

**PACIFIC SALMON COMMISSION
JOINT TRANSBOUNDARY TECHNICAL COMMITTEE

SALMON MANAGEMENT AND ENHANCEMENT
PLANS FOR THE STIKINE, TAKU
AND ALSEK RIVERS, 2020

REPORT TCTR (20)-01**

This plan was finalized June 3, 2020 by the
Transboundary Technical Committee

TABLE OF CONTENTS

Page

| | |
|---|-----------|
| ACRONYMS..... | V |
| LIST OF FIGURES..... | VI |
| LIST OF TABLES..... | VI |
| LIST OF APPENDICES | VI |
| INTRODUCTION | 8 |
| STIKINE RIVER..... | 8 |
| CHINOOK SALMON..... | 8 |
| Escapement Goal | 8 |
| Preseason Forecast..... | 8 |
| Harvest Sharing Objectives..... | 9 |
| Management Procedures | 10 |
| Harvest Information Sharing..... | 13 |
| Stock Assessment Program..... | 15 |
| SCKEYE SALMON..... | 15 |
| Stock Groupings | 15 |
| Escapement Goal | 16 |
| Preseason Forecast..... | 17 |
| Harvest Sharing Objectives..... | 20 |
| Management Procedures..... | 20 |
| Summary..... | 24 |
| Inseason Data Exchange and Review | 24 |
| Stock Assessment Program..... | 24 |
| Stock Assessment Program..... | 27 |
| Data Evaluation Procedures | 28 |
| COHO SALMON | 31 |
| Escapement Goal | 32 |
| Preseason Forecast..... | 32 |
| Harvest Sharing Objectives..... | 32 |
| Stock Assessment Program..... | 32 |
| Management Procedures | 32 |
| TAKU RIVER..... | 33 |
| CHINOOK SALMON..... | 33 |
| Escapement Goal | 33 |
| Preseason Forecast..... | 33 |
| Harvest Sharing Objectives..... | 35 |
| Management Procedures | 35 |
| Harvest Information Sharing..... | 37 |
| Stock Assessment Program..... | 37 |
| SCKEYE SALMON..... | 38 |
| Escapement Goal | 38 |
| Preseason Forecast..... | 38 |
| Harvest Sharing Objectives..... | 40 |
| Management Procedures..... | 40 |
| Harvest Information Sharing..... | 43 |
| Stock Assessment Program..... | 43 |

| | |
|---|-----------|
| COHO SALMON | 44 |
| Escapement Goal | 44 |
| Preseason Forecast | 44 |
| Harvest Sharing Objectives | 44 |
| Management Procedures | 45 |
| Stock Assessment Program | 46 |
| Inseason Data Exchange and Review | 46 |
| ALSEK RIVER..... | 49 |
| Escapement Goal | 49 |
| Preseason Forecasts | 49 |
| Management Approach for the 2020 Season | 50 |
| Stock Assessment Program | 52 |
| 2020 TRANSBOUNDARY ENHANCEMENT PLANS | 54 |
| OVERVIEW | 54 |
| FRY PLANTS | 56 |
| EGG TAKE GOALS | 56 |
| GENETIC STOCK IDENTIFICATION PROJECTS | 57 |
| LITERATURE CITED | 60 |
| APPENDIX A: ANTICIPATED TRANSBOUNDARY PROJECTS, 2020 | 61 |
| APPENDIX B: TRANSBOUNDARY ENHANCEMENT PRODUCTION PLANS, 2020 | 79 |
| APPENDIX C: GENETIC STOCK IDENTIFICATION METHODS, 2020 | 81 |
| United States | 81 |
| Canada | 83 |
| United States | 105 |
| Canada | 107 |

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ACRONYMS

| | |
|------------------|--|
| AABM | Aggregate Abundance Based Management |
| AC | Allowable Catch |
| ADF&G | Alaska Department of Fish and Game |
| ASL | Age, Sex, Length |
| BY | Brood Year |
| BLC | Base Level Catch |
| CAFN | Champagne & Aishihik First Nation |
| CPUE | Catch Per Unit of Effort |
| CTC | Chinook Technical Committee of the Pacific Salmon Commission |
| CWT | Coded-Wire Tag |
| DFO | Department of Fish and Oceans, Canada |
| DIPAC | Douglas Island Pink and Chum, Inc. |
| ESSR | Excess Salmon to Spawning Requirements |
| FN | First Nation |
| FSC | Food, Social, Ceremonial |
| GSI | Genetic Stock Identification |
| MR | Mark–Recapture |
| MEF | Mid eye to tail fork length |
| MSY | Maximum Sustained Yield |
| N _{MSY} | Escapement goal point estimate |
| PSARC | Pacific Scientific Advice Review Committee of DFO |
| PSC | Pacific Salmon Commission |
| PST | Pacific Salmon Treaty |
| SCMM | Stikine Chinook Management Model |
| SEAK | Southeast Alaska |
| SEPP | Stikine Enhancement Production Plan |
| SFMM | Stikine Fisheries Management Model |
| SMM | Stikine Management Model |
| SPA | Scale Pattern Analysis |
| SW | Statistical Week |
| TAC | Total Allowable Catch |
| TEPP | Taku Enhancement Production Plan |
| TTC | Transboundary Technical Committee of the Pacific Salmon Commission |
| THA | Terminal Harvest Area |
| TFN | Tahltan First Nation |
| TRTFN | Taku River Tlingit First Nation |
| USFS | United States Forest Service |

LIST OF FIGURES

| | <u>Page</u> |
|--|-------------|
| Figure 1. U.S. fishing areas adjacent to the Stikine River. | 14 |
| Figure 2. The Stikine River and Canadian fishing areas. | 26 |
| Figure 3. The Taku River showing the Canadian commercial fishing area. | 47 |
| Figure 4. U.S. District 111 traditional drift gillnet fishing areas adjacent to the Taku River. | 48 |
| Figure 5. The Alsek River principal Canadian fishing areas. | 53 |

LIST OF TABLES

| | <u>Page</u> |
|--|-------------|
| Table 1. Stikine River large Chinook salmon terminal run preseason forecasts and postseason estimates from 2004 to 2019, and the 2020 preseason forecast. | 9 |
| Table 2. Stikine River sockeye salmon preseason run forecasts and postseason run size estimates from 1983 to 2019, and the 2020 preseason run forecast. | 19 |
| Table 3. Taku River large Chinook salmon terminal run preseason forecasts versus postseason estimates from 1997 to 2019, and the 2020 preseason forecast. | 34 |
| Table 4. Taku River sockeye salmon preseason run forecasts and postseason run estimates, 1994 to 2020. | 39 |
| Table 6. U.S and Canadian harvest shares of Taku River coho salmon. | 45 |
| Table 7. The 2018 SEPP results. | 54 |
| Table 8. The 2018 TEPP results. | 55 |
| Table 9. The 2019 SEPP results. (as of November 2019). | 55 |
| Table 10. The 2019 TEPP results. (as of November 2019). | 55 |
| Table 11. Chinook salmon GSI reporting groups | 58 |
| Table 12. Sockeye salmon GSI reporting groups. | 59 |

LIST OF APPENDICES

| | <u>Page</u> |
|--|-------------|
| Appendix A. 1 Proposed field projects, Stikine River 2020. | 61 |
| Appendix A .2. Proposed field projects, Taku River, 2020. | 67 |
| Appendix A. 3. Proposed field projects, Alsek River, 2020. | 73 |
| Appendix A. 4. Proposed enhancement projects for Transboundary Stikine and Taku rivers, 2020. | 75 |
| Appendix A. 5. Catalog of genetic tissue collections and baseline collection priorities. Baseline collections in 2020 are opportunistic with no identified funding. | 77 |
| Appendix B 1. Stikine Enhancement Production Plan 2020 (Signed by TBR Panel Chairs). | 79 |
| Appendix B 2. Taku Enhancement Production Plan 2020 (Signed by TBR Panel Chairs). | 80 |
| Appendix C. 1. Genetic stock identification methods for Chinook salmon stocks in the Transboundary rivers, 2020. | 81 |
| Appendix C. 2. Genetic stock identification methods for sockeye salmon stocks in the Transboundary rivers, 2019. | 105 |

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INTRODUCTION

Management of transboundary river salmon to achieve conservation, allocation and enhancement objectives, as stipulated by the PST, requires a cooperative approach by Canada and the United States. It is important that both Parties have a clear understanding of objectives and agree upon procedures to be used in managing fisheries, including criteria upon which modifications of fishing patterns will be based. This document is intended to facilitate cooperative salmon management, stock assessment, research and enhancement by ADF&G, CAFN, DFO, TFN, and TRTFN on transboundary stocks of salmon originating in the Canadian portions of the Stikine, Taku, and Alsek rivers.

This report contains, by river system (starting in the south and moving north) and species, the 2020 salmon run outlooks, spawning escapement goals, a summary of harvest sharing objectives, and an outline of management procedures to be used during the 2020 fisheries. Numerical forecasts are presented for Stikine River large Chinook (MEF > 659 mm; typically age 5–7) and sockeye salmon; Taku River large Chinook, sockeye and coho salmon; and Alsek River Chinook and sockeye salmon. Outlooks for other stocks are given qualitatively with reference to brood year escapement data where available. This report also contains plans for Stikine and Taku rivers sockeye salmon enhancement, as well as a detailed list of 2020 field projects that identify agency responsibility and contacts for various functions within each project. Information shown for 2018, 2019, and 2020 is preliminary. Unless otherwise defined, the 10-year average is 2010 to 2019 and the 5-year average is 2015 to 2019.

STIKINE RIVER

Chinook Salmon

Annex IV, Chapter 1, Paragraph 3(a)(iii) of the PST includes management details for directed fisheries targeting above border stocks of large Chinook salmon that apply in 2020.

Escapement Goal

Based on MSY analysis, Stikine River large Chinook salmon have an escapement goal range of 19,000 to 36,000 fish with a management objective of 17,400 fish, representing N_{MSY} for this stock (Bernard et al. 2000). This represents a drainage wide goal and is subject to periodic review by the TTC. Corresponding values for counts through the weir on the Little Tahltan are 2,700 to 5,300 fish with a point estimate of 3,300 fish (Bernard et al 2000). Based on the 10-year average, Little Tahltan River Chinook salmon represent 6% (range: 1–17%) of the total spawning population.

Preseason Forecast

The bilateral preseason forecast for the Stikine River large Chinook salmon terminal run is 13,400 fish. The forecast uses a sibling model in which the 2019 returns of age 4 (BY 2015) and age 5 (BY 2014) Chinook were used to predict the returns of age 5 (BY2015) and age 6 (BY2014) fish in 2020 using the relationships observed between age classes over the past nine years corrected with the 5-year average model error. The 95% confidence interval of this forecast is 5,500 to 21,200 fish.

This forecast is well below the 10-year average terminal run of 19,400 large Chinook salmon. Principal brood years contributing to the 2020 Chinook salmon run are 2014 (24,374 large fish spawning escapement), 2015 (21,597 large fish spawning escapement), and 2016 (10,554 large fish spawning escapement). The 2020 preseason forecast is insufficient for directed and assessment fisheries in both the U.S. and Canada.

Table 1. Stikine River large Chinook salmon terminal run preseason forecasts and postseason estimates from 2004 to 2019, and the 2020 preseason forecast. Forecast performance relative to actual was determined using postseason run reconstruction. Positive values indicate the forecast was higher than actual while negative values indicate the forecast was less than actual. Adjusted forecast uses 5-year average percentage error.

| Year | Forecast Estimate | | Postseason Run | Forecast Performance | |
|------|-------------------|----------|----------------|----------------------|----------|
| | Sibling | Adjusted | | Sibling | Adjusted |
| 2004 | 65,900 | | 62,137 | 6% | |
| 2005 | 80,300 | | 87,767 | -9% | |
| 2006 | 60,600 | | 62,241 | -3% | |
| 2007 | 37,400 | | 35,954 | 4% | |
| 2008 | 46,100 | | 33,619 | 37% | |
| 2009 | 31,900 | | 16,468 | 94% | |
| 2010 | 22,900 | | 19,615 | 17% | |
| 2011 | 30,000 | | 19,796 | 52% | |
| 2012 | 40,800 | | 29,911 | 36% | |
| 2013 | 32,000 | 22,400 | 21,720 | 47% | 3% |
| 2014 | 37,700 | 26,100 | 29,323 | 29% | -11% |
| 2015 | 40,600 | 30,200 | 27,354 | 48% | 10% |
| 2016 | 47,100 | 33,900 | 15,496 | 204% | 119% |
| 2017 | 24,700 | 18,300 | 8,145 | 203% | 125% |
| 2018 | 15,700 | 6,900 | 8,827 | 78% | -22% |
| 2019 | 26,300 | 8,300 | 14,283 | 86% | -41% |
| 2020 | 17,800 | 13,400 | | | |

Data source: *Final Estimates of Transboundary River Salmon Production, Harvest, and Escapement and a Review of Joint Enhancement Activities in 2017*.

Harvest Sharing Objectives

Provisions for harvest sharing and management of directed fisheries for Stikine River large Chinook salmon were successfully negotiated by the Transboundary Panel and implemented in 2005. These arrangements, with slight adjustments, were adopted through PST negotiations in 2006, renegotiated in 2019, and are in effect through 2028.

The harvest sharing provisions were developed to acknowledge the traditional harvest in fisheries, referred to as BLCs, which occurred prior to the annex period allowing for directed fisheries. The BLCs include incidental harvest in U.S. and Canadian commercial gillnet fisheries and sport fisheries, and the Canadian FN fishery. For directed fisheries, 50% of the TAC will be allocated to each country. Each Party shall determine the domestic allocation of their respective harvest shares.

When the terminal run is insufficient to provide for the Parties' Stikine River Chinook salmon BLC and the lower end of the escapement goal range, the reductions in each Party's base level fisheries, i.e. the fisheries that contributed to the BLCs, shall be proportional to the Stikine BLC shares. In this situation, an alternate assessment program may be recommended, and an assessment fishery may be implemented which fully considers the conservation needs of the stock.

With consideration for the SEAK Chinook salmon terminal exclusion and provisions of Chapter 3, U.S. harvest of Stikine River Chinook salmon up to 3,400 fish and non-Stikine River Chinook salmon harvested in District 108 will be accounted for in Chapter 3.

Management Procedures

Fishery openings will be based on weekly run strength and the TAC as defined by the PST. The preseason forecast will serve as the principal run size estimator until inseason run projections become available (typically by SW21). Inseason projections are generated by the Stikine Chinook Management Model (SCMM), or a MR estimate, or a combination of these two methods. On average, approximately 25% of the run has passed the Kakwan Point site (1996–2018) by May 25. An inseason run estimate before May 25 may be adopted if agreed to by Canada and the U.S. Weekly MR estimates are expected to be available by SW22 (May 24–30). If available, MR estimates may be used as the principal run size estimator or be used in concert with the SCMM in assessing weekly run sizes. Harvest performance of the Lower Stikine River fishery, in conjunction with daily water levels, will be monitored and may also be used, in part, to assess run size. From 2005 to 2016, the MR and SCMM average was deemed to be the most reliable predictor of terminal run size and was the principal method used to predict terminal run size after SW22. From 2017 to 2019, only the SCMM was used to predict terminal run size because insufficient MR data were available inseason.

Inseason estimates of inriver run size based on a MR estimate will be made using a bilaterally agreed-to sulk rate for tags released in event 1 of the 2-event MR program. Sulk rates will be based on analysis of inseason data. In the event a bilateral agreement cannot be reached with respect to the sulk rate, an assumed 11-day sulk rate will be used. During years with directed fisheries in District 108, a District 108 timing model is used to expand cumulative harvest to date to project harvest for the season, which is added to the inriver run projection to give an estimate of terminal run size. It is also used to determine weekly guideline harvests for District 108 fisheries. During years without directed fisheries in District 108, average harvest observed in District 108 for similar run sizes will be added to the inriver run projection to produce an estimate of terminal run size. For inseason run projections, MR abundance estimates will be expanded by timing models which include:

1. Average run timing of large Chinook salmon observed in the Canadian commercial/assessment fisheries from 2007 to 2016. Inriver timing models are used to expand the point MR estimate to project the total inriver run size. Inriver timing models are also used to determine weekly guideline harvests for the lower Stikine commercial fishery; and
2. Average run timing of large Chinook salmon in the District 108 drift gillnet fishery. This is based on a combination of run timing for the District 108 drift gillnet harvests from 1969 to 1973, select years of Canadian test fishery timing data lagged by 2 weeks, and Kakwan Point tagging CPUE lagged by 7 days (annual Kakwan Point CPUE data used for run timing was based on fishing conditions that were not unduly fettered by extraordinary high water conditions in any particular year).

United States

The 2020 preseason forecast does not allow for directed Chinook salmon fisheries in District 108. The U.S. does not anticipate any directed fisheries in 2020 based on recent trends of Stikine River Chinook salmon abundance and trends in Chinook salmon abundance throughout Southeast Alaska. As such, the U.S. will be restricting fisheries for Chinook salmon conservation.

The U.S. Federal Stikine River subsistence fishery for Chinook salmon will not open in 2020. If inseason run size estimates produce a U.S. AC during the period of May 15 to June 20, the subsistence fishery may open. A subsistence permit issued by the USFS to federally qualified subsistence users is required to fish in the Stikine River. Permit restrictions include restricting fishing area to upriver from tidal waters to the U.S./Canadian border; prohibiting fishing in tributaries or at stock assessment sites used by ADF&G and DFO; and restricting fishing gear to dipnets, spears, gaffs, rod and reel, beach seine, or gillnets not exceeding 15 fathoms (27.4 m) in length with mesh size no larger than 8 inches (20.3 cm). Subsistence fishermen will be required to check gillnets twice a day. The subsistence fishery is monitored inseason by USFS biologists who will provide weekly harvest and effort estimates to the ADF&G.

The Chinook salmon sport fishery in District 108 will be closed to retention of Chinook salmon beginning April 1 through July 14 in 2020 to protect Stikine-origin Chinook salmon and other wild SEAK Chinook salmon stocks. A small area inside District 108, adjacent to City Creek in Petersburg, will be open for the retention of Chinook salmon starting June 15 to target Alaska hatchery Chinook salmon in this location.

The District 108 directed Chinook salmon drift gillnet fishery will not open and restrictions will be implemented during the sockeye salmon fishery. Restrictions will include a delay of the initial opening by at least one week, a six-inch maximum mesh restriction, reduced time, and fishing area restrictions.

Spring troll fisheries targeting hatchery Chinook salmon in District 108 will be closed in 2020. In addition, the initial summer troll fishery in District 108 beginning July 1 will be closed to retention of Chinook salmon.

Canada

The preseason forecast of 13,400 large Chinook salmon does not allow for a directed fishery in Canada.

Although a directed commercial fishery is not anticipated to occur in 2020, the Canadian lower Stikine River commercial fishery (Figure 2) will be managed on a weekly basis with management actions driven by results of terminal run size projections derived by the SCMM and inseason MR results (for 2020, it is not likely that tag recoveries will be significant enough to generate reliable inseason MR estimates). Weekly inputs to the model may include catch data from Alaska District 108 gillnet, troll and sport fisheries; catch data from Canadian Stikine River commercial, test, FNs, and recreational fisheries; catch and effort from the Kakwan Point tagging site; and, escapement requirements. Weekly inputs required to generate a MR estimate will include the number of tags to date recovered from large Chinook salmon from the Lower Stikine commercial fishery, total catch to date of large Chinook salmon, and estimated fraction of the run that transited the fishery to date. Total available tags to date entering the fishery will be based on the median travel speed of tagged fish harvested. This metric (days from tagging site to fishery) will be subtracted from total tags applied to date at the Kakwan Point tagging site. Openings will be governed by weekly abundance and AC of large Chinook salmon based on historical weekly run timing. Average run timing of large Chinook salmon observed in the Canadian commercial/assessment fisheries from 2009 to 2018 will be used.

Should inseason projections warrant a directed harvest, fishers will be permitted one net with a maximum length of 135 m (~440 ft.) which may be deployed as a set gillnet or drift gillnet. The maximum mesh size permitted is 20.4 cm (~8.0 inch). Daily and weekly catches will be collected by a DFO representative on site. Harvests will be reported to the Whitehorse office on a daily basis.

The fishing zone is bounded by the international boundary upstream to near the confluence of the Porcupine and Stikine rivers. The Iskut River is open to commercial fishing from its mouth upstream approximately 10 km. Management of the lower river commercial fishery will switch to sockeye salmon at 12:00 noon

June 21 (SW26) unless Chinook salmon escapement concerns persist then the initial opening will be delayed for a week. Additionally, mesh size restrictions will be adopted, specifically limiting fishers to the use of 14.0 cm (~5.5 inch) mesh size through the Chinook salmon migrational period.

Achievement of escapement within the escapement goal range is the foremost priority in management considerations. Inriver allocation priority will be to fulfill food, social and ceremonial requirements of the traditional FN fishery. Commercial fisheries, therefore, will be managed to accommodate these fundamental priorities. The area of most intense management will be within the lower Stikine River commercial fishery.

It is anticipated that there will be three primary fishery management responses to inseason Chinook salmon run size projections:

1. Adjusting fishing time. Fishing time in the lower Stikine River fishery generally depends upon stock assessment and international and domestic catch allocation considerations. Although preseason expectation is for a run size not capable of providing commercial fishing opportunities, initial fishing periods would likely be of shorter duration due to uncertainty over the preseason run outlook should they be warranted. If inseason projections become available, caution will be exercised in providing any fishing opportunities.
2. Adjusting fishing area. Initially, fishing boundary locations will include the Stikine River upstream to near the mouth of the Porcupine River. The section of the Stikine River from the confluence of the Porcupine and Stikine rivers upstream to near the mouth of the Scud River may be opened should the Chinook salmon return arrive in numbers that are well above spawning escapement and FN fishery requirements. In the Iskut River, area will remain unchanged from previous years, i.e. from the mouth to a marker located approximately 10 km upstream from the mouth.
3. Adjusting quantity of fishing gear. Initially only one drift or set gillnet may be used. Gear may be increased to two gillnets, should an increase in exploitation rate be warranted based on inseason terminal run size estimates. Maximum mesh size permitted is 20.4 cm (~8.0 inch). Maximum allowable net length will remain at 135 m (~440 ft.).

In the upper Stikine River commercial fishery, should inseason run projections warrant a directed Chinook salmon harvest, the fishery will be based on openings fished in the lower Stikine River commercial fishery, lagged one week. Upper Stikine River fishers are permitted to use one net of the same dimensions as that used by fishers participating in the lower Stikine River commercial fishery as noted above. The fishing zone is bounded in the south by the confluence of the Chutine and Stikine rivers, and in the north by the confluence of the Tuya and Stikine rivers. Daily and weekly harvests will be collected by a DFO representative on site. Harvests will be reported to the Whitehorse office on a weekly basis (note: historical information indicates this fishery is largely inactive through late June, SW26).

As in past years, weekly fishing times in the FN fishery will not normally be restricted. In the FN fishery, reductions in fishing time would be considered only if no other adjustments could be made in lower and upper river commercial fisheries and in the recreational fishery. For 2020, harvesters will be encouraged to avoid harvesting Chinook salmon and focus on sockeye salmon. Daily and weekly harvests will be collected by a DFO representative on site. Harvests will be reported to the Whitehorse office on a weekly basis. Biological sampling to assess age, size, and stock identification will be conducted throughout the course of the fishery. Records will be delivered to DFO postseason.

The Stikine Chinook salmon recreational fishery is centred at the Tahltan River near its confluence with the Stikine River. Limited recreational fishing occurs in the mainstem Stikine River as well as the Iskut

River. Due to Chinook salmon escapement concerns, retention of Chinook salmon will not be permitted in the Stikine River drainage. Additionally, the Tahltan River will be closed to recreational salmon fishing June 01 to August 31. Typically, fishers are permitted four Chinook salmon per day, only two of which may be larger than 65 cm (~26 in) fork length. Possession limit consists of a two-day catch quota. Annual harvest by individual anglers is limited to ten large fish. Fishing activity, including harvest and release records, will be monitored and maintained, opportunistically, by a field technician stationed near the Tahltan River should restrictions in the recreational fishery be removed.

Harvest Information Sharing

The U.S. shall provide catches and effort in the following strata for each SW:

1. District 108 gillnet, sport, and troll fisheries,
2. Stikine River subsistence fishery, and
3. test fisheries in District 108.

Canada shall provide catch and effort statistics in the following strata for each SW:

1. the lower river commercial fishery (all areas),
2. the upper river commercial fishery,
3. the FN fishery,
4. recreational fishery (season estimate),
5. the lower Stikine River assessment fishery conducted near the international border, and
6. the ESSR or other terminal fishery catches will be reported as data become available.

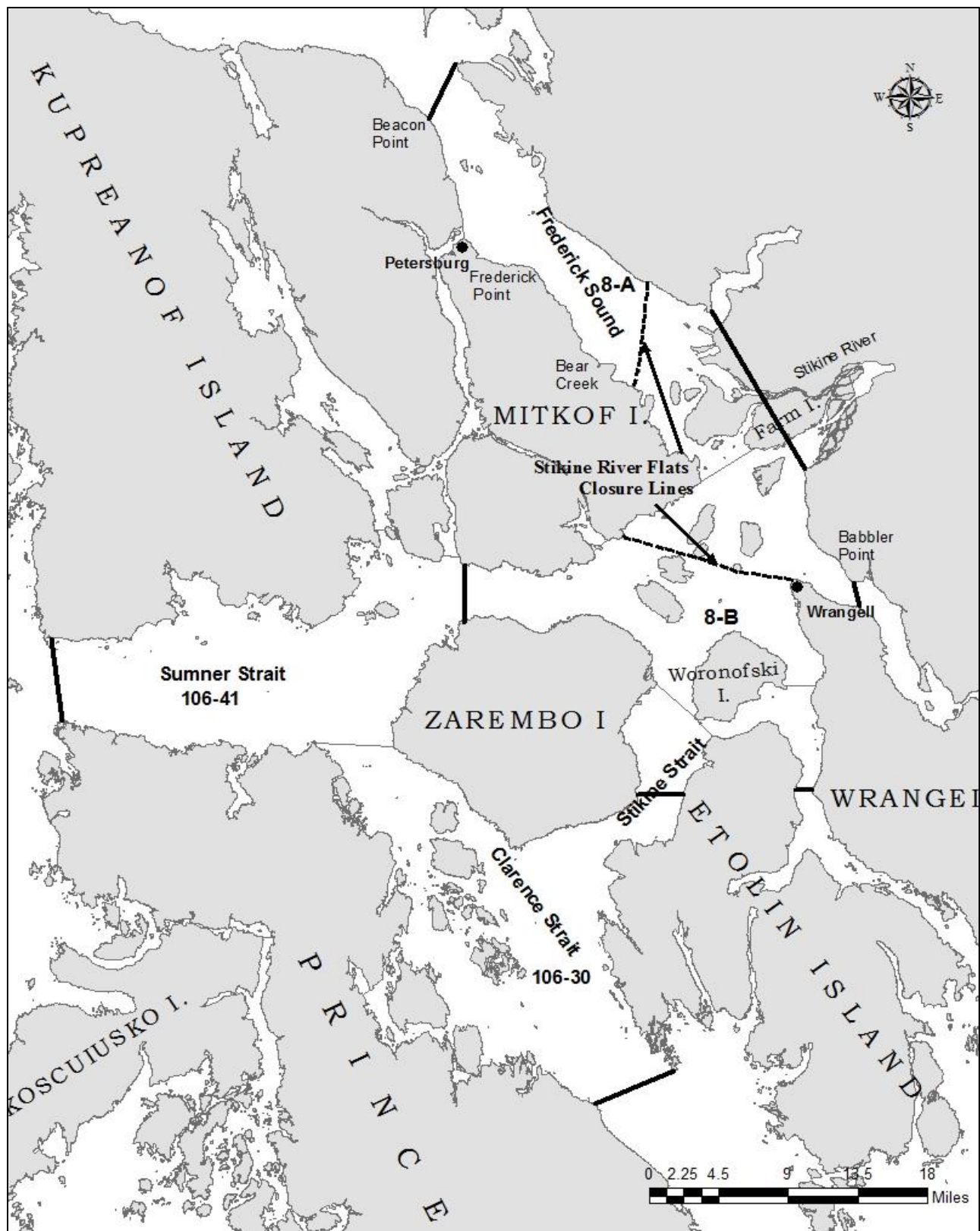


Figure 1. U.S. fishing areas adjacent to the Stikine River.

Stock Assessment Program

Each country shall:

1. provide harvest statistics for the same strata as sockeye salmon are reported,
2. sample its fisheries for: GSI (U.S.), CWT and spaghetti tags, and
3. conduct escapement and stock assessment programs as resources permit (see Appendix A. 1 for projects anticipated to be conducted in 2020).

Stock Composition of U.S. Harvests

Weekly contribution of above border Stikine River large Chinook salmon harvested in Alaska sport and commercial fisheries will be determined inseason by sampling harvest for CWT and ASL. The minimum sampling goal for CWTs is 20% of the harvest. The weekly sampling goal for ASL and GSI is 80 matched scales, tissue, and length samples with an additional 120 lengths for size composition determination.

Stock composition for sport and commercial harvest will be determined postseason. Tissue samples will be taken from sport and commercially harvested Chinook salmon in District 108 and processed postseason by ADF&G Gene Conservation Laboratory in Anchorage. GSI estimates will be used to recalculate contributions of above border Stikine River Chinook salmon in District 108 sport and commercial fisheries (Appendix C.1). In the absence of GSI data, CWT data will be used to determine stock composition postseason. Scales will be collected inseason and analyzed postseason to determine age structure composition of the harvest.

Stock Composition of Canadian Harvests (lower River commercial fishery)

GSI samples will be collected from both the lower Stikine River commercial fishery and from tagged fish originating from the Kakwan Point tagging project. These data will be analyzed to determine weekly abundance and run timing of Little Tahltan /Tahltan origin Chinook salmon and contrasted with the combined “other” stock groupings (Appendix C.1). Run timing and abundance of specific stock groupings included in the “other” category will also be determined. It is expected that these analyses will be conducted postseason (2021). Scales will be collected inseason and analyzed postseason to determine the age structure of the harvest. A minimum of 50% of the harvest will be sampled for CWT marked fish.

Sockeye Salmon

Annex IV, Chapter 1, Paragraph 3(a)(i) and Appendix of the PST includes management details for fisheries targeting above border stocks of Stikine River sockeye salmon that apply in 2020.

Stock Groupings

Stikine River sockeye salmon are characterized for research, management, and monitoring purposes, subdivided into three stock groups: 1) wild Tahltan stock, which are those fish originating from naturally spawning sockeye salmon in Tahltan Lake; 2) enhanced Tahltan stock, which are those fish originating from broodstock collected at Tahltan Lake and are subsequently back-planted as fry into Tahltan Lake; 3) mainstem stock, which are all other natural sockeye salmon populations in the Stikine River. For management purposes, collective wild and enhanced Tahltan Lake stocks are referred to as “total Tahltan stock”, or sometimes, just “Tahltan stock”.

Escapement Goal

Escapement goals have been established by the TTC for two Stikine River sockeye salmon stock groups; Tahltan stock group and mainstem stock group. Tahltan and mainstem stocks are considered discretely. Surpluses or deficits in escapement in one stock are not used to balance deficits or surpluses in the other.

Escapement goals have been established as ranges which reflect biological data and professional judgment regarding stock productivity, the ability of existing management systems to attain those established goals, precision of estimates of escapement generated by stock assessment programs, and the degree of risk considered acceptable.

Subjective management categories have been defined for various escapement ranges. A postseason estimate of escapement that falls within the Green Management Category shall be considered fully acceptable; one that falls within the Yellow Management Category shall be considered acceptable, but not desired; and one that falls within the Red Management Category shall be considered undesirable. Escapement goal ranges by management category represent the best judgment of desired escapement levels.

In 1993, the TTC established management objectives of 24,000 (escapement goal range 18,000 – 30,000) and 30,000 (escapement goal range 20,000 – 40,000) fish for the Tahltan and mainstem stocks of Stikine River sockeye salmon, respectively. For the Tahltan stock, this takes into account 20,000 naturally spawning fish and up to 4,000 fish needed for broodstock objectives of the Canada/U.S. Stikine River enhancement program.

Tahltan Stock

Ranges of escapement for the various management categories of the Tahltan stock are:

| | Management Objective = 24,000 | | | | |
|----------|--------------------------------------|-----------------|-----------------|-----------------|----------|
| Range | 0 - 12,999 | 13,000 – 17,999 | 18,000 – 30,000 | 30,001 – 45,000 | 45,000 + |
| Category | Red | Yellow | Green | Yellow | Red |

Mainstem Stock

Ranges of escapement for the various management categories of the mainstem stock are:

| | Management Objective = 30,000 | | | | |
|----------|--------------------------------------|-----------------|-----------------|-----------------|----------|
| Range | 0 - 14,999 | 15,000 – 19,999 | 20,000 – 40,000 | 40,001 – 75,000 | 75,000 + |
| Category | Red | Yellow | Green | Yellow | Red |

Data Exchange

The following data for the Tahltan sockeye salmon stock will be collected and exchanged for use in evaluating escapement goals:

1. spawning escapements, separated by wild and enhanced components,
2. smolt production, separated by wild and enhanced components, and
3. stock-specific harvests in the various fisheries.

The following relationships for the Tahltan stock will be examined:

1. terminal run as a function of spawning escapement level,
2. smolt production as a function of the number of natural spawners and enhanced fry,
3. adult production as a function of the number of smolts, and
4. relationship between the terminal run estimates to patterns of distribution and timing. This will include comparisons of various estimates (Stikine River sockeye forecast models, test fishing vs. commercial fishing CPUE, different stock ID results).

The following data for the mainstem stock will be collected and exchanged for use in evaluating escapement goals:

1. survey counts and escapement estimates based on reconstructions of inriver runs apportioned by stock ID data,
2. mainstem stock component of harvests from various fisheries, and
3. inventory and assessment data regarding historical run patterns of distribution, abundance, and timing of spawning fish.

The following relationships for the mainstem stock will be examined:

1. total escapement as a function of survey counts of escapement,
2. terminal run as a function of total spawning escapements, and
3. relationship of terminal run estimates to patterns of distribution and timing. This will include comparisons of various estimates (Stikine River sockeye salmon forecast models, aerial surveys, test fishing vs. commercial fishing CPUE, different stock ID results, etc.).

Preseason Forecast

For 2020, the terminal run¹ forecast for Stikine sockeye salmon is 103,000 fish, which constitutes a below average run size. For comparison, the 10-year average total Stikine sockeye salmon run size is approximately 120,100 fish. The 2020 forecast includes approximately 30,000 wild Tahltan (29%), 34,000 enhanced Tahltan (33%), and 39,000 mainstem sockeye salmon (38%). It is believed that final returns of Tuya implants were observed in 2019; none are expected in 2020.

The 2020 overall Stikine River sockeye salmon prediction is based on the following components:

1. A forecast of approximately 64,000 Tahltan wild and enhanced sockeye salmon of which 34,000 fish are expected from the enhancement project, and 30,000 fish are expected from natural spawners. This forecast is based on a smolt model in which the 3-year average (2017–2019) age

¹ Terminal run size = total run excluding allowance for harvests in marine areas outside the terminal Alaskan drift gillnet fisheries (e.g. Districts 106, and 108).

specific marine survival is applied to the number of smolts that emigrated from Tahltan Lake in 2017 and 2018. The smolt forecast, has proven to be more accurate than sibling forecast in recent years;

2. A forecast of approximately 39,000 mainstem sockeye salmon is based on a stock-recruitment model. Ideally, a sibling model would have been used. With this approach, the 2015 brood year returning in 2019 (age 4 fish) would be used to predict the returns of sibling fish (age 5) in 2020 based on relationships observed between these age classes over the previous 5 years. The 5-year old forecast would then be expanded by average age composition of the run. However, due to very limited fishing of mainstem stocks in 2019, it was not possible to reliably determine abundance of specific age classes; consequently, it was not possible to use a sibling model
3. In past years, the mainstem forecast averaged a sibling model with a stock-recruit model, but the sibling model has proven to be more accurate than either the stock-recruit model or average model.

Due to fluctuations in survival of Stikine River sockeye salmon, there is a high level of uncertainty in the preseason forecasts. There have been wide discrepancies between past forecasts and postseason run size estimates. Performance of preseason forecasts relative to final postseason estimates is summarized in Table 3. Despite problems with preseason forecasting, they are useful when used in concert with CPUE for management until inseason data becomes available for inseason run size projections.

Table 2. Stikine River sockeye salmon preseason run forecasts and postseason run size estimates from 1983 to 2019, and the 2020 preseason run forecast. Preseason forecasts have been based on combinations of sibling, smolt and stock-recruitment forecast methods. Forecast performance is expressed as % deviation from postseason run size estimate. Positive values indicate the forecast was higher than actual while negative values indicate the forecast was less than actual.

| Year | Preseason forecast | Postseason run size | Forecast performance | Absolute deviation | Absolute % deviation |
|-----------|--------------------|---------------------|----------------------|--------------------|----------------------|
| 1983 | 62,900 | 77,457 | 19% | 14,557 | 19% |
| 1984 | 37,500 | 83,961 | 55% | 46,461 | 55% |
| 1985 | 91,000 | 214,494 | 58% | 123,494 | 58% |
| 1986 | 262,000 | 75,456 | -247% | 186,544 | 247% |
| 1987 | 114,000 | 43,350 | -163% | 70,650 | 163% |
| 1988 | 123,500 | 45,096 | -174% | 78,404 | 174% |
| 1989 | 80,500 | 90,549 | 11% | 10,049 | 11% |
| 1990 | 94,000 | 67,384 | -39% | 26,616 | 39% |
| 1991 | 94,000 | 151,437 | 38% | 57,437 | 38% |
| 1992 | 127,300 | 231,936 | 45% | 104,598 | 45% |
| 1993 | 135,000 | 280,730 | 52% | 145,730 | 52% |
| 1994 | 312,000 | 208,036 | -50% | 103,964 | 50% |
| 1995 | 169,000 | 218,728 | 23% | 49,728 | 23% |
| 1996 | 329,000 | 372,785 | 12% | 43,785 | 12% |
| 1997 | 211,000 | 226,915 | 7% | 15,915 | 7% |
| 1998 | 218,500 | 121,448 | -80% | 97,052 | 80% |
| 1999 | 126,000 | 124,644 | -1% | 1,356 | 1% |
| 2000 | 138,000 | 78,504 | -76% | 59,496 | 76% |
| 2001 | 113,000 | 127,255 | 11% | 14,255 | 11% |
| 2002 | 80,000 | 79,329 | -1% | 671 | 1% |
| 2003 | 184,000 | 240,977 | 24% | 56,977 | 24% |
| 2004 | 289,500 | 311,987 | 7% | 22,487 | 7% |
| 2005 | 477,100 | 259,932 | -84% | 217,188 | 84% |
| 2006 | 179,200 | 268,585 | 33% | 89,407 | 33% |
| 2007 | 233,600 | 197,786 | -18% | 35,814 | 18% |
| 2008 | 228,600 | 120,209 | -90% | 108,391 | 90% |
| 2009 | 274,500 | 185,275 | -48% | 89,225 | 48% |
| 2010 | 187,700 | 157,001 | -20% | 30,699 | 20% |
| 2011 | 183,000 | 213,399 | 14% | 30,399 | 14% |
| 2012 | 134,000 | 124,540 | -8% | 9,460 | 8% |
| 2013 | 136,000 | 113,515 | -20% | 22,485 | 20% |
| 2014 | 152,300 | 153,323 | 1% | 1,023 | 1% |
| 2015 | 171,200 | 174,292 | 2% | 3,092 | 2% |
| 2016 | 223,000 | 247,892 | 10% | 24,892 | 10% |
| 2017 | 185,000 | 89,566 | -207% | 86,232 | 207% |
| 2018 | 160,900 | 61,412 | -262% | 97,249 | 262% |
| 2019 | 90,000 | 89,376 | -1% | 624 | 1% |
| 2020 | 103,000 | | | | |
| 1983–2019 | 173,200 | 160,200 | | 12,952 | 49% |

| | | | | |
|-----------|---------|---------|--------|-----|
| 2010–2019 | 162,300 | 142,400 | 19,878 | 36% |
|-----------|---------|---------|--------|-----|

Data source: *Final Estimates of Transboundary River Salmon Production, Harvest, and Escapement and a Review of Joint Enhancement Activities in 2017.*

The 2020 sockeye run forecast is characterized as below average. The preseason forecast translates into an expected TAC of 49,000 Stikine River sockeye that will be shared 53:47 between the US and Canada. The TAC outlook is comprised of the following components:

1. a forecasted Tahltan sockeye salmon TAC of 40,000 fish with an management objective of 24,000 fish and
2. a forecasted mainstem sockeye salmon TAC of 9,000 fish with an management objective of 30,000 fish.

Harvest Sharing Objectives

Pacific salmon harvest sharing provisions were renegotiated by the Transboundary Panel in January 2019 for the period 2019 through 2028.

Canada shall endeavour to harvest all fish surplus to management objectives and broodstock needs returning to the Stikine River as defined in the annual management plan. Beginning in 2019, harvest shares shall be 53% U.S. / 47% Canada from 2019 through 2023. If the final 2017 or 2018 SEPP provides an expected production of 100,000 returning sockeye salmon, the harvest shares shall be 50% U.S. / 50% Canada in 2022 or 2023. Beginning with the final 2019 SEPP and subsequent years, if expected production is 100,000 returning sockeye salmon, harvest shares three years later shall be 50% U.S. / 50% Canada. Otherwise, harvest shares for the Party that failed to implement enhancement projects designed to annually produce 100,000 returning sockeye salmon shall be reduced by 7.5% and reallocated to the other Party. If either Party fully terminates or does not continue its participation in the joint enhancement program, that Party's harvest share shall be reduced to 35%, and the harvest share adjustment shall be reallocated to the other Party for the subsequent fishing season(s). The Parties shall continue to develop and implement joint enhancement programs documented in an annual SEPP (see Annex IV, Chapter 1 (3)(a)(i)(C)(i) of the PST)(Appendix B.1.).

Management Procedures

United States

Commercial drift gillnet fisheries occur in waters of northern Clarence Strait and Sumner Strait in District 106 and in waters surrounding the terminus of the Stikine River in District 108 (Figure 1). Due to their proximity, management of these areas is interrelated resulting in some major stocks being subject to harvest in both districts. Two distinct management areas exist within each district. District 108 has Frederick Sound (Section 8-A) and Wrangell (Section 8-B) and District 106 has Sumner Strait (Subdistricts 106-41/42) and Clarence Strait (Subdistrict 106-30). Fishing gear used in Districts 106 and 108 are similar with common sockeye salmon net sizes ranging between five and six inches (130–140 mm). Both districts will be managed in accordance with the current Transboundary Rivers Annex of the PST.

The sockeye salmon season could open by regulation as early as 12:00 noon on Sunday, June 14 (SW25). However, with an expected poor return of Stikine River Chinook salmon, as well as Chinook salmon stocks throughout Southeast Alaska, conservation measures will be in place for the start of the sockeye salmon fishery. Conservation measures will include implementing a six-inch maximum mesh size in both districts,

delaying the start of the sockeye salmon fishery by one week in District 106 and by at least one week in District 108, and limiting fishing time and area in District 108. During the first few weeks of the sockeye salmon fishery, any extended fishing time, or midweek openings, will be based on the preseason forecasts, harvest estimates, and stock proportion data. Subsequent openings, fishery extensions, or midweek openings will be based primarily on inseason estimates produced by the SMM and other agreed upon methods for the remainder of the sockeye salmon season.

