Regional Operational Plan No. ROP.CF.1J.2022.11

Inriver Abundance of Stikine River Sockeye Salmon, 2022–2024

by

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

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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Plan Type:	*Category III*

Approval

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PURPOSE

The 2022 forecast of Stikine River sockeye salmon, *Oncorhynchus nerka*, run abundance is poor and we anticipate very little harvest 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 stock-specific information that is used to complete the mixed stock run reconstruction for Stikine River sockeye salmon. It is highly likely there will be little commercial fishing opportunity in 2022 to gather this pertinent information. To obtain stock composition data necessary to estimate the inriver abundance, we will continue to conduct a sockeye salmon stock assessment program at Kakwan Point that began in 2021. The project will be conducted in conjunction with the existing Stikine River Chinook salmon, *O. tshwaytscha*, stock assessment program, and will extend the project through the end of the sockeye salmon run in mid-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 CPUE information, capture and spaghetti tag sockeye salmon, and estimate the age, sex, and length composition for sockeye salmon captured at Kakwan Point.

Keywords: sockeye salmon, *Oncorhynchus nerka*, Stikine River, Southeast Alaska, genetic mark–recapture, Tahltan Lake, genetic stock identification, genetic mixed-stock analysis

OBJECTIVES

PRIMARY OBJECTIVES

1. Estimate the abundance of sockeye salmon passing Kakwan Point in the Stikine River that are greater than or equal to 350 mm mid eye to tail fork (METF) in length using genetic mark–recapture expansion of the Tahltan stock such that the estimate is within 25% of the true value 90% of the time.
2. Estimate the age, length (METF), 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 (METF), 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 for inseason management.

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 cooperatively operated by the Alaska Department of Fish and Game (ADF&G), Fisheries and Oceans Canada (DFO), and the Tahltan Central Government TCG. Since 1994, these organizations have relied almost exclusively on the Canadian lower river commercial fishery to provide migratory timing information used to complete annual mixed stock run reconstructions of Stikine River sockeye salmon (TTC 2022a). The 2022 forecast of Stikine River sockeye salmon run abundance is poor (TTC 2022b) and it is anticipated that there will be very little commercial harvest opportunity for either U.S. or Canadian fisheries. Lack of a Canadian inriver commercial fishery will result in the loss of stock assessment information historically used to estimate inriver abundance.

Additional inriver sockeye salmon stock assessment projects have been conducted in the Stikine River at various times, including at least seven years of ADF&G test fishing at Kakwan Point from

1979 to 1985 (Lynch et al. 1987) and six years of ADF&G inriver mark–recapture studies from 2000 to 2005[1]. Since 1986, a DFO lethal assessment fishery has been conducted annually in the same area as the Canadian inriver commercial fishery. The sampling design for the inriver assessment 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 assessment fishery (e.g., if the commercial fishery was open for 5 days in a statistical week, then the assessment fishery could only be operated the other 24-hrs in that statistical week; 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 assessment fishery. On average, in the assessment fishery, 24% of the fish were harvested by drift gillnets and 76% were harvested by set gillnets (TTC 2022a). Information from the assessment fishery was used to estimate stock composition; however, only CPUE information from the drift gillnet component of the harvest was used for inriver run estimates.

In 2021, ADF&G conducted a nonlethal sockeye salmon drift gillnet assessment project at Kakwan Point to provide essential stock assessment information that would otherwise be unavailable due to lack of inriver commercial fisheries (Courtney et al. 2021; TTC 2022b). The project, conducted in conjunction with the ongoing Chinook salmon assessment program (Courtney et al. 2022), proved successful for capturing sockeye salmon in 2021; however, sample size goals for estimating age-sex-length and CPUE were not met. ADF&G will continue to conduct this project during the 2022–2024 seasons, during which effort will be made to meet sample size requirements for sockeye salmon. The Kakwan Point stock assessment program will be standardized through time, similar to the Chinook salmon assessment program, with the goal of collecting sufficient samples to reconstruct the Stikine River sockeye salmon run. In addition, the project will incorporate a genetic mark–recapture study (Hamazaki and DeCovich 2014) to estimate inriver abundance postseason based on expansion of the Tahltan Lake component of the run (TTC 2022b).

