FSCI Biological Consultants

Technical Memorandum

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From: D. Bates, Sr. Biologist

To: Sandi Bandara, Environmental Technician, SCRD

CC: Jim Wilson, Community Advisor, Fisheries and Oceans Canada
Sid Quinn, Manager, Resource Management Dept, shíshálh Nation

Re: Proposed Chapman Creek Low Summer Flow Mitigation Plan for Odd Year Pink Salmon (*Oncorhynchus gorbuscha*) Returns

Background

Chapman Creek, located near Sechelt, BC is a principal water source for the Sunshine Coast. Community water use during low summer flow periods, results instream flows around 200-lps. This release is measured downstream of the Sunshine Coast Regional District water intake at the old Water Survey of Canada gauging station and again in the main river upstream of the hatchery intake in Reach 3. The low summer flows can cause problems for early returning hatchery introduced Pink Salmon by restricting upstream movement.

In 2023, the SCRD is proposing to reduces the EFN to 160-180 lps in order to maintain storage for anticipated needs in the later part of August and September. The reduction would occur I late August to September. With monitoring of salmon access and behaviour at lower flows.

In the late summer of 2015 and 2016 habitat assessments, along with flow monitoring were completed[1, 2]. This work achieved two goals, namely;

1. The quantification of available rearing habitats at various low summer flows within the anadromous reaches of the river, and
2. The identification and confirmation of potential "bottlenecks" that could hamper upstream migration of adult salmonids, principally Pink Salmon. The principle "bottleneck" areas in all cases were shallow riffles areas.

Results of the work completed in 2015 and 2016 found accessible and stable "high" value rearing habitat available in most reaches at flows less than 200-lps. The exception was Reach 1

[1] Bates, D. 2015. Preliminary review of low summer flow on salmonid habitat/passage in Chapman Creek. Letter to D. Crosby, SCRD, December 6. 2015.

[2] Bates, D. 2016. Review of low summer flow on salmonid habitat/passage in Chapman Creek. Letter to D. Crosby, SCRD, October 26, 2016.

and 2, (see map) which extend from Brookman Park near the mouth the hatchery intake. In this area Chapman Creek has been altered and manipulated over the last 5-7 decades. It is this length that measures approximately 1000-m and characterized by aggrading channel conditions that creates the greatest obstacles to migration for the Pink Salmon during the low summer flows.

The outcome of the 2015 and 2016 work was a target instream flow of 200-lps to reduce the risk to upstream migration through Reach 1 and 2. In 2021, additional work was completed with observational data at lower flows around and below the 200-lps threshold. In this year Pink Salmon were observed migrating upstream through Reach 1 and 2 at lower flows and holding above the hatchery intake. This suggested that yearly changes in the channel may facilitate adult salmon access at flows less than 200-lps (i.e., 150-200) and annual surveys should be conducted throughout the run period (August to end of September to document the progress and distribution of Pinks Salmon during this seasonal low flow period.

In the summer of 2022 (review triggered by November 2021 event), these same areas of lower Chapman Creek were again reviewed in the field (FoC, FSCI) and it was concluded that habitat quality and constraints documented in 2015, 2016 and 2021 remained unchanged. The "bottleneck", to migration during low summer flows is Brookman Park (Reach 1) and that habitat above Reach 2 appears stable and supports juvenile rearing with no indications of degradation (elevated water temperature, stressed fish) during low flows.

Proposed Mitigation Plans/Procedures

The following are proposed reaction/mitigation procedures to facilitate the safe passage and/or successful spawning of Pink Salmon that may, under extreme low water conditions become stranded or impeded. The proposed process will require cooperation from the SCRD, shíshálh Nation and SCSES.

1. In-river flows are recorded daily by the SCRD at the former Water Survey of Canada station. Additional flow measurements on the lower river should be conducted weekly between August 1 and September 15 to document the EFN. This should be conducted at the top of Reach 2. Note: this flow monitoring should be conducted by the SCRD and is only required in Pink Salmon return years (odd years). This site is considered the "best" available for reliable comparison.

   These measured field flows will also be used to validate the SCRD automatic gauging ensuring accuracy of the automated system. Points of Interest (POI) to be measured include; above the hatchery intake, and below the hatchery outlet. In addition, riffle crest wetted depth at the Brookman Park "bottleneck" should be observed and fish movement documented.

2. Starting the last week of July through to the middle of September the Pink Salmon escapement will be monitored and documented. Escapement monitoring is conducted

by the shíshálh Nation as an integral component of their Fisheries monitoring program with Fisheries and Oceans Canada. Escapement timing and adult Pink Salmon distribution will be shared with the SCRD. Recommended observation (bottleneck) points are:

- Davis Bay Beach. Schooling and holding Pink Salmon can be observed off the Davis Bay beach bear the mouth of Chapman Creek. Observations of "jumpers" and an increase in sport fisherman are an indicator of run build-up.