Due to expected return of Tahltan Lake and mainstem sockeye salmon, fishing time will likely be more liberal than what occurred in 2019. However, if the Tahltan Lake component of the run appears to be weaker than forecasted, a more conservative management approach may limit fishing time in District 108 and fishery extensions in District 106 would likely not occur during the first few weeks of the sockeye fishery. If inseason estimates of mainstem sockeye salmon fall below expectations, more conservative management actions may be needed during SWs 28–32. District 106 will be limited to two days a week during SWs 29–32 due to McDonald Lake sockeye salmon concerns.

Drift gillnet openings throughout the sockeye salmon season will begin at noon on Sundays. Announcements for drift gillnet openings throughout Southeast Alaska are made on Thursday afternoons. Announcements for any fishery extensions, or midweek openings, will be made on the fishing grounds by 10:00 a.m. of the last day of the regularly scheduled fishing period.

A U.S. Stikine River directed subsistence fishery for sockeye salmon will occur from June 21 to July 31. A subsistence permit issued by the USFS to federally qualified subsistence users is required to fish in the Stikine River. Permit restrictions include restricting fishing area to upriver from tidal waters to the U.S./Canadian border; prohibiting fishing in tributaries or at stock assessment sites used by ADF&G and DFO; and restricting fishing gear to dipnets, spears, gaffs, rod and reel, beach seine, or gillnets not exceeding 15 fathoms (27.4 m) in length with mesh size no larger than 5 1/2 inches (14.0 cm). Additionally, subsistence fishermen are required to check gillnets twice a day. Due to Chinook salmon conservation concerns, fishermen will be encouraged to tend nets closely and release live large Chinook salmon. The subsistence fishery is monitored inseason by USFS biologists who provide weekly estimates of harvest and effort to ADF&G.

A subsistence drift gillnet fishery targeting sockeye salmon is managed by ADF&G in the waters of Sumner Strait near Point Baker, which harvests an unknown number of Stikine River sockeye salmon. Waters of Sumner Strait permitted for this subsistence fishery are within three nautical miles of the Prince of Wales Island shoreline north of “Hole-in-the-Wall” at 56°15.70’ N. lat. and west of the longitude of the western entrance to Buster Bay at 133°29.00’ W. long. Only Alaska residents may participate in this fishery which will open each week from Wednesday noon through Sunday noon from June 10 through July 26 with a limit of 25 sockeye salmon per household per year. Drift gillnet restrictions include a maximum net length of 50 fathoms (91.4 m). Harvests for the past five years have ranged up to 31 sockeye salmon with two to three permits fished. It is anticipated that fewer than 100 sockeye salmon will be harvested in this fishery in 2020. Due to low effort and harvest in the Point Baker subsistence fishery, potential interception of Stikine River sockeye salmon is negligible.

Pink salmon typically begin entering District 106 in significant numbers by the third or fourth week of July. Management emphasis will transition from sockeye to pink salmon the first week of August. In 2020, the Southeast Alaska pink salmon harvest is forecasted to be 12 million fish, which is below the 10-year average (2010–2019) of 35 million fish. Early portions of the pink salmon fishery will be managed primarily by fishery performance. By early to mid-August, pink salmon destined for local systems will begin to enter the fishery in greater numbers and management will be based on observed local escapements.

If escapements are not evenly dispersed throughout the district, area and/or time restrictions may be necessary.

Chum salmon are not managed directly by ADF&G in Districts 106 and 108 and are harvested incidentally while targeting other species. Interest in harvesting chum salmon continues to be high due to good market conditions and hatchery chum salmon production. Hatchery produced chum salmon returning to Anita Bay are intercepted by drift gillnet fishermen in both districts. Chum salmon returning to Anita Bay have attracted greater fishing effort in the lower sections of District 108 near Anita Bay throughout the month of July and this trend is expected to continue in 2020. However, management actions in District 108 are based primarily on Stikine River sockeye salmon stocks during this period.

Canada

The Canadian lower Stikine River commercial fishery (Figure 2) will be managed on a weekly basis with management actions driven by results of stock, harvest, and escapement projections derived from the SMM, inriver catch performance compared to historical catch performance and run size and water levels, and inseason escapement monitoring projects. Weekly inputs to the model will include effort and harvest data from Alaska District 106 and 108 gillnet fisheries, harvest, effort and inseason stock composition data from the Canadian lower Stikine River commercial fishery and escapement requirements.

It is anticipated that management of sockeye salmon in the lower river commercial fishery will begin at 0500 hrs June 23 (SW26) for an initial 18-hour period. Due to Chinook salmon escapement concerns, the start of the sockeye salmon fishery will be delayed by over a week. Consideration for Tahltan Lake sockeye salmon stock management objectives will likely persist through July 18 (SW29). Thereafter, management attention will be focused primarily on mainstem sockeye salmon stock objectives. Actual time frames of responses to specific stock compositions may be fine-tuned inseason according to weekly results of the stock ID program.

Annex IV, Chapter 1, paragraph 4 of the PST prescribes that either Party takes corrective action in the event that a Party exceeds its catch allocation in any three of five consecutive years. In 2018, fisheries management actions based on bilaterally agreed to inseason run size information resulted in Canada exceeding its allocation for the third time in the previous five years (the other years were 2015 and 2017). In response, Canada reviewed its management actions for 2017 and 2018 in relation to stock assessment information available during the fishing season. It was found that preseason forecasts were significantly higher than postseason run estimates, resulting in early season fishing opportunities (SW26–27) that led Canada to exceed its weekly guidelines. Once inseason information became available, run projections were significantly lower but still exceeded the postseason run estimate which further exacerbated Canada's ability to manage within its AC. Management measures taken in 2019 to adjust for these factors were successful, and the 2019 harvest was within Canada's allocation. However, paragraph 4 provisions still apply for 2020.

In order account for this, i.e. to continue to align harvest with allocation, Canada will implement the following measures in 2020 based on anticipated fishing conditions (water levels) and effort (11 licences) being similar to 2017–2019:

- preseason forecast adjusted to reflect the recent observed smolt to adult survival rates (3 yrs.) for Tahltan sockeye salmon – will be used to inform management in SW26–27 and

- for SW28–34, to adjust for the tendency of the inseason models to project high during recently observed fishing conditions on the lower Stikine River, fishing opportunities (effort) will be provided conservatively.

Achievement of escapement within the escapement goal range is the foremost priority in management considerations. Inriver allocation priority will be to fulfill food, social and ceremonial requirements of the traditional FN fishery. Commercial fisheries, therefore, will be managed to accommodate these fundamental priorities. The area of most intensive management will be within the lower Stikine River commercial fishery.

The three primary fishery management responses to inseason sockeye salmon run size projections will include:

1. Adjusting fishing time. Fishing time in the lower Stikine River fishery generally depends upon stock assessment and international and domestic catch allocation considerations. Although preseason expectation is for a run size capable of providing commercial fishing opportunities, initial fishing periods will likely be of shorter duration due to uncertainty over the preseason run outlook. Once inseason projections become available, caution will be exercised in providing further fishing time.
2. Adjusting fishing area. Initially, fishing boundary locations will extend from the Canada/U.S. boundary upstream to a location near the mouth of the Porcupine River. The area includes the lower 10 km reach of the Iskut River. The section of the Stikine River upstream from the Porcupine-Stikine confluence will be closed for the initial sockeye salmon fishing periods. Consideration for increasing fishing area upstream to the boundary sign located approximately 9 km below the Stikine-Scud confluence will only be given if inseason indicators for both Chinook and sockeye salmon indicate a strong run, escapement targets are expected to be exceeded and harvests are below allocation targets. In the Iskut River, the area will remain unchanged from previous years, i.e. from the mouth to a marker located approximately 10 km upstream from the mouth.
3. Adjusting quantity of fishing gear. Initially, only one net per license will be permitted and may be deployed as a set or drift gillnet. Gear may be increased to two gillnets should an increase in exploitation rate be warranted based on inseason terminal run size estimates. Maximum allowable net length will remain at 135 m (~440 ft) and, in the absence of a directed Chinook salmon fishery, there will be a maximum mesh size restriction of 14.0 cm (~5.5 inch) through the sockeye salmon management period to conserve Chinook salmon.

In the upper Stikine River commercial fishery, the sockeye salmon fishery may open as early as June 28 (SW27), subject to Chinook salmon escapement concerns, for a 24-hour period. Thereafter, weekly fishing times will generally follow those of the lower river lagged by one week. Management regimes designed to reduce exploitation include reducing weekly fishing times and reducing gear from two nets to one net.

As in past years, weekly fishing times in the FN fishery are not expected to be restricted. Subject to conservation requirements, a terminal harvest at Tahltan Lake may occur under ESSR or other authorizations. In the FN fishery, reductions in fishing time would be considered only if no other adjustments could be made in the lower and upper river commercial fisheries.

Summary

Attainment of escapement goals for both the Tahltan Lake and mainstem sockeye salmon stocks is the primary objective of Stikine River sockeye salmon management. Harvest sharing will be based upon the TAC projections derived primarily from the SMM (recently modified without Tuya; eggs originating from Tahltan Lake were historically incubated at Snettisham Hatchery and released as fry into Tuya Lake in the upper Stikine drainage from 1992 to 2014) as outlined in the PST. In addition, other methods of estimating run sizes may be used in conjunction with the SMM with consultation between managers. Other factors that may influence management are results from inseason escapement projections, e.g. projected Tahltan Lake weir counts and water levels. TAC estimates will likely change from week to week as the SMM updates projected run sizes from cumulative CPUE's each week. Variations in TAC estimates will likely be larger early in the season when CPUE is high. Management actions will reflect these week-to-week changes in TAC estimates. Fishery managers from both countries will have weekly contact in order to evaluate output from the SMM, SFMM, and other stock assessment tools to update their respective management actions.

Inseason Data Exchange and Review

Canada and the U.S. will conduct data exchanges by telephone and/or email on Wednesday afternoon or Thursday morning of each week during the fishing season. At that time, current harvest statistics and stock assessment data will be updated, exchanged, and reviewed. Management plans for the next week for each country will be discussed at this time. It is anticipated that additional communications will be required each week. Weekly decision deadlines will be a) for Districts 106 and 108, 11:00 a.m., Thursday, Alaska Daylight Time; and, b) for the Canadian Stikine River fishery, 10:00 a.m., Friday, Pacific Daylight Time.

DFO field personnel will provide weekly otolith samples from the lower Stikine River commercial fishery for pick-up by ADF&G; or, otoliths may be delivered to Wrangell via select commercial fishermen Tuesday each week for processing and analysis in Juneau. Results from preliminary analysis can be expected by Thursday of the current week.

Stock Assessment Program

This section summarizes agreements regarding data which will be collected by each Party and, when appropriate, procedures that will be used for analysis.

Sockeye Salmon Harvest Statistics

The U.S. shall provide harvest and effort by SW in the following strata:

1. Subdistricts 106-41/42 (Sumner Strait),
2. Subdistrict 106-30 (Clarence Strait),
3. District 108, and
4. Stikine River subsistence fishery.

Canada shall provide harvest and effort by SW in the following strata:

1. lower river commercial fishery (all areas),

2. upper river commercial fishery,
3. FN fishery,
4. lower Stikine River test fishery conducted near the international border, and
5. the ESSR or other terminal fishery catches will be reported as data become available.

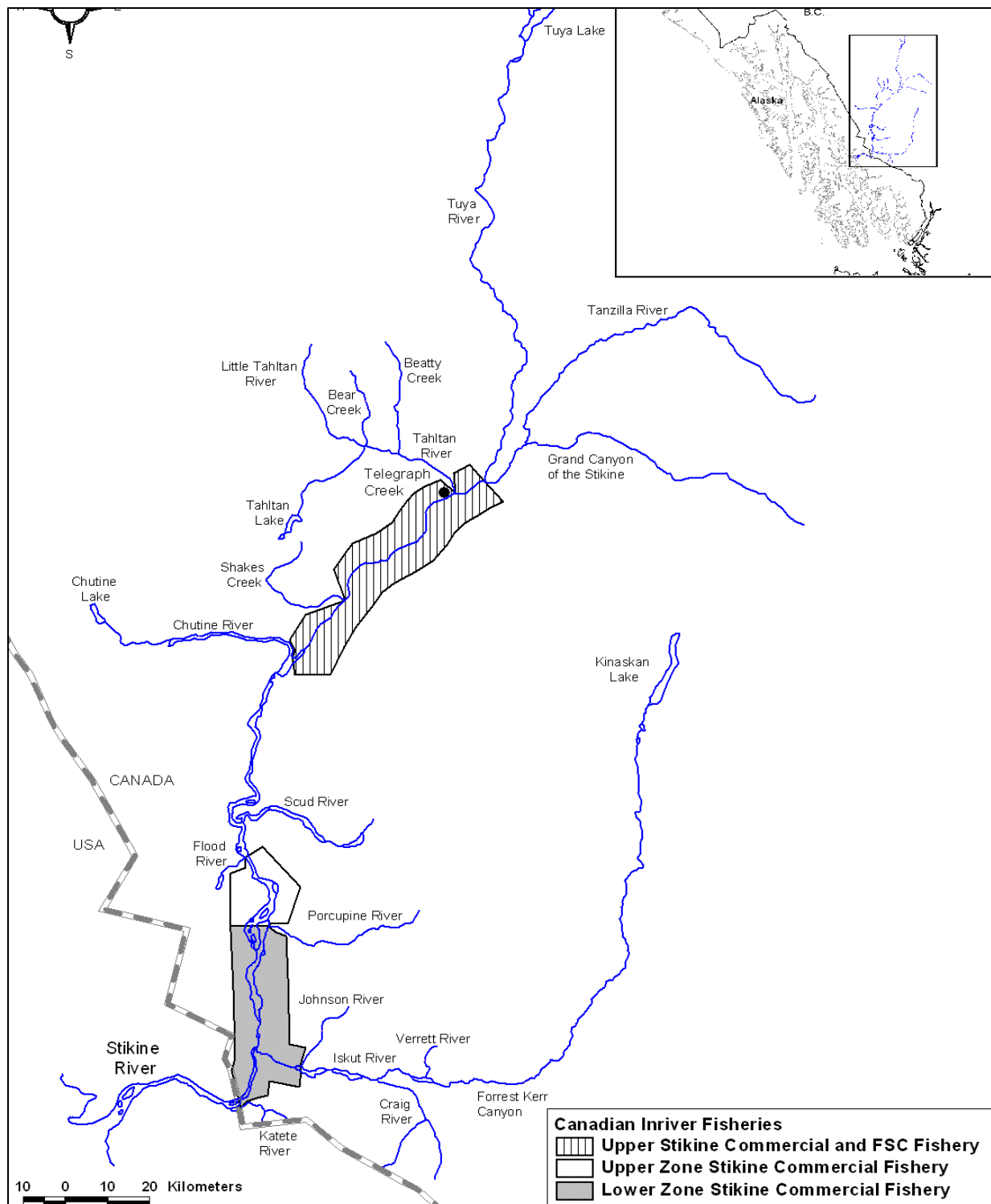


Figure 2. The Stikine River and Canadian fishing areas.

Stock Assessment Program

Stock Composition of U.S. Harvests

Districts 108 and 106 drift gillnet fisheries sockeye salmon harvest will be sampled weekly to obtain biological data used to estimate stock composition and age determination. Per week samples include 300 matched genetic tissue, otolith, and ASL samples in Subdistrict 106-41/42 (no otolith collection after SW 31); 520 matched genetic tissue, otolith, and ASL samples in District 108; and 300 matched genetic tissue, and ASL samples in Subdistrict 106-30. Otolith samples collected inseason will be sent to the ADF&G Mark, Tag, and Age Laboratory in Juneau to be processed and analyzed, within two days of the end of the fishing period, for contributions of enhanced Tahltan, Tuya, Taku, and U.S. sockeye salmon. In Subdistrict 106-30 weekly enhanced contribution will be estimated by applying the weekly proportion of enhanced Tahltan fish from the total Tahltan fish harvested in Subdistrict 106-41 to the total weekly harvest of Tahltan fish in Subdistrict 106-30. The proportions of enhanced fish and U.S. harvest data will be part of the data used in the weekly Stikine Management Models to estimate Stikine River inriver and terminal run estimates.

Postseason, GSI analysis will provide weekly stock composition estimates, which are used to estimate final contributions of Tahltan and mainstem sockeye salmon stocks to the harvests made each week in District 108 and Subdistricts 106-41/42 and 106-30 (Appendix C.2). Enhanced Tahltan and Tuya stocks will be determined through otolith analysis. Additionally, GSI analysis will provide seasonal estimates of age-specific stock composition for all major contributing age classes (>5%) for use in brood tables. These estimates are produced with a mark- and age-enhanced genetic mixed-stock analysis (MAGMA) model, which is an extension of the Pella-Masuda GSI model (Pella and Masuda 2001) that incorporates paired otolith mark and scale-age data. Age-specific stock composition estimates are only provided at the annual level because weekly sample sizes are not sufficient to meet precision standards. U.S. subsistence sockeye salmon harvest stock composition analysis will be based on postseason estimates of the Canadian lower Stikine River commercial fishery.

Stock Composition of the Inriver Canadian Harvest

Egg diameter data is used to estimate Tahltan stock versus the mainstem stock contributions to the sockeye salmon harvest. Tahltan fish generally have smaller diameter eggs (<3.7 mm) compared to mainstem fish. In addition, the enhanced Tahltan component will be determined from the analysis of otolith samples collected each week.

In the lower Stikine River commercial fishery, sockeye salmon harvest will be sampled weekly to obtain a total of 400 random samples. The first 200 will be sampled for ASL, egg diameter from females, otoliths, and genetic tissue sample collection. The second 200 will be sampled for length, sex, and egg diameter from females. ADF&G will analyze thermal otolith marks from a subsample of at least 60 of these samples each week. Arrangements will be made to ensure timely transfer of samples and notification of results for use in management decisions no later than the week following when samples are collected. Weekly shipment times for otolith samples from the river to ADF&G will be on Tuesday afternoon or Wednesday morning, unless otherwise agreed. If sample sizes are not available due to lack of fishing effort, samples may be augmented from test fishery harvests. The proportions of enhanced fish and Canadian harvest data will be part of the data used in the weekly Stikine Management Models to estimate Stikine River inriver and terminal run estimates.

In the upper Stikine River fishing area, up to 600 sockeye salmon will be sampled annually for ASL, egg diameters from females, and otoliths from the combined upper river commercial and FN fisheries.

Stock Composition and Run Timing in the Canadian Assessment Fishery

Proportions of Tahltan and mainstem sockeye salmon in test fishery harvest in the lower Stikine River will be estimated inseason in a similar manner to the commercial fishery. Up to 400 fish harvested in the test fishery per week will be sampled for matched ASL, egg diameter from females, and otolith samples. Two hundred of these will include matched genetic tissue sample collection. Test fishery otolith samples will be transferred to ADF&G as per arrangements made for commercial samples, for inseason analysis.

Postseason sockeye salmon stock composition estimates will be based on egg diameter from females, otolith, and ASL analyses; the enhanced proportion will be determined from otolith samples.

Spawning Escapement Estimates

An adult enumeration weir will be used to estimate Tahltan Lake sockeye salmon escapement. Age composition will be estimated from scale samples, and contributions of enhanced sockeye salmon will be determined from otolith samples. Approximately 600 fish will be sampled at the weir in proportion to the run for ASL; as well, 400 otolith and ASL samples will be taken from male fish (subject to conservation concerns, as this sampling component is lethal). Additionally, 400 otolith samples will be taken from the broodstock.

Mainstem sockeye salmon escapement will be estimated postseason using migratory timing information obtained from CPUE and stock identification data from commercial fishery and historical information, combined with weekly stock compositions estimated from commercial fishery harvest. Aerial surveys of six mainstem sockeye salmon spawning indices will be conducted to serve as ancillary escapement information.

Stikine River Run Estimates

The annual inriver Stikine River run is estimated by dividing the total inriver Tahltan run by the inriver stock composition of the Tahltan stock. Inriver Tahltan stock composition is estimated from analyzing data and samples taken in the lower river commercial (assessment) harvest and/or historical information (drift gillnet and set net). Samples include data on genetics, egg diameter from females (small eggs are Tahltan), otolith marks (Tahltan enhanced fish), age, and sex. To estimate the total stock composition postseason, the genetic presence/absence of Tahltan will be used to proportion out the Tahltan fish from mainstem. Enhanced Tahltan fish will be determined by otolith marks. Until the genetic analysis is complete the postseason model and historical data will be used to estimate stocks. Fishery stock composition is then multiplied by respective harvest to get stock specific harvest, CPUE, and migratory timing.

Data Evaluation Procedures

Historical Database

Canadian commercial fishing began in the Stikine River in 1975, but the methodology for estimating sockeye salmon terminal run sizes was not well standardized until 1982. Therefore, estimates of run size after this time are better than those made prior to 1982. The historical databases since 1979 for the Canadian lower Stikine River, from 1985 on for Alaskan Subdistricts 106-41/42 commercial fisheries, since 1986 to 2004 for the Canadian test fishery, from 2002 for the Subdistrict 106-30 fishery, and since 1986 for the District 108 fishery were used in the development of the SFMM for 2016 (note: the incomplete fishing pattern and unusual migratory behavior observed in the Canadian Lower Stikine River commercial fishery in some years may preclude the use of the data from those years in the model).

Management Models: SMM and SFMM

A description of the original SMM is given in the PSC report (1988). Many subtle changes have been made to the model since that documentation was written. The description was subsequently updated in Miller and Bednarski 2017. In addition, updates to account for loss of Tuya production have been incorporated. The purpose of the model is to aid managers in making weekly harvest decisions to meet U.S./Canada treaty obligations for harvest sharing and conservation of Stikine River sockeye salmon.

The SMM prediction model, based on the relationship between inriver cumulative CPUE and inriver run size along with weekly run fraction (based on the cumulative CPUE in the District 108 fishery) and cumulative harvest in District 108, is updated to make weekly inseason predictions of the total terminal run size and the TAC. First, a separate linear regression is used to predict inriver run size using cumulative CPUE from the inriver fishery for each week of the fishery beginning in SW27 (using cumulative CPUE from SW24–26). If the inriver run abundance is expected to be below average (low), intercept in the linear regression is forced to be zero. Second, to estimate the terminal run, the projected inriver run is added to the projected total season harvest of Stikine River sockeye salmon in District 108. Projected harvest in District 108 is based on an assumed 90% contribution of Stikine River sockeye salmon to the cumulative harvest expanded by historical run timing, and projected District 106 harvest is based on the assumption that 10% of the terminal run will be harvested in District 106. Therefore, the terminal run projection is the sum of the projection for the inriver run and the projection of the District 108 cumulative harvest expanded by historical run timing and then multiplied by $1/0.9$.

The SMM also estimates the stock proportions in District 106 and 108 harvests, from historical postseason SPA into triggers of run size for Tahltan and Mainstem; averages used each week depended upon whether the run was judged to be below average (0–40,000 fish), average (40,001–80,000 fish), or above average (80,001+ fish). The SMM for 2020 is based on CPUE data from 1994 to 2019 from the Alaska District 106 fishery and the Canadian commercial fishery in the lower river and from the lower Stikine River test fishery from 1986 to 2004. Enhanced Tahltan stock proportions are adjusted inseason based on the analysis of otolith samples taken in Districts 106 and 108.

Inriver CPUE from 1994 to 2000, 2004 to 2011 (excluding upper fishing area harvests and when additional nets were introduced into the fishery), is standardized, depending on the management regime expected to be in place, to ensure annual CPUE values are comparable. Historical CPUE values will reflect those of a one net regime; model inputs of CPUE from the lower river commercial fishery will be adjusted accordingly depending on whether one or two nets are being fished. If the management regime permits two nets and a fishing zone extended upstream to the mouth of the Flood River, as occurred in 2003 to 2009, the model will use adjusted data for lower Stikine River commercial CPUE which will exclude harvest and effort data from the Flood Glacier area (i.e. the extended fishing area fished during 1997–2000, 2004–2007, and 2009). In addition, weekly CPUE data from 1994 to 2000 and 2005 to 2009 (excluding the Flood area CPUE data) is decreased by 25% to account for the extra gear allowed during this period. This makes the historical CPUE data comparable with 2020 data.

Four sets of CPUE data have been used to predict the terminal run:

1. Subdistrict 106-41/42 cumulative CPUE of Stikine sockeye salmon stocks.
2. District 108 cumulative CPUE of Stikine sockeye salmon stocks.
3. Lower Stikine River commercial CPUE of Stikine sockeye salmon stocks.
4. Lower river test fishery cumulative CPUE.

For 2020, along with the SMM prediction model, the SFMM preliminary prediction model will be updated to make weekly inseason predictions of total terminal run size and TAC. The SFMM gives six estimates of run size compared to three estimates given by the SMM. The first four inseason terminal run size estimates of the SFMM (Model1–Model4) all have the same second order polynomial regression model structure,

$$\hat{Z}_{i,j} = \alpha + \beta_1 X_{i-1,j1} + \beta_2 X_{i-1,j1}^2 + \sum_{i=26}^{36} \gamma_i (D_i). \quad (1)$$

In this model structure, \hat{Z} is the predicted terminal run size estimated from data source j and for time period i , α is the intercept for SW 25, β is the slope of the regression line, γ is the adjustment to the intercept based on SW of the prediction ($i=26-36$), and X is data from data source j through time period $i-1$. The four data sources for the inseason model are: (1) cumulative commercial harvest of Subdistrict 106-41/42 through SWs $i-1$; (2) cumulative commercial harvest of the District 108 primary sockeye salmon harvest area through SWs $i-1$; (3) cumulative commercial CPUE of Subdistrict 106-41/42 through SWs $i-1$; or (4) cumulative commercial CPUE of the District 108 sockeye salmon area through SWs $i-1$.

Similar to the SMM model structure, Model5 and Model6 have the model structure,

$$\hat{Z}_{i,j} = \frac{I_{i,k} + (X_{i-1,j} / Y_{i-1})}{0.9}, \quad (2)$$

where I is the projected inriver run estimate by model k for time period i added to data from data source j through the time period $i-1$ (X) divided by cumulative historical run timing through SWs $i-1$ (Y). The data source is cumulative commercial harvest of the District 108 sockeye salmon area through SWs $i-1$. Projected harvest in the District 108 sockeye salmon area is based on an assumed 90% contribution of total Stikine sockeye salmon to cumulative harvest. There were two different inriver models (I_k). The first inriver model, used for Model5 terminal run size prediction, is based on an ANCOVA model,

$$\hat{I}_{i,j} = \alpha + \beta_1 X_{i-1,1} + \sum_{i=27}^{36} \gamma_i (D_i) + \sum_{i=27}^{36} \delta_{1i} (X_{i-1,1} D_i), \quad (3)$$

where X is cumulative inriver commercial harvest through SWs $i-1$ and δ is an interaction term. The second inriver model, used for Model6 terminal run size prediction, is a second order polynomial regression model using cumulative CPUE of the lower inriver commercial fishery through SWs $i-1$ (similar to equation 1).

For 2020 inseason predictions of abundance and TAC will be based on the following datasets:

1. Management actions in SW26–27 will be based on the preseason forecast.
2. Forecasts for SW27–30 will be based on the SMM with consideration given to the SFMM produced forecasts.
3. After SW30, management models will continue to be updated using the cumulative harvest data from Subdistrict 106-41/42 fishery data; however, run projections tend to be less reliable after SW30 and will be viewed accordingly.
4. Historical timing data will be used to provide weekly guideline harvests for each country.
5. Weekly management decisions may include other considerations:
 - a. Lower river commercial CPUE of the Tahltan Lake stock grouping may be used to calculate inriver run size by a linear regression equation independent of the model. Run size of Tuya and mainstem stock grouping will be determined based on the proportion of

the CPUE of these stock groupings in the current SW and expanded by run timing (note: water levels and associated changes in exploitation rates will be monitored and used in assessing the run size);

- b. The current week's inriver run size of Tahltan Lake sockeye salmon may be calculated based on estimated harvest rate in the lower Stikine River commercial fishery expanded by run timing. Harvest rate is estimated based on the historical relationship between effort and inriver run size. Run size projections for Tuya and mainstem stock groupings will be determined based on proportion of the CPUE of these stock groupings through the current SW and expanded by run timing (note: water levels and associated changes in exploitation rates will be monitored and used in assessing the run size);
- c. Harvest rates in existing fisheries compared to historical averages, run sizes, and water levels.
- d. Comparison of current year inriver harvest performance by stock grouping against past harvest performance and run size, and perceived changes in current year run timing information from the run timing regime identified in management models.

Separate projections of terminal run size will be made for combined Stikine sockeye salmon stocks (wild plus enhanced), the Tahltan Lake stock (wild plus enhanced), enhanced Tuya stock, and mainstem stock. This information will be used inseason to assist in fisheries management and postseason will be evaluated along with other measures of abundance.

The part of the models which determines total and weekly TAC levels for U.S. and Canadian fisheries has been formulated in EXCEL® for use by managers inseason. This part of the model uses coefficients from the linear regression model, established escapement goals, and PST harvest sharing provisions to determine TAC for each country. Estimates of weekly TAC and effort are provided as guidelines for the managers and are derived from 1986 to 2011 average run timing of stocks and the corresponding average CPUE levels of each fishery.

Inseason Use

For 2020, the models' predictions will set TAC levels; however, additional information may be used to calculate run size to inform decisions regarding fishery openings. Model output will be evaluated and compared with discrepancies from other information available on run strength (e.g. inriver Tahltan Lake CPUE and water level). Postseason evaluation will be used to improve the SMM and SFMM for the next year.

Postseason Evaluation

After the fishing season is over, the TTC will evaluate how well the SMM and SFMM performed in predicting the terminal run, where discrepancies occurred, and what might have caused them. The TTC will also determine whether escapement goals were met according to the **Spawning Escapement Goals** section of this report. Results from the evaluation will be presented in the annual harvest and escapement report prepared by the committee.

Coho Salmon

Annex IV, Chapter 1, Paragraph 3(a)(ii) of the PST includes management details for directed fisheries targeting above border stocks of Stikine River coho salmon that apply in 2020.

Escapement Goal

Stikine River coho salmon have an interim escapement goal range of 30,000 to 50,000 fish; however, this is not biologically based nor is there an assessment program in place for Stikine River coho salmon.

Preseason Forecast

Although annual aerial surveys and past test fishing projects, the latter of which, provided reliable run timing information coupled with “coarse” estimates of coho salmon run size relative to the inriver run size of sockeye salmon, there remains a lack of reliable escapement and marine survival data for Stikine River coho salmon required to generate a sound, defensible forecasts.

Harvest Sharing Objectives

The U.S. management intent is to ensure that sufficient coho salmon enter the Canadian section of the Stikine River to meet the agreed escapement goal range, plus an annual Canadian harvest of 5,000 coho salmon in a directed coho salmon fishery.

Stock Assessment Program

Each country shall:

1. provide harvest statistics for the same strata as sockeye salmon,
2. sample its fisheries for CWT, and
3. conduct escapement programs as resources permit.

Management Procedures

United States

Drift gillnet fishing for coho salmon will start in late August or early September. Alaskan hatcheries contribute substantially to coho salmon harvest in District 106 and 108 fisheries. Inseason estimates from CWT recovery data will be used to identify the hatchery component of harvest. Only harvest of wild coho salmon will be used for fishery performance evaluation. If there is a conservation concern for Stikine River coho salmon, District 108 drift gillnet and troll fisheries will be restricted.

The troll fishery harvests coho salmon primarily during the summer troll fishery (July 1 to September 30). The summer fishery targets Chinook and coho salmon. Chinook salmon are allowed to be retained during two periods, one beginning July 1 and the other in August. When Chinook salmon harvest goals are reached, the fishery is closed to Chinook salmon retention but remains open to coho salmon retention. During the summer troll fishery, the salmon troll fishery in District 108 is opened concurrently with drift gillnet fishing. The coho salmon season usually remains open through September 20 but may have closures for short periods in July and August for conservation and/or allocative reasons. An extension of the coho salmon season to September 30 may occur during years when the department projects escapements will be met.

A U.S. Stikine River subsistence fishery for coho salmon will occur in 2020 from August 1 to October 31. A subsistence permit issued by the USFS to federally qualified subsistence users is required to fish in the Stikine River. Permit restrictions include: restricting fishing area to upriver from tidal waters to the U.S./Canadian border; prohibiting fishing in tributaries or at stock assessment sites used by ADF&G and DFO; and restricting fishing gear to dipnets, spears, gaffs, rod and reel, beach seine, or gillnets not exceeding 15 fathoms (27.4 m) in length with mesh size no larger than 5 1/2 inches (14.0 cm). Subsistence fishermen will be required to check gillnets twice a day. The subsistence fishery is monitored inseason by USFS biologists who provide weekly estimates of harvest and effort to ADF&G.

Canada

Coho salmon management will commence in SW35 (starting August 23). It is anticipated that the AC of 5,000 fish will be harvested within a two to three week directed coho salmon fishery. Fishers will be permitted the use of one, 135 m (~440 ft.) gillnet. Maximum mesh size will be restricted to 20.4 cm (~8.0 inch). The Canadian fishery will be restricted in the event of conservation concerns.

TAKU RIVER

Chinook Salmon

Annex IV, Chapter 1, Paragraph 3(b)(iii) of the PST includes management details for directed fisheries targeting above border stocks of large Taku River Chinook salmon that apply in 2020.

Escapement Goal

Based on MSY analysis, Taku River large Chinook salmon have an escapement goal range of 19,000 to 36,000 fish with a management objective of 25,500 fish, representing N_{MSY} for this stock (McPherson et al. 2010).

Preseason Forecast

The bilateral preseason forecast for the Taku River large Chinook salmon terminal run is 12,400 fish. The forecast uses a sibling model in which 2019 returns of age 4 (BY 2015) and age 5 (BY 2014) Chinook salmon were used to predict returns of age 5 (BY2015) and age 6 (BY2014) fish in 2020 using relationships observed between age classes over the past nine years corrected with the 5-year average model error. The 95% confidence interval of this forecast is 5,200 to 19,600 fish.

This forecast is well below the 10-year average terminal run of 19,400 large Chinook salmon. Principal brood years contributing to the 2020 Chinook salmon run are 2014 (23,532 large fish spawning escapement), 2015 (23,567 large fish spawning escapement), and 2016 (9,177 large fish spawning escapement). The 2020 preseason forecast is insufficient for directed and assessment fisheries in both the U.S. and Canada.

Table 3. Taku River large Chinook salmon terminal run preseason forecasts versus postseason estimates from 1997 to 2019, and the 2020 preseason forecast. Preseason forecasts of large Chinook salmon terminal run size based on sibling models; prior to 2005, forecasts were for escapement. Forecast performance relative to actual was determined using postseason run reconstruction. Positive values indicate the forecast was higher than actual while negative values indicate the forecast was less than actual. Adjusted forecast uses 5-year average percentage error.

| Year | Forecast Estimate | | Postseason Run | Forecast Performance | |
|------|-------------------|----------|----------------|----------------------|----------|
| | Sibling | Adjusted | | Sibling | Adjusted |
| 1997 | 106,100 | | 126,202 | -16% | |
| 1998 | 47,800 | | 34,916 | 37% | |
| 1999 | 24,500 | | 22,445 | 9% | |
| 2000 | 32,100 | | 41,512 | -23% | |
| 2001 | 38,600 | | 53,390 | -28% | |
| 2002 | 39,900 | | 61,340 | -35% | |
| 2003 | 44,200 | | 42,882 | 3% | |
| 2004 | 56,500 | | 82,681 | -32% | |
| 2005 | 99,600 | | 65,334 | 52% | |
| 2006 | 64,200 | | 61,859 | 4% | |
| 2007 | 38,700 | | 18,650 | 108% | |
| 2008 | 39,400 | | 30,186 | 31% | |
| 2009 | 50,200 | | 35,106 | 43% | |
| 2010 | 41,300 | | 35,784 | 15% | |
| 2011 | 41,000 | | 24,088 | 70% | |
| 2012 | 48,000 | | 21,083 | 128% | |
| 2013 | 26,100 | 18,500 | 19,388 | 35% | -5% |
| 2014 | 37,900 | 26,800 | 27,324 | 39% | -2% |
| 2015 | 36,900 | 26,100 | 26,798 | 38% | -3% |
| 2016 | 32,600 | 29,200 | 11,631 | 180% | 151% |
| 2017 | 18,100 | 13,300 | 8,643 | 109% | 54% |
| 2018 | 7,100 | 4,700 | 7,328 | -3% | -36% |
| 2019 | 11,300 | 9,100 | 11,796 | -4% | -23% |
| 2020 | 15,100 | 12,400 | | | |

Data source: *Estimates of Transboundary River Salmon Production, Harvest, and Escapement and a Review of Joint Enhancement Activities in 2017*.

Harvest Sharing Objectives

Provisions for harvest sharing and management of directed fisheries for Taku River large Chinook salmon were successfully negotiated by the Transboundary Panel and implemented in 2005. These arrangements, with slight adjustments, were adopted through PST negotiations in 2006, renegotiated in 2019, and are in effect through 2028.

Harvest sharing provisions were developed to acknowledge the traditional harvest in fisheries, referred to as BLCs, which occurred prior to the annex period allowing for directed fisheries. BLCs include incidental harvest in U.S. and Canadian commercial gillnet fisheries and sport fisheries, and the Canadian FN fishery. For directed fisheries, 50% of the TAC will be allocated to each country. Each Party shall determine the domestic allocation of their respective harvest shares.

When the terminal run is insufficient to provide for the Parties' Taku River Chinook salmon BLC and the lower end of the escapement goal range, reductions in each Party's base level fisheries, i.e. the fisheries that contributed to BLCs, shall be proportional to Taku BLC shares. In this situation, an alternate assessment program may be recommended, and an assessment fishery may be implemented which fully considers conservation needs of the stock.

With consideration for the SEAK Chinook salmon terminal exclusion and provisions of Chapter 3, U.S. harvest of Taku River Chinook salmon up to 3,500 fish and non-Stikine River Chinook salmon harvested in District 111 will be accounted for in Chapter 3.

Management Procedures

Management coordination between U.S. and Canadian fishery managers will involve weekly communication between designated members or alternates. Canadian and U.S. fishery managers will conduct data exchanges by telephone and/or email on Wednesday afternoon or Thursday morning of each week during the fishing season. At that time, current harvest statistics and stock assessment data including MR data will be updated, exchanged, and reviewed. Management plans for the next week for each country will be discussed at this time. It is anticipated that additional communications will be required each week. Weekly decision deadlines will be a) for District 111, 11:00 a.m., Thursday, Alaska Daylight Time; i.e. noon Pacific Daylight Time; and, b) for the Canadian Taku River fishery, 10:00 a.m., Friday, Pacific Daylight Time.

Inseason estimates of the inriver run will be made using a bilaterally agreed-to sulk rate for tags released in event 1 of the two-event MR program. Sulk rates will be based on analysis of inseason data. In the event bilateral agreement cannot be reached with respect to sulk rate, an assumed 10-day sulk rate will be used. Inseason terminal run projections will be made using average run timing seen in catches at Canyon Island (or other bilaterally agreed-to timing). In addition, terminal marine harvests will be lagged one week to account for travel time between Taku Inlet and event 2 sampling area.

For inseason estimates, a valid Petersen will be sought. In the event a valid Petersen is not available, upon agreement, another valid estimate may be used. Should there be no agreement on an alternate valid estimator then the most recent agreed valid estimate will be used. If no agreed-to valid estimate has been generated the preseason forecast will be used.

$$TR = [(P_t + \text{Cus}_{(t-1)})/p_t]$$

Where: TR = projected terminal run of large Chinook salmon for the season;
 P_t = inriver population estimate from the MR program through week “t”;
 Cus_{t-1} = cumulative U.S. Chinook salmon catch to week “t-1”, i.e. U.S. catch lagged one week to account for migration timing;
 p_t = estimated cumulative proportion of run through to week t determined from the inriver run timing based on historical catch data from Canyon Island. (Both Parties must agree prior to adjusting run timing estimates inseason).

The PST harvest sharing provisions will be applied to weekly Chinook salmon AC projections to guide management of the Parties’ respective commercial fisheries. Run timing will be used to apportion the Parties’ ACs each week to provide guideline harvest levels for use in management. Though not likely to occur in 2020 due to the poor Chinook salmon forecast, test/assessment fisheries will be based on no more than four openings per week and effort will be standardized as best as possible throughout these days.

United States

The 2020 preseason forecast of 12,400 Taku River large Chinook salmon does not provide an AC for any directed Taku River Chinook salmon fisheries in District 111. The U.S. does not anticipate any directed fisheries in 2020 based on recent trends in Chinook salmon abundance throughout Southeast Alaska. Depending on development of the Taku River Chinook salmon run, Chinook salmon conservation measures including restrictions in time (including night closures), mesh size (6 inch maximum), and area (upper Taku Inlet, Point Bishop and Point Arden south below Grand Island closed) may be imposed during initial weeks of the directed sockeye salmon fishery.

The Chinook salmon sport fishery in District 111 will be closed from April 1 through June 14 to protect Taku-origin Chinook salmon and other SEAK wild Chinook salmon stocks. The Taku River Personal Use sockeye salmon fishery will also have a delayed start occurring in mid-July.

Canada

As in past years, restrictions in weekly fishing times in the Canadian FN fishery are not anticipated. Any reductions in fishing time would be considered only if no other adjustments could be made in commercial and recreational fisheries. Through discussions with the TRTFN, the poor Chinook salmon forecast for 2020 has been conveyed by DFO and it is believed that fishing effort will be extremely limited during the Chinook salmon season. Catches will be collected by TRTFN representatives and reported to the Whitehorse DFO office on a periodic basis.

The Taku River recreational fishery takes place primarily on the Nakina River; some additional fishing occurs on the Tatsamenie Lake outlet stream and other Taku River tributaries. In light of the poor Chinook salmon forecast, the Taku recreational fishery will be prohibited from fishing Chinook salmon effective April 1 through to the end of March 2021. The Nakina River will be closed to salmon fishing July 20 through August 15. The Tatsamenie Lake outlet stream will be closed from August 20 through September 15. The aggregate daily limit for salmon is four fish and the possession limit is eight fish. Annual harvest of Chinook salmon over 65 cms (~26 in) fork length is limited to ten fish from all fresh waters of British Columbia.

The Taku River commercial fishing area extends from approximately 50 m (~165 ft) upstream of the Canada/U.S. border to boundary signs located near Yellow Bluff, approximately 18 km (~11 mi) upstream and excluding Flannigan and South Fork sloughs. The vast majority of fishing effort occurs downstream of the Tulsequah River.

The 2020 bilaterally agreed preseason forecast of 12,400 large Chinook salmon is not sufficient for a directed commercial fishery and is well below the lower end of the escapement goal range. Typically, inseason management of Taku River Chinook salmon depends on abundance estimates generated from the joint MR program in the lower Taku River with tags being applied at Canyon Island and recoveries being made in Canadian assessment and/or commercial fisheries or other agreed to recovery methodology. For 2020, there will not be an assessment fishery to support the MR program or any other means of generating reliable inseason run estimates; as such, the preseason forecast will be used to manage the commercial fishery and to make necessary adjustments in other fisheries with the intention of limiting interception of Chinook salmon. As per the 2020 Taku River commercial conditions of licence, harvest of Chinook salmon will not be permitted.

Harvest Information Sharing

The U.S. shall provide to Canadian managers harvest and effort data by SW for the District 111 drift gillnet, sport, and troll fisheries and for the season in the personal use fishery.

Canada shall provide to U.S. managers harvest and effort data by SW in the commercial and test fisheries and for the season in the FN and recreational fisheries.

Stock Assessment Program

Each country shall:

1. provide harvest statistics for the same strata as sockeye salmon are reported;
2. sample its fisheries for CWTs, spaghetti tags, and GSI (U.S. D111 Marine);
3. conduct escapement and stock assessment programs as resources permit (see Appendix A. 2 for projects anticipated to be conducted in 2020).

Stock Composition of U.S. Harvests

Chinook salmon harvested in Alaska will be sampled for CWTs. The minimum sampling goal is 20% of the harvest; the target for 2020 is 30%.