Stikine River sockeye salmon are subdivided into three stock groups for stock assessment purposes (TTC 2022b): 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 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

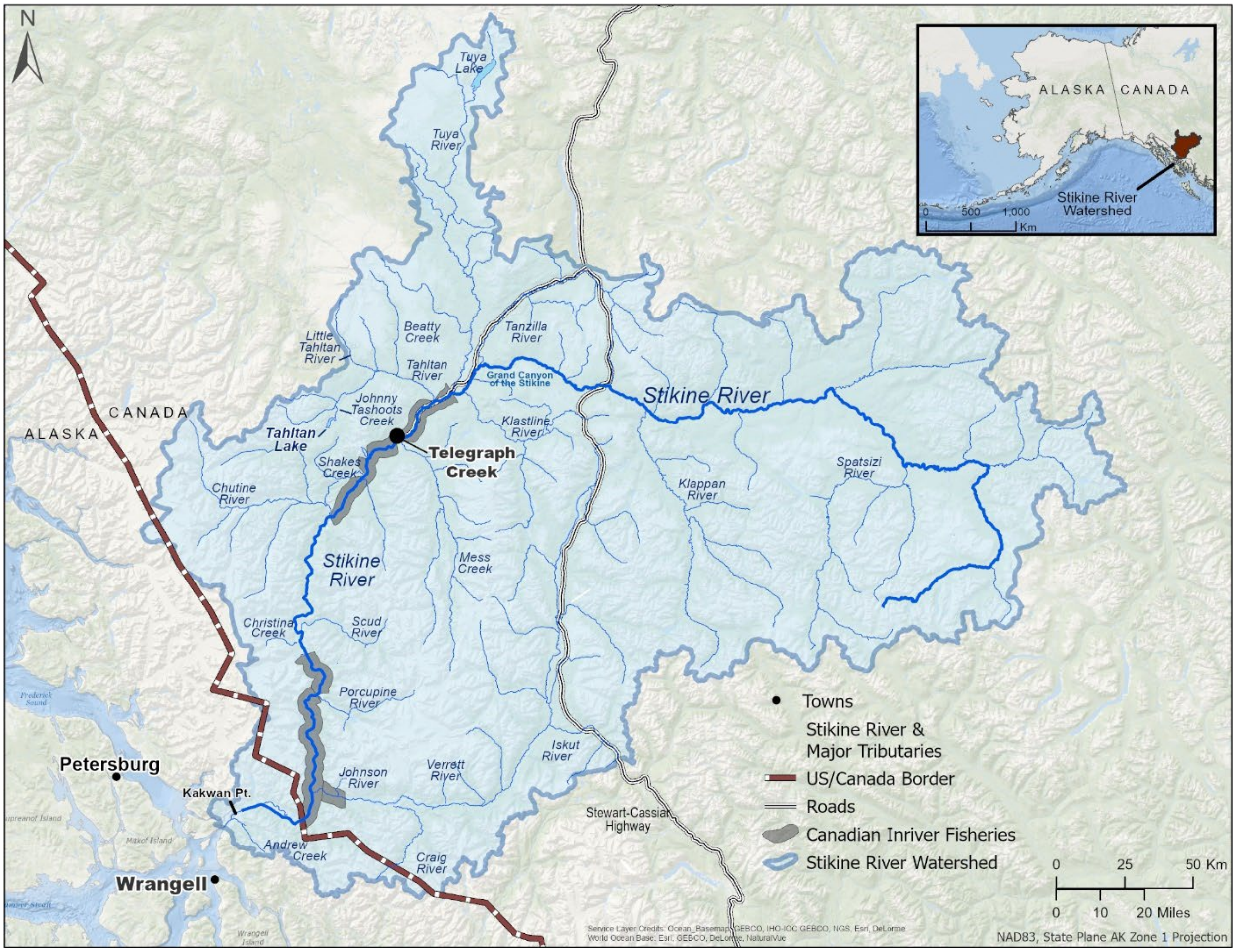

Figure 1.–Stikine River drainage and Canadian fishing areas.

