Regional Operational Plan No. CF.1J.2021.04

Operational Plan: Stikine River Sockeye Salmon Stock Assessment, 2021

by

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May 2021

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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SIGNATURE/TITLE PAGE

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Approval

Title	Name	Signature	Date
Project leader	Julie Bednarski		4/13/2021
Biometrician	Sara Miller		4/13/2021
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PURPOSE

The 2021 forecast of Stikine River sockeye salmon, *Oncorhynchus nerka*, run abundance is poor and we anticipate very little harvesting opportunity for either U.S. or Canadian fisheries. Since 1994, we have almost exclusively relied on the Canadian lower river commercial fishery to provide the migratory timing information that is used to complete the mixed stock run reconstruction for Stikine River sockeye salmon. It is highly likely there will be no fishing opportunity in 2021 to gather this pertinent information. To obtain stock composition data necessary to estimate the inriver abundance, we are initiating a sockeye salmon stock assessment program at Kakwan Point. The project will be conducted in conjunction with the existing Stikine River Chinook salmon, *O. tshwaytscha*, 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 stock that is monitored via weir. We will also gather daily catch per unit effort (CPUE) information and estimate the age, sex and length (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.

OBJECTIVES

PRIMARY OBJECTIVES

1. Estimate the inriver abundance of adult Stikine River sockeye salmon using genetic mark–recapture expansion of the Tahltan stock such that estimates are within 5% of the true population size 95% of the time. Adult sockeye salmon in the Stikine River are defined as salmon ≥ 350 mm measured from mid eye to fork (MEF).
2. Estimate the age, length (MEF), and sex composition of sockeye salmon caught in the Kakwan Point drift gillnet stock assessment program by statistical week.
3. Estimate the seasonal age, length, and sex composition of sockeye salmon caught in the Kakwan Point drift gillnet assessment program such that estimates are within 5% of the true proportion 95% of the time.

SECONDARY OBJECTIVES

1. Collect CPUE data from the Kakwan Point assessment program to develop a relationship with inriver abundance.

BACKGROUND

Salmon runs to the transboundary Stikine River are managed through provisions of Chapter 1 of the U.S.-Canada Pacific Salmon Treaty with stock assessment programs jointly operated by the Alaska Department of Fish and Game (ADF&G), Fisheries and Oceans Canada (DFO), and Tahltan Central Government (TTC 2020). Since 1994, we have almost exclusively relied on the Canadian lower river commercial fishery to provide migratory timing information used to complete the mixed stock run reconstruction for Stikine River sockeye salmon (TTC 2019; TTC 2020). The 2021 preseason forecast of Stikine River sockeye salmon run abundance is poor (Table 1) and we anticipate very little commercial harvest opportunity for either U.S. or Canadian

fisheries in the 2021 fishery season. Lack of a Canadian inriver commercial fishery will result in loss of stock assessment information historically used to estimate inriver abundance.

Additional inriver stock assessment projects have been conducted in the Stikine River at various times, including at least nine years of test fishing at Kakwan Point from 1979 to 1985 (Lynch et al. 1987) and inriver mark–recapture studies from 2000 to 2005[1]. Also, Canada has conducted a lethal test/assessment fishery (test fishery) in the same area as the inriver commercial fishery since 1986. The sampling design for the inriver test fishery in Canada was not standardized because the amount of fishing time was inversely tied to the amount of fishing time in the commercial fishery. That is, more time in the commercial fishery resulted in less time in the test fishery. For example, if the commercial fishery was open for 5-days in a statistical week, then the test fishery could only be operated the following 24-hrs in that statistical week because no test fishing is allowed 24-hrs before the commercial fishery opening. In addition, a combination of set and drift gillnets were used to catch fish in the test fishery. On average in the inriver test fishery, 24% of the fish were harvested by drift gillnets and 76% were harvested by set gillnets (TTC 2019); however, only CPUE information from the drift gillnet component of the harvest was used for stock assessment purposes.

Given the recent trend in low forecasts (Table 1) and advances in technology, specifically the ability to perform a genetic mark–recapture experiment (Hamazaki and DeCovich 2014), we plan to conduct a nonlethal sockeye salmon stock assessment program at Kakwan Point (Figure 1) in conjunction with the existing Stikine River Chinook salmon assessment program to provide the essential stock assessment information. The Kakwan Point stock assessment program will be standardized through time, similar to the current Chinook salmon assessment program, with the goal of collecting sufficient samples for run reconstruction of Stikine River sockeye salmon. In addition to providing information that would otherwise be lost due to lack of inriver commercial fisheries in 2021, this project may result in improved sockeye salmon stock assessment going forward, since methods (fishing time and gear) will be standardized. 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.

Stikine River sockeye salmon are subdivided into three stock groups for stock assessment purposes: 1) natural origin 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; and 3) Stikine River mainstem stock, which are all other natural sockeye salmon populations in the Stikine River. For management purposes, collective natural origin and enhanced Tahltan Lake stocks are referred to as "total Tahltan stock," or "Tahltan stock".

