Fishery Data Series No. 22-07

Migration, Tagging Response, and Distribution of Taku River Sockeye Salmon, 2019

by

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July 2022

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

FISHERY DATA SERIES NO. 22-07

MIGRATION, TAGGING RESPONSE, AND DISTRIBUTION OF TAKU RIVER SOCKEYE SALMON, 2019

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ABSTRACT

In 2019, we conducted a radiotelemetry study to assess dropout rates (and potential bias) in the annual U.S./Canada Taku River sockeye salmon (*Oncorhynchus nerka*) capture–recapture study, and to estimate the distribution of spawning populations and migration rates of stocks. Every 6th fish captured in fish wheels in the lower river was radiotagged (534 fish) and 22 aerial surveys were conducted to determine their fates. The proportion of radiotagged fish that did not cross the U.S./Canada border (i.e., dropout rate) was 16.8%. Of the remainder, 17.4% were harvested in the Canadian commercial fishery, 78.5% were tracked to a probable spawning location, and 4.1% were assigned an unknown fate. Based on the two-sample Kolmogorov-Smirnov nonparametric test, there was no difference between the length distributions of radiotagged fish and nonradiotagged fish (i.e., spaghetti tagged fish in the capture–recapture study), and the time of recovery between release at the fish wheels and harvest in the Canadian fishery was similar for radiotagged and nonradiotagged fish. Genetic stock identification of radiotagged fish was used to estimate the stock composition of the total fish wheel catch. The estimated proportion of river-type stocks was 71.1% and lake-type stocks was 28.9%. By reporting group, the mainstem Taku River was the largest contributor (66.8%), followed by King Salmon Lake (8.6%), Little Trapper Lake (8.3%), Tatsamenie Lake (7.5%), Kuthai Lake (4.5%), Tatsatua Lake (3.2%), Other (0.6%), and Nahlin River (0.5%). A total of 462 radiotagged fish met or exceeded the 95% probability threshold required for individual assignment to reporting group and were tracked to probable spawning locations. Seventy-one individually assigned fish were harvested in the Canadian commercial fishery between 0 and 23 days after being radiotagged. On average, radiotagged fish were harvested 4 days after tagging and 62% were harvested less than 5 days after tagging.

Keywords: Sockeye salmon, *Oncorhynchus nerka*, capture–recapture, Taku River, radiotelemetry, radiotag, dropout rate, migration rate, genetic stock identification, Pacific Salmon Treaty

INTRODUCTION

The Taku River is a transboundary river system that produces one of the largest runs of sockeye salmon (*Oncorhynchus nerka*) in northern British Columbia and Southeast Alaska (Figure 1). During the period 1984–2017, the terminal run of Taku River sockeye salmon averaged 214,310 fish (range 118,430 to 396,680 fish) and the annual average harvest was 105,180 fish, of which 80,000 fish were harvested in the U.S. District 111 commercial drift gillnet fishery, 1,000 fish were harvested in the U.S. personal use fishery, 24,000 fish were harvested in the Canadian inriver commercial fishery, and 180 fish were harvested in the Canadian Aboriginal fishery (TTC 2021). The Taku River sockeye salmon stock is jointly managed by the Alaska Department of Fish and Game (ADF&G), Fisheries and Oceans Canada (DFO), and the Taku River Tlingit First Nation (TRTFN). The Pacific Salmon Commission, via the Pacific Salmon Treaty, commits Canada and the U.S. to conservation and allocation obligations for salmon originating in the waters of the Canadian portion of the Taku River.

A joint U.S./Canada Taku River sockeye salmon stock assessment program has been conducted annually since 1984 by ADF&G, DFO, and TRTFN including a capture–recapture study to provide weekly inseason abundance estimates and postseason abundance estimates of Canadian-origin Taku River sockeye salmon (Clark et al. 1986; McGregor and Clark 1987, 1988, 1989; McGregor et al. 1991; Boyce and Andel 2014; Pestal et. al 2020). Detailed methods for the annual two-event capture–recapture abundance estimate were outlined in Bednarski et al. (2019). In summary, migrating adult salmon are captured with fish wheels, located in the vicinity of Canyon Island on the downstream (U.S. side) of the U.S./Canada border (Figure 1), as part of event one. All healthy adult salmon are spaghetti tagged, given a secondary mark (axillary process clip), and released from the fish wheels. Event two consists of recovery of tags and secondary mark data obtained from sockeye salmon harvested in Canadian commercial and assessment/test gillnet fisheries. These gillnet fisheries involve set nets and drift nets and occur in Canadian portions of the Taku River within 20 km of the international border; almost all harvest occurs within 5 km of the

U.S./Canada border. Additional information on the distribution and abundance of discrete spawning stocks is collected at escapement weirs at Little Trapper and Tatsamenie Lakes (operated by DFO), and Kuthai and King Salmon Lakes (operated by TRTFN).

The Taku River sockeye salmon population consists of 4 lake stocks (Tatsamenie, King Salmon, Little Trapper, Kuthai Lakes) and a conglomerate of all other stocks often referred to as the mainstem stock. In 1984 and 1986, radiotelemetry was used to locate and characterize the distribution of spawning sockeye salmon in the Taku River (Eiler et al. 1992). Through this work, the mainstem component was shown to contribute approximately 63% to the total inriver run. In contrast, the average proportion of the mainstem component calculated from recent capture–recapture estimates has been much larger (79% average 2013–2017). Further, the capture–recapture estimates of the proportion of the mainstem component also differed from estimates based on stock composition data from both the inriver Canadian fishery (52% average 2008–2017), and the U.S. District 111 traditional commercial drift gillnet fishery (54% average 2013–2017; TTC 2021). The discrepancy between the proportion of mainstem and lake spawning components highlighted the need address potential bias in capture–recapture estimates due to dropouts (i.e., loss of tags) and to properly define the current distribution of spawning sockeye salmon in the drainage.

A comprehensive multi-year radiotelemetry study was added to the Taku River stock assessment project beginning in 2019 to assess the dropout rate in the capture–recapture study, as well as the distribution of spawning populations and migration rates of stocks. Potential reasons for dropouts (i.e., tagged fish that do not migrate above the U.S./Canada border) include tagged fish spawning below the border, tag loss through shedding of tags or non-recognition of secondary marks, and mortality of tagged fish due to predation or stress from capture and handling during the tagging event. Thus, assessment of dropout rates in capture–recapture studies is important, as the loss of tags results in abundance estimates that are biased high (Pestal et al. 2020). Fish tagged in capture–recapture studies are assumed to experience a similar dropout rate as radiotagged fish, which provides a means to adjust abundance estimates. A radiotelemetry study was conducted on Taku River sockeye salmon in 1984 to assess spawning distribution, and partial radiotelemetry studies in 2015, 2017, and 2018 were used to assess dropout rates and to adjust historical inriver run estimates (1984–2018; Pestal et al. 2020). Although Eiler et al. (1992) conducted a radiotelemetry study in 1986, the study area included the upper Taku Inlet near the Taku Lodge, approximately 20 km below the border, so results of that study were not directly comparable to the capture–recapture study area.

The radiotelemetry studies conducted in 1984 and 1986 (Eiler et al. 1992) were the only studies conducted prior to 2019 that specifically characterized the distribution of spawning sockeye salmon in the Taku River. All other drainagewide spawning distribution information has been acquired through related projects like escapement weirs at the lakes and incidental tag recoveries from the capture–recapture study. Additional years of the radiotelemetry studies will help to better characterize the spawning distribution and locations of sockeye salmon in the Taku River drainage and will provide for improved estimates of inriver abundance. The assessment of the dropout rate of tagged fish in the capture–recapture study will be used to improve inriver run abundance estimates and management of U.S. and Canadian fisheries.

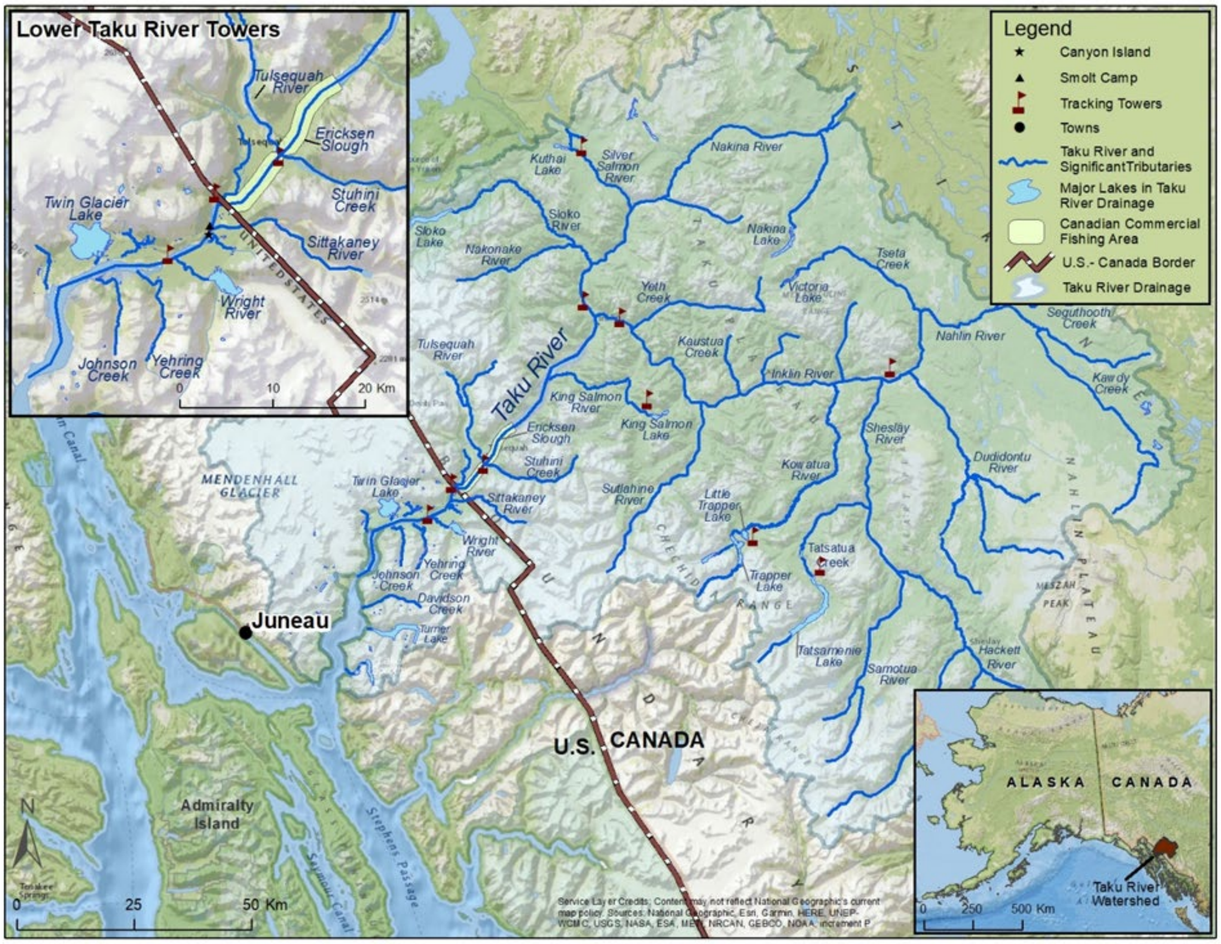

Figure 1.–Taku River drainage in Southeast Alaska and British Columbia and key landmarks, including the marking (Canyon Island) and recovery (Canadian fishery) locations of the capture–recapture study and radiotelemetry tracking towers.

STUDY SITE

The Taku River is a transboundary river system originating in the Stikine Plateau of northwestern British Columbia. The merging of 2 principal tributaries, the Inklin and Nakina Rivers, approximately 50 km upstream from the border, forms the mainstem of the Taku River. The Taku River flows southwest from this point through the Coast Mountain Range, eventually draining into Taku Inlet in Southeast Alaska, about 30 km northeast of Juneau (Figure 1). Most of the 17,000 km^2 Taku River watershed lies within Canada (Neal et al. 2010).

Seasonally, the Taku River is glacially turbid. Water discharge in the winter (November–March) ranges from approximately 49 to 196 m^3/s at the U.S. Geological Survey water gauging station located on the lower Taku River near Canyon Island (1988–2018; USGS 2019a). Discharge increases in April and May and reaches a maximum average flow of 890 to 1,000 m^3/s in June. Flow usually remains high in July but drops to approximately 500 m^3/s by late August. Sudden increases in discharge in the lower Taku River result from a Jökulhlaup; the release of the glacially impounded waters along the Tulsequah Glacier (Kerr 1948; Marcus 1960). These floods usually occur once or twice a year between June and September causing water levels to fluctuate dramatically and carrying a tremendous load of debris. From 1987 to 2018, the maximum instantaneous peak flow due to a Jökulhlaup event was 3,200 m^3/s (22 July 2007; USGS 2019b). From 1987 to 2003, a majority of the annual peak floods from the Jökulhlaup occurred in August (53%); from 2004 to 2018 only 2 annual peak floods from the Jökulhlaup occurred in August and a majority of the peaks occurred in July (53%; USGS 2019b).

OBJECTIVES

PRIMARY OBJECTIVES

1. Estimate the proportion of radiotagged fish that dropout of the capture–recapture study and determine, to the extent possible, the fate of these fish.
2. Estimate the annual stock composition of the fish wheel catch using genetic analysis.
3. Determine final fates of radiotagged fish that cross the U.S./Canada border to determine likely spawning locations for Canadian-origin sockeye salmon using radiotelemetry.

SECONDARY OBJECTIVE

1. Estimate the migratory timing profiles of sockeye salmon stocks in the Taku River drainage from the point of radiotagging (at the Canyon Island fish wheels) to their final spawning destination.
2. Estimate the proportion of lake-type and river-type sockeye salmon in the Taku River drainage using radiotelemetry data and genetic analysis of radiotagged fish.
3. Perform individual genetic assignment on all sockeye salmon captured at the fish wheels to determine genetic affinity for comparison with telemetry fates.

METHODS

FISH WHEELS

Sockeye salmon were captured using 2 fish wheels in the lower Taku River. Fish wheels were positioned in the vicinity of Canyon Island on opposite riverbanks, approximately 200 m apart. The Taku River channel at this location is ideal for fish wheel operation because the river is fully channelized through a relatively narrow canyon that has very steep walls. The fish wheels were secured in position by anchoring to large trees with 0.95 cm steel cable and held out from, and parallel to, the shoreline by log booms. Each fish wheel consisted of 2 aluminum pontoons, measuring approximately 12.2 m (length) × 0.8 m (width), filled with closed cell Styrofoam for flotation. The pontoons supported a 5.2 m wide structure consisting of an adjustable height axle, 2 or 3 catch baskets, metal slides, and one live box that held captured fish. The live boxes were 2.4 m (length) × 0.9 m (width) × 1.5 m (depth). The aluminum catch baskets were 3.0 m (width) × 3.7 m (depth), covered with nylon webbing (5.1 × 5.1 cm mesh openings), and bolted to a steel axle that spins in a pillow-block bearing assembly. The fish-catching baskets were rotated about the axle by the force of the water current against the baskets and uprights. Paddle boards or doors were added or removed from the fish wheel uprights and heavy canvas was draped on the back of the catch baskets as needed throughout the season to maintain an optimal speed of 2.0 to 3.0 revolutions per minute (Bednarski et al. 2019).

Salmon migrating upriver were captured by the rotating baskets as they swam under the fish wheels. Aluminum slides bolted to the rib midsection of each basket directed fish into the aluminum live boxes mounted to the outer side of the fish wheel pontoons. The live boxes were perforated to allow constant flow of fresh river water. Sampling and tagging was conducted on a boat tied off to the pontoons. Fish were netted from the live box and transferred to a trough filled with fresh river water for tagging and sampling. All healthy adult sockeye salmon captured at the fish wheels were sampled for sex and lengths from mid eye to tail fork (METF) data and tagged with a numbered spaghetti tag. Adult sockeye salmon were defined as salmon ≥350 mm METF length, measured to the nearest 5 mm. Fish that showed signs of injury or acted lethargic were enumerated and released untagged.

The fish wheels were operated from 15 May 2019, at the beginning of statistical week 20, through 4 October 2019, at the end of statistical week 40. The fish wheels were fished as continuously as possible for approximately 15 hours per day in 2 shifts (04:00–11:30 and 16:00–23:30). Each shift consisted of a crew of 2 or 3 people. The fish wheels were shut down between shifts (11:30–16:00 and 23:30–04:00) and when repairs were necessary. Prior to 15 June, the fish wheel live boxes were checked every 2 hours. Starting 16 June, the live boxes were checked on an hourly basis until mid-August when daily sockeye salmon catches slowed, after which they were checked every 2 hours for the remainder of the season. Because sampling was conducted from a boat, the fish wheels were allowed to continue spinning as fish were sampled and tagged. Detailed methods of fish sampling were outlined in Bednarski et al. (2019).

RADIOTELEMETRY

Radiotelemetry is the preferred method to determine the comprehensive spawning distribution of river-type salmon stocks (Eiler 1995; Koehn 2000; Reine 2005). Methods used during this project were similar to radiotelemetry studies that have been implemented by ADF&G on the Susitna River drainage for sockeye salmon (Yanusz et al. 2007 and 2011) and on the Taku and Stikine Rivers for Chinook salmon (*O. tshawytscha*; Richards et al. 2016a and 2016b). Internal pulse-coded radiotags, manufactured by Advanced Telemetry Systems (ATS), were placed in a subset of sockeye salmon that were marked in conjunction with the spaghetti tagged sockeye salmon in the capture–recapture project. The radiotags were 52 mm long, 19 mm in diameter, 26 g in mass, had a 30 cm external whip antenna, a terminal battery life of 96 d, and operated on several frequencies within the 150.000–152.999 MHz range. Eight frequencies had up to 100 pulse codes each, resulting in a total of 534 uniquely identifiable radiotags deployed. Each radiotag was equipped with a mortality indicator mode that activated when the radiotag was motionless for approximately 24 h. Radiotags were inserted through the esophagus and into the upper stomach of the fish using a 1.0 cm outside diameter and 30 cm long piece of cross-linked polyethylene plastic tubing (e.g., PEX). The antenna of the radiotag was threaded through the tube and pinched by hand at the end of the tube, such that the radio transmitter was tight against the opposite end of the tube. The plastic tube was marked with reference points to assist in proper tag insertion depths based on the length of the fish. Resistance felt during tag insertion, however, was the most useful indicator of proper insertion depth. The esophagus was visually inspected to ensure none of the radiotag body was visible prior to releasing the fish, which would potentially result in regurgitation of the radiotag and inadvertently affect estimates of the dropout rate.

Every 6th sockeye salmon captured in the fish wheels was tagged with a radio transmitter and matched with individual tissue and scale samples. These systematically collected samples were used to estimate the genetic stock composition and age-sex-length composition of the fish wheel catch. The initial rate of deployment of the radiotags was determined by the total number of radiotags allotted to the project for use in 2019 (500 tags) and the 2018 catch rates of the fish wheels (Table 1). The goal was to apply the radiotags proportionally throughout the run and using all 500 tags. The radiotagging rate was assessed throughout the season so adjustments could have been made if too few or too many tags were deployed daily. Movements of radiotagged fish were monitored from time of release by a combination of twice weekly aerial surveys and 10 stationary radiotelemetry tracking towers (towers) located throughout the drainage (Figure 1).

Table 1.–Weekly and seasonal deployment goals for radiotags at the Taku River, 2019. The proposed weekly tagging rate of sockeye salmon was based on the proportion and catch at the fish wheels in 2018 during statistical weeks 21–40, the slightly lower forecasted run size in 2019 compared to the 2018 run, and the 500 tags allocated for the project.