METHODS

CAPTURE AT KAKWAN POINT

Personnel will capture sockeye salmon in drift gillnets near Kakwan Point, (56.69, -132.22) using methods similar to the Stikine River Chinook salmon assessment program (Courtney et al. 2022). Chinook salmon have been captured in drift gillnets since 1995; capture techniques and suitable fishing sites were developed and identified in 1995 and have been adjusted annually due to changing river conditions. Mesh in drift gillnets will be 13 cm (5 in stretch), a size that primarily catches sockeye salmon. Nets will be 36.6 m long and approximately 5.5 m deep.

Fishing operations will begin in early May and end in August. Sockeye salmon are generally captured in the river from early to mid-June to 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 (Courtney et al. 2022). Starting 15 June, the crew will begin to fish sockeye nets in addition to Chinook salmon nets (i.e., switching from 18.4 cm to 13 cm mesh drift gillnets). From 15 June through mid-July, both skiffs will conduct an additional two wet net hours each of drift fishing to target sockeye salmon (a total of four hours per day), following the completion of daily Chinook salmon fishing. From mid-July through 15 August, two skiffs will be used to conduct the drift gillnet operation for sockeye salmon only, with a minimum of two people per skiff. Both crews will aim to fish seven days per week for four wet net hours per day each, for a total of eight hours per day. 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 four (15 June–10 July) and eight (11 July–15 August) hours of fishing effort per day for sockeye salmon 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.

When capture of a sockeye salmon is indicated (e.g., 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 placed into a sling inside a tote partially filled with fresh river water. Sockeye salmon captured (any size) will be measured (METF in mm), inspected to determine sex, sampled to collect scales (for age) and tissues (the left axillary process collected for genetic stock identification; GSI), spaghetti tagged and released. The spaghetti tag will be a uniquely numbered tag featuring a laminated protective sheath and a solid monofilament core. The tag will be threaded through the back of the fish at a point located approximately 2 cm below the posterior half of the dorsal fin so as to be embedded in the fin rays. Axillary processes will be excised and stapled onto Whatman filter paper cards for dry tissue preservation (Appendix B). The Whatman cards contain a place to record collector name, location, and other information and consist of a 10-spot grid system, which corresponds to 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 sampled for age, sex, and length as outlined in Courtney et al. (2022) but will not be counted towards that day's Chinook salmon CPUE. Sockeye salmon captured during the Chinook salmon drift period (8 hours of time 15 June 15–10 July) 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, Bednarski, and Mackenzie-Grieve). 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 gauging station15024800), temperature to nearest 1°C (both at 0900 hours each day), 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 METF) 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 contribution of Tahltan Lake stock within 5% of the true value, with 90% probability.

Three scale samples will be collected from each sockeye salmon, and the length of each sampled fish will be measured (METF) 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 Age, Sex, Length (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 collected 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, 2, 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 the genetic stock composition of the samples from sockeye salmon captured 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 amplified by polymerase chain reaction (PCR) and screened for 96 single nucleotide polymorphism markers (SNPs) using Fluidigm® 96.96 Dynamic Arrays (http://www.fluidigm.com). The Dynamic Arrays will be read on a Fluidigm® EP1™ 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 reextracted 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 (R Core Team 2021[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, 2) mainstem (i.e., mainstem populations from Stikine/Taku rivers), and 3) Other (i.e., all remaining non-Stikine River populations in the genetic baseline). 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 a method that incorporates ages from matched scales and hatchery thermal marks on matched otoliths to help inform the genetic estimates. Similarly, age-specific stock composition for all major contributing age classes (>5%; "0.X", "1.2", "1.3", "2.2", "2.3", "not") will be estimated seasonally. This method ("mark- and age-enhanced GSI"; MAGMA) is conducted in a Bayesian framework and provides two sets of parameters: 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. Each fish is stochastically assigned to a most likely population based on its genotype and age, and stock proportions are estimated based on summaries of the individual assignments. In this process, all available information (i.e., age and genotype) is used to assign individuals to stock of origin.

A Markov Chain Monte Carlo (MCMC) algorithm is utilized for estimation in the MAGMA method. To initialize this process, all fish with unknown origin or age are stochastically assigned a population or age class, then proportions for populations and age groups are estimated in the following steps:

1. All age data are summarized by assigned and observed populations for both wild and hatchery individuals;
2. Population and age composition are estimated from previous summaries (accounting for sampling error);
3. Each wild fish with genotypes is stochastically assigned to a wild population of origin based on the product of its genotypic frequency, age frequency, and population proportion;

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

4. Each wild fish without genotypes is stochastically assigned to a population of origin based on the product of its age frequency and population proportion; and
5. Steps 1–4 are repeated while updating the estimates of the stock proportions and age compositions with each iteration.

