PACIFIC SALMON COMMISSION
TRANSBOUNDARY TECHNICAL
COMMITTEE REPORT

SALMON MANAGEMENT AND ENHANCEMENT PLANS FOR THE STIKINE, TAKU AND ALSEK RIVERS, 2022

REPORT TCTR (22)-02

This plan was finalized April 27, 2022 by the
Transboundary Technical Committee

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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 and Aishihik First Nations
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
SR	Stock Recruit
SW	Statistical Week
TAC	Total Allowable Catch
TEPP	Taku Enhancement Production Plan
TCG	Tahltan Central Government
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

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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, TCG, 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 2022 salmon run outlooks, spawning escapement goals, a summary of harvest sharing objectives, and an outline of management procedures to be used during the 2022 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 2022 field projects that identify agency responsibility and contacts for various functions within each project. Information shown for 2021 is preliminary. Unless otherwise defined, the 10-year average is 2012 to 2021 and the 5-year average is 2017 to 2021.

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 2022

Escapement Goal

Based on MSY analysis, Stikine River large Chinook salmon have an escapement goal range of 14,000 to 28,000 fish with a management objective of 17,400 fish, representing N_{MSY} for this stock (Bernard et al. 2000). This represents a drainagewide 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 5% (range: 1–12%) of the total spawning population.

Preseason Forecast

The bilateral preseason forecast for the Stikine River large Chinook salmon terminal run is 7,400 fish. The forecast uses a sibling model in which the 2021 returns of age 4 (BY 2017) and age 5 (BY 2016) Chinook salmon were used to predict the returns of age 5 (BY 2017) and age 6 (BY 2016) fish in 2022 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 3,600 to 11,200 fish.

This forecast is well below the 10-year average terminal run of 17,400 large Chinook salmon. Principal brood years contributing to the 2022 Chinook salmon run are 2016 (10,544 large fish spawning escapement), 2017 (7,335 large fish spawning escapement), and 2018 (8,603 large fish spawning escapement. The 2022 preseason forecast is insufficient for directed and assessment fisheries in both the U.S. and Canada.

Table 1. Stikine River large Chinook salmon preseason terminal run forecasts and postseason estimates from 2004 to 2021, the 2022 preseason forecast, percent error, and forecast method. 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. Bias adjusted forecast uses 5-year average percentage error.

Year	Forecast	Postseason Run	Percent Error	Method
2004	65,900	62,137	6%	Sibling
2005	80,300	87,767	-9%	Sibling
2006	60,600	62,241	-3%	Sibling
2007	37,400	35,954	4%	Sibling
2008	46,100	33,619	37%	Sibling
2009	31,900	16,468	94%	Sibling
2010	22,900	19,615	17%	Sibling
2011	30,000	19,794	52%	Sibling
2012	40,800	29,895	36%	Sibling
2013	22,400	21,720	47%	bias adjusted sibling
2014	26,100	29,323	29%	bias adjusted sibling
2015	30,200	27,355	48%	bias adjusted sibling
2016	33,900	15,496	204%	bias adjusted sibling
2017	18,300	8,145	204%	bias adjusted sibling
2018	6,900	8,807	78%	bias adjusted sibling
2019	8,300	14,283	84%	bias adjusted sibling
2020	13,400	10,303	73%	bias adjusted sibling
2021	9,900	8,681	58%	bias adjusted sibling
2022	7,400			bias adjusted sibling

Data source: *Final Estimates of Transboundary River Salmon Production, Harvest, and Escapement and a Review of Joint Enhancement Activities in 2020.*

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 (1996–2021) 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 23–29). 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 10-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 2022 preseason forecast does not allow for directed Chinook salmon fisheries in District 108. The U.S. does not anticipate any directed fisheries in 2022 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 2022. 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 2022 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 two weeks, 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 2022. 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 7,400 large Chinook salmon does not allow for a directed fishery in Canada.

Although a directed commercial fishery is not anticipated to occur in 2022, 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 2021, it is not likely that tag recoveries will be significant enough to generate reliable inseason MR estimates). Weekly inputs to the model may include harvest data from Alaska District 108 gillnet, troll and sport fisheries; harvest data from Canadian Stikine River commercial, assessment, 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 harvest 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 administered 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 2010 to 2019 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 daily.

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. Typically, management of the lower river commercial fishery switches to sockeye salmon in SW26 subject to Chinook salmon conservation concerns. Additionally, mesh size restrictions may be adopted, specifically limiting fishers to the use of 14.0 cm (~5.5 inch) mesh size to reduce the likelihood of intercepting Chinook salmon.

Achievement of escapement within the escapement goal range is the foremost priority in management considerations. 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 2022, 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 River 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, is normally monitored, and maintained, opportunistically, by a field technician stationed near the Tahltan River should restrictions in the recreational fishery be removed.

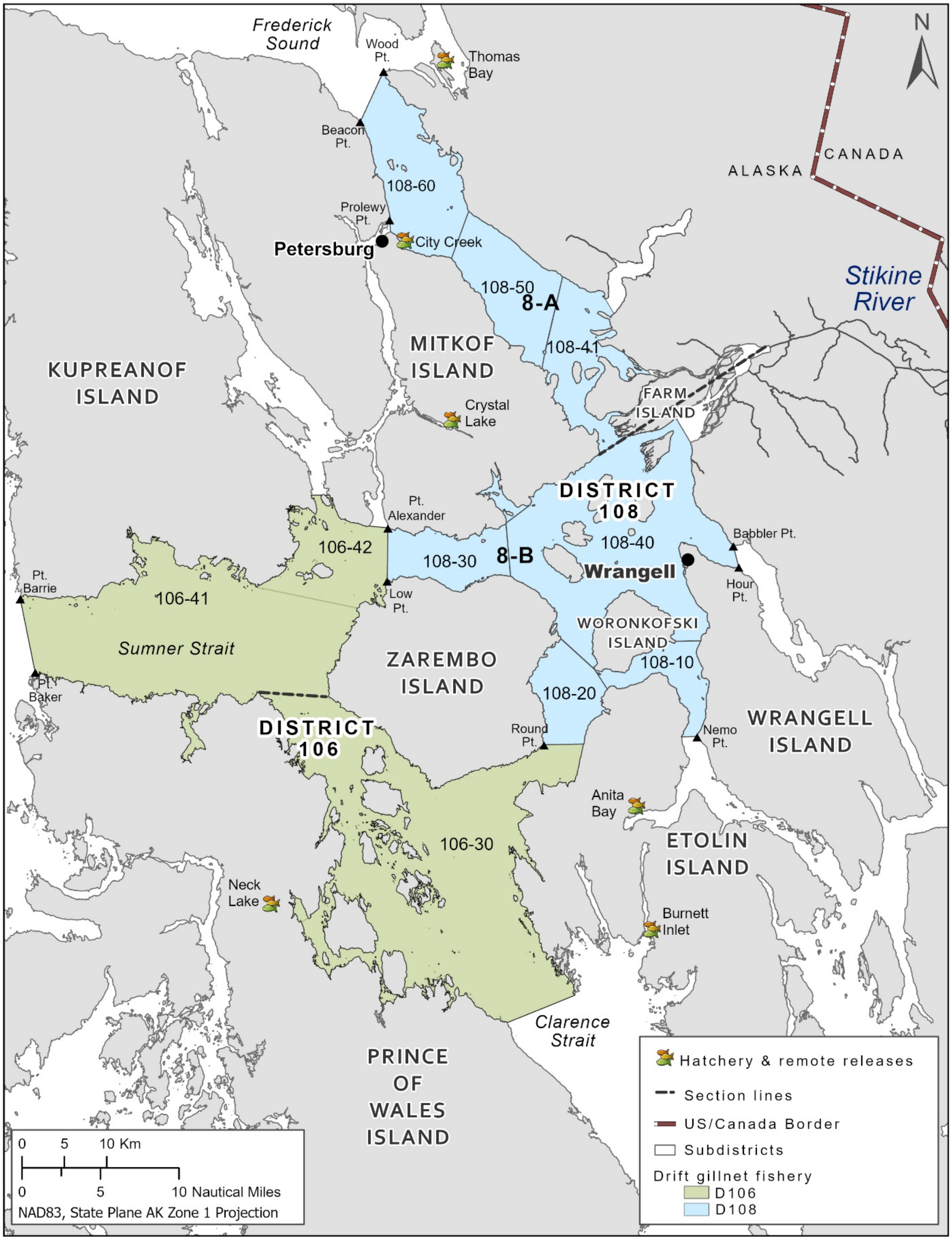

Figure 1. U.S. fishing areas adjacent to the Stikine River.

Stock Assessment Program

See Appendix A.1 for projects anticipated to be conducted in 2022.

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 30% 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 Chinook salmon tagged during the Kakwan Point project. The data will be analyzed to determine weekly abundance and run timing of Little Tahltan /Tahltan origin Chinook salmon and other stock groupings. (Appendix C.1). It is expected that these analyses will be conducted postseason (2023). 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.

Inseason Harvest and Assessment Information Sharing

The U.S. shall provide the following harvest and stock assessment information:

1. District 108 sport and commercial drift gillnet and troll fisheries harvest and effort data including estimates of Stikine-origin fish by SW (weekly);

2. Stikine River subsistence fishery harvest estimates by SW (postseason);

3. District 108 sport and commercial drift gillnet and troll fisheries CWT and spaghetti tag sampling data by SW (weekly);

4. Inriver mark–recapture study daily catch, effort, and ASL information and other Chinook salmon assessment data (daily).

Canada shall provide the following harvest and stock assessment information weekly:

1. Lower river commercial fishery harvest and effort (all areas) by SW);

2. Upper river commercial fishery harvest and effort by SW;

3. First Nation fishery harvest and effort by SW;

4. Recreational fishery harvest (season estimate);

5. Lower Stikine River assessment sampling catch and effort conducted near the international border by SW;

6. ESSR or other terminal fishery catches will be reported as data become available;

7. Little Tahltan Chinook salmon daily counts plus CWT and spaghetti tag recoveries;

8. GSI, CWT, and spaghetti tag fishery results and recoveries by SW or other agreed to interval.

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 2022.

Stock Groupings

Stikine River sockeye salmon are characterized for research, management, and monitoring purposes, and are 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: the Tahltan stock group and the 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.

In 1993, the TTC established management objectives of 24,000 fish (escapement goal range 18,000 – 30,000 fish) and 30,000 fish (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.

Preseason Forecast

For 2022, the terminal run[1] forecast for Stikine River sockeye salmon is 63,000 fish, which constitutes a below average run size. For comparison, the 10-year average total Stikine River sockeye salmon terminal run size is approximately 118,000 fish; the 10-yr average excluding Tuya stock is approximately 99,000 fish. The 2022 forecast includes approximately 12,000 wild Tahltan (19%), 30,000 enhanced Tahltan (48%), and 21,000 mainstem sockeye salmon (33%).

The 2022 overall Stikine River sockeye salmon prediction is based on the following components:

1. A forecast of approximately 42,000 Tahltan natural origin and enhanced sockeye salmon of which 30,000 fish are expected from the enhancement project, and 12,000 fish are expected from natural spawners. This forecast is based on a smolt model in which the 2-year average (2017–2021) age specific marine survival is applied to the number of smolts that emigrated from Tahltan Lake in 2019 and 2020. The smolt forecast has been more accurate than the sibling forecast in recent years.

2. A forecast of approximately 21,000 mainstem sockeye salmon. This forecast is based on a stock-recruitment model that is adjusted by the average model error over the past 5 years. In the past, a sibling model, based on the relationships between sibling 4 and 5-year old fish performed better than other models. Because of limited fishing opportunities for mainstem stocks in 2019 and 2020, it was not possible to reliably determine the abundance of specific age classes and as a result it was not reasonable to use the sibling model for 2022 forecasts.

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 the uncertainty in preseason forecasts, they are useful when used in concert with CPUE for management until inseason data becomes available for inseason run size projections.

[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).

Table 2. Stikine River sockeye salmon preseason run forecasts and postseason run size estimates from 1983 to 2021, the 2022 preseason run forecast, percent error, and forecast method. 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	Forecast	Actual	Percent Error	Method
1983	62,900	77,457	-19%	combinations of sibling, smolt and SR
1984	37,500	83,961	-55%	combinations of sibling, smolt and SR
1985	91,000	214,494	-58%	combinations of sibling, smolt and SR
1986	262,000	75,456	247%	combinations of sibling, smolt and SR
1987	114,000	43,342	163%	combinations of sibling, smolt and SR
1988	123,500	45,096	174%	combinations of sibling, smolt and SR
1989	80,500	90,550	-11%	combinations of sibling, smolt and SR
1990	94,000	67,385	39%	combinations of sibling, smolt and SR
1991	94,000	151,437	-38%	combinations of sibling, smolt and SR
1992	127,300	231,935	-45%	combinations of sibling, smolt and SR
1993	135,000	280,730	-52%	combinations of sibling, smolt and SR
1994	312,000	208,036	50%	combinations of sibling, smolt and SR
1995	169,000	218,728	-23%	combinations of sibling, smolt and SR
1996	329,000	372,785	-12%	combinations of sibling, smolt and SR
1997	211,000	226,915	-7%	combinations of sibling, smolt and SR
1998	218,500	121,448	80%	combinations of sibling, smolt and SR
1999	126,000	124,644	1%	combinations of sibling, smolt and SR
2000	138,000	78,504	76%	combinations of sibling, smolt and SR
2001	113,000	127,255	-11%	combinations of sibling, smolt and SR
2002	80,000	79,329	1%	combinations of sibling, smolt and SR
2003	184,000	240,977	-24%	combinations of sibling, smolt and SR
2004	289,500	311,987	-7%	combinations of sibling, smolt and SR
2005	477,100	259,932	84%	combinations of sibling, smolt and SR
2006	179,200	268,585	-33%	combinations of sibling, smolt and SR
2007	233,600	196,786	19%	combinations of sibling, smolt and SR
2008	228,600	120,209	90%	combinations of sibling, smolt and SR
2009	274,500	185,275	48%	combinations of sibling, smolt and SR
2010	187,700	157,001	20%	combinations of sibling, smolt and SR
2011	183,000	213,399	-14%	combinations of sibling, smolt and SR
2012	134,000	124,540	8%	combinations of sibling, smolt and SR
2013	136,000	113,515	20%	combinations of sibling, smolt and SR
2014	152,300	146,640	4%	combinations of sibling, smolt and SR
2015	171,200	174,292	-2%	combinations of sibling, smolt and SR
2016	223,000	247,892	-10%	combinations of sibling, smolt and SR
2017	185,000	98,768	87%	combinations of sibling, smolt and SR
2018	160,900	62,809	156%	combinations of sibling, smolt and SR

-continued-

Table 2. Continued.

Year	Forecast	Actual	Percent Error	Method
2019	90,000	89,380	1%	combinations of sibling, smolt and SR
2020	103,000	37,584	174%	combinations of sibling, smolt and SR
2021	56,000	83,839	-33%	combinations of sibling, smolt and SR
2022	63,000			combinations of sibling, smolt and SR

Data source: *Final Estimates of Transboundary River Salmon Production, Harvest, and Escapement and a Review of Joint Enhancement Activities in 2020.*

The 2022 sockeye salmon run forecast is characterized as below average. The preseason forecast translates into an expected TAC of 18,000 Stikine River sockeye salmon 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 18,000 fish with a management objective of 24,000 fish and
2. a forecasted mainstem sockeye salmon TAC of 0 fish with a 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.

Beginning in 2019, harvest shares are 53% U.S./47% Canada from 2019 through 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).

