawning period and established spawning flow from May 15 through Sept 14. The spawning period and flow for the Hancock Creek Hydro Project is June 16 through Oct 15.

Spawning timing is determined by two methods:

- 1) Observation of spawning activity such as mating fish or the construction of egg nests (redds)
- 2) Presence of emergent fry that are 30 mm long, or less. If emergent fry are observed then the spawning data can be back-calculated with the temperature data.

Trout spawning is initiated when average daily water temperature reaches 42 – 44 °F (Behnke 2002). This temperature is reached around May 1<sup>st</sup> based on BCH temperature data collected from September 2012 through September 2013 at the two stream gauges. Temperature data is currently being collected at the two stream gauges, and this study will add temperature loggers at the four study sites established during the 2013 Aquatic Resources Study.

## Purpose

The purpose of this study is to determine the period when resident trout initiate spawning in the BCH Project Reach and when trout emergence has been complete. This information will help to more accurately establish spawning flow requirements in the Black Canyon Project Reach.

## Objectives

The objectives of this BCH Spawning Study are to:

1. Record continuous temperature data at the four established study sites
2. Document presence/absence of spawning activity and redds in Project Reach
3. Document presence of emergent trout fry at the four study sites
4. Record length of captured trout fry at the four established study sites
5. Estimate spawning timing using standard methods of back-calculating from emergence using daily temperature units (DTU)

## Methods

Four study sites have been established as part of the 2013 Aquatic Resource Study for the BCH Project. These four study sites are:

1. Lower Reference Study Site in Ernie's Grove
2. Lower Project Study Site downstream of Canyon Springs
3. Upper Project Study Site at the top of the upper canyon
4. Upper Reference Study Site upstream of the intake site

Each site will be visited at one-week intervals to download the temperature data loggers and to record visual observations of mating trout and redds. If mating trout or redds are observed, the following data will be recorded:

- Date and time
- location, GPS coordinates
- habitat type
- substrate
- water velocity
- width, length of redd
- water depth and water temperature

During each site visit, visual observation along the river margin will be made; observation of trout fry will be recorded and trout fry will be capture with aquarium nets and measured for length. Fish that are 30 mm or less will categorized as newly emergent; we will assume that the fish had emerged from their redd on the previous day. Spawning timing will be estimated by back-calculating with daily temperature units based on studies completed by CES (1991) and Thompson et al. (2011). The CES study used 765 DTU based on a previous study by Leitritz and Lewis (1976). Thompson and others determine that trout required 762 DTU to develop from eggs to 15 mm fry and 892 days to develop to 20 mm try. This data was obtained from one capped redd study site. Additional literature will be reviewed prior to completing the data analysis.

## References

- Cascades Environmental Services, Inc. 1991. Spawning timing and fry emergence study: Hancock and Callegan creeks (FERC No. 9025 and 8864) prepared for Hydro West Group.
- Leitritz, E., and R. C. Lewis. 1976. Trout and salmon culture (hatchery methods). California Dept. Fish and Game, Fish Bun. 164.
- Thompson, J.N., J.L. Whitney, and R.E. Lamb. 2011. Snoqualmie River Game Fish Enhancement Plan – final report of research. Washington Department of Fish and Wildlife. Submitted to Puget Sound Energy in partial fulfillment of the Snoqualmie Falls Hydroelectric Project FERC No. 2493.