The MCMC algorithm will be run for 40,000 repetitions, with the first half of the iterations discarded. Five independent MCMC sampling processes (i.e., chains) will be run and checked for convergence among chains using three methods: 1) graphically, 2) via the Gelman-Rubin convergence diagnostic (Gelman and Rubin 1992; Brooks and Gelman 1998), and 3) using effective number of simulations draws (Gelman et al. 2014). The point estimates and credible intervals for stock-specific age compositions are summary statistics of the joint posterior output.

We will use a genetic mark–recapture technique (Hamazaki and DeCovich 2014) to estimate inriver Stikine River sockeye salmon (fish ≥ 350 mm METF) run abundance. This method is very similar to the historical method for estimating run abundance (TTC 2022a). In genetic mark–recapture, an unbiased estimate of the inriver Stikine River run abundance ($\widehat{N}$) at the first sampling event is

$$\widehat{N} = \frac{\hat{E}_m + \hat{C}_m}{\hat{p}_m} \times (1 - \hat{p}_o)\,, \quad (1)$$

where $\hat{E}_m$ and $\hat{C}_m$ are the estimates of escapement and catch of the inriver Tahltan Lake sockeye salmon run, respectively, and $\hat{p}_m$ and $\hat{p}_o$ are the GSI estimates of the portion of Tahltan and Other stocks, respectively, caught in drift gillnets near Kakwan Point. We will derive the 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.

To successfully apply a genetic mark–recapture, there are four assumptions that must be met: (1) the marked stock (i.e., Tahltan Lake stock) is genetically identifiable through GSI methods, (2) accurate estimate of escapement (i.e., weir counts) of the genetically marked stock, (3) accurate estimate of the proportion of the genetically marked stock at the fish wheels (i.e., that the event one sampling is representative of the entire run), and (4) accurate estimates of harvest (or other removal) of the genetically marked stock between the fish wheel and escapement enumeration (weir, sonar, etc.) (Hamazaki and DeCovich 2014). In order to achieve a genetic mark–recapture estimate with high precision and accuracy, the marked stock needs to be a large enough proportion of the total, typically around 20%.

There is no evidence that the first assumption (i.e., marked stock is genetically identifiable through GSI methods) will be violated, as the current genetic baseline consists of 241 populations, which are representative of the major producing stocks potentially present in the study area. The baseline consists of minor changes to Rogers Olive et al. (2018), with additional years pooled with existing Tatsatua Lake and Nahlin River populations and additional collections in the Yakutat area. The baseline was evaluated to ensure that the reporting groups meet reporting criteria as outlined in Barclay et al. (2019). Stock composition will be estimated for the following reporting groups: 1) Tahltan, 2) mainstem (i.e., all non-Tahltan fish), and 3) Other (all other sockeye salmon populations in the baseline). The second assumption (i.e., accurate estimate of escapement of the genetically marked stock) will be met. The Tahltan Lake sockeye salmon escapement has been enumerated at a counting weir operated annually at the lake since 1959, and it will continue to be operated into the future. The third assumption (i.e., accurate estimate of the proportion of the genetically marked stock at Kakwan Point) will be met if the catch of the drift gillnets is representative of the total run and effort is consistent throughout the immigration period. A relatively constant sampling effort will tend to equalize the probabilities of capture for all salmon passing the marking site regardless of when they pass. The fourth assumption (i.e., complete accounting for removals of the marked stock between Kakwan Point and escapement enumeration) will be met. The lower inriver commercial harvest will be used for our harvest estimate. If we do not have estimates of the 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.

INJURED OR DEAD MARINE MAMMALS

Consistent with the terms and conditions of the Biological Opinion for Southeast Alaska, if during the course of the study injured or entangled marine mammals are observed, the following protocols will be implemented:

- Document with photos/video (if possible, remain at least 100 yards from the animal) and record the date, time, and location (latitude/longitude, description of bay, point, island, etc.).
- If possible, record the species of marine mammal, age class, sex (for sea lions), type of gear, a description of the gear (i.e., line, gillnet, etc.) and how the animal is entangled, its relative degree of impairment, and direction of travel.
- As soon as possible, report to the ALASKA MARINE MAMMAL STRANDING NETWORK (24-hr hotline 877-925-7773; 877-9-AKR-PRD) and include information gathered above. Ideally for dead animals, if communications allow, contact the hotline while near the carcass to determine if additional information/samples can be collected.
- Specifically for an observed live and entangled whale, immediately call the U.S. COAST GUARD (VHF Channel 16).

