Slamgeesh Program Operation Support

Final Report
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Executive Summary

In 2018 we received funding from the Pacific Salmon Commission's Northern Endowment Fund to support the operational costs of extending the field season of the Slamgeesh Salmon Project. This support allowed for the enumeration and sampling of both juvenile and adult salmonids typically unaccounted during the normal length of the field season. As a result of the extension of the trapping season, we captured an additional 5% of coho salmon smolts (*n*= 144), one sockeye salmon smolt, 38% of adult coho salmon (*n*= 210) and zero adult sockeye salmon. We estimate 8,617 sockeye and 37,416 coho salmon smolt outmigrants, 333 adult sockeye and at least 554 adult coho salmon passed through the adult fish counting facility. Extending the trapping season allowed us to provide more accurate representation of Slamgeesh salmon stocks in 2018.

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Introduction

Slamgeesh Lake is located in the Skeena River watershed in northwestern British Columbia and is considered the sole small lakes indicator stock for the upper Skeena Watershed (Figure 1). Upper Skeena River conservation units (CU) have similar run timing as the Babine Lake enhanced stocks. The Slamgeesh Salmon Program allows for the monitoring of small upper Skeena River CUs that may be affected by the exploitation of the Babine Lake enhanced stocks.

Since 2000, the Gitksan Watershed Authorities (GWA) has conducted the Slamgeesh Salmon Program annually at Slamgeesh Lake. The program is typically in operation from the first week of May to the first week of July during smolt emigration and the third week of July through the end of October during adult migration. The field crew is made up of one GWA biologist and six GWA technicians. The counting facility is monitored twenty-four hours a day once each trap is installed.