		Weekly				Cumulative			
		Expected		Goal		Expected		Goal	
Statistical week	Start date	CPUE	Catch	Radio	Scale/Length sampling	CPUE	Catch	Radio	Scale/Length sampling
21	5/19	0.00	0	0	0	0.00	0	0	0
22	5/26	0.00	0	0	0	0.00	0	0	0
23	6/2	0.00	2	0	0	0.00	2	0	0
24	6/9	0.00	4	1	1	0.00	5	1	1
25	6/16	0.00	14	2	2	0.01	19	3	3
26	6/23	0.04	118	20	20	0.05	137	23	23
27	6/30	0.13	397	67	67	0.18	534	90	90
28	7/7	0.15	454	76	76	0.33	988	166	166
29	7/14	0.23	689	116	116	0.56	1,676	282	282
30	7/21	0.22	667	112	112	0.79	2,344	394	394
31	7/28	0.10	305	51	51	0.89	2,649	445	445
32	8/4	0.03	94	16	16	0.92	2,743	461	461
33	8/11	0.03	94	16	16	0.95	2,837	477	477
34	8/18	0.02	73	12	12	0.98	2,910	489	489
35	8/25	0.02	54	9	9	1.00	2,964	498	498
36	9/1	0.00	11	2	2	1.00	2,975	500	500
37	9/8	0.00	0	0	0	1.00	2,975	500	500
38	9/15	0.00	0	0	0	1.00	2,975	500	500
39	9/22	0.00	0	0	0	1.00	2,975	500	500
40	9/29	0.00	0	0	0	1.00	2,975	500	500
Totals:		1.00	2,975	500	500				

Assumptions of the radiotagging study included: (1) sockeye salmon will be radiotagged in proportion to the run, (2) radiotagging will not change the survival, movement (destination or fate), or catchability of a fish (i.e., no tagging effects), (3) fates of radiotracked fish will be accurately determined (Bednarski et al. 2019), and (4) the radiotagged fish will be a representative sample of the spaghetti tagged fish.

The first assumption (i.e., sockeye salmon will be radiotagged in proportion to the run) will be true if fishing effort and catchability is constant for all "stocks" (i.e., fish that spawn in the same area) that enter the river. During the study, sampling effort was held as consistent as possible during the immigration (i.e., every 6th sockeye salmon captured in the fish wheels was tagged with a radio transmitter) so that the cumulative distribution of tagged through the sampling time period would be similar to the cumulative distribution of sockeye salmon returning the Taku River to spawn, over the same time period. If nonproportional tagging occurred, the proportions were stratified by time and CPUE (see *Spawning Distributions* in *Methods*). If fishing effort at the fish wheels (event one marking) or in the Canadian fishery (potentially recaptured in the fishery) was not consistent across the run, the ratios of radiotagged fish observed in the various spawning areas will be biased.

Assumption two (i.e., tagging effects) cannot be directly tested as an individual fish that was not handled or tagged cannot be tracked along its route or to its final destination. An indirect test of this assumption, though, is the time between tag application and recovery. Based on capture–recapture data from spaghetti tagged fish on the Taku River in years 1984 through 2018, the behavior of tagged fish, such as sulking, was not very long for most fish that eventually migrated upstream and, thus, was not a major source of bias (Pestal et al. 2020).

The third assumption (i.e., fates of radiotracked fish will be accurately determined) will be true if (1) radiotags remain operational throughout the project, (2) all radiotagged fish are detected during aerial surveys during their migration upstream, and (3) radiotagged fish are detected at their final destination during aerial surveys. The final destination of a radiotagged fish may not be detected during an aerial survey if its carcass is washed downstream (or the fish is not detected at all during its migration due to a faulty radiotag, an unknown migration path, or the fish regurgitates the tag), or if the last survey is conducted before a radiotagged fish reaches its final destination. The towers and radiotags remained operational throughout the project, with minimal periods of reduced or no coverage, and concerted effort was made to ensure proper installation, testing, and monitoring of all towers throughout the season. Eiler (1995) found tracking success to be >97% for radiotagged Chinook salmon that passed undamaged towers on the Taku River, and other salmon telemetry studies conducted in Southeast Alaska experienced similar high detection rates (Johnson et al. 1992; Pahlke and Bernard 1996; Pahlke et al. 1996; Pahlke and Etherton 1999; Richards et al. 2008; Weller and Evans 2012). Throughout the 2019 season, 22 aerial surveys were conducted to track radiotagged sockeye salmon to determine their final fate locations, during which all major spawning tributaries were surveyed roughly twice per week (see *Aerial Telemetry Surveys* in *Methods*). It was assumed that all radiotagged fish that successfully spawned should have been at or near their spawning location during at least one of the aerial tracking surveys (Richards et al. 2014).

To ensure the fourth assumption (i.e., the radiotagged fish will be a representative sample of the spaghetti tagged fish) was met, every 6th salmon that was captured in the fish wheels was systematically radiotagged. We assumed that the radiotagged fish would provide a representative sample of the spaghetti tagged fish (i.e., share similar survival, movement, and catchability) and the results derived from radiotagged fish (fates, dropout rates, genetic stock composition) could be extended to the inriver population (i.e., spaghetti tagged fish). To test this assumption, the cumulative time-to-recovery in the Canadian harvest (i.e., sulk time) was compared between the radiotagged and the spaghetti tagged fish, and two-sample Kolmogorov-Smirnov (K-S) nonparametric tests (Conover 1999) were used to compare the length distribution of radiotagged fish to nonradiotagged fish to determine if radiotagged sockeye salmon were representative of the size distribution of the inriver population The length distribution of nonradiotagged fish was represented by sex and length data collected from sockeye salmon captured and spaghetti tagged at the Canyon Island fish wheels. The K-S test was used to calculate *D*, the maximum vertical deviation between 2 cumulative length-frequency distributions from 2 sets of sample data. The *D* statistic is sensitive to differences in both the shape and location (mean length) of the distributions. The null hypothesis states that there is no difference between the 2 distributions. If the calculated value *D* is less than the critical value, one fails to reject the null hypothesis (i.e., P-value > 0.05). Three K-S tests were performed using the statistical program R (R Core Team 2020; version 3.6.3) to compare the lengths of radiotagged fish to the lengths of nonradiotagged fish for (1) all fish, both sexes combined; (2) males only; and (3) females only. All associated files, data, and code were archived at https://gitlab.com/transboundary-committee/Taku-Sockeye-Public.

Size and Age Composition

Scale samples were analyzed at the ADF&G Region I Scale Aging Laboratory in Douglas, Alaska. Scale impressions were made in cellulose acetate and prepared for analysis as described by Clutter and Whitesel (1956). Scales were examined under moderate (70×) magnification to determine age. Age classes were designated by the European aging system where freshwater and saltwater years were separated by a period (e.g., age 1.3 denoted a fish with 1 freshwater and 3 ocean years; Koo 1962). Age, length, and sex data were entered into the Region I Commercial Fisheries Database by Douglas staff. The weekly age distribution, the seasonal age distribution weighted by week, and the mean length by age and sex weighted by week were calculated using standard sampling summary statistics from Cochran (1977) (Appendix A).

Tag Recovery and Tracking Radiotags

Canadian Fisheries

Tags were recovered daily from the Canadian commercial fishery harvest. A directed sockeye salmon fishery occurred from 30 June to 15 August, after which time directed fishing effort shifted to coho salmon (*O. kisutch*). Weekly commercial fishing periods ranged from one to 5 days.

Commercial license conditions stipulated that spaghetti and radiotags, recovered from harvested sockeye salmon, be submitted to DFO personnel daily. Harvest statistics, secondary mark data, and tag information were collected daily by DFO personnel based at Ericksen Slough and reported to the Whitehorse office, then forwarded to the ADF&G office in Douglas. ADF&G staff also recovered small numbers of spaghetti and radiotags from the U.S. inriver personal use fishery and the District 111 commercial drift gillnet fishery, located downriver from the fish wheels. These tags were not removed from the analysis because they were included in the dropout estimate. Tag information from individual recoveries in harvests was also used to identify paired tissues, which were used for genetic analyses.

Other Recovery Locations

Observations and recoveries of radiotagged fish were made at upstream sockeye salmon enumeration weirs at the outlets of Little Trapper (20 July–31 August), Tatsamenie (4 August–5 October), Kuthai (4 July–3 September), and King Salmon (5 July–4 September) Lakes (TTC 2021). Additional recoveries were made during escapement sampling activities directed at Chinook salmon or sockeye salmon at the Nakina, Nahlin, and Tatsatua Rivers, and in the mainstem Taku River (TTC 2021).

Aerial Telemetry Surveys

Twenty-two aerial surveys were conducted in 2019 to track radiotagged sockeye salmon to determine their final fate locations, where they presumably spawned, and to calculate the dropout rate of fish radiotagged at the fish wheels (Appendix B). Two aerial surveys in fixed wing aircraft were generally conducted per week from 2 July to 10 October to cover the entire drainage: one survey on the east side (Inklin River drainage) and one survey on the west side (Nakina River drainage). All surveys also included the mainstem Taku River, below the Inklin-Nakina confluence (Figure 1). All major spawning tributaries were surveyed, including those previously identified by Eiler et al. (1988, 1992). An antenna was mounted to the side of the aircraft and an ATS 4520 receiver with internal GPS receiver was used to record the location of each fish. The date and time of decoding, frequency, pulse code, latitude and longitude, signal strength, and activity status of each decoded transmitter was automatically recorded by the receiver. An aerial survey sheet was completed for each survey and included date, time of flight (start and end time), surveyor, weather, general flight path, name of file downloaded, and a brief description of the survey (Appendix C). After the survey was completed, a preliminary map of survey points was created for detection of possible errors and to track the progress of radiotagged fish.

Stationary Telemetry Towers

The telemetry towers were mainly used to confirm detection of select radiotagged fish and to provide information on migratory timing to the lake sites. Ten stationary tracking towers were used on the Taku River to record movements (upstream or downstream passage) of radiotagged fish (Figure 1; Appendix D). One tower was placed below the tagging site, one tower was placed at the U.S./Canada border between the marking site and Canadian fisheries, and one tower was placed above the main Canadian fishery near the Tulsequah River. The distance between the tower at the U.S./Canada border and the Tulsequah tower was approximately 9 km. In addition, 2 towers were placed near the Inklin/Nakina confluence and one tower was placed near the confluence of the Nahlin and Sheslay Rivers (start of the Inklin River). Four Towers were placed at the outlets of each of the lake systems with weirs (Tatsamenie, King Salmon, Little Trapper, and Kuthai Lakes). The tower placed downstream of the tagging site was used to estimate the emigration rate of radiotagged sockeye salmon from the study area. The upstream towers were used to estimate immigration rates into Canada. Tower operations were started before fish were present at each location, and were concluded after mid-October (Appendix D).

The towers were constructed and operated as described by Eiler (1995), except that they did not have satellite up-link capabilities (see Richards et al. 2016a for details). Each tower consisted of an ATS R4500C integrated receiver and data logger, 2 directional Yagi antennae (one aimed upstream and one aimed downstream), a solar panel, and battery power system. The towers were strategically placed to afford the antennae unobstructed downstream and upstream views. Radiotagged fish within reception range of the towers were identified by radio frequency and recorded on the data logger. The towers recorded the date and time that each radiotag was detected, the antenna that detected the radiotag (upstream, downstream, or both), the signal strength, and the activity pattern (active or inactive). The towers were programmed to record data every 60 minutes. The location of each radiotag relative to the tower (upriver or downriver from the site) was deduced by comparing the upstream and downstream antenna signal strengths. A reference radiotag was placed near each tower to verify that the tower components were functioning properly and to identify if/when the tower stopped working or recording data. Depending on accessibility, the towers were checked from weekly to approximately every 3 weeks.

Tracking data were downloaded from the receivers via a laptop computer and copied onto a separate external hard drive. A logbook was maintained at each tower to record date, staff name, settings, and battery voltage for each visit. A checklist with radio receiver settings and the data download steps was stored at each site.

Fates

The final fates of all radiotagged sockeye salmon were determined and categorized following the completion and processing of all aerial surveys. Fates were determined based on the highest signal strength (signal strength of 120 dBm or above) recorded along the fish's route and maximum upstream location based on aerial surveys and stationary tower data. Spawning locations were then assigned to one of the general spawning locations as determined by genetic stock identification.

Dropout

A dropout was defined as a fish that did not migrate above the U.S./Canada border. Based on the final fates of the radiotagged fish, the proportion of radiotagged fish that dropout of the study was determined by dividing the total number of radiotagged fish that did not cross the U.S./Canada border by the total number of radiotagged fish.

SPAWNING DISTRIBUTIONS

If we assume that the fish migrating past the 2 fish wheels were proportionally tagged, the proportion of sockeye salmon destined for probable spawning location *I* was estimated as (Cochran 1977, page 52),

$$\hat{p}_i = \frac{r_i}{r}, \tag{1}$$

where:

r_i = number of radiotagged fish out of r assumed to have spawned in location i, and

r = number of radiotagged fish released from the marking site that retained upstream migration and were assigned to a probable spawning location.

The variance of $\hat{p}_i$ was then be estimated by (Cochran 1977, page 52),

$$\text{var}(\hat{p}_i) = \frac{\hat{p}_i(1-\hat{p}_i)}{r-1}. \tag{2}$$

If the assumption of proportional tagging was not met, the number of fish with radiotags r, distributed by time stratum j (i.e., statistical week) and spawning location i, was adjusted to compensate for unequal effort and unequal tagging fractions over time (Ericksen and Chapell 2006),

$$r'_{ij} = \frac{r_{ij}}{\hat{\phi}_j}, \tag{3}$$

where $\hat{\phi}_j$ = the proportion of sampled fish that were radiotagged, adjusted for unequal fish wheel effort over time,

$$\hat{\phi}_j = \frac{x_{1j}+x_{2j}}{X_{1j}\frac{H_{1j}}{h_{1j}}+X_{2j}\frac{H_{2j}}{h_{2j}}}, \tag{4}$$

where:

X = number of sockeye salmon caught in fish wheels (fish wheel designation by subscript 1, 2),

x = number of sockeye salmon radiotagged in fish wheels (fish wheel designation by subscript 1, 2),

H = total possible number of hours of fish wheel operation (fishing effort), and

h = actual number of hours of fish wheel operation (fishing effort).

All quantities are specific to time stratum j (i.e., statistical weeks). Then, the proportion of fish that spawn in location i was estimated as,

$$\hat{q}_i = \frac{\sum_j^{\text{weeks}} r'_{ij}}{\sum_i^{\text{fates}} \sum_j^{\text{weeks}} r'_{ij}}, \tag{5}$$

with approximate variance,

$$\text{var}(\hat{q}_i) \cong \frac{\hat{q}_i(1-\hat{q}_i)}{\sum_j^{\text{weeks}}(x_{1j}+x_{2j})-1}. \tag{6}$$

Equation 5 is restricted to those fish that were assigned a spawning fate.

GENETIC ANALYSES

To meet the objectives of this study, 2 different genetic analyses were performed. For the primary objective, the stock composition of sockeye salmon radiotagged at the fish wheels (i.e., the population captured in event one of the capture–recapture study) was estimated for 9 reporting groups (Appendix E). Sample sizes obtained in the study were adequate for estimating the stock composition within 5% of true value, 90% of the time. For the secondary objective, each radiotagged fish was individually assigned to the most probable reporting group. The individual assignment data were used to calculate the number of fish in each reporting group that did not pass the U.S./Canada border and to compare with known telemetry fates.

Laboratory Analysis

Genomic DNA was extracted from tissue samples using a NucleoSpin 96 Tissue Kit by Macherey-Nagel (Düren, Germany). DNA was screened for 96 SNPs using Fluidigm 96.96 Dynamic Arrays (http://www.fluidigm.com). The Dynamic Arrays was read on a Fluidigm EP1System or Biomark System after amplification and scored using Fluidigm SNP Genotyping Analysis software. If necessary, SNPs were 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 were re-extracted and genotyped as a quality control measure to identify laboratory errors and to measure the background discrepancy rate of the genotyping process. The quality control analyses were performed by staff not involved in the original genotyping, and the methods are described in detail in Dann et al. (2012). Genotypes were imported and archived in the Gene Conservation Laboratory Oracle database, LOKI.

Genotypes in the LOKI database were imported into the statistical program R for analysis (R Core Team 2020). Prior to statistical analysis, 3 statistical quality control analyses were performed to ensure high-quality data: (1) individuals missing >20% of their genotype data (markers) were identified and removed from analyses as this is indicative of low-quality DNA (80% rule; Dann et al. 2012); (2) duplicate individuals were identified and removed; and (3) non-sockeye salmon were identified and removed.

Stock Composition

Stock composition of the fish wheel catch was estimated for the following reporting groups: (1) mainstem Taku/Stikine River (mainstem Taku River), (2) Nahlin River, (3) King Salmon Lake, (4) Kuthai Lake, (5) Little Trapper Lake, (6) Tatsatua Lake, (7) Tatsamenie Lake, (8) Chutine Lake, and (9) Other. Among these genetic reporting groups, 4 (King Salmon Lake, Kuthai Lake, Little Trapper Lake, and Tatsamenie Lake) were considered to be lake-type stocks and the remaining (mainstem Taku River, Nahlin River, Tatsatua Lake, Chutine Lake, and Other) were grouped as river-type stocks (Miller and Pestal 2020). The current genetic baseline consists of 241 populations, which are representative of the major producing stocks in the study area. The baseline consists of minor changes to Rogers Olive et al. (2018), with additional years pooled with existing Tatsatua and Nahlin River populations and additional collections in the Yakutat area (Appendix E). The baseline was evaluated to ensure that the reporting groups met reporting criteria as outlined in Barclay et al. (2019). Stock composition for the entire season, by stratum and for the subset of fish harvested in the Canadian commercial fishery was estimated using the R package *rubias* (Moran and Anderson 2019). Strata generally corresponded to statistical week but were determined postseason as some weeks needed to be pooled to maintain greater than 30 fish per stratum. A single Markov Chain Monte Carlo chain with starting values equal among all populations formed the posterior distribution that described the stock composition of each stratum. Summary statistics were tabulated from these distributions to describe stock compositions.

Individual Assignment

Individual assignment data were also generated using the R package *rubias* (see *Individual Assignment* in *Results*). Briefly, for each individual radiotagged fish, the posterior means of reporting group membership was calculated along with the probability of the individual's genotype given it is from that collection. Together, these data were used to determine the most probable reporting group. We implemented a cut-off requirement of 95% probability to determine a 'true' group membership (Simmons et al. 2013). Samples that fell below the cut-off were considered inconclusive and were not assigned to a reporting group. It is worth noting that even though stock composition could be calculated from individual assignment data, it is not recommended because calculations would be limited to the subset of fish that met assignment thresholds. Further, depending on the study objectives, assignment thresholds could be modified, resulting in changes to stock composition.

RESULTS

Fish wheel operations began on 15 May and ended on 4 October. A total of 3,222 sockeye salmon were tagged with spaghetti tags and 534 were tagged with radiotags (Appendix F). The first sockeye salmon was radiotagged on 8 June (statistical week 23), and the last radiotag was deployed on 14 September (statistical week 37). Peak tagging rates occurred during statistical week 30 when 645 fish were spaghetti tagged and 107 were radiotagged, which represented 20% of the season total tags deployed for each tag type (Table 2). Tags were applied in proportion to abundance throughout the sockeye salmon run (i.e., every 6th sockeye salmon captured was radiotagged). A total of 7 unique frequencies, each containing either 50 or 100 individual pulse codes, were deployed. One sockeye salmon was inadvertently tagged with a frequency (150.504 MHz) reserved for coho salmon during week 34 (Table 3).

Table 2.–Number of radiotags and spaghetti tags applied to Taku River sockeye salmon at the Canyon Island fish wheels by statistical week, 2019.

		Spaghetti tags applied		Radiotags applied	
Statistical week	Start date	Weekly	Cumulative	Weekly	Cumulative
23	2-Jun	6	6	1	1
24	9-Jun	46	52	7	8
25	16-Jun	145	197	24	32
26	23-Jun	148	345	25	57
27	30-Jun	304	649	50	107
28	7-Jul	373	1,022	61	168
29	14-Jul	288	1,310	48	216
30	21-Jul	645	1,955	107	323
31	28-Jul	563	2,518	94	417
32	4-Aug	281	2,799	47	464
33	11-Aug	183	2,982	31	495
34	18-Aug	106	3,088	17	512
35	25-Aug	79	3,167	13	525
36	1-Sep	33	3,200	5	530
37	8-Sep	20	3,220	4	534
38	15-Sep	2	3,222	0	534
Totals:		3,222		534	

Table 3.–Number of Taku River sockeye salmon radiotagged by statistical week and frequency at the Canyon Island fish wheels, 2019.