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 2022 and extend to 15 August 2022. Sockeye salmon sampling will take place 15 June to 15 August 2022. ASL and genetic samples will be processed postseason and analysis will be completed by 15 November 2022.

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 Tahltan weir counts and spaghetti tag recaptures, 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 Tahltan weir counts and spaghetti tag recaptures, and arranges logistics with field crew.

Philip Richards, FBIII. Will 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.

Steve Heinl, Salmon Research Coordinator. Will assist with project operational planning and technical report review.

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.

Vacant, 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.

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

Johnny Sembsmoen, Senior Aquatic Science Technician. Will oversee and assist with all Canadian aspects of the project including planning, budget, sample design, permits, equipment, and supervising field operations. Coalesces, edits, analyzes and reports data; assists with fieldwork.

Cheri Frocklege. Fisheries Program Manager, Tahltan First Nation. Will coordinate and oversee all TFN involvement in the program. May participate in field components as required.

Kyle Inkster, Tahltan Fisheries Technician. Will supervise the Canadian portion of the field tagging program. Will coordinate schedules with the ADF&G 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 assist in equipment and camp maintenance.

Drew Inkster, Tahltan Fisheries Technician. 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 ADF&G crew to fish in the most efficient manner possible.

Various DFO and TFN Technicians. Will conduct all aspects of field operations, including safe operation of equipment, sampling, Tahltan weir counts and spaghetti tag recaptures data collection, and general field camp duties. Will assist in equipment and camp maintenance.

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APPENDICES

Appendix A.–Catch-effort form.

RECORD AND SEND IN DATA FROM SHADED CELLS

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

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

Adult Finfish Tissue Sampling for DNA Analysis

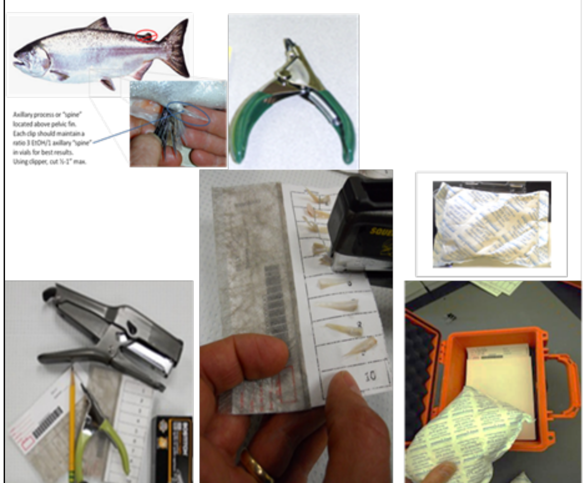
ADF&G Gene Conservation Lab, Anchorage

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 **dry storage** (with desiccant packs) in Pelican case or watertight file box.

II. Sampling Method



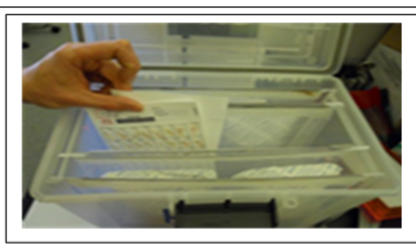
IV. Supplies included in sampling kit:

1. Clippers - for cutting a portion of selected fin.
2. Whatman genetics card (10WGC) – holds 10 fish/card.
3. Stapler – extra protection, secure sample to numbered grid.
4. Staples – only use staples provided, specific for stapler.
5. Silica packs – desiccant removes moisture from samples.
6. Pelican case – sampling and overnight drying before file box.
7. Dehydrator – recharging desiccant packs only.
8. File box – long term dry storage prior to return shipment.
9. Blotter cards – insert between 10WGC and desiccant pack.
10. Zip ties – for return inseason shipments of Pelican case.
11. Laminated "return address" labels.
12. Sampling instructions.
13. Pencil

V.