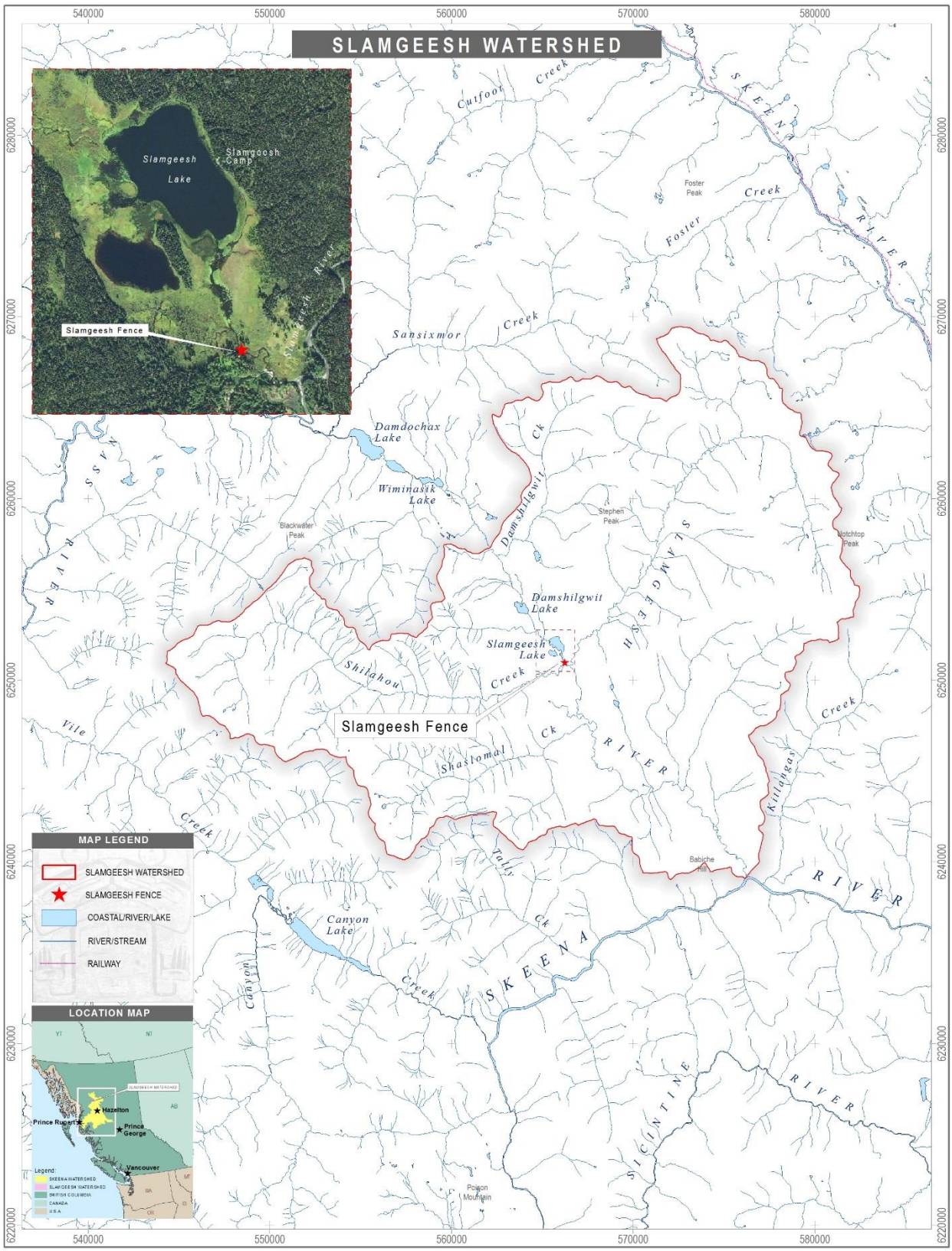

Figure 1. Map of Slamgeesh River watershed with location of trapping fence.

Objective

The main objectives of the project as identified in the Detailed Proposal are:

- Obtain a more accurate recruitment estimate for out-migrating sockeye and coho salmon smolts
- Obtain a total escapement census for adult salmon spawning above the counting facility

These objectives were thought to be met by extending both ends of the sampling season.

Methods

The trapping facility for both juvenile and adult salmon is located ~500 m below the outlet of Slamgeesh Lake (Figure 1). During each trapping season, the facility is retrofitted with two fyke traps for trapping emigrating juveniles and an aluminum fish weir for trapping adults.

Juvenile Season

Juvenile salmon emigrating out of Slamgeesh Lake into Damshilgwit Creek are directed into two fyke traps via aluminum paneling that cover ~60% of bank width and excludes the thalwag of Damshilgwit Creek. Juvenile fish enter the traps and are swept into a floating live-box.

Each morning (0900 hours), live-boxes are examined for captures. All captured fish are speciated and counted by hand. All captured sockeye and coho salmon receive an adipose fin clip, and 50 of each species are selected at random for the collection of meristic and morphometric data including the following: fork length (mm), weight (grams), scale smear and tissue. Up to 200 sockeye and 200 coho are released above of the traps for the mark-recapture experiment. All captured coho salmon receive a coded-wire-tag (CWT) implant.

Adult Season

Fish returning to Damshilgwit Creek to spawn above Slamgeesh Lake are met by an aluminum modular fence. Spacing between the bars on the aluminum paneling (25 mm) ensures that both large adult sockeye, coho salmon and associated “jacks” can not pass through the fence without entering the live-box. Each day, the live box is checked at 0900 and 1400 hours for captured fish.

All captured fish are enumerated by hand. Before fish are released above the weir, the following meristic and morphometric data is collected from each individual: species, sex, fork length (cm), pre/post spawn morphology, five scales, tissue and examined for adipose fin clip. All coho salmon without an adipose fin are scanned for the presence of a CWT.

Results

Juvenile Season

Two fyke traps were in full operation for 63 days beginning on April 27th. Slamgeesh Lake was free of ice by May 7th and spring freshet occurred on May 7th, inhibiting both traps from operating for two days. One of the traps was uninstalled on June 29th due to low water velocity on right bank, while the other trap remained in operation until July 2nd.

Installing the traps at the end of April and running them through July 2nd enabled sampling of the entire sockeye salmon smolt outmigration (first encounter April 30th, last encounter June 11th) and the entire coho salmon smolt population (first encounter April 27th, last encounter June 28th). In April the fyke traps were in full operation for four days, 5% of total coho salmon smolts (n= 144) and <0.5% sockeye

salmon smolts (*n*= 1) were captured during that time. Peak outmigration for sockeye salmon smolts was on May 18th and peak outmigration for coho salmon smolts was June 1st.