	Radiotag frequency (MHz)								
Statistical week	150.322	150.343	150.403	150.434	150.553	150.562	150.584	150.504[a]	Total
23	1	0	0	0	0	0	0	0	1
24	7	0	0	0	0	0	0	0	7
25	24	0	0	0	0	0	0	0	24
26	18	7	0	0	0	0	0	0	25
27	0	43	7	0	0	0	0	0	50
28	0	0	43	18	0	0	0	0	61
29	0	0	0	48	0	0	0	0	48
30	0	0	0	34	73	0	0	0	107
31	0	0	0	0	27	67	0	0	94
32	0	0	0	0	0	33	14	0	47
33	0	0	0	0	0	0	31	0	31
34	0	0	0	0	0	0	16	1	17
35	0	0	0	0	0	0	13	0	13
36	0	0	0	0	0	0	5	0	5
37	0	0	0	0	0	0	4	0	4
Total	50	50	50	100	100	100	83	1	534

[a] One sockeye salmon was inadvertently tagged with a frequency (150.504 MHz) reserved for coho salmon during statistical week 34.

AGE, SEX AND LENGTH OF FISH WHEEL CATCH

In 2019, the sockeye salmon catch at the Canyon Island fish wheels was composed primarily of age-0.3 (54%), age-1.3 (28%), age-1.2 (8%), and age-0.2 (7%) fish (Table 4). The remainder of the catch (5%) was composed of age-1.1, age-2.2, and age-2.3 fish. The mean length of age-0.3 fish was 570 mm for males and 556 mm for females, and the mean length of age-1.3 fish was 560 mm for males and 552 mm for females. The mean length of age-0.2 fish was 443 mm for males and 459 for females, and the mean length for age-1.2 fish was 465 mm for males and 488 mm for females (Table 5).

Table 4.–Age composition of Taku River sockeye salmon captured at the Canyon Island fish wheels weighted by statistical week, 2019.

Age class	Brood year	Sample size	Estimated catch	SE of catch	Percent of catch	SE percent of catch
0.2	2016	32	210	34	7%	1%
0.3	2015	281	1,742	64	54%	2%
1.1	2016	3	18	9	1%	0%
1.2	2015	40	246	35	8%	1%
1.3	2014	142	894	59	28%	2%
2.2	2014	3	21	12	1%	0%
2.3	2013	12	84	23	3%	1%
Total		513	3,215			

Table 5.–Average mid eye to tail fork (METF) length in mm of Taku River sockeye salmon captured at the Canyon Island fish wheels by age class and sex, 2019.

		Male			Female			Total		
Age class	Brood year	Sample size	Mean length	SE	Sample size	Mean length	SE	Sample size	Mean length	SE
0.2	2016	28	443	5.5	4	459	24.0	32	445	5.6
0.3	2015	101	570	3.0	180	556	1.8	281	561	1.6
1.1	2016	3	368	7.3	–	–	–	3	368	7.3
1.2	2015	29	465	5.3	11	488	8.1	40	471	4.7
1.3	2014	45	560	5.0	97	552	3.0	142	554	2.6
2.2	2014	2	515	5.0	1	535	–	3	522	7.3
2.3	2013	5	582	19.0	7	553	7.1	12	565	9.5
Total		213			200				513	

Two-sample K-S tests were used to analyze the 2019 data. One of the 534 radiotagged fish was not measured for length and 4 of the 2,679 nonradiotagged fish were not assigned a sex. Of the fish with associated lengths and sex, there were 214 male radiotagged fish, 319 female radiotagged fish, 1,169 male nonradiotagged fish, and 1,506 female nonradiotagged fish (Tables 6 and 7).

Cumulative length distributions of radiotagged fish compared to nonradiotagged fish (D = 0.0539, P-value = 0.1515; Figure 2), and female radiotagged fish to female nonradiotagged tagged fish (D = 0.0702, P-value = 0.1488; Figure 3) did not appear to differ. Cumulative length distributions of male radiotagged fish compared to male nonradiotagged fish (D = 0.1697, P-value = <0.001; Figure 4) did differ. The radiotagged fish, as a whole, adequately represented the length distribution of sockeye salmon in the Taku River, as sampled from the Canyon Island fish wheels.

Table 6.–Range, average, mode, and median of the lengths of radiotagged fish.

Tag type	Sample size	Sex	Range (mm)	Average (mm)	Mode (mm)	Median (mm)
Radiotagged	214	Male	405–630	544	550	555
Radiotagged	319	Female	355–650	543	550	550
Radiotagged	533	Both	355–650	543	550	550

Table 7.–Range, average, mode, and median of the lengths of nonradiotagged fish.

Tag type	Sample size	Sex	Range (mm)	Average (mm)	Mode (mm)	Median (mm)
Nonradiotagged	1,169	Male	350–665	525	565	550
Nonradiotagged	1,506	Female	350–665	547	550	550
Nonradiotagged	2,675	Both	350–665	537	550	550

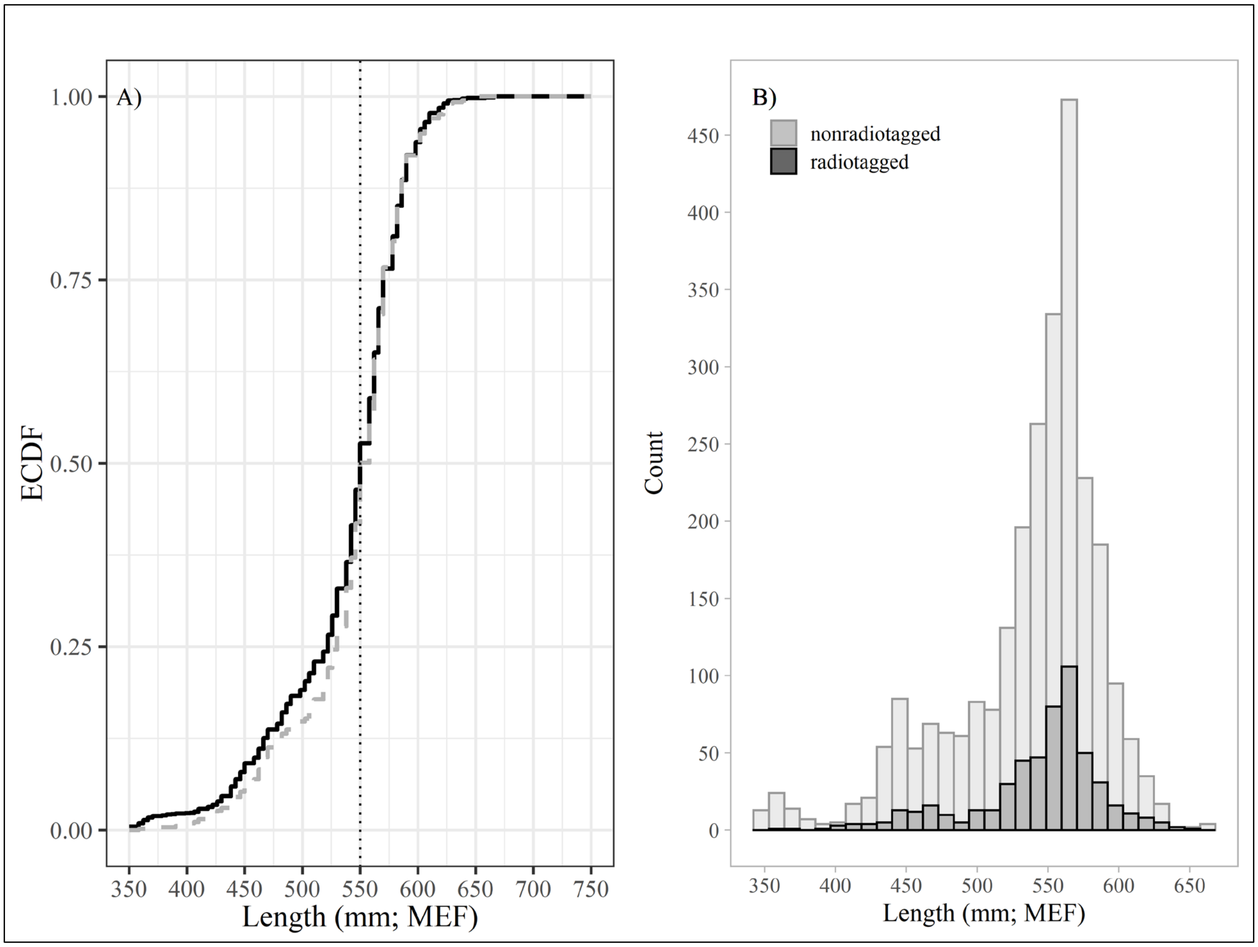

Figure 2.–A) Empirical cumulative distribution function (ECDF) for all sockeye salmon sampled at the Canyon Island fish wheels, both sexes combined, 2019. The black line is length data from fish captured and tagged at the fish wheels (nonradiotagged fish) and the gray line is length data from radiotagged fish. The black dotted vertical line is the mid eye to tail fork length ("MEF"; mm) where the maximum deviation between the 2 curves occurs (550 mm). B) Histogram of fish length samples for radiotagged and nonradiotagged fish.

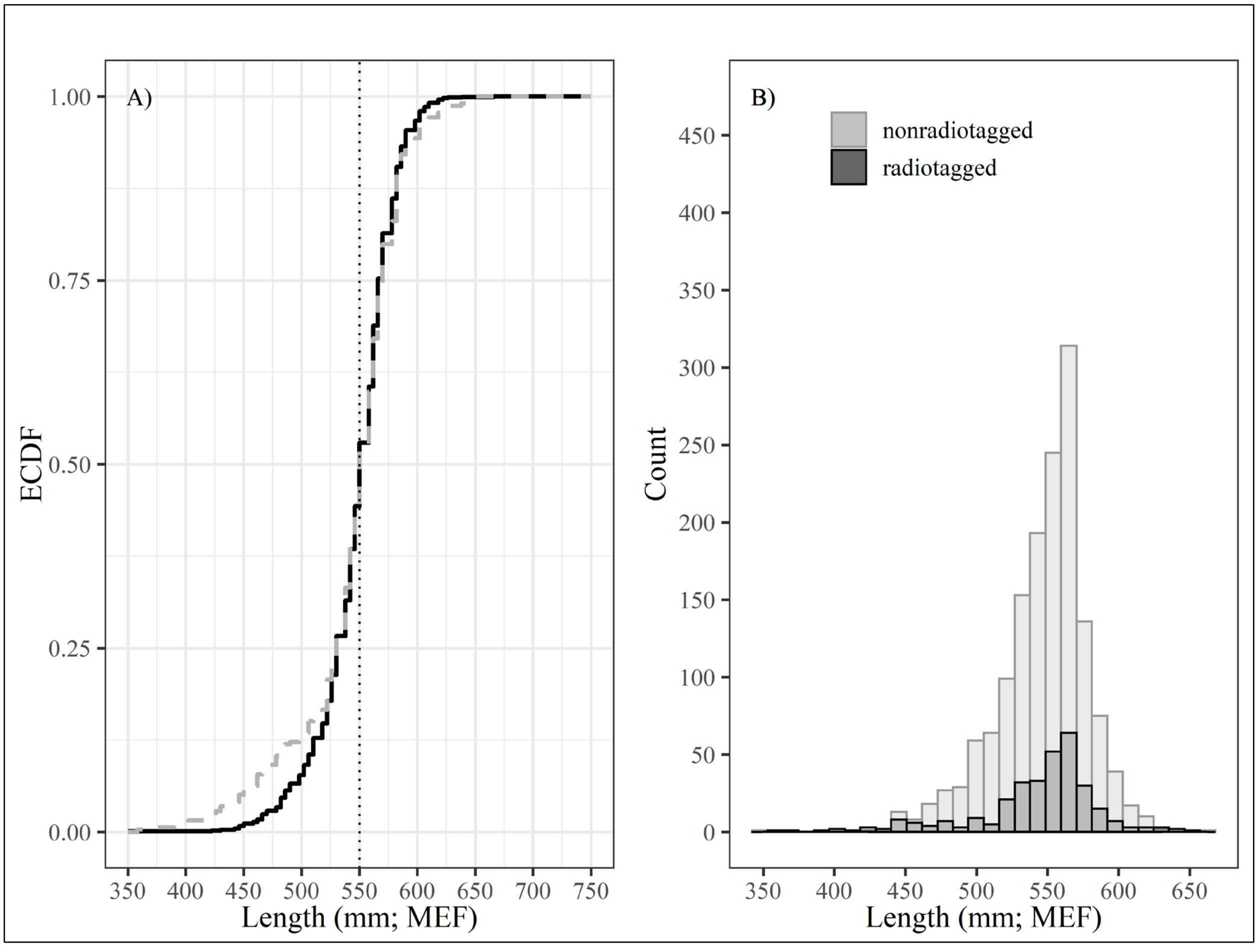

Figure 3.–A) Empirical cumulative distribution function (ECDF) for female sockeye salmon sampled at the Canyon Island fish wheels, 2019. The black line is length data from female fish captured and tagged at the fish wheels (female nonradiotagged fish) and the gray line is length data from female radiotagged fish. The black dotted vertical line is the mid eye to tail fork length ("MEF"; mm) where the maximum deviation between the 2 curves occurs (550 mm). B) Histogram of female fish length samples for radiotagged and nonradiotagged fish.

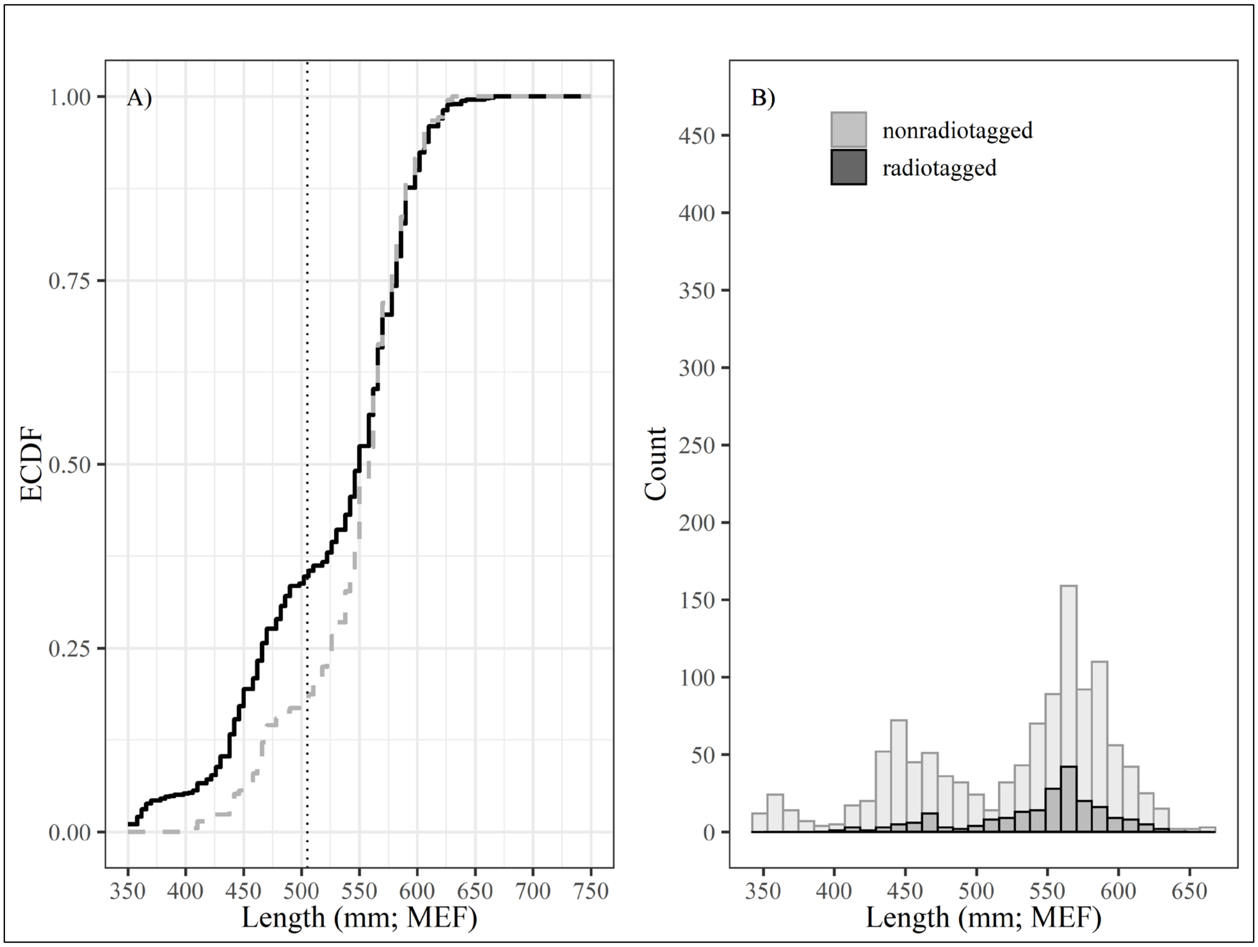

Figure 4.–A) Empirical cumulative distribution function (ECDF) for male sockeye salmon sampled at the Canyon Island fish wheels, 2019. The black line is length data from male fish captured and tagged at the fish wheels (male nonradiotagged fish) and the gray line is length data from male radiotagged fish. The black dotted vertical line is the mid eye to tail fork length ("MEF"; mm) where the maximum deviation between the 2 curves occurs (505 mm). B) Histogram of male fish length samples for radiotagged and nonradiotagged fish.

TAG RECOVERY

Of the 534 sockeye salmon radiotagged, 525 were successfully detected during aerial surveys and 9 were never detected. The 9 undetected radiotags were censored from the study because they were not detected by aerial surveys or any of the stationary towers and were assumed to be defective. Of the 525 fish with functional radiotags, 437 (83.2%) successfully crossed the U.S./Canada border and 88 (16.8%) did not cross the U.S./Canada border.

The stationary towers located throughout the Taku River drainage varied in their effectiveness to track radiotagged fish (Appendix D). For example, postseason review of the Flannigan Slough stationary tower, located at the U.S./Canada border, showed the tower was not useful in determining migration time of radiotagged sockeye salmon from tagging to crossing the border as signal strengths varied up-and-down, presumably as fish milled around in the vicinity of the tower. Furthermore, when fish were out of the water during tagging at the fish wheels or when surfacing (jumping), the radiotag signals could potentially be recorded as far upstream as the Tulsequah

River tower (approximately 10 km upriver) even though the fish had not yet crossed the U.S./Canada border.

The Canadian commercial fishery occurred from statistical weeks 27 to 38. Sockeye salmon were harvested in the Canadian commercial fishery between statistical weeks 27 and 38 and fishery openings varied from 2 to 5 days per week. Harvest rates on spaghetti tagged and radiotagged sockeye salmon in the commercial fishery varied by statistical week (Table 8). Peak harvest of tagged sockeye salmon occurred in statistical week 31, when 40% of the radiotagged fish and 35% of the spaghetti tagged fish were harvested (Figure 5). The cumulative time-to-recovery in the Canadian harvest was similar between radiotagged and nonradiotagged fish (Figure 6).