Management Procedures

<u>United States</u>

Commercial drift gillnet fisheries occur in waters of northern Clarence Strait (District 106, Sections 6-B, 6-C and 6-D) and Sumner Strait (District 106, Section 6-A) and in waters surrounding the terminus of the Stikine River in District Frederick Sound (District 108, Section 8-A) and Wrangell (District 108, Section 8-B) (Figure 1). Due to their proximity, management of these areas is interrelated resulting in some major stocks being subject to harvest in both districts. Fishing gear used in Districts 106 and 108 are similar with common sockeye salmon gillnet 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.

By regulation, directed sockeye salmon fishery could open 12:00 noon on Sunday, June 12 (SW25). However, given the poor forecast for Stikine River Chinook salmon as well as the expected poor return of Chinook salmon stocks to Southeast Alaska and Stikine River 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 (SW 26) and by at least two weeks in District 108 (SW 27), and with limited fishing time and area in District 108.

Based on the forecast, the AC will be comprised primarily of Tahltan stocks with a high proportion of enhanced fish. Historic harvest timing information (i.e. stock proportions by SW) provided by the genetics program will be used to target those stocks as they pass through each district sequentially. As such, forecast and historic stock proportion data combined with harvest information will be early season tools used to set fishing periods during the first few weeks of the fishery. Opportunity in District 108 will be considered when Tahltan sockeye stocks are present (generally SW 27-29), with limited time, area, and mesh restrictions to conserve Chinook salmon. If inseason data indicates poorer than expected sockeye salmon abundance, District 108 may remain closed to fishing until early August and fishery extensions in District 106 may not occur during the first few weeks of the sockeye salmon fishery. Subsequent openings and fishery extensions will be based primarily on inseason estimates produced by the SSFM and other agreed upon methods for the remainder of the sockeye salmon season. If inseason estimates of mainstem sockeye salmon appear to be weak, then more conservative management actions will be implemented in District 108 during SWs 29–32. 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 normally occurs 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 conservations 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 56º15.70’ N. lat. and west of the longitude of the western entrance to Buster Bay at 133º29.00’ W. long. Only Alaska residents may participate in this fishery which will open each week from Wednesday noon through Sunday noon from June 1 through July 31 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 30 sockeye salmon with two to three permits fished. It is anticipated that fewer than 100 sockeye salmon will be harvested in this fishery in 2022. 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 2022, the Southeast Alaska pink salmon harvest is forecasted to be 16 million fish, which is below the 10-year average (2012–2021) of 34 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. 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 southern portions of District 108 near Anita Bay throughout the month of July and this trend is expected to continue in 2022. However, management actions in District 108 are based primarily on Stikine River sockeye salmon stocks during this period.

Canada

Contingent on confirmation of allowable harvest, a directed sockeye salmon commercial fishery may be considered based upon inseason stock assessment information. Should a directed sockeye salmon fishery occur, it is anticipated that management of sockeye salmon in the lower river commercial fishery would begin during the week of July 03. Consideration for Tahltan Lake sockeye salmon stock management objectives would likely persist through July 16 (SW29). Thereafter, management attention will be focused on mainstem sockeye salmon stock objectives which based on the preseason run forecast is not sufficient in size to support a directed harvest. Actual time frames of responses to specific stock compositions may be fine-tuned inseason according to historical stock composition information.

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 SFMM, 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.

Annex IV, Chapter 1, paragraph 4 of the PST prescribes that either Party takes corrective action if a Party exceeds its catch allocation in any three of five consecutive years. Fisheries management actions based on bilaterally agreed to inseason run size information resulted in Canada exceeding its allocation in 2017 – 2018 and 2020. In response, Canada reviewed its management actions for those years 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. As a result, paragraph 4 provisions apply for 2022.

Factors that will influence management (forecast and inseason run projection uncertainty, environmental conditions) in 2022 are expected to be similar to what was observed in 2017 – 2021:

- Low and variable sockeye salmon survival rates influencing reliability of the preseason forecast.

- Highly variable river levels – anticipated to be above average.

- Due to the low preseason forecast and limited Canadian AC, commercial fishery opening to be delayed until stat week 28 (July 03 – 09); contingent on confirmation of in-season abundance and available Canadian AC.

For SWs 30–34 (beginning July 17): directed commercial fishing opportunities not anticipated due to the poor preseason mainstem sockeye salmon forecast. Achievement of escapement goals 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 the preseason expectation is for a run size capable of providing limited 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 would typically open a week after the initial lower commercial fishery opening, subject to Chinook and sockeye 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 be considered under ESSR or other authorizations once management objectives are anticipated to be exceeded. 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.

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.

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 – 29,999	30,000 – 44,999	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 – 39,999	40,000 – 74,999	75,000 +
Category	Red	Yellow	Green	Yellow	Red

Summary

Achievement 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 preseason forecast. The Stikine management model (SMM) will not be used in 2022, but the SFMM that uses 106-41 and potentially 108 data (Models 1 - 4) maybe used. Other methods of estimating run sizes may be used. Other factors that may influence management are results from inseason escapement projections, e.g., projected Tahltan Lake weir counts and water levels. Fishery managers from both countries will have weekly contact to evaluate other stock assessment tools to update their respective management actions.

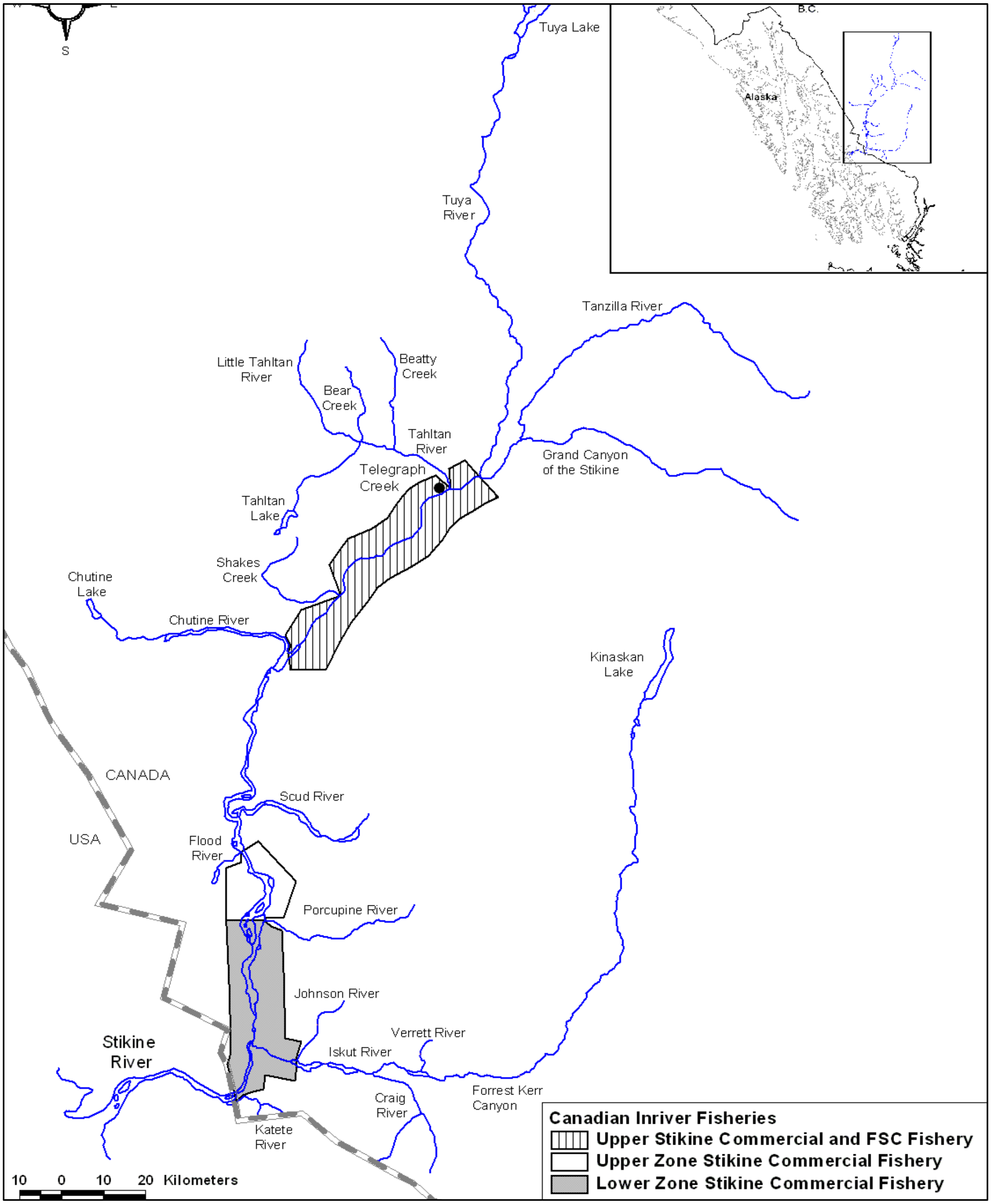

Figure 2. The Stikine River and Canadian fishing areas.

Stock Assessment Program

See Appendix A.1 for projects anticipated to be conducted in 2022.

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, 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 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.

Kakwan Point Stock Assessment Program

The sockeye salmon stock assessment program has relied heavily on run timing information gathered from the Canadian commercial fishery; however, due to the poor preseason forecast, that fishery will not open at the start of 2022. To obtain stock composition data necessary to estimate the inriver abundance, a sockeye salmon stock assessment program is being initiated at Kakwan Point. The project will be conducted in conjunction with the existing Stikine River Chinook salmon assessment program and will extend the project through the end of the sockeye salmon run in late August. Tissue samples will be collected from sockeye salmon for genetic mixed stock analysis and for use in a genetic mark–recapture study to estimate inriver abundance based on an expansion of the Tahltan Lake stock that is monitored via weir. We will also gather daily CPUE information and estimate the ASL composition for sockeye salmon captured. This stock assessment program is designed to capture sockeye salmon in proportion to abundance during immigration; therefore, it is expected that it will provide an unbiased estimate of abundance. This estimate will be assessed by TTC postseason for use in the Stikine River sockeye salmon run reconstruction.

Stock Composition and Run Timing of the Inriver Canadian Harvest and Sampling Projects

Typically, the lower Stikine River commercial sockeye salmon harvest is sampled weekly to obtain a total of 400 random samples; the first 200 are matched samples for ASL (GSI from scales), egg diameter from females, and otoliths, and the second 200 are matched samples for length, sex, and egg diameter from females. The ADF&G Mark lab analyzes thermal otolith marks from a subsample of at least 60 of these samples each week. In the sockeye assessment fishery, up to 200 sockeye salmon per week are sampled for matched ASL (GSI from scales), egg diameter from females, and otoliths samples, and up to 200 sockeye salmon per week are sampled for sex (including egg diameters from females) and length. As a result of the Wrangell ADF&G office closure in 2020, inseason otolith analyses sockeye salmon sampled in the Canadian commercial and assessment fisheries will not be possible and analyses will be completed postseason.

Egg diameter data is typically used in season to estimate Tahltan stock versus the mainstem stock contributions to the sockeye salmon harvests from commercial and assessment fisheries (Tahltan fish generally have smaller diameter eggs (<3.7 mm) compared to mainstem fish), and the enhanced Tahltan component is determined from the analysis of otolith samples collected each week and analyzed by the ADF&G Mark lab.

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

Canada is implementing a nonlethal sockeye salmon sampling project using drift and set gillnets to generate CPUE and stock composition for inriver run abundance as a mortality-based assessment fishery was not recommended to the Transboundary Panel for 2022 and inriver commercial fisheries are not likely to occur or be very limited for sockeye salmon. The project will use methodologies equivalent to historical assessment fisheries. Canada examined the historical relationships between lower river assessment drift gillnet cumulative CPUE and the inriver run for Stikine River sockeye salmon, and individually for Tahltan and mainstem stocks. Inseason cumulative CPUE by SW will be used to estimate inriver run abundance by stock using the 3 and 5-year historical averages of stock composition and run timing as stock composition will not be available inseason. Catch from the set gillnet will be sampled for ASL (scales will be used for GSI analysis) and used postseason for run reconstruction. The project will be assessed by the TTC postseason for use in the Stikine River sockeye salmon run reconstruction.

Although an upper river commercial fishery is not anticipated, First Nation fisheries are likely to occur and up to 600 sockeye salmon will be sampled for ASL and matched otoliths.

Spawning Escapement Estimates

Sockeye salmon will be enumerated at Tahltan Lake through a weir. Approximately 600 fish will be live sampled in proportion to the run for ASL. To assess natural origin and enhanced proportions, 400 otolith samples will be taken from the broodstock. If 2022 escapement concerns are not an issue, an additional 400 male fish will be lethally sampled for otoliths (and ASL).

Mainstem sockeye salmon escapement will be estimated postseason using migratory timing information obtained from CPUE and stock composition data from assessment projects and historical information. Aerial surveys of six mainstem sockeye salmon spawning sites will be conducted to serve as indices of run abundance.

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. Historically, 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), and/or stock assessment programs. Samples include data on genetics, egg diameter from females (small eggs are Tahltan), otolith marks (Tahltan enhanced fish), age, and sex. Stock composition will be estimated postseason using genetic mixed stock identification techniques and the enhanced portion of Tahltan fish will be determined using otolith marks. The historical data will be used to estimate stocks until the genetic analysis is complete and assessed by the TTC. The stock composition is then multiplied by respective harvest to get stock specific harvest, CPUE, and migratory timing.

Escapement Evaluation and Production

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 natural origin and enhanced components,

2. smolt production, separated by natural origin 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, assessment 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, assessment fishing vs. commercial fishing CPUE, different stock ID results, etc.).

Inseason Harvest and Assessment Information Sharing

The U.S. shall provide the following harvest and stock assessment information:

1. Subdistricts 106-41/42 (Sumner Strait) commercial drift gillnet fishery harvest and effort data including estimates of Stikine-origin fish by SW (weekly);

2. Subdistrict 106-30 (Clarence Strait) commercial drift gillnet fishery harvest and effort data including estimates of Stikine-origin fish by SW (weekly);

3. District 108 commercial drift gillnet fishery harvest and effort data including estimates of Stikine-origin fish by SW (weekly);

4. Stikine River subsistence fishery (postseason);

4. Inriver assessment daily catch, effort and ASL information and other sockeye salmon assessment data (daily).

Canada shall provide the following harvest and stock assessment information weekly:

1. Lower river commercial fishery harvest and effort (all areas) by SW;

2. Upper river commercial fishery harvest and effort by SW;

3. First Nation fishery harvest and effort by SW;

4. Lower Stikine River assessment fishery catch, and effort conducted near the international border by SW;

5. ESSR or other terminal fishery harvests will be reported as data become available;

6. Tahltan smolt and adult sockeye salmon daily counts;

7. Fishery GSI results as data becomes available.

Stikine Sockeye Salmon Management Model Description

In years with sufficient commercial fisheries information the historic management model is used. In 2022, the SFMM (Model 1 and Model 3) may be used to estimate the terminal run size using 106-41/42 data.

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.

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), 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 2020 average run timing of stocks and the corresponding average CPUE levels of each fishery.

Inseason Use

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 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 2021.

Escapement Goal

Management objectives have not been established for Stikine River coho salmon. Assessment projects are in the developmental phase and are scheduled to be implemented by 2024. There is no escapement goal range for Stikine River coho salmon.

Preseason Forecast

Although annual aerial surveys have provided an index of coho abundance, and past assessment fisheries have provided run timing information and a coarse estimate of run size (relative to inriver run for sockeye salmon), reliable escapement and marine survival data are lacking for coho salmon and as a result, reliable forecasts of coho salmon run size are not possible at this time.

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.

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 can 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 2022 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 SW36 (starting August 28; delayed one week due to mainstem sockeye salmon escapement concerns). 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.