Stock composition for sport and commercial harvest will be determined postseason. Genetic tissue samples will be taken from sport and commercially harvested Chinook salmon in District 111 and processed postseason by ADF&G Gene Conservation Laboratory in Anchorage (Appendix C.1). GSI will be used to recalculate contributions of above border Taku River Chinook salmon in the District 111 sport and commercial fisheries. In the absence of GSI data, CWT data will be used to determine stock composition postseason. ASL data will be collected inseason and analyzed postseason to determine age structure of the harvest.

Stock Composition of Canadian Harvests

If available for 2020, mixed stock Chinook salmon DNA samples will be collected in Taku River commercial and assessment fisheries for stock identification analysis (Appendix C.1). A minimum of 40% of Chinook salmon harvested in the commercial fishery and all of the assessment fishery will be examined for adipose clips for CWTs. Further details on these sampling programs are summarized in Appendix A. 2.

Spawning Escapement Estimates

Drainage wide escapement will be determined by the joint Canada/U.S. MR program. Headwater areas will be sampled using a variety of methods including carcass weirs, rod and reel snagging, video counters, aerial surveys, etc. (Appendix A. 2). Fish will be sampled for ASL and presence of spaghetti tags and coded wire tags. Estimation of escapement to the Nahlin River subdrainage using sonar enumeration will continue for a fifth season in 2020.

Sockeye Salmon

Annex IV, Chapter 1, Paragraph 3(b)(i) and Appendix of the PST includes management details for fisheries targeting above border stocks of Taku River sockeye salmon that apply in 2020.

Escapement Goal

Based on MSY analysis, Taku River sockeye salmon have an escapement goal range of 40,000 to 75,000 fish with a management objective of 58,000 fish, representing the midpoint of the escapement goal range for this stock (Miller and Pestal 2020). This is a change from the historical goal range, based on professional judgement, of 71,000 to 80,000 fish with a management objective of 75,000 fish.

Preseason Forecast

The preseason forecast for the terminal run of Taku River sockeye salmon in 2020 is approximately 139,000 wild fish, which is below the 10-year average run size of 148,000 fish. This is a stock-recruitment model forecast that was adjusted using the 5-year model error (5.5%). Note that as a result of a recent review of the assessment program, adjustments have been made to inriver run (and by extension, escapement and terminal run) size estimates. These were made to address biases in mark-recapture estimates and have resulted in lower estimates for all years dating back to the beginning of the assessment program. Consequently, the estimated 1984 to 2018 average terminal run size has changed from 213,000 to approximately 171,000 fish; however historic preseason forecasts were based on unadjusted numbers, therefore the postseason run size estimate remains unadjusted in Table 4.

Table 4. Taku River sockeye salmon preseason run forecasts and postseason run estimates, 1994 to 2020. Starting in 2019 the forecast and run size are adjusted estimates, whereas the estimates prior to 2019 are nonadjusted. Forecast performance relative to the actual was determined using postseason run reconstruction. Positive values indicate the forecast was higher than actual while negative values indicate the forecast was less than actual.

| Year | Preseason Forecast | Forecast Method ^a | Postseason Run Size | Forecast Performance |
|------|--------------------|------------------------------|---------------------|----------------------|
| 1994 | 237,500 | | 229,642 | 3% |
| 1995 | 211,300 | SR – Total | 238,434 | -11% |
| 1996 | 219,000 | Average – Total | 322,379 | -32% |
| 1997 | 285,200 | Average – Total | 174,565 | 63% |
| 1998 | 238,100 | Average – Total | 139,824 | 70% |
| 1999 | 202,900 | Average – Total | 176,764 | 15% |
| 2000 | 273,200 | Average – Total | 246,954 | 11% |
| 2001 | 250,500 | Average – Total | 396,678 | -37% |
| 2002 | 293,100 | Average – Total | 251,633 | 16% |
| 2003 | 303,800 | Average – Total | 330,332 | -8% |
| 2004 | 231,200 | Average – Total | 204,059 | 13% |
| 2005 | 272,100 | Average – Total | 188,244 | 45% |
| 2006 | 204,100 | Average – Total | 233,425 | -13% |
| 2007 | 211,700 | SR – Wild | 161,429 | 31% |
| 2008 | 181,000 | SR – Wild | 145,239 | 25% |
| 2009 | 213,000 | SR – Wild | 118,620 | 80% |
| 2010 | 205,000 | SR – Wild | 153,201 | 34% |
| 2011 | 230,700 | Average – Wild | 201,875 | 14% |
| 2012 | 197,300 | Average – Wild | 193,574 | 2% |
| 2013 | 255,000 | Average – Wild | 184,411 | 38% |
| 2014 | 190,000 | Average – Wild | 140,929 | 35% |
| 2015 | 216,000 | Average – Wild | 193,431 | 12% |
| 2016 | 200,000 | SR – Wild | 271,455 | -26% |
| 2017 | 198,000 | SR – Wild | 199,235 | -1% |
| 2018 | 160,000 | SR-Adj. – Wild | 171,235 | -7% |
| 2019 | 120,000 | SR-Adj. – Wild | 168,508 | -29% |
| 2020 | 139,000 | SR-Adj. – Wild | | |

Data source: *Final Estimates of Transboundary River Salmon Production, Harvest, and Escapement and a Review of Joint Enhancement Activities in 2017*.

^a SR=stock-recruitment model; SR-Adj.= stock-recruitment model adjusted by 10-year average (2008–2017) model error; average=average of stock-recruitment and sibling-based models; Total=Terminal run of wild and enhanced fish; Wild=Terminal run of wild fish.

Tatsamenie Sockeye Salmon

The 2020 terminal run forecast for Tatsamenie sockeye is approximately 40,000 fish, which is well above the 10-year average run size of 17,000 fish. The 2020 forecast is comprised of an enhanced component of 10,000 fish, and a wild component of 30,000 fish. The wild component is forecasted using a smolt model based on estimates of out-migrating wild smolt in 2017 (151,844 fish) and 2018 (1,058,500 fish), and recent 5-year average smolt to adult survival rate of 6.0%. The enhanced component is forecasted using a smolt model based on estimates of out-migrating enhanced smolt in 2017 (178,349 fish) and 2018 (329,000 fish) with recent odd and even 5-year average smolt to adult survival rates of 1.4% and 6.6%, respectively.

The escapement of sockeye salmon to Tatsamenie Lake is a crucial element of the current Canada/U.S. enhancement program. Based on a fecundity of approximately 4,000 eggs per female, equal sex ratios, a broodstock holding success rate of 80%, along with the guideline that no more than 50% of escapement can be utilized for enhancement purposes, an escapement of about 3,000 sockeye salmon would be needed to

achieve the maximum egg take of 3.0 million eggs referred to in the 2020 Taku Enhancement Production Plan.

Harvest Sharing Objectives

Pacific salmon harvest sharing provisions were renegotiated by the Transboundary Panel in January 2019 for the period 2019 through 2028.

The following arrangements will be used for the 2020 to 2028 fishing seasons:

- Inseason above border run estimates will be based on the joint mark–recapture program that will incorporate an adjustment of 22% (to account for dropouts and size selectivity);
- TAC and resulting harvest allocations inseason will be based on estimates of Taku River wild sockeye salmon terminal run size minus the management objective;
- Canada may, in addition to its share of the TAC, harvest any projected sockeye salmon in excess of the management objective and broodstock needs apportioned by run timing;
- If either Party identifies it will be unlikely to harvest all or a portion of its AC, the other party may, in addition to its share of the TAC, harvest any projected sockeye salmon in excess of the management objective and broodstock needs apportioned by run timing;
- For 2020, the postseason run reconstruction will incorporate an adjustment for the tag dropout rate observed in the 2020 Taku River sockeye salmon radio telemetry project as well as adjust for size selectivity if necessary.

Management Procedures

A similar management process as described for Chinook salmon will be followed for sockeye salmon whereby inriver population estimates from the joint MR program will be used to project inseason run sizes and inseason data exchange and review will occur between parties. Management agencies will collaborate to achieve joint inseason terminal run estimates on a weekly basis.

A coordinated management focus on Tatsamenie sockeye salmon in Taku Inlet and inriver has occurred in the past. Management measures during these periods have attempted to ensure adequate numbers of sockeye salmon escape to Tatsamenie Lake to support wild production and egg-take objectives. If conservation concerns arose, e.g. due to depressed CPUE in fisheries and/or inriver assessment programs, management actions have included conservative and/or reduced fishing time. Although this is unlikely for 2020 given the favourable preseason forecast, managers will monitor stock assessment data inseason to determine if any special management measures are required for the Tatsamenie stock.

United States

Directed sockeye salmon fishing in District 111 traditionally opens for a 72-hour fishing period beginning noon on the third Sunday in June (June 21; SW26). Depending on the development of the Taku River Chinook salmon return, Chinook salmon conservation measures including restrictions in time (including night closures), mesh size (6-inch maximum), and area (upper Taku Inlet, Point Bishop and Point Arden south below Grand Island closed) will be imposed. District 111 will be managed through mid-August primarily based on sockeye salmon abundance. Taku River sockeye salmon abundance will be evaluated using District 111 overall harvest and CPUE data and weekly inriver run size estimates from the Taku River MR program. Contributions of enhanced sockeye salmon will be estimated inseason by analysis of salmon otoliths sampled from commercial harvests. For purposes of inseason run size estimation, average weekly

historical stock composition data will be used to estimate the contribution of Taku River wild and Port Snettisham enhanced sockeye salmon contributions to the harvest. The above data will be used to generate weekly estimates of the Taku River terminal sockeye salmon run size, Taku River sockeye salmon TAC and U.S. harvest of Taku River sockeye salmon. The interim arrangement established for the 2020 to 2023 seasons provides more foundation to target weekly ACs, calculated using adjusted inseason run estimates and a bilaterally agreed management objective, and may result in additional time warranted for D111 gillnetters in Taku Inlet after the Chinook conservation period. Age and stock compositions of wild sockeye salmon stocks harvested will be revised postseason by analysis of GSI data derived from sampling harvests and escapements.

Returns from domestic hatchery programs are expected to contribute significantly to the District 111 fishery in 2020. The forecast return of Snettisham Hatchery sockeye salmon is 226,000 fish. DIPAC's summer chum salmon return to Gastineau Channel and Limestone Inlet is forecast to be 650,000 fish. Portions of these returns will be available for incidental harvest in directed wild sockeye salmon fisheries in Taku Inlet. Fishing time may be extended in Stephens Passage south of Circle Point during July to harvest hatchery returns of summer chum salmon to Limestone Inlet and during August to harvest returns of Snettisham Hatchery sockeye salmon.

A personal use fishery in U.S. portions of the Taku River was established by the Alaska Board of Fisheries (BOF) in 1989 and will operate from mid-July through mid-August in 2020. The one-month fishery will be delayed by approximately two weeks to further aid in Taku River Chinook salmon conservation. Legal gear type is set nets, not to exceed 15 fathoms in length. The seasonal bag limit was increased at the 2018 BOF meeting and is now ten sockeye salmon for a household of one, or twenty sockeye salmon for a household of two or more persons. Fishing is not allowed within 100 yards of the U.S./Canada research fish wheels.

Canada

For the sockeye salmon season, a directed commercial fishery will be delayed by more than a week and commence at noon Tuesday, June 30 (SW27) for a 48-hour period. Extensions are not likely during the first week of fishing due to the poor large Chinook salmon forecast and an anticipated poor return of Kuthai Lake sockeye salmon. Additional measures will also be implemented based on Chinook salmon considerations. For 2020, as per Taku River commercial conditions of licence, harvest of Chinook salmon will not be permitted. A maximum mesh size restriction of 140 mm (approximately 5.5 inches) will be in effect through SW29 (ending July 18) and reductions in fishing time may be required if large Chinook salmon harvests are significant during the early weeks of the directed sockeye salmon fishery. Maximum net length will be 36.6 m (120 ft) for both drift- and set-gillnets. Canadian sockeye salmon management decisions for the Taku River fishery (Figure 3) will be based on weekly projections of terminal run sizes of wild and enhanced fish, TAC, and escapement of wild stocks.

Weekly sockeye salmon TAC projections (wild stocks) will be made using the following calculations:

$$TAC_{(w)} = [(E_{w(t)} + C_{w(t)} + A_{w(t-1)}) / \rho_{w(t)}] - E_w$$

Where: $TAC_{(w)}$ = projected total allowable catch of wild w sockeye salmon for the season;
 $E_{w(t)}$ = cumulative escapement to week t based on MR data;
 $C_{w(t)}$ = cumulative Canadian wild harvest to week t ;
 $A_{w(t-1)}$ = estimated cumulative U.S. harvest of wild Taku sockeye salmon to the preceding week $t-1$ (preceding week used to allow for migration time).
 $\rho_{w(t)}$ = estimated proportion of run through to week t determined from the average inriver run timing based on historical inriver CPUE data. (Run timing estimates will be adjusted inseason according to inseason CPUE data relative to historical data in both U.S. and Canadian fisheries);
 E_w = management objective of 58,000 fish..

PST harvest sharing provisions will be applied to weekly wild sockeye salmon TAC projections to guide management of the commercial fishery. Run timing will be used to apportion projected Canadian AC each week and to make projections of total escapement. Canadian harvest will be adjusted with the objective of meeting escapement and agreed Canada/U.S. harvest sharing objectives. Since it is expected that production of enhanced sockeye salmon will be between 5,000 and 15,000 fish, Canada's harvest share will be 23% of the TAC. If inseason projections of enhanced fish drop below 5,000 fish or rise above 15,000 fish, Canada's share will be adjusted as per harvest sharing provisions of the PST.

Low escapements of Kuthai Lake sockeye salmon stock are of ongoing concern. Duration of the opening in SW27 (June 28 – July 4) may be reduced if it appears that escapement of the Kuthai Lake stock is at risk of being compromised. For the SW31–33 period (July 26 – August 15), management attention will focus on Tatsamenie sockeye salmon to ensure adequate numbers of sockeye salmon escape to Tatsamenie Lake to support wild production and egg-take objectives.

Harvest Information Sharing

The U.S. shall provide harvest and effort data in the following strata for each SW:

1. District 111 (Subdistricts 111-20, 31, 32, 33, 34);
2. Taku River personal use fishery (season estimate).

Canada shall provide harvest and effort data in the following strata for each SW:

1. Taku River commercial fishery;
2. FN fishery (season estimate).

Stock Assessment Program

Stock Composition of U.S. Harvests

District 111 drift gillnet sockeye salmon harvest will be sampled weekly to obtain 300 matched genetic tissue, otolith, and ASL samples in both Subdistrict 111-31 and 111-32. Otolith samples collected inseason will be sent to the ADF&G Mark, Tag, and Age Laboratory in Juneau to be processed and analyzed, within two days of the end of the fishing period, for contributions of Taku, Stikine, and Port Snettisham enhanced sockeye salmon. Proportions of enhanced fish, combined with inriver MR data, will be used in weekly Taku Management Models to estimate wild sockeye salmon terminal run size.

Postseason, the matched GSI/otolith samples collected inseason will be used to estimate weekly contributions of wild and enhanced sockeye salmon stocks in the District 111 drift gillnet fishery. Additionally, GSI analysis will provide seasonal estimates of age-specific stock composition for all major contributing age classes (>5%) for use in brood tables (Appendix C.2). These estimates are produced with a mark- and age-enhanced genetic mixed-stock analysis (MAGMA) model, which is an extension of the Pella-Masuda GSI model (Pella and Masuda 2001) that incorporates paired otolith mark and scale-age data. Age-specific stock composition estimates are only provided at the annual level because weekly sample sizes are not sufficient to meet precision standards.

Stock Composition of Canadian Harvests

To evaluate the contribution of enhanced sockeye salmon to the Canadian inriver commercial harvest, 192 otoliths will be collected per week from the inriver commercial gillnet fishery. Otolith samples collected inseason will be flown from Canyon Island, Taku River, to Juneau every Thursday afternoon. Inseason processing of otoliths by the ADF&G Mark, Age, and Tag Lab will be completed within two working days of delivery. Data collected from sampled otoliths will be used both inseason and postseason to estimate the contribution of enhanced sockeye salmon. In addition, 150 genetic samples (scales) will be collected each week for postseason stock composition analysis (Appendix C.2).

Spawning Escapement Estimates

System-wide escapement will be determined by the joint Canada/U.S. MR program. Adult enumeration weirs will be used to estimate escapements of sockeye salmon to Tatsamenie, Little Trapper, Kuthai and King Salmon lakes. Age composition will be determined from scale samples, and contributions of enhanced sockeye salmon will be determined from otolith samples. Approximately 750 fish will be sampled during

the season at each location for ASL; in addition, 400 otoliths matched with ASL will be taken from Tatsamenie broodstock.

Coho Salmon

Annex IV, Chapter 1, Paragraph 3(b)(ii) of the PST includes management details for fisheries targeting above border stocks of Taku River coho salmon that apply in 2020.

Escapement Goal

Based on MSY analysis, Taku River coho salmon have an escapement goal range of 50,000 to 90,000 fish with a management objective of 70,000 fish, representing N_{MSY} for this stock (Pestal and Johnston 2015). Prior to the development of this goal and from the inception of the PST in 1985, the management intent of the U.S. was to ensure a minimum above border inriver run of 38,000 coho salmon. In 1999, the Parties agreed to implement a new abundance-based approach; development and analysis began in 2014 with eventual approval by the Panel in February 2015.

Preseason Forecast

The forecast for the total run of Taku River coho salmon in 2020 is 158,000 fish which equates to a terminal run of approximately 122,000 fish after applying an average nonterminal marine harvest rate of 23%. By comparison, the 10-year average total run is 136,000 fish and terminal run is 111,000 fish. The 2020 forecast was generated using the relationship between CPUE in smolt tagging and total run estimates seen since 1997.

Harvest Sharing Objectives

Harvest sharing agreements between Canada and the U.S. for Taku River coho salmon were newly established for the current Annex Period.

The following arrangement will be used for the 2020 fishing season:

- The calculation of terminal abundance shall include harvest prior to SW 34;
- The following applies to the assessment of the terminal run of Taku River coho salmon after accounting for the harvest prior to SW 34:
 - 1) If the preseason terminal abundance forecast is less than the lower end of the escapement goal range plus 5,000 fish, the Committee may recommend an alternate assessment program. Following the Panel's approval, an assessment fishery may be implemented which fully considers the conservation needs of the stock.
 - 2) When the terminal abundance exceeds the lower end of the escapement goal range, plus 5,000 coho salmon, and up to MSY point goal plus 5,000 fish, Canada may harvest 5,000 coho salmon apportioned by bilaterally approved run timing;
- The Parties' annual terminal and inriver TAC share of Taku River coho salmon shall be as follows:

- 1) For terminal abundance in excess of 75,000 coho salmon, AC accumulates according to the table below:

Table 6. U.S and Canadian harvest shares of Taku River coho salmon.

| Terminal Run Size | | Allowable Catch Range | | Harvest Share | |
|----------------------|---------|-----------------------|--------|---------------|--------|
| Lower | Upper | Lower | Upper | U.S. | Canada |
| 75,001 | 80,000 | 1 | 5,000 | 100% | 0% |
| 80,001 | 100,000 | 5,001 | 25,000 | 50% | 50% |
| Greater than 100,000 | | 25,001+ | | 90% | 10% |

Note: the harvest shares associated with the above terminal run sizes are based on an escapement goal range of 50,000 to 90,000 coho salmon with an MSY Point goal of 70,000 fish.

- The Parties' primary management objective is to achieve the agreed spawning escapement goal. If the projected spawning escapement of Canadian-origin Taku River coho salmon is greater than the agreed spawning escapement point goal, Canada may, in addition to its AC, harvest the projected surplus to spawning escapement apportioned by run timing.

Management Procedures

United States

Beginning in mid-August, management of the District 111 drift gillnet fishery will be based on run strength of coho salmon. Inseason management will be based on evaluation of fishery harvest, effort and CPUE relative to historical levels, recovery of CWTs from fishery sampling, and inriver run size estimates from the Taku River MR program. The U.S. will strive to achieve the AC and management objective. A substantial run of coho salmon (40,000 fish) is expected to the Macaulay Hatchery in Gastineau Channel. Portions of these returns will be available for incidental harvest in the directed coho salmon fisheries in Taku Inlet.

Canada

In mid-August (SW34, starting August 17), management actions will shift to coho salmon.

The weekly coho salmon TAC projections (Canadian origin) will be made using the following calculations:

$$TAC = [(E_{(t)} + C_{(t)} + A_{(t-1)}) / \rho_{(t)}] - E$$

- Where:
- TAC = projected total allowable catch of Canadian origin coho salmon for the season;
 - $E_{(t)}$ = cumulative escapement to week t based on MR data;
 - $C_{(t)}$ = cumulative Canadian harvest to week t ;
 - $A_{(t-1)}$ = estimated cumulative U.S. harvest of Canada origin coho salmon to the preceding week $t-1$ (preceding week used to allow for migration time).
 - $\rho_{(t)}$ = estimated proportion of run through to week t determined from the average inriver run timing based on historical inriver CPUE data;
 - E = system-wide escapement goal for Canadian origin coho salmon (70,000).

Inseason management will be based on evaluation of fishery harvest, CPUE data relative to historical levels and estimates of TAC. Based on the MSY point goal of 70,000 fish, Canada will endeavor to manage to the

agreed-to goal and harvest surplus above escapement needs in a combination of commercial and assessment fisheries. In the event reliable inriver run projections fall below the lower bound of the escapement goal range (50,000 fish), no commercial or assessment fishing will take place.

To address chum salmon conservation concerns, retention of chum salmon will be prohibited throughout the season. In addition, fishers must release any steelhead caught. It is anticipated that the commercial fishery will remain closed for pink salmon unless markets are developed.

Stock Assessment Program

All coho salmon caught in Canadian fisheries will be inspected for a missing adipose fin and those fish missing their adipose fin will be landed head-on and sampled for CWTs to assist in a variety of coho salmon stock assessment initiatives.

Spawning Escapement Estimates

System-wide spawning escapement estimates will be determined by the joint Canada/U.S. MR program, and a portion of the Canadian commercial fishery harvest will be sampled for ASL data.

Inseason Data Exchange and Review

Canada and the U.S. will conduct data exchanges by telephone and/or email on Wednesday afternoon or Thursday morning of each week during the fishing season. At that time, current harvest statistics and stock assessment data will be updated, exchanged, and reviewed. Management plans for the next week for each country will be discussed at this time. It is anticipated that additional communications will be required each week. Weekly decision deadlines will be a) for Districts 111, 11:00 a.m., Thursday, Alaska Daylight Time; and, b) for the Canadian Taku River fishery, 10:00 a.m., Friday, Pacific Daylight Time.

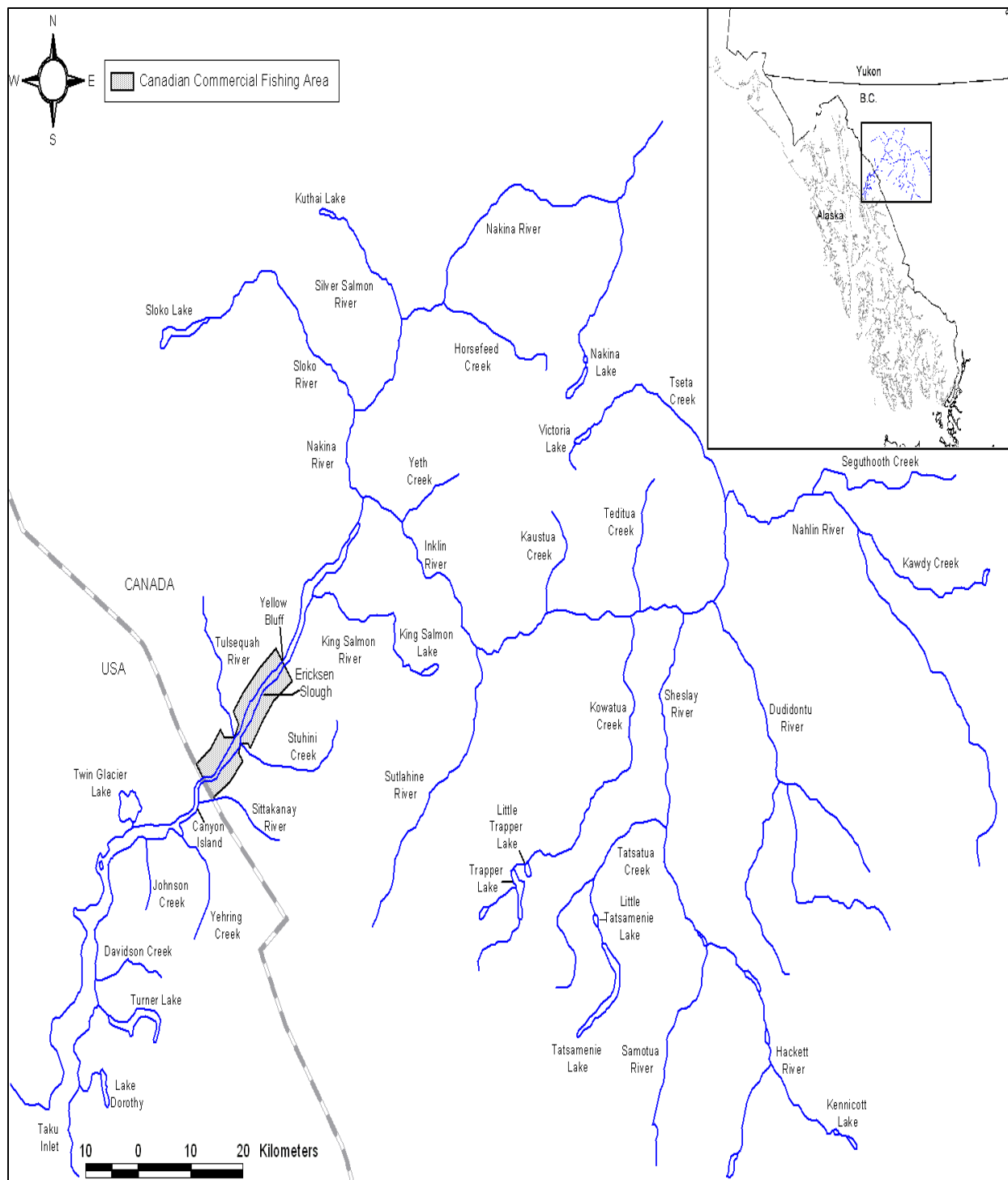


Figure 3. The Taku River showing the Canadian commercial fishing area.

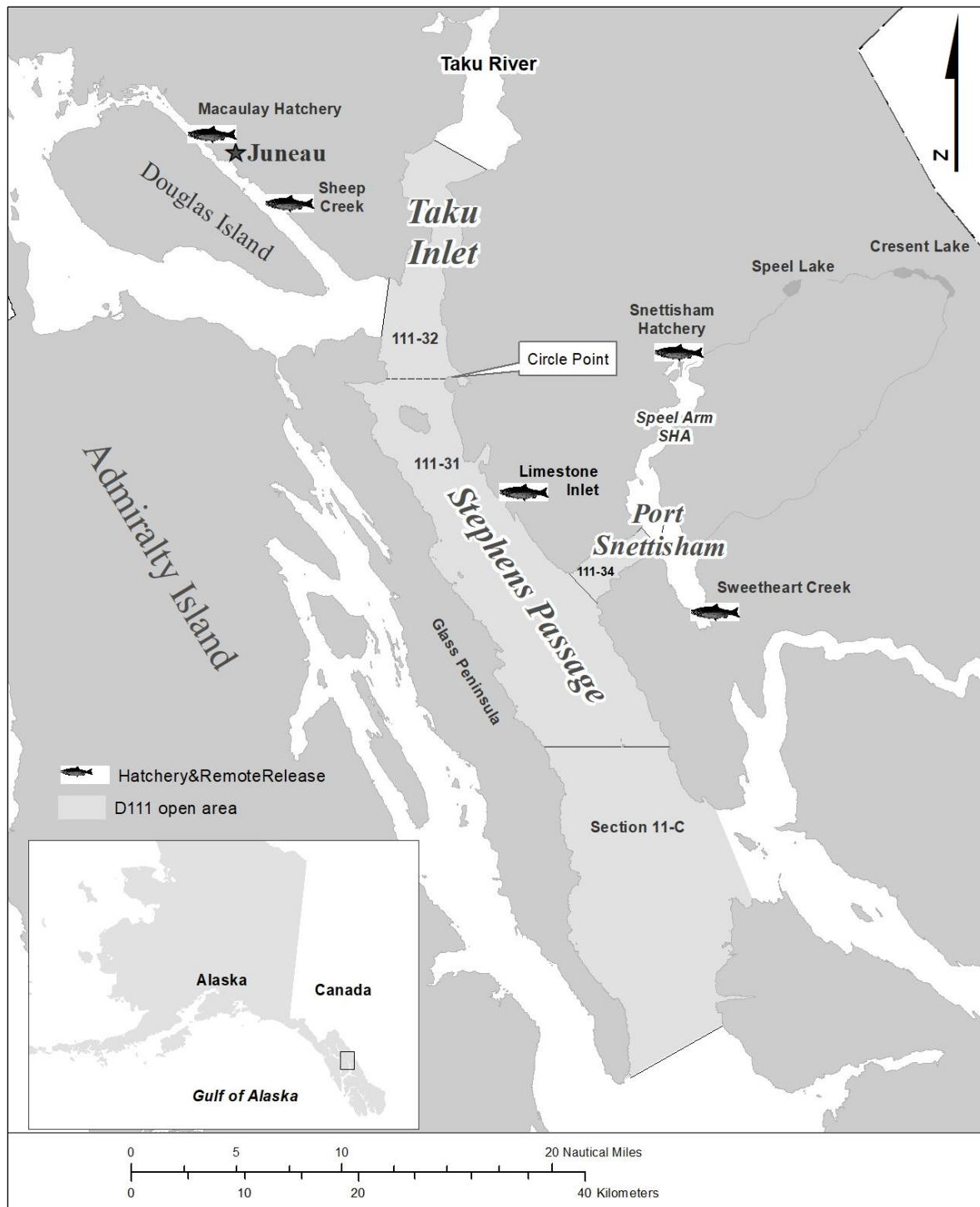


Figure 4. U.S. District 111 traditional drift gillnet fishing areas adjacent to the Taku River.

ALSEK RIVER

Annex IV, Chapter 1, Paragraph 3(c) of the PST includes management details for fisheries targeting above border stocks of Alsek River Chinook and sockeye salmon that apply in 2020.

The principal U.S. fishery that targets Alsek River (Figure 5) stocks is a commercial set gillnet fishery that operates near Dry Bay, from the Gulf of Alaska approximately 20 km up the Alsek River. A small subsistence fishery also operates in Dry Bay. U.S. fishers target sockeye and coho salmon but other Alsek River stocks are also harvested incidentally.

The principal Canadian fisheries occur in the upper Tatshenshini River drainage. A traditional FN fishery also takes place in the upper Tatshenshini River drainage. At present, approximately 100 to 150 members of CAFN harvest salmon via traditional and nontraditional methods (gaffs, traps, rod and reel, nets, weir), primarily in the Klukshu River, and to a lesser extent, in Village Creek, Blanchard River, and Goat Creek. Recreational fisheries take place primarily on the Tatshenshini River in the Dalton Post area and on the Takhanne and Blanchard rivers.

Most Alsek River Chinook, sockeye, and coho salmon spawn in Canada, but spawning occurs in U.S. tributaries as well.

Escapement Goal

Based on MSY analysis, Alsek River Chinook salmon have an escapement goal range of 3,500 to 5,300 fish with a management objective of 4,700 fish, representing the N_{MSY} for this stock. This corresponds to a Klukshu River escapement goal range of 800 to 1,200 fish with a management objective of 1,000 fish (Bernard and Jones 2010).

Based on MSY analysis, Alsek River sockeye salmon have an escapement goal range of 24,000 to 33,500 fish with a management objective of 29,700 fish, representing N_{MSY} for this stock. This corresponds to a Klukshu River escapement goal range of 7,500 to 11,000 fish with a management objective of 9,700 fish (Eggers and Bernard 2011).

Preseason Forecasts

Forecasts are germane to the Klukshu stocks of Chinook and sockeye salmon. The preseason forecast for Klukshu River Chinook salmon escapement in 2020 is 1,200 fish. This forecast is below the 10-year average of approximately 1,500 fish but is within the escapement goal range of 800 to 1,200 Chinook salmon. A stock-recruitment model was used to generate the forecast based on 25 years of Klukshu Chinook production data and was discounted using the 5-year average model error (51%). On average, the Klukshu River Chinook salmon stock comprises 25% of the Alsek River drainage wide run (Bernard and Jones 2010). Expanding the Klukshu forecast by a factor of 4.0 provides a 2020 Alsek River Chinook run forecast of approximately 4,700 fish.

The preseason forecast for Klukshu River sockeye salmon escapement in 2020 is 15,000 fish. This is below the 10-year average of 16,500 fish but above the escapement goal range of 7,500 to 11,000 fish. The forecast is a stock recruit model based on 25 years of Klukshu sockeye salmon production data and was discounted using the 3-year average model error (21%). Based on MR results (2000–2004) and run size estimates using GSI (2005–2006, 2011), the Klukshu sockeye stock comprises approximately 23% of the Alsek River drainage wide sockeye salmon run and this information can be used to expand the Klukshu forecast to a 2020 Alsek River sockeye run forecast of approximately 65,000 fish.

There is much uncertainty with these forecasts. Recent survival of Chinook and sockeye salmon has been highly variable; therefore, developing accurate forecasts has been problematic.

Management Approach for the 2020 Season

A large and variable proportion of drainagewide escapements of Alsek River Chinook, and sockeye salmon stocks are enumerated through an enumeration facility located on the Klukshu River operated by DFO and CAFN.

United States

The U.S. commercial sockeye salmon fishery in Dry Bay traditionally opens for a 24-hour period beginning on the first Sunday in June; however, recent levels of poor production in Klukshu River sockeye and Chinook salmon stocks, the opening will be 12-hours for SW 24. Restrictions will include 12-hour for SW 24 and a six-inch maximum mesh restriction in place through July 25, SW 30. Management strategies will remain conservative through SW 29 until it can be ascertained that the Klukshu River sockeye salmon escapement goal range will be met.

Historically, inseason management decisions have been made by monitoring fishery performance data and comparing it to historical CPUE for a given opening to adjust time and area openings. Parent-year escapement information and harvest trends are also considered when determining weekly fishing periods. Although there is no directed Chinook salmon fishery, the directed sockeye salmon fishery opens during the peak of Chinook salmon return to the Alsek River. Peak timing appears to be during the first two weeks of June based on tagging data (1998–2004) and Chinook salmon test fishery data (2005–2008, 2011 and 2012). Chinook salmon tagging studies conducted from 1998 through 2004 indicated that approximately 15% to 30% of Chinook salmon passing through Dry Bay are bound for the Klukshu River drainage. U.S. Alsek River harvests have been less than 1,000 Chinook salmon each year since 1981; with a historical average harvest of approximately 400 Chinook salmon. In 2019, the U.S. commercial fishery was opened for a total of 40.5 days with a harvest of 79 Chinook salmon (lowest harvest since 1990) and 9,787 sockeye salmon.

Since 2010, Chinook salmon escapements in the Klukshu River have been within or above the escapement goal range except in 2012, 2016, and 2017; sockeye salmon escapements in the Klukshu River have been within or above the escapement goal range except in 2013, 2016, 2017 and 2018.

Beginning in mid-August, management of the set gillnet fishery will be based on the run strength of coho salmon. Inseason management will be based on evaluation of fishery harvest trends, fishing effort, and CPUE relative to historical levels, similar to the management plan for sockeye salmon. Recent years have seen a decline in fishing effort during the coho salmon season on the Alsek River, mainly due to lack of aircraft charters to transport fish to town. It is anticipated that there will be minimal fishing effort for harvesting coho salmon again in 2020.

Canada

Canadian fisheries for Alsek River salmon will proceed similarly to regimes in recent years. Next to conservation, the priority in management will be to provide for basic food, social and ceremonial needs of the CAFN. Basic needs allocations are 200 Chinook and 3,000 sockeye salmon, as documented in the CAFN final land claim agreement. Restrictions in the FN fishery will be considered if the projected Klukshu River counts are below 800 Chinook salmon, 1,500 early sockeye and/or 7,500 total sockeye salmon.

Decisions to implement restrictions will take into account management actions taken to conserve stocks in both the Canadian recreational fishery and the U.S. Dry Bay fishery.

The following specific provisions apply to recreational Chinook and sockeye salmon fisheries in the Alsek River watershed (Yukon portion) in 2020:

- A salmon angling (including catch and release) closure will be in effect April 1 through August 14, 2020;
- The daily catch and possession limits for Chinook salmon will be varied to 0 at the start of the season. Further management actions will be informed by inseason estimates of abundance;
- The preseason outlook projects an average return of sockeye salmon in 2020. The daily catch and possession limits will be varied to 0 at the start of the season and remain in effect if inseason abundance projections fall short of management triggers (>4,500 by August 15 or >10,500 by September 6);

Angling for, retention or possession of Chinook and sockeye salmon will not be permitted in the recreational fishery prior to August 15, 2020 unless inseason assessment programs identify that spawning escapement needs will be met and FN harvests levels are accounted for prior to this date. Recreational harvest opportunities may be liberalized for coho salmon should a strong return materialize. Factors that will influence liberalization of recreational coho salmon harvest limits include:

- the status of the sockeye run and potential impacts of by-catch of sockeye during a directed coho recreational fishery.
- the status of the coho run and overall projected weir count.
- In the recreational salmon fishery, the following closed/open times will be in effect for 2020:
 - the closed times (all angling) for Klukshu River, Nesketahin Lake and Village Creek will be from June 15 to November 30. This includes the area downstream of the assessment program site on the lower Klukshu River;
 - the salmon nonretention periods on the Takhanne and Blanchard rivers will be from July 24 to August 31;
 - salmon nonretention in Klukshu Lake will be in effect year round.

Notable considerations for the Alsek River watershed (B.C.) portion in 2020 include:

- Angling for Chinook and sockeye salmon in the recreational fishery is prohibited effective April 1 (until further notice);
- The daily limit for coho salmon is 2 per day;
- Annual fishing closures include:

- Kwatini Creek, Stanley Creek and Goat Creek are closed to Chinook, sockeye and coho fishing.

Stock Assessment Program

Escapements of Chinook, sockeye, and coho salmon through the Klukshu River escapement monitoring programme and sockeye salmon through the Village Creek (Nesketahin Lake) escapement monitoring programme serve as an inseason indicator of stock strength. Adjustments to above border fisheries may be made on the basis of these results. An estimate of the total Alsek River sockeye salmon run will be made using GSI analysis of U.S. commercial fishery samples and an expansion of the Klukshu River results. Escapement of large Chinook salmon into the Blanchard River will be estimated from a pilot sonar project. A summary of anticipated field projects in the Alsek River drainage is presented in Appendix A. 3.

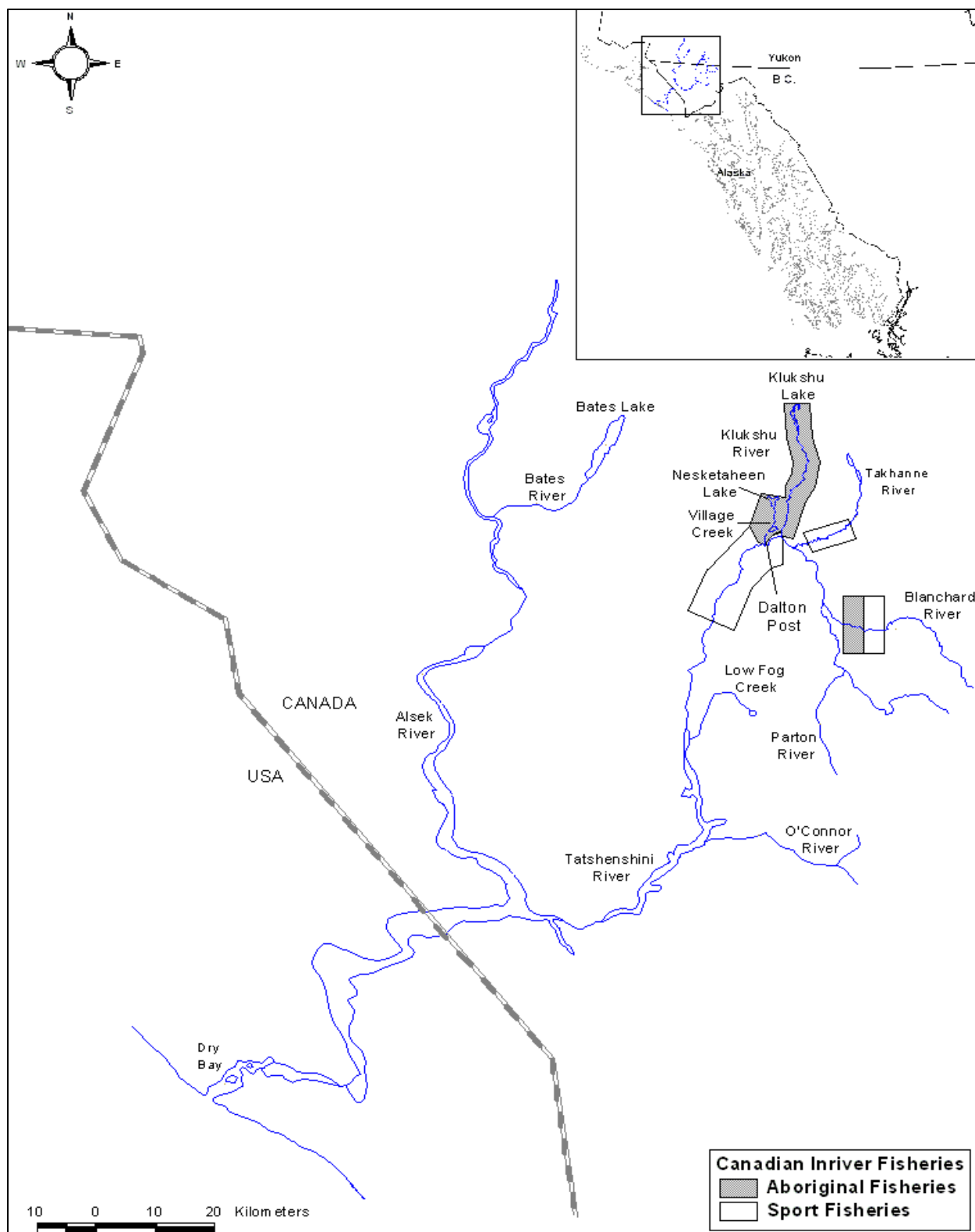


Figure 5. The Alsek River principal Canadian fishing areas.

2020 TRANSBOUNDARY ENHANCEMENT PLANS

Overview

Joint sockeye salmon enhancement projects are conducted on the Stikine and Taku rivers. Broodstock are collected in Canada at Tahltan Lake in the Stikine River drainage and from Tatsamenie Lake in the Taku River drainage. Eggs from these sockeye salmon are incubated and thermally marked at Snettisham Hatchery in Alaska. Fry originating from the Tahltan Lake egg take are back-planted into Tahltan Lake in the Stikine River drainage. Fry originating from the Tatsamenie Lake egg take are returned to their lake of origin. Two other projects of interest on the Taku River include: investigation of fish passage at Trapper Lake for anadromous salmon production; and egg collection and back-planting at King Salmon Lake.

As part of the current agreement the parties agreed that:

1. A SEPP and a TEPP shall be prepared annually by the Committee by February 1. The SEPP and TEPP will detail the planned enhancement activities to be undertaken by the Parties and the expected production from site specific egg takes, access improvements and all other enhancement activities outlined in the annual SEPP and TEPP. The Committee will use these data to prepare an initial enhancement production forecast based on the best available information.
2. The Panel shall review the annual SEPP and TEPP and make recommendations to the Parties concerning them by February 28 (Appendix B). Details on the 2020 plans are described below under *Egg-Take Goals*.