[1] Stock Assessment Division. 2007. Abundance of the sockeye salmon escapement in the Stikine River drainage, 2006. Fisheries and Oceans Canada. N06-120A. PSC Northern Fund Final Reports. https://www.psc.org/publications/fund-backgrounders-final-reports/#60-482-northern-fund-1501022960.

Table 1.–Stikine River sockeye salmon preseason run forecasts and postseason run size estimates from 1983 to 2020, and the 2021 preseason run forecast. Preseason forecasts have been based on combinations of sibling, smolt, and stock-recruitment forecast methods. Forecast performance is expressed as the percent deviation from the postseason run size estimate. Positive values indicate the forecast was higher than actual and negative values indicate the forecast was less than actual.

Year	Preseason forecast	Postseason run size	Forecast performance	Absolute deviation	Absolute % deviation
1983	62,900	77,457	-19%	14,557	19%
1984	37,500	83,961	-55%	46,461	55%
1985	91,000	214,494	-58%	123,494	58%
1986	262,000	75,456	247%	186,544	247%
1987	114,000	43,350	163%	70,650	163%
1988	123,500	45,096	174%	78,404	174%
1989	80,500	90,549	-11%	10,049	11%
1990	94,000	67,384	39%	26,616	39%
1991	94,000	151,437	-38%	57,437	38%
1992	127,300	231,936	-45%	104,636	45%
1993	135,000	280,730	-52%	145,730	52%
1994	312,000	208,036	50%	103,964	50%
1995	169,000	218,728	-23%	49,728	23%
1996	329,000	372,785	-12%	43,785	12%
1997	211,000	226,915	-7%	15,915	7%
1998	218,500	121,448	80%	97,052	80%
1999	126,000	124,644	1%	1,356	1%
2000	138,000	78,504	76%	59,496	76%
2001	113,000	127,255	-11%	14,255	11%
2002	80,000	79,329	1%	671	1%
2003	184,000	240,977	-24%	56,977	24%
2004	289,500	311,987	-7%	22,487	7%
2005	477,100	259,932	84%	217,168	84%
2006	179,200	268,585	-33%	89,385	33%
2007	233,600	197,786	18%	35,814	18%
2008	228,600	120,209	90%	108,391	90%
2009	274,500	185,275	48%	89,225	48%
2010	187,700	157,001	20%	30,699	20%
2011	183,000	213,399	-14%	30,399	14%
2012	134,000	124,540	8%	9,460	8%
2013	136,000	113,515	20%	22,485	20%
2014	152,300	153,323	-1%	1,023	1%
2015	171,200	174,292	-2%	3,092	2%
2016	223,000	247,892	-10%	24,892	10%
2017	185,000	98,768	87%	86,232	87%
2018	160,900	69,127	133%	91,773	133%
2019	90,000	89,380	1%	620	1%
2020	103,000	35,497	190%	67,503	190%
2021	58,000	NA	NA	NA	NA

NA= not available at the time of publication.