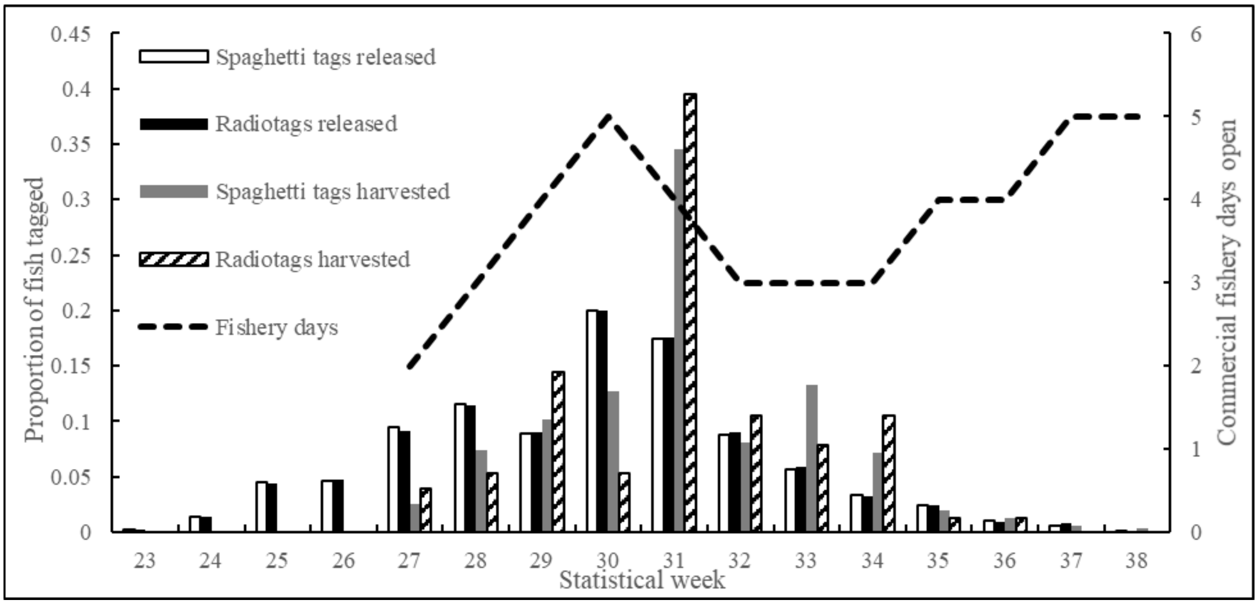

Figure 5.–Proportion of spaghetti tagged and radiotagged sockeye salmon released at the Canyon Island fish wheels and proportion of recoveries of spaghetti tagged and radiotagged fish harvested in the Canadian commercial fishery by statistical week in 2019. The number of Canadian commercial fishery days by statistical week is shown by the dashed black line.

Table 8.–Proportions and numbers (*n*) of radiotagged sockeye salmon released at the Canyon Island fish wheels and radiotagged fish harvested in the Canadian commercial fishery by statistical week, 2019.

Released		Stat.	Radiotagged fish harvested by statistical week										Harvested	
Proportion	*n*	week	27	28	29	30	31	32	33	34	35	36	*n*	Proportion
0.002	1	23	0	0	0	0	0	0	0	0	0	0	0	0.000
0.013	7	24	0	0	0	0	0	0	0	0	0	0	0	0.000
0.044	23	25	1	1	0	0	0	0	0	0	0	0	2	0.263
0.048	25	26	0	1	0	0	0	0	0	0	0	0	1	0.013
0.091	48	27	2	2	3	0	0	0	0	0	0	0	3	0.039
0.114	60	28	0	0	6	0	0	0	0	0	0	0	4	0.053
0.090	47	29	0	0	2	3	1	0	0	0	0	0	11	0.145
0.200	105	30	0	0	0	1	15	2	0	0	0	0	4	0.053
0.175	92	31	0	0	0	0	14	5	0	0	0	0	30	0.395
0.090	47	32	0	0	0	0	0	1	5	0	0	1	8	0.105
0.059	31	33	0	0	0	0	0	0	1	6	0	0	6	0.079
0.032	17	34	0	0	0	0	0	0	0	2	0	0	8	0.105
0.025	13	35	0	0	0	0	0	0	0	0	1	0	1	0.013
0.010	5	36	0	0	0	0	0	0	0	0	0	0	1	0.013
0.008	4	37	0	0	0	0	0	0	0	0	0	0	0	0.000
Total	525		3	4	11	4	30	8	6	8	1	1	76	0.140
Proportion of total harvested			0.04	0.05	0.14	0.05	0.39	0.11	0.08	0.11	0.01	0.01	1.00	

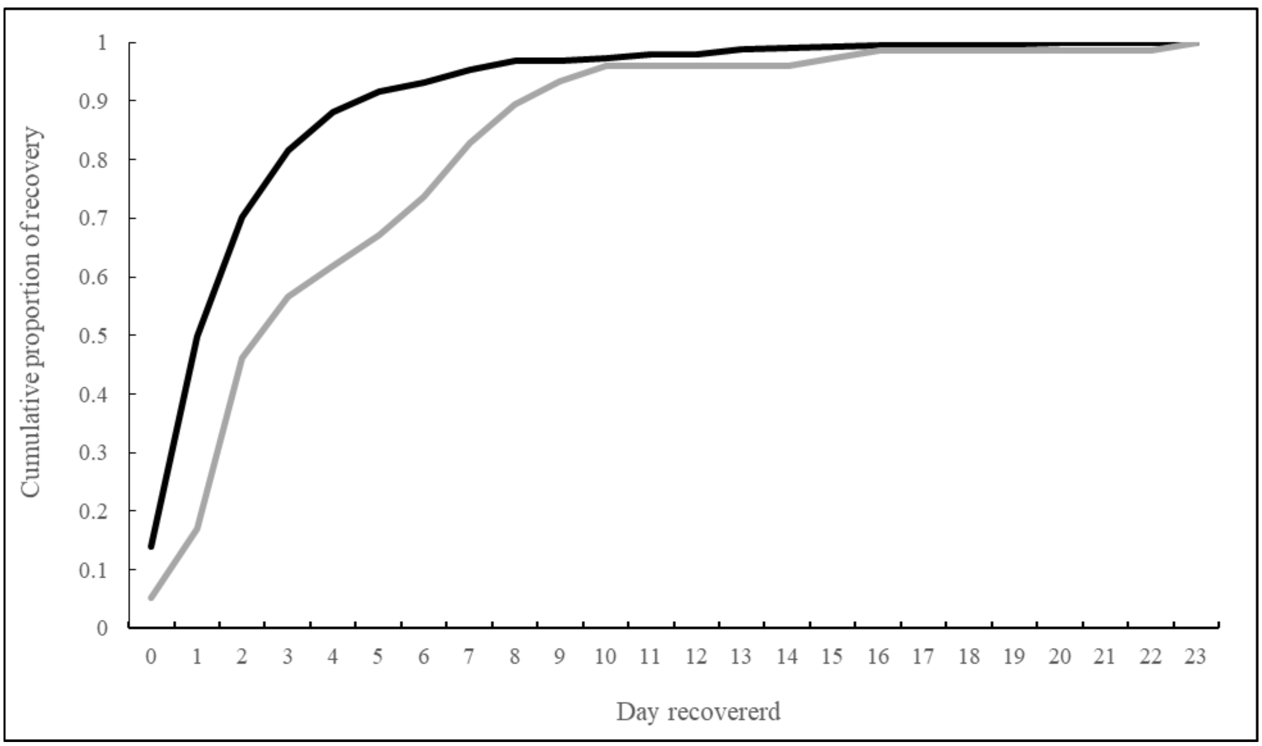

Figure 6.–The cumulative time-to-recovery of spaghetti tagged fish (black line; $n = 458$) and radiotagged fish (gray line; $n = 76$) between release at the Canyon Island fish wheels and recovery in the Canadian commercial fishery in 2019.

FATES

Fate codes were designated for all 525 radiotagged sockeye salmon; 9 radiotagged fish (1.7%) were never detected during aerial surveys or at any of the stationary towers (Table 9). The total number of dropouts (fish that never passed the U.S./Canada border) was 88 fish, or 16.8% of the 525 radiotagged fish successfully detected. Of the 437 radiotagged sockeye salmon that crossed the U.S./Canada border, 76 fish (17.4%) were captured in the Canadian commercial fishery, 343 fish (78.5%) were tracked to a probable spawning location, and 18 fish (4.1%) were assigned an unknown fate. These 18 radiotagged fish were aerially tracked upstream of the U.S./Canada border, and thus were considered available for recapture in the Canadian commercial fishery (event 2), but were later tracked downstream of the U.S./Canada border. These fish may have died and washed downstream, emigrated from the system, or spawned below the border outside the bounds of aerial tracking surveys (Table 9).

Table 9.–List of fate descriptions recorded for all radiotagged sockeye salmon on the Taku River, 2019.

Fate description	*n*
Never located, unknown fate	9
Never passed the U.S./Canada border, regurgitated tag/died	81
Never passed the U.S./Canada border, was recovered in a U.S. fishery	7
Never passed the U.S./Canada border, was tracked to a tributary below the U.S./Canada border	0
Passed the U.S./Canada border, unknown fate	18
Passed the U.S./Canada border, tracked to a probable spawning location	343
Passed the U.S./Canada border, captured in the Canadian inriver fishery	76

AERIAL SURVEY SPAWNING DISTRIBUTION

Probable spawning locations for 343 radiotagged fish (Table 10) were determined fish-by-fish using data gathered during 22 drainage wide aerial surveys (Appendix B). The farthest upstream detection, preferably within a cluster of detections that showed a high signal strength (>120 dBm), was used to identify the likely spawning location. These probable spawning locations are approximate, however, as the telemetry dataloggers marked the location of the aircraft when recording data and not the precise location of the radiotags being detected (Figure 7). The mainstem Taku River accounted for more than half (53%) of radiotags tracked to likely spawning locations. Little Trapper Lake had the highest number of radiotags among the lake systems, with 6% tracked during the aerial surveys.

Table 10.–Final probable spawning locations of radiotagged sockeye salmon based on drainagewide aerial surveys of the Taku River, 2019. Location is listed geographically, progressing upstream from the U.S./Canada border (Figure 1).

Location	*n*	Proportion	SE of proportion
Mainstem Taku River	180	0.525	0.037
Wilms Creek	4	0.012	0.054
Tulsequah River	25	0.073	0.052
King Salmon River	15	0.044	0.053
King Salmon Lake	17	0.050	0.053
Sloko River	3	0.009	0.054
Nakina River	30	0.087	0.052
Silver Salmon River	2	0.006	0.054
Kuthai Lake	2	0.006	0.054
Inklin River	9	0.026	0.053
Kowatua Creek	12	0.035	0.053
Little Trapper Lake	21	0.061	0.052
Sheslay River	5	0.015	0.054
Tatsatua Creek	10	0.029	0.053
Tatsamenie Lake	4	0.012	0.054
Hackett River	1	0.003	0.054
Dudidontu River	1	0.003	0.054
Nahlin River	2	0.006	0.054
Total	343		

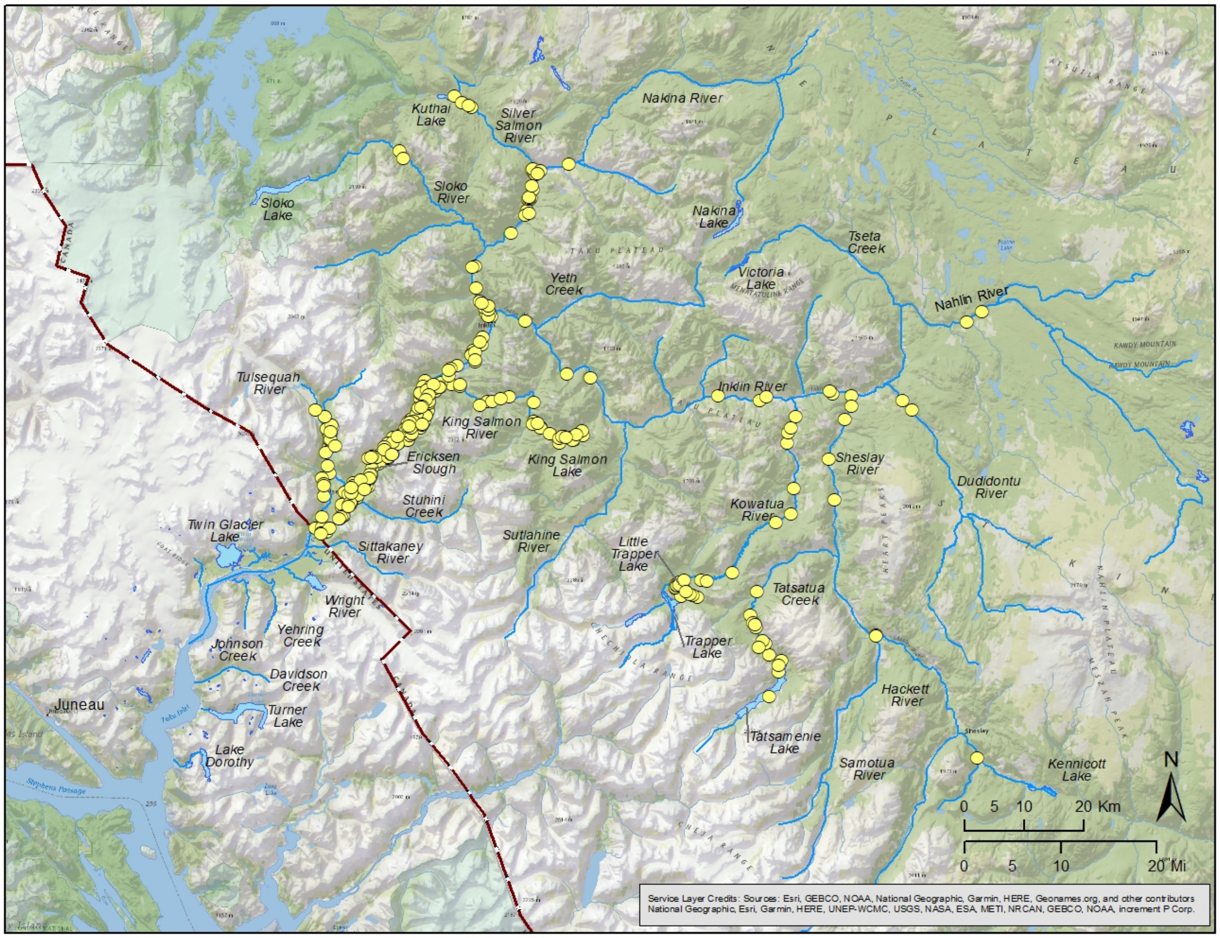

Figure 7.–Final fate locations of radiotagged Taku River sockeye salmon that crossed the U.S./Canada border (maroon dotted line) and likely spawned (n = 343 fish) in 2019. Final fate locations indicate farthest upstream aerial detections, not necessarily exact spawning locations.

GENETIC ANALYSES

Nine reporting groups of sockeye salmon met the baseline evaluation tests used to assess identifiability of reporting groups: mainstem Taku River, Nahlin River, King Salmon Lake, Kuthai Lake, Little Trapper Lake, Tatsatua Lake, Tatsamenie Lake, Chutine Lake (tributary to the Stikine River), and Other (i.e., all remaining collections in the baseline). Of the 534 sockeye salmon radiotagged at the Canyon Island fish wheels, 528 fish passed all quality control measures and were included in further analyses. Among these genetic reporting groups, 4 (King Salmon Lake, Kuthai Lake, Little Trapper Lake, and Tatsamenie Lake) were considered to be lake-type stocks and the remaining (mainstem Taku River, Nahlin River, Tatsatua Lake, Chutine Lake, and Other) were grouped as river-type stocks (Miller and Pestal 2020).

Stock Composition

Stock Composition of Fish Wheel Catch

The stock composition of the fish wheel catch was estimated using the 528 radiotagged sockeye salmon that passed quality control measures (Appendix G). Estimates were stratified by week, but statistical weeks 23–26 and 34–37 were pooled due to low sample sizes (*n* < 30). The estimated total proportions of river-type stocks was 71.1% and lake-type stocks was 28.9%. By reporting group, the mainstem Taku River was the largest contributor (66.8%), followed by King Salmon Lake (8.6%), Little Trapper Lake (8.3%), Tatsamenie Lake (7.5%), Kuthai Lake (4.5%), Tatsatua Lake (3.2%), Other (0.6%), and Nahlin River (0.5%). Although the Chutine Lake reporting group was represented in the analysis, it was an insignificant contributor to the overall stock composition (0%), so will not be discussed further (Table 11; Figure 8).

Run timing varied by stock (Figure 9). The mainstem Taku River reporting group, the highest contributing stock, peaked at the fish wheels in statistical week 31, when it accounted for 80.1% of the total stock composition (Table 11). The Kuthai Lake and King Salmon Lake reporting groups showed the highest stock contribution early in the season: Kuthai Lake peaked during the statistical week 23–26 stratum (28.7%) and King Salmon Lake peaked in statistical week 27 (24.6%). The Little Trapper Lake reporting group showed the highest contributions near the midpoint of the season and peaked in statistical week 29, when it represented 20.8% of the stock composition. The Tatsamenie Lake reporting group was primarily found later in the season, and composed 22.8% of the stock composition in the statistical week 34–37 stratum. The Nahlin River reporting group was only identified early in the season in the statistical week 23–26 stratum, when it contributed 7.0% to the stock composition. Contribution of the Tatsatua Lake reporting group was also low and composed 6.6% of the stock composition in the statistical week 34–37 stratum (Table 11).

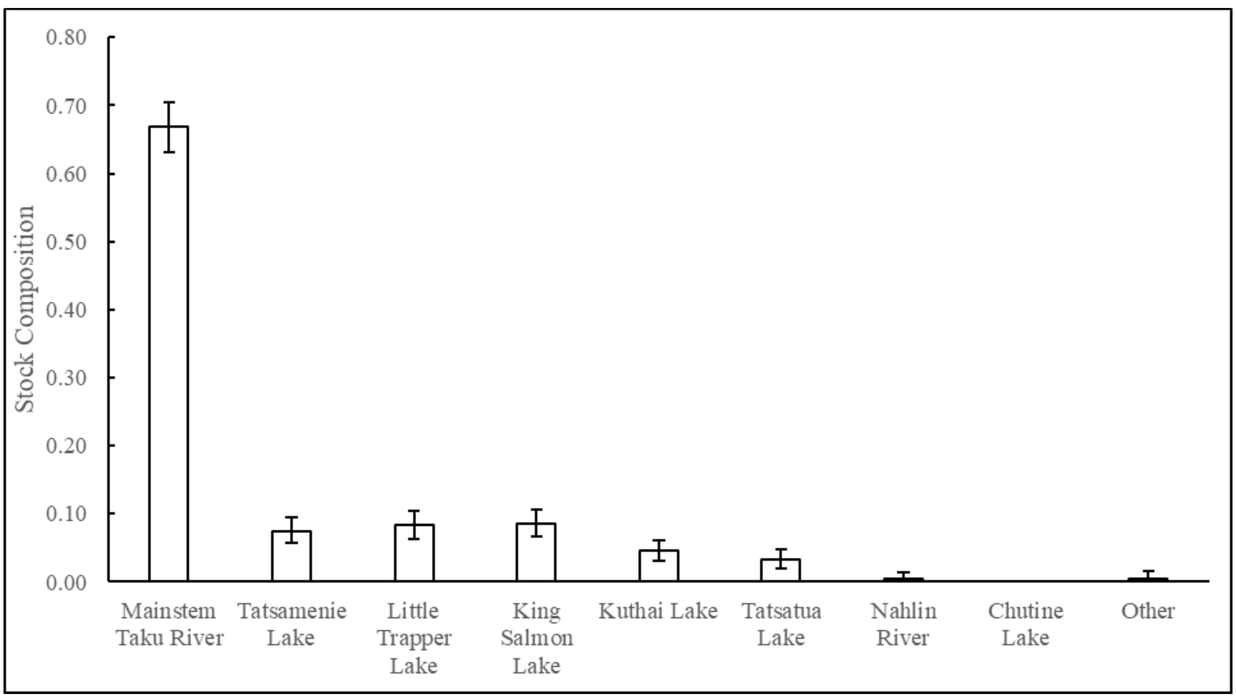

Figure 8.–Estimated genetic stock composition and 90% credible intervals of radiotagged Taku River sockeye salmon in the Canyon Island fish wheel catch, by reporting group, 2019 (*n* = 528 fish).

Table 11.–Estimated genetic stock composition of the fish wheel catch based on radiotagged fish (top), and estimated numbers of sockeye salmon spaghetti tagged by stock (bottom) based on genetic stock identification at the Canyon Island fish wheels, 2019.