In January 2020, the Panel reviewed the 2018 SEPP (Table 7) and results, as well as received an update on activities from the 2018 TEPP (Table 8), 2019 SEPP (Table 9) and TEPP (Table 10) to date. Additional details on brood year 2018 sockeye salmon can be found below under *Fry Plants*.

Table 7. The 2018 SEPP results.

| Enhancement Project | SEPP | Actual |
|---------------------|---|--|
| Tahltan Lake | <ul style="list-style-type: none">• Egg take with target of 5.0 million• Guideline for last fishing day will be September 25. (Fry to be planted into Tahltan and/or Tuya lakes) | <ul style="list-style-type: none">• Canada revised egg-take target to 2.5 million eggs to match wild smolt production in Tahltan Lake.• 2.3 million eggs were collected.• Last fishing day was September 23.• No IHNV loss.• 1.9 million fry released in Tahltan Lake.• No fry released in Tuya Lake. |

Table 8. The 2018 TEPP results.

| Enhancement Project | TEPP | Actual |
|----------------------------|--|--|
| Tatsamenie Lake | <ul style="list-style-type: none"> Egg-take goal of 2,500,000 eggs, including 500,000 for extended rearing. | <ul style="list-style-type: none"> 2.3 million eggs collected. No IHNV loss. 1.4 million fry directly released in lake. 371,000 extended rearing fry released from in-lake net pens. |
| Trapper Lake | Egg take with target of 500,000. Program continuation contingent on barrier removal. | <ul style="list-style-type: none"> No eggs collected due to low early escapement. |

Table 9. The 2019 SEPP results. (as of November 2019).

| Enhancement Project | SEPP | Actual |
|----------------------------|--|--|
| Tahltan Lake | <ul style="list-style-type: none"> Egg take with target of 5.0 million Guideline for last fishing day will be September 25. (Fry to be planted into Tahltan and/or Tuya lakes) | <ul style="list-style-type: none"> Egg-take target revised to 4.5 million eggs to match wild smolt production in Tahltan Lake. An estimated 3.5 million eyed eggs after picking. Last fishing day was on September 25th. Fry Release pending |

Table 10. The 2019 TEPP results. (as of November 2019).

| Enhancement Project | TEPP | Actual |
|----------------------------|--|---|
| Tatsamenie Lake | <ul style="list-style-type: none"> Egg take goal of 3,000,000 eggs, including 500,000 for extended rearing. | <ul style="list-style-type: none"> An estimated 2,600,000 eggs collected. Fry Release pending |
| Trapper Lake | <ul style="list-style-type: none"> Egg take with target of 500,000. Contingent on barrier removal. | <ul style="list-style-type: none"> An estimated 429,000 eggs collected. Approximately 279,000 eyed eggs after picking. Fry release pending Sockeye salmon passage remediation has not occurred. |
| King Salmon Lake | <ul style="list-style-type: none"> Egg take with target of 250,000. | <ul style="list-style-type: none"> No eggs collected due to a high return of sockeye to King Salmon Lake. |

Several assessment projects are conducted to monitor the recipient lakes (e.g. plankton, water chemistry) and the survival of out planted fry (e.g. smolt enumeration, fry sampling). A summary of the enhancement field and incubation projects is presented in Appendix A. 4.

Fry Plants

Fry plants from the 2018 transboundary sockeye salmon egg takes occurred from May 16 through June 14, 2019.

Stikine drainage:

Tahltan Lake:

There were approximately 1.8 million brood year 2018 fry delivered to Tahltan Lake. Fry were held for approximately 24 hours in net pens for observations before being released into the lake.

Taku drainage:

Tatsamenie Lake:

There were approximately 1.76 million brood year 2018 fry delivered to Tatsamenie Lake. Approximately 1.4 million fry were released directly into the lake and 370,000 fry were reared in net pens before being released into the lake. There were two rearing groups. The first group was flown into the lake on May 25 and released on June 25. The second group was flown into the lake on June 10 and released on July 5. Both groups were released at 2 grams. It appears that both release groups left the lake as zero-check smolt. The fed fry were released at a site located in the midlake area (pelagic zone) approximately 2 km upstream from the outlet of the lake. The fry that are not subject to extended rearing were released near shore at various sites within the north section of the lake.

Trapper Lake:

In 2018, no eggs were collected due to low sockeye salmon return numbers on the front shoulder of the run.

Egg Take Goals

Target sockeye egg takes for the fall of 2020 are as follows:

Tahltan Lake

- Up to 5.0 million eggs or a maximum of 30% of available female escapement.
- Final egg take target to be determined inseason based on actual escapement into Tahltan Lake and matching enhanced smolt production to expected wild smolt production. In consideration of the desire to minimize disturbance of natural spawning at the adult collection sites, the guideline for the last date that eggs will be collected at Tahltan Lake is September 25.

Tatsamenie Lake

- Up to 3.0 million eggs or a maximum of 50% of available female escapement.

- Up to 500,000 eggs will be designated for the Tatsamenie extended rearing project with the remainder going to direct lake out planting.

Little Trapper Lake

- Up to 1.0 million eggs will be collected, contingent on adult sockeye salmon passage remediation.

King Salmon Lake

- In 2020, no eggs will be collected.

GENETIC STOCK IDENTIFICATION PROJECTS

Harvests of transboundary salmon fisheries are subject to the harvest sharing agreement outlined in Annex IV of the PST, and thus stock composition estimates are critical to document compliance with these agreements, as well as to reconstruct runs of wild stocks, estimate the return of enhanced fish, forecast upcoming returns, and support sustainable management. The preferred method for estimating stock contributions in fisheries in and near the Stikine, Taku, and Alsek rivers is GSI, and this has been in use for transboundary management for sockeye salmon since 2011 and for Chinook salmon since 2005. Members of the TTC met in April 2013 to define agreed-upon reporting groups for each species for Taku and Stikine River fisheries (Table 15 and 16), and to define precision and accuracy goals (to be within 10% of the true mixture 90% of the time). Appendices C.1 and C.2 describes methods that the Parties use to estimate stock composition of Chinook and sockeye salmon in transboundary fisheries, as well as existing Chinook and sockeye salmon collections and identified gaps. Baseline collection priorities for 2018 are listed in Appendix Table A.5.

Table 11. Chinook salmon GSI reporting groups agreed upon by the TTC in April 2013 for fisheries occurring in and near the Taku and Stikine rivers. Reporting groups under the “Treaty” management objective are those necessary for calculating the harvest sharing agreement outlined in Annex IV of the PST. Reporting groups under the “Transboundary” objective are those necessary for run reconstructions and forecasting upcoming returns.

| Management Objective | Party | Fishery | Reporting Groups |
|----------------------|--------------|------------------------------------|---|
| Treaty | U.S., Canada | U.S. District 108, Inriver Stikine | <i>Stikine</i> <i>Other</i> |
| | | U.S. District 111, Inriver Taku | <i>Taku</i> <i>Other</i> |
| Transboundary | U.S. | U.S. District 108 | <i>Little Tahltan</i> <i>Stikine Other</i> <i>Non-Stikine</i> |
| | | U.S. District 111 | <i>Taku</i> <i>Other</i> |
| | Canada | Inriver Stikine | <i>Little Tahltan</i> <i>Stikine Other</i> |
| | | Inriver Taku | <i>Taku</i> |
| Domestic (not PST) | U.S. | U.S. District 108 | <i>Taku</i> <i>Stikine</i> <i>Andrews</i> <i>Southern SEAK</i> <i>Other</i> |
| | | U.S. District 111 | <i>Taku</i> <i>Stikine</i> <i>Andrews</i> <i>Other</i> |
| | | Inriver Stikine | <i>Early (Little Tahltan, Tahltan, Christine)^a</i> <i>Late (Verrett, Craig)^a</i> |
| | | Inriver Taku | <i>Early (Nahlin, Dudidontu, Tseta)^a</i> <i>Mid (Nakina)^a</i> <i>Late (Kowatua, Tatsatua)^a</i> |
| | | | |

^aIndicates a Conservation Unit (CU) under Canada’s Wild Salmon Policy.

Table 12. Sockeye salmon GSI reporting groups agreed upon by the TTC in April 2013 for fisheries occurring in and near the Taku and Stikine rivers. Reporting groups under the “Treaty” management objective are those necessary for calculating the harvest sharing agreement outlined in Annex IV of the PST. Reporting groups under the “Transboundary” objective are those necessary for run reconstructions, forecasting upcoming returns, and estimating returns of enhanced fish.

| Management Objective | Party | Fishery | Reporting Groups |
|----------------------|--------------|---|--|
| Treaty | U.S., Canada | U.S. District 106, 108; Inriver Stikine | <i>Stikine</i> <i>Other</i> |
| | | U.S. District 111, Inriver Taku | <i>Taku</i> <i>Other</i> |
| Transboundary | U.S. | U.S. District 106, 108 | <i>Tahltan</i> <i>Stikine Other</i> <i>Non-Stikine</i> |
| | | U.S. District 111 | <i>Tatsamenie</i> <i>Taku Lakes Other</i> <i>Taku River-type</i> <i>Non-Taku</i> |
| | Canada | Inriver Stikine | <i>Tahltan</i> <i>Stikine Other</i> |
| | | Inriver Taku | <i>Tatsamenie</i> <i>Taku Lakes Other</i> <i>Taku River-type</i> |
| Domestic (not PST) | U.S. | U.S. District 106, 108 | <i>Tahltan</i> <i>Stikine Other</i> <i>McDonald</i> <i>SEAK</i> <i>Other</i> |
| | | U.S. District 111 | <i>Tatsamenie</i> <i>Taku Lakes Other</i> <i>Taku River-type</i> <i>Speel</i> <i>SEAK</i> <i>Other</i> |
| | | Inriver Stikine | <i>Chutine^a</i> <i>Christina^a</i> <i>Tahltan^a</i> <i>Mainstem^a</i> <i>Iskut</i> |
| | | Inriver Taku | <i>Kuthai^a</i> <i>Little Trapper/Trapper^a</i> <i>Tatsamenie^a</i> <i>Tatsatua/Little Tatsamenie^a</i> <i>King Salmon^a</i> <i>Taku River-type^a</i> |

^aIndicates a Conservation Unit (CU) under Canada’s Wild Salmon Policy.

LITERATURE CITED

- Bernard, D.R., S.A. McPherson, K.A. Pahlke, and P. Etherton. 2000. *Optimal production of Chinook salmon from the Stikine River*. Alaska Department of Fish and Game, Fishery Manuscript 00-1, Anchorage.
- Bernard, D. R., and E. L. Jones III. 2010. *Optimum escapement goals for Chinook salmon in the transboundary Alsek River*. Alaska Department of Fish and Game, Fishery Manuscript Series No. 10-02, Anchorage.
- Eggers, D.M. and D.R. Bernard. 2011. Run reconstruction and escapement goals for Alsek River sockeye salmon. Alaska Department of Fish and Game, Fishery Manuscript Series No. 11-01, Anchorage.
- McPherson, S.A., E.L. Jones III, S.J. Fleischman, and I.M. Boyce. 2010. *Optimal Production of Chinook Salmon from the Taku River Through the 2001 Year Class*. Alaska Department of Fish and Game, Fishery Manuscript Series No. 10-03, Anchorage.
- Miller, S.E. and J.A. Bednarski. 2017. Stikine sockeye salmon management model: improving management uncertainty. Pacific Salmon Comm. Tech. Rep. No. 38: 31 p.
- Miller, S.E., and Pestal, G. 2020. Estimates of a Biologically-Based Spawning Goal and Management Benchmarks for the Canadian-Origin Taku River Sockeye Salmon Stock Aggregate. DFO Can. Sci. Advis. Sec. Res. Doc. 2020/nnn. vii + 74 p.
- Pacific Salmon Commission Joint Transboundary Technical Committee. 1988 Salmon management plan for the Transboundary Rivers 1988. Report: TCTR (88)-2.
- Pacific Salmon Commission Joint Transboundary Technical Committee. 2019. Salmon management and enhancement plans for the Stikine, Taku and Alsek rivers, 2017. Report TCTR 19-2. Pacific Salmon Commission, Vancouver, B.C.
- Pella, J. and Masuda, M. 2001. Bayesian methods for analysis of stock mixtures from genetic characters. Fish. Bull. 99: 151-167.
- Pestal, G. and Johnston, S. 2015. Estimates of a Biologically-Based Spawning Goal and Biological Benchmarks for the Canadian-Origin Taku River Coho Stock Aggregate. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/048. ix + 114 p

APPENDIX A: ANTICIPATED TRANSBOUNDARY PROJECTS, 2020

Proposed projects regarding the Stikine, Taku, and Alsek salmon stocks are summarized in Appendix A. 1 to A. 5. For each project listed, information regarding the dates of operation, primary objectives, and agency roles are described. Contacts are listed at the bottom of each table. The agencies will endeavor to achieve the proposed field projects detailed below. The agencies acknowledge these projects or elements thereof are subject to funding shortfalls from time to time. In the event there is a deviation from the elements described the agency will provide advance notification, where possible, to the other agency.

Appendix A. 1 Proposed field projects, Stikine River 2020.

| Project/ Approx. Dates | Function | Agency | Involvement |
|---------------------------------------|--|--|---|
| Stikine Chinook Mark–Recapture | | | |
| 5/5 – 7/7 | <ul style="list-style-type: none"> Spaghetti tag all healthy fish captured; 25 – 30% precision goal for Stikine River large Chinook salmon captured from Kakwan Point drift net site. Collect GSI samples (from each fish tagged) separated by week; provided to DFO. Remove spaghetti tags from Canadian fisheries, Little Tahltan weir (record only) and from Iskut tributaries (Verrett). Tags may also be recovered from other spawning sites (e.g. Shakes, Craig, Tashoots, Little Tahltan, Tahltan, Beatty, Bear). At Kakwan Point, sacrifice all adipose-clipped nonlarge Chinook salmon and wand large Chinook salmon with missing adipose for presence/absence of CWT and samples to go to ADF&G lab. | ADF&G/ DFO/ TFN ADF&G/ DFO/TFN DFO/TFN ADF&G/ DFO/TFN | All aspects except tag recovery All aspects All aspects |
| Tahltan Lake Smolt Estimation | | | |
| 5/6 – 6/12 | <ul style="list-style-type: none"> Enumerate Tahltan Lake sockeye salmon smolts and sample up to 800 smolts for age, size and otoliths. | DFO/TFN | All aspects |
| Upper Stikine Sampling | | | |
| 6/15 – 8/14 | <ul style="list-style-type: none"> Sample up to 81 sockeye salmon / week for matched ASL and otoliths from the TFN and commercial fishery at Telegraph Creek and sample in proportion to the run for a season total of 600 samples. Opportunistically sample Chinook salmon, marked and unmarked, for ASL, CWTs, and spaghetti tags. | TFN/DFO TFN/DFO | Collect samples, data collection, and data analysis Sampling and data analysis |

Appendix A. 1. (continued)

| Project/ Approx. Dates | Function | Agency | Involvement |
|---|--|---------|-------------|
| Little Tahltan Chinook Salmon Enumeration | | | |
| 6/20 – 8/14 | <ul style="list-style-type: none"> Enumerate Little Tahltan Chinook salmon using a video weir located at the mouth of the river. Record presence/absence of spaghetti tags and adipose fins. Post season record estimated lengths through video counter. Spawning ground sampling for ASL and spaghetti/CWT tags July 15 through August 14. Emphasize the release of pre-spawn female Chinook salmon with adipose fin clips. | DFO/TFN | All aspects |
| | | DFO/TFN | All aspects |
| | | DFO/TFN | All aspects |
| Sockeye Assessment Fishery in Lower Stikine | | | |
| 6/25 – 8/22 | <ul style="list-style-type: none"> Conduct test fishery for sockeye salmon to assess run size and run timing. Chinook salmon caught in the test drift net shall be released. In the test set net sample any Chinook salmon for tags/tag loss, CWTs and for ASL. CWT samples to go to DFO lab in Vancouver, unless other arrangements are made. Sample up to 400 sockeye salmon per week for otoliths matched with scales and for females, with egg diameters. Transfer otolith samples to ADF&G weekly for inseason processing. Sample all coho salmon (caught in sockeye test fishery) for CWTs and ASL; CWT samples to go to DFO lab in Vancouver, unless other arrangements are made. | DFO/TFN | All aspects |
| Tahltan River Chinook Assessment Feasibility | | | |
| 5/15 – 8/14 | <ul style="list-style-type: none"> Tahltan River sonar site reconnaissance; feasibility of sonar enumeration methodology. Throughout the duration of the run of large Chinook salmon, evaluate sites for use of sonar in the lower Tahltan River. | DFO/TFN | All aspect |

Appendix A. 1. (continued)

| Project/ Approx. Dates | Function | Agency | Involvement |
|---|---|-------------------|----------------------------------|
| Commercial Inriver Fishery Stock ID Sampling | | | |
| Chinook nonretention in 2020 | <ul style="list-style-type: none"> Not for 2020. In the unlikely event of a directed commercial Chinook salmon fishery, commercial harvest sampling to include up to 200/week for ASL and secondary marks (operculum punch), plus observe 50% of the harvest for adipose clips. Collect heads from all clipped fish observed. All CWT samples will go to the DFO lab in Vancouver unless other arrangements are made. | DFO/TFN | All aspects |
| | <ul style="list-style-type: none"> Not for 2020. U.S. port samplers will sample a portion of the lower river harvest delivered to Wrangell-Petersburg and will collect up to 200 GSI samples/week. | ADF&G | Harvest delivered in U.S. |
| 6/23 – 8/22 | <ul style="list-style-type: none"> Randomly sample the commercial harvest of sockeye salmon to include 200/week for matched ASL, otolith, egg-diameter, and GSI, <u>and</u> another 200/week for egg-diameter and length. Otolith deliveries to be arranged with ADF&G and will require delivery by boat to Wrangell. Analyze 60 to 200 sockeye otolith samples per week. In the event that there is limited commercial effort, potential for sampling in Petersburg/Wrangell. | DFO/TFN, ADF&G | All aspects, Otolith analysis |
| Chinook nonretention in 2020 | <ul style="list-style-type: none"> Not for 2020. Incidental commercial catch sampling for Chinook salmon during targeted sockeye salmon fishery to include up to 200/week for ASL and secondary marks (operculum punch), plus observe >50% of the catch for adipose clips. Collect heads and ASL information from all clipped fish observed. CWT samples to go to DFO lab in Vancouver, unless other arrangements are made. Collect 200 GSI samples/week. | DFO | All aspects |
| 8/23 – 9/12 | <ul style="list-style-type: none"> Sample all adipose clipped coho for CWTs and ASL; annual commercial fishery sampling target is 500 for ASL, plus observe >50% of the catch for adipose clips. All CWT samples will go to the DFO lab in Vancouver, unless other arrangements are made. | DFO/TFN | All aspects |

Appendix A. 1. (continued)

| Project/ Approx. Dates | Function | Agency | Involvement |
|--|---|---------|-------------|
| Districts 106 and 108 Stock ID Sampling | | | |
| 6/21 – 7/18 | <ul style="list-style-type: none"> Sample a minimum of 20% of Chinook salmon harvest for CWTs as per PSC coastwide standard; sample Chinook salmon for ASL (ASL sampling goals are 600 for the season for D108). The GSI sampling targets for Chinook salmon in D108 commercial fisheries are 120/week for directed fisheries and 80/week for nondirected fisheries. | ADF&G | All aspects |
| 6/21 – 8/8 | <ul style="list-style-type: none"> Collect 300 sockeye salmon samples/week for ASL, GSI, and otoliths matched samples in drift gillnet fisheries in Subdistrict 106-41 and 520 sockeye salmon samples/week in District 108. | ADF&G | All aspects |
| 6/21 – 10/17 | <ul style="list-style-type: none"> Sample a minimum 20% of coho catches in the drift gillnet fisheries in each district for CWT and sample 600 coho for ASL (sampling goals are 600 per district for the season). | ADF&G | All aspects |
| Chinook Salmon Surveys | | | |
| 7/23 – 8/17 | <ul style="list-style-type: none"> Survey Chinook salmon in Andrew Creek and sample a minimum 200 Chinook salmon for ASL, spaghetti tags, and CWTs. Conduct aerial and foot surveys. | ADF&G | All aspects |
| 7/29 – 8/12 | <ul style="list-style-type: none"> Conduct aerial surveys on the Little Tahltan River, Beatty, and Bear creeks. | DFO/TFN | All aspects |
| Tahltan Lake Salmon Enumeration | | | |
| 7/8 – 9/15 | <ul style="list-style-type: none"> Enumerate Tahltan Lake sockeye salmon entering the lake at the weir with the option to use video enumeration for the tail end of the migration period. Live-sample a minimum of 600 sockeye salmon for ASL and an additional 100 fish per day for sex. Endeavour to conduct terminal fishery at Tahltan Lake if escapement targets are likely to be exceeded. | DFO/TFN | All aspects |

Appendix A. 1. (continued)

| Project/ Approx. Dates | Function | Agency | Involvement |
|---|---|-------------------|-------------|
| Tahltan Lake Salmon Enumeration Continued | | | |
| | <ul style="list-style-type: none"> If escapement goal is projected to be achieved, lethally sample up to 400 male sockeye for ASL and otoliths from the weir (400 fish will also be sampled from the broodstock take). | DFO/TFN | All aspects |
| | <ul style="list-style-type: none"> Sample available postspawn Chinook salmon in Johnny Tashoots Creek for ASL, spaghetti tags, and CWTs and collect GSI baseline samples to complete inventory. | DFO/TFN | All aspects |
| Chinook and Coho Salmon Coded Wire Tagging | | | |
| 4/18 – 5/31 | <ul style="list-style-type: none"> Targets are 50k Chinook smolts and 10k coho smolts. | ADF&G/ DFO/TFN | All aspects |
| | <ul style="list-style-type: none"> Sample every 100th Chinook and 115th Coho smolt for length (FL). | ADF&G/ DFO/TFN | All aspects |
| Sport Fishery Chinook Salmon Sampling | | | |
| Chinook non-retention in 2020 | <ul style="list-style-type: none"> Not for 2020. Survey anglers in the Tahltan River subject to recreational fishery opening and sample FSC fish at same sites. | TFN/DFO | All aspects |

Appendix A. 1. (continued)

| Project/ Approx. Dates | Function | Agency | Involvement |
|---|--|---|-------------|
| 6/15 – 7/21 | <ul style="list-style-type: none"> Conduct catch sampling program for Petersburg and Wrangell sport fisheries and sample for CWTs, GSI, and ASL and the target is to sample 30% of the catch. Chinook salmon final harvests are based on the Petersburg/Wrangell area creel and GSI combined program. | ADF&G | All aspects |
| Coho and Sockeye Salmon Aerial Surveys | | TFN | All aspects |
| 9/10, 10/25 – 11/4 | <ul style="list-style-type: none"> Enumerate Stikine sockeye and coho salmon spawning abundance within index areas of the Canadian portion of the river. | | |
| Coho Stock Assessment Options | | | |
| 9/9 – 10/6 | <ul style="list-style-type: none"> Katete River sonar site reconnaissance; feasibility of sonar enumeration methodology. | DFO/TFN | All aspect |
| 8/12 – 10/21 | <ul style="list-style-type: none"> Mark-recapture feasibility study to determine abundance in the Iskut River. | | |
| 10/13 – 10/25 | <ul style="list-style-type: none"> GSI baseline development (Katete River, Iskut mainstem, Craig River, Verrett River, Stikine | | |
| Contacts: Stikine Projects | | | |
| Jody Mackenzie-Grieve/Johnny Sembsmoen | (DFO) | All DFO projects. | |
| Bill Waugh | (DFO) | All DFO projects. | |
| Cheri Frocklage/Kerry Carlick | (TFN) | Inriver sampling projects. | |
| Phil Richards/Kristin Courtney/Stephen Todd | (ADF&G) | Chinook tagging and surveys; Andrew Creek sampling. | |
| Julie Bednarski | (ADF&G) | 106&108 samples, stock assessment. | |

Canadian staff associated with Stikine projects that may be crossing the Canadian/U.S. border:

Johnny Sembsmoen, Aaron Foos, Sean Stark, Paul Vecsei, Ian Boyce, Mathieu Ducharme, Cheri Frocklage, Kerry Carlick, Kyle Inkster, Jared Dennis, Drew Inkster, Michael Nole, John Nole, Noreen Vance, Raina Feldman, Sheldon Dennis, Phillippe Beaulieu, Jody Mackenzie-Grieve, Mark McFarland, Ross Wilcox, and Bill Waugh.

U.S. staff associated with Stikine projects that may be crossing the Canadian/U.S. border:

Troy Thynes, Sara Gilk-Baumer, Kyle Shedd, Chase Jalbert, Julie Bednarski, Tom Kowalske, Phil Richards, Kiana Putman, Graham Gablehouse, Kyle Martini, Alex Freericks, Michelle Dutro, Brendan Jackson, Chris Kamal, Patrick Fowler, Tory DeAngelis, Kristin Courtney, Stephen Todd, Randy Peterson, Jeff Williams, Andy Piston, Lowell Fair, Scott Forbes, Paul Salomone, Katie Taylor, Andy Barclay and Lars Sorensen.

Appendix A .2. Proposed field projects, Taku River, 2020.

| Project/Dates | Function | Agency | Involvement |
|------------------------|---|-------------------------|-------------------------------|
| Marking Program | | | |
| Mid-April | <ul style="list-style-type: none"> Set up camp, build and place fish wheels. | ADF&G/ TRTFN/ DFO | All aspects |
| 4/15 – 10/3 | <ul style="list-style-type: none"> Fish wheel operation (5/15– ~ early Oct)—wheels will be operated at least 15 hours in daylight with hourly fish wheel checks (includes extended holding study). Drift gillnet operation (4/28 – 6/30); 4 wet net hours per day Mark all Chinook, sockeye, and coho salmon with spaghetti tags. Tagging goals for each species are: <ul style="list-style-type: none"> Chinook salmon: <ul style="list-style-type: none"> Spaghetti tag all healthy fish captured 25 – 30% precision goal for season; Radio tag 200 large Chinook salmon (drift gillnet); Collect GSI samples from all large fish (delivered to Canada) Sample all Chinook salmon for ASL Sacrifice all adipose-clipped nonlarge Chinook salmon and wand large Chinook salmon with missing adipose for presence/absence of CWT; CWT samples to go to ADF&G lab. Sockeye salmon: <ul style="list-style-type: none"> Spaghetti tag all healthy fish >350mm MEF (includes left axillary appendage secondary mark – collect all for GSI analysis) Sample up to 260/week for ASL Precision goals 50% for weekly inseason estimates, 10% for postseason; Fish wheels spinning by 5/15 Radio tag up to 700 healthy fish caught in wheels (includes matched GSI and ASL). Coho salmon: <ul style="list-style-type: none"> Spaghetti tag all healthy fish >350mm MEF Radio tag up to 200 healthy fish Sample 600 per season for ASL 25% precision goal for season (95% relative precision). Sacrifice all adipose-clipped coho salmon caught for CWTs; CWT samples to go to ADF&G lab. | ADF&G TRTFN DFO | 5 staff 1 staff 2 staff |

Appendix A. 2. (continued)

| Project/Dates | Function | Agency | Involvement |
|---|--|--|---|
| Salmon Telemetry | | | |
| 4/28 – 10/15 | <ul style="list-style-type: none"> Operate 10 towers at various sites to account for fish distribution and inform MR estimates; 6 river and 4 lake sites. Towers will remain in place until all fish have passed. | ADF&G/ DFO | All aspects |
| 5/15 – 10/15 | <ul style="list-style-type: none"> Weekly flights to determine radio tag locations within the drainage. | | |
| Smolt Tagging – CWT lower Taku | | | |
| 3/23 – 5/31 | <ul style="list-style-type: none"> CWT goals are 50,000 Chinook and 30,000 coho salmon smolt. Sample every 100th Chinook and 115th coho salmon smolt for length (FL) and weight. Sample 300 coho salmon smolt for age (12–15 scales per fish). | ADF&G/ DFO ADF&G DFO TRTFN | All aspects ADF&G 6 staff 4 staff 2 staff |
| Canadian Aboriginal Fishery Monitoring | | | |
| 5/1 – 10/1 | <ul style="list-style-type: none"> Collect and record FN catch information. | TRTFN | All aspects |
| Nahlin Chinook Enumeration | | | |
| 5/28 – 7/31 | <ul style="list-style-type: none"> Enumerate large Chinook salmon using sonar in lower Nahlin River. | DFO | All aspects |
| Nahlin/Tseta Sampling | | | |
| 7/25 – 8/7 | <ul style="list-style-type: none"> Sample Chinook salmon in Nahlin River and Tseta Creek for ASL, spaghetti tags/tag loss, and CWTs and all CWT samples to go to either the DFO or ADF&G lab. | ADF&G/ DFO/ TRTFN | All aspects |
| Dudidontu Sampling | | | |
| 8/1 – 8/21 | <ul style="list-style-type: none"> Sample Chinook salmon in Dudidontu River for ASL, CWTs, and spaghetti tags/tag loss and all CWT samples to go to either the DFO or ADF&G lab. | ADF&G/ DFO/ TRTFN | All aspects |
| Nakina Salmon Escapement Sampling | | | |
| 7/1 – 8/30 | <ul style="list-style-type: none"> Extended operation of the Chinook salmon carcass weir on the Nakina River with trial video camera system. Sample all Chinook salmon carcasses for ASL, spaghetti tags/tag loss, and CWTs and all CWT samples to go to the DFO lab. Estimate length and observe tags on all Chinook salmon passing through video camera system. Opportunistically obtain GSI samples from Nakina sockeye salmon (target is 200 over the long term). | TRTFN TRTFN TRTFN | All aspects All aspects All aspects |

Appendix A. 2. (continued)

| Project/Dates | Function | Agency | Involvement |
|---|---|--|--|
| Canadian Commercial Fishery Sampling | | | |
| 6/30 – 10/17 | <ul style="list-style-type: none"> Collect and record commercial harvest information; forward to ADF&G Juneau via Whitehorse. Sample sockeye and coho salmon for ASL and secondary marks; 200 per week for sockeye; 520 per season for coho salmon; Examine >30% of coho salmon harvest for adipose clips and secondary marks. Sample up to 200 sockeye salmon per week for GSI. Collect 192 sockeye salmon otolith samples per week to estimate contribution of enhanced fish; send otolith samples to ADF&G weekly for processing via Canyon Island. Inseason sockeye salmon otolith analysis. Collect and record all spaghetti tags and radio tags caught in commercial fisheries. Collect salmon roe as required for CWT program. | DFO DFO DFO DFO DFO DFO | All aspects All aspects All aspects All aspects All aspects All aspects |
| Canadian Coho Assessment Fishery | | | |
| 9/13 – 10/7 | <ul style="list-style-type: none"> Dependent on available commercial TAC, the Canadian commercial fishery may be used as the second event of the mark recapture program. Up to 5,000 fish may be harvested based on average run timing subject to conservation needs. In the event there is not a commercial fishery, capture and inspect up to 500 coho salmon per week for spaghetti tags and CWTs. Sample up to 520 coho salmon for the season for ASL and tag scars. CWT samples to go to DFO | DFO/TRTFN | All aspects |
| District 111 Fishery Sampling | | | |
| 6/15 – 10/17 | <ul style="list-style-type: none"> Collect and record commercial harvest information beginning 6/21 and all spaghetti and radio tags recoveries; forward to DFO Whitehorse via Juneau. Sample a minimum of 20% of Chinook and coho salmon harvests for CWTs/ASL. | ADF&G ADF&G | All aspects All aspects |

Appendix A. 2. (continued)

| Project/Dates | Function | Agency | Involvement |
|---|--|-----------|-------------|
| | <ul style="list-style-type: none"> Sample commercial Chinook salmon harvest for GSI samples; targets are 120/week for directed and 80/week for nondirected incidental harvest. | ADF&G | All aspects |
| | <ul style="list-style-type: none"> Collect 320 matched GSI/ASL/otolith samples per week from sockeye salmon with subdistrict specific goals from the commercial harvest. | ADF&G | All aspects |
| | <ul style="list-style-type: none"> Conduct harvest sampling program in the Juneau area sport fishery beginning 6/15 and sample for CWTs, ASL, and GSI (Chinook). Target is to sample 20% of Chinook and coho harvest for CWTs and conduct postseason mail surveys (statewide survey) to obtain final harvest data for coho salmon. Chinook salmon final harvests are based on Juneau area creel and GSI combined program. | ADF&G | All aspects |
| Kuthai Sockeye Enumeration | | | |
| 7/4 – 9/3 | <ul style="list-style-type: none"> Using video enumeration methodology, record all sockeye salmon and spaghetti tags observed as they enter Kuthai Lake; if run size permits, sample for ASL and spaghetti tags/tag loss. (up to 600 fish). | TRTFN | All aspects |
| King Salmon Enumeration | | | |
| 7/5 – 9/4 | <ul style="list-style-type: none"> Using video enumeration methodology, record all sockeye salmon and spaghetti tags observed as they enter King Salmon Lake; if run size permits, sample for ASL and spaghetti tags/tag loss (up to 600 fish). | TRTFN | All aspects |
| Aerial Chinook surveys | | | |
| 7/21 – 8/25 | <ul style="list-style-type: none"> Aerial surveys of spawning Chinook salmon in the Nakina, Nahlin, Dudidontu, Tatsatua, Kowatua, and Tseta rivers. | ADF&G | All aspects |
| Nakina Chinook Fishery Monitoring | | | |
| 6/14 – 7/15 | <ul style="list-style-type: none"> Monitor FSC and recreational fishery. | TRTFN/DFO | All aspects |
| Little Trapper Sockeye Enumeration | | | |
| 7/18 – 8/31 | <ul style="list-style-type: none"> Enumerate adult sockeye salmon through weir and sample for ASL, spaghetti tag loss (750 samples), and recover spaghetti tags. | DFO | All aspects |

Appendix A. 2. (continued)

| Project/Dates | Function | Agency | Involvement |
|--|--|---|-------------|
| Tatsamenie Sockeye Enumeration | | | |
| 8/7 – 10/5 | <ul style="list-style-type: none"> Enumerate adult sockeye salmon through weir and sample for ASL, spaghetti tag loss (750 samples), and recover spaghetti tags. A total of 400 broodstock will be sampled for ASL and matched otoliths. | DFO | All aspects |
| Tatsamenie Area Chinook sampling | | | |
| 8/13 – 9/16 | <ul style="list-style-type: none"> On Tatsatua Creek between Tatsamenie and Tatsatua Lakes, sample Chinook salmon for ASL, spaghetti tags/tag loss, and CWTs and all CWT samples to go to the DFO lab. | DFO | All aspects |
| 8/13 – 9/16 | <ul style="list-style-type: none"> On Tatsatua Creek below Tatsatua Lake, sample postspawn Chinook salmon for ASL, spaghetti tags/tag loss, and CWTs and all CWT samples to go to the DFO lab. | DFO/T RTFN | All aspects |
| Kowatua Creek Sampling | | | |
| 9/1 – 10/1 | <ul style="list-style-type: none"> On Kowatua Creek below Little Trapper Lake, sample all postspawn Chinook salmon for ASL, spaghetti tags/tag loss, and CWTs and all CWT samples to go to the DFO lab. | DFO | All aspects |
| Taku Genetic Baseline Development | | | |
| 7/15 – 11/15 | Sloko River and Nahlin River Chinook salmon; Nakina River and Little Trapper Lake sockeye salmon; and coho salmon in the Dudidontu, Nahlin, Kowatua, Tatsatua, King Salmon, Tulsequah rivers and lower river mainstem components from the intertidal zone to the King Salmon River including Flannigan Slough. | DFO/T RTFN/ ADF&G | All aspects |
| Contacts: | | Taku Projects | |
| Ray Vinzant | (ADF&G) | Canyon Island adult tagging | |
| Julie Bednarski | (ADF&G) | ADF&G Taku sockeye salmon program (adult/CYI) | |
| Phil Richards | (ADF&G) | ADF&G Taku Chinook and coho programs (adult/aerial) | |
| Jeff Williams | (ADF&G) | ADF&G Taku Chinook and coho programs (smolt/adult) | |
| Sara Gilk-Baumer | (ADF&G) | Genetics (lead) | |
| Kyle Shedd | (ADF&G) | Genetics | |
| Chase Jalbert | (ADF&G) | Genetics (sockeye) | |
| Ed Jones | (ADF&G) | ADF&G Taku Chinook and coho programs | |
| Aaron Foos | (DFO) | All DFO Taku Programs | |
| Sean Stark | (DFO) | All DFO Taku programs | |
| Bill Waugh | (DFO) | All DFO Taku programs | |
| Danielle Hosick | (DFO) | All DFO Taku programs | |
| Mark Connor | (TRTFN) | All TRTFN programs | |
| Jason Williams | (TRTFN) | All TRTFN programs | |
| Richard Erhardt | (TRTFN) | All TRTFN programs | |

Canadian staff associated with Taku projects that may be crossing the Canadian/U.S. border:

Aaron Foos, Sean Stark, Ian Boyce, Paul Vecsei, Mathieu Ducharme, Adam Brennan, Teresa Bachynski, Danielle Hosick, Mark Connor, Richard Erhardt, Jason Williams, Calvin Carlick, Joseph Netro, Trevor Williams, Ross Wilcox, Logan O'Shea, Jerry Jack, Brian Mercer, and Bill Waugh.

U.S. staff associated with Taku projects that may be crossing the Canadian/U.S. border:

Julie Bednarski, Ed Jones, Sara Gilk-Baumer, Dave Harris, Scott Forbes, Phil Richards, John Cooney, Jeff Nichols, Randy Peterson, Jeff Williams, Andy Piston, Nathan Frost, Andy Barclay, Lars Sorensen, Stephen Todd, Stephen Warta, James Byrant, Josh Miller, John Carlile, Kristin Courtney, Lowell Fair, Judy Lum, Kyle Shedd, Ray Vinzant, Chase Jalbert, Crystal Jakabosky, Gordon Krueger, Brian Elliott, Erica Lucas, Sara Miller, Nathan Van Sickle, Rich Brenner, and Joe Simonowicz.

Appendix A. 3. Proposed field projects, Alsek River, 2020.

| Project/Dates | Function | Agency | Involvement |
|--|---|---------------|-------------|
| Klukshu River Sampling | | | |
| 6/8 – 10/16 | <ul style="list-style-type: none"> Enumerate Chinook, sockeye and coho salmon with a video enumeration programme. Estimate recreational and CAFN fishery catches. Opportunistically collect ASL information from sockeye salmon caught by CAFN (up to 600 scale samples). Opportunistically sample up to 200 Chinook salmon from the CAFN harvest for ASL (MEF), and CWTs. Sample Chinook, sockeye, coho salmon opportunistically within the drainage for ASL. | DFO/CAFN | All aspects |
| Alsek Chinook/Sockeye Salmon Assessment | | | |
| | <ul style="list-style-type: none"> Pilot project to enumerate Chinook salmon in the Blanchard River using sonar; continuation of the Takhanne River snorkel effort to enumerate Chinook salmon. Alsek River sockeye salmon run reconstruction using Dry Bay commercial fishery performance data; stock composition will be determined using GSI (contingent on adequate commercial fishery samples). | DFO/CAFN | All aspects |
| Village Creek Sockeye Enumeration | | | |
| 6/15 – 9/30 | <ul style="list-style-type: none"> Enumerate salmon (sockeye salmon focus) using video methodology at Village Creek. | DFO | All aspects |
| Lower Alsek River Sampling | | | |
| 6/7 – 8/15 | <ul style="list-style-type: none"> Collect ASL and GSI samples on 800 sockeye salmon and all Chinook salmon from the Dry Bay commercial fishery for use in drainagewide abundance estimates (contingent on adequate samples). | ADF&G/ DFO | All aspects |

| Contact: | | Alsek Projects |
|------------------|---------|-----------------------|
| Aaron Foos | (DFO) | All DFO projects |
| Bill Waugh | (DFO) | All DFO projects |
| Sean Stark | (DFO) | All DFO projects |
| Danielle Hosick | (DFO) | All DFO projects |
| Jennifer Lee | (CAFN) | CAFN projects |
| Rick Hoffman | (ADF&G) | All U.S. projects |
| Hannah Christian | (ADF&G) | All ADF&G projects |

Canadian staff associated with Alsek projects that may be crossing the Canadian/U.S. border:

Aaron Foos, Sean Stark, Bill Waugh, Paul Vecsei, Danielle Hosick and Jennifer Lee.

U.S. staff associated with Alsek projects that may be crossing the Canadian/U.S. border:

Rick Hoffman, Hannah Christian and Ed Jones.

Appendix A. 4. Proposed enhancement projects for Transboundary Stikine and Taku rivers, 2020.

| Project/Dates | Function | Agency | Involvement |
|---|--|-----------------|------------------------|
| All Projects, Egg Collection and Transport, Fry Releases | | | |
| 2/1 – 5/15 | <ul style="list-style-type: none"> Acquire Canadian permitting regarding egg and fry transport | DFO | All aspects |
| Tahltan Lake Enhancement Project | | | |
| 5/5 – 6/20 | <ul style="list-style-type: none"> Enumeration and sampling of smolts from Tahltan Lake (Stikine River, in Canada) and collection of otolith samples to determine planted contribution. | DFO | All aspects |
| 5/15 – 6/30 | <ul style="list-style-type: none"> Backplant sockeye fry from Snettisham Hatchery into Tahltan Lake. | DIPAC/ ADF&G | All aspects |
| 6/1 – 8/30 | <ul style="list-style-type: none"> Limnological samples from Tahltan Lake monthly. | DFO | All Aspects |
| 8/24 – 10/05 | <ul style="list-style-type: none"> Collect up to 5.0 million sockeye eggs from Tahltan Lake and transport to Snettisham Hatchery in Alaska. (Dates are subject to onsite conditions). | DFO | Egg-take and transport |
| 8/24 – 10/05 | <ul style="list-style-type: none"> Sample 200 male and 200 female adult sockeye salmon from Tahltan Lake broodstock for otolith samples. | DFO | All aspects |

Appendix A. 4. (continued)

| Project | Function | Agency | Involvement |
|--|--|--------------------------------|------------------------|
| Tatsamenie Lake Enhancement Project | | | |
| 5/10 – 8/30 | <ul style="list-style-type: none"> Sample smolt out-migration from Tatsamenie (Taku River, in Canada) and conduct mark–recapture program on smolt from Tatsamenie Lake, submit samples to DFO for otolith analysis. | DFO | All aspects |
| 5/24 – 5/30 | <ul style="list-style-type: none"> Back-plant sockeye fry from Snettisham Hatchery into Tatsamenie Lake. | DFO/DIPAC / ADF&G | All aspects |
| 5/25 – 6/21 | <ul style="list-style-type: none"> Extended rearing - net pen rearing of ~ 500,000 sockeye fry. Expected growth from 0.5 g to 2.0 grams. | DFO/DIPAC /Metla Environmental | All Aspects |
| 8/15 – 10/30 | Collect up to 50% available broodstock (up to 3.0 million sockeye eggs) from Tatsamenie Lake and transport to Snettisham Hatchery in Alaska. | DFO | Egg-take and transport |
| 9/25 – 10/05 | <ul style="list-style-type: none"> Sample 200 male and 200 female adult sockeye salmon from Tatsamenie Lake broodstock for otolith samples. | DFO | All aspects |
| Trapper Lake Enhancement | | | |
| 6/1 – 9/30 | <ul style="list-style-type: none"> Egg Take of 1,000,000 for planting into Trapper Lake. | DFO | All aspects |
| Salmon Egg Incubation | | | |
| 9/1 – 6/15 | <ul style="list-style-type: none"> Incubation and thermal marking of juvenile sockeye (eggs & alevins) collected from transboundary lakes at the Snettisham Incubation Facility in Alaska. | DIPAC/ ADF&G | All aspects |

Canadian staff that may be crossing the Canadian/US border:

Flight crew

US staff that may be crossing the Canadian/US border:

Snettisham Hatchery Staff, Eric Prestegard, Garold V. Pryor, and Lorraine Vercessi; flight crew from Ward Air airline.