Sockeye Salmon Smolts

Marked individual smolts (up to 200/day) were released upstream of the traps in the outlet of Slamgeesh Lake, this allows the estimate of trap efficiency (~11%). To account for low numbers of recaptures, we used the Chapman modification of the Lincoln-Peterson mark-recapture estimator (Seber, 1982) to estimate the number of sockeye salmon smolts (8,617± 1,501). The 2018 sockeye salmon smolts are mainly derived from the 2016 brood year, which had a total escapement of 260 pre-spawn large sockeye salmon (128 females). The estimated average number of smolts per female for the 2016 brood year (range; 56 to 79) was below the project's historic average (84 smolts per female).

Coho Salmon Smolts

Marked individuals (up to 200/day) were released upstream of the traps in the outlet of Slamgeesh Lake, this allows the estimate of trap efficiency (~7%). To account for low numbers of recaptures, we used the Chapman modification of the Lincoln-Peterson mark-recapture estimator (Seber, 1982) to estimate the number of coho salmon smolts (37,416± 5,029). Total output of CWTs in 2018 was 2,023 (adjusted for 85% tag retention). Tag retention was estimated by scanning all recaptured individuals for a CWT and specific tag retention/capture mortality experiments.

Adult Season

The counting facility was in full operation for 96 days, beginning on July 19th and ending on November 5th. Due to fires in the proximity of the counting facility, the Slamgeesh camp was evacuated for 13 days from August 20th through September 2nd. During that time, the fence was inoperable and allowed fish to pass uncounted, inhibiting the opportunity for a census count. No major high-water events ceased operation of the facility. Water temperatures stayed elevated above 18˚C for a total of 32 days with a maximum of 25.4˚C on July 29th.

Sockeye Salmon

A total of 207 large and 6 jack sockeye salmon were enumerated through the fence. We adjusted the actual number of fish counted using the area-under-curve (AUC) method to yield an estimated escapement above the Slamgeesh counting facility of 333 sockeye salmon. The adjusted total of 333 sockeye salmon is 37% lower than the 18 years average ($\bar{N}$=532; Figure 2). The first sockeye salmon passed through the fence on August 1st and the last was counted on October 21st. The typical run timing curve will not be reported for 2018 due to the trapping facility being inoperable during the average peak run of sockeye salmon for this program.