Stock Assessment Program

Each country shall:

1. provide harvest statistics by SW weekly;
2. sample its fisheries for CWTs;
3. develop and implement an abundance-based approach to managing coho salmon on the Stikine River.

Inseason Data Exchange Timing

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.

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 Taku River large Chinook salmon that apply in 2022.

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 6,600 fish. The forecast uses a sibling model in which 2021 returns of age 4 (BY 2017) and age 5 (BY 2016) Chinook salmon were used to predict returns of age 5 (BY2017) and age 6 (BY2016) fish in 2022 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 4,000 to 9,200 fish.

This forecast is well below the 10-year average terminal run of 16,200 large Chinook salmon. Principal brood years contributing to the 2022 Chinook salmon run are 2016 (9,177 large fish spawning escapement), 2017 (8,214 large fish spawning escapement), and 2018 (7,271 large fish spawning escapement). The 2022 preseason forecast is insufficient for directed and assessment fisheries in both the U.S. and Canada.

Table 3. Taku River large Chinook salmon preseason escapement, terminal run forecasts versus postseason estimates from 1997 to 2021, the 2022 preseason forecast, percent error, and forecast method. 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. Bias adjusted forecast uses 5-year average percentage error.

Year	Forecast	Actual	Percent Error	Method
1997	106,100	114,938	-8%	Sibling
1998	47,800	31,039	54%	Sibling
1999	24,500	16,786	46%	Sibling
2000	32,100	34,997	-8%	Sibling
2001	38,600	46,644	-17%	Sibling
2002	39,900	55,044	-28%	Sibling
2003	44,200	36,435	21%	Sibling
2004	56,500	75,032	-25%	Sibling
2005	99,600	65,334	52%	Sibling
2006	64,200	61,859	4%	Sibling
2007	38,700	18,650	108%	Sibling
2008	39,400	30,186	31%	Sibling
2009	50,200	35,106	43%	Sibling
2010	41,300	35,784	15%	Sibling
2011	41,000	24,088	70%	Sibling
2012	48,000	21,083	128%	bias adjusted sibling
2013	26,100	19,388	35%	bias adjusted sibling
2014	26,800	27,324	-2%	bias adjusted sibling
2015	26,100	26,798	-3%	bias adjusted sibling
2016	29,200	11,631	151%	bias adjusted sibling
2017	13,300	8,643	54%	bias adjusted sibling
2018	4,700	7,328	-36%	bias adjusted sibling
2019	9,100	11,797	-23%	bias adjusted sibling
2020	12,400	16,010	-23%	bias adjusted sibling
2021	10,300	11,722	-12%	bias adjusted sibling
2022	6,600			bias adjusted sibling

Data source: *Estimates of Transboundary River Salmon Production, Harvest, and Escapement and a Review of Joint Enhancement Activities in 2020.*

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 Chinook salmon fisheries. BLCs include incidental harvest of Chinook salmon in U.S. and Canadian commercial gillnet fisheries and sport fisheries, and the Canadian FN fishery. For directed Chinook salmon 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.

A valid Petersen estimate will be sought inseason. In the event a valid Petersen estimate 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 bilaterally-agreed valid estimate will be used. If no agreed-to valid estimate has been generated, the preseason forecast will be used.

$$\mathbf{TR = [(P_t + Cus_{(t-1)})/}\boldsymbol{p_t}\mathbf{)\ ]}$$

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 2022 due to the poor Chinook salmon forecast, 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 2022 preseason forecast of 6,600 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 2022 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, and through June 30 in Taku Inlet, to protect Taku River-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 2022 has been conveyed by DFO and it is believed that fishing effort will be extremely limited during the Chinook salmon season. Catch data 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. Considering 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 2022. 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. Most of the fishing effort occurs downstream of the Tulsequah River.

The 2022 bilaterally agreed preseason forecast of 6,600 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 2022, 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 2022 Taku River commercial conditions of licence, harvest of Chinook salmon will not be permitted.

Stock Assessment Program

See Appendix A.2 for projects anticipated to be conducted in 2022.

Stock Composition of U.S. Harvests

Weekly contribution of above border Taku 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 30% 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. 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 2022, 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 and assessment fisheries will be examined for adipose clips for CWTs. Further details on these sampling programs are summarized in Appendix A. 2.

Spawning Escapement Estimates

Drainagewide 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 seventh season in 2022.

Inseason Harvest and Assessment Information Sharing

The U.S. shall provide the following harvest and stock assessment information:

1. District 111 sport and commercial drift gillnet fisheries harvest and effort data including estimates of Taku-origin fish by SW (weekly);

2. Taku River personal use fishery harvest (postseason);

3. District 111 sport and commercial drift gillnet fisheries CWT and spaghetti tag data by SW (weekly);

4. Inriver mark-recapture study catch, numbers tagged, effort and ASL data (daily);

5. Inriver CWT, telemetry, aerial survey, headwater sampling information and other Chinook salmon assessment data (weekly).

Canada shall provide the following harvest and stock assessment information weekly:

1. Inseason harvest and effort data by SW in the commercial and assessment fisheries and for the season in the FN and recreational fisheries;

2. Daily data updates from any Taku Chinook salmon mark-recapture programs, including details on effort, number of fish captured, sampled, and marks recovered;

3. Weekly data updates on other Taku Chinook salmon stock assessment programs, i.e. CWT programs, headwater enumeration programs, aerial surveys, headwater sampling, etc.

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 2022.

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).

Preseason Forecast

The preseason forecast for the terminal run of Taku River sockeye salmon in 2022 is approximately 128,000 wild fish, which is below the 10-year average run size of 150,000 fish. This is based on a new sibling model that forecasts the current year returns for the four major age classes (1.2, 1.3, 0.3, 0.2) based on brood year relationships between year x and year x-1 for each age class (1984 – 2021). Each age class was adjusted by the recent 5-year model error. Note that this forecast is based on data resulting from a recent review of the assessment program, where 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. Table 4.

Table 4. Taku River wild sockeye salmon preseason run forecasts and postseason run estimates, 1994 to 2021, the 2022 preseason run forecast, percent error, and forecast method. 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. Bias adjusted forecast uses average percentage error.

Year	Forecast	Actual	Percent Error	Method
1994	237,500	229,642	3%	SR
1995	211,300	238,434	-11%	SR
1996	219,000	322,379	-32%	average S/R and sibling
1997	285,200	174,565	63%	average S/R and sibling
1998	238,100	139,824	70%	average S/R and sibling
1999	202,900	176,764	15%	average S/R and sibling
2000	273,200	246,954	11%	average S/R and sibling
2001	250,500	396,678	-37%	average S/R and sibling
2002	293,100	251,633	16%	average S/R and sibling
2003	303,800	330,332	-8%	average S/R and sibling
2004	231,200	204,059	13%	average S/R and sibling
2005	272,100	188,244	45%	average S/R and sibling
2006	204,100	233,425	-13%	average S/R and sibling
2007	211,700	161,429	31%	SR
2008	181,000	145,239	25%	SR
2009	213,000	118,620	80%	SR
2010	205,000	153,201	34%	SR
2011	230,700	201,875	14%	average S/R and sibling
2012	197,300	193,574	2%	average S/R and sibling
2013	255,000	184,411	38%	average S/R and sibling
2014	190,000	140,929	35%	average S/R and sibling
2015	216,000	193,431	12%	average S/R and sibling
2016	200,000	268,770	-26%	SR
2017	198,000	199,235	-1%	SR
2018	160,000	171,235	-7%	SR-adjusted 10-yr
2019	120,000	167,284	-28%	SR-adjusted 10-yr
2020	139,000	120,092	16%	SR-adjusted 5-yr
2021	140,000	209,275	-33%	Sibling-adjusted 5-yr
2022	128,000			Sibling-adjusted 5-yr

Data source: *Final Estimates of Transboundary River Salmon Production, Harvest, and Escapement and a Review of Joint Enhancement Activities in 2020.*

Taku River Enhanced Sockeye Salmon Forecast

The 2022 terminal run forecast for Taku River enhanced sockeye salmon is approximately 5,500 fish from two enhancement projects.

The 2022 terminal run forecast for Tatsamenie enhanced sockeye salmon is approximately 5,000 fish, which is below the 10-year average enhanced run size of 8,000 fish. The enhanced forecast is based on a smolt model that uses estimates of out-migrating enhanced smolt, primary years contributing are 2019 (576,000) and 2020 (358,000 fish), with the recent 3-year average Tatsamenie Lake smolt to adult survival rate of 1.1%.

The 2022 terminal run forecast for Trapper Lake enhanced sockeye salmon originating from feasibility studies is approximately 500 fish. This is based on fry to adult survival rates observed in previous years of the project.

Harvest Sharing Objectives

Pacific salmon harvest sharing provisions were renegotiated by the Transboundary Panel in January 2019 for the period 2019 through 2028. In 2020, the Commission agreed to the following Taku River sockeye salmon harvest sharing revisions for the 2020–2028 fishing seasons:

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

- TAC and resulting harvest allocations inseason will be based on estimates of Taku River natural origin sockeye salmon terminal run size minus the management objective of 58,000 fish.
- 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.

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 weekly.

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

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

Where:	$TAC_{(w)}$	=	projected total allowable catch of natural origin *w* sockeye salmon for the season;
	$E_{w(t)}$	=	cumulative escapement to week *t* based on MR data;
	$C_{w(t)}$	=	cumulative Canadian natural origin harvest to week *t*;
	$A_{w(t-1)}$	=	estimated cumulative U.S. harvest of natural origin 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.

A coordinated management focus on Tatsamenie Lake 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 natural origin 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 a reduction in fishing time. Although this is unlikely for 2022 given the favourable preseason forecast, managers will monitor stock assessment data inseason to determine if any special management measures are required for the Tatsamenie Lake stock.

<u>United States</u>

Directed sockeye salmon fishing in District 111 traditionally opens for a 72-hour fishing period beginning noon on the third Sunday in June (June 19; SW26). 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 (Figure 4). 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, 10-yr average weekly stock composition data will be used to estimate the contribution of Taku River wild and Port Snettisham enhanced sockeye salmon contributions to the harvest. This will be used to generate weekly estimates of the Taku River terminal wild sockeye salmon run size, Taku River sockeye salmon TAC and U.S. harvest of Taku River sockeye salmon. Weekly harvest objectives calculated using adjusted inseason run size estimates, historical run timing and the bilaterally agreed to management objective may result in additional time for D111 gillnetters in Taku Inlet. GSI analyses will be utilized postseason to determine the sockeye salmon stock composition of the D111 harvest.

Returns from domestic hatchery programs are expected to contribute substantially to the District 111 fishery in 2022. The forecast return of Snettisham Hatchery sockeye salmon is 60,000 fish. DIPAC's summer chum salmon return to Gastineau Channel and Limestone Inlet is forecast to be 524,000 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 2022. The one-month fishery historically occurred throughout July but will again be delayed, as it has since 2017, 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 10 sockeye salmon for a household of one, or 20 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, the directed commercial fishery will be delayed by more than a week and commence at noon Wednesday, June 29 (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 concern for returning Kuthai Lake sockeye salmon. Additional measures will also be implemented based on Chinook salmon considerations. For 2022, 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 16) and reductions in fishing time may be required if large Chinook salmon catches are significant during the early weeks of the directed sockeye salmon fishery. Maximum gillnet length will be 36.6 m (120 ft). The use of set gillnets will not be permitted during the first commercial opening to reduce the incidental catch of Chinook salmon. 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.

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 5,001 and 15,000 fish, Canada's harvest share will be 23% of the TAC (Table 6). If inseason projections of enhanced fish drop below 5,001 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 26 – July 02) 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 24 – August 13), 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.

Stock Assessment Program

See Appendix A.2 for projects anticipated to be conducted in 2022.

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.

<u>Stock Composition of Canadian Harvests</u>

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 Friday afternoon, weather permitting. Inseason processing of otoliths by the ADF&G Mark, Age, and Tag Lab will be completed for first reads 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).

<u>Spawning Escapement Estimates</u>

Systemwide 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.

Inseason Harvest and Assessment Information Sharing

The U.S. shall provide the following harvest and stock assessment information:

1. District 111 (Subdistricts 111-31, 32, 34) commercial drift gillnet fishery harvest and effort data including estimates of Taku-origin fish by SW (weekly);

2. Taku River personal use fishery harvest (postseason);

3. Inriver mark-recapture study catch, numbers tagged, effort and ASL data (daily);

4. Inriver telemetry information and other sockeye salmon assessment data (weekly).

Canada shall provide the following harvest and stock assessment information on a weekly basis:

1. Taku River commercial fishery harvest and effort data by SW;

2. First Nation fishery harvest data (postseason estimate);

3. Daily data updates from any Taku sockeye salmon capture–recapture programs, including details on effort, number of fish captured, sampled, and marks recovered.

4. Updates on other Taku sockeye salmon stock assessment programs, i.e. headwater enumeration programs.

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 2022.

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 2022 is 106,000 fish which equates to a terminal run of approximately 87,000 fish after applying an average nonterminal marine harvest rate of 18%. By comparison, the 10-year average total run is 117,000 fish and terminal run is 99,000 fish. The 2022 forecast was generated by applying the recent 5 year average marine survival (6.4%) to the 2021 smolt estimate (1.65M) and was not corrected with recent model error (Table 5).

Table 5. Taku River coho salmon preseason forecasts and postseason estimates from 1997 to 2022, the 2022 preseason forecast, percent error, and forecast method. From 1997 to 2012, the forecast and actual estimates were total run, since 2013 the estimates were terminal run. 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	Forecast	Actual	Percent Error	Method
1997	35,035	50,886	-31%	smolt CPUE using 10-yr avg marine survival
1998	66,472	119,925	-45%	smolt CPUE using 10-yr avg marine survival
1999	66,343	117,176	-43%	smolt CPUE using 10-yr avg marine survival
2000	70,147	109,148	-36%	smolt CPUE using 10-yr avg marine survival
2001	107,493	162,777	-34%	smolt CPUE using 10-yr avg marine survival
2002	223,162	303,275	-26%	smolt CPUE using 10-yr avg marine survival
2003	186,755	265,090	-30%	smolt CPUE using 10-yr avg marine survival
2004	139,011	251,537	-45%	smolt CPUE using 10-yr avg marine survival
2005	99,811	222,997	-55%	smolt CPUE using 10-yr avg marine survival
2006	134,053	226,694	-41%	smolt CPUE using 10-yr avg marine survival
2007	82,319	133,301	-38%	smolt CPUE using 10-yr avg marine survival
2008	99,199	174,070	-43%	smolt CPUE using 10-yr avg marine survival
2009	113,716	224,010	-49%	smolt CPUE using 10-yr avg marine survival
2010	141,238	246,822	-43%	smolt CPUE using 10-yr avg marine survival
2011	83,349	129,939	-36%	smolt CPUE using 10-yr avg marine survival
2012	100,136	112,947	-11%	smolt CPUE using 10-yr avg marine survival
2013	125,000	103,792	20%	smolt CPUE using 10-yr avg marine survival
2014	127,000	171,888	-26%	smolt CPUE using 10-yr avg marine survival
2015	118,000	79,919	48%	smolt CPUE using 10-yr avg marine survival
2016	152,000	111,217	37%	smolt CPUE using 10-yr avg marine survival
2017	140,000	78,056	79%	smolt CPUE using 10-yr avg marine survival
2018	81,000	85,485	-5%	smolt CPUE using 2-yr avg marine survival
2019	73,000	105,110	-31%	smolt CPUE using 3-yr avg marine survival
2020	122,000	61,935	97%	smolt CPUE using 5-yr avg marine survival
2021	94,000	98,523	-5%	smolt CPUE using 5-yr avg marine survival
2022	87,000			smolt CPUE using 5-yr avg marine survival

Data source: *Final Estimates of Transboundary River Salmon Production, Harvest, and Escapement and a Review of Joint Enhancement Activities in 2020.*

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 2022 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

A similar management process as described for Chinook and sockeye salmon will be followed for coho 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.