Appendix A. 5. Catalog of genetic tissue collections and baseline collection priorities. Baseline collections in 2020 are opportunistic with no identified funding.

| Drainage | Location | Priority | # Needed | Agency |
|--|---|----------|----------|------------|
| Adjacent Stikine Chinook baseline samples | | | | |
| | Farragut | M | 210 | ADF&G/NMFS |
| | Harding | M | 82 | ADF&G/NMFS |
| Stikine Chinook baseline samples | | | | |
| | Chutine | M | 193 | DFO |
| | Tuya | M | 152 | DFO |
| | Beatty Creek | M | 184 | DFO/ADF&G |
| | Bear Creek | H | 195 | DFO |
| | Johnny Tashoots Creek | H | 84 | DFO |
| | Craig | M | 86 | DFO |
| | Katete | L | 200 | DFO |
| | Stikine (above Chutine) | L | 200 | DFO |
| | Stikine (below Chutine) | M | 200 | DFO |
| | N. Arm (U.S. section) | L | 182 | ADF&G |
| | Goat (U.S. section) | L | 129 | ADF&G |
| | Alpine/Clear (U.S. section) | L | 77 | ADF&G |
| | Kikahe (U.S. section) | L | 183 | ADF&G |
| Stikine sockeye baseline samples | | | | |
| | Stikine mainstem (look alike) | L | | DFO |
| | Iskut (look alike) | L | | DFO |
| | Christina Lake (lake spawners) | H | 185 | DFO |
| | Christina Lake (inlet spawners) | M | 200 | DFO |
| | Katete | M | 169 | DFO |
| Taku Chinook baseline samples | | | | |
| | Yeth | H | 144 | DFO |
| | King Salmon | H | 168 | DFO |
| | Sloko | M | 195 | DFO |
| | mainstem Taku | L | 200 | DFO |
| | Sutlahine | L | 196 | DFO |
| | Inklin | L | 200 | DFO |
| Taku sockeye baseline samples | | | | |
| | Taku Mainstem (look alike) | L | | DFO/ADF&G |
| | Nakina | M | 161 | TRT |
| | Johnson (U.S. section) | L | 200 | ADF&G |
| | Samotua | L | 200 | DFO |
| | Kuthai | H | 28 | DFO |
| Alsek Chinook baseline samples | | | | |
| | Goat Creek | H | 26 | DFO |
| | Lofog Creek | L | 198 | DFO |
| | mainstem Tatshenshini (middle, i.e. Kudwat) | H | 128 | DFO |
| | mainstem Tatshenshini (lower) | H | 200 | DFO |
| | mainstem Tatshenshini (upper) | H | 200 | DFO |
| | mainstem Alsek | L | 200 | DFO |
| | Tweedsmuir | | 194 | DFO |

Appendix A. 5. (continued)

| Project/Dates | Location | Priority | # Needed | Agency |
|--|-------------------------------|----------|----------|--------|
| Alsek sockeye baseline samples | | | | |
| | Takhanne River | H | 196 | DFO |
| | Goat Creek | M | 121 | DFO |
| | Mainstem Tatshenshini (lower) | H | 79 | DFO |
| | Tats Lake | M | 187 | DFO |
| | Detour Creek | L | 174 | DFO |
| | Stinky Creek | M | 97 | DFO |
| | Tweedsmuir | M | 48 | DFO |
| | Alsek mainstem | L | 200 | ADF&G |
| | Border Slough | M | 14 | DFO |
| | Tanis (U.S. section) | L | 200 | ADF&G |
| | Basin (U.S. section) | H | 155 | ADF&G |
| Adjacent Alsek baseline samples | | | | |
| | Ahrnklin R. | L | 15 | ADF&G |
| | Italo | L | 158 | ADF&G |

GSI sampling protocol:

- the target sample size is 200 adult samples per population unless otherwise noted.
- the preferred tissue to sample is the axillary appendage. For baseline samples, each fish will be sampled for two appendages; one to be sent to the DFO lab and the other to the ADF&G lab. If only one appendage is sampled, that party's lab will subsample the existing tissue and send to the other lab. For fishery samples, each fish will be sampled for one axillary appendage which will be shared if requested.
- If opercular punches are taken, two punches will be taken from each fish, again one for each of the respective labs. To eliminate problems associated with potential delamination of punches in composite samples i.e. where punches from one population and/or location are all stored in one vial as has been the practice, opercular punches will now be stored in individual labeled vials.
- Axillary appendages and opercular punches will be stored in ethanol (full strength) or dried onto Whatman tissue paper and each sample appropriately labeled (date, location (**GPS**), species, number of samples, fixative and volume thereof, collector, contact name, agency, phone number).
- Although it is recognized that there are potential efficiencies in terms of effort, time, storage, shipping and archiving associated with using scale samples for GSI, this should not be a tissue of choice when obtaining fishery or other samples for GSI (e.g. out of a tote) but may be used as last resort.

APPENDIX B: TRANSBOUNDARY ENHANCEMENT PRODUCTION PLANS, 2020

Appendix B 1. Stikine Enhancement Production Plan 2020 (Signed by TBR Panel Chairs).

| 2020 Stikine Enhancement Production Plan (SEPP) – Stikine River Sockeye Salmon | | | |
|---|--|---|--|
| Enhancement Project | Activities¹ | Expected Production | Egg to Adult Survival² |
| Tahltan Lake | Egg Take: target of 5.0 million eggs ³ Guideline for last adult broodstock collection day is September 25 Outplant: All fry to be “direct release” into Tahltan Lake. | 65,000 adults resulting from direct release in Tahltan Lake. | Direct Release: 1.3% |
| | | Expected Total Production⁴ 65,000 | |

¹ All hatchery production will be thermal marked.

² Survivals based on historical data starting with brood year 1989. Green egg to fry survival is 71%. Fry to adult survival is 1.81%.

³ Egg take target will be based on actual escapement into Tahltan Lake and matching enhanced smolt production to expected wild smolt production.

⁴ Prior year SEPPs were developed to comply with Chapter 1, paragraph 3(a)(1)(iii)(a). Those estimates were based upon assumed survivals different than observed long term averages as well as the intended stocking of both Tahltan and Tuya lakes. The Panel recognizes the result of this SEPP is unlikely to achieve 100,000 enhanced sockeye salmon as identified in Chapter 1, paragraph 3(a)(1)(iii)(a) because: Canada is withdrawing Tuya Lake for stocking in 2020; biological constraints associated with enhancement of Tahltan Lake; the practicality and achievability of Tahltan Lake sockeye salmon egg takes; and there being no other identified enhancement projects.


 Canada, Transboundary Panel Co-Chair

FEB 20, 2020
 Date


 U.S., Transboundary Panel Co-Chair

2/20/20
 Date

Appendix B 2. Taku Enhancement Production Plan 2020 (Signed by TBR Panel Chairs).

| 2020 Taku Enhancement Production Plan (TEPP) – Taku River Sockeye Salmon | | | |
|--|--|---|-------------------------------------|
| Enhancement Project | Activities ¹ | Expected Production | Egg to Adult Survival |
| Tatsamenie Lake | Egg Take: target of 50% of available adult brood stock (up to 3.0 million eggs ²). | 12,500 adults from direct release | Direct Release: 0.5% ³ |
| | Outplant: Progeny (fry) from 500,000 eggs will be held for in-lake “extended rearing” and fry from the remainder of the eggs will be for “direct release” into the lake ⁴ . | 4,000 adults from extended rearing | Extended Rearing: 0.8% ³ |
| Trapper Lake | Egg Take: target of 1,000,000 eggs from Little Trapper Lake. | 1,000 adults | Direct Release: 0.1% ⁵ |
| | Outplant: All fry to be “direct release” into Trapper Lake. Future program continuation/ expansion contingent on adult sockeye salmon passage remediation. | | |
| | | Expected Total Production 17,500 | |


¹ All hatchery production will be thermal marked.

² Starting in 2019, adult sockeye salmon returns to Tatsamenie Lake are expected to be low. To increase overall survival, thus rebuilding returns from this year class, the egg-take goal has been increased from previous years Tatsamenie Lake sockeye salmon egg-take goals that targeted up to 30% of available broodstock to a maximum of 2.5 million eggs.


³ Adult production estimates based on extended rearing program results from brood years 2008 through 2013. Green egg to fry survival is 88%. Fry to adult survival is 0.95% extended rearing and 0.54% direct release.

⁴ Adjustments to fry releases may be made if fry production results are lower than targeted.

⁵ Adult production estimates based on results from brood years 1990 through 1994 and 2006 through 2007. Green egg to fry survival is low at 57%. Fry to adult survival is 0.2%.


Canada, Transboundary Panel Co-Chair

FEB 20, 2020
Date


U.S., Transboundary Panel Co-Chair

2/24/20
Date

APPENDIX C: GENETIC STOCK IDENTIFICATION METHODS, 2020

Appendix C. 1. Genetic stock identification methods for Chinook salmon stocks in the Transboundary rivers, 2020.

United States

The following methods will be used by the ADF&G Gene Conservation Laboratory to estimate stock proportions of transboundary Chinook salmon harvested by commercial fishers in U.S. Districts 108 and 111 in Southeast Alaska.

Fishery Sampling

Chinook salmon will be collected from commercial gillnet landings at processors in Southeast Alaska, and in the sport fishery by onboard participants and by creel census samplers. During sampling, Chinook salmon will be selected without regard to size, sex, adipose fin-clip, or position in the hold. Fin tissue will be dissected from sampled fish and dried onto Whatman paper. Along with each individual sampled, basic information will be recorded such as size, sex, date, vessel, and age (from scale samples). At the end of the fishery, samples will be transported back to the ADF&G Gene Conservation Laboratory, Anchorage, for analysis. Associated data will be archived as part of the ASL database maintained by ADF&G.

Representative tissue collections of individuals for mixture analysis will be created by subsampling up to 1,600 large (> 659 mm MEF) individuals from the collected samples in proportions weighted by harvest in the ports and quadrants that comprise the mixture composition to be estimated. Because the PST applies to large Chinook salmon, only large Chinook salmon will be included in the analysis. Where sufficient samples exist, the sample will be randomly subsampled proportional to harvests. Target mixture sample sizes is 400 individuals to achieve acceptable levels of accuracy and precision. Due to the vagaries of fisheries and fishery sampling, target sample sizes may not always be available for every stratum. Sample sizes smaller than the target could be analyzed, but strata represented by fewer than 100 individuals will be pooled into larger groups for analysis whenever possible. If directed gillnet fisheries do not occur, commercial fishery samples will be obtained by sampling Chinook salmon caught incidentally in sockeye gillnet fisheries in Districts 108 and 111.

Laboratory Analysis

Samples will be assayed for DNA loci developed by the GAPS group for use in Treaty fisheries (Seeb et al. 2007). DNA will be extracted from axillary process tissue using DNeasy®, 96-tissue kits (QIAGEN® Valencia CA). Polymerase chain reaction (PCR) will be carried out in 10 ul reaction volumes (10 mM Tris-HCl, 50 mM KCl, 0.2 mM each dNTP, 0.5 units Taq DNA polymerase [Promega, Madison, WI]) using an Applied Biosystems (AB, Foster City CA) thermocycler. Primer concentrations, MgCl₂ concentrations and the corresponding annealing temperature for each primer are available in Seeb et al. 2007. PCR fragment analysis will be done on an AB 3730 capillary DNA sequencer. A 96-well reaction plate will be loaded with 0.5 ul PCR product along with 0.5 ul of GS500LIZ (AB) internal lane size standard and 9.0 ul of Hi-Di (AB). PCR bands will be visualized and separated into bin sets using AB GeneMapper software v4.0. All laboratory analyses will follow protocols accepted by the CTC.

Genetic data will be collected as individual multilocus genotypes for the 13 microsatellite loci currently included in the CTC standardized baseline. According to the convention implemented by the CTC, at each locus, a standardized allele is one that has a recognized holotype specimen from which the standardized allele can be reproduced using commonly applied fragment analysis techniques. By the process of sizing the alleles from the holotype specimens, any individual laboratory should be able to convert allele sizes

obtained in the laboratory to standardized allele names. Genotype data will be stored as GeneMapper (*.fsa) files on a network drive that is backed up nightly. Long-term storage of the data was in an *Oracle* database (*LOKI*) on a network drive maintained by ADF&G computer services.

Quality Control

Several measures will be implemented to ensure the quality of data produced. First, each individual tissue sample will be assigned a unique accession identifier. At the time DNA is extracted or analyzed from each sample, a sample sheet will be created that linked each individual sample's code to a specific well number in a uniquely numbered 96-well plate. This sample sheet will follow the sample through all phases of the project, minimizing the risk of misidentification of samples through human-induced errors. Second, genotypes will be assigned to individuals using a system in which two individuals score the genotype data independently. Discrepancies between the two sets of scores will then be resolved with one of two possible outcomes: (1) one score accepted and the other rejected, or (2) both scores rejected and the score blanked. Lastly, approximately 8% of the individuals, eight samples from each 96-well DNA extraction plate, will be reanalyzed for all loci. This ensures that the data are reproducible, and any errors created from the processing of individual plates are corrected.

Estimating Stock Compositions

Whenever possible, representative mixtures of individuals for GSI will be created by subsampling individuals from the collected tissue samples in proportion to harvest by stat week. The stock composition of fishery mixtures will be estimated using the program BAYES (Pella and Masuda 2001). The Bayesian method of MSA estimates the proportion of stocks caught within each fishery using 4 pieces of information: 1) a baseline of allele frequencies for each population, 2) the grouping of populations into the reporting groups desired for MSA, 3) prior information about the stock proportions of the fishery, and 4) the genotypes of fish sampled from the fishery.

The baseline of allele frequencies for Chinook salmon populations will be obtained from the Genetic Analysis of Pacific Salmon (GAPS) consortium baseline database. Version 3.0 of the CTC baseline contains allele frequencies from 357 populations contributing to PSC fisheries, ranging from the Situk River in Alaska to the Central Valley of California (Table C.1.1). A catalog of existing tissues and potential gaps in this baseline for transboundary applications is described in Table C.1.2. Reporting groups have been defined based upon transboundary management needs and meeting criteria set by the Gene Conservation Laboratory (Habicht et al. 2012). The reporting groups for these fisheries are: 1) Taku, 2) Andrew, 3) Stikine, 4) Southern Southeast Alaska, and 5) Other. At the request of the TTC, these reporting groups will be rolled up into the agreed-upon reporting groups. These reporting groups meet the minimum critical level of 90% correct allocation in repeated proof tests (Seeb et al. 2000). Results will be noted if estimates do not meet the precision and accuracy guidelines set by the TTC in April 2013 (to estimate the proportion of mixtures within 10% of the true mixture 90% of the time).

The choice of prior information about stock proportions in a fishery (the prior probability distribution hereafter referred to as the prior) is important to the outcome of MSA (Habicht et al. 2012). In this analysis, the estimated stock proportions from the previous year in a given stratum will be used as the prior for that stratum across years. The prior information about stock proportions will be incorporated in the form of a Dirichlet probability distribution. The sum of all prior parameters will be set to 1 (prior weight), which is equivalent to adding 1 fish to each mixture (Pella and Masuda 2001).

For each fishery mixture, 5 independent Markov Chain Monte Carlo (MCMC) chains of 40,000 iterations will be run with different starting values and discarded the first 20,000 iterations to remove the influence of the initial start values. In order to assess the among-chain convergence, the Gelman-Rubin shrink factors computed for all stock groups in BAYES will be examined (Gelman and Rubin 1992). If a shrink factor for

any stock group in a mixture was greater than 1.2, the mixture will be reanalyzed with 80,000 iterations. If a mixture still has a shrink factor greater than 1.2 after the reanalysis, results from the 5 chains will be averaged and a note made in the results. We will combine the second half of the 5 chains to form the posterior distribution and tabulate mean estimates, 90% credibility intervals, and standard deviations from a total of 100,000 iterations.

Canada

The following methods are used by the DFO's Molecular Genetics Laboratory, Pacific Biological Station, Nanaimo, B.C. to estimate stock proportions of transboundary Chinook salmon harvested by inriver fisheries on the Alsek, Taku, and Stikine rivers.

Laboratory Analysis

Once Chinook salmon genomic DNA was available, surveys of variation at the following 15 microsatellite loci will be conducted: *Ots100*, *Ots101*, *Ots104*, *Ots107* (Nelson and Beacham 1999), *Ssa197* (O'Reilly et al. 1996), *Ogo2*, *Ogo4* (Olsen et al. 1998), *Oke4* (Buchholz et al. 2001), *Omy325* (O'Connell et al. 1997), *Oki100* (Beacham et al. 2008), *Ots2*, *Ots9* (Banks et al. 1999), *Ots201b*, *Ots211*, *Ots213* (Grieg et al. 2003). This panel of loci called "DFO plus 3" consists of the DFO markers plus three loci from the Genetic Analysis of Pacific Salmon (GAPs) consortium panel of markers. Microsatellites will be size fractionated in an Applied Biosystems (ABI) 3730 capillary DNA sequencer, and genotypes will be scored by GeneMapper software 3.0 (Applied Biosystems, Foster City, CA) using an internal lane sizing standard.

In general, polymerase chain (PCR) reactions will be conducted in 10 µl volumes consisting of 0.06 units of Taq polymerase, 1µl of 30ng DNA, 1.5-2.5mM MgCl₂, 1mM 10x buffer, 0.8mM dNTP's, 0.006-0.065µM of labeled forward primer (depending on the locus), 0.4µM unlabeled forward primer, 0.4µM unlabeled reverse primer, and deionized H₂O. PCR will be completed on an MJResearch™ DNA Engine™ PCT-200 or a DNA Engine Tetrad™ PCT-225. The amplification profile will involve one cycle of 2 min @ 92°C, 30 cycles of 15 sec @ 92°C, 15 sec @ 52-60°C (depending on the locus) and 30 sec @ 72°C, and a final extension for 10 min @ 72°C. Specific PCR conditions for a particular locus could vary from this general outline. Further information on laboratory equipment and techniques is available at the Molecular Genetics Laboratory website at <http://www.pac.dfo-mpo.gc.ca/science/facilities-installations/pbs-sbp/mgl-lgm>.

Baseline Populations

Mixture analysis will require microsatellite analysis of Chinook salmon from drainage specific baselines within Canada, consisting of 11 populations/sampling sites for the Stikine River, six populations/sampling sites for the Alsek River, and nine populations/sampling sites for the Taku River (Table C.1.3). A catalog of existing tissues and potential gaps in this baseline for transboundary applications is described in Table C.1.2. All annual baseline samples available for a specific sample location will be combined to estimate population allele frequencies, as was recommended by Waples (1990).

Estimation of Stock Composition

Analysis of fishery samples will be conducted with a Bayesian procedure (BAYES) as outlined by Pella and Masuda (2001). Each locus will be assumed to be in Hardy-Weinberg equilibrium, and expected genotypic frequencies will be determined from the observed allele frequencies and used as model inputs. For BAYES, the initial FORTRAN-based computer program as outlined by Pella and Masuda (2001) required large amounts of computer analytical time when applied to stock identification problems with a baseline as comprehensive as employed in the current study. Given this limitation, a new version of the program was developed by our laboratory as a C-based program which is available from the Molecular Genetics Laboratory website (Neaves et al. 2005). In the analysis, ten 20,000-iteration Monte Carlo Markov

chains of estimated stock compositions will be produced, with initial starting values for each chain set at 0.90 for a particular population which was different for each chain. Estimated stock compositions will be estimated when all Monte Carlo Markov chains had converged producing a Gelman-Rubin coefficient < 1.2 (Pella and Masuda 2001). The last 1,000 iterations from each of the 10 chains will be combined, and for each fish the probability of originating from each population in the baseline will be determined. These individual probabilities will be summed over all fish in the sample, and divided by the number of fish sampled to provide the point estimate of stock composition. Standard deviations of estimated stock compositions will also be determined from the last 1,000 iterations from each of the 10 Monte Carlo Markov chains incorporated in the analysis.

References

- Banks, M.A., M.S. Blouin, B.A. Baldwin, V.K. Rashbrook, H.A. Fitzgerald, S.M. Blankenship, and D. Hedgcock. 1999. Isolation and inheritance of novel microsatellites in Chinook salmon (*Oncorhynchus tshawytscha*). *Journal of Heredity* 90:281-288.
- Beacham, T.D., M. Wetklo, C. Wallace, J.B. Olsen, B.G. Flannery, J.K. Wenburg, W.D. Templin, A. Antonovich, and L.W. Seeb. 2008. The application of microsatellites for stock identification of Yukon River Chinook salmon *North American Journal of Fisheries Management* 28:283-295.
- Bucholz, W.G., S.J. Miller, and W.J. Spearman. 2001. Isolation and characterization of chum salmon microsatellite loci and use across species. *Animal Genetics* 32:162-165.
- Gelman, A. and D. B. Rubin. 1992. Inference from iterative simulation using multiple sequences. *Statistical Science* 7: 457-511.
- Griegel, C., D.P. Jacobson, and M.A. Banks. 2003. New tetranucleotide microsatellites for fine-scale discrimination among endangered Chinook salmon (*Oncorhynchus tshawytscha*) *Molecular Ecology Notes* 3:376-379.
- Habicht, C., J. R. Jasper, T. H. Dann, N. A. DeCovich, and W. D. Templin. 2012. Western Alaska Salmon Stock Identification Program Technical Document 11: Defining reporting groups. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J12-16, Anchorage.
- Neaves, P. I., C. G. Wallace, J. R. Candy, and T. D. Beacham. 2005. CBayes: Computer program for mixed stock analysis of allelic data. Version v4.02.
- Nelson, R.J. and T.D. Beacham. 1999. Isolation and cross-species amplification of microsatellite loci useful for study of Pacific salmon. *Animal Genetics* 30:228-229.
- Olsen, J.B., P. Bentzen, and J.E. Seeb. 1998. Characterization of seven microsatellite loci derived from pink salmon. *Molecular Ecology* 7:1087-1090.
- O'Reilly, P.T., L.C. Hamilton, S.K. McConnell, and J.M. Wright. 1996. Rapid analysis of genetic variation in Atlantic salmon (*Salmo salar*) by PCR multiplexing of dinucleotide and tetranucleotide microsatellite. *Canadian journal of Fisheries and Aquatic Sciences* 53:2292-2298.
- O'Connell, M., R.G. Danzmann, J.M. Cornuet, J.M. Wright, and M.M. Ferguson. 1997. Differentiation of rainbow trout stocks in Lake Ontario and the evaluation of the stepwise mutation and infinite allele

- mutation models using microsatellite variability. *Canadian Journal of Fisheries and Aquatic Sciences* 54:1391-1399.
- Pella, J. and Masuda, M. 2001. Bayesian methods for analysis of stock mixtures from genetic characters. *Fish. Bull.* 99: 151-167.
- Seeb, L. W., C. Habicht, W. D. Templin, K. E. Tarbox, R. Z. Davis, L. K. Brannian and J. E. Seeb. 2000. Genetic diversity of sockeye salmon of Cook Inlet, Alaska, and its application to management of populations affected by the Exxon Valdez oil spill. *Transactions of the American Fisheries Society* 129(6):1223-1249.
- Seeb, L. W., Antonovich, A., Banks, M., Beacham, T., Bellinger, R., Blankenship, S., Campbell, M., Decovich, N., Garza, J. C., Guthrie, C., Lundrigan, T., Moran, P., Narum, S., Stephenson, J., Supernault, J., Teel, D., Templin, W. D., Wenburg, J. K., Young, S., and Smith, C. T. 2007. Development of a standardized DNA database for Chinook salmon. *Fisheries* 32(11):540-552.
- Waples R.S. and D.J. Teel. 1990. Conservation Genetics of Pacific Salmon I. Temporal changes in allele frequencies. *Conservation Biology* 4:144-156.

Appendix Table C.1.1. Chinook salmon coastwide baseline of microsatellite data used by the ADF&G Gene Conservation Laboratory. Location and reporting group details for each population by reporting groups, sample size, and collection dates. This baseline is used by ADF&G for GSI of Chinook salmon in U.S. Districts 108 and 111 fisheries of Chinook salmon. Reporting groups may be rolled up to correspond with those identified as necessary to meet transboundary management objectives.

| | Reporting Group | Population | N | Collection Date |
|----|---------------------|--|-----|------------------------------------|
| 1 | Other | Situk River | 127 | 1988, 1990, 1991, 1992 |
| 2 | | Blanchard River | 349 | 2000, 2001, 2002, 2003 |
| 3 | | Goat Creek | 62 | 2007, 2008 |
| 4 | | Klukshu River | 238 | 1987, 1989, 1990, 1991, 2000, 2001 |
| 5 | | Takhanne River | 196 | 2000, 2001, 2002, 2003, 2008 |
| 6 | | Big Boulder Creek | 138 | 1992, 1995, 2004 |
| 7 | | Tahini River--Macaulay Hatchery | 77 | 2005 |
| 8 | | Tahini River | 119 | 1992, 2004 |
| 9 | | Kelsall River | 153 | 2004 |
| 10 | Taku | King Salmon River | 143 | 1989, 1990, 1993 |
| 11 | | Dudidontu River | 233 | 2002, 2004, 2005, 2006 |
| 12 | | Kowatua Creek | 288 | 1989, 1990, 2005 |
| 13 | | Little Tatsamenie River | 684 | 1999, 2005, 2006, 2007 |
| 14 | | Little Trapper River | 74 | 1999 |
| 15 | | Upper Nahlin River | 132 | 1989, 1990, 2004 |
| 16 | | Nakina River | 428 | 1989, 1990, 2004, 2005, 2006, 2007 |
| 17 | Andrew | Tatsatua Creek | 171 | 1989, 1990 |
| 18 | | Andrew Creek | 131 | 1989, 2004 |
| 19 | | Andrew Creek--Crystal Hatchery | 207 | 2005 |
| 20 | | Andrew Creek--Macaulay Hatchery | 135 | 2005 |
| 21 | Stikine | Andrew Creek--Medvejie Hatchery | 177 | 2005 |
| 22 | | Christina River | 164 | 2000, 2001, 2002 |
| 23 | | Craig River | 96 | 2001 |
| 24 | | Johnny Tashoots Creek | 62 | 2001, 2004, 2005, 2008 |
| 25 | | Little Tahltan River | 126 | 2001, 2004 |
| 26 | | Shakes Creek | 164 | 2000, 2001, 2002, 2007 |
| 27 | | Tahltan River | 80 | 2008 |
| 28 | S. Southeast Alaska | Verrett River | 482 | 2000, 2002, 2003, 2007 |
| 29 | | Chickamin River | 126 | 1990, 2003 |
| 30 | | King Creek | 136 | 2003 |
| 31 | | Butler Creek | 190 | 2004 |
| 32 | | Leduc Creek | 43 | 2004 |
| 33 | | Humpy Creek | 124 | 2003 |
| 34 | | Chickamin River--Little Port Walter H. | 218 | 1993, 2005 |
| 35 | | Chickamin River--Whitman Hatchery | 193 | 2005 |
| 36 | | Clear Creek | 134 | 1989, 2003, 2004 |
| 37 | | Cripple Creek | 141 | 1988, 2003 |
| 38 | | Gene's Lake | 92 | 1989, 2003, 2004 |
| 39 | | Kerr Creek | 151 | 2003, 2004 |
| 40 | | Unuk River--Little Port Walter H. | 149 | 2005 |
| 41 | | Keta River | 200 | 1989, 2003, 2004 |
| 42 | | Blossom River | 190 | 2004 |
| 43 | Other | Cranberry River | 158 | 1996, 1997 |
| 44 | | Damdochax River | 63 | 1996 |
| 45 | | Ishkheenickh River | 192 | 2004, 2006 |
| 46 | | Kincolith River | 220 | 1996, 1999 |
| 47 | | Kiteen River | 54 | 2006 |
| 48 | | Kwinageese River | 67 | 1996, 1997 |
| 49 | | Meziadin River | 45 | 1996 |
| 50 | | Oweegie Creek | 147 | 1996, 1997, 2004 |
| 51 | | Tseax River | 198 | 1995, 1996, 2002, 2006, 2008 |
| 52 | | Cedar River | 112 | 1996 |

Appendix Table C.1.1. Continued

| | Reporting Group | Population | N | Collection Date |
|-----|-----------------|---------------------------|-----|---|
| 53 | Other (cont) | Ecstall River | 149 | 2000, 2001, 2002 |
| 54 | | Exchamsiks River | 106 | 1995, 2009 |
| 55 | | Exstew River | 140 | 2009 |
| 56 | | Gitnadoix River | 170 | 1995, 2009 |
| 57 | | Kitsumkalum River (Lower) | 449 | 1996, 1998, 2001, 2009 |
| 58 | | Kasiks River | 60 | 2006 |
| 59 | | Zymagotitz River | 119 | 2006, 2009 |
| 60 | | Zymoetz River (Upper) | 54 | 1995, 2004, 2009 |
| 61 | | Kispiox River | 88 | 1995, 2004, 2006, 2008 |
| 62 | | Kitseguecla River | 258 | 2009 |
| 63 | | Kitwanga River | 169 | 1996, 2002, 2003 |
| 64 | | Shegunia River | 78 | 2009 |
| 65 | | Sweetin River | 60 | 2004, 2005, 2008 |
| 66 | | Bear River | 99 | 1991, 1995, 1996, 2005 |
| 67 | | Kluakaz Creek | 98 | 2007, 2008, 2009 |
| 68 | | Kluayaz Creek | 144 | 2007, 2008, 2009 |
| 69 | | Kuldo Creek | 170 | 2008, 2009 |
| 70 | | Osti Creek | 90 | 2009 |
| 71 | | Sicintine River | 105 | 2009 |
| 72 | | Slamgeesh River | 125 | 2004, 2005, 2006, 2007, 2008, 2009 |
| 73 | | Squingala River | 259 | 2008, 2009 |
| 74 | | Sustut River | 337 | 1995, 1996, 2001, 2002, 2005, 2006 |
| 75 | | Babine River | 105 | 1996 |
| 76 | | Bulkley River (Upper) | 206 | 1991, 1998, 1999 |
| 77 | | Morice River | 105 | 1991, 1995, 1996 |
| 78 | | Suskwa River | 85 | 2004, 2005, 2009 |
| 79 | | Yakoun River | 131 | 1989, 1996, 2001 |
| 80 | | Atnarko Creek | 142 | 1996 |
| 81 | | Chuckwalla River | 46 | 1999, 2001, 2005 |
| 82 | | Dean River | 175 | 2002, 2003, 2004, 2006 |
| 83 | | Dean River (Upper) | 176 | 2001, 2002, 2003, 2004, 2006 |
| 84 | | Docee River | 42 | 1999, 2002, 2007 |
| 85 | | Kateen River | 128 | 2004, 2005 |
| 86 | | Kilbella River | 50 | 2001, 2005 |
| 87 | | Kildala River | 197 | 1999, 2000 |
| 88 | | Kitimat River | 135 | 1997 |
| 89 | | Kitlope River | 181 | 2004, 2006 |
| 90 | | Takia River | 46 | 2002, 2003, 2006 |
| 91 | | Wannock River | 129 | 1996 |
| 92 | | Capilano River | 75 | 1999 |
| 93 | | Cheakamus River | 54 | 2006, 2007, 2008 |
| 94 | | Devereux River | 148 | 1997, 2000 |
| 95 | | Klinaklini River | 198 | 1997, 1998, 2002 |
| 96 | | Phillips River | 287 | 2000, 2004, 2006, 2007, 2008 |
| 97 | | Squamish River | 181 | 2003 |
| 98 | | Burman River | 218 | 1985, 1989, 1990, 1991, 1992, 2000, '02, 2003 |
| 99 | | Conuma River | 140 | 1997 |
| 100 | | Gold River | 258 | 1983, 1985, 1986, 1987, 1992, 2002 |
| 101 | | Kennedy River (Lower) | 320 | 2005, 2007, 2008 |
| 102 | | Marble River | 136 | 1996, 1999, 2000 |
| 103 | | Nahmint River | 43 | 2002, 2003 |
| 104 | | Nitinat River | 125 | 1996 |
| 105 | | Robertson Creek | 124 | 1996, 2003 |
| 106 | | San Juan River | 175 | 2001, 2002 |
| 107 | | Sarita River | 137 | 1997, 2001 |
| 108 | | Tahsis River | 174 | 1996, 2002, 2003 |
| 109 | | Thornton Creek | 158 | 2001 |
| 110 | | Tlupana River | 58 | 2002, 2003 |
| 111 | | Toquart River | 68 | 1999, 2000 |

Appendix Table C.1.1. Continued

| | Reporting Group | Population | N | Collection Date |
|-----|-----------------|-------------------------------|-----|------------------------------------|
| 112 | Other (cont) | Tranquil Creek | 227 | 1996, 1999, 2004 |
| 113 | | Zeballos River | 148 | 2002, 2005, 2006, 2007, 2008 |
| 114 | | Chemainus River | 202 | 1996, 1999 |
| 115 | | Nanaimo River (Fall) | 122 | 1996, 2002 |
| 116 | | Nanaimo River (Summer) | 166 | 1996, 2002 |
| 117 | | Nanaimo River (Spring) | 94 | 1998 |
| 118 | | Nanaimo River (Upper) | 114 | 2003, 2004 |
| 119 | | Nimpkish River | 68 | 2004 |
| 120 | | Puntledge River (Fall) | 279 | 2000, 2001 |
| 121 | | Puntledge River (Summer) | 255 | 1998, 2000, 2006 |
| 122 | | Qualicum River | 79 | 1996 |
| 123 | | Quinsam River | 143 | 1996, 1998 |
| 124 | | Harrison River | 216 | 1999, 2002 |
| 125 | | Big Silver Creek | 54 | 2004, 2005, 2006, 2007, 2008 |
| 126 | | Birkenhead River | 154 | 1998, 1999, 2001, 2002, 2005, 2006 |
| 127 | | Pitt River (Upper) | 65 | 2004, 2005, 2006, 2007, 2008 |
| 128 | | Maria Slough | 271 | 1999, 2000, 2001, 2002, 2005 |
| 129 | | Baezaeko River | 80 | 1984, 1985 |
| 130 | | Bridge River | 157 | 1996 |
| 131 | | Cariboo River | 76 | 1996, 2007, 2008 |
| 132 | | Cariboo River (Upper) | 166 | 2001 |
| 133 | | Chilcotin River | 201 | 1996, 1997, 1998, 2001 |
| 134 | | Chilcotin River (Lower) | 173 | 1996, 2000, 2001 |
| 135 | | Chilko River | 144 | 1995, 1999, 2001, 2002 |
| 136 | | Cottonwood River (Upper) | 118 | 2004, 2007, 2008 |
| 137 | | Elkin Creek | 190 | 1996 |
| 138 | | Endako River | 42 | 1997, 1998, 2000 |
| 139 | | Nazko River | 179 | 1983, 1984, 1985 |
| 140 | | Nechako River | 128 | 1992, 1996 |
| 141 | | Portage Creek | 138 | 2002, 2004, 2005, 2006, 2008 |
| 142 | | Quesnel River | 119 | 1996, 1997 |
| 143 | | Stuart River | 125 | 1996 |
| 144 | | Taseko River | 120 | 1997, 1998, 2002 |
| 145 | | Bowron River | 78 | 1997, 1998, 2001, 2003 |
| 146 | | Fontoniko Creek | 46 | 1996 |
| 147 | | Goat River | 46 | 1997, 2000, 2001, 2002 |
| 148 | | Holmes River | 100 | 1996, 1999, 2000, 2001, 2002 |
| 149 | | James Creek | 53 | 1984, 1988 |
| 150 | | McGregor River | 119 | 1997 |
| 151 | | Morkill River | 152 | 2001 |
| 152 | | Salmon River (Fraser) | 153 | 1996, 1997 |
| 153 | | Slim Creek | 113 | 1996, 1998, 2001 |
| 154 | | Swift Creek | 120 | 1996, 2000 |
| 155 | | Fraser River above Tete Jaune | 183 | 2001 |
| 156 | | Torpy River | 135 | 2001 |
| 157 | | Willow River | 37 | 1997, 2002, 2004 |
| 158 | | Coldwater River | 109 | 1995, 1997, 1998, 1999 |
| 159 | | Coldwater River (Upper) | 69 | 2004, 2005, 2006 |
| 160 | | Deadman River | 256 | 1997, 1998, 1999, 2006 |
| 161 | | Lois River | 259 | 1997, 1999, 2001, 2006, 2008 |
| 162 | | Nicola Hatchery | 135 | 1998, 1999 |
| 163 | | Nicola River | 88 | 1998, 1999 |
| 164 | | Spius Creek | 52 | 1998, 1999 |
| 165 | | Spius Creek (Upper) | 82 | 2001, 2006 |
| 166 | | Spius Hatchery | 95 | 1996, 1997, 1998 |
| 167 | | Blue River | 57 | 2001, 2002, 2003, 2004, 2006, 2007 |
| 168 | | Clearwater River | 112 | 1997 |
| 169 | | Finn Creek | 174 | 1996, 1998, 2002, 2006, 2008 |

Appendix Table C.1.1. Continued

| | Reporting Group | Population | N | Collection Date |
|-----|-----------------|--------------------------------------|-----|------------------------------------|
| 170 | Other (cont) | Lemieux Creek | 56 | 2001, 2002, 2004, 2006 |
| 171 | | North Thompson River | 77 | 2001 |
| 172 | | Raft River | 105 | 2001, 2002, 2006, 2008 |
| 173 | | Adams River | 76 | 1996, 2001, 2002 |
| 174 | | Bessette Creek | 103 | 1998, 2002, 2003, 2004, 2006, 2008 |
| 175 | | Eagle River | 76 | 2003, 2004 |
| 176 | | Shuswap River (Lower) | 93 | 1996, 1997 |
| 177 | | Shuswap River (Middle) | 149 | 1997, 2001 |
| 178 | | South Thompson River | 73 | 1996, 2001 |
| 179 | | Salmon River | 126 | 1997, 1998, 1999 |
| 180 | | Thompson River (Lower) | 175 | 2001, 2008 |
| 181 | | Dungeness River | 123 | 2004 |
| 182 | | Elwha Hatchery | 209 | 1996, 2004 |
| 183 | | Elwha River | 139 | 2004, 2005 |
| 184 | | Upper Cascade River | 43 | 1998, 1999 |
| 185 | | Marblemount Hatchery | 91 | 2006 |
| 186 | | North Fork Nooksack River | 137 | 1998, 1999 |
| 187 | | North Fork Stilligamish River | 290 | 1996, 2001, 2004 |
| 188 | | Samish Hatchery | 74 | 1998 |
| 189 | | Upper Sauk River | 120 | 1994, 1998, 1999, 2006 |
| 190 | | Skagit River (Summer) | 99 | 1994, 1995 |
| 191 | | Skagit River (Lower; Fall) | 95 | 1998, 2006 |
| 192 | | Skagit River (Upper) | 53 | 1998 |
| 193 | | Skykomish River | 73 | 1996, 2000 |
| 194 | | Snoqualmie River | 49 | 2005 |
| 195 | | Suiattle River | 122 | 1989, 1998, 1999 |
| 196 | | Wallace Hatchery | 191 | 1996, 2004, 2005 |
| 197 | | Bear Creek | 204 | 1998, 1999, 2003, 2004 |
| 198 | | Cedar River | 170 | 1994, 2003, 2004 |
| 199 | | Nisqually River–Clear Creek Hatchery | 132 | 2005 |
| 200 | | Grovers Creek Hatchery | 95 | 2004 |
| 201 | | Hupp Springs Hatchery | 90 | 2002 |
| 202 | | Issaquah Creek | 166 | 1999, 2004 |
| 203 | | Nisqually River | 94 | 1998, 1999, 2000, 2006 |
| 204 | | South Prairie Creek | 78 | 1998, 1999, 2002 |
| 205 | | Soos Creek | 178 | 1998, 2004 |
| 206 | | Univ of Washington Hatchery | 125 | 2004 |
| 207 | | Voights Hatchery | 93 | 1998 |
| 208 | | White River | 146 | 1998 |
| 209 | | George Adams Hatchery | 131 | 2005 |
| 210 | | Hamma Hamma River | 128 | 1999, 2000, 2001 |
| 211 | | North Fork Skokomish River | 87 | 1998, 1999, 2000, 2004, 2005, 2006 |
| 212 | | South Fork Skokomish River | 96 | 2005, 2006 |
| 213 | | Forks Creek Hatchery | 140 | 2005 |
| 214 | | Hoh River (Fall) | 115 | 2004, 2005 |
| 215 | | Hoh River (Spring/Summer) | 138 | 1995, 1996, 1997, 1998, 2005, 2006 |
| 216 | | Hoko Hatchery | 73 | 2004, 2006 |
| 217 | | Humptulips Hatchery | 60 | 1990 |
| 218 | | Makah Hatchery | 128 | 2001, 2003 |
| 219 | | Queets River | 53 | 1996, 1997 |
| 220 | | Quillayute River | 52 | 1995, 1996 |
| 221 | | Quinault River | 54 | 1995, 1997, 1998 |
| 222 | | Quinault Hatchery | 82 | 2001, 2006 |
| 223 | | Sol Duc Hatchery | 94 | 2003 |
| 224 | | Cowlitz Hatchery (Spring) | 124 | 2004 |
| 225 | | Kalama Hatchery | 133 | 2004 |
| 226 | | Lewis Hatchery | 116 | 2004 |
| 227 | | Abernathy Creek | 89 | 1995, 1997, 1998, 2000 |

Appendix Table C.1.1. Continued

| | Reporting Group | Population | N | Collection Date |
|-----|-----------------|---------------------------------------|-----|------------------|
| 228 | Other (cont) | Abernathy Hatchery | 91 | 1995 |
| 229 | | Coweeman River | 109 | 1996, 2006 |
| 230 | | Cowlitz Hatchery (Fall) | 116 | 2004 |
| 231 | | Elochoman River | 88 | 1995, 1997 |
| 232 | | Green River | 55 | 2000 |
| 233 | | Lewis River (Fall) | 79 | 2003 |
| 234 | | Lewis River (Lower; Summer) | 83 | 2004 |
| 235 | | Lewis River (Summer) | 128 | 2004 |
| 236 | | Sandy River (Fall) | 106 | 2002, 2004 |
| 237 | | Washougal River | 108 | 1995, 1996, 2006 |
| 238 | | Big Creek Hatchery | 95 | 2004 |
| 239 | | Elochoman Hatchery | 94 | 2004 |
| 240 | | Spring Creek | 194 | 2001, 2002, 2006 |
| 241 | | Sandy River (Spring) | 63 | 2006 |
| 242 | | McKenzie Hatchery | 127 | 2002, 2004 |
| 243 | | McKenzie River | 90 | 1997 |
| 244 | | North Fork Clackamas River | 62 | 1997 |
| 245 | | North Santiam Hatchery | 125 | 2002, 2004 |
| 246 | | North Santiam River | 83 | 1997 |
| 247 | | Klickitat Hatchery | 82 | 2002, 2006 |
| 248 | | Klickitat River (Spring) | 40 | 2005 |
| 249 | | Shitike Creek | 127 | 2003, 2004 |
| 250 | | Warm Springs Hatchery | 127 | 2002, 2003 |
| 251 | | Granite Creek | 54 | 2005, 2006 |
| 252 | | John Day River (upper mainstem) | 65 | 2004, 2005, 2006 |
| 253 | | Middle Fork John Day River | 83 | 2004, 2005, 2006 |
| 254 | | North Fork John Day River | 105 | 2004, 2005, 2006 |
| 255 | | American River | 116 | 2003 |
| 256 | | Upper Yakima Hatchery | 179 | 1998 |
| 257 | | Little Naches River | 73 | 2004 |
| 258 | | Yakima River (Upper) | 46 | 1992, 1997 |
| 259 | | Naches River | 64 | 1989, 1993 |
| 260 | | Carson Hatchery | 168 | 2001, 2004, 2006 |
| 261 | | Entiat Hatchery | 127 | 2002 |
| 262 | | Little White Salmon Hatchery (Spring) | 93 | 2005 |
| 263 | | Methow River (Spring) | 85 | 1998, 2000 |
| 264 | | Twisp River | 122 | 2001, 2005 |
| 265 | | Wenatchee Hatchery | 43 | 1998, 2000 |
| 266 | | Wenatchee River | 62 | 1993 |
| 267 | | Tucannon River | 112 | 2003 |
| 268 | | Chamberlain Creek | 45 | 2006 |
| 269 | | Crooked Fork Creek | 100 | 2005, 2006 |
| 270 | | Dworshak Hatchery | 81 | 2005 |
| 271 | | Lochsa River | 125 | 2005 |
| 272 | | Lolo Creek | 92 | 2001, 2002 |
| 273 | | Newsome Creek | 75 | 2001, 2002 |
| 274 | | Rapid River Hatchery | 136 | 1997, 1999, 2002 |
| 275 | | Rapid River Hatchery | 46 | 2001, 2002 |
| 276 | | Red River/South Fork Clearwater | 172 | 2005 |
| 277 | | Catherine Creek | 111 | 2002, 2003 |
| 278 | | Lookingglass Hatchery | 188 | 1994, 1995, 1998 |
| 279 | | Minam River | 136 | 1994, 2002, 2003 |
| 280 | | Wenaha Creek | 46 | 2002 |
| 281 | | Imnaha River | 132 | 1998, 2002, 2003 |
| 282 | | Bear Valley Creek | 45 | 2006 |
| 283 | | Johnson Creek | 186 | 2001, 2002, 2003 |
| 284 | | Johnson Hatchery | 92 | 2002, 2003, 2004 |
| 285 | | Knox Bridge | 90 | 2001, 2002 |