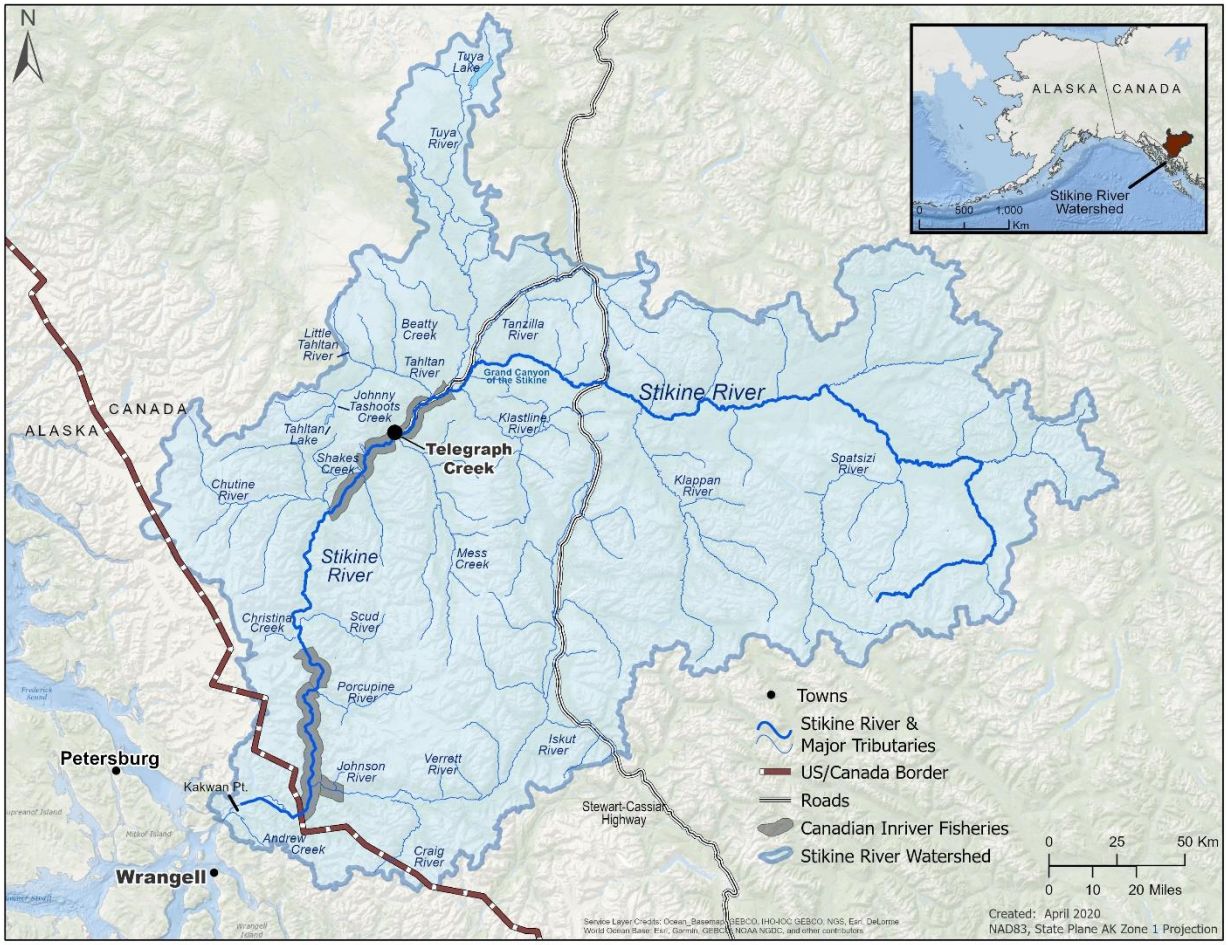

Figure 1.–Stikine River drainage and Canadian fishing areas.

METHODS

CAPTURE AT KAKWAN POINT

Personnel will capture sockeye salmon in drift gillnets near Kakwan Point, using a similar approach and methods used for Stikine River Chinook salmon assessment (Neuneker et al. *In prep*) in which Chinook salmon have been captured using drift gillnets since 1995. Capture techniques in this long-standing project are highly refined and suitable fishing locations are well defined and are finetuned annually depending on river conditions. Drift gillnets used in the sockeye salmon assessment work will have mesh that is 13 cm (stretch), will be 36.6 m long and approximately 5.5 m deep.

Fishing operations will begin in early May and end in August. The Stikine River sockeye salmon inriver run begins in early to mid-June and runs through the end of August. From May through mid-July, two skiffs will be used for drift gillnetting during the Chinook salmon assessment portion of the project (Neuneker et al. *In prep*). Starting 15 June through 15 August, both skiffs will be used to conduct an additional two hours of drift fishing (either an additional 1 hour for 2 boats or 2 hours for 1 boat) following the daily Chinook salmon fishing earlier in the day. The crew will switch from Chinook salmon nets (which have larger mesh size) to sockeye salmon nets at this time. A minimum of two people will operate each skiff for safety purposes. From mid-July through

mid-August, one skiff will be used to conduct the drift gillnet operation and a minimum of two people will operate the skiff. An additional skiff with one person will remain nearby to assist with any nets that may get hung up for safety purposes. The crew will aim to fish seven days per week for two wet net hours per day. To ensure safety, two boats will be operated during high water, when large amounts of debris are frequently present in the river. It will be a priority to keep fishing effort as constant as possible. ADF&G and DFO crew leaders will coordinate fishing schedules and ensure that fishing is conducted as safely as possible. Crews will carefully record fishing and processing time on the Gillnet Effort Recording Form (Appendix A). The time spent fishing during each drift will be tallied to ensure a minimum of two hours of fishing effort per day is completed. Drifts at the sites identified on the lower river are short in duration (approximately 15 min), which results in a relatively high amount of processing time and boat travel to complete each drift. If two hours of fishing effort is insufficient to reach sample size goals (see Age, Sex, and Length Composition section), time may be adjusted inseason.

When capture of a sockeye salmon is indicated (tug of the net, bobbing cork line), the net will be immediately retrieved. Fish will be carefully removed from the net (cutting the net if needed), and fish placed into a sling inside a tote partially filled with fresh river water. Sockeye salmon captured (any size) will be measured (mid eye to tail fork; MEF), inspected to determine sex, sampled to collect scales (for age) and tissues (the left axillary process for aging and genetic stock identification, GSI), and released. Axillary processes will be excised and stapled onto Whatman filter paper cards for dry tissue preservation (Appendix E). The Whatman cards contain locations to record collector name, location, and other information and consist of a 10-spot grid system, which correspond the columns on scale cards. Thus, scale and genetic samples will be matched on their respective cards. All Chinook salmon captured during the period in which the Chinook and sockeye salmon assessment projects overlap (approximately 15 June to 10 July) will be tagged and sampled as outlined in Neuneker et al. (*In prep*) but will not be counted towards that day's Chinook salmon CPUE. Sockeye salmon captured during the Chinook salmon drift period will be released (i.e., not sampled).