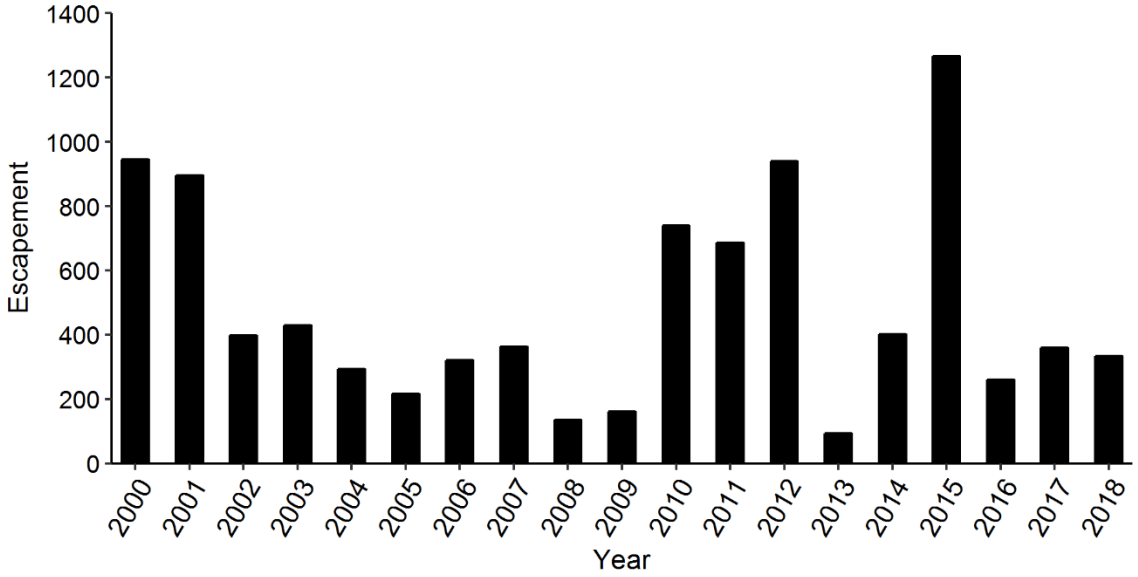

Figure 2. Total number of large sockeye salmon enumerated through the counting facility from 2000 to 2018. Escapements have been derived using mark-recapture, area-under-curve and census counts. Note the 2018 count (n=213) was expanded ($\bar{N}$=333) using area-under-curve.

Coho Salmon – Counts and Run Timing

At the time of fence removal, we had enumerated 554 coho salmon through the fence. This is the lowest recorded count of coho salmon since the project began in 2000 and is 72% lower than the 18-year average ($\bar{N}$=1,978; Figure 3). The first coho salmon passed through the fence on August 19th and the last on November 5th. By October 19th, 52% of the run (n= 286) had passed through the counting facility, which is 17 days later than the 18-year average. Total counts and run timing may have shifted due to 2018 counts being incomplete. In addition, 38% of the run (n=210) passed through the counting facility in the five days of operation in November.

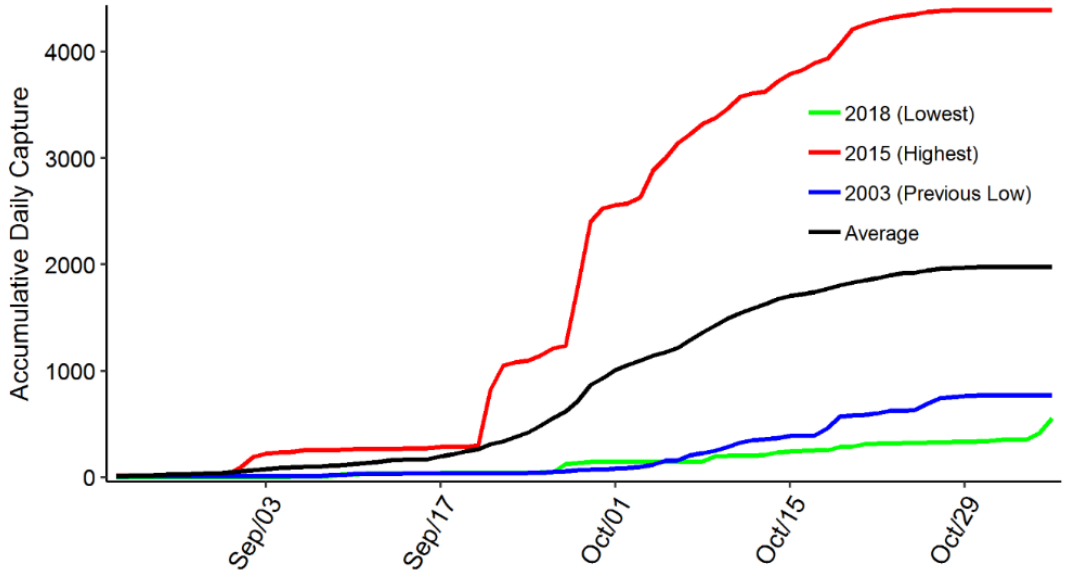

Figure 3. Comparison of the 2018 (lowest recorded *N*=554), 2014 (highest recorded; *N*=4,391), 2003 (previous low; *N*=768) and average (2000-2017; $\bar{N}$=1,978) accumulative daily capture of coho salmon through the Slamgeesh Salmon Project adult enumeration facility.