Statistical week	*n*	Mainstem Taku River	Tatsamenie Lake	Little Trapper Lake	King Salmon Lake	Kuthai Lake	Tatsatua Lake	Nahlin River	Chutine Lake	Other
23–26	56	0.489	0.000	0.000	0.138	0.287	0.000	0.070	0.000	0.016
27	50	0.597	0.000	0.080	0.246	0.077	0.000	0.000	0.000	0.000
28	61	0.595	0.000	0.151	0.225	0.030	0.000	0.000	0.000	0.000
29	46	0.650	0.000	0.208	0.086	0.045	0.000	0.000	0.000	0.011
30	107	0.671	0.111	0.104	0.034	0.000	0.051	0.000	0.000	0.028
31	93	0.801	0.071	0.042	0.021	0.010	0.055	0.000	0.000	0.000
32	46	0.686	0.138	0.152	0.024	0.000	0.000	0.000	0.000	0.000
33	31	0.690	0.148	0.042	0.000	0.000	0.031	0.000	0.000	0.089
34–37	38	0.667	0.228	0.006	0.000	0.000	0.066	0.000	0.000	0.033
Total	528	0.668	0.075	0.083	0.086	0.045	0.032	0.005	0.000	0.006
23–26	345	169	0	0	48	99	0	24	0	5
27	304	181	0	24	75	23	0	0	0	0
28	373	222	0	56	84	11	0	0	0	0
29	288	187	0	60	25	13	0	0	0	3
30	645	433	72	67	22	0	33	0	0	18
31	563	451	40	24	12	5	31	0	0	0
32	281	193	39	43	7	0	0	0	0	0
33	183	126	27	8	0	0	6	0	0	16
34–37	240	160	55	1	0	0	16	0	0	8
Total	3,222	2,153	240	268	277	146	104	16	0	17

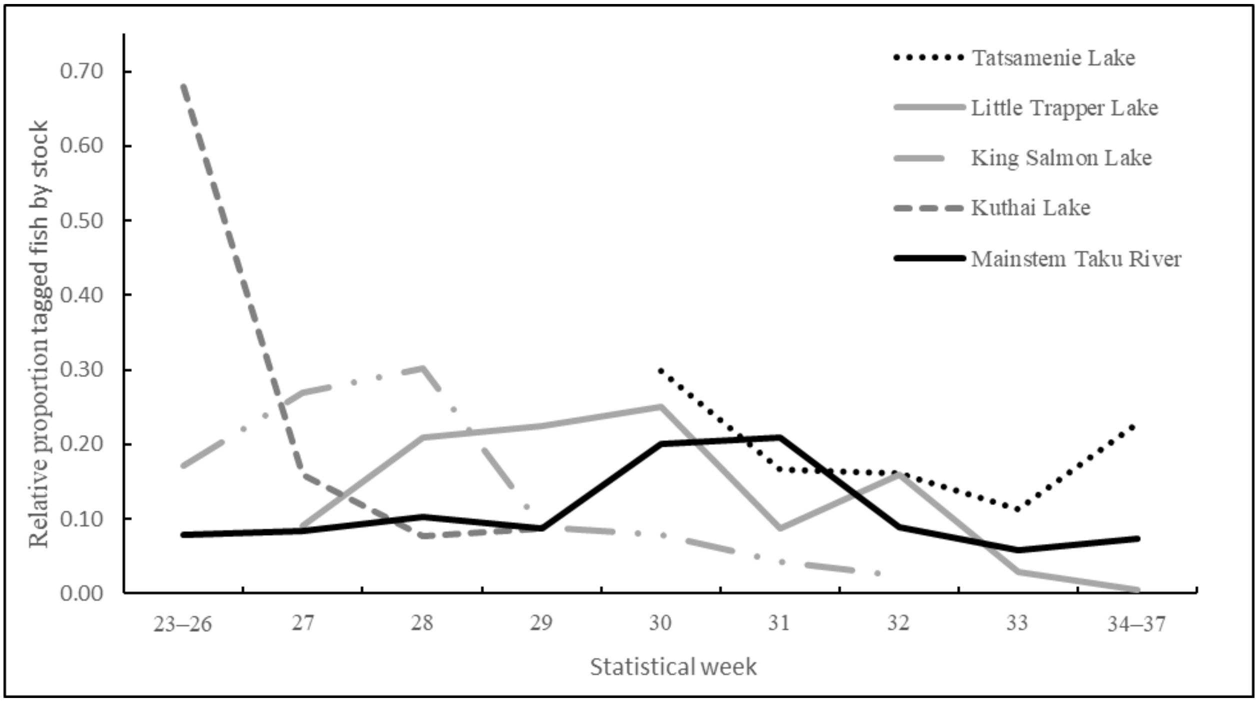

Figure 9.–Relative run timing of each major contributing sockeye salmon reporting group (i.e., those contributing > 4% of annual escapement) radiotagged at the Canyon Island fish wheels by statistical week, 2019. Weekly proportions sum to 100% for individual stocks.

Stock Composition of Canadian Harvest

The stock composition of radiotagged sockeye salmon harvested in the Canadian commercial fishery was estimated from 75 samples. Most of the harvested sockeye salmon were estimated to be from the river-type stocks (77.3%) and the remaining were lake-type stocks (22.7%). By reporting group, mainstem Taku River (76.8%) was the largest contributor followed by Tatsamenie Lake (12.3%), Little Trapper Lake (9.0%), Kuthai Lake (1.4%), and Tatsatua Lake (0.5%) (Figure 10). No radiotagged sockeye salmon from the King Salmon Lake, or Chutine Lake reporting groups were recovered in the harvested samples (Figure 10).

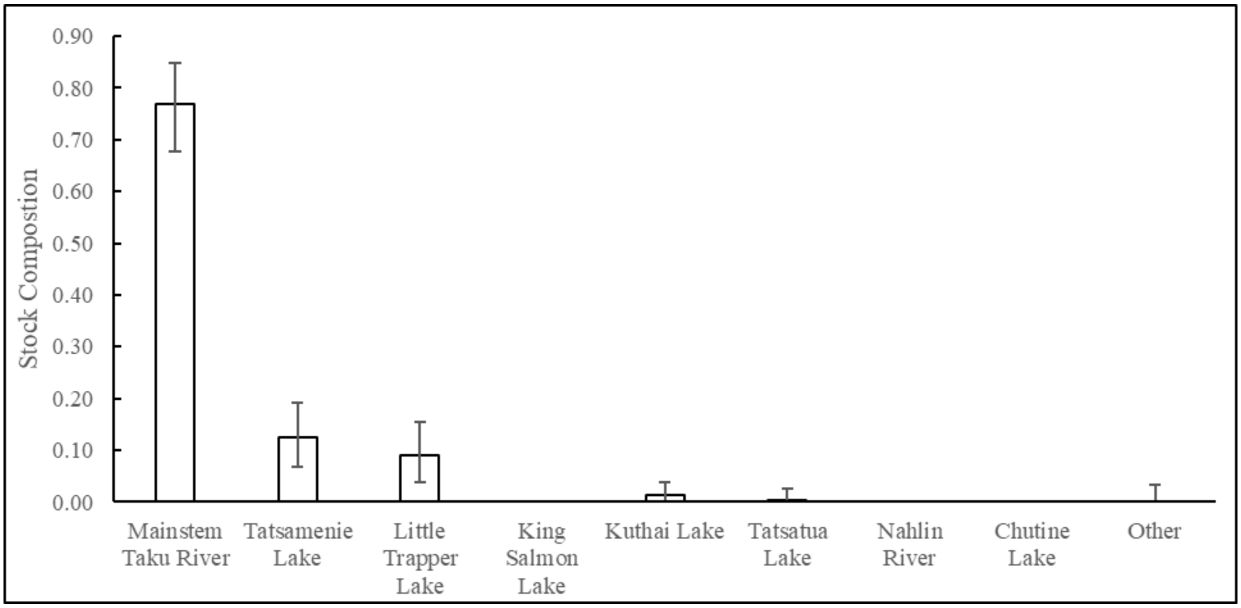

Figure 10.–Estimated genetic stock composition and 90% credible intervals of radiotagged Taku River sockeye salmon harvested in the Canadian commercial fishery, by reporting group, in 2019 (n = 75 fish).

INDIVIDUAL GENETIC ASSIGNMENT

Individual Assignment of Radiotagged Fish

In addition to estimating stock composition of the fish wheel catch, we calculated individual genetic assignment to the reporting group for each fish radiotagged at the fish wheels (Table 12). Overall, 462 (88%) of the 528 radiotagged fish met the ≥0.95 probability threshold required for successful reporting group assignment. Fish that fell below this threshold were not considered conclusively assigned to a specific reporting group or and were excluded from the following results (Table 12).

Table 12.–Number of sockeye salmon that were radiotagged at the fish wheels and identified to reporting group through individual assignment (≥0.95 probability threshold), 2019.

Reporting group	*n*
Mainstem Taku River	318
Tatsamenie Lake	30
Little Trapper Lake	37
King Salmon Lake	44
Kuthai Lake	25
Tatsatua Lake	4
Nahlin River	0
Other	4
Total radiotags	462

Overall, the vast majority of radiotagged sockeye salmon individually assigned to river-type stocks (n = 326 fish). Within this stock classification, most sockeye salmon assigned to the mainstem Taku River reporting group (n = 318 fish). Interestingly, a small number of radiotagged sockeye salmon (n = 14 fish) that genetically assigned to one of the lake-type reporting groups—

Tatsamenie Lake, Little Trapper Lake, King Salmon Lake, or Kuthai Lake—had final fate locations (based on aerial surveys and the stationary tower detections) in the mainstem of the Taku River. It is unknown if these fish strayed from the spawning areas predicted from their genetic assignments, died during migration, regurgitated the radiotag, or washed downriver after spawning. Although there is potential for genetic misassignment to reporting group, we feel confident that the genetic assignment data were accurate due to the stringent probability threshold (≥95%) used for reporting group assignment. Potential evidence of sockeye salmon straying from their natal streams was evident. A single fish assigned to the Tatsatua Lake reporting group was tracked to the Dudidontu River and a fish assigned to the Tatsamenie Lake reporting group was tracked to Kowatua Creek (Figure 11). It is noteworthy that some fish assigned to the Tatsamenie Lake reporting group had final fate locations in the Sheslay River (Figure 11); however, Tatsamenie Lake fish are known to spawn late in the season, so the study period may not have adequately represented the entire migration. That said, there was a cluster of fish with final fate locations in the outflow of Tatsamenie Lake (Figure 12).

A cluster of 12 radiotagged sockeye salmon with a genetic assignment to the Kuthai Lake reporting group were aerially tracked to a final location at the junction of the Nakina and Silver Salmon Rivers (Figure 13). These fish presumably could not pass a known partial barrier in the Silver Salmon River and were unable to reach Kuthai Lake. The 2019 total weir count of 605 sockeye salmon at Kuthai Lake was below the 2007–2018 average count of 913 fish (TTC 2021). Further, a malfunction of the datalogger at the Kuthai Lake tower precluded further examination of radiotagged sockeye salmon that were aerially tracked above the partial barrier, located just downstream of the lake (Appendix F). Similarly, 6 fish from the King Salmon Lake reporting group that were tracked to final locations in lower King Salmon River may have been unable to pass a known partial barrier (Figure 14). Sixteen of the 18 sockeye salmon that were tracked upstream of the U.S./Canada border then subsequently downstream of the border to an unknown fate (see section *Fates*) met criteria for individual genetic assignment. Of these fish, 13 were assigned to the Mainstem Taku River reporting group, 2 to the King Salmon Lake reporting group, and a single fish to the Tatsamenie Lake reporting group.

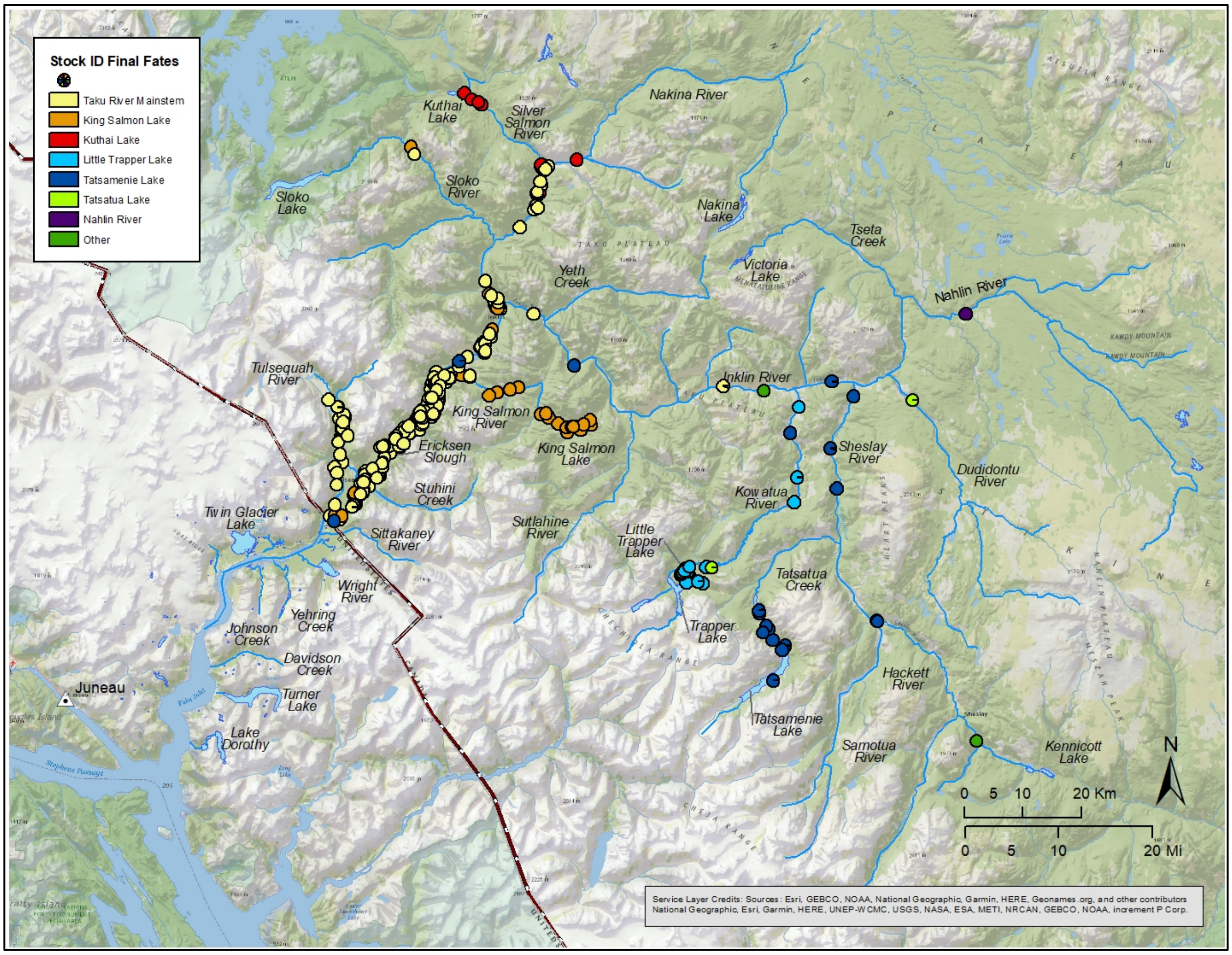

Figure 11.–Final fates and distribution of radiotagged sockeye salmon that met the individual genetic assignment probability threshold (≥0.95; n = 462 fish), Taku River drainage 2019.

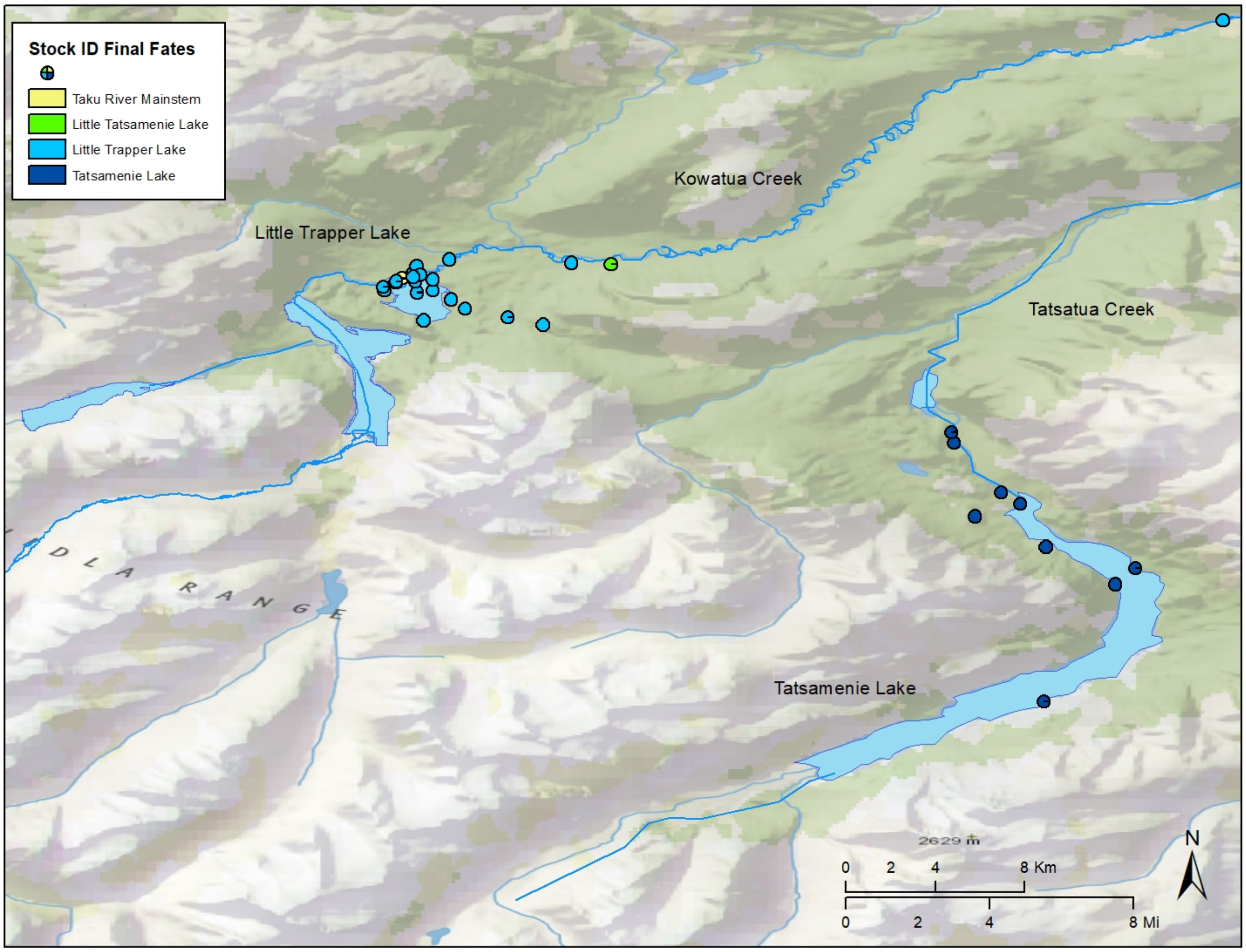

Figure 12.–Final fates of radiotagged sockeye salmon that met the individual genetic assignment probability threshold (≥0.95) at Little Trapper and Tatsamenie Lakes, 2019.