Weekly fishing schedule and effort will be determined by onsite staff in consultation with the project leaders (Courtney and Bednarski). Effort and catch data will be recorded on the Gillnet Effort Recording Form (Appendix A). River height to nearest 0.1 ft (from the USGS 15024800 Stikine R NR Wrangell AK gauging station), temperature to nearest 1°C (both at 0900 hours each day), shutdown times, and other comments will be recorded on these forms. Daily sockeye salmon catch, and minutes fished will be sent to supervisors upon completion of that day's fishing.

AGE, SEX, GENETIC, AND LENGTH COMPOSITION

Sockeye salmon (fish ≥ 350 mm MEF) age composition will be determined from scale samples collected from a minimum of 640 fish. This sample size was selected based on work by Thompson (2002) for calculating a sample size to estimate several proportions simultaneously. A sample size of 510 fish is needed to ensure the estimated proportion of each adult age class will be within 5% of the true value with at least 95% probability. The sampling goal was increased to 640 fish to guarantee the sample size target would be achieved, assuming age will not be determined for 20% of the sampled fish due to regenerated scales or other nonreadable scales. This sample size will also meet sex composition requirements, as only 385 samples (assuming no data loss) are required to achieve the precision criteria for estimating sex composition (Thompson 2002). Finally, the

sample size is adequate for performing GSI, as 400 samples are needed to estimate the stock composition of Tahltan within 5% of the true value, 90% of the time.

Three scale samples will be collected from each sockeye salmon, and the length of each sampled fish will be measured (MEF) to the nearest 5 mm. Sex will be determined from examination of external dimorphic sexual maturation characteristics, such as kype development, belly shape, and trunk depth. Sex and length data will be recorded on standardized ASL optical scan data forms and will be matched with scale cards (Appendix C). ASL data forms for sockeye salmon will be scanned and archived in the ADF&G Region 1 Commercial Fisheries Database.

Scale samples will be taken from the "preferred area" of the fish, two scale rows above the lateral line on the left side of the fish on a diagonal downward from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963; Appendix D). All regenerated scales will be discarded. It is critical that all scale cards are kept clean and dry, and all scales are properly oriented on the card. Scales need to be carefully cleaned of dirt, slime, and skin, then moistened and mounted on the gum card with the ridged side with grooves (rough outer side of the scale) facing out, and the anterior end (the end of the scale pointing toward the salmon's head when plucked) is pointed toward the top of the scale card (Appendix D). Scales will then be pressed down with a finger or a pencil so that they stick to the scale card. Scales will be collected from each fish and placed on gum cards at the rate of one fish per column over row spaces 1, through 10 on the gum card (Appendix D). Room will be left at the top middle portion of the card to accommodate the label. It is important to keep the scale cards as dry as possible to prevent the gum from running and obscuring the scale ridges. The gum card will be filled out completely, including the names of the samplers, species, card number, locality, and statistical area/stream code.

Scale samples will be analyzed at the Region I Scale Aging Laboratory in Douglas, Alaska. Scale impressions will be made in cellulose acetate and prepared for analysis as described by Clutter and Whitesel (1956). Scales will be examined under moderate (70×) magnification to determine age. Age classes will be designated by the European aging system where freshwater and saltwater years are separated by a period (e.g., age 1.3 denotes a fish with one freshwater and three ocean years and represents a 5-year-old fish; Koo 1962).

Laboratory Analysis for stock composition

To determine stock composition of the drift gillnet samples at Kakwan point, genomic DNA will be extracted from tissue samples using a NucleoSpin® 96 Tissue Kit by Macherey-Nagel (Düren, Germany). DNA will be screened for 96 SNPs using Fluidigm® 96.96 Dynamic Arrays (http://www.fluidigm.com). The Dynamic Arrays will be read on a Fluidigm® EP1™ System or Biomark™2 System after amplification and scored using Fluidigm® SNP Genotyping Analysis software. If necessary, SNPs may be rescreened on a QuantStudio™ 12K Flex Real-Time PCR System (Life Technologies) as a backup method for assaying genotypes. Approximately 8% of individuals analyzed for this project will be re-extracted and genotyped as a quality control measure to identify laboratory errors and to measure rates of inconsistencies during repeated analyses. The quality control analyses will be performed by staff not involved in the original genotyping, and the methods are described in detail in Dann et al. (2012). Genotypes will be imported and archived in the Gene Conservation Laboratory Oracle database, LOKI.

Statistical Analysis for stock composition

Genotypes in the LOKI database will be imported into the statistical program R for analysis.[2] Prior to statistical analysis, three statistical quality control analyses will be performed to ensure high-quality data: 1) individuals missing >20% of their genotype data (markers) will be identified and removed from analyses, as this is indicative of low quality DNA (80% rule; Dann et al. 2012); 2) duplicate individuals will be identified and removed; and 3) non-sockeye salmon will be identified and removed.