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

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

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 Canadian 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).

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 endeavor to achieve the AC and management objective. The forecast return of coho salmon to the DIPAC Macaulay Hatchery in Gastineau Channel is 12,000 fish. 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 14), management actions will shift to coho salmon.

Inseason management will be based on evaluation of fishery harvest, effort and CPUE relative to historical levels, and inriver run size estimates from the Taku River MR program. Canada will endeavor to manage to the agreed management objective of 70,000 coho salmon 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.

Stock Assessment Program

See Appendix A.2 for projects anticipated to be conducted in 2022.

All coho salmon harvested in Canadian fisheries will be inspected for a missing an 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. Greater than 40% of the harvest will be sampled to determine proportion of adipose fin clipped fish missed in the fishery. Coho salmon harvested in Alaska will be sampled for CWTs in both the commercial and sport fisheries. The minimum sampling goal is 20% of the harvest. CWT data will be used to determine stock composition postseason.

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 Harvest and Assessment Information Sharing

The U.S. shall provide the following harvest and stock assessment information:

1. District 111 commercial drift gillnet fishery harvest and effort data including estimates of Taku-origin fish by SW (weekly);

2. District 111 sport fishery harvest and effort data including estimates of Taku-origin fish by SW (postseason);

3. Taku River personal use fishery harvest (postseason);

4. Inriver mark-recapture study catch, numbers tagged, effort and ASL data (daily);

5. Inriver CWT, telemetry, baseline sampling information and other coho salmon assessment data (weekly).

Canada shall provide the following harvest and stock assessment information on a weekly basis:

1. Inseason harvest and effort data by SW for the commercial and any assessment fisheries and postseason for the FN and recreational fisheries;
2. Daily data updates from any Taku coho salmon mark-recapture programs, including details on effort, number of fish captured, sampled, and marks recovered;
3. Weekly data updates on other Taku coho salmon stock assessment programs, i.e. CWT programs, headwater enumeration programs, baseline sampling, etc.

Inseason Data Exchange Timing

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.

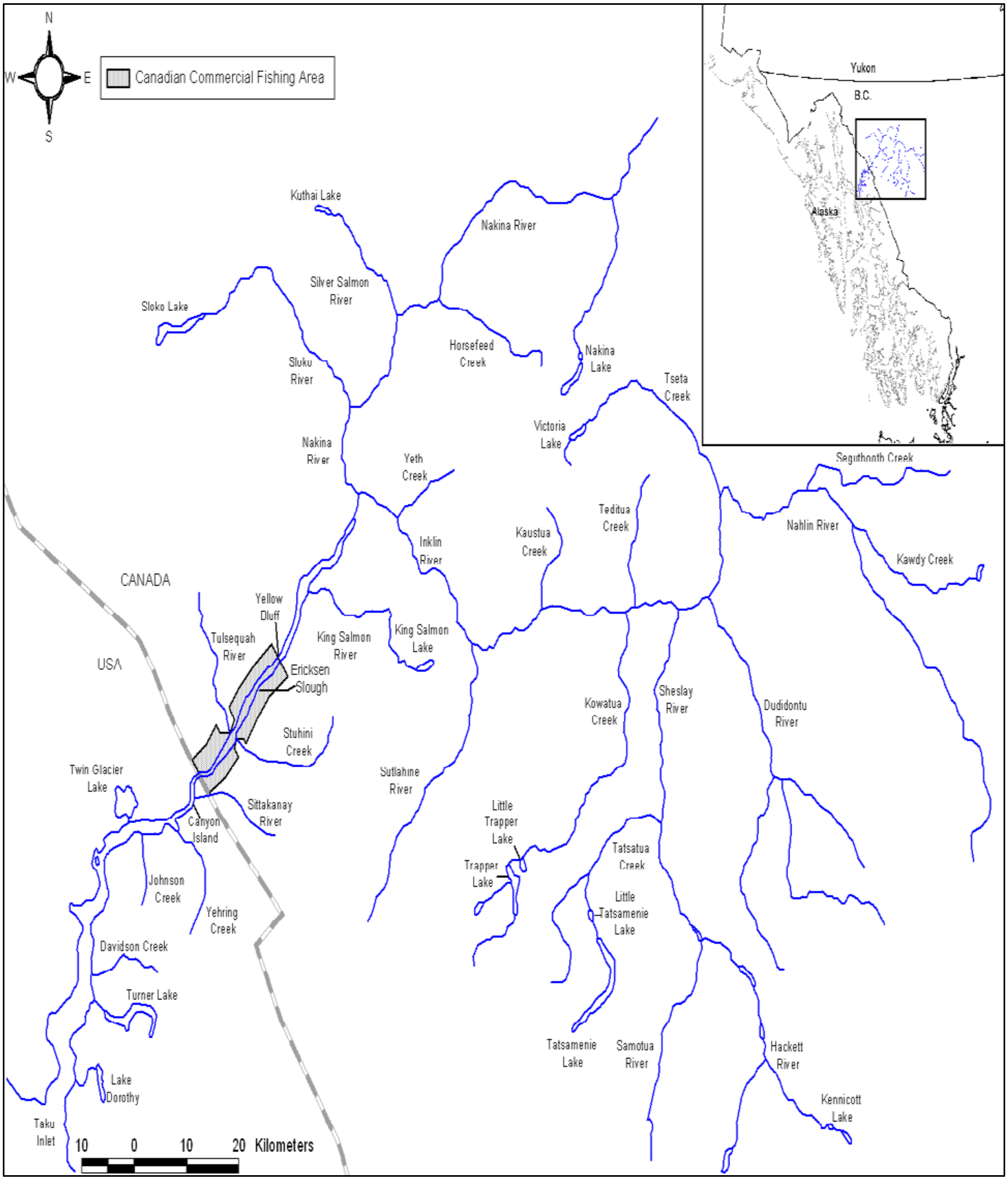

Figure 3. The Taku River showing the Canadian commercial fishing area.

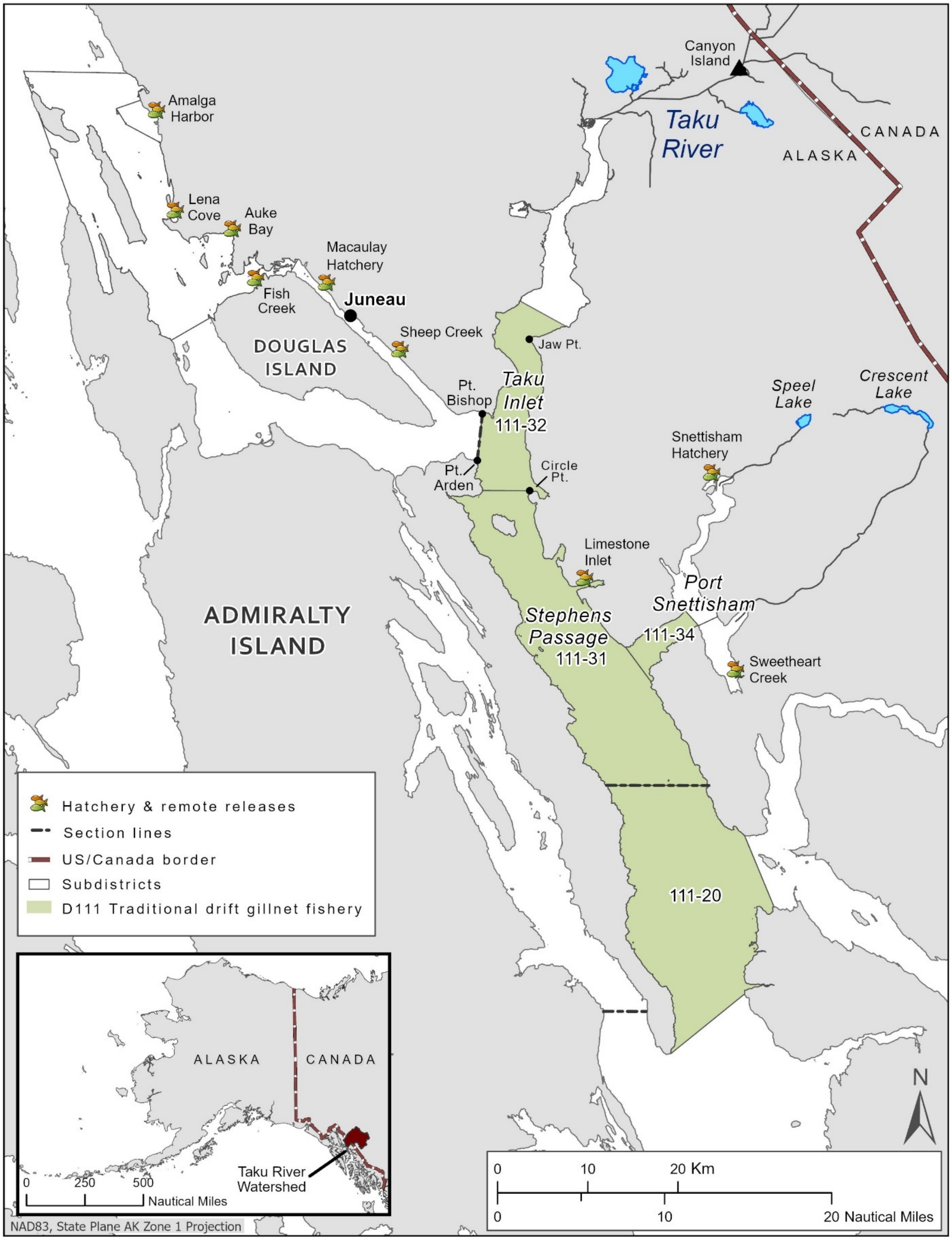

Figure 4. U.S. District 111 traditional drift gillnet fishing areas adjacent to the Taku River.

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 2022.

The principal U.S. fishery that targets Alsek River stocks is a commercial set gillnet fishery that operates in Dry Bay, from the Gulf of Alaska to approximately 20 km up the Alsek River (Figure 5). A small subsistence fishery also operates in Dry Bay.

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 Goals

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 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 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 terminal run in 2022 is 1,000 fish. This forecast is below the 10-year average of approximately 1,200 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 28 years of Klukshu Chinook production data adjusted using the recent 5-year average model error (43%). 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 2022 Alsek River Chinook run forecast of approximately 4,000 fish.

The preseason forecast for Klukshu River sockeye salmon terminal run in 2022 is 11,300 fish. This is below the 10-year average of 14,200 fish and just above the escapement goal range of 7,500 to 11,000 fish. The forecast is a stock recruit model based on 28 years of Klukshu sockeye salmon production data adjusted using the recent 5-year average model error (1%). 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 2022 Alsek River sockeye run forecast of approximately 49,000 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 2022 Season

Little inseason abundance information is available to inform U.S. Alsek River salmon management as most stock assessment data are gathered in the headwaters. Chinook and sockeye salmon are enumerated at the Klukshu River using video technology operated by DFO and CAFN. Nesketahin Lake sockeye salmon and Blanchard River large Chinook salmon are also enumerated. Daily count data are used to inform inseason Canadian management actions on these stocks which represent a variable proportion of drainagewide escapements of Alsek River salmon. Postseason data are required to inform individual stock contributions and to estimate Alsek River drainagewide salmon abundances.

Currently, there are no programs in place to estimate coho salmon escapement. However, partial counts of coho salmon abundance are obtained for the Klukshu River stock, but this only serves as general run strength indicator as the project ends prior to the end of the coho salmon run.

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; and the first Sunday in June for 2022 will be 24-hours for SW 24. A six-inch maximum mesh restriction will be in place through July 24, SW 30 and live Chinook salmon will be asked to be released. 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 2021, the U.S. commercial fishery was opened for a total of 42 days with a harvest of 340 Chinook salmon and 8,877 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, 2018 and 2020.

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, like 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 2022.

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 consider 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 2022:

- A salmon angling (including catch and release) closure will be in effect April 1 through August 14, 2022.

- Due to a sustained period of poor returns, the daily harvest 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 a below average return of sockeye salmon in 2022. The daily harvest 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 fish by August 15 or >12,700 fish 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, 2022, 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 salmon run and potential impacts of bycatch of sockeye salmon during a directed coho salmon recreational fishery.

- The status of the coho salmon run and overall projected weir count.

In the recreational salmon fishery, the following closed/open times will be in effect for 2022:

- 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 non-retention periods on the Takhanne and Blanchard rivers will be from July 24 to August 31.

- Salmon non-retention in Klukshu Lake will be in effect year round.

- Single hook and artificial fly only restrictions are applicable in specified waters.

Notable considerations for the Alsek River watershed (B.C.) portion in 2022 include:

- Retention of 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.

- The possession limit is 8 salmon (in the aggregate, species combined).

- All retained salmon must measure 30 cm or more.

- It is illegal to catch or attempt to catch salmon by willfully foul hooking. Any accidentally foul-hooked salmon must be released.

- Only single barbless hooks are allowed.

- All steelhead must be released.

- Annual fishing closures include:

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

Stock Assessment Program

See Appendix A.3 for projects anticipated to be conducted in 2022.

Drainagewide abundance of Chinook and sockeye salmon will be determined by the joint Canada/U.S. MR program for the first time since 2004. The abundance of Chinook salmon (fish age-1.2 and older) and sockeye salmon (fish ≥ 350 mm mid eye tail fork length (METF)) upstream of the event 1 set gillnet site at river mile 19 will be estimated in 2022 using 2-event MR methods. Daily CPUE information will be gathered and the ASL composition for salmon captured will be estimated. The second sampling event will consist of inspecting Chinook and sockeye salmon for marks upriver at Klukshu River and Village Creek enumeration projects, as well as on various Alsek River salmon spawning grounds. Tissues will be collected from all Chinook and sockeye salmon captured in event 1 for a mixed stock GSI analysis and for use in a genetic MR expansion of the Klukshu and Nesketahin sockeye salmon stocks.

Escapements of Chinook and sockeye salmon through the Klukshu River enumeration project and sockeye salmon through the Village Creek (Nesketahin Lake) enumeration project serve as an inseason indicator of stock strength. Adjustments to above border fisheries may be made based on 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 sonar project.

Inseason Harvest and Assessment Information Sharing

The U.S. shall provide the following harvest and stock assessment information for Chinook and sockeye salmon:

1. Dry Bay commercial set gillnet fishery harvest and effort data by SW (weekly);

2. Inriver mark-recapture study catch, numbers tagged, effort and ASL data (daily);

3. Alsek River subsistence fishery harvest (postseason);

Canada shall provide the following harvest and stock assessment information for Chinook and sockeye salmon:

1. Alsek River First Nation fishery harvest data (postseason);

2. Weekly updates from any Alsek River assessment programs, including details on effort, number of fish counted, sampled, and marks recovered.