Return to ADF&G Anchorage lab:
ADF&G – Genetics
333 Raspberry Road
Anchorage, Alaska 99518

Lab staff: 907-267-2247
Judy Berger: 907-267-2175
Freight code: _________



III. Sampling Instructions

- **Prior to Sampling:**
  - Set up workspace and fill out required collection information (location, date, species, and latitude/longitude).
  - Place Whatman genetic card (10WGC) on mini clipboard flat for easy access. One Whatman card per scale card. Same card can be used throughout same day.

- **Sampling:**
  - Wipe excess water and/or slime off the axillary process "spine" prior to sampling to avoid getting excess water or fish slime.
  - Clip off the axillary "spine" using dog clippers or scissors to get roughly a ½ - **1" inch maximum** piece and/or about the size of a small fingernail.
  - Place one clipped axillary onto appropriate grid space. Follow sampling order printed on card - **do not deviate**. If large tissue sample, center tissue diagonally on grid space.
  - **Only one axillary clip per fish into each numbered grid space.**
  - Staple every axillary clip to 10WGC card (see photo).
  - Sampling complete for each day and/or the card is full, place in case.
  - Fold the black cloth, **do not** staple landscape cloth to paper edge.
  - Periodically, wipe or rinse clippers with water to eliminate cross contamination of samples.
  - Place 10WGC card inside Pelican case, layer with blotter cards and desiccant packs. Leave card in Pelican case overnight. **DO NOT REMOVE FOAM!**
  - Close and secure the lid of Pelican case so drying begins.
  - Data: Record **each fin clip number to paired data** information (example: location, sample date, and card barcode). Electronic version.
  - **Prior to next day of sampling**, remove all cards from daily Pelican case and place them into file box (shown below) for long term dry storage.

- **Loading Pelican Case:**
  - 1st card: Remove blotter papers and desiccant packs (remove from vacuum plastic) from 2nd Pelican case. Place first card in the case with tissues facing up. Next, place blotter paper directly over card and place one or 2 desiccant packs on top. Close and secure lid so long-term drying begins.
  - With this collection, all cards can be stacked for long term dry storage in 2nd Pelican case. Add them so **tissue samples always face the blotter paper** and place the desiccant pack(s) on top of both.
  - Close and secure Pelican case after inserting daily cards.
  - For **every morning** begin by removing all dried card(s) from previous day & put them into 2nd Pelican case or file box with desiccant packs for long term dry storage.
  - All cards must **remain in file box with desiccant pack at all times** to dry flat.

- **Post-sampling storage:**
  o Store all dried 10WGC tissue cards in file box at room temperature or cooler. Two desiccant packs fit inside file box plus 4 file folders to help keep cards dry and flat until packed for return shipment.

- **Shipping at end of the season:**
  o Keep all **dried** cards layered inside Pelican or file box with secured lid, pack all dry cards in photo sleeves and inside priority mailing box with returning sampling supplies. Tape box shut and tape return address on box and/or hand carry on aircraft for delivery.

-continued-

Appendix B.–Page 2 of 2.

Species: Chinook

Event 1: Drift Gillnet Fish Wheel (circle one)

Event 2 : Tahini Kelsall Big Boulder (circle one)