The stock composition will be estimated for the following groups: 1) Tahltan and 2) mainstem (i.e., all non-Tahltan fish). The current genetic baseline consists of 241 populations (Rogers Olive et al 2018, with minor additions to the Yakutat region), which are representative of the major producing stocks in the study area. The baseline has been evaluated to ensure that the previously mentioned groups meet reporting criteria as described in Barclay et al (2019). Stock composition for each stratum will be estimated using the R package *rubias* (Moran and Anderson 2018). A single Markov Chain Monte Carlo chain with starting values equal among all populations will form the posterior distribution that describes the stock composition of each stratum. Summary statistics will be tabulated from these distributions to describe stock compositions.

INRIVER ABUNDANCE ESTIMATE

We will utilize a genetic mark–recapture technique (Hamazaki and DeCovich 2014) to estimate inriver Stikine River sockeye salmon (fish ≥ 350 mm MEF) run abundance. This method is very similar to the historical method for estimating run abundance (TTC 2019). In genetic mark–recapture, an unbiased estimate of the above border Stikine River run abundance (N) at the first sampling event is

$$\widehat{N} = \frac{\hat{E}_m + \hat{C}_m}{\hat{p}_m},$$

where $\hat{E}_m$ and $\hat{C}_m$ are the estimates of escapement and harvest of the inriver Tahltan Lake sockeye salmon run, respectively, and $\hat{p}_m$ is the GSI estimate of the portion of Tahltan stock in the sockeye salmon caught in drift gillnets near Kakwan Point. We will derive variance of the above estimate using a parametric bootstrap simulation (Efron and Tibshirani 1993). In this simulation, we will incorporate variances associated with both run size or harvest estimates and genetic proportion.

The assumptions for employing genetic mark–recapture techniques are the following: 1) presence of Tahltan stock that can be accurately genetically identified through GSI methods, 2) escapement of the above border Tahltan Lake sockeye salmon can be accurately estimated, 3) the proportion of Tahltan stock at Kakwan Point can be accurately estimated, and 4) harvest of inriver Tahltan Lake sockeye can be accurately estimated. We will rely on counts at the Tahltan Lake weir for our escapement estimate, and lower inriver commercial harvest for our harvest estimate. If we do not have stock composition of the inriver harvest, then we will rely on historical information (drift gillnet and set gillnet) and run timing to determine the Tahltan portion of that harvest. Previous

[2] R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/ (accessed May 2021).

work has shown that the proportion of the Tahltan stock can be identified and estimated using the current ADF&G sockeye salmon genetic baseline (Rogers Olive et al. 2018) and established GSI methods.

SCHEDULE AND DELIVERABLES

Field activities for sampling salmon at the Kakwan Point Stikine River stock assessment program under this project will begin approximately 5 May, 2021 and extend to 15 August, 2021. Sockeye salmon sampling will take place 15 June to 15 August, 2021. ASL and genetic samples will be processed postseason and analysis will be completed by November 15, 2021.

RESPONSIBILITIES

I. Agency Responsibilities

A. ADF&G. Will plan project in cooperation with DFO. Will write operational plan with DFO. Will provide equipment for all aspects of sampling sockeye salmon, room and board at Kakwan Point, and other operating supplies. Will summarize all sampling data from Kakwan Point operations in spreadsheets and provide to DFO. Will perform analysis and take responsibility for analysis of data and first draft of report. Will provide final data and draft of report for review to DFO.

B. DFO. Will assist in planning of project. Will provide core staff to tag at Kakwan Point. Will review data, provide input into report, write sections regarding recovery, and serve as co-author.

II. U.S. Personnel Responsibilities

Julie Bednarski, FBIII. Will oversee and assist with all aspects of the project including planning, budget, sample design, permits, equipment, and supervising field operations. Coalesces, edits, analyzes, and reports data; assists with fieldwork. Takes lead role in analysis and first draft of report.

Kristin Courtney, FBII, Project Leader. Will oversee and assist with all aspects of the project including planning, budget, sample design, permits, equipment, and supervising field operations. Coalesces, edits, analyzes, and reports data; assists with fieldwork. Assists in supervising Kakwan Point operations, assists with supervision of recovery, and arranges logistics with field crew.

Philip Richards, FBIII. Will oversee and assist with all aspects of the project including planning, budget, sample design, permits, equipment, and supervising field operations. Coalesces, edits, analyzes, and reports data; assists with fieldwork.

Sara Miller, Biometrician III. Provides input to and approves sampling design. Reviews operational plan and provides biometric details. Writes code for and completes data analysis and reviews final report.

Bobby Hsu, Biometrician II. Provides biometric support for estimation of abundance using genetic mark–recapture.

Chase Jalbert, Fishery Geneticist I. Will oversee and assist with genetics portion of the project. Writes code for genetic analyses and provides stock compositions for genetic mark–recapture.

Stephen Todd, FBI. Supervises one portion of the field tagging program. Will coordinate schedules with DFO-Tahltan crew and share responsibility for all aspects of field operations, including safe operation of riverboats and other equipment, tagging, data collection, and general field camp duties. Will assume lead role in equipment and camp maintenance.