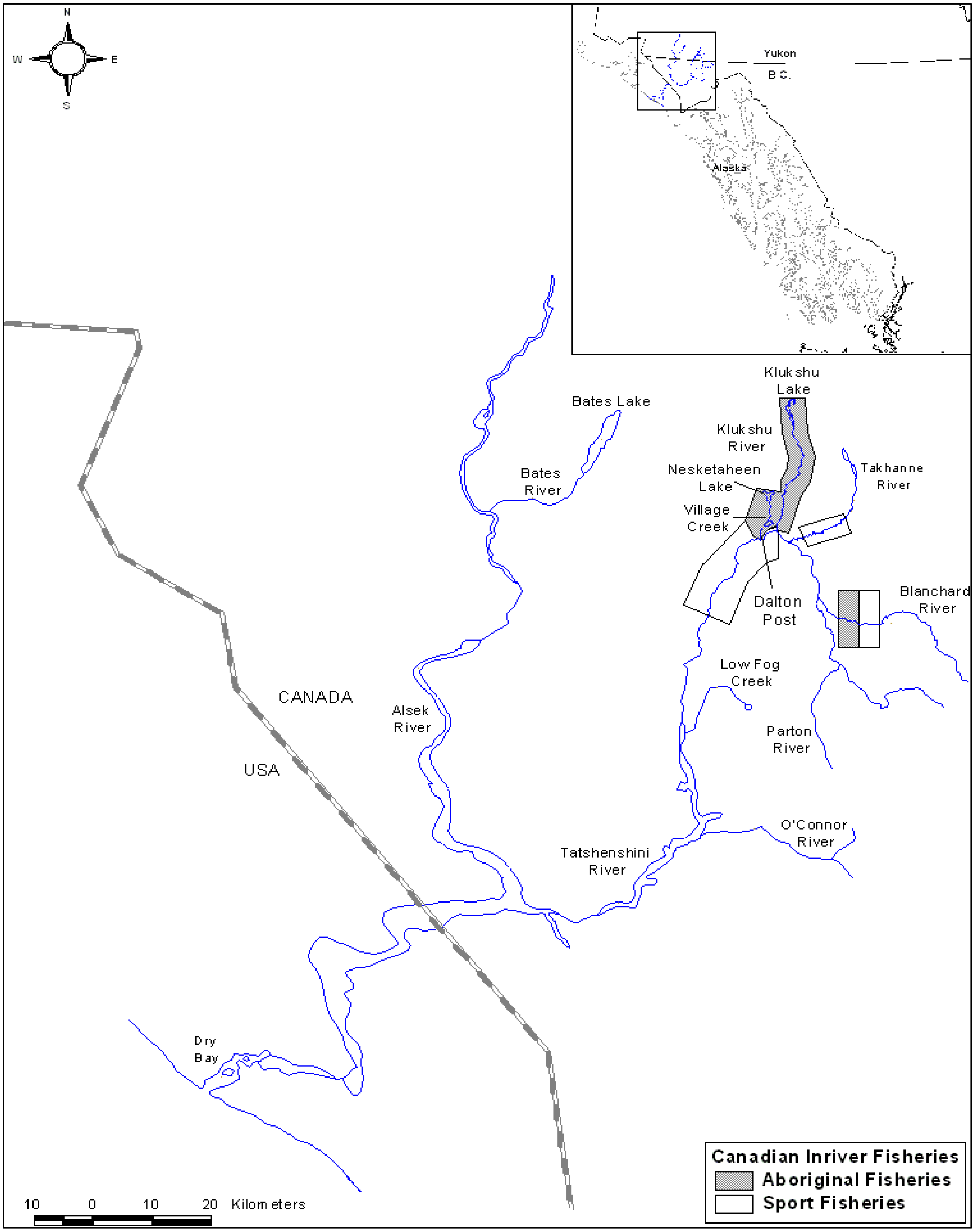

Figure 5. The Alsek River principal Canadian fishing areas.

2022 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, Little Trapper Lake and King Salmon Lake in the Taku River drainage. Enhancement Production Plans are produced for each river drainage, the Stikine River plan is known as the SEPP and Taku River plan is known as the TEPP. Enhancement Production Plans are developed by the Enhancement Sub-committee, reviewed by the Transboundary Technical Committee, and approved by the Transboundary Panel. Sockeye salmon eggs are incubated and thermally marked at Snettisham Hatchery in Alaska. The following spring, fry are released back into the lake where broodstock were collected, except for Little Trapper Lake fry, which are released to Trapper Lake. Taku River enhancement investigations additionally include assessments for fish passage restoration to Trapper Lake and assessment of salmon re-introduction considerations with resident lake species for anadromous salmon production planning.

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. Details on the current year plans are described below under *Egg-Take Goals*.

In January 2022, the Panel reviewed the 2020 SEPP (Table 7) and results, as well as received an update on activities from the 2020 TEPP (Table 8), 2021 SEPP (Table 9) and 2021 TEPP (Table 10) to date. Additional details on brood year 2020 sockeye salmon can be found below under *Fry Plants.*

Table 7. The 2020 SEPP results.

Enhancement Project	SEPP	Actual
Tahltan Lake	• Egg-take with target of 5.0 million. • Guideline for last fishing day will be September 25. • Fry to be planted into Tahltan Lake and/or Tuya lakes)	• Enhancement Sub-committee adjusted egg-take target to 500,000 eggs match estimated wild smolt production in Tahltan Lake. • 446,045 eggs were collected. • Last fishing day was September 25th. • No fry lost to IHNV. • 329,700 fry released in Tahltan Lake. • No fry released in Tuya Lake.

Table 8. The 2020 TEPP results.

Enhancement Project	TEPP	Actual
Tatsamenie Lake	• Egg-take goal of 3.0 million eggs (up to 50% of available broodstock), including 500,000 for extended rearing.	• 1.7 million eggs collected. • No IHNV loss. • 1.04 million fry directly released in lake. • 241,900 extended rearing fry delivered to net pens.
Trapper Lake	• Egg-take with target of 1.0 million eggs. Program continuation contingent on barrier removal.	• 467,266 eggs collected from Little Trapper Lake. • No IHNV loss. • 319,400 fry directly released to Trapper Lake.

Table 9. The 2021 SEPP results. (as of March 2022).

Enhancement Project	SEPP	Actual
Tahltan Lake	• 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	• Enhancement Sub-committee adjusted egg-take target inseason to 1.5 million eggs to match estimated wild smolt production. • An estimated 1.46 million eggs collected. • An estimated 1.25 million eyed eggs after picking. • Fry Release pending.

Table 10. The 2021 TEPP results. (as of March 2022).

Enhancement Project	TEPP	Actual
Tatsamenie Lake	• Egg-take goal of 2.5 million eggs, including 500,000 for extended rearing.	• • An estimated 2.9 million eggs collected. • An estimated 1.9 million eyed eggs after picking. • Fry Release pending.
Trapper Lake	• Egg-take with target of 1.0 million eggs, pending broodstock availability and contingent on barrier removal.	• An estimated 1.0 million eggs collected. • Approximately 425,822 eyed eggs after picking. • Fry release pending. • Sockeye salmon passage remediation has not occurred.
King Salmon Lake	• Egg-take goal of 250,000, pending broodstock threshold of greater than 600 and less than 4,000 sockeye escapement.	• Escapement 6,839 sockeye • No eggs collected

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 2020 transboundary sockeye salmon egg takes occurred from May 27th through June 8th, 2021.

Stikine drainage

<u>Tahltan Lake</u>

There were approximately 329,700 brood year 2020 fry delivered to Tahltan Lake on June 7. Fry were held for approximately 24 hours in net pens for observations before being released into the lake. The average size was 0.15g.

Taku drainage

<u>Tatsamenie Lake</u>

There were approximately 1.3 million brood year 2020 fry delivered to Tatsamenie Lake. Approximately 1.04 million fry were released directly into the lake on May 27 and June 6. The average size at release was 0.19g. Approximately 241,900 fry were reared in net pens before being released into the lake on July 3. The average size at release was 1.7g.

<u>Trapper Lake</u>

There were approximately 319,400 brood year 2020 fry delivered and released directly to Trapper Lake. The average size at release was 0.19g.

Egg Take Goals

Enhancement of sockeye salmon is defined the Pacific Salmon Treaty Chapter 1: Transboundary Rivers with further guidance in Appendix to Annex IV, Chapter 1: *Understanding on the Joint Enhancement of Transboundary River Sockeye Stocks*. The intent is to annually produce 100,000 returning sockeye salmon to each river system.

Field projects regarding transboundary rivers can be found in Appendix A. Each project lists the approximate dates of operation; primary objectives; and agency roles and responsibilities. In the event there is a deviation from the elements described in Appendix A, the agency responsible will provide advanced notice, where possible, to the other agency.

The Enhancement Sub-Committee annually develops Enhancement Production Plans for the Sitkine and Taku Rivers. These plans define the activities, expected survival, and expected production for each project within the river system. Additional information in the plan may include broodstock collection limitations, additional rearing strategy information or other information that may affect the project. These plans are reviewed by the Transboundary Technical Committee and approved by the Transboundary Panel during the Annual Pacific Salmon Treaty Meeting. Plans for 2022 can be found in Appendix B.

Implementation of the approved enhancement plans require communication between agencies. This includes communication between the project leaders at the egg-take site and the hatchery, as well as communication between the Co-Chairs of the Enhancement Sub-Committee and/or the designates (co-chairs). Deviations from the plan may be required to meet Treaty guidelines, based on inseason information. The most common guideline examples are using less than 30% available broodstock and not exceeding the 1:1 ratio of enhanced to wild smolt, however sex composition and run timing may have inseason effects, as well. In the event there is a foreseen need for a deviation from the plan, the rationale for the deviation shall be discussed by the co-chairs, who will provide resolution. If the event is unforeseen, the agency responsible will notify the co-chairs when possible. Co-chairs will keep their respective Technical Committee Chairs appraised to inseason developments.

Target sockeye salmon egg takes for the fall of 2022 are as follows:

<u>Tahltan Lake</u>

- 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. The guideline for the last date that eggs will be collected at Tahltan Lake is September 25, to minimize disturbance of natural spawning at the adult collection sites.

<u>Tatsamenie Lake</u>

- Up to 2.5 million eggs total or a maximum of 30% 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.

<u>Little Trapper Lake</u>

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

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 2022 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	*Stikine* *Other*
		U.S. District 111, Inriver Taku	*Taku* *Other*
Transboundary	U.S.	U.S. District 108	*Little Tahltan* *Stikine Other* *Non-Stikine*
		U.S. District 111	*Taku* *Other*
	Canada	Inriver Stikine	*Little Tahltan* *Stikine Other*
		Inriver Taku	*Taku*
Domestic (not PST)	U.S.	U.S. District 108	*Taku* *Stikine* *Andrews* *Southern SEAK* *Other*
		U.S. District 111	*Taku* *Stikine* *Andrews* *Other*
		Inriver Stikine	*Early (Little Tahltan, Tahltan, Christine)*[a] *Late (Verrett, Craig)*[a]
		Inriver Taku	*Early (Nahlin, Dudidontu, Tseta)*[a] *Mid (Nakina)*[a] *Late (Kowatua, Tatsatua)*[a]

[a]Indicates 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	*Stikine* *Other*
		U.S. District 111, Inriver Taku	*Taku* *Other*
Transboundary	U.S.	U.S. District 106, 108	*Tahltan* *Stikine Other* *Non-Stikine*
		U.S. District 111	*Tatsamenie* *Taku Lakes Other* *Taku River-type* *Non-Taku*
	Canada	Inriver Stikine	*Tahltan* *Stikine Other*
		Inriver Taku	*Tatsamenie* *Taku Lakes Other* *Taku River-type*
Domestic (not PST)	U.S.	U.S. District 106, 108	*Tahltan* *Stikine Other* *McDonald* *SEAK* *Other*
		U.S. District 111	*Tatsamenie* *Taku Lakes Other* *Taku River-type* *Speel* *SEAK* *Other*
		Inriver Stikine	*Chutine*[a] *Christina*[a] *Tahltan*[a] *Mainstem*[a] *Iskut*
		Inriver Taku	*Kuthai*[a] *Little Trapper/Trapper*[a] *Tatsamenie*[a] *Tatsatua/Little Tatsamenie*[a] *King Salmon*[a] *Taku River-type*[a]

[a]Indicates a Conservation Unit (CU) under Canada's Wild Salmon Policy.

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APPENDIX A: ANTICIPATED TRANSBOUNDARY PROJECTS, 2022

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 2022.

Project/ Approx. Dates	Function	Agency	Involvement
Stikine Chinook Program			
5/5 – 7/10	• Spaghetti tag all healthy Chinook salmon; 25–30% precision goal for Stikine River large Chinook salmon captured from Kakwan Point drift net site; large Chinook will be tagged with blue spaghetti tags and nonlarge fish will be tagged with yellow spaghetti tags; target for large is 240 large fish healthy released with spaghetti tags, of those fish 200 will be radio tagged.	ADF&G/ DFO/TCG	All aspects
	• Collect GSI samples from all tagged fish separated by week; samples will go to the ADF&G lab, will be cataloged, and then duplicate samples provided to the DFO lab.	ADF&G/ DFO/TCG	All aspects
	• At Kakwan Point, all adipose-clipped male Chinook salmon will be sacrificed; all female Chinook salmon will be checked for the presence or absence of a CWT using a hand wand and then released; all heads from sacrificed fish will be sent to ADF&G lab.	ADF&G/ DFO/TCG	All aspects
6/20 – 8/14	• Fish will be sampled for spaghetti tags, ASL, adipose finclips and CWTs in the Canadian fisheries, inriver above border sockeye (nonlethal) sampling, at the Little Tahltan weir (record only) and from Iskut tributaries (Verrett); fish may also be sampled from other spawning sites (e.g., Shakes, Craig, Tashoots, Little Tahltan, Tahltan, Beatty, Bear, Christina and Chutine); baseline GSI samples will also be collected opportunistically from tributaries and duplicate samples will be provided to the DFO and ADF&G labs.	DFO/TCG/ ADF&G	All aspects
Salmon Telemetry			
?/?–?/?	• Operate 4 towers at various sites to account for fish behavior and inform MR estimates; towers will remain in place until all fish have passed.	ADF&G/	All aspects

Appendix A. 1. (continued)

Project/ Approx. Dates		Function	Agency	Involvement
5/15–08/31	•	Weekly flights to determine radio tag locations within the drainage.	ADF&G/	All aspects
Tahltan Lake Smolt Estimation				
5/4 – 6/30	•	Enumerate Tahltan Lake sockeye salmon smolts and sample up to 800 smolts for age, size, and otoliths.	DFO/TCG	All aspects
Little Tahltan Chinook Salmon Enumeration				
6/22 – 8/15	•	Enumerate Little Tahltan Chinook salmon by size (large/nonlarge) using a video weir located at the mouth of the river.	DFO/TCG	All aspects
	•	Record presence/absence of preferred (left) side secondary marks, spaghetti and radio tags, and adipose fins.	DFO/TCG	All aspects
7/15 – 8/15	•	Postseason record estimated lengths through video counter.	DFO/TCG	All aspects
	•	Spawning ground sampling for ASL and spaghetti/CWT tags. Emphasize the release of prespawn female Chinook salmon with adipose fin clips.	DFO/TCG	All aspects
Upper Stikine Sampling				
6/20 – 8/14	•	Sample up to 81 sockeye salmon per week for matched ASL and otoliths from the TCG and commercial fishery at Telegraph Creek and sample in proportion to the run for a season total of 600 samples.	TCG/DFO	All aspects
	•	Opportunistically sample Chinook salmon marked and unmarked, for ASL, CWTs and spaghetti tags.	TCG/DFO	All aspects
Inriver Sockeye Salmon Run Assessment (nonlethal)				
6/15–8/15	•	Conduct sampling for sockeye salmon at Kakwan Point to assess run size (catch and effort from drift gillnet). Spaghetti tag all sockeye salmon captured and collect ASL and genetic tissues (finclips).	DFO/TCG/ ADF&G	All aspects
6/20 – 8/27		Above border, conduct sampling for sockeye salmon to assess run size (catch and effort from drift gillnet) stock composition, and run timing (samples from set gillnet catch). Inspect all fish for spaghetti tags and secondary marks.	DFO/TCG/ ADF&G	All aspects

Appendix A. 1. (continued)

Project/ Approx. Dates	Function	Agency	Involvement
6/20 – 8/27	• Above border, Chinook salmon caught in the drift gillnet sampling shall be released. In the set gillnet, sample any Chinook salmon for tags/tag loss, CWTs and for ASL; CWT samples to go to DFO lab in Vancouver or the ADF&G lab in Juneau, unless other arrangements are made.	DFO/TCG/ ADF&G	All aspects
	• Sample up to 100 sockeye salmon per week for matched ASL samples; for GSI, sockeye salmon scales will be collected from the above border sampling project.	DFO/TCG/ ADF&G	All aspects
6/15–8/15	• At Kakwan Point, opportunistically sample coho salmon for ASL and genetic tissues, and inspect for adipose clips; send samples to ADF&G genetics lab.	DFO/TCG/ ADF&G	All aspects
6/20 – 8/27	• Above border, sample any coho salmon for CWTs and ASL and inspect for left axillary clips; CWT samples to go to either the DFO lab in Vancouver or the ADF&G lab in Juneau, unless other arrangements are made.	DFO/TCG/ ADF&G	All aspects
Tahltan River Chinook Salmon Assessment Feasibility			
5/15 – 8/14	• Tahltan River sonar site reconnaissance; feasibility of sonar enumeration methodology.	DFO/TCG	All aspects
	• Throughout the duration of the run of large Chinook salmon, evaluate sites for use of sonar in the lower Tahltan River.	DFO/TCG	All aspects
Commercial Inriver Fishery Stock ID Sampling			
Not for 2022	• A Chinook salmon retention prohibition will be in place but 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/TCG	All aspects
	• Chinook salmon nonretention will be in place but 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.