Appendix Table C.1.1. Continued

| | Reporting Group | Population | N | Collection Date |
|-----|-----------------|-------------------------------------|-----|--|
| 286 | Other (cont) | McCall Hatchery | 80 | 1999, 2001 |
| 287 | | Poverty Flat | 88 | 2001, 2002 |
| 288 | | Sesech River | 115 | 2001, 2002, 2003 |
| 289 | | Stolle Meadows | 91 | 2001, 2002 |
| 290 | | Big Creek | 142 | 2001, 2002, 2003 |
| 291 | | Big Creek (Lower) | 74 | 1999, 2002 |
| 292 | | Big Creek (Upper) | 87 | 1999, 2002 |
| 293 | | Camas Creek | 42 | 2006 |
| 294 | | Capehorn Creek | 51 | 2006 |
| 295 | | Marsh Creek | 95 | 2001, 2002 |
| 296 | | Decker Flat | 78 | 1999, 2002 |
| 297 | | Valley Creek (Lower) | 94 | 1999, 2002 |
| 298 | | Valley Creek (Upper) | 95 | 1999, 2002 |
| 299 | | East Fork Salmon River | 141 | 2004, 2005 |
| 300 | | Pahsimeroi River | 71 | 2002 |
| 301 | | Sawtooth Hatchery | 260 | 2002, 2003, 2005, 2006 |
| 302 | | West Fork Yankee Fork | 59 | 2005 |
| 303 | | Hanford Reach | 163 | 1999, 2000, 2001 |
| 304 | | Klickitat River (Summer/Fall) | 149 | 1994, 2005 |
| 305 | | Little White Salmon Hatchery (Fall) | 94 | 2006 |
| 306 | | Marion Drain | 131 | 1989, 1992 |
| 307 | | Methow River (Summer) | 115 | 1992, 1993, 1994 |
| 308 | | Okanagan River | 72 | 2000, 2002, 2003, 2004, 2006, 2007, 2008 |
| 309 | | Priest Rapids Hatchery | 181 | 1998, 1999, 2000, 2001 |
| 310 | | Priest Rapids Hatchery | 67 | 1998 |
| 311 | | Umatilla Hatchery | 90 | 2006 |
| 312 | | Umatilla Hatchery | 94 | 2003 |
| 313 | | Wells Dam Hatchery | 128 | 1993 |
| 314 | | Wenatchee River | 119 | 1993 |
| 315 | | Yakima River (Lower) | 102 | 1990, 1993, 1998 |
| 316 | | Deschutes River (Lower) | 101 | 1999, 2001, 2002 |
| 317 | | Deschutes River (Upper) | 128 | 1998, 1999, 2002 |
| 318 | | Clearwater River | 88 | 2000, 2001, 2002 |
| 319 | | Lyons Ferry | 185 | 2002, 2003 |
| 320 | | Nez Perce Tribal Hatchery | 123 | 2003, 2004 |
| 321 | | Alsea River | 108 | 2004 |
| 322 | | Kilchis River | 44 | 2000, 2005 |
| 323 | | Necanicum Hatchery | 50 | 2005 |
| 324 | | Nehalem River | 131 | 2000, 2002 |
| 325 | | Nestucca Hatchery | 119 | 2004, 2005 |
| 326 | | Salmon River | 83 | 2003 |
| 327 | | Siletz River | 107 | 2000 |
| 328 | | Trask River | 123 | 2005 |
| 329 | | Wilson River | 120 | 2005 |
| 330 | | Yaquina River | 113 | 2005 |
| 331 | | Siuslaw River | 105 | 2001 |
| 332 | | Coos Hatchery | 58 | 2005 |
| 333 | | Coquille River | 118 | 2000 |
| 334 | | Elk River | 129 | 2004 |
| 335 | | South Coos Hatchery | 73 | 2005 |
| 336 | | South Coos River | 45 | 2000 |
| 337 | | South Umpqua Hatchery | 128 | 2002 |
| 338 | | Sixes River | 107 | 2000, 2005 |
| 339 | | Umpqua Hatchery | 132 | 2004 |
| 340 | | Applegate Creek | 110 | 2004 |
| 341 | | Cole Rivers Hatchery | 126 | 2004 |
| 342 | | Klaskanine Hatchery | 96 | 2009 |
| 343 | | Chetco River | 136 | 2004 |
| 344 | | Klamath River | 111 | 2004 |
| 345 | | Trinity Hatchery (Fall) | 144 | 1992 |
| 346 | | Trinity Hatchery (Spring) | 127 | 1992 |
| 347 | | Eel River | 122 | 2000, 2001 |
| 348 | | Russian River | 142 | 2001 |
| 349 | | Battle Creek | 99 | 2002, 2003 |
| 350 | | Butte Creek | 61 | 2002, 2003 |

Appendix Table C.1.1. Continued

| | Reporting Group | Population | N | Collection Date |
|-----|-----------------|---------------------------|-----|---|
| 351 | Other (cont) | Feather Hatchery (Fall) | 129 | 2003 |
| 352 | | Stanislaus River | 61 | 2002 |
| 353 | | Butte Creek | 101 | 2002, 2003 |
| 354 | | Deer Creek | 42 | 2002 |
| 355 | | Feather Hatchery (Spring) | 144 | 2003 |
| 356 | | Mill Creek | 76 | 2002, 2003 |
| 357 | | Sacramento River (Winter) | 95 | 1992, 1993, 1994, '95, '97, '98, 2001, '03, '04 |

Appendix Table C.1.2. Catalog of genetic tissue collections for transboundary Chinook salmon stocks, and baseline collection priorities. Baseline collections in 2020 are opportunistic with no identified funding. Initial populations for baseline gaps are from Report TCTR(07)-02, “Summary of the Transboundary Genetic Stock ID Workshop: January 18–19, 2007”.

| Location/Pop | Sample Goal | No. samples 2020 | | Collection Years | | Collection Priority |
|---------------------------|-------------|------------------|-------|--|--|---------------------|
| | | U.S. | Can. | U.S. | Canada | |
| Stikine Adjacent | | | | | | |
| Unuk | | | 336 | | 1989 1999 2003 2004 | |
| Clear | 200 | 197 | | 1989 2003 2004 | | |
| Cripple | 200 | 153 | 143 | 1988 2003 | 1988 2003 | |
| Gene’s Lake | 200 | 125 | | 1989 2003 2004 | | |
| Boundary | 200 | 23 | | 2003 | | |
| Kerr | 200 | 156 | | 2003 2004 | | |
| Lake Creek | 200 | 30 | | 2003 | | |
| Eulachon | 200 | | | | | |
| Bradfield | 400 | 447 | | 2012 2015 | | |
| Farragut | 400 | 190 | | 1993 1994 2013 | | M |
| Harding | 400 | 318 | | 1989 2012 2015 | | M |
| Aaron | 200 | | | | | |
| Eagle | 200 | | | | | |
| Stikine | | | | | | |
| North Arm Ck (US) | 200 | 18 | | 1989 | | L |
| Alpine/Clear (US) | 200 | 123 | 5 | 2007 2009 2010 2013 2014 | 2013 | L |
| Andrews Ck (US) | 200 | 255 | 144 | 1989 2004 | 2000 | |
| Goat Ck (US) | 200 | 71 | 21 | 2007 2009 2012 2013 2014 2015 | 2013 2014 | L |
| Kikahe (US) | 200 | 17 | | 2009 | | L |
| Katete | 200 | | | | | L |
| Verrett | 200 | 423 | 1,101 | 2007 2010 2015 | 2000 2002 2003 2007 2009 2010 2015 2016 2017 2019 | |
| Craig | 200 | | 114 | | 2001 | M |
| Christina (or Christine?) | 200 | | 240 | | 2000 2001 2002 | |
| Bear Ck | 200 | | 5 | | 2011 | H |
| Stikine (below Chutine) | 200 | | | | | M |
| Chutine | 200 | | 7 | | 2002 | M |
| Stikine (above Chutine) | 200 | | | | | L |
| Shakes | 200 | 84 | 225 | 1993 2007 | 2000 2001 2002 2003 2007 | |
| Tahltan R | 200 | 360 | 212 | 1989 1990 2008 2009 2011 | 2008 2009 2011 | |
| Little Tahltan R | 400 | 1,487 | 1,154 | 1991 2005 2008 2010 2012 2013 2014 2015 | 1999 2001 2004 2010 2015 2016 2019 | |

| Location/Pop | Sample Goal | No. samples 2020 | | Collection Years | | | | | | Collection Priority | | | | | |
|--------------------------|-------------|------------------|------|------------------|------|------|--------|------|------|---------------------|------|------|------|------|---|
| | | U.S. | Can. | U.S. | | | Canada | | | | | | | | |
| Johnny Tashoots | 200 | 76 | 116 | 2008 | 2009 | | | | 2001 | 2004 | 2005 | 2008 | 2009 | H | |
| Beatty | 200 | | 16 | | | | | | 2019 | | | | | M | |
| Tuya | 200 | 48 | 41 | 2007 | 2008 | 2009 | 2011 | 2012 | 2013 | 2008 | 2009 | 2011 | 2012 | 2013 | M |
| Taku Adjacent | | | | | | | | | | | | | | | |
| Chilkat - Big Boulder Ck | 200 | 180 | 144 | 1991 | 1992 | 1995 | 2004 | | | 1992 | 1995 | 2004 | | | |
| Chilkat – Tahini | | | 142 | | | | | | | 1992 | 2004 | | | | |
| Whiting | 200 | | | | | | | | | | | | | | |
| Taku | | | | | | | | | | | | | | | |
| mainstem Taku | 200 | | | | | | | | | | | | | | L |
| King Salmon | 200 | 32 | | 2007 | 2008 | 2010 | | | | | | | | | H |
| Inklin | 200 | | | | | | | | | | | | | | L |
| Sutlahine | 200 | 4 | 3 | 2010 | | | | | | 2010 | | | | | L |
| Yeth | 200 | 56 | 53 | 2008 | 2009 | 2010 | | | | 2008 | 2009 | 2010 | | | H |
| Kowatua/Little Trapper | 200 | 190 | 379 | 1989 | 1990 | | | | | 1989 | 1990 | 1999 | 2005 | | |
| Tatsatua/Tatsamenie | 200 | 887 | 698 | 1989 | 1990 | 2003 | 2004 | 2005 | 2007 | 1999 | 2005 | 2006 | 2007 | | |
| Hackett | 200 | 189 | 233 | 2007 | 2008 | | | | | 2006 | 2007 | 2008 | | | |
| Dudidontu | 200 | 663 | 352 | 1990 | 1997 | 2004 | 2005 | 2006 | 2008 | 2002 | 2004 | 2005 | 2006 | 2008 | |
| Tseta | 200 | 464 | 327 | 1989 | 2003 | 2008 | 2010 | | | 1989 | 2008 | 2010 | | | |
| Nahlin | 200 | 297 | 303 | 1989 | 1990 | 2004 | 2005 | | | 1999 | 2004 | 2006 | 2007 | | |
| Sloko | 200 | 5 | 5 | 2019 | | | | | | 2019 | | | | | M |
| Nakina | 400 | 230 | 480 | 1989 | 1990 | 2007 | | | | 2001 | 2004 | 2005 | 2006 | 2007 | |
| Alsek Adjacent | | | | | | | | | | | | | | | |
| Situk | 400 | 513 | 132 | 1988 | 1990 | 1991 | 1992 | 2011 | 2013 | 1988 | 1990 | 1991 | 1992 | | |
| Alsek | | | | | | | | | | | | | | | |
| mainstem Alsek | 200 | | | | | | | | | | | | | | L |
| Tatshenshini | | | 24 | | | | | | | 2001 | | | | | |
| Mainstem (lower) | 200 | | | | | | | | | | | | | | H |
| Mainstem (upper) | 200 | | | | | | | | | | | | | | H |
| Lofog | 200 | 2 | | 2010 | | | | | | | | | | | L |
| Mainstem (middle)/Kudwat | 200 | 72 | 70 | 2008 | 2010 | 2011 | | | | 2008 | 2010 | 2011 | | | H |
| Klukshu | 200 | 228 | 433 | 1989 | 1990 | 1991 | | | | 1987 | 2000 | 2001 | | | |
| Village Creek | 200 | 16 | 8 | 2012 | 2013 | | | | | 2012 | | | | | M |
| Takhanne | 200 | 35 | 218 | 2008 | 2010 | 2011 | | | | 2000 | 2001 | 2002 | 2003 | 2008 | |
| | | | | | | | | | | 2010 | 2011 | | | | |

| Location/Pop | Sample Goal | No. samples 2020 | | Collection Years | | | | | | | | | | Collection Priority |
|--------------|-------------|------------------|------|------------------|------|------|------|------|--------|------|------|------|------|---------------------|
| | | U.S. | Can. | U.S. | | | | | Canada | | | | | |
| Blanchard | 200 | | 381 | | | | | | | 2000 | 2001 | 2002 | 2003 | |
| Stanley Ck | 200 | 34 | | 2010 | 2011 | 2012 | 2013 | | | | | | | M |
| Goat Ck | 200 | 164 | 174 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2007 | 2008 | 2009 | 2010 | 2011 |
| | | | | 2013 | | | | | | 2012 | 2013 | | | H |
| Tweedsmuir | 200 | 6 | 6 | 2009 | 2011 | | | | | 2009 | 2011 | | | M |

Appendix Table C.1.3. Inventory of DFO sample collections analyzed for Chinook salmon microsatellite variation reported by region, population, sampling year, and sample size from which a subset is used for the Transboundary GSI analysis.

| Region Code | Region Name | Stock Code | Population Name | Collection Year | Sample Size |
|-------------|-------------|------------|-----------------|--|-------------|
| 1 | UPFR | 37 | Dome | 1991 1994 1995 1996 2000 2001 | 382 |
| 1 | UPFR | 38 | Salmon@PG | 1996 1997 | 263 |
| 1 | UPFR | 39 | Tete_Jaune | 1993 1994 1995 2001 | 475 |
| 1 | UPFR | 49 | Bowron | 1995 1997 1998 2001 2003 2009 | 250 |
| 1 | UPFR | 63 | Horsey | 1995 1997 2000 2001 2002 2003 2004 2010 | 47 |
| 1 | UPFR | 64 | Goat | 1995 1997 2000 2001 2002 | 76 |
| 1 | UPFR | 65 | Holmes | 1995 1996 1999 2000 2001 2002 | 219 |
| 1 | UPFR | 66 | Swift | 1995 1996 2000 2001 2006 2009 2010 2012 | 452 |
| 1 | UPFR | 67 | Slim_C | 1995 1996 1998 2001 | 240 |
| 1 | UPFR | 68 | Indianpoint | 1995 | 47 |
| 1 | UPFR | 69 | Willow_R | 1995 1996 1997 2000 2002 2004 | 117 |
| 1 | UPFR | 98 | Fontoniko | 1996 | 63 |
| 1 | UPFR | 100 | Herrick | 1996 | 1 |
| 1 | UPFR | 134 | Holliday_Cr | 2000 2001 2002 2003 2004 2005 | 29 |
| 1 | UPFR | 142 | McGregor | 1997 | 125 |
| 1 | UPFR | 182 | Antler | 1998 | 5 |
| 1 | UPFR | 185 | Small | 1998 2000 2001 2002 2003 | 19 |
| 1 | UPFR | 225 | Nevin_Cr | 2001 2002 2003 2004 2010 2011 | 50 |
| 1 | UPFR | 229 | Snowshoe | 2000 2001 2002 | 8 |
| 1 | UPFR | 230 | RedMountain | 2001 | 4 |
| 1 | UPFR | 231 | Kenneth_Cr | 2001 2002 2004 | 98 |
| 1 | UPFR | 232 | Ptarmigan | 2000 2001 2002 2004 | 32 |
| 1 | UPFR | 233 | Walker | 2000 2001 | 45 |
| 1 | UPFR | 234 | Humbug | 2000 2002 2009 | 6 |
| 1 | UPFR | 246 | Morkill | 2001 | 208 |
| 1 | UPFR | 247 | Torpy | 2001 | 174 |
| 1 | UPFR | 259 | Robson | 2000 2002 | 22 |
| 1 | UPFR | 269 | Driscoll_Cr | 2002 | 5 |
| 1 | UPFR | 327 | EastTwin_Cr | 2002 2004 2006 2012 | 7 |
| 1 | UPFR | 328 | McKale | 2002 2012 | 13 |
| 1 | UPFR | 339 | Menzies | 2002 | 3 |
| 1 | UPFR | 350 | James | 1984 1988 | 58 |
| 1 | UPFR | 447 | Hay_Cr | 2004 | 12 |
| 1 | UPFR | 448 | Narcosli_Cr | 2004 2008 | 8 |
| 1 | UPFR | 449 | Twan_Cr | 2004 | 1 |
| 2 | MUFR | 8 | Quesnel | 1990 1994 1995 1996 1997 | 562 |
| 2 | MUFR | 29 | Stuart | 1991 1992 1994 1995 1996 | 545 |
| 2 | MUFR | 30 | Nechako | 1991 1992 1994 1995 1996 | 562 |
| 2 | MUFR | 44 | Chilko | 1994 1995 1996 1999 2001 2002 | 425 |
| 2 | MUFR | 45 | Bridge | 1994 1995 1996 2011 | 424 |
| 2 | MUFR | 50 | Cottonwood | 1995 2004 2007 2008 | 176 |
| 2 | MUFR | 71 | Elkin_R | 1995 1996 2010 | 248 |
| 2 | MUFR | 73 | U_Chilcotin | 1995 1996 1997 1998 2001 | 276 |
| 2 | MUFR | 74 | Portage_C | 1995 1996 2001 2002 2004 2005 2006 2008 2011 | 286 |
| 2 | MUFR | 96 | Horsefly | 1996 1997 2004 2011 2012 2013 | 100 |

| | | | | | |
|---|--------|-----|----------------|---|-----|
| 2 | MUFR | 99 | L_Cariboo | 1996 1998 2007 2008 | 104 |
| 2 | MUFR | 102 | L_Chilcoti | 1996 2000 2001 | 236 |
| 2 | MUFR | 103 | Westroad | 1996 1997 2007 2008 | 104 |
| 2 | MUFR | 104 | Endako | 1996 1997 1998 2000 2006 2007 2008 2009 | 207 |
| 2 | MUFR | 143 | Taseko | 1997 1998 2001 2002 2010 | 205 |
| 2 | MUFR | 149 | Seton_Dam | 2001 | 4 |
| 2 | MUFR | 206 | Chilako | 1998 | 45 |
| 2 | MUFR | 207 | Pinchi | 2000 2003 2005 2008 2009 2011 2012 2013 | 27 |
| 2 | MUFR | 228 | Kuzkwa_Cr | 2001 2003 2004 2007 2008 2009 2011 2012 2013 | 114 |
| 2 | MUFR | 254 | U_Cariboo | 2001 | 171 |
| 2 | MUFR | 264 | Tachie | 2005 2009 | 3 |
| 2 | MUFR | 349 | Nazko | 1983 1984 1985 | 194 |
| 2 | MUFR | 351 | Baezaeko | 1984 1985 | 82 |
| 2 | MUFR | 450 | Ahbau_Cr | 2004 | 5 |
| 2 | MUFR | 451 | John_Boyd_Cr | 2004 | 13 |
| 2 | MUFR | 452 | Lightning_Cr | 2004 | 14 |
| 2 | MUFR | 453 | Wansa_Cr | 2004 | 5 |
| 2 | MUFR | 472 | McKinley_R | 2007 | 1 |
| 2 | MUFR | 481 | U_Mckinley_R | 2006 | 1 |
| 2 | MUFR | 482 | Baker_Cr | 2008 | 31 |
| 2 | MUFR | 483 | Kazchek_Cr | 2008 2009 2013 | 7 |
| 2 | MUFR | 484 | Stellako_R | 2008 2010 2011 | 7 |
| 3 | LWFR-F | 6 | Harrison | 1988 1992 1994 1999 2002 | 686 |
| 3 | LWFR-F | 40 | Chilliwack_F | 1994 1995 1998 1999 2002 2010 | 696 |
| 3 | LWFR-F | 194 | Chilliwac@Stav | 1994 1999 2000 2001 2002 | 381 |
| 3 | LWFR-F | 333 | Inch_Cr | 2002 | 1 |
| 3 | LWFR-F | 471 | Sweltzer_Cr | 2006 | 22 |
| 4 | NOTH | 70 | Raft_R | 1995 1996 2001 2002 2006 2008 2009 2010 2011 2013 | 496 |
| 4 | NOTH | 77 | Mahood | 1995 | 19 |
| 4 | NOTH | 87 | Finn | 1996 1998 2002 2006 2008 2009 2010 2011 2013 | 216 |
| 4 | NOTH | 145 | Clearwater | 1997 1998 | 281 |
| 4 | NOTH | 208 | Barriere | 2000 2001 2002 | 55 |
| 4 | NOTH | 210 | Blue | 2000 2001 2002 2003 2004 2006 2007 2009 2010 2011 | 84 |
| 4 | NOTH | 211 | Lemieux_Cr | 2000 2001 2002 2004 2006 2008 2009 2010 2011 2013 | 161 |
| 4 | NOTH | 226 | N_Thom@Main | 2001 2011 | 116 |
| 4 | NOTH | 260 | Albreda | 2000 | 1 |
| 4 | NOTH | 441 | West_Twin_Cr | 2003 2004 | 13 |
| 5 | SOTH | 43 | L_Shuswap | 1994 1995 1996 1997 2010 | 389 |
| 5 | SOTH | 47 | M_Shuswap | 1994 1995 1997 2001 | 375 |
| 5 | SOTH | 75 | Eagle_R | 1995 2000 2001 2003 2004 2009 2010 2011 | 331 |
| 5 | SOTH | 76 | Salmon@SA | 1995 1996 1997 1998 1999 2011 | 215 |
| 5 | SOTH | 84 | L_Adams | 1996 2001 2002 2010 | 340 |
| 5 | SOTH | 85 | South_Thom | 1996 2000 2001 | 266 |
| 5 | SOTH | 95 | Little_R | 1996 2001 2010 | 254 |
| 5 | SOTH | 136 | Scotch_Cr | 2001 | 2 |
| 5 | SOTH | 137 | L_Thompson | 2001 2008 | 229 |

| | | | | | |
|---|------|-----|----------------|---|------|
| 5 | SOTH | 183 | Bessette | 1998 2001 2002 2003 2004 2006 2008 2011 2012 2013 2014 | 201 |
| 5 | SOTH | 195 | L_Shus@U_Adams | 1993 1997 2001 | 46 |
| 5 | SOTH | 235 | Duteau_Cr | 2001 2002 2003 2006 2010 2013 | 75 |
| 5 | SOTH | 268 | Harris_Cr | 2001 2010 2013 | 5 |
| 5 | SOTH | 270 | Seymour@Thomp | 2002 2003 2010 | 44 |
| 6 | LWTH | 42 | Nicola | 1992 1994 1995 1997 1998 1999 | 433 |
| 6 | LWTH | 46 | Coldwater | 1994 1995 1996 1997 1998 1999 | 274 |
| 6 | LWTH | 81 | Spius | 1996 1998 1999 | 137 |
| 6 | LWTH | 82 | Deadman | 1996 1997 1998 1999 2006 | 492 |
| 6 | LWTH | 83 | Bonaparte | 1996 2006 | 344 |
| 6 | LWTH | 90 | Louis | 1996 1997 1999 2000 2001 2006 2008 2010 2011 2013 | 621 |
| 6 | LWTH | 223 | U_Coldwat_SP | 2001 2002 2004 2005 2006 | 221 |
| 6 | LWTH | 224 | U_Spius_SP | 2001 2002 2006 2009 | 175 |
| 7 | ECVI | 2 | Big_Qualicum | 1988 1992 1996 1997 | 365 |
| 7 | ECVI | 3 | Quinsam | 1988 1992 1996 1997 1998 2012 2014 2015 | 564 |
| 7 | ECVI | 7 | Nanaimo_SU | 1996 1998 1999 2002 2005 | 459 |
| 7 | ECVI | 11 | Cowichan | 1988 1996 1999 2000 | 680 |
| 7 | ECVI | 18 | Chemainus | 1996 1999 | 261 |
| 7 | ECVI | 94 | Nimpkish | 1996 2004 2007 2010 2011 | 316 |
| 7 | ECVI | 97 | L_Qualicum | 1996 1998 2002 2007 | 305 |
| 7 | ECVI | 101 | Nanaimo_F | 1996 1997 1998 1999 2002 2003 | 523 |
| 7 | ECVI | 105 | Puntledge_Su | 1988 1996 1997 1998 2000 2001 2005 2006 | 1120 |
| 7 | ECVI | 106 | Puntledge_F | 1988 1996 1997 1998 2000 2001 2005 2006 | 652 |
| 7 | ECVI | 110 | Quatse | 1996 2000 | 30 |
| 7 | ECVI | 266 | Goldstream | 1998 | 22 |
| 7 | ECVI | 335 | Woss_Lake | 2001 | 31 |
| 7 | ECVI | 386 | NanaimoUpper | 1996 1998 2002 2003 2004 2005 | 135 |
| 7 | ECVI | 553 | PuntledgeSum | 2013 2014 | 844 |
| 8 | WCVI | 1 | Robertson | 1988 1996 2003 2013 2014 2015 | 965 |
| 8 | WCVI | 5 | Conuma | 1988 1996 1997 1998 2013 2014 2015 | 1052 |
| 8 | WCVI | 9 | Nitinat | 1989 1996 2003 2013 2014 2015 | 1019 |
| 8 | WCVI | 31 | Kennedy | 1992 2005 2007 2008 2015 | 431 |
| 8 | WCVI | 34 | Thornton | 1992 1999 2000 2001 2015 | 621 |
| 8 | WCVI | 72 | Marble@NVI | 1994 1996 1999 2000 2015 | 553 |
| 8 | WCVI | 107 | Sarita | 1996 1997 2001 2013 2015 | 928 |
| 8 | WCVI | 108 | Nahmint | 1996 2001 2002 2003 2004 2005 | 411 |
| 8 | WCVI | 109 | Stamp | 1973 1996 1998 2015 | 339 |
| 8 | WCVI | 111 | Tranquil | 1996 1999 2004 2014 2015 | 409 |
| 8 | WCVI | 135 | San_Juan | 2001 2002 2014 2015 | 401 |
| 8 | WCVI | 242 | Burman | 1976 1985 1986 1989 1990 1991 1992 2000 2002 2003 2006 2013 2015 | 960 |
| 8 | WCVI | 257 | Toquart | 1999 2000 2015 | 111 |
| 8 | WCVI | 314 | Gold_R | 1987 1992 1999 2002 | 227 |
| 8 | WCVI | 315 | Zeballos | 2002 2004 2005 2006 2007 2008 2009 | 199 |
| 8 | WCVI | 330 | Colonial_Cay | 1999 2004 2015 | 82 |
| 8 | WCVI | 331 | Tahsis | 1996 1999 2002 2003 2014 2015 | 437 |
| 8 | WCVI | 332 | Thupana | 2002 2003 2013 | 98 |
| 8 | WCVI | 340 | Sucwoa | 2002 2005 | 10 |
| 8 | WCVI | 405 | Sooke | 2004 2014 2015 | 233 |

| | | | | | |
|----|------|-----|-----------------|---|-----|
| 8 | WCVI | 406 | Cardy | 2004 | 11 |
| 8 | WCVI | 458 | Cypre_R | 2004 2014 2015 | 68 |
| 8 | WCVI | 459 | Megin_R | 2003 2004 2006 2007 2015 | 97 |
| 8 | WCVI | 460 | Ursus_Cr | 2003 2004 2006 | 8 |
| 8 | WCVI | 461 | Bedwell_R | 2004 2007 2014 2015 | 51 |
| 8 | WCVI | 463 | Kaouk_R | 2010 2011 2015 | 223 |
| 8 | WCVI | 464 | Moyeha_R | 2003 2004 2006 2010 2011 | 57 |
| 8 | WCVI | 491 | Taylor_R | 2015 | 2 |
| 8 | WCVI | 550 | Clemens_Cr | 2011 2015 | 3 |
| 8 | WCVI | 551 | Sprout_R | 2013 | 12 |
| 8 | WCVI | 557 | Gordon_R | 2014 | 33 |
| 8 | WCVI | 558 | Leiner_R | 2014 2015 | 140 |
| 8 | WCVI | 567 | Artlish | 2015 | 36 |
| 8 | WCVI | 568 | AshRiver | 2015 | 9 |
| 8 | WCVI | 570 | Tahsish | 2015 | 39 |
| 8 | WCVI | 571 | WarnBayCr | 2015 | 1 |
| 9 | SOMN | 12 | Squamish | 1990 1996 1997 | 161 |
| 9 | SOMN | 119 | Mamquam | 1996 2003 2005 2007 2008 2012 | 38 |
| 9 | SOMN | 123 | Shovelnose | 1996 2002 2004 2008 | 22 |
| 9 | SOMN | 147 | Klinaklini | 1997 1998 2002 | 472 |
| 9 | SOMN | 148 | Devereux | 1997 1998 2000 | 325 |
| 9 | SOMN | 177 | Homathko | 1997 1998 | 51 |
| 9 | SOMN | 241 | Phillips | 2000 2004 2005 2006 2007 2008 2009 2010 2011 2014 | 677 |
| 9 | SOMN | 262 | Capilano | 1999 | 126 |
| 9 | SOMN | 338 | Quatam | 2003 | 3 |
| 9 | SOMN | 409 | Ahnuhati | 2004 | 2 |
| 9 | SOMN | 410 | Clear | 2004 | 1 |
| 9 | SOMN | 412 | Heydon | 2003 | 3 |
| 9 | SOMN | 415 | Cheakamus | 2005 2006 2007 2008 2009 2012 | 99 |
| 9 | SOMN | 445 | Kingcome_Cr | 2004 | 2 |
| 9 | SOMN | 457 | Ashlu_Cr | 2004 2005 2007 | 6 |
| 9 | SOMN | 470 | Cheakamus_F | 2006 2007 2008 2011 | 114 |
| 9 | SOMN | 486 | Squamish_28Mile | 2004 | 3 |
| 9 | SOMN | 487 | Mashiter_Cr | 2004 2005 2012 | 5 |
| 9 | SOMN | 488 | Cheakamus_Su | 2008 | 40 |
| 9 | SOMN | 489 | Furry_Cr | 2007 2008 2009 | 4 |
| 9 | SOMN | 509 | Highfalls_Cr | 2008 | 1 |
| 10 | NOMN | 4 | Kitimat | 1996 1997 1998 | 483 |
| 10 | NOMN | 23 | Wannock_R | 1991 1996 1997 2000 | 506 |
| 10 | NOMN | 27 | Atnarko | 1991 1996 | 275 |
| 10 | NOMN | 32 | Marble@CC | 2000 | 41 |
| 10 | NOMN | 112 | U_Atnarko | 1996 2011 | 200 |
| 10 | NOMN | 116 | Kilbella | 1996 1998 2000 2001 2005 | 196 |
| 10 | NOMN | 117 | Chuckwalla | 1996 1998 1999 2000 2001 2005 | 315 |
| 10 | NOMN | 118 | Kildala | 1996 1997 1998 1999 2000 | 441 |
| 10 | NOMN | 121 | Nusatsum | 1996 2006 | 103 |
| 10 | NOMN | 122 | Saloompt | 1996 2006 | 138 |
| 10 | NOMN | 184 | Hirsch | 1998 1999 2000 | 474 |
| 10 | NOMN | 214 | Neechanz | 2000 2002 2003 2005 | 57 |
| 10 | NOMN | 215 | Ashlulm | 2000 2002 2003 2005 | 66 |

| | | | | | |
|----|---------|-----|---------------|---|-----|
| 10 | NOMN | 216 | Washwash | 2000 | 1 |
| 10 | NOMN | 217 | Tzeo | 2000 | 3 |
| 10 | NOMN | 222 | Kwinamass | 2000 2001 2002 2003 | 362 |
| 10 | NOMN | 249 | U_Dean | 2001 2002 2003 2004 2006 | 203 |
| 10 | NOMN | 250 | Dean@Main | 2001 | 25 |
| 10 | NOMN | 256 | Dala | 1998 | 14 |
| 10 | NOMN | 261 | Docee | 1998 1999 2002 2004 2007 2010 | 126 |
| 10 | NOMN | 334 | Khutzeymateen | 2002 | 3 |
| 10 | NOMN | 343 | Sheemahant | 2002 2003 | 18 |
| 10 | NOMN | 344 | Amback | 2002 | 1 |
| 10 | NOMN | 345 | Takia | 2002 2003 2006 | 63 |
| 10 | NOMN | 346 | Dean | 2002 2003 2004 2006 | 219 |
| 10 | NOMN | 394 | Kitlope | 2004 2006 | 201 |
| 10 | NOMN | 395 | Kateen | 2004 2005 2006 | 244 |
| 10 | NOMN | 408 | Kumealon | 2004 2010 | 4 |
| 10 | NOMN | 425 | Jayesco | 2006 | 11 |
| 10 | NOMN | 534 | LowAtnarko | 2011 | 50 |
| 11 | NASS | 25 | Kwinageese | 1996 1997 | 266 |
| 11 | NASS | 53 | Damdochax | 1995 1996 1997 | 273 |
| 11 | NASS | 57 | Meziadin | 1995 1996 1997 | 194 |
| 11 | NASS | 58 | Owegee | 1995 1996 1997 2004 | 235 |
| 11 | NASS | 59 | Seaskinnish | 1995 1996 1997 | 99 |
| 11 | NASS | 61 | Tseax | 1995 1996 2002 2006 2008 | 244 |
| 11 | NASS | 62 | Cranberry | 1996 1997 | 175 |
| 11 | NASS | 78 | Snowbank | 1996 | 51 |
| 11 | NASS | 79 | Kincolith | 1996 1999 | 286 |
| 11 | NASS | 80 | Teigen | 1996 1997 | 30 |
| 11 | NASS | 88 | Bowser | 1996 | 1 |
| 11 | NASS | 397 | Ishkheenickh | 2004 2006 | 199 |
| 11 | NASS | 398 | Kiteen | 2004 2006 | 59 |
| 12 | LWFR-Sp | 92 | Big_Silver | 1996 2002 2003 2004 2005 2006 2007 2008 2009 2012 | 210 |
| 12 | LWFR-Sp | 93 | Birkenhead | 1991 1993 1994 1996 1997 1998 1999 2000 2001 2002 2003 2005 2006 2009 2010 | 347 |
| 12 | LWFR-Sp | 209 | Chilliwack_Sp | 2000 2001 2002 2005 2006 | 16 |
| 12 | LWFR-Sp | 272 | Upper_Pitt | 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 | 235 |
| 12 | LWFR-Sp | 341 | Sloquet_Cr | 2002 2003 2004 2006 | 35 |
| 12 | LWFR-Sp | 342 | Douglas_Cr | 2002 | 3 |
| 12 | LWFR-Sp | 387 | DollyVarden | 2003 2009 | 3 |
| 12 | LWFR-Sp | 426 | BlueCr_UpPitt | 2006 2007 2008 2011 2012 | 50 |
| 13 | LWFR-Su | 91 | Nahatlatch_R | 1991 1996 2001 2002 2003 2007 2013 | 29 |
| 13 | LWFR-Su | 212 | Maria_Slough | 1999 2000 2001 2002 2005 | 366 |
| 14 | QCI | 186 | Yakoun | 1987 1989 1996 2001 | 211 |
| 15 | Alaska | 187 | Unuk | 1989 1999 2003 2004 | 336 |
| 15 | Alaska | 188 | King_Salmon | 1989 1990 1993 1999 2007 2008 2010 | 266 |
| 15 | Alaska | 190 | Chickamin | 1990 1993 1999 | 259 |
| 15 | Alaska | 428 | Tahini | 1992 2004 | 142 |
| 15 | Alaska | 429 | Situk | 1988 1990 1991 1992 | 132 |
| 15 | Alaska | 430 | Big_Boulder_C | 1992 1995 2004 | 144 |
| 17 | Taku | 189 | Little_Tatsam | 1999 2005 2006 2007 | 698 |

| | | | | | |
|----|----------------|-----|----------------|--|-----|
| 17 | Taku | 192 | Nahlin | 1999 2004 2006 2007 | 303 |
| 17 | Taku | 253 | Nakina | 2001 2004 2005 2006 2007 | 480 |
| 17 | Taku | 326 | Dudidontu | 2002 2004 2005 2006 2008 | 352 |
| 17 | Taku | 414 | Tseta | 1989 2008 2010 | 327 |
| 17 | Taku | 422 | Kowatua | 1989 1990 1999 2005 | 379 |
| 17 | Taku | 437 | Hackett_r | 2006 2007 2008 | 233 |
| 17 | Taku | 465 | Tatsamenie | 2005 | 38 |
| 17 | Taku | 505 | Yeth_Cr | 2008 2009 2010 | 53 |
| 17 | Taku | 516 | Satlahine_R | 2010 | 3 |
| 18 | Stikine | 191 | Little_Tahltan | 1999 2001 2004 2010 | 745 |
| 18 | Stikine | 220 | Andrew_Cr | 2000 | 144 |
| 18 | Stikine | 240 | Christina | 2000 2001 2002 | 240 |
| 18 | Stikine | 243 | Verrett | 2000 2002 2003 2007 2009 2010 | 854 |
| 18 | Stikine | 248 | Shakes_Cr | 2000 2001 2002 2003 2007 | 225 |
| 18 | Stikine | 252 | Craig | 2001 | 114 |
| 18 | Stikine | 336 | Johnny_Tashoot | 2001 2004 2005 2008 2009 | 99 |
| 18 | Stikine | 337 | Chutine | 2002 | 7 |
| 18 | Stikine | 476 | Tahltan_R | 2008 2009 2011 | 212 |
| 18 | Stikine | 477 | Tuya_R | 2008 2009 2011 2012 2013 | 41 |
| 18 | Stikine | 533 | BearCr | 2011 | 5 |
| 18 | Stikine | 565 | Goat_Cr | 2013 2014 | 21 |
| 18 | Stikine | 566 | Alpine_Cr | 2013 | 5 |
| 18 | Stikine | 569 | LowryCr | 2015 | 1 |
| 19 | Skeena Upper | 20 | Bear | 1991 1995 1996 2005 2012 | 270 |
| 19 | Skeena Upper | 51 | Sustut | 1995 1996 1999 2001 2002 2003 2005 2006 2012 | 603 |
| 19 | Skeena Upper | 396 | Slamgeesh | 2004 2005 2006 2007 2008 2009 | 129 |
| 19 | Skeena Upper | 418 | Kluatantan | 2006 2008 2009 2010 | 38 |
| 19 | Skeena Upper | 466 | Kluayaz_Cr | 2007 2008 2009 2010 | 165 |
| 19 | Skeena Upper | 479 | Squingula_R | 2008 2009 | 271 |
| 19 | Skeena Upper | 480 | Kuldo_C | 2008 2009 2010 | 171 |
| 19 | Skeena Upper | 492 | Otsi_Cr | 2007 2008 2009 2010 2011 | 276 |
| 19 | Skeena Upper | 495 | Sicintine_R | 2009 2010 | 319 |
| 20 | Skeena Babine | 511 | Babine | 2010 2011 | 198 |
| 21 | Skeena Bulkley | 15 | Bulkley_Early | 1991 1996 1998 1999 | 567 |
| 21 | Skeena Bulkley | 399 | Suskwa | 2004 2005 2009 2010 2011 2012 | 201 |
| 21 | Skeena Bulkley | 510 | Morice_R | 2010 2011 | 243 |
| 22 | Skeena Mid | 16 | Kitwanga | 1991 1996 2002 2003 | 284 |
| 22 | Skeena Mid | 55 | Kispiox | 1979 1985 1989 1991 1995 2004 2006 2008 2010 | 197 |
| 22 | Skeena Mid | 401 | Sweetin | 2004 2005 2008 2010 | 245 |
| 22 | Skeena Mid | 493 | Shegunia_R | 2009 2010 2011 2012 | 255 |
| 22 | Skeena Mid | 494 | Kitsequecla_R | 2009 | 260 |
| 22 | Skeena Mid | 501 | Nangeese_R | 2010 | 32 |
| 23 | Skeena Lower | 21 | Ecstall | 1995 2000 2001 2002 2003 2013 | 371 |
| 23 | Skeena Lower | 24 | Kitsumkalum_R | 1991 1995 1996 1998 2001 2009 | 810 |
| 23 | Skeena Lower | 54 | Exchamsiks | 1995 2009 | 116 |
| 23 | Skeena Lower | 86 | Cedar_Early | 1996 | 116 |
| 23 | Skeena Lower | 271 | Gitnadoix | 1995 2002 2003 2009 | 245 |
| 23 | Skeena Lower | 402 | Thomas_Cr | 2003 2004 2009 2010 | 117 |
| 23 | Skeena Lower | 496 | Exstew_R | 2009 | 140 |