Brendan Jackson, FTIII. Will be crew lead and responsible for assisting in all aspects of field operations, including safe operation of riverboats and other equipment, tagging, data collection, and general field camp duties. Will assist in equipment and camp maintenance. Will work closely with Tahltan crew to fish in the most efficient manner possible.

Chris Kamal, FTII. Will assist in all aspects of field operations, including safe operation of riverboats and other equipment, tagging, data collection, and general field camp duties. Will assist in equipment and camp maintenance. Will work closely with Tahltan crew to fish in the most efficient manner possible.

Vacant, FTII. Will assist in all aspects of field operations, including safe operation of riverboats and other equipment, tagging, data collection, and general field camp duties. Will assist in equipment and camp maintenance. Will work closely with Tahltan crew to fish in the most efficient manner possible.

II. Canadian Personnel Responsibilities

Jody Mackenzie-Grieve, Senior Aquatic Science Biologist. Technical support as required.

Johnny Sembsmoen, Senior Aquatic Science Technician. Technical support as required.

Cheri Frocklege. Fisheries Program Manager, Tahltan Central Government. Coordinate and oversee any Tahltan Central Government involvement in the program.

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APPENDICES

Appendix A.–Gillnet effort recording form.

Location _____			Date _____ Page_____	
Water Temp_____at ____Hr _			Water Depth____ at __ _____Hr _	
Water Comments _____			Weather Comments_____	
Gear Description _____			Crew _____	
Drift/ Set #	Minutes Fished	Cumulative Minutes	Sockeye	Comments: other species, snags. Note, ad clips and Chinook caught but not tagged
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
Daily Totals				

Appendix B.–Catch-effort form.

RECORD AND SEND IN DATA FROM SHADED CELLS

Date	ADFG, minutes	DFO, minutes	Total minutes	Total hours	Catch	Sampled	Cumulative Catch	Cumulative Sampled	CPUE

Appendix C.–Stikine River Kakwan Point drift net test fishery ASL (age, sex, length) bubble sheets instructions.

Data must be recorded neatly and accurately on the optical scan forms.

Description: Written above description line at top of ASL bubble sheet form:

- **SOCKEYE/108-40-015/Drift Gillnet/Stikine River Test Fishery 290/ Esc/SW**

Card:

- Card numbers start with 001. Scale cards are numbered sequentially beginning with "001" and continue through the entire season. Do not repeat or omit scale card numbers.

Species:

- Sockeye salmon = 2.
- Species code listed on back of ASL bubble sheet.

Day/Month/Year:

- List day of sample, only one day per ASL bubble sheet.

District: 108

Sub-District: 40

Stream: 015

Stat. Week:

- A Statistical week is Sunday through Saturday.
- Statistical week chart supplied.

Project: 3

- Escapement listed on back of ASL bubble sheet.

Gear: 03

- Drift gillnet – listed on back of ASL bubble sheet.

Harvest Code:

- DO NOT USE- harvest code is used when sampling commercially caught salmon.

Length Type: 2

- Measure fish mid eye to tail fork on all species.

Cards: up to 4

- Always indicate; it will be 1 to 4 scale cards per ASL sheet.

-continued-

User Code Definitions:

- Do not use unless instructed by project supervisor.

Sex: indicate male or female

Length: record length

E: indicate no scale taken or collected

- No Scale Collected - Fill in the E column when a scale/scales are not collected.

Right Hand margin of ASL bubble sheet:

- Record GSI barcode and grid number: Record last 4 digits of the Whatman card number and last two digits of the specimen number WWWW01; WWWW02; etc.:

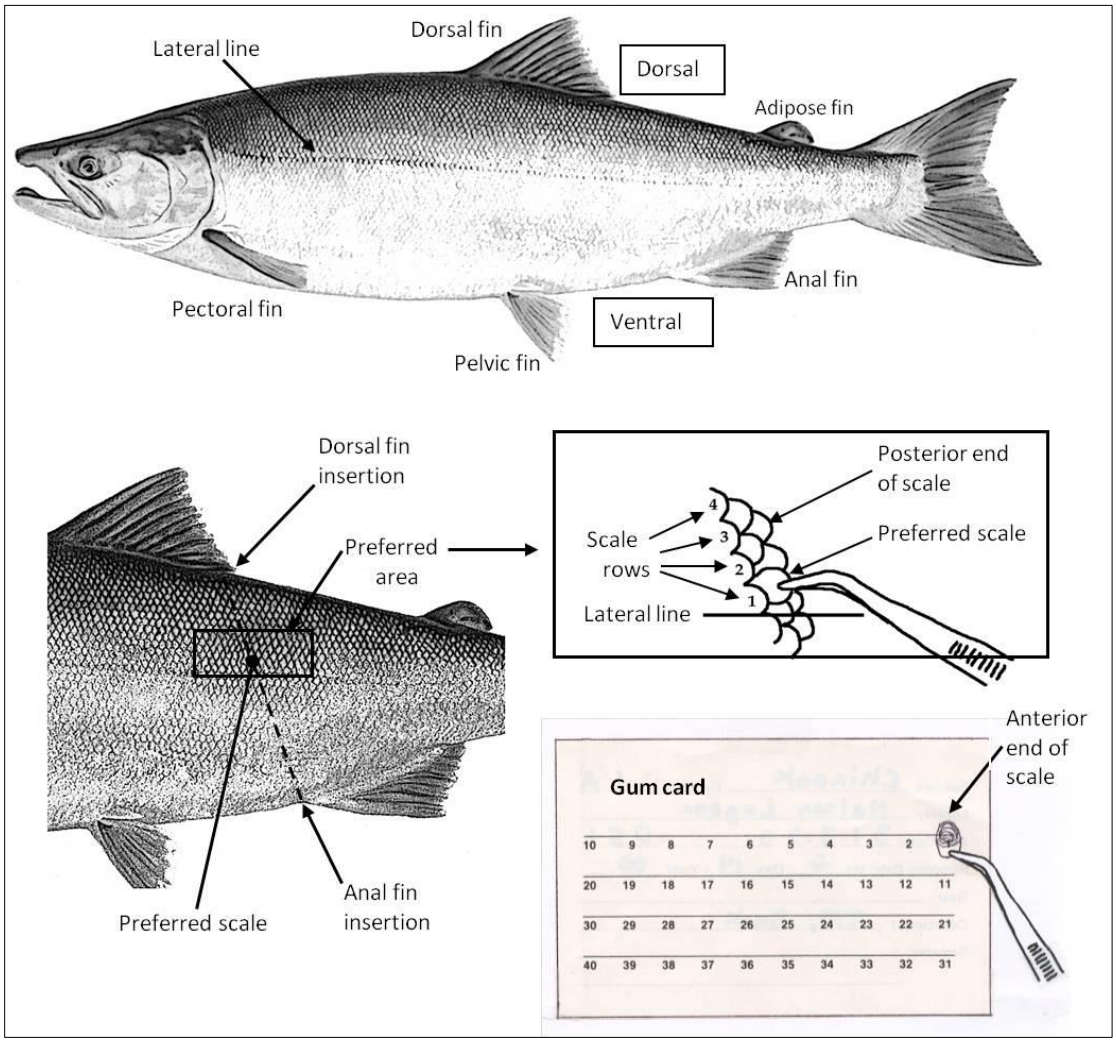
Back of ASL bubble sheet:

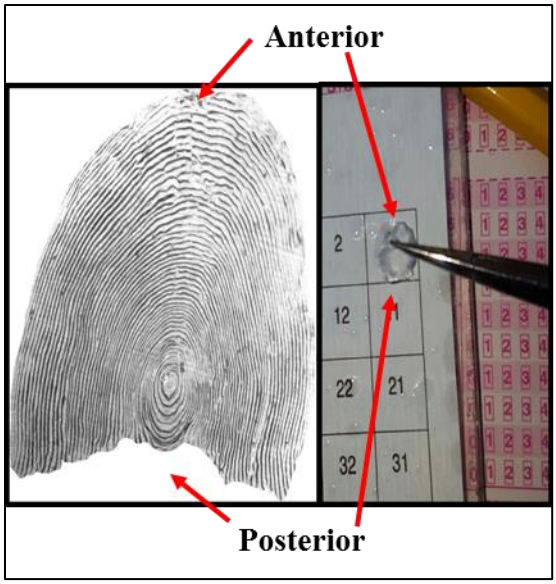
- Write in CODE TYPE = GSI.
- Record GSI number.

ASL Bubble sheet hints:

- Number 2 pencil is the best pencil to use to fill in bubbles.
- Always fill in the whole bubble.
- Do not fill out a new bubble sheet on top of a completed bubble sheet. Stray marks can be transferred from the completed bubble sheet to the back of the new bubble sheet.
- **DO NOT MAKE MARKS NEAR OR ON THE BOTTOM MARGIN OF THE ASL BUBBLE SHEET.**
- **DO NOT FOLD THE ASL BUBBLE SHEET.**

Appendix D.–Preferred scale sampling area on an adult salmon.