Appendix A. 1. (continued)

Project/ Approx. Dates	Function	Agency	Involvement
7/3–7/16 Subject to inseason assessment	• Randomly sample the commercial harvest of sockeye salmon to include 200/week for matched ASL, otolith, egg-diameter, and GSI, and 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 salmon otolith samples per week; if there is limited commercial effort, potential for sampling in Petersburg/Wrangell.	DFO/TCG /ADF&G	All aspects, Otolith analysis
Not for 2022	• Any targeted sockeye salmon fishery will include sampling of incidentally harvested Chinook salmon 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
8/28 – 9/17	• Sample all adipose clipped coho salmon for CWTs and ASL and inspect for axillary clips; annual commercial fishery sampling target is 500 for ASL, plus observe >50% of the harvest for adipose clips; all CWT samples will go to the DFO lab in Vancouver, unless other arrangements are made.	DFO/TCG	All aspects
Districts 106 and 108 Stock ID Sampling			
6/26 – 7/16	• In D108, sample a minimum of 30% of Chinook salmon harvest for CWTs; sample Chinook salmon for ASL (goal is 600 for the season); the GSI sampling targets for Chinook salmon in D108 commercial fisheries are 120/week for directed fisheries and 80/week for nondirected fisheries; due to a poor forecast for Stikine Chinook, samples are unlikely.	ADF&G	All aspects
6/19 – 8/6	• For ASL, GSI, and otoliths matched samples in drift gillnet fisheries collect 300 sockeye salmon samples/week in D106-41 and 520 sockeye salmon samples/week in D108.	ADF&G	All aspects
6/19 – 10/15	• In D106 and D108, sample a minimum 20% of coho salmon harvests in the drift gillnet fisheries for CWT and sample 600 coho for ASL (goals are 600 per district for the season).	ADF&G	All aspects

Appendix A. 1. (continued)

Project/ Approx. Dates	Function	Agency	Involvement
Chinook Salmon Surveys			
7/24 – 8/20	• Survey Chinook salmon in Andrew Creek and, if the abundance is adequate, sample a minimum 200 Chinook salmon for ASL, spaghetti/radio tags, and CWTs; conduct aerial and foot surveys.	ADF&G	All aspects
7/28 – 8/11	• Conduct aerial surveys on the Little Tahltan, Tahltan, Verrett, Beatty, Tashoots, Christina, Chutine and Bear creeks.	DFO/TCG/ ADF&G	All aspects
Tahltan Lake Salmon Enumeration			
7/7 – 9/15	• Enumerate Tahltan Lake sockeye salmon entering the lake at the weir.	DFO/TCG	All aspects
	• Live sample a minimum of 600 sockeye salmon for ASL and an additional 100 fish per day for sex. Inspect for spaghetti tag and secondary mark.	DFO/TCG	All aspects
	• Endeavour to conduct terminal fishery at Tahltan Lake if escapement targets are likely to be exceeded.	DFO/TCG	All aspects
	• If escapement goal is projected to be achieved, lethally sample up to 400 male sockeye salmon for ASL and otoliths from the weir (400 fish will also be sampled from the broodstock take).	DFO/TCG	All aspects
	• Sample available postspawn Chinook salmon in Johnny Tashoots Creek for ASL, spaghetti tags, and CWTs and collect GSI baseline samples to complete inventory.	DFO/TCG	All aspects
Chinook and Coho Salmon Coded Wire Tagging			
4/15 – 5/31	• Targets are 50k Chinook smolts and 10k coho smolts.	ADF&G/ DFO/TCG	All aspects
	• Sample every 100th Chinook and 115th coho smolt for length (FL) and weight (g).	ADF&G/ DFO/TCG	All aspects
Sport Fishery Chinook Salmon Sampling			
For 2022	• In the Stikine River drainage, Chinook salmon nonretention will be in place; the Talhtan River will be closed for salmon angling.	ADF&G/ DFO/TCG	All aspects

Appendix A. 1. (continued)

Project/ Approx. Dates	Function	Agency	Involvement
6/15 – 7/16	• In City Creek terminal harvest area of D108, the sport fishery in the Petersburg and Wrangell areas will be sampled for CWTs, GSI, and ASL and the target is to sample 30% of the harvest; 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			
9/5 – 9/15, 10/25–11/3	• Enumerate Stikine sockeye and coho salmon spawning abundance within index areas of the Canadian portion of the river.	TCG	All aspects
Coho Stock Assessment Options			
9/8 – 10/5	• Katete River sonar site reconnaissance; feasibility of sonar enumeration methodology.	DFO/TCG	All aspects
8/14 – 10/29	• Mark–recapture feasibility study to determine abundance in the Iskut River.	DFO/TCG	All aspects
10/16–10/29	• GSI baseline development (Katete River, Iskut mainstem, Craig River, Verrett River, Stikine).	DFO/TCG	All aspects

Contacts: Stikine

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Appendix A. 2. Proposed field projects, Taku River, 2022.

Project/ Approx. Dates	Function	Agency	Involvement
Taku Chinook, Sockeye and Coho Salmon Marking Program			
Mid-April	• Set up camp and build fish wheels.	ADF&G TRTFN/ DFO	All aspects
5/1 – 10/1	• Fish wheels will operate at least 15 hours per day in daylight with hourly fish wheel checks (includes extended holding study) to capture all salmon.	ADF&G TRTFN/ DFO	All aspects
4/28 – 6/30	• Drift gillnet operation will have 4 wet net hours per day to capture Chinook salmon.	ADF&G TRTFN/ DFO	All aspects
	• All healthy Chinook salmon will be spaghetti tagged secondary marked; all marked large- and small-sized Chinook salmon will be tagged with blue spaghetti tags and medium-sized fish will be tagged with yellow spaghetti tags; the tagging target for large Chinook salmon is 750 healthy fish released with spaghetti tags; the precision goal is 25–30% for the season; radio tag 200 of the spaghetti tagged large fish (drift gillnet); tissue samples will be collected on all large fish captured using drift gillnets for use in GSI analyses by statistical week; tissues will be provided to DFO ; additional paired samples will be gathered on radio tagged fish and those will go to the ADF&G lab; all captured Chinook salmon will be sampled for ASL; and all adipose-clipped male Chinook salmon will be sacrificed; all female Chinook salmon will be checked for the presence or absence of a CWT using a hand wand and then released; all heads from sacrificed fish will be sent to ADF&G lab.	ADF&G TRTFN/ DFO	All aspects
5/1 – 10/1	• All healthy sockeye salmon (>350mm MEF) captured in the fishwheels will be spaghetti tagged and marked with a left axillary finclip which will be collected for use in GSI analyses; up to 260 fish/week will be sampled for ASL; precision goals are 50% for weekly.	ADF&G TRTFN/ DFO	All aspects

Appendix A. 2. (continued)

Project/ Approx. Dates		Function	Agency	Involvement
5/1 – 10/1	•	Up to 700 healthy fish will be radio tagged and matching tissue and ASL data will be gathered.	ADF&G TRTFN/ DFO	All aspects
	•	All healthy coho salmon (>350mm MEF) captured in the fish wheels and set gillnets operated at Canyon Island will be spaghetti tagged and marked with a left axillary finclip; the ASL target for coho salmon is 600 fish for the season; an additional 200 fish will be radio tagged and all adipose finclipped fish will be sacrificed for CWT analysis and all heads from sacrificed fish will be sent to ADF&G lab.	ADF&G TRTFN/ DFO	All aspects
Salmon Telemetry				
4/23– 10/29	•	Operate 8 towers at various sites to account for fish behavior and inform MR estimates; 4 river and 4 lake sites; towers will remain in place until all fish have passed.	ADF&G/ DFO	All aspects
5/15–10/29	•	Weekly flights to determine radio tag locations within the drainage.	ADF&G/ DFO/ TRTFN	All aspects
Chinook and Coho Salmon Coded Wire Tagging				
4/1 – 5/31	•	The CWT goals are 50,000 Chinook and 30,000 coho salmon smolt; sample every 100th Chinook salmon and 115th coho salmon smolt for length (FL) and weight (g); and sample 300 coho salmon smolt for age (12–15 scales per fish).	ADF&G/ DFO	All aspects
Canadian Aboriginal Fishery Monitoring				
5/1 – 10/1	•	Collect and record FN harvest information.	TRTFN	All aspects
Nahlin Chinook Enumeration				
5/28 – 7/31	•	Enumerate large Chinook salmon using sonar in lower Nahlin River.	DFO	All aspects
Nahlin/Tseta/Dudidontu Sampling				
7/25 – 8/25	•	Sample Chinook salmon in Nahlin River, Tseta Creek, and Dudidontu River 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

Appendix A. 2. (continued)

Project/ Approx. Dates	Function	Agency	Involvement
Nakina Sampling			
7/1 – 8/30	• Extended operation of the 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 the video camera system; and opportunistically obtain GSI samples from Nakina sockeye salmon (target is 200 over the long term).	TRTFN	All aspects
Canadian Commercial Fishery Sampling			
6/28 – 10/15	• Sample Chinook, sockeye, and coho salmon harvest for ASL and secondary marks; 200 per week for sockeye salmon; 520 per season for coho salmon; 50–150 per week for Chinook salmon; examine all Chinook and coho salmon harvest for adipose clips and secondary marks.	DFO	All aspects
	• Collect 192 sockeye salmon otolith samples per week to estimate contribution of enhanced fish; provide samples to ADF&G for processing inseason.	ADF&G/ DFO	All aspects
	• Collect and record all spaghetti tags and radio tags captured in commercial fisheries.	DFO	All aspects
	• Collect salmon roe as required for CWT program.	DFO	All aspects
Canadian Coho Assessment Fishery			
9/11 – 10/15	• 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.	DFO/ TRTFN	All aspects
	• 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

Appendix A. 2. (continued)

Project/ Approx. Dates	Function	Agency	Involvement
District 111 Fishery Sampling			
6/19–10/15	• Collect and record commercial harvest information and all spaghetti and radio tags; sample a minimum of 30% of the Chinook and 20% of the coho salmon harvests for CWTs/ASL; sample commercial Chinook salmon harvest for GSI samples; targets are 120/week for directed and 80/week for nondirected incidental harvest; and collect 320 matched GSI/ASL/otolith samples per week from sockeye salmon with subdistrict specific goals from the commercial harvest.	ADF&G	All aspects
6/1– 8/31	• When open, conduct sport fishery harvest sampling in the Juneau area for CWTs, ASL, and GSI. Target is to sample 30% of Chinook and 20% 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 a combination of the Juneau area catch sampling and GSI programs.	ADF&G	All aspects
Kuthai Sockeye Salmon Enumeration			
7/3 – 9/2	• Using video enumeration methodology, record all sockeye salmon and spaghetti tags observed; if run size permits, sample for ASL and spaghetti tags/tag loss (up to 600 fish).	TRTFN	All aspects
King Salmon Enumeration			
7/4 – 9/3	• Using video enumeration methodology, record all sockeye salmon and spaghetti tags observed; if run size permits, sample for ASL and spaghetti tags/tag loss (up to 600 fish).	TRTFN	All aspects
Chinook Salmon Aerial surveys			
7/21 – 8/25	• Aerial surveys of spawning Chinook salmon in the Nakina, Nahlin, Dudidontu Rivers and Tatsatua, Kowatua, and Tseta Creeks.	ADF&G	All aspects
Nakina Chinook Salmon Fishery Monitoring			
Not for 2022	• Monitor FN and recreational fishery.	TRTFN/ DFO	All aspects
Little Trapper Sockeye Salmon Enumeration			
7/20 – 8/31	• 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/ Approx. Dates	Function	Agency	Involvement
Tatsamenie Sockeye salmon Enumeration			
8/6 – 10/5	• 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 Salmon Sampling			
9/1 – 10/1	• At Tatsamenie Lake sockeye weir and on Tatsatua Creek between Tatsamenie and Tatsatua Lakes opportunistically sample Chinook salmon for ASL, spaghetti tags/tag loss, and CWTs and all CWT samples to go to the DFO lab.	DFO	All aspects
8/15 – 9/15	• On Tatsatua Creek below Tatsatua Lake sample postspawn Chinook salmon for ASL, spaghetti tags/tag loss, and CWTs and all CWT samples will be sent the DFO lab.	DFO/ TRTFN	All aspects
Kowatua Creek Sampling			
9/1 – 10/1	• 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

Appendix A. 2. (continued)

Project/ Approx. Dates		Function	Agency	Involvement
Taku Salmon Baseline Development				
7/15 – 11/15	•	Targeted sampling of coho salmon in the Hackett, Dudidontu, Nahlin, Kowatua, Tatsatua, King Salmon, Tulsequah Rivers and lower river mainstem from the intertidal zone to the King Salmon River including Flannigan Slough. Opportunistically sample Nahlin River Chinook salmon and Nakina River and Little Trapper Lake sockeye salmon.	DFO/ TRTFN/ ADF&G	All aspects

Contacts: Taku

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Appendix A. 3. Proposed field projects, Alsek River, 2022.