| | | | | | |
|----|--------------|-----|----------------|---|-----|
| 23 | Skeena Lower | 497 | Kasiks_R | 2009 | 63 |
| 23 | Skeena Lower | 498 | Zymogotitz_R | 2006 2009 | 120 |
| 23 | Skeena Lower | 500 | Fiddler_Cr | 2010 | 113 |
| 23 | Skeena Lower | 502 | Khyex_R | 2010 | 37 |
| 23 | Skeena Lower | 503 | Lakelse_R | 2010 | 10 |
| 23 | Skeena Lower | 504 | McDonell | 2010 | 5 |
| 24 | Alsek | 236 | Blanchard | 2000 2001 2002 2003 | 381 |
| 24 | Alsek | 237 | Klukshu | 1987 2000 2001 | 433 |
| 24 | Alsek | 239 | Takhanne | 2000 2001 2002 2003 2008 2010 2011 | 218 |
| 24 | Alsek | 251 | Tatshenshi | 2001 | 24 |
| 24 | Alsek | 469 | Goat_Cr | 2007 2008 2009 2010 2011 2012 2013 | 174 |
| 24 | Alsek | 478 | Kudwat_Cr | 2008 2010 2011 | 70 |
| 24 | Alsek | 506 | Tweedmuir | 2009 2011 | 6 |
| 25 | Unuk River | 427 | Cripple_Cr | 1988 2003 | 143 |
| 50 | Puget Sound | 160 | Skagit_Su | 1994 1995 1996 | 310 |
| 50 | Puget Sound | 164 | White_F | 1994 1998 | 252 |
| 50 | Puget Sound | 165 | Nooksack_SP@Ke | 1998 | 200 |
| 50 | Puget Sound | 166 | Green_F@Soos | 1998 | 100 |
| 50 | Puget Sound | 168 | Green@Kendal_F | 1998 | 50 |
| 50 | Puget Sound | 171 | Skykomish_Su | 1996 2004 2005 | 114 |
| 50 | Puget Sound | 173 | StillaguamishS | 1996 | 87 |
| 50 | Puget Sound | 317 | Serpentine | 2002 | 46 |
| 50 | Puget Sound | 439 | Soos_Cr_H | 1998 2004 | 183 |
| 50 | Puget Sound | 499 | Snohomish_R | 2009 2010 | 306 |
| 51 | Juan de Fuca | 167 | Elwha_F | 1996 | 99 |
| 52 | Coastal Wash | 161 | Solduc_F | 1995 | 98 |
| 52 | Coastal Wash | 162 | Quinault_F | 1995 1997 2006 | 100 |
| 52 | Coastal Wash | 163 | Hoh_River_SP_S | 1995 1996 1997 | 59 |
| 52 | Coastal Wash | 169 | Queets | 1996 1997 | 138 |
| 52 | Coastal Wash | 515 | Willapa_Cr | 2005 2010 | 261 |
| 53 | Low Col | 158 | Abernathy_F | 1995 | 100 |
| 53 | Low Col | 170 | Coweeman | 1996 2006 | 195 |
| 53 | Low Col | 433 | Cowlitz_H_Sp | 2004 | 138 |
| 54 | Up Col-Sp | 154 | Chewuch_SP | 1993 | 100 |
| 54 | Up Col-Sp | 159 | Twisp_SP | 1995 2001 2005 | 227 |
| 54 | Up Col-Sp | 175 | Chiwawa_SP | 1993 | 100 |
| 54 | Up Col-Sp | 299 | Entiat_Sp | 2002 | 142 |
| 55 | Up Col-Su/F | 172 | Silmilkameen_S | 1993 2005 2006 | 370 |
| 55 | Up Col-Su/F | 174 | Wenatchee_Su | 1993 | 235 |
| 55 | Up Col-Su/F | 204 | Hanford_Reach | 1998 1999 2000 2001 2004 2006 | 617 |
| 55 | Up Col-Su/F | 281 | Deschutes-F | 1998 1999 2001 2002 | 230 |
| 55 | Up Col-Su/F | 347 | Okanagan | 2000 2002 2003 2004 2005 2006 2007 2008 | 132 |
| 55 | Up Col-Su/F | 348 | Osoyoos_Resid | 2003 2004 2009 | 35 |
| 55 | Up Col-Su/F | 407 | OkanaganJuv | 2003 | 7 |
| 56 | Snake-Sp/Su | 155 | Snake_S | 1993 | 36 |
| 56 | Snake-Sp/Su | 157 | Tucannon_SP | 1995 2003 | 274 |
| 56 | Snake-Sp/Su | 196 | McCall_Hat | 1989 | 41 |
| 56 | Snake-Sp/Su | 198 | Valley_Cr | 1989 | 43 |
| 56 | Snake-Sp/Su | 199 | Imnaha | 1998 1999 2002 2003 | 239 |
| 56 | Snake-Sp/Su | 200 | Rapid_Sp | 1997 1999 2002 | 363 |

| | | | | | |
|----|------------------------|-----|----------------|--------------------------|-----|
| 56 | Snake-Sp/Su | 201 | Upper_Valley | 1998 | 77 |
| 56 | Snake-Sp/Su | 202 | Wenaha | 1998 2002 | 89 |
| 56 | Snake-Sp/Su | 203 | Marsh_Cr | 1989 1991 1998 1999 | 220 |
| 56 | Snake-Sp/Su | 205 | McCall | 1997 | 32 |
| 56 | Snake-Sp/Su | 278 | Up_Salmon-SP | 1989 1992 1993 | 165 |
| 56 | Snake-Sp/Su | 279 | Frenchman-SP | 1991 1992 | 61 |
| 56 | Snake-Sp/Su | 280 | Decker_FlatSP | 2000 | 16 |
| 56 | Snake-Sp/Su | 293 | Salmon_E_Fork | 1999 | 53 |
| 56 | Snake-Sp/Su | 434 | Minam_Cr | 1994 2002 2003 | 144 |
| 56 | Snake-Sp/Su | 435 | Secech | 2001 2002 2003 | 277 |
| 56 | Snake-Sp/Su | 440 | Johnson_Cr | 2001 2002 2003 | 240 |
| 57 | Snake-F | 156 | Lyon's_Ferry_F | 1993 1998 2002 2003 | 370 |
| 58 | North & Central Oregon | 178 | Trask_hat_SP | 1997 | 48 |
| 58 | North & Central Oregon | 179 | Trask_hat_F | 1997 2005 | 236 |
| 58 | North & Central Oregon | 273 | Euchre_Cr | 1996 | 57 |
| 58 | North & Central Oregon | 275 | Umpqua_Smith | 1997 1998 2004 | 229 |
| 58 | North & Central Oregon | 282 | Elk | 1995 2004 | 206 |
| 58 | North & Central Oregon | 311 | Nehalem | 1996 2000 2002 2004 2005 | 327 |
| 58 | North & Central Oregon | 312 | Siuslaw | 1995 2011 | 258 |
| 58 | North & Central Oregon | 535 | Cle_Elm_Hatch | 2004 | 95 |
| 59 | South Oregon coastal | 274 | Hunter_Cr | 1995 | 96 |
| 59 | South Oregon coastal | 276 | Cole | 1995 2004 | 188 |
| 59 | South Oregon coastal | 277 | Pistol | 1995 | 98 |
| 59 | South Oregon coastal | 298 | Winchuk | 1995 | 80 |
| 59 | South Oregon coastal | 300 | Lobster_Cr | 1998 | 49 |
| 59 | South Oregon coastal | 436 | Umpqua_Sp | 2004 | 136 |
| 59 | South Oregon coastal | 438 | Nestucca_F | 2004 2005 | 153 |
| 61 | Klamath/Trinity | 213 | Trinity_SP | 1998 | 100 |
| 61 | Klamath/Trinity | 219 | Trinity_F | 1992 1998 | 244 |
| 61 | Klamath/Trinity | 289 | Salmon_Cal | 1998 | 28 |
| 61 | Klamath/Trinity | 297 | Blue_Cr | 1999 | 94 |
| 61 | Klamath/Trinity | 307 | Trinity_S_Fork | 1997 | 15 |
| 62 | Mid Col-Sp | 176 | Naches_Sp | 1989 1993 | 109 |
| 62 | Mid Col-Sp | 291 | Granite | 2000 2005 2006 | 93 |
| 62 | Mid Col-Sp | 294 | John_Day_Mid | 2000 | 40 |
| 62 | Mid Col-Sp | 295 | John_Day_N | 2000 | 40 |
| 62 | Mid Col-Sp | 296 | John_Day_main | 2000 2004 2005 2006 | 228 |
| 62 | Mid Col-Sp | 432 | Spring_Cr_H | 2001 2002 | 137 |
| 63 | Up Willamette | 180 | North_Santiam | 1997 2002 2004 | 236 |
| 63 | Up Willamette | 285 | Sandy | 1997 2002 2004 | 208 |

| | | | | | |
|----|--------------------|-----|-------------|---|-----|
| 63 | Up Willamette | 292 | Mackenzie | 1997 | 12 |
| 63 | Up Willamette | 308 | Clackamas_N | 1997 | 79 |
| 64 | Cent Val-F | 124 | Sacr_F | 1993 1995 | 129 |
| 64 | Cent Val-F | 125 | Sacr_LF | 1992 1993 1994 1995 1997 1998 2001 2003 2004 | 211 |
| 64 | Cent Val-F | 197 | Mokelumne | 1995 | 95 |
| 64 | Cent Val-F | 283 | Toulumne | 1998 | 34 |
| 64 | Cent Val-F | 284 | Merced | 1998 1999 | 200 |
| 64 | Cent Val-F | 286 | Yuba | 2000 | 50 |
| 64 | Cent Val-F | 287 | Stanislaus | 1998 2002 | 101 |
| 64 | Cent Val-F | 302 | American | 1999 | 69 |
| 64 | Cent Val-F | 303 | Feather_F | 1999 2000 2003 | 272 |
| 64 | Cent Val-F | 305 | Battle_Cr | 1999 2002 2003 | 183 |
| 64 | Cent Val-F | 309 | Butte_F | 2000 | 49 |
| 64 | Cent Val-F | 310 | Deer_Cr | 2000 | 15 |
| 65 | Cent Val-Sp | 288 | Butte_Sp | 2000 2002 2003 | 186 |
| 65 | Cent Val-Sp | 304 | Feather_Sp | 1999 2000 2003 | 226 |
| 65 | Cent Val-Sp | 306 | Yuba_Sp | 2000 | 32 |
| 66 | Coastal California | 431 | Eel_F | 2000 2001 | 279 |

Appendix C. 2. Genetic stock identification methods for sockeye salmon stocks in the Transboundary rivers, 2019.

United States

The following methods will be used by the ADF&G Gene Conservation Laboratory to estimate stock proportions of transboundary sockeye salmon harvested by commercial fishers in U.S. Districts 106, 108, and 111 in Southeast Alaska.

Fishery Sampling

Landings from drift gillnet fisheries in Subdistricts 106-30 and 106-41 (District 106), in District 108, and in District 111 will be sampled by ADF&G at fish processing facilities in Ketchikan, Wrangell, Petersburg, and Juneau, and by observers on tenders. Sampling protocols will ensure that the fish sampled will be as representative of catches as possible. Axillary processes will be excised and dried onto Whatman paper. Associated data for each sample including fishery and capture date will be recorded, and the tissue sample for each fish will be paired with age, sex, and length (ASL) information and with otolith samples. Otolith samples will be examined for enhanced marks by the ADF&G Mark, Tag, and Age Laboratory in Juneau.

Laboratory Analysis

We will extract genomic DNA from tissue samples using a DNeasy® 96 Blood and Tissue Kit by QIAGEN® (Valencia, CA). We will screen 96 SNP markers using Fluidigm® 96.96 Dynamic Array™ Integrated Fluidic Circuits (IFCs), which systematically combine up to 96 assays and 96 samples into 9,216 parallel reactions. The components are pressurized into the IFC using the IFC Controller HX (Fluidigm). Each reaction is conducted in a 7.2nL volume chamber consisting of a mixture of 20X Fast GT Sample Loading Reagent (Fluidigm), 2X TaqMan® GTXpress™ Master Mix (Applied Biosystems™), Custom TaqMan® SNP Genotyping Assay (Applied Biosystems™), 2X Assay Loading Reagent (Fluidigm), 50X ROX Reference Dye (Invitrogen™), and 60-400ng/μl DNA. Thermal cycling is performed on a Fluidigm FC1™ Cyclizer using a Fast-PCR protocol as follows: a “Thermal-Mix” step of 70°C for 30 min and 25°C for 10 min, an initial “Hot-Start” denaturation of 95°C for 2 min followed by 40 cycles of denaturation at 95°C for 2 sec and annealing at 60°C for 20 sec, with a final “Cool-Down” at 25°C for 10 sec. The Dynamic Array IFCs will be read on a Biomark™ or EP1™ System (Fluidigm) after amplification and scored using Fluidigm SNP Genotyping Analysis software.

Assays that failed to amplify on the Fluidigm system will be reanalyzed with the QuantStudio™ 12K Flex Real-Time PCR System (Life Technologies). Each reaction will be performed in 384-well plates in a 5μL volume consisting of 6–40ng/μl of DNA, 2X TaqMan® GTXpress™ Master Mix (Applied Biosystems™), and Custom TaqMan® SNP Genotyping Assay (Applied Biosystems). Thermal cycling will be performed on a Dual 384-Well GeneAmp® PCR System 9700 (Applied Biosystems) as follows: an initial “Hot-Start” denaturation of 95°C for 10 min followed by 40 cycles of denaturation at 92°C for 1 sec and annealing at 60°C for 1 min, with a final “Cool-Down” hold at 10°C. The plates will be scanned on the system after amplification and scored using the Life Technologies QuantStudio 12K Flex Software. Genotypes produced on both platforms will be imported and archived in the Gene Conservation Lab Oracle database, LOKI.

Quality Control

Quality control methods will consist of reextracting 8% of project fish and genotyping them for the same SNPs assayed in the original extraction. Discrepancy rates will be calculated as the number of conflicting genotypes, divided by the total number of genotypes examined. These rates describe the difference between original project data and quality control data for all SNPs and can identify extraction, assay plate, and genotyping errors. This quality control method is the best representation of the error rate of our current genotype production.

Error rates for the original genotyping can be estimated as half the rate of discrepancy by assuming that the discrepancies among analyses were due equally to errors during the original genotyping and to errors during quality control, and by assuming that at least one of these assays produced the correct genotype.

Estimating Stock Compositions

A single nucleotide polymorphism (SNP) baseline was recently developed for Southeast Alaska (SEAK) and British Columbia (BC) (Rogers Olive et al. in review). This baseline included populations spanning from Prince William Sound, south to Washington State for a total of 171 populations (Table C.2.1). This baseline was analyzed at a total of 96 markers, of which 91 markers were kept for MSA (Table C.2.2). A catalog of existing tissues and potential gaps in this baseline for transboundary applications is described in Table C.2.3.

Reporting groups are defined based upon transboundary management needs and meeting criteria set by the Gene Conservation Laboratory (Habicht et al. 2012). Once defined, reporting groups underwent extensive testing for use in MSA. This included repeated proof tests, in which we sampled 200 individuals without replacement from each reporting group and analyzed them as a mixture against the reduced baseline. The reporting groups tested for Stikine River area fisheries included: 1) Tahltan, 2) Stikine Other, and 3) Non-Stikine. Reporting groups tested for Taku River area fisheries included: 1) Tatsamenie, 2) Taku Lakes Other, 3) Taku/Stikine Mainstem, and 4) Other. These reporting groups meet the minimum critical level of 90% correct allocation in repeated proof tests (Seeb et al. 2000).

Methods for mixture analysis have improved since the inception of this project, and can now include additional available data to help inform the genetic estimates. Specifically, ages from matched scales and hatchery marks on matched otoliths allow more detailed stock composition estimates. With the additional information gained from including ages and otolith marked fish, results were reported for 5 reporting groups for Stikine River area fisheries (Stikine/Taku Mainstem, Tahltan Wild, Enhanced Tahltan, Enhanced Tuya, and Non-Stikine). At the request of the TTC, these groups will be rolled up into the agreed-upon reporting groups, with the Tahltan reporting groups including Tahltan Wild, Enhanced Tahltan, and Enhanced Tuya. For Taku River area fisheries, results were reported for 9 reporting groups (Taku/Stikine Mainstem, Taku Lakes, Tatsamenie Wild, Speel Wild, Enhanced Tatsamenie, Enhanced Trapper, Enhanced Snettisham, and Enhanced Stikine). At the request of the TTC, these reporting groups will be rolled up into the agreed-upon reporting groups, with the Tatsamenie reporting group including Tatsamenie Wild and Enhanced Tatsamenie, the Taku Lakes Other reporting group including Taku Lakes and Enhanced Trapper, the Taku/Stikine Mainstem reporting group staying the same, and the Other reporting group including Speel Wild, Enhanced Snettisham, Enhanced Stikine, and Other. Results will be noted if estimates do not meet the precision and accuracy guidelines set by the TTC in April 2013 (to estimate the proportion of mixtures within 10% of the true mixture 90% of the time).

In the mark- and age-enhanced GSI model, the Bayesian methods of the Pella-Masuda Model (Pella and Masuda 2001) will be extended to include otolith-marked and aged individuals for estimating stock

compositions where unmarked fish have unknown origin, but are known to belong to some wild stock in the genetic baseline and otolith-marked individuals are known to belong to a hatchery stock. While all individuals are aged, none of the otolith-marked fish are genotyped and only a subset of wild fish are genotyped. Thus, the entire mixture sample will be comprised of 3 sample components: 1) the number of wild individuals that are aged and genotyped; 2) the number of wild individuals that are aged but not genotyped; and 3) the number of aged and otolith-marked fish.

Two sets of parameters will be required for running the model: 1) a vector of stock compositions, summing to one, with a proportion for each of the wild and hatchery stocks weighted by harvest per stratum; and 2) a matrix of age composition, with a row for each of the wild and hatchery stocks (summing to one), and a column for each age class. This information will be “completed” iteratively by stochastically assigning each wild fish to a population, then estimating the stock proportions based on summaries of assignments from each iteration.

To initialize the algorithm, all wild fish will be given a stock assignment stochastically. The initialized algorithm will then proceed in the following steps:

- 1) Summarize all age data by assigned and observed stocks for both wild and hatchery individuals;
- 2) Estimate the stock proportions and age composition from previous summaries (accounting for sampling error);
- 3) Stochastically assign each wild fish with genotypes to a wild stock of origin based on the product of its genotypic frequency, age frequency, and stock proportion for each population;
- 4) Stochastically assign each wild fish without genotypes to a stock of origin based on the product of its age frequency and stock proportion for each population; and
- 5) Repeat steps 1-4 while updating and recording the estimates of the stock proportions and age compositions with each iteration.

This algorithm will be run for 40,000 iterations, discarding the first 20,000 iterations to eliminate the effect of the initial state. Multiple chains will be run to assess convergence via the Gelman-Rubin shrink factor which compares variation within a chain to the total variation among chains (Gelman and Rubin 1992). Shrink factors greater than 1.2 indicated that the chains did not converge for a given mixture. To address this, we reanalyzed the mixture in question with double the number of iterations. The point estimates and credibility intervals for the stock proportions and age composition were summary statistics of the output.

Canada

The following methods are used by the DFO’s Molecular Genetics Laboratory, Pacific Biological Station, Nanaimo, B.C. to estimate stock proportions of transboundary sockeye salmon harvested by inriver fisheries on the Alsek, Taku, and Stikine rivers.

Laboratory Analysis

Once sockeye salmon genomic DNA are available, surveys of variation at the following 15 microsatellite loci will be conducted: Ots2, Ots3 (Banks et al. 1999); Ots100, Ots103, Ots107 (Beacham et al. 1998; Nelson and Beacham 1999); Oki1a Oki1b, Oki6, Oki10, Oki16, and Oki29 (Smith et al. 1998 and unpublished); One8 (Scribner et al. 1996); and Omy77 (Morris et al. 1996). Microsatellites will be size fractionated in an Applied Biosystems (ABI) 3730 capillary DNA sequencer, and genotypes will be scored by GeneMapper software 3.0 (Applied Biosystems, Foster City, CA) using an internal lane sizing standard.

In general, polymerase chain (PCR) reactions will be conducted in 10 µl volumes consisting of 0.06 units of Taq polymerase, 1µl of 30ng DNA, 1.5-2.5mM MgCl₂, 1mM 10x buffer, 0.8mM dNTP’s, 0.006-0.065µM of labeled forward primer (depending on the locus), 0.4µM unlabeled forward primer, 0.4µM

unlabeled reverse primer, and deionized H₂O. PCR will be completed on an MJResearch™ DNA Engine™ PCT-200 or a DNA Engine Tetrad™ PCT-225. The amplification profile will involve one cycle of 2 min @ 92°C, 30 cycles of 15 sec @ 92°C, 15 sec @ 52-60°C (depending on the locus) and 30 sec @ 72°C, and a final extension for 10 min @ 72°C. Specific PCR conditions for a particular locus could vary from this general outline. Further information on laboratory equipment and techniques is available at the Molecular Genetics Laboratory website at <http://www.pac.dfo-mpo.gc.ca/science/facilities-installations/pbs-sbp/mgl-lgm>.

Baseline Populations

Mixture analysis will require microsatellite analysis of sockeye salmon from drainage specific baselines within Canada, consisting of 16 populations/sampling sites for the Stikine River, 16 populations/sampling sites for the Alsek River, and 17 populations/sampling sites for the Taku River (Table C.2.4). All annual baseline samples available for a specific sample location will be combined to estimate population allele frequencies, as was recommended by Waples (1990). A catalog of existing tissues and potential gaps in this baseline for transboundary applications is described in Table C.2.3.

Estimation of Stock Composition

Analysis of fishery samples will be conducted with a Bayesian procedure (BAYES) as outlined by Pella and Masuda (2001). Each locus will be assumed to be in Hardy-Weinberg equilibrium, and expected genotypic frequencies will be determined from the observed allele frequencies and used as model inputs. For BAYES, the initial FORTRAN-based computer program as outlined by Pella and Masuda (2001) required large amounts of computer analytical time when applied to stock identification problems with a baseline as comprehensive as employed in the current study. Given this limitation, a new version of the program was developed by our laboratory as a C-based program which is available from the Molecular Genetics Laboratory website (Neaves et al. 2005). In the analysis, ten 20,000-iteration Monte Carlo Markov chains of estimated stock compositions will be produced, with initial starting values for each chain set at 0.90 for a particular population which will be different for each chain. Estimated stock compositions will be estimated when all Monte Carlo Markov chains had converge producing a Gelman-Rubin coefficient < 1.2 (Pella and Masuda 2001). The last 1,000 iterations from each of the 10 chains will be combined, and for each fish the probability of originating from each population in the baseline will be determined. These individual probabilities will be summed over all fish in the sample, and divided by the number of fish sampled to provide the point estimate of stock composition. Standard deviations of estimated stock compositions will be determined from the last 1,000 iterations from each of the 10 Monte Carlo Markov chains incorporated in the analysis.

References

- Banks, M.A., M.S. Blouin, B.A. Baldwin, V.K. Rashbrook, H.A. Fitzgerald, S.M. Blankenship, and D. Hedgcock. 1999. Isolation and inheritance of novel microsatellites in Chinook salmon (*Oncorhynchus tshawytscha*). *Journal of Heredity* 90:281-288.
- Beacham, T.D., M. Wetklo, C. Wallace, J.B. Olsen, B.G. Flannery, J.K. Wenburg, W.D. Templin, A. Antonovich, and L.W. Seeb 2008. The application of microsatellites for stock identification of Yukon River Chinook salmon *North American Journal of Fisheries Management* 28:283-295.
- Beacham, T.D. and C.C. Wood. 1999. Application of microsatellite DNA variation to estimation of stock composition and escapement of Nass River sockeye salmon (*Oncorhynchus nerka*). *Canadian Journal of Fisheries and Aquatic Sciences* 56:1-14.

- Beacham, T.D., L. Margolis, and R.J. Nelson. 1998. A comparison of methods of stock identification for sockeye salmon (*Oncorhynchus nerka*) in Barkley Sound, British Columbia. North Pacific Anadromous Fish Commission Bulletin 1:227-239.
- Bucholz, W.G., S.J. Miller, and W.J. Spearman. 2001. Isolation and characterization of chum salmon microsatellite loci and use across species. *Animal Genetics* 32:162-165.
- Gelman, A. and D. B. Rubin. 1992. Inference from iterative simulation using multiple sequences. *Statistical Science* 7: 457-511.
- Grieg, C., D.P. Jacobson, and M.A. Banks. 2003. New tetranucleotide microsatellites for fine-scale discrimination among endangered Chinook salmon (*Oncorhynchus tshawytscha*) *Molecular Ecology Notes* 3:376-379.
- Habicht, C., J. R. Jasper, T. H. Dann, N. A. DeCovich, and W. D. Templin. 2012. Western Alaska Salmon Stock Identification Program Technical Document 11: Defining reporting groups. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J12-16, Anchorage.
- Morris, D.B., K.R. Richard, and J.M. Wright. 1996. Microsatellites from rainbow trout (*Oncorhynchus mykiss*) and their use for genetic study of salmonids. *Canadian Journal of Fisheries and Aquatic Sciences* 53:120-126.
- Neaves, P. I., C. G. Wallace, J. R. Candy, and T. D. Beacham. 2005. CBayes: Computer program for mixed stock analysis of allelic data. Version v4.02. Free program distributed by the authors over the internet from http://www.pac.dfo-mpo.gc.ca/sci/mgl/Cbayes_e.htm
- Nelson, R.J. and T.D. Beacham. 1999. Isolation and cross-species amplification of microsatellite loci useful for study of Pacific salmon. *Animal Genetics* 30:228-229.
- Olsen, J.B., P. Bentzen, and J.E. Seeb. 1998. Characterization of seven microsatellite loci derived from pink salmon. *Molecular Ecology* 7:1087-1090.
- O'Reilly, P.T., L.C. Hamilton, S.K. McConnell, and J.M. Wright. 1996. Rapid analysis of genetic variation in Atlantic salmon (*Salmo salar*) by PCR multiplexing of dinucleotide and tetranucleotide microsatellite. *Canadian journal of Fisheries and Aquatic Sciences* 53:2292-2298.
- O'Connell, M., R.G. Danzmann, J.M. Cornuet, J.M. Wright, and M.M. Ferguson. 1997. Differentiation of rainbow trout stocks in Lake Ontario and the evaluation of the stepwise mutation and infinite allele mutation models using microsatellite variability. *Canadian Journal of Fisheries and Aquatic Sciences* 54:1391-1399.
- Pella, J. and Masuda, M. 2001. Bayesian methods for analysis of stock mixtures from genetic characters. *Fish. Bull.* 99: 151-167.
- Rogers Olive, S. D., S. E. Gilk-Baumer, E. K. C. Fox, and C. Habicht. *In review*. Genetic baseline of Southeast Alaska sockeye salmon for mixed stock analyses, 2014. Alaska Department of Fish and Game, Fishery Data Series, Anchorage. Seeb, L. W., C. Habicht, W. D. Templin, K. E. Tarbox, R. Z. Davis, L. K. Brannian and J. E. Seeb. 2000. Genetic diversity of sockeye salmon of Cook Inlet, Alaska, and its application to management of populations affected by the Exxon Valdez oil spill.

- Transactions of the American Fisheries Society 129(6):1223-1249. Scribner, K.T., J.R. Gust, and R.L. Fields. 1996 Isolation and characterization of novel salmon microsatellite loci: cross-species amplification and population genetic applications. Canadian Journal of Fisheries and Aquatic Sciences 53:833-841.
- Smith, C.T., B.F. Koop, and R.J. Nelson. 1998. Isolation and characterization of coho salmon (*Oncorhynchus kisutch*) microsatellites and their use in other salmonids. Molecular Ecology 7:1613-1621.
- Waples R.S. and D.J. Teel. 1990. Conservation Genetics of Pacific Salmon I. Temporal changes in allele frequencies. Conservation Biology 4:144-156.

Appendix Table C.2.1. Sockeye salmon genetic baseline by reporting groups for 171 wild populations used in Southeast Alaska. Hatchery populations of sockeye salmon determined using otolith information. This baseline is used by ADF&G for GSI of sockeye salmon in U.S. Districts 106, 108, and 111. Reporting groups may be rolled up to correspond with those identified as necessary to meet transboundary management objectives.

| | <i>Stikine Reporting Groups</i> | <i>Taku Reporting Groups</i> | Region | Location | N | Year(s) Collected |
|----|---------------------------------|------------------------------|----------------|----------------------------------|-----|-------------------|
| 1 | <i>Non-Stikine</i> | <i>Other</i> | Prince William | Bainbridge Lake | 95 | 2010 |
| 2 | | | Sound | Coghill Lake | 378 | 1991, 1992, 2010 |
| 3 | | | | Eshamy Lake | 185 | 1991, 2008 |
| 4 | | | | Main Bay | 96 | 1991 |
| 5 | | | | Miners Lake | 191 | 1991, 2009 |
| 6 | | | Copper | Bering Lake | 95 | 1991 |
| 7 | | | | Clear Creek at 40 Mile | 86 | 2007 |
| 8 | | | | Eyak Lake - Hatchery Creek | 95 | 2010 |
| 9 | | | | Eyak Lake - Middle Arm | 95 | 2007 |
| 10 | | | | Eyak Lake - South beaches | 87 | 2007 |
| 11 | | | | Fish Creek - East Fork Gulkana R | 95 | 2008 |
| 12 | | | | Gulkana River - East Fork | 75 | 2008 |
| 13 | | | | Klutina Lake - inlet | 95 | 2008, 2009 |
| 14 | | | | Klutina River - mainstem | 95 | 2008 |
| 15 | | | | Banana Lake - Klutina | 80 | 2008 |
| 16 | | | | Bear Hole - tributary Klutina | 94 | 2008 |
| 17 | | | | Kushtaka Lake | 189 | 2007, 2008 |
| 18 | | | | Long Lake weir | 95 | 2005 |
| 19 | | | | Mahlo River | 94 | 2008 |
| 20 | | | | Martin Lake | 187 | 2007, 2008 |
| 21 | | | | Martin River Slough | 95 | 2008 |
| 22 | | | | McKinley Lake | 95 | 2007 |
| 23 | | | | McKinley Lake | 95 | 2008 |
| 24 | | | | McKinley Lake/Salmon Creek | 188 | 1991, 2007 |
| 25 | | | | Salmon Creek - Bremner | 93 | 2008 |
| 26 | | | | Mendeltna Creek | 188 | 2008, 2009 |
| 27 | | | | Mentasta Lake | 95 | 2008 |
| 28 | | | | Paxson Lake - outlet | 75 | 2009 |
| 29 | | | | St. Anne Creek | 186 | 2005, 2008 |
| 30 | | | | Steamboat Lake - Bremner | 95 | 2008 |
| 31 | | | | Swede Lake | 95 | 2008 |
| 32 | | | | Tanada Creek weir | 94 | 2005 |
| 33 | | | | Tanada Lake - lower outlet | 95 | 2009 |
| 34 | | | | Tanada Lake - shore | 93 | 2009 |
| 35 | | | | Tebay River - Outlet | 93 | 2008 |
| 36 | | | | Tokun Lake | 189 | 2008, 2009 |
| 37 | | | | Tonsina Lake | 94 | 2009 |
| 38 | | | Yakutat | Ahrnklin River | 90 | 2007 |
| 39 | | | | Akwe River | 95 | 2009 |
| 40 | | | | Dangerous River | 95 | 2009 |
| 41 | | | | East Alsek River | 94 | 2003 |
| 42 | | | | Lost/Tahwah Rivers | 93 | 2003 |
| 43 | | | | Old Situk River | 163 | 2007 |
| 44 | | | | Mountain Stream | 159 | 2007 |
| 45 | | | | Situk Lake | 190 | 2013 |
| 46 | | | Alsek | Blanchard River | 160 | 2007- 2009 |
| 47 | | | | Border Slough | 141 | 2007-2009, 2011 |
| 48 | | | | Klukshu River | 101 | 2007, 2008 |
| 49 | | | | Upper Tatshenshini R/Kudwat Ck | 195 | 2003, 2009-2011 |
| 50 | | | | Tatshenshini - Kwatini River | 65 | 2011 |
| 51 | | | | Neskataheen Lake | 195 | 2007 |
| 52 | | | | Tweedsmuir Lake | 94 | 2007, 2009 |
| 53 | | | | Vern Ritchie | 114 | 2009, 2010 |
| 54 | | | N. Southeast | Chilkat Lake | 190 | 2007 |
| 55 | | | | Chilkat Mainstem - Mosquito Lk | 95 | 2007 |
| 56 | | | | Chilkat Mainstem - Bear Flats | 95 | 2007 |
| 57 | | | | Chilkat River - Mule Meadows | 190 | 2003, 2007 |
| 58 | | | | Chilkoot Lake - beaches | 251 | 2007 |

Appendix Table C.2.1. Continued

| | <i>Stikine Reporting Groups</i> | <i>Taku Reporting Groups</i> | Region | Location | N | Year(s) Collected |
|-----|---------------------------------|------------------------------|--------------|---------------------------------|-----|---|
| 59 | <i>Non-Stikine</i> | <i>Other</i> | | Chilkoot Lake - Bear Creek | 233 | 2007 |
| 60 | <i>(cont.)</i> | <i>(cont.)</i> | | Chilkoot River - Chilkoot River | 159 | 2003 |
| 61 | | | | Berners Bay | 165 | 2003, 2013 |
| 62 | | | | Lace River | 63 | 2013 |
| 63 | | | | Steep Creek | 91 | 2003 |
| 64 | | | | Windfall Lake | 142 | 2003, 2007 |
| 65 | | | | Lake Creek (Auke Creek Weir) | 200 | 2013 |
| 66 | | | | Crescent Lake | 194 | 2003 |
| 67 | | <i>Speel Wild</i> | | Speel Lake | 95 | 2003 |
| 68 | | | | Snettisham Hatchery | 241 | 2007, 2013 |
| 69 | | <i>Other</i> | | Vivid Lake | 48 | 1993 |
| 70 | | | | Bartlett River - Creel survey | 69 | 2013 |
| 71 | | | | North Berg Bay Inlet | 153 | 1991, 1992 |
| 72 | | | | Neva Lake | 160 | 2013 |
| 73 | | | | Sitkoh Lake | 351 | 2003, 2011, 2012 |
| 74 | | | | Lake Eva | 115 | 2012 |
| 75 | | | | Kook Lake | 346 | 2007, 2010, 2012-13 |
| 76 | | | | Pavlof Lake | 174 | 2012, 2013 |
| 77 | | | | Hasselborg Lake | 209 | 2012, 2013 |
| 78 | | | | Kanalku Lake ¹ | 319 | 2007, 2010, 2013 |
| 79 | | | | Kutlaku Lake | 128 | 2012, 2013 |
| 80 | | | | Hoktaheen Lake | 96 | 2004 |
| 81 | | | | Falls Lake | 190 | 2003, 2010 |
| 82 | | | | Ford Arm Creek | 199 | 2013 |
| 83 | | | | Klag Bay Stream outlet | 200 | 2009 |
| 84 | | | | Redfish Lake Beaches | 94 | 1993 |
| 85 | | | | Salmon Lake weir | 185 | 2007, 2008 |
| 86 | | | | Redoubt Lake - outlet | 200 | 2013 |
| 87 | | | | Benzeman Lake | 95 | 1991, 1993 |
| 88 | | <i>Taku Lakes</i> | Taku | King Salmon Lake | 214 | 2010, 2011 |
| 89 | | | | Little Tatsamenie | 139 | 1990, 1991, 2011 |
| 90 | | | | Little Trapper Lake | 237 | 1990, 2006 |
| 91 | | | | Kuthai Lake | 171 | 2006 |
| 92 | | <i>Tatsamenie Wild</i> | | Tatsamenie Lake | 288 | 2005, 2006 |
| 93 | <i>Stikine/Taku</i> | <i>Stikine/Taku</i> | | Hackett River | 52 | 2008 |
| 94 | <i>Mainstem</i> | <i>Mainstem</i> | | Nahlin River | 84 | 2003, 2007 |
| 95 | | | | Tulsequah River | 156 | 2007, 2008, 2009 |
| 96 | | | | Yellow Bluff Slough | 81 | 2008, 2010, 2011 |
| 97 | <i>Stikine/Taku</i> | <i>Stikine/Taku</i> | | Shustahine Slough | 185 | 2008, 2009 |
| 98 | <i>Mainstem</i> | <i>Mainstem</i> | | Taku River | 95 | 2007 |
| 99 | <i>(cont.)</i> | <i>(cont.)</i> | | Takwahoni/Sinwa Creek | 108 | 2009, 2011 |
| 100 | | | | Tuskwa/Chunk/Bear Sloughs | 356 | 2008, 2009 |
| 101 | | | | Fish Creek | 159 | 2009, 2010 |
| 102 | | | | Yehring Creek | 171 | 2007, 2009 |
| 103 | | | Stikine | Shakes Slough | 67 | 2006, 2007, 2009 1985-6, 2002, 2006-09 |
| 104 | | | | Iskut River | 318 | 09 |
| 105 | | | | Verrett River | 65 | 2010, 2011 |
| 106 | | | | Scud River | 191 | 2007, 2008, 2009 |
| 107 | | | | Andy Smith/Porcupine/Fowler Sl | 120 | 2007-2011 |
| 108 | | | | Devil's Elbow | 201 | 2007, 2008, 2009 |
| 109 | | | | Chutine River | 94 | 2008 |
| 110 | | | | Chutine Lake | 224 | 2009, 2011 |
| 111 | | | | Christina Lake | 50 | 2010, 2011 |
| 112 | <i>Tahltan Wild</i> | <i>Other</i> | | Little Tahltan River | 95 | 1990 |
| 113 | | | | Tahltan Lake | 196 | 2006 |
| 114 | <i>Non-Stikine</i> | | S. Southeast | Hugh Smith Lake | 309 | 2004, 2007, 2013 |
| 115 | | | | McDonald Lk - Hatchery Ck | 369 | 2001, 2003, '07, '13 |
| 116 | | | | Hatchery Creek - Sweetwater Lk | 142 | 2003, 2007 |
| 117 | | | | Kah Sheets Lake | 96 | 2003 |
| 118 | | | | Kunk Lake | 96 | 2003 |
| 119 | | | | Luck Lake | 94 | 2004 |
| 120 | | | | Big Lake | 90 | 2010, 2011 |

Appendix Table C.2.1. Continued

| | <i>Stikine Reporting Groups</i> | <i>Taku Reporting Groups</i> | Region | Location | N | Year(s) Collected |
|-----|---|--|---------------|-------------------------------|-----|-------------------|
| 121 | <i>Non-Stikine (cont.)</i> | <i>Other (cont.)</i> | | Mill Creek Weir | 189 | 2007 |
| 122 | | | | Petersburg Lake | 95 | 2004 |
| 123 | | | | Red Bay Lake | 95 | 2004 |
| 124 | | | | Salmon Bay Lake | 170 | 2004, 2007 |
| 125 | | | | Shipley Lake | 94 | 2003 |
| 126 | | | | Thoms Lake | 66 | 2004 |
| 127 | | | | Sarkar Lakes | 91 | 2000, 2005 |
| 128 | | | | Heckman Lake | 189 | 2004, 2007 |
| 129 | | | | Helm Lake | 94 | 2005 |
| 130 | | | | Karta /McGilvery Ck/Salmon Lk | 285 | 1992, 2003, 2004 |
| 131 | | | | Kegan Lake | 95 | 2004 |
| 132 | | | | Mahoney Creek | 154 | 2003, 2007 |
| 133 | | | | Unuk River - Gene's Lake | 164 | 2007, 2008 |
| 134 | | | | Fillmore Lake - Hoffman Creek | 52 | 2005 |
| 135 | | | | Klakas Lake | 95 | 2004 |
| 136 | | | | Bar Creek - Essowah Lake | 95 | 2004 |
| 137 | | | | Eek Creek | 50 | 2004, 2007 |
| 138 | | | | Hetta Creek - middle run | 95 | 2009 |
| 139 | | | | Hetta Creek - early run | 95 | 2010 |
| 140 | | | | Hetta Lake | 281 | 2003, 2008, 2009 |
| 141 | | | | Klawock Lake | 134 | 2004, 2008 |
| 142 | | | Nass | Bowser Lake | 94 | 2001 |
| 143 | | | | Damdochax Creek | 93 | 2001 |
| 144 | | | | Meziadin Lake | 186 | 2001, 2006 |
| 145 | | | Skeena | Tintina Creek | 94 | 2006 |
| 146 | | | | Alastair Lake | 85 | 2006 |
| 147 | | | | Four Mile Creek/Pierre Creek | 180 | 2006 |
| 148 | | | BC/Washington | Fulton River/Morrison Creek | 187 | 2006, 2007 |
| 149 | | | | Kitsumkalum Lake | 56 | 2006 |
| 150 | | | | Lower Tahlo River/Tahlo Creek | 183 | 1988, 1994, 2007 |
| 151 | | | Fraser | McDonell Lake - Zymoetz River | 63 | 2006 |
| 152 | | | | Nangeese River | 40 | 2006 |
| 153 | | | | Nanika River | 94 | 2007 |
| 154 | | | | Slamgeesh River | 95 | 2006 |
| 155 | | | | Sustut River - Johanson Lake | 95 | 2006 |
| 156 | | | | Swan Lake | 93 | 2006 |
| 157 | | | | Upper Babine River | 95 | 2006 |
| 158 | | | | Naden River | 95 | 1995 |
| 159 | | | | Kitlope Lake | 95 | 2006 |
| 160 | | | | Baker Lake | 90 | 1996 |
| 161 | | | Fraser | Issaquah Creek | 82 | 1996 |
| 162 | | | | Cedar River | 93 | 1994 |
| 163 | | | | Adams R - Shuswap Lk (late) | 95 | 2007 |
| 164 | | | | Birkenhead River | 90 | 2007 |
| 165 | | | | Chilko Lake | 87 | 2001 |
| 166 | | | | Gates Creek | 90 | 2009 |
| 167 | | | | Harrison River | 95 | 2007 |
| 168 | | | | Horsefly River | 274 | 2001, 2007 |
| 169 | | | PWS | Raft River | 84 | 2001 |
| 170 | | | | Stellako River | 94 | 2007 |
| 171 | | | | Weaver Creek | 88 | 2001 |
| 172 | | | | Main Bay Enhanced | NA | NA |
| 173 | <i>Enh. Tahltan</i> <i>Enh. Tuya</i> | <i>Enh. Snettisham</i> <i>Other</i> | N. Southeast | Speel Arm Enhanced | NA | NA |
| 174 | | | | Sweetheart Enhanced | NA | NA |
| 179 | | | S. Southeast | Burnett Enhanced | NA | NA |
| 180 | | | | McDonald Enhanced | NA | NA |
| 175 | | <i>Enh. Tatsamenie</i> <i>Enh. Trapper</i> <i>Enh. Stikine</i> | Taku | Tatsamenie Enhanced | NA | NA |
| 176 | | | | Trapper Enhanced | NA | NA |
| 177 | | | | Tahltan Enhanced | NA | NA |
| 178 | | | | Tuya Enhanced | NA | NA |

Appendix Table C.2.2. Ninety-six single nucleotide polymorphism (SNP) markers used by ADF&G to provide GSI of sockeye salmon in U.S. Districts 106, 108, and 111, and the source lab for each marker.

| Marker | Source ¹ | Marker | Source ¹ |
|--------------------------------|---------------------|--------------------------------------|---------------------|
| <i>One_ACBP-79</i> | A | <i>One_srp09-127</i> | C |
| <i>One_agt-132</i> | B | <i>One_ssrd-135</i> | C |
| <i>One_aldB-152</i> | C | <i>One_STC-410</i> | A |
| <i>One_apoe-83</i> | B | <i>One_STR07</i> | A |
| <i>One_CD9-269</i> | B | <i>One_SUMO1-6</i> | C |
| <i>One_cetm1-167</i> | B | <i>One_sys1-230</i> | C |
| <i>One_CFP1</i> | D | <i>One_taf12-248</i> | C |
| <i>One_cin-177</i> | C | <i>One_Tf_ex11-750</i> | A |
| <i>One_COI²</i> | A | <i>One_Tf_in3-182</i> | A |
| <i>One_ctgf-301</i> | A | <i>One_tshB-92</i> | C |
| <i>One_Cytb_17²</i> | A | <i>One_txnlp-401</i> | C |
| <i>One_Cytb_26²</i> | A | <i>One_U1003-75</i> | B |
| <i>One_E2-65</i> | A | <i>One_U1004-183</i> | B |
| <i>One_gdh-212</i> | C | <i>One_U1009-91</i> | B |
| <i>One_GHII-2165</i> | A | <i>One_U1010-81</i> | B |
| <i>One_ghsR-66</i> | C | <i>One_U1012-68</i> | B |
| <i>One_GPDH-20</i> | A | <i>One_U1013-108</i> | B |
| <i>One_GPH-414</i> | A | <i>One_U1014-74</i> | B |
| <i>One_HGFA-49</i> | A | <i>One_U1016-115</i> | B |
| <i>One_HpaI-71</i> | A | <i>One_U1024-197</i> | B |
| <i>One_HpaI-99</i> | A | <i>One_U1101</i> | B |
| <i>One_hsc71-220</i> | A | <i>One_U1103</i> | B |
| <i>One_Hsp47</i> | D | <i>One_U1105</i> | B |
| <i>One_IL8r-362</i> | A | <i>One_U1201-492</i> | B |
| <i>One_KCT1-453</i> | B | <i>One_U1202-1052</i> | B |
| <i>One_KPNA-422</i> | A | <i>One_U1203-175</i> | B |
| <i>One_LEI-87</i> | A | <i>One_U1204-53</i> | B |
| <i>One_lpp1-44</i> | B | <i>One_U1205-57</i> | B |
| <i>One_metA-253</i> | C | <i>One_U1206-108</i> | B |
| <i>One_MHC2_190</i> | A | <i>One_U1208-67</i> | B |
| <i>One_Mkpro-129</i> | C | <i>One_U1209-111</i> | B |
| <i>One_ODC1-196</i> | B | <i>One_U1210-173</i> | B |
| <i>One_Ots208-234</i> | C | <i>One_U1212-106</i> | B |
| <i>One_Ots213-181</i> | A | <i>One_U1214-107</i> | B |
| <i>One_p53-534</i> | A | <i>One_U1216-230</i> | B |
| <i>One_pax7-248</i> | C | <i>One_U301-92</i> | A |
| <i>One_PIP</i> | D | <i>One_U401-224</i> | A |
| <i>One_Prl2</i> | A | <i>One_U404-229</i> | A |
| <i>One_rab1a-76</i> | B | <i>One_U502-167</i> | A |
| <i>One_RAG1-103</i> | A | <i>One_U503-170</i> | A |
| <i>One_RAG3-93</i> | A | <i>One_U504-141</i> | A |
| <i>One_redd1-414</i> | C | <i>One_vamp5-255</i> | C |
| <i>One_RFC2-102</i> | A | <i>One_yatf-214</i> | C |
| <i>One_RFC2-285</i> | A | <i>One_VIM-569</i> | A |
| <i>One_rpo2j-261</i> | C | <i>One_ZNF-61</i> | A |
| <i>One_sast-211</i> | C | <i>One_Zp3b-49</i> | A |
| <i>One_spf30-207</i> | C | <i>One_COI_Cytb17_26²</i> | |

¹ A) Gene Conservation Laboratory of ADF&G; B) International Program for Salmon Ecological Genetics at the University of Washington; C) Hagerman Genetics Laboratory of the Columbia River Inter-Tribal Fish Commission; and D) Molecular Genetics Laboratory at the Canadian Department of Fisheries and Oceans.