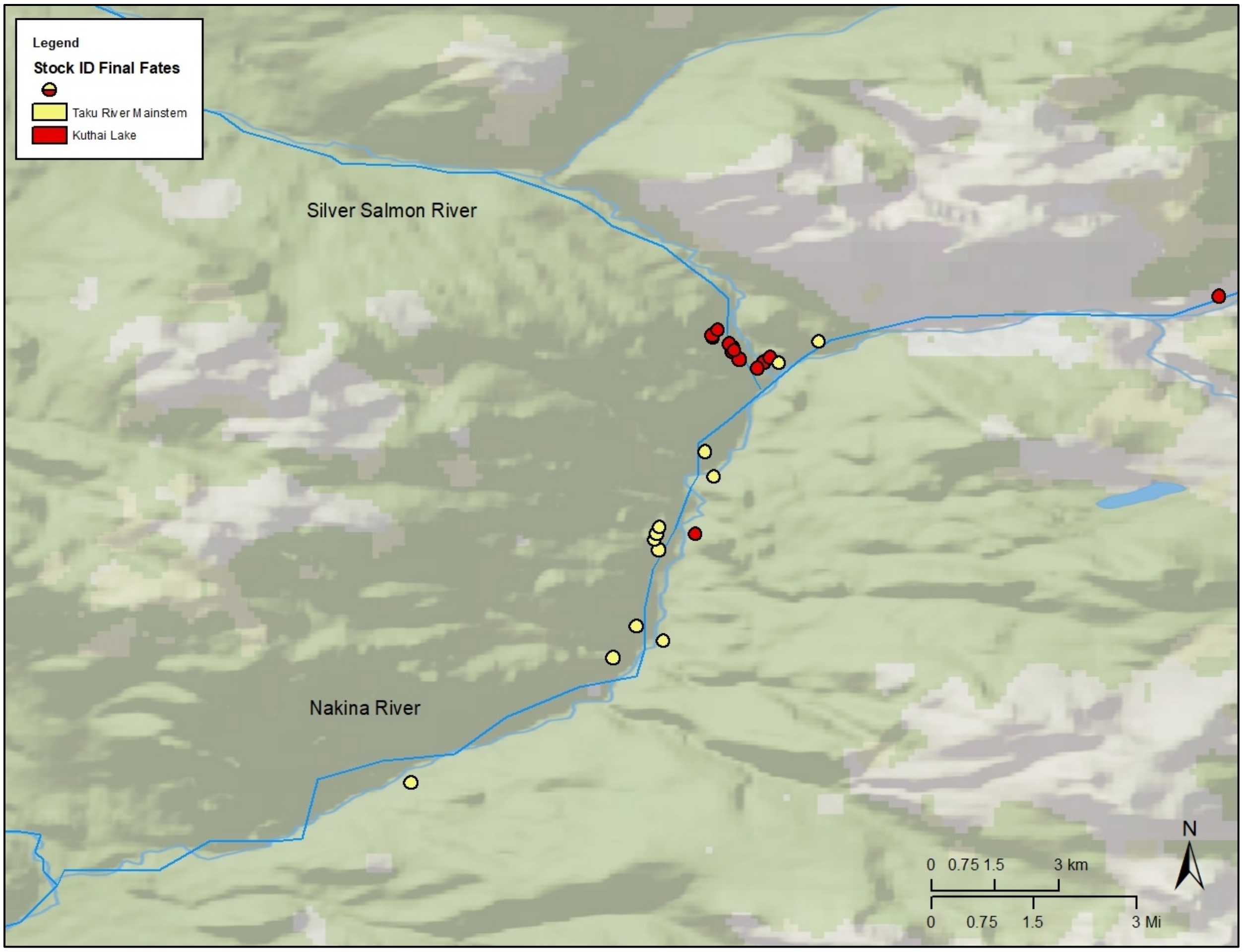

Figure 13.–Final fates of radiotagged sockeye salmon that met the individual genetic assignment probability threshold (≥0.95) at the confluence of the Nakina and Silver Salmon Rivers, 2019.

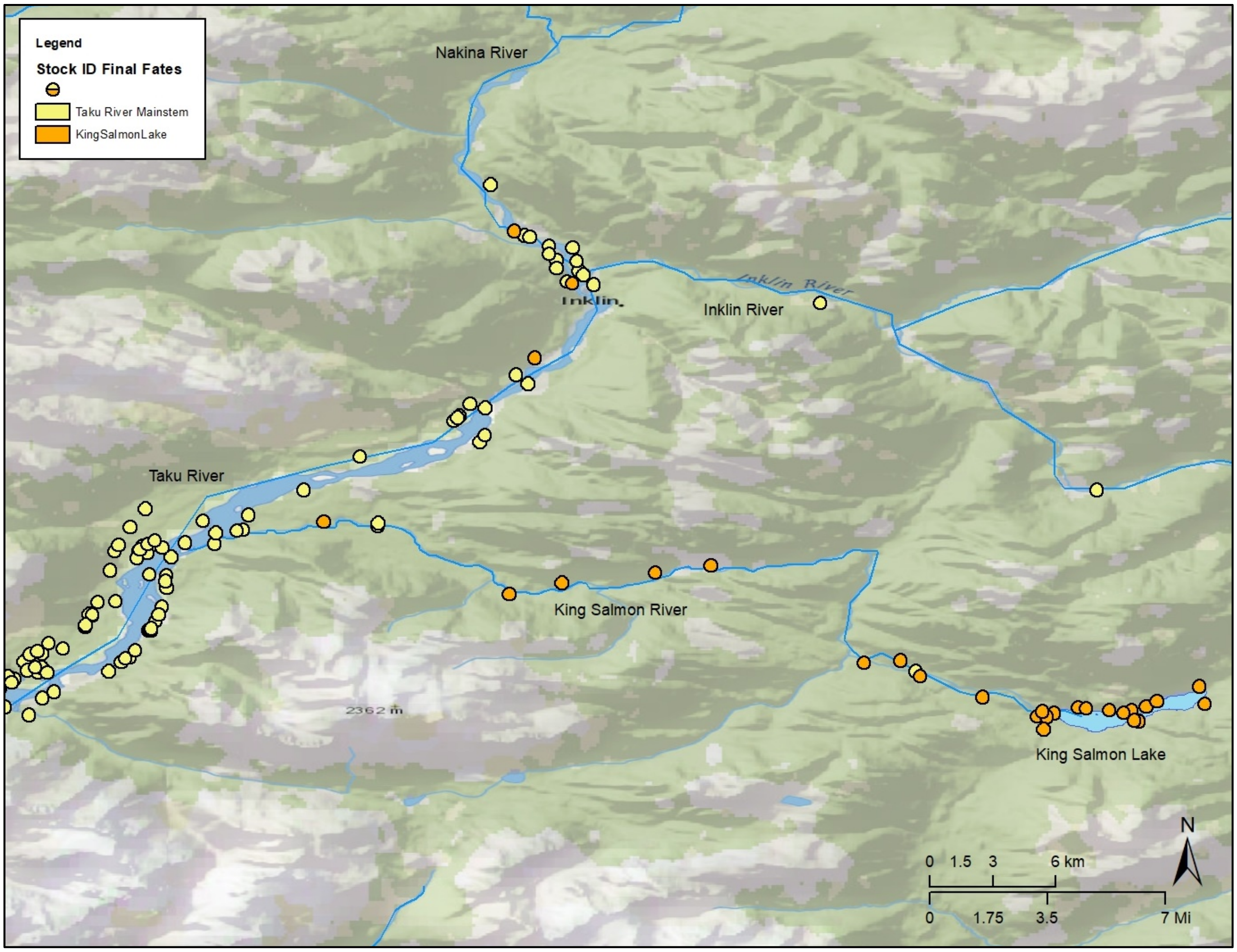

Figure 14.–Final fates of radiotagged sockeye salmon that met the individual genetic assignment probability threshold (≥0.95) at the King Salmon River and King Salmon Lake, 2019.

Individual Assignment of Above Border Individuals

Of the 437 radiotagged sockeye salmon that crossed the U.S./Canada border, 382 of these fish met the ≥0.95 probability threshold for individual genetic assignment. River-type stocks (mainstem Taku River, Tatsatua Lake, Nahlin River, and Other) composed the majority of the individually assigned fish that crossed the U.S./Canada border (*n* = 264 fish), and most of these fish were assigned to the mainstem Taku River reporting group (*n* = 256 fish). The lake-type stocks were assigned to the following reporting groups: King Salmon Lake (*n* = 36 fish), Little Trapper Lake (*n* = 34 fish), Tatsamenie Lake (*n* = 26 fish), and Kuthai Lake (*n* = 22 fish; Table 13).

Table 13.–Number of radiotagged sockeye salmon that met the genetic individual assignment probability threshold (≥0.95 probability) and crossed the U.S./Canada border, by statistical week and reporting group, Taku River, 2019.

	Statistical week radiotagged														
Reporting group	24	25	26	27	28	29	30	31	32	33	35	36	37	38	Total
Mainstem Taku River	2	5	11	24	28	24	52	48	25	20	10	4	2	1	256
King Salmon Lake	0	2	4	9	12	3	3	2	1	0	0	0	0	0	36
Kuthai Lake	4	7	3	3	2	2	0	1	0	0	0	0	0	0	22
Little Trapper Lake	0	0	0	3	8	7	8	3	3	1	1	0	0	0	34
Tatsamenie Lake	0	0	0	0	0	0	9	5	4	4	2	2	0	0	26
Tatsatua Lake	0	0	0	0	0	0	1	2	0	0	1	0	0	0	4
Nahlin River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	1	0	0	1	1	0	0	0	0	1	0	0	4
Total	6	14	19	39	50	37	74	61	33	25	14	7	2	1	382

Individual Assignment of Canadian Commercial Harvest

Seventy-one of the 75 radiotagged sockeye salmon harvested in the Canadian commercial fishery met the ≥0.95 probability threshold for individual genetic assignment. Most of the individually assigned fish belonged to the mainstem Taku River reporting group (*n* = 54 fish), of which 28 fish (52%) had been radiotagged during statistical weeks 30 and 31. Except for a single sockeye salmon in the Kuthai Lake reporting group that was radiotagged in statistical week 27, fish from early run sockeye salmon stocks—the King Salmon Lake, Kuthai Lake, and Nahlin River reporting groups—were not represented in radiotags recovered from the Canadian commercial fishery. Sockeye salmon that assigned to the Little Trapper Lake reporting group (*n* = 7 fish) had been radiotagged in the middle of the season, from statistical week 27 to 31. Sockeye salmon assigned to the Tatsamenie Lake reporting group (*n* = 8 fish) had been radiotagged from statistical week 30 to 33 (Table 14).

Table 14.–Number of radiotagged sockeye salmon that met the genetic individual assignment probability threshold (≥0.95 probability) and were harvested in the Canadian commercial fishery by statistical week and reporting group, Taku River, 2019.

	Statistical week radiotagged										
Reporting group	25	26	27	28	29	30	31	32	33	35	Total
Mainstem Taku River	1	1	5	4	4	15	13	4	6	1	54
King Salmon Lake	0	0	0	0	0	0	0	0	0	0	0
Kuthai Lake	0	0	1	0	0	0	0	0	0	0	1
Little Trapper Lake	0	0	2	2	1	0	2	0	0	0	7
Tatsamenie Lake	0	0	0	0	0	3	3	1	1	0	8
Tatsatua Lake	0	0	0	0	0	0	1	0	0	0	1
Nahlin River	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0
Total	1	1	8	6	5	18	19	5	7	1	71

Migration Timing

Migration time within the Taku River drainage was estimated for radiotagged sockeye salmon that were individually assigned to reporting groups (n = 462 fish). Migration time from the Canyon Island fish wheels to harvest in the Canadian inriver commercial fishery ranged between 0 and 23 days (Figure 15). On average, radiotagged fish were harvested 4 days after tagging (SD = 4 days), and the median number of days between tagging and harvest was 3 days. Of the radiotagged sockeye salmon harvested in the Canadian commercial fishery (n = 71 fish), 62% were harvested <5 days after the tagging event at the fish wheels (Figure 15).

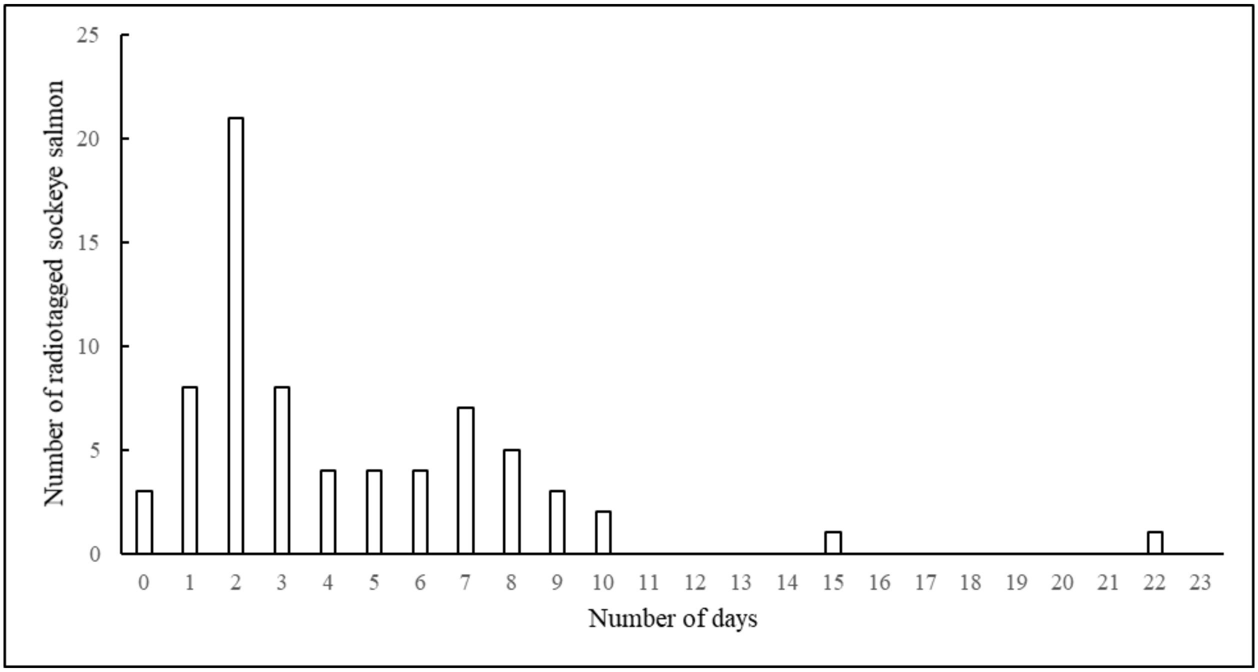

Figure 15.–Number of days between radiotagging at the Canyon Island fish wheels and subsequent harvest in the Canadian commercial fishery for radiotagged sockeye salmon that met the genetic individual assignment probability threshold (≥0.95 probability; n = 71 fish), Taku River, 2019.

The migration time (days) for sockeye salmon between the initial tagging event at the Canyon Island fish wheels, the first detection at the Nakina River or Inklin River stationary telemetry towers, and the first detection at either the lake or the Nahlin River tower was also examined. We note that fish in the mainstem of the Taku River were not examined, as most spawn below the Nakina/Inklin junction. Although there were gaps in the telemetry tower data at some sites (Appendix D), 42 radiotagged fish that assigned to a reporting group were examined for migration time between the tagging site and towers (Table 15).

Table 15.–Migration time of known individually assigned radiotagged sockeye salmon (≥0.95 probability threshold) from the time of tagging to detection at Nakina River/Inklin River confluence and tributary/lake towers. Stationary towers were located at the mouth of the Nakina and Inklin Rivers. The King Salmon River was located downstream of the Nakina and Inklin Rivers.

Reporting group	*n*	Average days to Nakina or Inklin River tower	Average days to tributary towers
King Salmon Lake	17	–	22
Kuthai Lake	1	6	33
Tatsamenie Lake	7	14	32
Little Trapper Lake	16	10	25
Nahlin River	1	27	43

DISCUSSION

A primary objective of this project was to estimate the proportion of radiotagged fish that dropped out of the concurrent capture–recapture study. We estimated that rate to be 16.8% in 2019, which was less than the 22.0% dropout rate that was factored into historical capture–recapture estimates based on previous radio telemetry studies (Miller and Pestal 2020). Our estimated dropout rate was incorporated into the final Taku River sockeye salmon capture–recapture analysis and the 2019 inriver population estimate of 103,152 sockeye salmon (TTC 2021). The estimated dropout rate in 2019, along with additional estimates from planned future studies, will be used to provide an average dropout rate for capture–recapture studies moving forward.

An important assumption of this study was that radiotagged fish provided a representative sample of the spaghetti tagged fish that were not radiotagged (i.e., they shared similar survival, movement, and catchability). Results derived from radiotagged fish (final fates, dropout rates, genetic stock composition) could then reasonably be extended to the spaghetti tagged (i.e., nonradiotagged) fish in the capture–recapture study. Radiotagging fish at a standardized rate ensured that the cumulative distribution of radiotagged and nonradiotagged fish was the same over the entire study period. The cumulative time from release at the fish wheels to recovery in the Canadian harvest (i.e., sulk time) was also similar between radiotagged and nonradiotagged fish. In addition, two-sample K-S tests confirmed that the size distributions of radiotagged and nonradiotagged fish were similar for samples of females and, importantly, for both sexes combined. The size distribution of male radiotagged fish, however, differed from male nonradiotagged fish; male radiotagged fish averaged longer (by 19 mm) and the length distribution was truncated (range: 405–630 mm) compared to male nonradiotagged fish (range: 350–665 mm). If these smaller or larger (nonrepresented) fish were from a particular reporting group or behaved differently, the results from the radiotagging study may not exactly represent the nonradiotagged fish.

The estimated proportions of river-type and lake-type fish depends on the method applied (e.g., genetics or final fates based on aerial surveys and detection at telemetry towers) and groupings assigned. Based on genetic stock composition of radiotagged fish at fish wheels, the estimated proportion of river-type fish was 71.1% and lake-type fish was 28.9%. The proportion of river-type fish was lower than stock composition estimates from the 2019 inriver Canadian commercial fishery (river-type = 77.3%) and the proportion of river-type in the total harvest of Taku River sockeye salmon in the U.S. District 111 traditional commercial drift gillnet fishery (river-type = 80.2%; TTC 2021). The estimated stock proportions, using spawning distribution identified by aerial surveys, was 87.1% river-type, and 12.9% lake-type. It is noteworthy that in some cases the exact locations of radiotagged fish were difficult to determine due to proximity of fish to outlet streams in their respective lakes. Including outlet streams in the calculation of lake-type stocks brings the aerial estimate of river-type (76.0%) and lake-type (24.0%) stocks much closer to the genetic estimates. Further, this more closely follows the classification scheme employed by Eiler et al. (1992), who estimated 63% of radiotagged fish were tracked to "river areas without lakes" (i.e., river-type fish) and 37% were tracked to "areas associated with lakes" (i.e., lake-type fish).

As discussed previously, care must be taken when applying lake- and river-type classifications to telemetry survey data. The inability to differentiate final fates in lakes versus outlet streams may significantly alter estimates. Further, as demonstrated by 14 fish that had genetic affinities for lake-type stocks but were tracked to the mainstem Taku River, estimates of stock composition may be artificially inflated. The pairing of individual genetic assignments with matched telemetry data proved useful in identifying fish that were tracked to unexpected locations. We feel confident that the genetic assignment data were accurate due to the stringent probability threshold (≥95%) used for reporting group assignment.

Further genetic examination of radiotagged fish was useful in determining specific stock contributions and was useful for determining the run timing of specific sockeye salmon stocks within the Taku River drainage. Additional studies in 2020 and 2021 will continue to provide important information on dropout rates and spawning stock distribution and aid in the management of this important sockeye salmon run. Upon completion of this multi-year study, we recommend examining the spawning distribution across all years using a habitat classification model. A fine-scale, multi-year, habitat model may prove useful in identifying habitat usage (e.g., river, creek, lake, outlet stream) of sockeye salmon in the Taku River watershed.

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APPENDICES

The weekly sockeye salmon age-sex distribution, the seasonal age-sex distribution weighted by week, and the mean length by age and sex weighted by week, were calculated using equations from Cochran (1977).

Let

h	=	index of the stratum (week),
j	=	index of the age class,
p_{hj}	=	proportion of the sample taken during stratum h that is age j,
n_h	=	number of fish sampled in week h, and
n_{hj}	=	number observed in class j, week h.