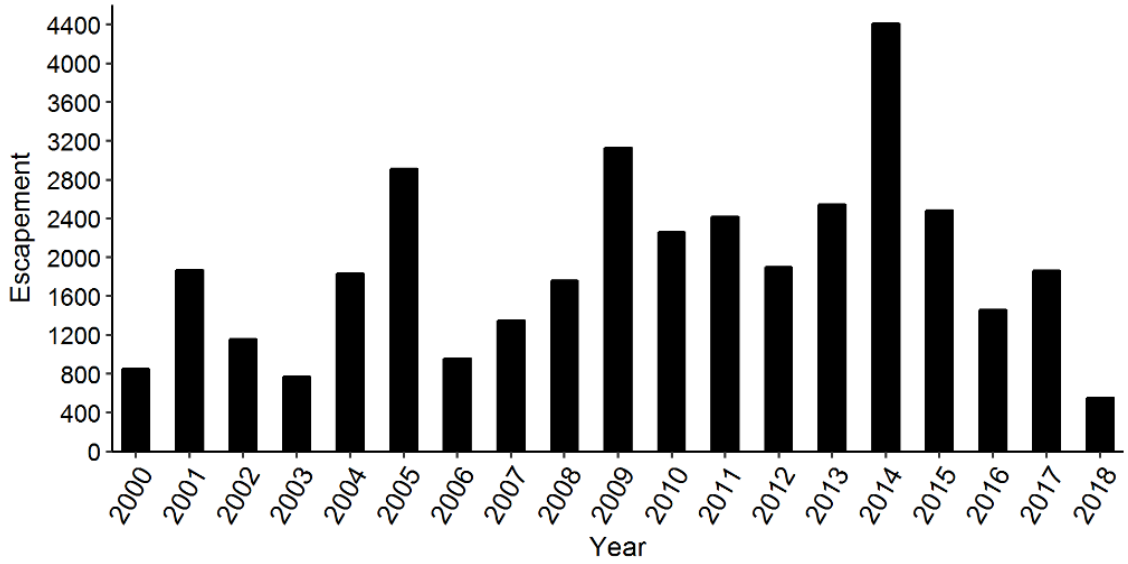

Figure 4. Total number of coho salmon enumerated through the counting facility from 2000 to 2018. Escapements have been derived using mark-recapture and census counts.

Budget Summary

Expenditures of the Northern Endowment Fund matched the budgeted amount of $32,500. The 10% hold back of $3,250 is anticipated once the final report is accepted by the Pacific Salmon Commission. A summary of fund expenditures in relation to budgeted amounts is as follows:

Description	Budget (PSC)	Expenditure	Balance
Wages and Salaries	16,980.00	14,775.00	2,205.00
Contract Services	0.00	0.00	0.00
Travel	6,520.00	9,418.29	-2,898.29
Supplies and materials	9,000.00	8,306.71	693.29
Capital Equipment	0.00	0.00	0.00
Indirect costs	0.00	0.00	0.00
Total	**32,500.00**	**32,500.00**	**0.00**

Conclusions

An estimated 8,617 (±1,501) sockeye and 37,416 (± 5,029) coho salmon smolts out-migrated from Slamgeesh Lake in 2018. Due to the supplemental funding provided for the project, the smolt trapping season was extended for 10 days. This increased the sample size for both sockeye and coho salmon smolts by <0.5% and 5%, respectively.

The adult trapping season was extended for a total of 14 days due to the supplemental funding provided for this project. An estimated 333 adult sockeye and 554 coho salmon passed through the trapping facility. Zero sockeye and 210 (38% of total count) coho salmon passed though the weir during the extended sampling season.

The program was completed within the timeframe of the project proposal. Preliminary results suggest extensions of the trapping season are warranted during the months of April and November but rather than extending the trapping season for 2019, the GWA will instead shift the season. While the emigration of sockeye salmon smolts and migrating adults is well covered during the normal operation timeline, the rationale of this shift in the trapping season will be to increase the sample size of coho salmon smolts and complete a census of returning coho salmon adults. The GWA will work to reallocate its core funding to support the proposed changes to the typical trapping season.

Acknowledgements

An important component of this project is support by the labor, advice and cooperation from Wilps Gwininitxw and Chief Gwininitxw. Thank you to the many GWA technicians that worked on this project in 2018 including: Richard Harris, Angus Gawa, Tony Gawa, James Loring, Gordon Ridley and Deirdra Oud. Continued support from the Department of Oceans and Fisheries North Coast Stock Assessment staff, Canadian Helicopters, Lake Districts Air and Alpine Lakes Air is much appreciated.

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