



Technical Memorandum

Date: August 26, 2021
From: Dave Bates, Sr. Biologist
To: Sandi Bandara, Env. Tech., SCRCD

Our File Number: FSCI-21-0036

Re: Fish Salvage below the Chapman Lake Dam (control structure)

On August 20, 2021, **FSCI** Biological Consultants conducted a fish (and amphibian) salvage at the request of the SCRCD. The salvage took place in the 80-m length of Chapman Creek from the SCRCD dam (lake control) to the outlet of the lake siphons.

This length of stream is bypassed when the lake level reaches critical stage and the siphons are required to maintain water in Chapman Creek.

Throughout the bypassed section the channel is characterized by bedrock pools and short riffle areas dominated by large angular rock (Photo 1). Under de-watered conditions the pools retain water and provide safe refuge. The short lengths of riffles between pools dewater and are the focus of increased salvage effort.

Salvage effort focuses on collection, removal and relocation of any rearing salmonids within the de-watered stream length. The only species captured in past salvage operations is Dolly Varden char (*Salvelinus malma*) (Photo 2). All captured fish are examined to determine the species, enumerated, sampled and released below the siphon outlet.

In the past there has been incidental catch of Northwest Salamander juveniles. These have also been released downstream of the siphons. Amphibian juveniles (or adults) are not handled by the crew but transported in dedicated nets in order to reduce the risk of harm.

The salvage starts at the siphon outlet and a 2-person crew works upstream. Fish are captured using a Smith Root LR-24 electrofishing unit. Settings for the electroshocker are adjusted, based on stream conditions. On August 20, water conductivity was 16 $\mu\text{S}/\text{cm}$ and water temperature 16.5°C. The electroshocker was set at 700V with frequency of 60Hz and 25% Duty Cycle.

Electrofishing was conducted using a multi catch methodology and the results used to estimate the total number within the salvage section of stream. The multiple catch methodology assumes consistent catchability and a maximum likelihood estimate for N (total number) is determined using an iterative process using:

$$T = \sum_{i=1}^k C_i$$
$$X = \sum_{i=1}^k (k-i) C_i$$

Where:

i = pass number

k = number of removals (passes)

C_i = number of fish caught in ith pass

X = and intermediate statistic used below

T = total number of fish caught in all passes

The estimated N is then determined using the iterative process by substituting values for *n* until:

$$\left[\frac{n+1}{n-T+1} \prod_{i=1}^k \frac{kn-X-T+1+(k-i)}{kn-X+2+(K-i)} \right] \leq 1.0$$

A total of three passes were conducted on August 20 and 24 Dolly Varden char were removed and released downstream unharmed. Sizes ranged from 81 to 153-mm representing Age classes 1+, 2+ and possible 3+. Total effort was 2059 sec.

The resulting population estimate was 28 with a 95% CI of 7.36. Assuming the estimated population is 28 and the capture resulted in the removal of 24, an estimated 86% of the rearing Dolly Varden were relocated safely.

There were no amphibians caught during the 2021 salvage operation.

If you require any further information please feel free to contact me.





Photo 1: Lower section of Chapman Creek below the SCRDR lake control dam. This section is dominated by bedrock with pools linked by riffle/cascades and containing large angular substrates. Fish remaining in deeper bedrock pools have residual water for survival during prolonged de-watered periods. Riffles are salvaged.



Photo 2: Example of the resident Dolly Varden char salvaged from the dewatered length of Chapman Creek (below the lake) and released unharmed below the siphon outlet.