Then the age distribution was estimated for each week of the escapement in the usual manner:

$$\hat{p}_{hj} = n_{hj}/n_h. \tag{1}$$

If N_h equals the number of fish in the escapement in week h, standard errors of the weekly age class proportions are calculated in the usual manner (Cochran 1977, page 52, equation 3.12):

$$SE(\hat{p}_{hj}) = \sqrt{\left[\frac{(\hat{p}_{hj})(1-\hat{p}_{hj})}{n_h-1}\right][1 - n_h/N_h]}. \tag{2}$$

The age distributions for the total escapement were estimated as a weighted sum (by stratum size) of the weekly proportions. That is,

$$\hat{p}_j = \textstyle\sum_h p_{hj}\,(N_h/N), \tag{3}$$

such that N equals the total escapement. The standard error of a seasonal proportion is the square root of the weighted sum of the weekly variances (Cochran 1977, pages 107–108):

$$SE(\hat{p}_j) = \sqrt{\textstyle\sum_j^h [SE(\hat{p}_{hj})]^2 (N_h/N)^2}. \tag{4}$$

The mean length, by sex and age class (weighted by week of escapement), and the variance of the weighted mean length, were calculated using the following equations from Cochran (1977, pages 142–144) for estimating means over subpopulations. That is, let i equal the index of the individual fish in the age-sex class j, and y_{hij} equal the length of the ith fish in class j, week h, so that,

$$\hat{\bar{Y}}_j = \frac{\sum_h (N_h/n_h)\sum_i y_{hij}}{\sum_h (N_h/n_h) n_{hj}}, \text{ and} \tag{5}$$

$$\hat{V}\left(\hat{\bar{Y}}_j\right) = \frac{1}{\hat{N}_j^2}\sum_h \frac{N_h^2(1-n_h/N_h)}{n_h(n_h-1)}\left[\sum_i \left(y_{hij} - \bar{y}_{hj}\right)^2 + n_{hj}\left(1 - \frac{n_{hj}}{n_h}\right)\left(\bar{y}_{hj} - \hat{\bar{Y}}_j\right)^2\right]. \tag{6}$$

Appendix B.–Dates of aerial telemetry surveys, survey area, and tributaries surveyed, Taku River, 2019.

Date	Survey area	Tributaries surveyed
2-Jul	East	Taku River, Inklin River, Nahlin River, Tatsatua Creek, Tatsamenie Lake, Trapper Lake, Kowatua Creek, King Salmon Lake, King Salmon River
5-Jul	West	Taku River, Nakina River, Silver Salmon River, Kuthai Lake
9-Jul	East	Taku River, Inklin River, Nahlin River, Tatsatua Creek, Tatsamenie Lake, Trapper Lake, Kowatua Creek
12-Jul	West	Taku River, Nakina River, Silver Salmon River, Kuthai Lake, Sloko River, Nakeneke River, Tulsequah River, Wilms Creek
17-Jul	East	Taku River, Tseta Creek, Trapper Lake, Kowatua Creek, King Salmon Lake, King Salmon River
18-Jul	West	Taku River, Nakina River, Nakeneke River, Sloko River, Silver Salmon River
22-Jul	East	Tseta Creek, Nahlin River
23-Jul	East	Taku River, Inklin River, Dudidontu River, Hackett River, Sheslay River, Tatsatua Creek, Tatsamenie Lake, Little Trapper Lake, Kowatua Creek, King Salmon Lake, King Salmon River
26-Jul	West	Taku River, Nakina River, Silver Salmon River, Kuthai Lake, Sloko River, Tulsequah River
30-Jul	East	Taku River, Nahlin River, Tatsamenie Lake, Tatsatua Creek, Little Trapper Lake, Kowatua Creek, King Salmon Lake, King Salmon River
6-Aug	West	Taku River, Nakina River, Silver Salmon River, Kuthai Lake, King Salmon Lake, King Salmon River, Tulsequah River
9-Aug	East	Taku River, Inklin River, Tseta Creek, Dudidontu River, Tatsamenie Lake, Tatsatua Creek, Sheslay River, Little Trapper Lake, Kowatua Creek
13-Aug	West	Taku River, Nakina River, Silver Salmon River, Kuthai Lake, Sloko River, Tulsequah River, Wilms Creek
21-Aug	West	Taku River, Nakina River, Silver Salmon River, Kuthai Lake, Sloko River, Tulsequah River
22-Aug	East	Taku River, Inklin River, Tatsamenie Lake, Tatsatua Creek, Sheslay River, Little Trapper Lake, Kowatua Creek, King Salmon Lake, King Salmon River
27-Aug	West	Taku River, Nakina River, Silver Salmon River, Kuthai Lake, Sloko River, Tulsequah River, Wilm's Creek, Sockeye Creek
29-Aug	East	Taku River, Inklin River, Yeth Creek, Sheslay River, Tatsamenie Lake, Tatsatua Creek, Little Trapper Lake, Kowatua Creek, King Salmon Lake, King Salmon River
5-Sep	West/East	Taku River, Nakina River, Inklin River, Sheslay River, Tatsamenie Lake, Tatsatua Creek, Little Trapper Lake, Kowatua Creek, King Salmon Lake, King Salmon River, Tulsequah River
10-Sep	East	Taku River, Inklin River, Sheslay River, Tatsamenie Lake, Tatsatua Creek, Little Trapper Lake, Kowatua Creek, King Salmon Lake, King Salmon River
17-Sep	West	Taku River, Nakina River, Silver Salmon River, Kuthai Lake, Sloko River, Tulsequah River, Wilm's Creek, Sockeye Creek
3-Oct	East	Taku River, Inklin River, Sheslay River, Hackett River, Tatsamenie Lake, Tatsatua Creek, Little Trapper Lake, Kowatua Creek, King Salmon Lake, King Salmon River, Tulsequah River
8-Oct	West/East	Taku River, Inklin River, Yeth Creek, Nakina River, Silver Salmon River, Kuthai Lake, Sloko River

Appendix C.–Sample telemetry aerial survey form, Taku River drainage, 2019.

Aerial Survey Data Entry Sheet

Date:

Time (Start/End):

Weather:

General Flight Path (based on handheld GPS):

Biologist(s):

Name of File Downloaded:

Brief Description of Survey:

Appendix D.–Stationary telemetry tower operation dates, periods of reduced coverage, and periods of no coverage, Taku River drainage, 2019.

Tower	Date installed	Date removed	Periods of reduced coverage	Periods with no coverage
Flannigan 1 (border)	16 Apr	23 Oct	30 May–30 Jun, 27 Jul–8 Aug, 2 Sep–6 Sep, 23 Oct	11 Jun, 15 Jun
Flannigan 2 (border)	16 Apr	23 Oct	30 May–30 Jun, 27 Jul–11 Aug, 2 Sep–6 Sep, 26 Sep, 27 Sep, 23 Oct	11 Jun, 15 Jun, 22 Jun
Deadfall (below border)	17 Apr	24 Oct	None	None
Inklin River (junction)	5 May	31 Oct	None	None
King Salmon Lake	28 Jun	31 Oct	None	None
Kuthai Lake	25 Jun	31 Oct	19 Jul	9 Aug–31 Oct
Nahlin River 1	4 Jun	31 Oct	6 Jun, 7 Jun, 10 Jun, 14 Jun, 7 Jul, 9 Jul– 11 Jul, 18 Jul–22 Jul, 24 Jul–30 Jul, 1 Aug, 2 Aug, 6 Oct–9 Oct	8 Jun, 9 Jun
Nahlin River 2	4 Jun	31 Oct	6 Jun, 10 Jun, 10 Jul, 11 Jul, 18 Jul–21 Jul, 1 Aug, 2 Aug, 17 Aug–21 Aug, 6 Oct–9 Oct	None
Sloko/Nakina River (junction)	5 May	31 Oct	19 Jul–26 Jul	None
Tatsamenie Lake 1	3 Jul	31 Oct	28 Aug–31 Aug, 15 Oct–22 Oct, 25 Oct–27 Oct, 29 Oct, 30 Oct	23 Oct, 24 Oct
Tatsamenie Lake 2	3 Jul	31 Oct	28 Aug–31 Aug, 15 Oct–27 Oct	29 Oct, 30 Oct
Little Trapper Lake	28 May	31 Oct	None	None
Tulsequah River	16 Apr	24 Oct	None	None

Appendix E.–Reporting group, location, ADF&G collection code, and the number (*n*) of sockeye salmon used in the genetic baseline for mixed stock analysis of Taku River fish wheel catches, 2019.

Reporting group	Location	ADF&G collection code	*n*
Chutine Lake	Stikine - Chutine Lake	SCHUTL09.SCHUT11	224
King Salmon Lake	Taku - King Salmon Lake	SKSLK10.SKSLK11	214
Kuthai Lake	Taku - Kuthai Lake	SKUTH06	171
Tatsatua	Taku - Tatsatua Lake (Tatsatua)	SLTAT11.SLTAT12	153
Little Trapper Lake	Taku - Little Trapper	SLTRA90.SLTRA06	237
Mainstem Taku River	Stikine - Andy Smith Slough	SFOWL07.SFOWL08.SFOWL09.SANDY07.SANDY09	54
Mainstem Taku River	Stikine - Bronson Slough	SBRON08.SBRON09	78
Mainstem Taku River	Stikine - Christina Lake	SCHRI11.SCHRI12	70
Mainstem Taku River	Stikine - Chutine River	SCHUT08	94
Mainstem Taku River	Stikine - Craig River	SCRAIG06.SCRAIG07.SCRAIG08	38
Mainstem Taku River	Stikine - Devil's Elbow	SDEVIL07.SDEVIL08	148
Mainstem Taku River	Stikine - Devil's Elbow	SDEVIL09	53
Mainstem Taku River	Stikine - Iskut River	SISKU85.SISKU86.SISKU02.SISKU06.SISKU08.SISKU09	153
Mainstem Taku River	Stikine - Iskut River (Craigson Slough)	SISKU07	42
Mainstem Taku River	Stikine - Porcupine River	SPORCU07.SPORCU11	74
Mainstem Taku River	Stikine - Scud River	SSCUD07.SSCUD08.SSCUD09	191
Mainstem Taku River	Stikine - Shakes Slough Creek	SSHAKS06.SSHAKES07.SSHAKS09	67
Mainstem Taku River	Taku - Fish Creek	SFISHCR09.SFISHCR10	159
Mainstem Taku River	Taku - Hackett River	SHACK08	52
Mainstem Taku River	Taku - Sustahine Slough	SSUSTA08.SSHUST09	185
Mainstem Taku River	Taku - Tulsequah River	STULS07.STULS08.STULS09	156
Mainstem Taku River	Taku - Tuskwa Creek	STUCH08.SCHUNK09.STUSK08.SBEARSL09.STUSKS08.STUSKS09	356
Mainstem Taku River	Taku - Yehring Creek	SYEHR07.SYEHR09	171
Mainstem Taku River	Taku - Yellow Bluff	SYELLB08.SYELLB10.SYELLB11	81
Mainstem Taku River	Taku Mainstem - Taku River	STAKU07	95
Mainstem Taku River	Taku Mainstem - Takwahoni/Sinwa	STAKWA09	67
Nahlin River	Taku - Nahlin River	SNAHL03.SNAHL04.SNAHL05.SNAHL06.SNAHL07.SNAHL12	341
Tatsamenie	Taku - Tatsamenie Lake	STATS05.STATS06	288

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Reporting group	Location	ADF&G collection code	*n*
Other	Ahrnklin River	SAHRN07	90
Other	Akwe River	SAKWE09.SAKWE16	186
Other	Alsek - Blanchard River	SBLAN07	89
Other	Alsek - Blanchard River	SBLAN09	62
Other	Alsek - Border Slough	SBORD07.SBORD08	71
Other	Alsek - Border Slough	SBORD09.SBORD11	70
Other	Alsek - Datlasaka Creek	SDATLAS12	95
Other	Alsek - Goat Creek	SGOATC07.SGOATC12	56
Other	Alsek - Klukshu River	SKLUK07	94
Other	Alsek - Klukshu River Weir late	SKLUK06	95
Other	Alsek - Kudwat (Little Tatshenshini Lake)	SLTATS01.SLTATS03	65
Other	Alsek - Kudwat (Tatshenshini) - Bridge/Silver	SBRIDGE11.SBRIDGE12	105
Other	Alsek - Kudwat (Tatshenshini) - Kwatini	SKWAT11	65
Other	Alsek - Kudwat (Tatshenshini) - Stinky Creek	SSTINKY11	40
Other	Alsek - Kudwat (Upper Tatshenshini)	SUTATS03	95
Other	Alsek - Kudwat Creek (Tatshenshini)	SKUDW09.SKUDW10.SKUDW11	100
Other	Alsek - Neskataheen Lake	SNESK07	195
Other	Alsek - Tweedsmuir	STWEED07	48
Other	Alsek - Tweedsmuir	STWEED09	46
Other	Alsek - Vern Ritchie	SVERNR09.SVERNR10	114
Other	Antler-Gilkey River	SANTGILK13	53
Other	Bainbridge Lake	SBAIN10	95
Other	Banana Lake - Klutina	SBANA08	80
Other	Bar Creek - Essowah Lake	SBAR04	95
Other	Bartlett River - Creel survey	SBART13	69
Other	Bear Hole - tributary Klutina	SBEARH08	94
Other	Bering Lake	SBERI91	95
Other	Berners River	SBERN03.SBERN13	165
Other	Big Lake - Ratz Harbor Creek	SBIGLK10.SBIGLA14	161
Other	Bloomfield Lake	SBLOOM05	93
Other	Central - Kitlope Lake	SKITL06	95
Other	Central Coast - Amback Creek	SAMBA04	91
Other	Chilkat Lake	SCKAT13	189
Other	Chilkat Lake early run	SCKAT07E.SCKAT07L	190
Other	Chilkat Mainstem - Bear Flats	SBEARFL07	95
Other	Chilkat Mainstem - Mosquito Lake	SMOSQ07	95
Other	Chilkat River - Mule Meadows	SMULE03.SMULE07	190
Other	Chilkoot Lake - beaches	SCHILB07	251
Other	Chilkoot Lake - Bear Creek	SCHILBC07	233
Other	Chilkoot River	SCHIK03	159

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Reporting group	Location	ADF&G collection code	*n*
Other	Clear Creek at 40 Mile	SCLEAR07	86
Other	Coghill Lake	SCOGH91.SCOG92HL.SCOG92ES.SCOGH10	378
Other	Columbia River - Okanagan River	SOKAN02	95
Other	Crescent Lake	SCRES03	194
Other	Dangerous River	SDANG09	95
Other	East Alsek River	SEAST03B	94
Other	Eek Creek	SEEK04.SEEK07	50
Other	Eshamy Creek	SESHAR08.SESHA91	185
Other	Eyak Lake - Hatchery Creek	SEYAK10	95
Other	Eyak Lake - Middle Arm	SEYAM07	95
Other	Eyak Lake - South beaches	SEYASB07	87
Other	Falls Lake - East Baranof Island	SFALL03.SFALL10	190
Other	Fillmore Lake - Hoffman Creek	SFILLM05	52
Other	Fish Creek - off East Fork Gulkana River	SFISHC08	95
Other	Ford Arm Creek	SFORD13	199
Other	Ford Arm Lake weir	SFORD04	207
Other	Fraser - Adams River - Shuswap late	SLADA02.SADAM07	187
Other	Fraser - Birkenhead	SBIRK07	90
Other	Fraser - Chilko Lake	SCHILK01	87
Other	Fraser - Chilliwack Lake	SCHILW04	89
Other	Fraser - Cultus Lake	SCULT02	91
Other	Fraser - Fraser Lake	SFRAS96	85
Other	Fraser - Gates Creek	SGATES09	90
Other	Fraser - Harrison River	SHARR07	95
Other	Fraser - Lower Horsefly River	SLHOR01.SUHOR01.SHORSE07	274
Other	Fraser - Middle Shuswap River	SMSHU02	91
Other	Fraser - Nahatlatch - Nahatlatch River	SNAHAT02	92
Other	Fraser - North Thompson	SNTHOM05	95
Other	Fraser - Raft River	SRAFT01	84
Other	Fraser - Scotch River	SSCOT00	91
Other	Fraser - Stellako River	SSTEL07	94
Other	Fraser - Tachie River	STACH01	94
Other	Fraser - Trembleur - Kynock	SKYNO97	94
Other	Fraser - Weaver Creek	SWEAV01	88
Other	Great Central Lake	SGCENLK02	95
Other	Gulkana River - East Fork	SGULK08EF	75
Other	Hasselborg Lake	SHASSEL12.SHASSELR13	209
Other	Hatchery Creek - Sweetwater	SHATC03.SHATC07	142
Other	Heckman Lake	SHECK04.SHECK07	189
Other	Helm Lake	SHELM05	94
Other	Hetta Creek - early run	SHETT10E	95

-continued-

Reporting group	Location	ADF&G collection code	*n*
Other	Hetta Creek - late run	SHETT03.SHETT08.SHETT09L	281
Other	Hetta Creek - middle run	SHETT09M	95
Other	Hoktaheen - marine waters	SHOKTAM14	47
Other	Hoktaheen - upper lake main inlet	SHOKTAI04	47
Other	Hoktaheen - upper lake outlet	SHOKTAO04	49
Other	Hugh Smith - Cobb Creek	SCOBB07	99
Other	Hugh Smith Lake	SHSMI92.SHUGH13	155
Other	Hugh Smith Lake - Bushmann Creek	SHUGH04	150
Other	Inlet Creek - Klawock	SINCK03.SINCK08.SHALF08	212
Other	Issaquah Creek - Puget Sound Drainage	SISSA96	82
Other	Italio River	SITAL17	41
Other	Kah Sheets Lake	SKAHS03	96
Other	Kanalku Creek	SKANA07.SKANA10.SKANAL13	319
Other	Kegan Lake	SKEGA04	95
Other	Kitimat River	SKITIM10	93
Other	Kitwanga River	SKITW12	92
Other	Klag Bay Stream outlet	SKLAG09	200
Other	Klakas Lake	SKLAK04	95
Other	Klawock-Three Mile Creek	STHRE04.STHRE10	181
Other	Klutina Lake - inlet	SKLUTI08.SKLUTI09	95
Other	Klutina River - mainstem	SKLUT08	95
Other	Kook Lake	SKOOK12E.SKOOK13	148
Other	Kook Lake - late	SKOOK07.SKOOK10L.SKOOK12L	194
Other	Kunk Lake - Etolin Island system	SKUNK03	96
Other	Kushtaka Lake	SKUSH07.SKUSH08	189
Other	Kutlaku Lake	SKUTL03	95
Other	Kutlaku Lake	SKUTL12	78
Other	Kutlaku Lake	SKUTL13	50
Other	Lace River	SLACE13	63
Other	Lake Creek	SAUKE13baseline.SLAKECR14	318
Other	Lake Eva	SLEVA12	115
Other	Lake Pleasant - Soleduck River	SLAKE97	76
Other	Lake Wenatchee	SWENA98	95
Other	Long Lake weir	SLONGLK05	95
Other	Lost/Tahwah Rivers	SLOST03B.SLOST03C	139
Other	Luck Lake - P.O.W. Island	SLUCK04	94
Other	Mahlo River	SMAHL08	94
Other	Mahoney Creek	SMAHO03.SMAHO07	153
Other	Main Bay	SMAIN91	96
Other	Martin Lake	SMART07.SMART08	187
Other	Martin River Slough	SMARTR08	95