Stat. Week: ______________________

Date: _______/_______/________ Scale Card: __________

Sampler: ______________________

GCL USE ONLY 10 WGC

SILLY: ______________________

Barcode

10	9	8	7	6	5	4	3	2	1

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

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

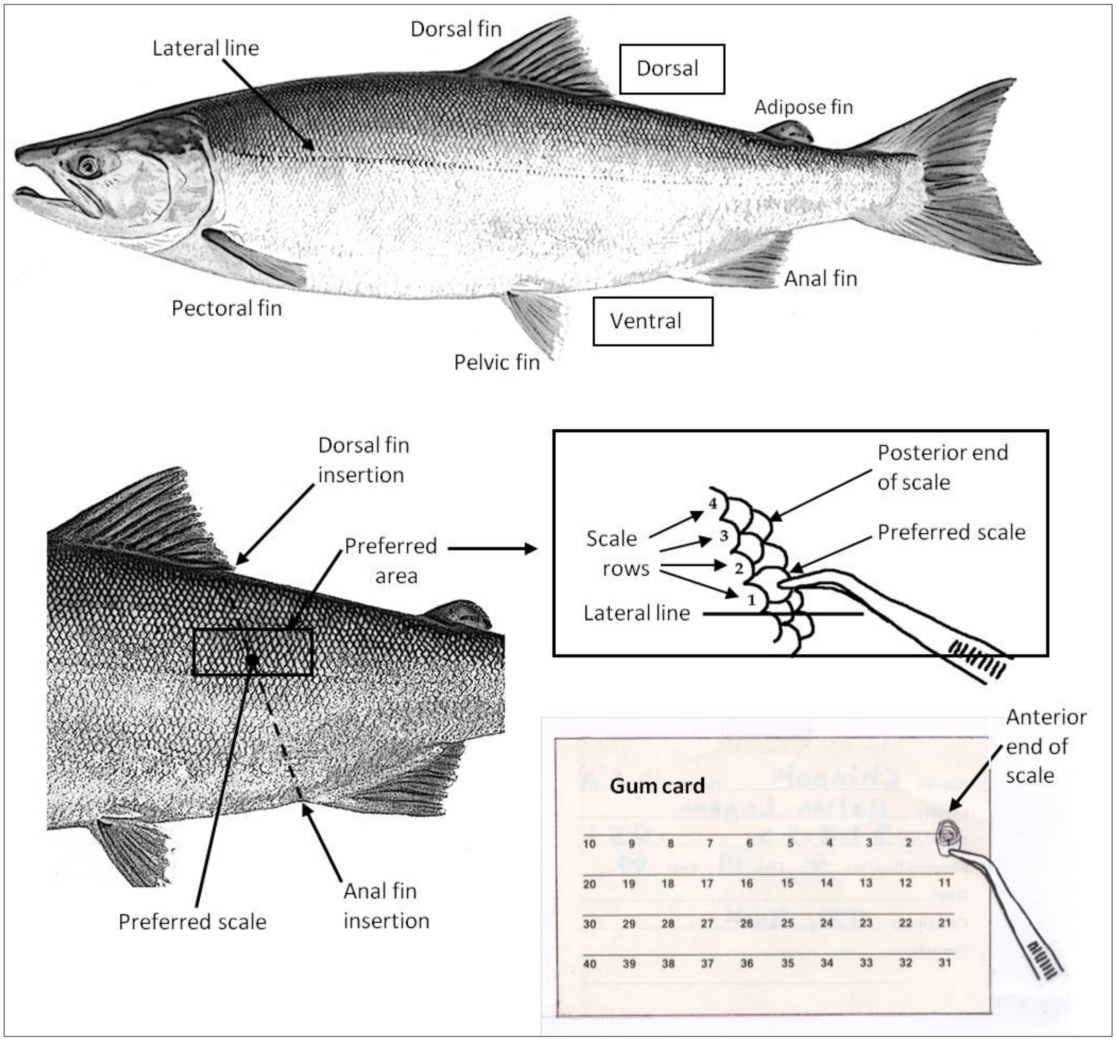
Back of ASL bubble sheet:

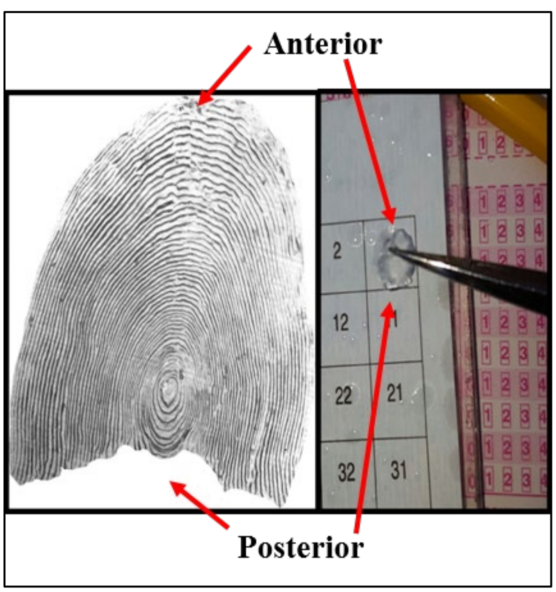
- Write in CODE TYPE = GSI.
- Record GSI number

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.**