Project/ Approx. Dates	Function	Agency	Involvement
Alsek Chinook and Sockeye Marking Program			
Mid-May	• Set up camp and build tent platforms.	ADF&G	All aspects
5/20 – 8/10	• Set gillnet operation will include use of 2 nets, each fished daily for 6 wet net hours to capture Chinook and sockeye salmon.	ADF&G	All aspects
	• All healthy Chinook salmon captured will be spaghetti tagged and marked with a left axillary finclip which will be collected for use in GSI analyses; all marked large fish will be tagged with blue spaghetti tags and nonlarge fish will be tagged with yellow spaghetti tags. Tissue samples will be collected on all fish captured for use in GSI analyses by statistical week; duplicate tissues will be provided to ADF&G/DFO labs. All captured fish will be sampled for ASL and matched with tag and genetic information; and all adipose finclipped Chinook salmon will be sacrificed and their heads will be sent to ADF&G lab.	ADF&G	All aspects
	• All healthy sockeye salmon (>350mm MEF) captured will be tagged with fluorescent orange spaghetti tags and marked with a left axillary finclip which will be collected for use in GSI analyses. Fish will be sampled for ASL and matched with tag and genetic information.	ADF&G	All aspects
Ongoing	• Permit acquisition and tower site selection in preparation for radiotelemetry in 2023.	ADF&G/ DFO/ CAFN	All aspects
8/15 – 10/15	• Collect recreational fishery catch and harvest data, sample available harvest for ASL.	DFO/ CAFN	All aspects
	• Estimate Alsek River FN fishery harvest, sample harvest for ASL opportunistically.	DFO/ CAFN	All aspects
Klukshu River Sampling			
6/13 – 10/14	• Enumerate Chinook, sockeye and coho salmon with a video enumeration program; inspecting all Chinook and sockeye salmon for spaghetti tags and marks.	DFO/ CAFN	All aspects

Appendix A. 3. (continued)

Project/ Approx. Dates		Function	Agency	Involvement
Postseason	•	Estimate recreational and FN fishery harvest.	DFO/ CAFN	All aspects
	•	Opportunistically collect ASL information from sockeye salmon harvested by FN (up to 600 scale samples).	DFO/ CAFN	All aspects
6/13 – 10/14	•	Opportunistically sample 200 Chinook salmon from the FN harvest for ASL (MEF), and CWTs.	DFO/ CAFN	All aspects
	•	Sample various spawning grounds for Chinook and sockeye salmon within the drainage for ASL, genetic tissues, spaghetti tags and marks. Opportunistically sample coho salmon.	DFO/ CAFN	All aspects
Blanchard and Takhanne Rivers Chinook salmon monitoring				
6/15 – 8/31	•	Pilot project to enumerate Chinook salmon in the Blanchard River using sonar; continuation of the Takhanne River snorkel surveys to enumerate Chinook salmon.	DFO/ CAFN	All aspects
Village Creek Sockeye Enumeration				
6/15 – 9/30	•	Enumerate salmon (Nesketahin Lake sockeye salmon focus) using video methodology at Village Creek.	DFO	All aspects
Lower Alsek River Sampling				
6/5 – 8/13	•	Collect ASL and GSI samples on 800 sockeye salmon and all Chinook salmon from the Dry Bay commercial fishery. Duplicate tissues will be provided to ADF&G/DFO labs.	ADF&G	All aspects

Contacts: Alsek

Aaron Foos	(DFO)	DFO Stock Assessment
Sean Stark	(DFO)	DFO Stock Assessment
Bill Waugh	(DFO)	All DFO programs
Danielle Hosick	(DFO)	DFO Stock Assessment
Melina Hougen	(CAFN)	CAFN projects
Tom Buzzell	(CAFN)	CAFN projects
Rick Hoffman	(ADF&G)	ADF&G Dry Bay management/Alsek research
Vacant	(ADF&G)	ADF&G Alsek research
Phil Richards	(ADF&G)	ADF&G Southeast research
Sara Gilk-Baumer	(ADF&G)	ADF&G Southeast/TBR genetics
Kyle Shedd	(ADF&G)	ADF&G TBR genetics
Chase Jalbert	(ADF&G)	ADF&G NBTC genetics
Ed Jones	(ADF&G)	ADF&G Southeast/TBR Chinook/sockeye/coho assessment

Canadian staff associated with Alsek projects that may be crossing the Canadian/U.S. border:
Aaron Foos, Sean Stark, Bill Waugh, Danielle Hosick, Melina Hougen, Mark McFarland, Melanie Collette, Adam Brennan, Byron Cousins, Devan Bruce, Rebecca Laforge, and Tom Buzzell

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Rick Hoffman, Phil Richards, Joe Simonowicz, Nathan Frost, James Bryant, Julie Bednarski, Cobin Lind, Kenny Matson, Kris Larson, Danny Green, Brian Elliott, Steve Heinl, Andy Piston, Kyle Shedd, Chase Jalbert, Sara Gilk-Baumer, Troy Thynes, Lowell Fair and Ed Jones.

Appendix A. 4. Proposed enhancement projects for Transboundary Stikine and Taku rivers, 2022.

Project/Dates	Function	Agency	Involvement
All Projects, Egg Collection and Transport, Fry Releases			
2/1 – 5/15	• Acquire Canadian permitting regarding egg and fry transport	DFO	All aspects
Tahltan Lake Enhancement Project			
5/5 – 6/20	• Enumeration and sampling of smolts from Tahltan Lake (Stikine River, in Canada) and collection of otolith samples to determine planted contribution.	DFO /TCGFN	All aspects
5/15 – 6/30	• Backplant sockeye salmon fry from Snettisham Hatchery into Tahltan Lake.	DIPAC/ ADF&G	All aspects
6/1 – 8/30	• Limnological samples from Tahltan Lake monthly.	DFO/TCGFN	All Aspects
8/24 – 10/05	• Collect up to 5.0 million sockeye salmon eggs from Tahltan Lake and transport to Snettisham Hatchery in Alaska. (Dates are subject to onsite conditions). • Sample 200 male and 200 female adult sockeye salmon from Tahltan Lake broodstock for otolith samples.	DFO/ TCGFN	Egg-take and transport
King Salmon Lake Enhancement			
8/10 – 9/30	• • No eggs will be collected in 2022.	DFO/ TRTFN	All aspects
8/24 – 10/05	• Sample 200 male and 200 female adult sockeye salmon from King Salmon Lake broodstock for otolith samples.	DFO/ TCGFN	All aspects
Tatsamenie Lake Enhancement Project			
5/10 – 8/30	• Sample smolt outmigration from Tatsamenie (Taku River, in Canada) and conduct mark–recapture program on smolt from Tatsamenie Lake, submit samples to DFO for otolith analysis.	DFO/ Melta Environmental	All aspects
5/24 – 5/30	• Back-plant sockeye fry from Snettisham Hatchery into Tatsamenie Lake.	DFO/DIPAC/ ADF&G	All aspects
5/25 – 6/21	• Extended rearing - net pen rearing of ~ 225,000 sockeye salmon fry. Expected growth from 0.5 g to 1.7 grams.	DFO/DIPAC/ Metla Environmental	All Aspects

Appendix A. 4. (continued)

Project	Function	Agency	Involvement
Tatsamenie Lake Enhancement Project (continued)			
8/15 – 10/30	• Collect up to 30% available broodstock (up to 2.5 million sockeye salmon eggs) from Tatsamenie Lake and transport to Snettisham Hatchery in Alaska.	DFO/DIPAC/Metla Environmental	Egg-take and transport
9/25 – 10/05	• Sample 200 male and 200 female adult sockeye salmon from Tatsamenie Lake broodstock for otolith samples.	DFO/Metla Environmental	All aspects
Trapper Lake Enhancement			
6/1 – 9/30	• Collect 1.0 million sockeye salmon eggs for broodstock needs.	DFO/Metla Environmental	All aspects
9/25 – 10/05	• Sample 200 male and 200 female adult sockeye salmon from Trapper Lake broodstock for otolith samples.	DFO/Metla Environmental	All aspects
Salmon Egg Incubation			
9/1 – 6/15	• Incubation and thermal marking of juvenile sockeye salmon (eggs & alevins) collected from transboundary lakes at the Snettisham Incubation Facility in Alaska.	DIPAC/ ADF&G	All aspects

Contacts: Enhancement Projects

Corino Salomi	(DFO)	All DFO projects.
Sean Collins	(DFO)	All DFO projects.
Alex Parker/Adam Brennon	(DFO)	All DFO Projects
Melanie Collette/Jason Calvert	(DFO)	All DFO Projects
Flip Pryor	(ADF&G)	All ADF&G Projects
Mark Connor	(TRTFN)	All TRTFN Projects
Cheri Frocklage	(TCGFD)	All TCGFN Projects
Katie Harms	(DIPAC)	All DIPAC Projects
Brian Mercer	(Metla)	All Metla Projects

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, Katie Harms, Eric Prestegard, Garold V. Pryor, and Joshua Russell; flight crew from Ward Air airline.

Appendix A. 5. Catalog of genetic tissue collections and baseline collection priorities. Baseline collections in 2022 are opportunistic with no identified funding. All genetic tissues should be sampled in duplicate with tissues sent to both ADF&G and DFO genetics labs.

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
	Italio	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: signed copies of SEPP and TEPP pasted into document

2022 Stikine Enhancement Production Plan (SEPP) – Stikine River Sockeye Salmon			
Enhancement Project	**Activities[1]**	**Expected Production**	**Egg to Adult Survival[2]**
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[3].	65,000 adults resulting from direct release in Tahltan Lake.	Direct Release: 1.3%
		Expected Total Production[4] **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 1.28%.
[3] Actual eggs taken will be based on escapement data into Tahltan Lake and matching enhanced smolt production to expected wild smolt production.
[4] Prior year SEPPs were developed to comply with the Chapter 1, paragraph 3(a)(i)(C)(i). 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)(i)(C)(i) because: Canada is withdrawing Tuya Lake for stocking; 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

February 16, 2022
Date

U.S., Transboundary Panel Co-Chair

2/16/22
Date

2022 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 30% of available adult brood stock (up to 2.5 million eggs). Outplant: Progeny (fry) from 500,000 eggs will be held for in-lake "extended rearing" and fry from the remaining 2 million eggs will be for "direct release" into the lake[3].	8,000 adults from direct release 3,500 adults from extended rearing	Direct Release: 0.4%[2] Extended Rearing: 0.7%[2]
Trapper Lake	Egg Take: target of 1,000,000 eggs from Little Trapper Lake (pending broodstock availability). Outplant: All fry to be "direct release" into Trapper Lake. Future program continuation/ expansion contingent on adult sockeye salmon passage remediation.	1,000 adults	Direct Release: 0.1%[4]
		Expected Total Production 12,500	

[1] All hatchery production will be thermal marked.
[2] Adult production estimates based on extended rearing program results from brood years 2008 through 2014. Green egg to fry survival is 74%. Fry to adult survival is 1.0% extended rearing and 0.53% direct release.
[3] Adjustments to fry release strategy may be made if fry production results are lower than targeted.
[4] Adult production estimates based on results from brood years 1990 through 1994 and 2006 through 2007. Green egg to fry survival is low at 58%. Fry to adult survival is 0.2%.

Canada, Transboundary Panel Co-Chair — Date: February 16, 2022

U.S., Transboundary Panel Co-Chair — Date: 2/16/22

APPENDIX C: GENETIC STOCK IDENTIFICATION METHODS, 2022

Appendix C.1. Genetic stock identification methods for Chinook salmon stocks in the Transboundary rivers, 2022.

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.

<u>Fishery Sampling</u>

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 finclip, 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) Chinook salmon 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.

<u>Laboratory Analysis</u>

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 NucleoSpin® 96 Tissue Kits by Macherey-Nagel (Düren, Germany). 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, $MgCl_2$ 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 will be imported and archived in the Gene Conservation Lab Oracle database, LOKI.

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 each 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. 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.

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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. District 108 and 111 fisheries. 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		King Salmon River	143	1989, 1990, 1993
11	Taku	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		Tatsatua Creek	171	1989, 1990
18	Andrew	Andrew Creek	131	1989, 2004
19		Andrew Creek–Crystal Hatchery	207	2005
20		Andrew Creek–Macaulay Hatchery	135	2005
21		Andrew Creek–Medvejie Hatchery	177	2005
22	Stikine	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		Verrett River	482	2000, 2002, 2003, 2007
29	S. Southeast Alaska	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 Stilliguamish 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 2022 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".

	Sample	No. samples 2020		Collection Years		Collection
Location/Pop	Goal	U.S.	Can.	U.S.	Canada	Priority
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 U.S.	No. samples 2020 Can.	Collection Years U.S.	Collection Years Canada	Collection Priority
Johnny Tashoots	200	76	116	2008 2009	2001 2004 2005 2008 2009 2019	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 U.S.	No. samples 2020 Can.	Collection Years U.S.	Collection Years Canada	Collection Priority
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 2013	2007 2008 2009 2010 2011 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	Tlupana	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	Kitseguecla_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, 2022.

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 NucleoSpin® 96 Tissue Kits by Macherey-Nagel (Düren, Germany). 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™ Cycler using a Fast-PCR protocol as follows: a "Thermal-Mix" step of 70ºC for 30 min and 25ºC for 10 min, an initial "Hot-Start" denaturation of 95ºC for 2 min followed by 40 cycles of denaturation at 95ºC for 2 sec and annealing at 60ºC for 20 sec, with a final "Cool-Down" at 25ºC 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 fail 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

Genotypes will be compared to a genetic baseline of sockeye salmon that currently includes 241 populations representing all major sockeye salmon-producing systems in SEAK and British Columbia (north of and including the Skeena River) and from representative sockeye salmon producing systems south of the Skeena River, including the Fraser River and stocks in the pacific northwest of the U.S. (Rogers Olive et al. 2018). (Table C.2.1). This baseline was analyzed at a total of 96 markers (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 include: 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 will be reported for 4 reporting groups for Stikine River area fisheries (Stikine/Taku Mainstem, Tahltan Wild, Enhanced Tahltan, 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 and Enhanced Tahltan. For Taku River area fisheries, results will be reported for 8 reporting groups (Taku/Stikine Mainstem, Taku Lakes, Tatsamenie Wild, Speel Wild, Enhanced Tatsamenie, Enhanced Snettisham, Enhanced Stikine, and Other). 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 and Taku/Stikine Mainstem reporting groups 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.
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.

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Appendix Table C.2.1. Sockeye salmon genetic baseline by reporting groups for 241 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.

	Stikine Reporting Groups	***Taku Reporting Groups***	Region	Location	N	Year(s) Collected
1	***Non-Stikine***	***Other***	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	Eyak Lake - Middle Arm	95	2007
7				Eyak Lake - South beaches	87	2007
8				Eyak Lake - Hatchery Creek	95	2010
9				Mendeltna Creek	188	2008, 2009
10				Swede Lake	95	2008
11				Fish Creek – E Fk Gulkana River	95	2008
12				Gulkana River - East Fork	75	2008
13				Paxson Lake - outlet	75	2009
14				Mentasta Lake	95	2008
15				Tanada Creek weir	94	2005
16				Tanada Lake - lower outlet	95	2009
17				Tanada Lake - shore	93	2009
18				Klutina River - mainstem	95	2008
19				Klutina Lake - inlet	95	2008, 2009
20				Bear Hole - tributary Klutina	94	2008
21				Banana Lake - Klutina	80	2008
22				St. Anne Creek	186	2005, 2008
23				Mahlo River	94	2008
24				Tonsina Lake	94	2009
25				Long Lake weir	95	2008
26				Tebay - Outlet/Mouth	93	2008
27				Steamboat Lake - Bremner	95	2008
28				Salmon Creek - Bremner	93	2008
29				Clear Creek at 40 Mile	86	2007
30				McKinley Lake	95	2007
31				McKinley Lake	95	2008
32				McKinley Lake	95	1991
33				McKinley Lake - Salmon Creek	93	2007
34				Martin Lake	187	2007, 2008
35				Martin River Slough	95	2008
36				Tokun Lake	189	2008, 2009
37				Bering Lake	95	1991
38				Kushtaka Lake	189	2007, 2008
39			Yakutat	Situk Lake	159	2007
40				Situk Lake	190	2013
41				Old Situk	163	2007
42				Lost/Tahwah Rivers	139	2003
43				Ahrnklin River	90	2007
44				Dangerous River	95	2009
45				Akwe River	186	2009, 2016
46				East Alsek River	94	2003
47			Alsek	Datlasaka Creek	95	2012
48				Goat Creek	56	2007, 2012
49				Border Slough	71	2007, 2008
50				Border Slough	70	2009, 2011
51				Tweedsmuir	48	2007
52				Tweedsmuir	46	2009
53				Vern Ritchie	114	2009, 2010
54				Neskataheen Lake	195	2007
55				Klukshu River Weir late	95	2006
56				Klukshu River	94	2007
57				Kudwat Creek (Tatshenshini)	100	2009 - 2011
58				Kudwat - Bridge/Silver	105	2011, 2012