Appendix Table C.2.3. Catalog of genetic tissue collections for transboundary sockeye salmon stocks and baseline collection priorities. Baseline collections in 2020 are opportunistic with no identified funding. Initial populations for baseline gaps are from Report TCTR(07)-02, "Summary of the Transboundary Genetic Stock ID Workshop: January 18-19, 2007".

| Location/Pop | | Sample Goal | No. samples 2020 | | Collection Years | | | | Collection Priority |
|--------------------------------|--|-------------|------------------|------|--|--|--|--|---------------------|
| | | | U.S. | Can. | U.S. | | Canada | | |
| Stikine Adjacent | | | | | | | | | |
| Hugh Smith - Cobb | | 200 | 450 | 282 | 2003 2012 2013 | | 1992 2000 | | |
| Karta River | | 200 | 139 | 265 | 1992 2008 | | 1992 2000 | | |
| Mahoney Creek | | 200 | 198 | 71 | 2003 2007 | | 2002 | | |
| Salmon Bay Lake | | 200 | 213 | 198 | 1992 2004 2007 | | 2000 | | |
| Virginia | | 200 | 295 | | 2007 | | | | |
| Hatchery Cr - Sweetwater | | 200 | 732 | | 2003 2007 2013 2015 | | | | |
| Eek Cr | | 200 | 52 | | 2004 2007 | | | | |
| Fillmore Lk - Hoffman Cr | | 200 | 55 | | 2005 | | | | |
| Sarkar - Five Finger Cr | | 200 | 55 | | 2005 | | | | |
| Sarkar Lakes | | 200 | 45 | 45 | 2000 | | 2000 | | |
| Stikine | | | | | | | | | |
| Alpine Ck | | 200 | 1 | | 2009 | | | | |
| Andrew Ck | | 200 | 3 | | 2005 2006 | | | | |
| Shakes Ck | | 200 | 271 | 214 | 2006 2007 2008 2012 2013 | | 2001 2002 2006 2007 2008 2009 2012 | | |
| Mainstem | | | 100 | 154 | 2001 | | 2001 2010 | | |
| Andy Smith Slough | | 200 | 42 | 40 | 2007 2008 2009 2011 | | 2007 2008 2009 2011 | | L |
| Devil's Elbow | | 200 | 460 | 311 | 2007 2008 2009 | | 2001 2007 2008 2009 | | |
| Fowler Slough | | 200 | 61 | 39 | 2007 2008 2009 2010 2011 2012 | | 2007 2008 2009 2010 | | L |
| Porcupine Slough | | 200 | 114 | 187 | 2007 2008 2009 2010 2011 2012 | | 2000 2001 2007 2008 2009 2010 2011 2012 | | L |
| Katete | | 200 | 29 | 31 | 2001 2002 | | 2001 2002 | | M |
| Iskut | | | 208 | 200 | 1985 1986 2002 2006 2007 2008 2009 | | 1985 2002 2006 2007 2008 | | |
| Verrett River/Slough | | 200 | 260 | 496 | 2000-2003 2008 2010 2011 2012 2013 2014 2015 | | 1986 2000 2001 2002 2003 2008 2010 2011 2012 2013 2014 | | |
| Iskut m.s. - Craig/Craigson Sl | | 200 | 43 | 66 | 2006 2007 2008 | | 2001 2006 2007 2009 | | L |
| Iskut m.s. -Bronson Sl/Bugleg | | 200 | 101 | 168 | 2008 2009 2012 | | 2001 2008 2009 2012 | | L |
| Iskut m.s. - Hoodoo Slough | | 200 | 10 | | 2010 | | | | L |
| Iskut m.s.- Zappa | | 200 | 7 | | 2008 | | | | L |
| Iskut m.s. - Inhini Slough | | 200 | | | | | | | L |
| Iskut m.s. - Twin | | 200 | | 29 | | | 2002 | | L |
| Christina | | | | | | | | | |
| Lake spawners | | 400 | 215 | 130 | 1984 2010 2011 2012 | | 1984 2010 2011 2012 | | H |
| Inlet spawners | | 200 | | | | | | | M |

| Location/Pop | Sample Goal | No. samples 2020 | | Collection Years | | | | | | | | Collection Priority |
|-------------------------------|-------------|------------------|------|------------------------------------|--|--|--|--------|---|--|---|---------------------|
| | | U.S. | Can. | U.S. | | | | Canada | | | | |
| Scud | 200 | 402 | 623 | 2001 2007 2008 2009 2010 2011 2012 | | | | | 1985 1987 2000 2001 2007 2008 2009 2010 2011 2012 | | | |
| Chutine | | | | | | | | | | | | |
| Chutine River | 200 | 448 | 537 | 2001 2008 2009 2010 | | | | | 1985 2000 2001 2002 2008 2009 | | | |
| Chutine Lake | 200 | 225 | 258 | 2009 2011 | | | | | 2009 2010 2011 | | | |
| Tatalaska Ck | 200 | | | | | | | | | | | |
| Tahltan | 400 | 296 | 468 | 2002 2005 2006 | | | | | 1987 1996 2002 | | | |
| Tuya | 200 | 206 | 794 | 2008 | | | | | 1997 2000 2001 2002 1997 2000 2001 2002 | | | |
| Upper Stikine | 200 | | | | | | | | | | | |
| Taku Adjacent | | | | | | | | | | | | |
| Chilkat Lake | 200 | 637 | 49 | 1990 2007 2013 | | | | | 1981 | | | |
| Mule Meadows | 200 | 383 | | 2003 2007 | | | | | | | | |
| Chilkoot River | | 164 | 95 | 2003 | | | | | 2003 | | | |
| Chilkoot Lake | | 486 | 288 | 2007 | | | | | 2007 | | | |
| Windfall | 200 | 432 | | 2003 2007 2014 | | | | | | | | |
| Whiting | 200 | | | | | | | | | | | |
| Taku | | | | | | | | | | | | |
| Yehring | 200 | 205 | 109 | 2007 2009 2011 | | | | | 2007 2011 | | | |
| Fish Ck | 200 | 364 | 107 | 2009 2010 | | | | | 2010 | | | |
| Johnson (US section) | 200 | | | | | | | | | | L | |
| Mainstem | | 142 | | 2007 2013 | | | | | | | | |
| Chunk/Bear Sl | 200 | 340 | 306 | 2008 2009 | | | | | 2008 2009 | | | |
| Shustahini | 200 | 413 | 210 | 2008 2009 | | | | | 2000 2008 2009 | | | |
| Takwahoni/Sinwa | 200 | 286 | 211 | 2009 2010 2011 | | | | | 2000 2009 2010 2011 | | | |
| Tuskwa | 200 | 354 | 468 | 2004 2008 2009 | | | | | 2000 2004 2008 2009 | | | |
| Yonakina | 200 | 7 | 54 | 2011 | | | | | 2004 2011 | | L | |
| Yellow Bluff | 200 | 82 | 81 | 2008 2010 2011 | | | | | 2008 2010 2011 | | L | |
| Tulsequah | 200 | 267 | 306 | 2007 2008 2009 | | | | | 2000 2007 2008 2009 | | | |
| King Salmon | 400 | 253 | 557 | 2010 2011 2014 | | | | | 2000 2003 2004 2005 2010 2011 2013 | | | |
| Inklin | | | | | | | | | | | | |
| Little Trapper | 400 | 271 | 507 | 1990 1991 2006 | | | | | 1992 2004 various | | | |
| Tatsatua Lake (L. Tatsamenie) | 400 | 258 | 388 | 1990 1991 2011 2012 | | | | | 1985 1987 1993 2005 2011 2012 | | | |
| Tatsamenie Lake | 400 | 501 | 551 | 1992 2005 2006 2011 2012 | | | | | 1992 1993 various | | | |
| Samotua | 200 | | | | | | | | | | L | |
| Hackett | 200 | 253 | 292 | 2007 2008 2009 | | | | | 1985 1987 2007 2008 2009 | | | |
| Dudidontu | 200 | 7 | | 2011 | | | | | | | | |
| Tseta | 200 | | | | | | | | | | | |

| Location/Pop | Sample Goal | No. samples 2020 | | Collection Years | | Collection Priority |
|-----------------------|-------------|------------------|------|---|-------------------------------|---------------------|
| | | U.S. | Can. | U.S. | Canada | |
| Nahlin River | 200 | 428 | 459 | 2003 2004 2005 2006 2007 2012 | 2004 2005 2006 2007 2012 | |
| Silver Salmon R | 200 | 31 | | 2008 | | |
| Kuthai Lake | 400 | 300 | 372 | 1986 2004 2006 | 1986 1987 2004 2005 | H |
| Nakina | 200 | 10 | 39 | 2008 2009 2011 2012 | 2008 2009 2011 | M |
| Alsek Adjacent | | | | | | |
| Ahrnklin River | 200 | 185 | | 2003 2007 | | L |
| Lost/Tahwah Rivers | 200 | 199 | | 2003 | | |
| Situk Lake | 200 | 688 | | 1995 2007 2013 | | |
| Old Situk | 200 | 427 | | 1995 2007 2015 2017 | | |
| Dangerous | 200 | 295 | | 2009 | | |
| Italio | 200 | 42 | | 2017 | | L |
| Akwe | 200 | 307 | | 2009 2016 | | |
| Alsek | | | | | | |
| Basin Creek | 200 | | 45 | | 2002 2003 | H |
| Tanis (US section) | 200 | | | | | L |
| Alsek mainstem (US) | 200 | | | | | L |
| Border Slough | 200 | 186 | 185 | 2007 2008 2009 2011 2012 | 2007 2008 2009 2011 2012 | M |
| Alsek mainstem (Can) | 200 | | | | | L |
| Tashenshini | | | | | | |
| Lower | 200 | | 121 | | 2000 2001 2002 2003 2010 | H |
| Upper | 200 | 100 | | 2003 | | |
| Tats Lake | 200 | 13 | | 2010 | | M |
| O'Connor | 200 | | 96 | | 2001 2002 2003 | |
| Sediment Ck | 200 | 13 | 11 | 2010 | 2010 | |
| Lofog | 200 | | 3 | | 2002 2003 | |
| Detour | 200 | 4 | 26 | 2011 | 2001 2011 | L |
| Kudwat | 200 | 248 | 249 | 2000 2001 2003 3007 2009 2010 2011 2012 | 2001 2007 2009 2010 2011 2012 | |
| Stinky | 200 | 40 | 103 | 2011 | 2001 2011 | M |
| Bridge/Silver | 200 | 105 | 105 | 2011 2012 | 2011 2012 | |
| Kane | 200 | | 108 | | 2001 2002 2003 | |
| Nesketahin Lk | 200 | 541 | 832 | 2001 2007 2019 | 2000 2001 2002 2003 2007 | |
| Klukshu R | 200 | 226 | 196 | 2006 2019 | 2016 2019 | |
| Klukshu Lk | 200 | 244 | 221 | 2018 2019 | 2016 2018 | |
| Takhanne | 200 | | 4 | | 2002 2003 | H |
| Blanchard Lake | 200 | 178 | 252 | 2007 2008 2009 | 2001 2002 2003 2007 2008 2009 | |
| Stanley Ck | 200 | | 31 | | 2001 2002 2003 | |
| Goat Ck | 200 | 71 | 79 | 2007 2011 2012 2017 | 2007 2012 2017 | M |

| Location/Pop | Sample Goal | No. samples 2020 | | Collection Years | | | | | | Collection Priority | | | | | |
|--------------|-------------|------------------|------|------------------|------|------|--------|------|------|---------------------|------|------|------|------|---|
| | | U.S. | Can. | U.S. | | | Canada | | | | | | | | |
| Kwatini | 200 | 85 | 65 | 2011 | 2013 | | | 2011 | | | | | | | |
| Datlaska Ck | 200 | 199 | 79 | 2012 | 2013 | | | 2017 | 2018 | | | | | | |
| Vern Ritchie | 200 | 212 | 217 | 2007 | 2008 | 2009 | 2010 | 2007 | 2008 | 2009 | 2010 | | | | |
| Tweedsmuir | 200 | 150 | 152 | 2007 | 2009 | 2010 | 2011 | 2012 | 2003 | 2007 | 2009 | 2010 | 2011 | 2012 | M |

Appendix C.2.4. Inventory of DFO sample collections analyzed for Sockeye salmon microsatellite variation reported by region, population, sampling year, and sample size from which a subset is used for the Transboundary GSI analysis.

| Region Code | Region Name | Stock Code | Population Name | Collection Year | Sample Size |
|-------------|------------------|------------|-----------------|--------------------------|-------------|
| 1 | Early Stuart(Fr) | 25 | Kynock | 1994 1997 | 180 |
| 1 | Early Stuart(Fr) | 35 | Dust | 1988 1991 1994 1997 2005 | 349 |
| 1 | Early Stuart(Fr) | 36 | Gluskie | 1997 | 151 |
| 1 | Early Stuart(Fr) | 37 | Forfar | 1997 | 151 |
| 1 | Early Stuart(Fr) | 183 | Porter_Cr | 2000 2005 | 120 |
| 1 | Early Stuart(Fr) | 184 | Hudson_Bay | 2000 2005 | 120 |
| 1 | Early Stuart(Fr) | 185 | Blackwater | 2000 2005 | 123 |
| 1 | Early Stuart(Fr) | 405 | Rossette | 2005 | 100 |
| 1 | Early Stuart(Fr) | 406 | Sinta | 2005 | 97 |
| 1 | Early Stuart(Fr) | 407 | Paula | 2005 | 116 |
| 1 | Early Stuart(Fr) | 408 | Sandpoint | 2005 | 97 |
| 1 | Early Stuart(Fr) | 409 | Narrows | 2005 | 98 |
| 1 | Early Stuart(Fr) | 410 | Bivouac | 2005 | 99 |
| 1 | Early Stuart(Fr) | 411 | Felix | 2005 | 99 |
| 1 | Early Stuart(Fr) | 412 | FiveMile | 2005 | 99 |
| 1 | Early Stuart(Fr) | 413 | Driftwood | 2005 | 98 |
| 2 | Early Summer(Fr) | 9 | Scotch | 1994 1995 1996 1999 2000 | 536 |
| 2 | Early Summer(Fr) | 16 | Gates_Cr | 1986 1992 1995 1999 2000 | 433 |
| 2 | Early Summer(Fr) | 18 | Eagle | 2000 2002 | 198 |
| 2 | Early Summer(Fr) | 19 | Nadina | 1986 1992 1999 2000 | 353 |
| 2 | Early Summer(Fr) | 20 | Nahatlatch_Lake | 1996 1997 2010 | 338 |
| 2 | Early Summer(Fr) | 22 | Seymour | 1986 1996 1999 | 335 |
| 2 | Early Summer(Fr) | 28 | Pitt | 1986 2000 2001 2005 2010 | 447 |
| 2 | Early Summer(Fr) | 29 | U_Adams | 1996 2000 2010 | 466 |
| 2 | Early Summer(Fr) | 30 | Upper_Barrier | 1996 1999 2000 2001 | 491 |
| 2 | Early Summer(Fr) | 31 | Chilliw_lake | 1996 2003 2004 2005 | 226 |
| 2 | Early Summer(Fr) | 32 | Raft | 1996 2000 2001 2012 | 319 |
| 2 | Early Summer(Fr) | 33 | Chilko_south | 1996 1997 2001 | 410 |
| 2 | Early Summer(Fr) | 104 | Bowron | 1999 2000 2001 | 264 |
| 2 | Early Summer(Fr) | 181 | Cayenne | 2000 | 100 |
| 2 | Early Summer(Fr) | 298 | Thompson_N | 2003 2005 2012 | 225 |
| 2 | Early Summer(Fr) | 443 | Taseko | 2007 2010 2011 | 126 |
| 2 | Early Summer(Fr) | 480 | Yohetta_Cr | 2010 2011 | 25 |

| | | | | | |
|---|------------------|-----|----------------|--|-----|
| 2 | Early Summer(Fr) | 481 | Nahatlatch_R | 2010 | 102 |
| 2 | Early Summer(Fr) | 482 | Corbold_Cr | 2010 | 102 |
| 2 | Early Summer(Fr) | 483 | Anstey_R | 2010 | 98 |
| 2 | Early Summer(Fr) | 485 | Sinmax_Cr | 2010 | 54 |
| 2 | Early Summer(Fr) | 486 | Nemian_Cr | 2010 | 20 |
| 2 | Early Summer(Fr) | 487 | Taseko_R_upper | 2010 | 2 |
| 2 | Early Summer(Fr) | 511 | Bridge_R | 2011 | 17 |
| 3 | Summer(Fr) | 1 | Stellako | 1992 1995 1996 1998 1999 2000 2011 | 689 |
| 3 | Summer(Fr) | 2 | Birkenhead | 1992 1995 1997 1998 1999 2001 2010 | 644 |
| 3 | Summer(Fr) | 12 | Chilko | 1998 1999 | 222 |
| 3 | Summer(Fr) | 13 | Middle_R | 1993 1996 1997 1998 2000 2001 | 425 |
| 3 | Summer(Fr) | 21 | Tachie | 1994 1995 1996 1997 1999 2000 2001 2011 2012 | 682 |
| 3 | Summer(Fr) | 24 | Horsefly | 1985 1986 1993 1996 1997 1998 1999 2005 | 946 |
| 3 | Summer(Fr) | 34 | Mitchell | 1993 1994 1996 1997 1998 2001 2005 | 537 |
| 3 | Summer(Fr) | 56 | Pinchi_Cr | 1999 2005 | 171 |
| 3 | Summer(Fr) | 208 | Kuzkwa_Cr | 2001 | 104 |
| 3 | Summer(Fr) | 209 | L_Horsefly | 2001 | 200 |
| 3 | Summer(Fr) | 210 | M_Horsefly | 2001 | 198 |
| 3 | Summer(Fr) | 211 | U_Horsefly | 2000 2001 | 497 |
| 3 | Summer(Fr) | 238 | Roaring | 2001 | 100 |
| 3 | Summer(Fr) | 239 | McKinley | 2001 2005 | 225 |
| 3 | Summer(Fr) | 241 | Wasko_Cr | 2001 | 100 |
| 3 | Summer(Fr) | 242 | Blue_Lead_Cr | 2001 | 100 |
| 3 | Summer(Fr) | 327 | Cogburn_Cr | 2003 2011 | 29 |
| 3 | Summer(Fr) | 328 | DollyVarden_Cr | 2001 2003 | 121 |
| 3 | Summer(Fr) | 414 | Quesnel_Decept | 2005 | 77 |
| 3 | Summer(Fr) | 454 | Chilko_North | 1992 1995 1996 1997 2000 2001 2008 2009 | 782 |
| 3 | Summer(Fr) | 488 | Ormonde_Cr | 2010 | 24 |
| 3 | Summer(Fr) | 489 | Sampson_Slough | 2010 2011 2012 | 163 |
| 3 | Summer(Fr) | 490 | Nechako_R | 2010 2014 | 29 |
| 3 | Summer(Fr) | 509 | GreenRiver | 2011 2012 | 95 |
| 3 | Summer(Fr) | 512 | Pemberton_Cr | 2011 | 13 |
| 4 | Late(Fr) | 3 | L_Adams | 1982 1990 1995 1996 1998 1999 | 550 |
| 4 | Late(Fr) | 4 | Weaver | 1982 1986 1992 1996 1998 1999 2000 2001 | 692 |
| 4 | Late(Fr) | 8 | L_Shuswap | 1983 1986 1990 1996 1998 1999 2002 | 408 |
| 4 | Late(Fr) | 10 | Harrison | 1986 1995 2000 | 329 |

| | | | | | |
|---|-------------|-----|-----------------|---|------|
| 4 | Late(Fr) | 11 | Cultus_Lake | 1992 1995 1999 2000 2001 2002 2004 2005 2006 2007 2008 2009 | 2407 |
| 4 | Late(Fr) | 14 | Portage_Cr | 1986 1997 1998 1999 | 466 |
| 4 | Late(Fr) | 15 | MiddleShuswap | 1986 2002 | 246 |
| 4 | Late(Fr) | 17 | WidgeonSlough | 2002 | 97 |
| 4 | Late(Fr) | 23 | Big_Silver | 2000 2002 | 199 |
| 4 | Late(Fr) | 256 | Eagle_L | 1986 1990 2002 2010 | 384 |
| 4 | Late(Fr) | 257 | Douglas_Harr | 2002 2003 2011 | 19 |
| 4 | Late(Fr) | 288 | Little | 2002 | 101 |
| 4 | Late(Fr) | 484 | Salmon_R_SA | 2010 2014 | 88 |
| 5 | Washington | 182 | LakeWashington | 2000 | 198 |
| 5 | Washington | 192 | Baker_Lake | 1991 1996 2011 | 189 |
| 5 | Washington | 194 | Ozette_Lake | 1995 | 50 |
| 5 | Washington | 519 | BigCr_Quinalt_R | 1995 | 100 |
| 6 | South Coast | 252 | Sakinaw | 1998 2000 2001 2002 2005 2006 2010 2011 2012 2013 2014 2015 | 834 |
| 6 | South Coast | 292 | Phillips | 2002 2005 | 205 |
| 6 | South Coast | 296 | Village_Bay | 2003 2006 | 21 |
| 6 | South Coast | 299 | Heydon | 2003 | 176 |
| 6 | South Coast | 301 | Glendale | 2003 | 188 |
| 6 | South Coast | 431 | Stephens_Cr | 2004 | 2 |
| 6 | South Coast | 561 | Tzoonie_R | 2015 | 0 |
| 7 | VI | 5 | Sproat | 1987 1990 1992 2002 | 469 |
| 7 | VI | 6 | Great_Central | 1987 1990 1992 2002 | 750 |
| 7 | VI | 7 | Henderson | 1988 1993 1995 2002 | 346 |
| 7 | VI | 54 | Hobiton | 1992 | 81 |
| 7 | VI | 145 | Kennedy | 1986 | 91 |
| 7 | VI | 149 | Woss_Lake | 1985 2001 2002 | 283 |
| 7 | VI | 228 | Vernon_L | 2001 2002 | 360 |
| 7 | VI | 229 | Nimpkish_L | 2001 2002 2003 2011 2014 | 302 |
| 7 | VI | 297 | Quatse | 2002 2003 | 292 |
| 7 | VI | 302 | Schoen | 2003 | 29 |
| 7 | VI | 329 | Muchalat | 2004 | 65 |
| 7 | VI | 345 | Nahwitti | 2004 | 32 |
| 8 | Columbia | 129 | Okanagan | 1993 1997 1998 1999 2000 2001 2002 2012 | 908 |
| 8 | Columbia | 193 | Lake_Wenatchee | 1988 2007 | 89 |
| 8 | Columbia | 306 | Osoyoos | 2002 2003 2004 | 165 |
| 8 | Columbia | 428 | Rocky_Reach | 2005 | 80 |

| | | | | | |
|----|--------------|-----|-----------------|------------------------------------|-----|
| 8 | Columbia | 468 | RedfishLk_Idaho | 2008 2009 2010 | 200 |
| 8 | Columbia | 523 | Bedrock_Cr | 1996 | 99 |
| 9 | Nass | 43 | Bonney | 1987 1994 1996 1998 1999 2001 | 544 |
| 9 | Nass | 44 | Gingit_RT | 1987 1988 1997 2011 | 442 |
| 9 | Nass | 45 | Kwinageese | 1987 2000 2001 | 194 |
| 9 | Nass | 47 | Damdochax | 1987 1994 1998 1999 2000 2001 | 557 |
| 9 | Nass | 48 | Bowser | 1986 1987 1994 1998 1999 2000 2001 | 827 |
| 9 | Nass | 49 | Zolzap_juv_RT | 1996 1997 | 60 |
| 9 | Nass | 232 | Meziadin_beach | 2001 | 188 |
| 9 | Nass | 233 | Tintina_Cr | 2001 2002 2006 | 203 |
| 9 | Nass | 234 | Hanna_Cr | 2001 2002 2006 | 253 |
| 9 | Nass | 560 | Gitzyon_RTCr | 2013 2014 | 30 |
| 10 | Lower Skeena | 65 | McDonnell | 1987 1988 1994 2002 | 283 |
| 10 | Lower Skeena | 68 | Swan_Lk | 1988 1994 2006 | 288 |
| 10 | Lower Skeena | 75 | Williams | 1987 1988 1994 2005 2006 | 434 |
| 10 | Lower Skeena | 76 | Schulbuckhand | 1988 2005 | 102 |
| 10 | Lower Skeena | 79 | Alastair | 1987 1988 1994 1998 2006 | 354 |
| 10 | Lower Skeena | 80 | Kitwanga_R | 1998 2009 | 153 |
| 10 | Lower Skeena | 82 | Kalum | 1994 | 77 |
| 10 | Lower Skeena | 289 | Stephens_Lk | 2001 2004 | 202 |
| 10 | Lower Skeena | 436 | Kalum_lake | 2006 | 89 |
| 10 | Lower Skeena | 444 | Zymoetz_RT | 2006 | 64 |
| 10 | Lower Skeena | 463 | KitwangaBeach | 2008 2009 | 401 |
| 10 | Lower Skeena | 530 | Kalam/Cedar_Cha | 2012 | 100 |
| 11 | Upper Skeena | 66 | Motase | 1987 | 75 |
| 11 | Upper Skeena | 78 | SalixBear | 1987 1988 | 116 |
| 11 | Upper Skeena | 173 | Sustut | 1993 2000 2001 2006 | 341 |
| 11 | Upper Skeena | 465 | Damshilgwit | 2004 | 203 |
| 11 | Upper Skeena | 470 | Slamgeesh | 2006 2008 | 469 |
| 12 | Bulkley | 73 | Nanika | 1988 1994 2003 2012 | 157 |
| 12 | Bulkley | 466 | Bulkley_R_upper | 2004 2005 2012 2014 | 45 |
| 13 | Babine | 67 | Grizzly | 1987 | 78 |
| 13 | Babine | 69 | U_Babine | 1987 1994 2006 | 291 |
| 13 | Babine | 70 | Pinkut | 1985 1987 1990 1994 | 492 |
| 13 | Babine | 71 | Fulton_L | 1985 1987 1990 1994 | 536 |
| 13 | Babine | 72 | L_Babine | 1987 1994 | 150 |

| | | | | | |
|----|---------------|-----|-----------------|---|-----|
| 13 | Babine | 77 | Pierre | 1987 1988 2006 2013 | 318 |
| 13 | Babine | 118 | Twain_Cr | 1987 1990 | 154 |
| 13 | Babine | 123 | Four_Mile | 1987 1988 2006 | 227 |
| 13 | Babine | 331 | Babine_Fence | 1959 1960 | 190 |
| 13 | Babine | 446 | HallidaySlou_RT | 2005 2006 2007 2009 | 68 |
| 13 | Babine | 531 | Morrison_L | 2012 | 88 |
| 13 | Babine | 540 | Johnston_Lake | 2010 | 121 |
| 14 | Stikine | 40 | Tuya | 1996 2002 2007 2008 | 239 |
| 14 | Stikine | 41 | Tahltan | 1987 1996 2002 | 468 |
| 14 | Stikine | 42 | U_Stikine | 1996 | 352 |
| 14 | Stikine | 81 | Scud_RT | 1985 1987 2000 2001 2007 2008 2009 2010 2011 2012 | 623 |
| 14 | Stikine | 95 | Iskut_RT | 1985 2002 2006 2007 2008 | 200 |
| 14 | Stikine | 120 | ChutineRiver | 1985 2000 2001 2002 2008 2009 | 537 |
| 14 | Stikine | 121 | Christina_Lk | 1984 2010 2011 2012 | 130 |
| 14 | Stikine | 139 | Iskut_Verrett | 1986 2000 2001 2002 2003 2010 2011 2012 | 459 |
| 14 | Stikine | 165 | PorcupineSlo_RT | 2000 2001 2007 2008 2009 2010 2011 2012 | 187 |
| 14 | Stikine | 221 | Katete_RT | 2001 2002 | 31 |
| 14 | Stikine | 222 | Bugleg_Cr_RT | 2001 | 42 |
| 14 | Stikine | 223 | Shakes_Cr_RT | 2001 2002 2006 2007 2008 2009 2012 | 214 |
| 14 | Stikine | 224 | Bronson_Slou_RT | 2001 2008 2009 2012 | 126 |
| 14 | Stikine | 225 | Devils_Elbow_RT | 2001 2007 2008 2009 | 311 |
| 14 | Stikine | 226 | Iskut_Craig_RT | 2001 2006 2007 2009 | 66 |
| 14 | Stikine | 227 | Stikine_main_RT | 2001 2010 | 154 |
| 14 | Stikine | 276 | Twin | 2002 | 29 |
| 14 | Stikine | 439 | St_Main@Fowl_RT | 2007 2008 2009 2010 | 39 |
| 14 | Stikine | 440 | St_Main@Andy_RT | 2007 2008 2009 2011 | 40 |
| 14 | Stikine | 457 | StikineCraig_RT | 2008 | 22 |
| 14 | Stikine | 458 | Isket_Zappa_RT | 2008 | 7 |
| 14 | Stikine | 459 | AndrewCr | 2006 | 2 |
| 14 | Stikine | 476 | ChutineLake | 2009 2010 2011 | 258 |
| 14 | Stikine | 496 | Hoodoo_Slough | 152 2010 | 26 |
| 15 | Central Coast | 57 | Tenas | 1985 | 80 |
| 15 | Central Coast | 89 | Banks | 1986 | 41 |
| 15 | Central Coast | 99 | Namu | 1999 | 93 |
| 15 | Central Coast | 100 | Mary_Cove | 1999 | 78 |
| 15 | Central Coast | 101 | Lagoon_Cr | 1999 | 50 |

| | | | | | |
|----|---------------|-----|-----------------|-------------------------------|-----|
| 15 | Central Coast | 102 | Devon_Lake | 1985 1999 2004 | 332 |
| 15 | Central Coast | 103 | Mikado_Cr | 1986 1999 | 162 |
| 15 | Central Coast | 106 | Lowe_Lake | 1986 | 40 |
| 15 | Central Coast | 107 | Kimsquit | 1986 | 78 |
| 15 | Central Coast | 108 | Canoonna | 1986 | 100 |
| 15 | Central Coast | 109 | Tankeeah | 1986 2001 2002 2003 2004 2005 | 399 |
| 15 | Central Coast | 110 | Kitlope | 1986 2006 2010 | 270 |
| 15 | Central Coast | 111 | Koeye | 1986 2004 | 86 |
| 15 | Central Coast | 119 | Lonesome | 1997 | 99 |
| 15 | Central Coast | 126 | Long_Lake | 1989 1998 1999 2000 2001 | 483 |
| 15 | Central Coast | 130 | Klinaklini | 1998 2002 | 319 |
| 15 | Central Coast | 230 | Smokehouse_Cr | 2001 2002 | 231 |
| 15 | Central Coast | 231 | Canoe_Cr | 2001 2002 | 139 |
| 15 | Central Coast | 295 | Klemtu | 2002 | 27 |
| 15 | Central Coast | 305 | Martin | 2002 | 1 |
| 15 | Central Coast | 317 | Bella_Coola_mix | 2003 | 222 |
| 15 | Central Coast | 335 | Prudhomme_Cr | 2004 | 111 |
| 15 | Central Coast | 336 | Curtis_Cr | 2004 | 106 |
| 15 | Central Coast | 337 | Kooryet_Cr | 2004 | 129 |
| 15 | Central Coast | 338 | Freda_Lake | 2004 | 37 |
| 15 | Central Coast | 340 | Keecha_Lake | 2004 | 99 |
| 15 | Central Coast | 341 | Kingkown_N | 2004 | 95 |
| 15 | Central Coast | 342 | Kingkown_S | 2004 | 107 |
| 15 | Central Coast | 343 | Diane_Cr | 2004 | 91 |
| 15 | Central Coast | 347 | Shawatlan_Lake | 2004 | 100 |
| 15 | Central Coast | 348 | Evelyn_Lake | 2004 | 103 |
| 15 | Central Coast | 349 | Kent_Lake | 2004 | 105 |
| 15 | Central Coast | 350 | L_Kwakwa_Lake | 2004 | 57 |
| 15 | Central Coast | 351 | U_Kwakwa_Lake | 2004 | 66 |
| 15 | Central Coast | 352 | Deer_Lake | 2004 2008 | 185 |
| 15 | Central Coast | 353 | Kitkiata_Lake | 2004 | 100 |
| 15 | Central Coast | 363 | Maria | 2004 | 1 |
| 15 | Central Coast | 364 | Kadjusdis | 2004 | 98 |
| 15 | Central Coast | 365 | Kwakusdis | 2004 | 7 |
| 15 | Central Coast | 366 | Hooknose | 2004 | 6 |
| 15 | Central Coast | 367 | Dean | 2004 | 1 |

| | | | | | |
|----|---------------|-----|-----------------|------------------------------------|-----|
| 15 | Central Coast | 426 | Kitimat | 2005 2010 | 312 |
| 15 | Central Coast | 427 | West_Arm_Cr | 2005 2006 2008 | 137 |
| 15 | Central Coast | 429 | Bloomfield_Cr | 2005 | 117 |
| 15 | Central Coast | 471 | Moore_Lk | 2006 | 22 |
| 15 | Central Coast | 472 | Tsimtack_Cr | 2006 | 22 |
| 15 | Central Coast | 473 | Atnarko | 2005 | 44 |
| 15 | Central Coast | 475 | NWMoorelake | 2009 | 18 |
| 15 | Central Coast | 493 | Tezwa_R | 2006 | 21 |
| 16 | Taku | 55 | Kuthai | 1986 1987 2004 2005 | 372 |
| 16 | Taku | 58 | Tatsatua | 1985 1987 1993 2005 2011 2012 | 388 |
| 16 | Taku | 85 | Hackett_RT | 1985 1987 2007 2008 2009 | 292 |
| 16 | Taku | 90 | Little_Trapper | 1992 2004 | 107 |
| 16 | Taku | 144 | B_Tatsamenie | 1992 1993 | 151 |
| 16 | Taku | 167 | Tuskwa_RT | 2000 2004 2008 2009 | 468 |
| 16 | Taku | 169 | Taku_KingSalmon | 2000 2003 2004 2005 2010 2011 2013 | 557 |
| 16 | Taku | 170 | Tulsequah_RT | 2000 2007 2008 2009 | 306 |
| 16 | Taku | 171 | Shustahini_RT | 2000 2008 2009 | 210 |
| 16 | Taku | 172 | Takwahoni_RT | 2000 2009 2010 2011 | 211 |
| 16 | Taku | 316 | Nahlin | 2004 2005 2006 2007 2012 | 459 |
| 16 | Taku | 344 | Yonakina_RT | 2004 2011 | 54 |
| 16 | Taku | 445 | TakuMainstem_RT | 2007 | 126 |
| 16 | Taku | 460 | YellowBluff_RT | 2008 2010 2011 | 81 |
| 16 | Taku | 461 | BearSlough_RT | 2008 2009 | 306 |
| 16 | Taku | 462 | NakinaR | 2008 2009 2011 | 39 |
| 16 | Taku | 495 | Yehring_Cr_RT | 2007 2011 | 109 |
| 16 | Taku | 516 | Fish_Cr | 2010 | 107 |
| 17 | Alsek | 59 | Klukshu_mix | 1992 2000 2007 2008 | 524 |
| 17 | Alsek | 166 | Neskataheen | 2000 2001 2002 2003 2007 | 832 |
| 17 | Alsek | 168 | L_Tatshenshi_RT | 2000 2001 2002 2003 2010 | 121 |
| 17 | Alsek | 217 | Kudwat_Cr_RT | 2001 2007 2009 2010 2011 2012 | 249 |
| 17 | Alsek | 218 | Detour_Cr_RT | 2001 2011 | 26 |
| 17 | Alsek | 219 | U_Tatshensh_RT | 2001 2002 2003 | 318 |
| 17 | Alsek | 220 | Stinky_Cr_RT | 2001 2011 | 103 |
| 17 | Alsek | 236 | Klukshu_Early | 2000 2001 2002 | 226 |
| 17 | Alsek | 237 | Klukshu_Late | 2000 2001 2002 | 309 |
| 17 | Alsek | 243 | Alsek_T_down | 2001 2002 2003 | 75 |

| | | | | | |
|----|-----------|-----|-----------------|-------------------------------|-----|
| 17 | Alsek | 244 | Stanley_Cr_RT | 2001 2002 2003 | 31 |
| 17 | Alsek | 245 | Alsek_T_up | 2001 2002 2003 | 50 |
| 17 | Alsek | 246 | Blanchard | 2001 2002 2003 2007 2008 2009 | 252 |
| 17 | Alsek | 247 | OConnor_RT | 2001 2002 2003 | 96 |
| 17 | Alsek | 249 | Kane | 2001 2002 2003 | 108 |
| 17 | Alsek | 250 | Unknown_Alsek | 2001 | 35 |
| 17 | Alsek | 432 | Basin_Cr_RT | 2002 2003 | 45 |
| 17 | Alsek | 433 | Tweedsmuir_RT | 2003 2007 2009 2010 2011 2012 | 152 |
| 17 | Alsek | 434 | LowFog_RT | 2002 2003 | 3 |
| 17 | Alsek | 435 | Takhanne_RT | 2002 2003 | 4 |
| 17 | Alsek | 437 | VernRichie_RT | 2007 2008 2009 2010 | 217 |
| 17 | Alsek | 438 | Goat_Cr_RT | 2007 2012 | 66 |
| 17 | Alsek | 441 | BorderSlough_RT | 2007 2008 2009 2011 2012 | 185 |
| 17 | Alsek | 497 | Sediment_Cr_RT | 2010 | 11 |
| 17 | Alsek | 513 | Kwatine_Cr | 2011 | 65 |
| 17 | Alsek | 515 | Bridge_Silver | 2011 2012 | 105 |
| 18 | Owikenno | 97 | Inziana | 1997 2000 2001 2002 | 397 |
| 18 | Owikenno | 98 | Washwash | 1997 2000 2001 2002 | 366 |
| 18 | Owikenno | 132 | Ashlulm | 2000 2001 2002 2004 2007 | 234 |
| 18 | Owikenno | 133 | Dallery | 2000 2001 2002 | 161 |
| 18 | Owikenno | 134 | Genesee | 2000 2001 2002 2004 2007 | 190 |
| 18 | Owikenno | 135 | Neechanz | 2000 2001 2002 2004 | 328 |
| 18 | Owikenno | 136 | Amback | 2000 2001 2002 2004 | 411 |
| 18 | Owikenno | 137 | Sheemahant | 2000 2001 2002 2004 | 282 |
| 18 | Owikenno | 251 | Marble_Cr | 2001 2002 | 121 |
| 18 | Owikenno | 300 | Wannock | 2002 | 86 |
| 19 | QCI | 128 | CopperR_QCI | 1993 1996 2001 | 170 |
| 19 | QCI | 131 | Yakoun | 1989 1993 | 160 |
| 19 | QCI | 188 | Awun | 1995 | 79 |
| 19 | QCI | 189 | Naden | 1995 | 98 |
| 19 | QCI | 235 | Mercer_Lake | 1983 | 41 |
| 20 | SE Alaska | 113 | Hugh_Smith | 1992 2000 | 282 |
| 20 | SE Alaska | 114 | Heckman | 1992 2000 | 296 |
| 20 | SE Alaska | 116 | McDonald | 1992 2000 | 276 |
| 20 | SE Alaska | 117 | Karta | 1992 2000 | 265 |
| 20 | SE Alaska | 147 | Thoms_Lake | 2000 | 212 |

| | | | | | |
|----|-----------|-----|-----------------|-----------|-----|
| 20 | SE Alaska | 154 | Kutlaku_Lake | 2000 | 203 |
| 20 | SE Alaska | 155 | Red_Bay_Lake | 2000 | 201 |
| 20 | SE Alaska | 162 | Sitkoh | 2000 2001 | 382 |
| 20 | SE Alaska | 174 | PetersburgLake | 2000 | 193 |
| 20 | SE Alaska | 175 | Salmon_Bay | 2000 | 198 |
| 20 | SE Alaska | 176 | Sarkar | 2000 | 45 |
| 20 | SE Alaska | 177 | Luck | 2000 | 200 |
| 20 | SE Alaska | 178 | Hetta | 2000 2002 | 313 |
| 20 | SE Alaska | 179 | Klakas | 2000 | 200 |
| 20 | SE Alaska | 180 | Kegan | 2000 | 196 |
| 20 | SE Alaska | 272 | Mahoney | 2002 | 71 |
| 20 | SE Alaska | 273 | Kah_Sheets | 2002 | 105 |
| 20 | SE Alaska | 274 | Kunk | 2002 | 107 |
| 20 | SE Alaska | 275 | Shipley | 2002 | 105 |
| 20 | SE Alaska | 455 | Chilkoot | 2003 | 95 |
| 20 | SE Alaska | 456 | ChilkootLkBeach | 2007 | 95 |
| 20 | SE Alaska | 477 | Klawock | 2004 2010 | 288 |
| 21 | Unuk | 60 | Border_Lake | 1987 | 50 |