Clean, moisten and mount scale on the scale card directly over the appropriate scale number. The side of the scale facing up on the scale card is the same as the side facing up when it is attached to the fish. This outward facing side is referred to as the "sculptured" side of the scale. The ridges on this sculptured side can be felt with fingernail or forceps. When placing the scale on the scale card, place in one uniform direction. **ANTERIOR SIDE POINTING UP, SCULPTURED SIDE FACING OUT.**

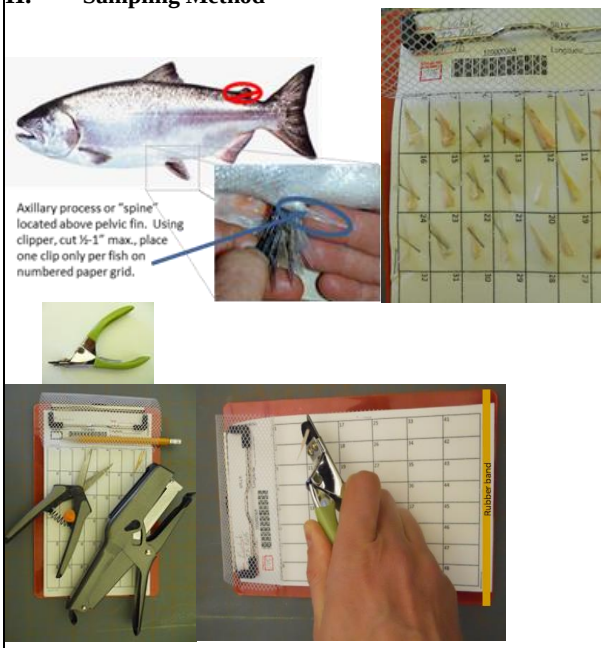
Appendix E.–Adult finfish tissue sampling for DNA analysis.

I. General Information

We use fin tissues as a source of DNA to genotype fish. Genotyped fish are used to determine the genetic characteristics of fish stocks or to determine stock compositions of fishery mixtures. The most important thing to remember in collecting samples is that **only quality tissue samples give quality results**. If sampling from carcasses: tissues need to be as "fresh" and as cold as possible.

Preservative used: Silica desiccant bead packet dries and preserves tissues for later DNA extraction. Quality DNA preservation requires **Fast drying** (under 5 hours at 65ºF); **Dry storage (**with 2 desiccant packs) in weathertight file box.

II. Sampling Method



III. Sampling Instructions

- **Prior to sampling**: Set up workspace, fill out required collection information (upper left hand corner only) and place Whatman genetics card (WGC) on clipboard, secure with rubber band; ready to sample.
- **Sampling:**
  - Wipe fin prior to sampling.
  - Briefly wipe or rinse scissors with water between samples to reduce cross contaminating.
  - Using scissors; cut one axillary fin per fish.
  - Place in daily bulk bottle with ethanol alcohol.
- **Transferring to Whatman Card:**
  - Strain bottle (keep separate per day)
  - Ideally samples would be placed randomly (i.e., not all the big axillaries first; do not sort by size or anything else).
  - Only Whatman cards valid per day (**might need multiple cards per day if over 40; do not use same card for multiple days).**
  - Place one clipped fin tissue onto appropriate grid space. Follow sampling order printed on card - do not deviate. If large tissue sample, center tissue diagonally on grid space.
  - you may have to trim down larger samples so they don't overlap into other grids.
  - **Only one fin clip per fish into each numbered grid space**.
  - Sampling complete.
  - Staple each sample to WGC (see photo to the left).
- **Loading the Pelican Case:**
  - First card: Remove blotter papers and desiccant packs from Pelican Case. Place first card in Pelican Case with tissues facing up. Next, place blotter paper directly over card and place 2 desiccant packs on top. Close and secure lid so drying begins.
  - Up to 4 cards can be added per case. Add cards so the tissue samples always face the desiccant pack through blotter paper: 2nd card facing down between desiccant packs; 3rd card facing up between desiccant packs; and 4th card facing down on top of second desiccant pack. Close and secure Pelican case after inserting each card.
  - All Whatman cards **remain in Pelican overnight**.
  - **desiccant packs should be exchanged with dry packs when samples transferred to Weather tight file box.**
- **Storage Transfer:** Remove cards from Pelican case and place in photo sleeves. Store dried tissues in Weather tight file box at room temperature or below. Two desiccant packs will dry/press cards and promote the tissue preservation process**. The packs should be dried out every 2 weeks.**
- **Storage and shipping:** Keep all Whatman cards inside in Weather tight file box **at all times** with closed /secure lid at CYI.
- **End of season will ship them to Anchorage via Douglas Regional Office.**

IV. Supplies included in sampling kit:

1. Clippers - for cutting a portion of selected fin.
2. Whatman genetics card – holds 40 fish/sheet.
3. Pelican Case - 1st stage of drying and holding card samples.
4. Silica packs – desiccant removes moisture from samples.
5. Pre-cut blotter paper – covers full sample card for drying.
6. Shipping box – put filled Pelican case inside box for shipment.
7. Clipboard – holds Whatman genetics card while sampling.
8. Stapler – extra protection, secure sample to numbered grid.
9. Staples – only use staples provided, specific for stapler.
10. Rubber bands – secure paper to clipboard (optional).
11. Laminated "return address" labels.
12. Sampling instructions.
13. Pencil

Desiccant pack—keep dry by using a dehydrator. The packets are placed into the dehydrator which is run at ~140F-160F, overnight. Dehydrators can be run longer, if necessary. Make sure to store dry desiccant packs intended for later use inside a pelican case or weather tight file box without samples.

-continued-

Appendix E.–Page 2 of 2.