- <u>The first holding pool at Brookman Park</u>. This location is near the top of the high tide influence and becomes the first holding location for migrating Pink Salmon. Pool depth and limited cover provide adequate holding prior to navigation of the first "bottleneck" riffle crest (see map). Pink Salmon numbers are to be recorded following a flood tide. Data will be used to monitor the building of the run.

- <u>Immediately downstream of the hatchery outlet</u>. The presence of adults in this section will confirm adult Pink Salmon are able to navigate the Brookman Park "bottleneck". Once at this location, adult Pinks may continue navigating upstream **<u>OR</u>** can be collected for brood at the hatchery. The collection of brood would be covered under the current hatchery Aquaculture License. Brood and egg collection at this point may also depend on the ability of the hatchery to provide incubation (or holding) flows within the facility.

- <u>Above the hatchery intake and the last channel control weir</u>. Once the fish reach this point continued access upstream is possible. Surveys in 2015 found, at low flows (200-lps) Pink Salmon distributed themselves upstream with no problems.

3. Section 1 and 2 above, provides monitoring locations in order to document the progress and distribution of the Pink Salmon, but once in-river and found to be holding and/or stranded it may become necessary to protect and encourage further distribution. The trigger for additional flow release will be the extended delay in movement (1 week). If field crews determine fish are accumulating in the lower reach and not moving, the shíshálh Nation (or designated observer) will immediately notify contacts in Fisheries and Oceans Canada and hatchery. In addition, the SCRD will be notified to begin plans for pulsed release.

   In the event Pink Salmon are hampered on the upstream migration with this target flow, the SCRD are prepared to release additional water (up to 400-lps) for a select period of time for no less than 4 hours. This is referred to as a pulsed flow[1]. Any pulsed flows should be undertaken at night and the success monitored pre and post flow release. Success will be gauged by field crew(s) (shíshálh Nation, Fisheries and Oceans, hatchery

staff) conducting foot surveys at first light and documenting the extent of upstream distribution.
The SCRD should also be prepared to extend the pulse period if water is available and the situation warrants the release. Research on pulsed flow for other species suggests the pulse periods should be longer extending up to 48 hours. It is not expected that this longer duration would be required given the short distance fish need to travel (1000-m).

4. All planned pulsed events will be discussed prior to release with the Fisheries and Oceans Canada, Community Advisor. Hatchery staff will also be notified through the Community Advisor. It should be noted that the hatchery may have to manage their water withdrawal during any planned pulse period ensuring the increased water volume has access to the length of stream (Reach 2 and Reach 1) presently bypassing flows for the hatchery. This flow release is exclusively intended to move the fish upstream past the hatchery intake.

   All pulse releases must be documented with time of start including the attenuation correction, length of flow and change in Pink Salmon distribution following release.

   While pulse flows are necessary for the adults, they also have the potential to create additional problems for rearing juveniles. The SCRD should be prepared to increase and decrease flows following current fisheries flow ramping criteria of 2.5 to – 5.0 cm per hour. This translation from release at the lake to the lower anadromous reaches will be determined through planned and management release in non-pink salmon return years.

5. In the event fish are holding in deteriorating conditions and there is no water available for pulsing flows it may be necessary to physically handle the adults. This approach is considered a last resort.

   If returns are low and adequate habitat is available for spawning below the “bottleneck” points handling should not be considered. In this case fish should be allowed to spawn undisturbed. Pink Salmon can successfully spawn in the areas near the tidal salt fresh interface.

   In the event handling is necessary, appropriate permits will be required from Fisheries and Oceans Canada. There are 2 possible outcomes for this process. These are:

   - Adults would be seined in the holding pool in Reach 1 and depending on the level of sexual maturity, possibly transported, upstream. They would then be released above the hatchery. These fish could also be moved to the hatchery **IF** adequate hatchery conditions are available.

   - If the fish captured are sexually mature, a riverside egg collection exercise should be considered. Eggs and milt would be collected by fisheries staff and then transferred to the hatchery where the eggs would be fertilized and

placed into incubation. This assumes conditions at the hatchery are conducive to incubating eggs.

In either scenario, the SCRD will require the expertise of Fisheries and Oceans Canada and the shíshálh Nation and their experienced fisheries and hatchery staff.

The preceding procedures/responses assume a problem will arise and are specific to the odd year returning Pink Salmon. Planned procedures and mitigation should be revisited in each return year as the lower river and the problem "bottleneck" areas change with each flood flow.