Appendix Table C.2.1. Continued

	Stikine Reporting Groups	Taku Reporting Groups	Region	Location	N	Year(s) Collected
59				Kudwat - Stinky Creek	40	2011
60				Kudwat (Upper Tatshenshini)	95	2003
61				Kudwat (Little Tatshenshini Lake)	65	2001, 2003
62				Kudwat (Tatshenshini) - Kwatini	65	2011
63				Alsek - Blanchard River	89	2007
64				Alsek - Blanchard River	62	2009
65				Italio River	41	2017
66				Sockeye Creek	136	2017, 2018
67				Tawah Creek	94	2017
68			N. Southeast	NI - Chilkat Mainstem - Bear Flats	95	2007
69				NI - Chilkat River - Mule Meadows	190	2003, 2007
70				NI - Chilkat Mainstem - Mosquito	95	2007
71				NI - Chilkat Lake early run	190	2007
72				NI - Chilkat Lake	189	2013
73				NI - Chilkoot River	159	2003
74				NI - Chilkoot Lake - Bear Creek	233	2007
75				NI - Chilkoot Lake - beaches	251	2007
76				Vivid Lake	48	1993
77				Seclusion Lake - in lake	117	2014
78				North Berg Bay inlet	53	1991
79				North Berg Bay inlet	100	1992
80				Bartlett River - Creel survey	69	2013
81				NI - Neva Lake weir	94	2008
82				NI - Neva Lake weir	255	2009, 2013
83				Hoktaheen - upper lake main inlet	47	2004
84				Hoktaheen - upper lake outlet	49	2004
85				Hoktaheen - marine waters	47	2014
86				NO - Klag Bay Stream outlet	200	2009
87				NO - Ford Arm Lake weir	207	2004
88				Ford Arm Creek	199	2013
89				Redoubt Lake - outlet	200	2013
90				NO - Salmon Lake weir	185	2007, 2008
91				Necker Bay	95	1991, 1993
92				Falls Lake - East Baranof Island	190	2003, 2010
93				NO - Redfish Lake Beaches	94	1993
94				NI - Kutlaku Lake	95	2003
95				NI - Kutlaku Lake	78	2012
96				NI - Kutlaku Lake	50	2013
97				Lace River	63	2013
98				Berners River	165	2003, 2013
99				Antler-Gilkey River	53	2013
100				NI - Windfall Lake	142	2003, 2007
101				NI - Steep Creek	91	2003
102				Lake Creek	318	2013, 2014
103				NI - Crescent Lake	194	2003
104		***Speel Wild***		NI - Speel Lake	95	2003
105				NI - Snettisham Hatchery - Speel	146	2013
106				NI - Snettisham Hatchery	190	2006, 2007
107		***Other***		Pavlof River	174	2012, 2013
108				Kook Lake - late	194	2007, 2010, 2012
109				Kook Lake	148	2012, 2013
110				Sitkoh Lake	351	2003, 2011, 2012
111				Lake Eva	115	2012
112				Hasselborg Lake	209	2012, 2013
113				NI - Kanalku Creek	319	2007, 2010, 2013
114		***Taku Lakes***	Taku	Kuthai Lake	171	2006
115				King Salmon Lake	214	2010, 2011
116				Little Trapper	237	1990, 2006
117				Tatsatua Lake (Little Tatsamenie)	153	2011, 2012
118		***Tats. Wild***		Tatsamenie Lake	288	2005, 2006
119	***Stikine/Taku***	***Stikine/Taku***		Hackett River	52	2008
120	***Mainstem***	***Mainstem***		Nahlin River	341	2003-2007, 2012

Appendix Table C.2.1. Continued

	Stikine Reporting Groups	*Taku Reporting Groups*	Region	Location	N	Year(s) Collected
121				Taku Mainstem - Taku River	95	2007
122				Taku Mainstem - Takwahoni/Sinwa	67	2009
123				Taku - Sustahine Slough	185	2008, 2009
124				Taku - Tuskwa Creek	356	2008, 2009
125				Taku - Yellow Bluff	81	2008, 2010, 2011
126				Taku - Tulsequah River	156	2007-2009
127				Taku - Fish Creek	159	2009, 2010
128				Taku - Yehring Creek	171	2007, 2009
129	***Tahltan Wild***	***Other***	Stikine	Stikine - Little Tahltan	95	1990
130				Stikine - Tahltan Lake	196	2006
131	***Stikine/Taku***	***Stikine/Taku***		Stikine - Chutine River	94	2008
132	***Mainstem***	***Mainstem***		Stikine - Chutine Lake	224	2009, 2011
133				Stikine - Andy Smith Slough	54	2007-2009
134				Stikine - Porcupine River	74	2007, 2011
135				Stikine - Devil's Elbow	148	2007, 2008
136				Stikine - Devil's Elbow	53	2009
137				Stikine - Scud River	191	2007-2009
138				Stikine - Iskut River	153	1985, 1986, 2002, 2006, 2008-9
139				Stikine - Iskut River (Craigson)	42	2007
140				Stikine - Craig River	38	2006-2008
141				Stikine - Bronson Slough	78	2008, 2009
142				Stikine - Shakes Slough Creek	67	2006, 2007, 2009
143				Stikine - Christina Lake	70	2011, 2012
144	***Non-Stikine***	***Other***	S. Southeast	SI - Petersburg Lake	95	2004
145				SI - Kah Sheets Lake	96	2003
146				SI - Mill Creek Weir E - Virginia L	94	2007
147				SI - Mill Creek Weir L - Virginia L	95	2007
148				SI - Kunk Lake - Etolin Island syst	96	2003
149				SI - Thoms Lake	93	2004, 2014
150				SI - Red Bay Lake	95	2004
151				SI - Salmon Bay Lake	170	2004, 2007
152				SO - Shipley Lake	94	2003
153				SO - Sarkar - Five Finger Creek	91	2000, 2005
154				SI - Hatchery Creek - Sweetwater	142	2003, 2007
155				SI - Luck Lake - P.O.W. Island	94	2004
156				Big Lake - Ratz Harbor Creek	161	2010, 2014
157				SI - McDonald Lake - Hatchery Ck	368	2001, ‘03, ‘07, 2013
158				McGilvery Creek	472	1992, 2003, ‘04, ‘16
159				SI - Unuk River - Gene's Lake	95	2007
160				SI - Unuk River - Gene's Lake	69	2008
161				SI - Helm Lake	94	2005
162				SI - Heckman Lake	189	2004, 2007
163				SI - Mahoney Creek	153	2003, 2007
164				SI - Kegan Lake	95	2004
165				SO - Fillmore Lake - Hoffman Crk	52	2005
166				SO - Klawock-Three Mile Creek	181	2004, 2010
167				SO - Inlet Creek - Klawock	212	2003, 2008
168				SO - Hetta Creek - late run	281	2003, 2008, 2009
169				SO - Hetta Creek - middle run	95	2009
170				SO - Hetta Creek - early run	95	2010
171				SO - Eek Creek	50	2004, 2007
172				SO - Klakas Lake	95	2004
173				SO - Bar Creek - Essowah Lake	95	2004
174				Hugh Smith Lake	155	1992, 2013
179				SI - Hugh Smith Lake - Bushmann	150	2004
180				Hugh Smith - Cobb Creek	99	2007
175			Nass	Nass - Kwinageese	76	2001, 2012
176				Nass - Bowser Lake	94	2001

Appendix Table C.2.1. Continued

	Stikine Reporting Groups	***Taku Reporting Groups***	Region	Location	N	Year(s) Collected
177			Nass	Nass - Kwinageese	76	2001, 2012
178				Nass - Bowser Lake	94	2001
179				Nass - Bonney Creek	164	2001, 2012
180				Nass - Damdochax Creek	93	2001
181				Nass - Meziadin Beach	186	2001, 2006
182				Nass - Hanna Creek	93	2006
183				Nass - Tintina Creek	94	2006
184				Nass - Gingit Creek	94	1997
185			Skeena	Skeena - Alastair Lake	118	1987, 2006
186				Skeena - Lakelse Lake (Williams)	93	2006
187				Skeena - Sustut River	79	2001
188				Skeena - Salix Bear	94	1987, 1988
189				Skeena - Motase Lake	47	1987
190				Skeena - Slamgeesh River	95	2006
191				Skeena - Upper Babine River	95	2006
192				Skeena - Four Mile Creek	85	2006
193				Skeena - Pinkut Creek	187	1994, 2006
194				Skeena - Grizzly Creek	76	1987
195				Skeena - Pierre Creek	95	2006
196				Skeena - Fulton River	95	2006
197				Skeena - Morrison	92	2007
198				Skeena - Lower Tahlo River	78	1994
199				Skeena - Tahlo Creek	95	2007
200				Skeena - McDonell Lk (Zymoetz)	131	2002, 2006
201				Skeena - Kitsumkalum Lake	56	2006
202				Skeena - Kitsumkalum Lake	94	2012
203				Kitwanga River	92	2012
204				Skeena - Stephens Creek	95	2001
205				Skeena - Nangeese River	40	2006
206				Skeena - Kispiox River	53	2002
207				Skeena - Swan Lake	93	2006
208				Skeena - Nanika River	113	1988, 2007
209			Fraser	Fraser - Trembleur - Kynock	94	1997
210				Fraser - Tachie River	94	2001
211				Fraser - Stellako River	94	2007
212				Fraser - Fraser Lake	85	1996
213				Fraser - Lower Horsefly River	274	2001, 2007
214				Fraser - Nahatlatch River	92	2002
215				Fraser - Cultus Lake	91	2002
216				Fraser - Chilliwack Lake	89	2004
217				Fraser - Chilko Lake	87	2001
218				Fraser - Raft River	84	2001
219				Fraser - Adams R - Shuswap late	187	2002, 2007
220				Fraser - Middle Shuswap River	91	2002
221				Fraser - Scotch River	91	2000
222				Fraser - Gates Creek	90	2009
223				Fraser - Birkenhead	90	2007
224				Fraser - Weaver Creek	88	2001
225				Fraser - Harrison River	95	2007
226				Fraser - North Thompson	95	2005
227			BC/Washington	QCI - Naden River	95	1995
228				QCI - Yakoun Lake	70	1993
229				Kitimat River	93	2010
230				Bloomfield Lake	93	2005
231				Tankeeah River	47	2003
232				Tankeeah River	47	2005
233				Central Coast - Amback Creek	91	2004
234				Central - Kitlope Lake	95	2006
235				Great Central Lake	95	2002
236				Vancouver Island - Quatse River	95	2003

Appendix Table C.2.1. Continued

	Stikine Reporting Groups	Taku Reporting Groups	Region	Location	N	Year(s) Collected
237				Mitchell River	94	2001
238				Columbia River - Okanagan River	95	2002
239				Lake Pleasant - Soleduck River	76	1997
240				Issaquah Creek - Puget Sound	82	1996
241				Lake Wenatchee	95	1998
242		***Enh. Snettish.***	N. Southeast	Speel Arm Enhanced	NA	NA
243		***Other***		Sweetheart Enhanced	NA	NA
244			S. Southeast	Burnett Enhanced	NA	NA
245				McDonald Enhanced	NA	NA
246		***Enh. Tats.***	Taku	Tatsamenie Enhanced	NA	NA
247	***Enh. Tahltan***	***Enh. Stikine***	Stikine	Tahltan 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]
One_ACBP-79	A	*One_srp09-127*	C
One_agt-132	B	*One_ssrd-135*	C
One_aldB-152	C	*One_STC-410*	A
One_apoe-83	B	*One_STR07*	A
One_CD9-269	B	*One_SUMO1-6*	C
One_cetn1-167	B	*One_sys1-230*	C
One_CFP1	D	*One_taf12-248*	C
One_cin-177	C	*One_Tf_ex11-750*	A
One_CO1[2]	A	*One_Tf_in3-182*	A
One_ctgf-301	A	*One_tshB-92*	C
One_Cytb_17[2]	A	*One_txnip-401*	C
One_Cytb_26[2]	A	*One_U1003-75*	B
One_E2-65	A	*One_U1004-183*	B
One_gdh-212	C	*One_U1009-91*	B
One_GHII-2165	A	*One_U1010-81*	B
One_ghsR-66	C	*One_U1012-68*	B
One_GPDH-20	A	*One_U1013-108*	B
One_GPH-414	A	*One_U1014-74*	B
One_HGFA-49	A	*One_U1016-115*	B
One_HpaI-71	A	*One_U1024-197*	B
One_HpaI-99	A	*One_U1101*	B
One_hsc71-220	A	*One_U1103*	B
One_Hsp47	D	*One_U1105*	B
One_IL8r-362	A	*One_U1201-492*	B
One_KCT1-453	B	*One_U1202-1052*	B
One_KPNA-422	A	*One_U1203-175*	B
One_LEI-87	A	*One_U1204-53*	B
One_lpp1-44	B	*One_U1205-57*	B
One_metA-253	C	*One_U1206-108*	B
One_MHC2_190	A	*One_U1208-67*	B
One_Mkpro-129	C	*One_U1209-111*	B
One_ODC1-196	B	*One_U1210-173*	B
One_Ots208-234	C	*One_U1212-106*	B
One_Ots213-181	A	*One_U1214-107*	B
One_p53-534	A	*One_U1216-230*	B
One_pax7-248	C	*One_U301-92*	A
One_PIP	D	*One_U401-224*	A
One_Prl2	A	*One_U404-229*	A
One_rab1a-76	B	*One_U502-167*	A
One_RAG1-103	A	*One_U503-170*	A
One_RAG3-93	A	*One_U504-141*	A
One_redd1-414	C	*One_vamp5-255*	C
One_RFC2-102	A	*One_vatf-214*	C
One_RFC2-285	A	*One_VIM-569*	A
One_rpo2j-261	C	*One_ZNF-61*	A
One_sast-211	C	*One_Zp3b-49*	A
One_spf30-207	C	*One_CO1_Cytb17_26*[2]	

[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 2022 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 U.S.	No. samples 2020 Can.	Collection Years U.S.	Collection Years Canada	Collection Priority
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						

Location/Pop	Sample Goal	No. samples 2020 U.S.	No. samples 2020 Can.	Collection Years U.S.	Collection Years Canada	Collection Priority
Lake spawners	400	215	130	1984 2010 2011 2012	1984 2010 2011 2012	H
Inlet spawners	200					M
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	

Location/Pop	Sample Goal	No. samples 2020 U.S.	No. samples 2020 Can.	Collection Years U.S.	Collection Years Canada	Collection Priority
Dudidontu	200	7		2011		
Tseta	200					
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	

Location/Pop	Sample Goal	No. samples 2020 U.S.	No. samples 2020 Can.	Collection Years U.S.	Collection Years Canada	Collection Priority
Stanley Ck	200		31		2001 2002 2003	
Goat Ck	200	71	79	2007 2011 2012 2017	2007 2012 2017	M
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 Table 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	Canoona	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	Uknown_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	Owikeno	97	Inziana	1997 2000 2001 2002	397
18	Owikeno	98	Washwash	1997 2000 2001 2002	366
18	Owikeno	132	Ashlulm	2000 2001 2002 2004 2007	234
18	Owikeno	133	Dallery	2000 2001 2002	161
18	Owikeno	134	Genesee	2000 2001 2002 2004 2007	190
18	Owikeno	135	Neechanz	2000 2001 2002 2004	328
18	Owikeno	136	Amback	2000 2001 2002 2004	411
18	Owikeno	137	Sheemahant	2000 2001 2002 2004	282
18	Owikeno	251	Marble_Cr	2001 2002	121
18	Owikeno	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