-continued-

Reporting group	Location	ADF&G collection code	*n*
Other	McDonald Lake - Hatchery Creek	SMCDO01.SMCDO03.SMCDO07.SMCDO13	368
Other	McGilvery Creek	SKART92.SMCGI03.SMCGI04.SMCGI16	472
Other	McKinley Lake	SMCKI07	95
Other	McKinley Lake	SMCKI08	95
Other	McKinley Lake	SMCKI91	95
Other	McKinley Lake - Salmon Creek	SMCKSC07	93
Other	Mendeltna Creek	SMEND08.SMEND09	188
Other	Mentasta Lake	SMENT08	95
Other	Mill Creek Weir Early - Virginia Lake	SMILLC07E	94
Other	Mill Creek Weir Late - Virginia Lake	SMILLC07L	95
Other	Miners Lake	SMINE91.SMINE09	191
Other	Mitchell River	SMITCH01	94
Other	Nass - Bonney Creek	SBONN01.SBONN12	164
Other	Nass - Bowser Lake	SBOWS01	94
Other	Nass - Damdochax Creek	SDAMD01	93
Other	Nass - Gingit Creek	SGING97	94
Other	Nass - Hanna Creek	SHANNA06	93
Other	Nass - Kwinageese	SKWIN01.SKWIN12U	76
Other	Nass - Meziadin Beach	SMERI01.SMEZIB06	186
Other	Nass - Tintina Creek	STINT06	94
Other	Necker Bay	SNECKER91.SNECKER93	95
Other	Neva Lake weir	SNEVA08	94
Other	Neva Lake weir	SNEVA09.SNEVA13	255
Other	North Berg Bay inlet	SNBERG91	53
Other	North Berg Bay inlet	SNBERG92	100
Other	Old Situk	SOSITU07	163
Other	Pavlof River	SPAVLOF12.SPAVLOFR13	174
Other	Paxson Lake - outlet	SPAXSO09	75
Other	Petersburg Lake	SPETL04	95
Other	QCI - Naden River	SNADE95	95
Other	QCI - Yakoun Lake	SYAKO93	70
Other	Red Bay Lake	SREDBL04	95
Other	Redfish Lake Beaches	SREDB93	94
Other	Redoubt Lake - outlet	SREDOUBT13	200
Other	Salmon Bay Lake	SSALM04.SSALM07	170
Other	Salmon Creek - Bremner	SSALMC08	93
Other	Salmon Lake weir	SSALML07.SSALML08	185
Other	Sarkar - Five Finger Creek	SSARK00.SSARF05	91
Other	Seclusion Lake - in lake	SSECLK14.SSECLKIN14	117
Other	Shipley Lake	SSHIP03	94
Other	Sitkoh Lake	SSITK03.SSITK11.SSITK12	351

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Reporting group	Location	ADF&G collection code	*n*
Other	Situk Lake	SSITU07	159
Other	Situk Lake	SSITU13	190
Other	Skeena - Alastair Lake	SALAS87.SALAS06	118
Other	Skeena - Four Mile Creek	SFMILE06	85
Other	Skeena - Fulton River	SFULT06	95
Other	Skeena - Grizzly Creek	SGRIZ87	76
Other	Skeena - Kispiox River	SKISP02	53
Other	Skeena - Kitsumkalum Lake	SKALUM06	56
Other	Skeena - Kitsumkalum Lake	SKALUM12	94
Other	Skeena - Lakelse Lake (Williams)	SLAKEL06	93
Other	Skeena - Lower Tahlo River	SLTAH94	78
Other	Skeena - McDonell Lake (Zymoetz River)	SMCDON02.SMCDON06	131
Other	Skeena - Morrison	SMORR07	92
Other	Skeena - Motase Lake	SMOTA87	47
Other	Skeena - Nangeese River	SNANG06	40
Other	Skeena - Nanika River	SNANI88.SNANI07	113
Other	Skeena - Pierre Creek	SPIER06	95
Other	Skeena - Pinkut Creek	SPINK94.SPINK06	187
Other	Skeena - Salix Bear	SSALIX87.SSALIX88	94
Other	Skeena - Slamgeesh River	SSLAM06	95
Other	Skeena - Stephens Creek	SSTECR01	95
Other	Skeena - Sustut River	SSUST01	79
Other	Skeena - Swan Lake	SSWANLK06	93
Other	Skeena - Tahlo Creek	STAHLO07	95
Other	Skeena - Upper Babine River	SUBAB06	95
Other	Snettisham Hatchery	SSNET06.SSPEE07	190
Other	Snettisham Hatchery - Speel Lake	SSPEE13	146
Other	Sockeye Creek	SSOCK17.SSOCK18	136
Other	Speel Lake	SSPEE03	95
Other	St. Anne Creek	SSANN05.SSTACR08	186
Other	Steamboat Lake - Bremner	SSTEAM08	95
Other	Steep Creek	SSTEE03	91
Other	Stikine - Little Tahltan	SLTAH90	95
Other	Stikine - Tahltan Lake	STAHL06	196
Other	Swede Lake	SSWEDE08	95
Other	Tanada Creek weir	STANA05	94
Other	Tanada Lake - lower outlet	STANAO09	95
Other	Tanada Lake - shore	STANAS09	93
Other	Tankeeah River	STANK03	47
Other	Tankeeah River	STANK05	47
Other	Tawah Creek	STAWA17	94

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Reporting group	Location	ADF&G collection code	*n*
Other	Thoms Lake	STHOM04.STHOM14	93
Other	Tokun Lake	STOKUN08.STOKUN09	189
Other	Tonsina Lake	STONSL09	94
Other	Unuk River - Gene's Lake	SGENE07	95
Other	Unuk River - Gene's Lake	SGENE08	69
Other	Vancouver Island - Quatse River	SQUAT03	95
Other	Vivid Lake	SVIVID93	48
Other	Windfall Lake	SWIND03.SWIND07	142

Appendix F.–Individual sockeye salmon radiotagged at Canyon Island by tagging date, spaghetti tag number, size (mid eye to tail fork length [METF]), genetic identification number (GSI), Radiotag frequency (MHz), radiotag pulse code, and final location, Taku River drainage, 2019.

Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
23	6/8/19	1	80451	565	332001	150.322	0	Dropout	–	–
24	6/10/19	2	80458	545	332002	150.322	1	Nahlin River	58.88183	-131.75461
24	6/11/19	3	80463	525	332003	150.322	2	Nakina/Silver Salmon	59.12287	-133.01451
24	6/12/19	4	80470	595	332004	150.322	3	Silver Salmon River	59.21792	-133.19090
24	6/13/19	5	80475	525	332005	150.322	4	Mainstem Taku River	58.72099	-133.42555
24	6/14/19	6	80481	590	332006	150.322	5	Nakina River	59.11959	-133.01044
24	6/14/19	7	80487	435	332007	150.322	6	Mainstem Taku River	58.70777	-133.43131
24	6/15/19	8	80493	630	332008	150.322	7	Nakina River	59.12137	-133.01103
25	6/16/19	9	80499	570	332009	150.322	8	Kuthai Lake	59.23533	-133.24253
25	6/17/19	10	80506	545	332010	150.322	9	Kuthai Lake	59.22574	-133.22081
25	6/17/19	11	80511	510	332011	150.322	11	Mainstem Taku River	58.58494	-133.64748
25	6/18/19	12	80518	460	332012	150.322	12	King Salmon River/Lake	58.74398	-133.01804
25	6/18/19	13	80523	540	332013	150.322	13	Harvested	–	–
25	6/18/19	14	80530	625	332014	150.322	14	Silver Salmon River	59.22186	-133.19952
25	6/18/19	15	80536	575	332015	150.322	15	Dropout	–	–
25	6/19/19	16	80542	575	332016	150.322	16	Mainstem Taku River	58.71568	-133.41401
25	6/20/19	17	80548	570	332017	150.322	17	Nakina River	59.12058	-133.01029
25	6/20/19	18	80554	535	332018	150.322	18	Dudidontu River	58.76613	-131.94767
25	6/20/19	19	80560	560	332019	150.322	19	Nakina River	59.12137	-133.01103
25	6/20/19	20	80566	540	332020	150.322	20	No detections	–	–
25	6/20/19	21	80572	575	332021	150.322	21	Mainstem Taku River	58.71450	-133.42034
25	6/20/19	22	80578	530	332022	150.322	22	Mainstem Taku River	58.58400	-133.65074
25	6/20/19	23	80584	465	332023	150.322	23	Mainstem Taku River	58.72513	-133.40266
25	6/21/19	24	80590	565	332024	150.322	24	Mainstem Taku River	58.78996	-133.33319
25	6/21/19	25	80597	560	332025	150.322	25	Nahlin River	58.89590	-131.70978
25	6/21/19	26	80604	550	332026	150.322	26	Nakina River	59.12327	-133.01468
25	6/21/19	27	80610	540	332027	150.322	27	Dropout	–	–
25	6/21/19	28	80616	525	332028	150.322	28	Dropout	–	–
25	6/22/19	29	80622	575	332029	150.322	29	Dropout	–	–
25	6/22/19	30	80628	560	332030	150.322	30	Dropout	–	–
25	6/22/19	31	80635	515	332031	150.322	31	Nakina River	59.13149	-132.90718
25	6/22/19	32	80641	570	332032	150.322	32	King Salmon River/Lake	58.71738	-132.94593
26	6/23/19	33	80647	455	332033	150.322	33	Tulsequah River	58.72672	-133.61234
26	6/26/19	34	80653	550	332034	150.322	34	Dropout	–	–

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
26	6/26/19	35	80658	575	332035	150.322	35	Tulsequah River	58.72566	-133.60843
26	6/27/19	36	80664	440	332036	150.322	36	Tulsequah River	58.71736	-133.60933
26	6/27/19	37	80670	555	332037	150.322	37	Tulsequah River	58.72805	-133.60832
26	6/27/19	38	80676	525	332038	150.322	38	Tulsequah River	58.70683	-133.61344
26	6/27/19	39	80682	535	332039	150.322	39	Dropout	–	–
26	6/27/19	40	80688	605	332040	150.322	40	King Salmon River/Lake	58.77417	-133.15214
26	6/27/19	41	80694	570	332041	150.322	41	King Salmon River/Lake	58.72092	-132.90000
26	6/27/19	42	80701	470	332042	150.322	42	King Salmon River/Lake	58.77475	-133.13661
26	6/28/19	43	80706	410	332043	150.322	43	Nakina River	58.92382	-133.16824
26	6/28/19	44	80712	495	332044	150.322	44	Dropout	–	–
26	6/28/19	45	80718	490	332045	150.322	45	Harvested	–	–
26	6/28/19	46	80724	445	332046	150.322	46	Tulsequah River	58.72948	-133.61069
26	6/28/19	47	80731	485	332047	150.322	47	Mainstem Taku River	58.85123	-133.19170
26	6/28/19	48	80737	415	332048	150.322	48	Mainstem Taku River	58.74026	-133.38424
26	6/28/19	49	80743	505	332049	150.322	49	Inklin River	58.77058	-132.35983
26	6/29/19	50	80749	560	332050	150.322	75	King Salmon River/Lake	58.73605	-132.99954
26	6/29/19	51	80755	585	332051	150.343	0	Tulsequah River	58.73605	-132.99954
26	6/29/19	52	80761	605	332052	150.343	1	Dropout	–	–
26	6/29/19	53	80767	520	332053	150.343	2	King Salmon River/Lake	58.73393	-132.99748
26	6/29/19	54	80773	570	332054	150.343	3	Dropout	–	–
26	6/29/19	55	80779	555	332055	150.343	4	Nakina River	59.11839	-133.00265
26	6/29/19	56	80785	530	332056	150.343	5	Nakina River	59.11810	-133.00890
26	6/29/19	57	80791	560	332057	150.343	6	Nakina River	59.12008	-133.01005
27	6/30/19	58	80797	505	332058	150.343	7	King Salmon River/Lake	58.72205	-132.87470
27	6/30/19	59	80803	620	332059	150.343	8	Harvested	–	–
27	6/30/19	60	80809	545	332060	150.343	9	Mainstem Taku River	58.66164	-133.49478
27	6/30/19	61	80815	550	332061	150.343	11	Harvested	–	–
27	6/30/19	62	80821	540	332062	150.343	12	King Salmon River/Lake	58.71667	-132.94704
27	6/30/19	63	80827	585	332063	150.343	13	Little Trapper Lake	58.49550	-132.61066
27	6/30/19	64	80833	575	332064	150.343	14	Mainstem Taku River	58.72581	-133.40315
27	7/1/19	65	80839	535	332065	150.343	15	Nakina River	59.11751	-133.00377
27	7/1/19	66	80845	445	332066	150.343	16	Dropout	–	–
27	7/1/19	67	80851	535	332067	150.343	17	Mainstem Taku River	58.75378	-133.33055
27	7/1/19	68	80857	565	332068	150.343	18	King Salmon River/Lake	58.71910	-132.90631
27	7/1/19	69	80864	455	332069	150.343	19	Mainstem Taku River	58.69067	-133.44010

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
27	7/1/19	70	80870	525	332070	150.343	20	Dropout	–	–
27	7/1/19	71	80876	565	332071	150.343	21	Tulsequah River	58.73743	-133.60216
27	7/1/19	72	80883	590	332072	150.343	22	Harvested	–	–
27	7/1/19	73	80888	580	332073	150.343	23	Tulsequah River	58.73462	-133.61913
27	7/2/19	74	80894	615	332074	150.343	24	Harvested	–	–
27	7/2/19	75	80900	570	332075	150.343	25	Tulsequah River	58.73038	-133.61394
27	7/2/19	76	80906	575	332076	150.343	26	Tulsequah River	58.70900	-133.61057
27	7/2/19	77	80912	555	332077	150.343	27	Nakina River	59.07861	-133.02707
27	7/2/19	78	80918	590	332078	150.343	28	Mainstem Taku River	58.71599	-133.41326
27	7/2/19	79	80924	475	332079	150.343	29	Dropout	–	–
27	7/2/19	80	80930	530	332080	150.343	30	Harvested	–	–
27	7/3/19	81	80936	560	332081	150.343	31	Mainstem Taku River	58.69391	-133.43961
27	7/3/19	82	80942	585	332082	150.343	32	King Salmon River/Lake	58.78165	-133.08787
27	7/3/19	83	80948	550	332083	150.343	33	Nakina River	59.11627	-133.00511
27	7/3/19	84	80955	605	332084	150.343	34	Mainstem Taku River	58.60354	-133.56995
27	7/4/19	85	80861	355	332085	150.343	35	Dropout	–	–
27	7/4/19	86	80767	530	332086	150.343	36	King Salmon River/Lake	58.73974	-133.02177
27	7/4/19	87	80673	565	332087	150.343	37	Mainstem Taku River	58.69709	-133.42753
27	7/4/19	88	80579	600	332088	150.343	38	Harvested	–	–
27	7/4/19	89	80485	575	332089	150.343	39	Tulsequah River	58.73462	-133.61913
27	7/4/19	90	80391	590	332090	150.343	40	Mainstem Taku River	58.76016	-133.35612
27	7/4/19	91	80297	475	332091	150.343	41	King Salmon River/Lake	58.71448	-132.90331
27	7/4/19	92	80204	460	332092	150.343	42	Mainstem Taku River	58.91336	-133.15438
27	7/5/19	93	81011	580	332093	150.343	43	Harvested	–	–
27	7/5/19	94	81017	569	332094	150.343	44	Mainstem Taku River	58.73545	-133.37815
27	7/5/19	95	81023	550	332095	150.343	45	No detections	–	–
27	7/5/19	96	81029	550	332096	150.343	46	King Salmon River/Lake	58.71810	-132.90971
27	7/5/19	97	81035	570	332097	150.343	47	Mainstem Taku River	58.70000	-133.45187
27	7/5/19	98	81041	570	332098	150.343	48	Harvested	–	–
27	7/5/19	99	81047	400	332099	150.343	49	Mainstem Taku River	58.62980	-133.53261
27	7/5/19	100	81053	545	332100	150.343	75	Little Trapper Lake	58.48869	-132.60119
27	7/6/19	101	81060	545	332101	150.403	0	Harvested	–	–
27	7/6/19	102	81065	560	332102	150.403	1	No detections	–	–
27	7/6/19	103	81070	585	332103	150.403	2	Mainstem Taku River	58.79020	-133.32949
27	7/6/19	104	81075	520	332104	150.403	3	King Salmon River/Lake	58.77854	-133.11196

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
27	7/6/19	105	81083	475	332105	150.403	4	King Salmon River/Lake	58.74066	-133.00605
27	7/6/19	106	81089	600	332106	150.403	5	Mainstem Taku River	58.84409	-133.19878
27	7/6/19	107	81095	480	332107	150.403	6	Mainstem Taku River	58.78724	-133.34520
28	7/7/19	108	81101	560	332108	150.403	7	Mainstem Taku River	58.76077	-133.35609
28	7/7/19	109	81107	565	332109	150.403	8	Harvested	–	–
28	7/7/19	110	81113	545	332110	150.403	9	King Salmon River/Lake	58.71801	-132.93990
28	7/7/19	111	81119	465	332111	150.403	10	King Salmon River/Lake	58.71639	-132.94292
28	7/7/19	112	81125	555	332112	150.403	11	Little Trapper Lake	58.49634	-132.60302
28	7/7/19	113	81131	585	332113	150.403	12	Mainstem Taku River	58.84608	-133.19630
28	7/7/19	114	81137	470	332114	150.403	13	Dropout	–	–
28	7/8/19	115	81143	465	332115	150.403	14	Dropout	–	–
28	7/8/19	116	81149	440	332116	150.403	15	Mainstem Taku River	58.86003	-133.16667
28	7/8/19	117	81155	525	332117	150.403	16	Mainstem Taku River	58.76035	-133.35478
28	7/8/19	118	81161	545	332118	150.403	17	King Salmon River/Lake	58.72496	-132.97072
28	7/8/19	119	81167	570	332119	150.403	18	Harvested	–	–
28	7/8/19	120	81173	645	332120	150.403	19	King Salmon River/Lake	58.72951	-132.87706
28	7/8/19	121	81179	530	332121	150.403	20	Tulsequah River	58.69831	-133.62228
28	7/8/19	122	81185	530	332122	150.403	21	Tulsequah River	58.72181	-133.61017
28	7/8/19	123	81191	570	332123	150.403	22	King Salmon River/Lake	58.77206	-133.01718
28	7/9/19	124	81198	535	332124	150.403	23	Tulsequah River	58.74062	-133.60500
28	7/9/19	125	81204	545	332125	150.403	24	Kowatua Creek	58.58557	-132.32098
28	7/9/19	126	81210	585	332126	150.403	25	Nakina River	59.11848	-133.00244
28	7/9/19	127	81216	555	332127	150.403	26	Dropout	–	–
28	7/10/19	128	81231	580	332128	150.403	27	Mainstem Taku River	58.90868	-133.14486
28	7/10/19	129	81237	550	332129	150.403	28	Mainstem Taku River	58.70161	-133.45000
28	7/10/19	130	81243	460	332130	150.403	29	Mainstem Taku River	58.61807	-133.57060
28	7/10/19	131	81249	605	332131	150.403	30	Harvested	–	–
28	7/11/19	132	81257	470	332132	150.403	31	Mainstem Taku River	58.87122	-133.16377
28	7/11/19	133	81263	580	332133	150.403	32	No detections	–	–
28	7/11/19	134	81269	495	332134	150.403	33	King Salmon River/Lake	58.71107	-132.94426
28	7/11/19	135	81275	565	332135	150.403	34	Dropout	–	–
28	7/11/19	136	81281	460	332136	150.403	35	King Salmon River/Lake	58.80049	-133.25492
28	7/11/19	137	81287	540	332137	150.403	36	Nakina River	59.12437	-133.01351
28	7/11/19	138	81294	535	332138	150.403	37	Mainstem Taku River	58.79144	-133.31470
28	7/11/19	139	81300	535	332139	150.403	38	Mainstem Taku River	58.78828	-133.33467

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
28	7/11/19	140	81367	520	332140	150.403	39	Mainstem Taku River	58.69270	-133.44408
28	7/11/19	141	81372	505	332141	150.403	40	Little Trapper Lake	58.48577	-132.58756
28	7/11/19	142	81318	550	332142	150.403	41	Little Trapper Lake	58.49444	-132.60732
28	7/11/19	143	81324	565	332143	150.403	42	Dropout	–	–
28	7/12/19	144	81330	595	332144	150.403	43	Little Trapper Lake	58.48222	-132.58203
28	7/12/19	145	81337	465	332145	150.403	44	Sloko River	59.15330	-133.40384
28	7/12/19	146	81343	485	332146	150.403	45	Nakina River	59.12196	-132.99214
28	7/12/19	147	81349	560	332147	150.403	46	Mainstem Taku River	58.76389	-133.32476
28	7/12/19	148	81355	485	332148	150.403	47	King Salmon River/Lake	58.71926	-132.91603
28	7/12/19	149	81361	580	332149	150.403	48	Mainstem Taku River	58.69845	-133.45511
28	7/12/19	150	81367	565	332150	150.403	49	Mainstem Taku River	58.75772	-133.32742
28	7/12/19	151	81374	555	332151	150.434	0	King Salmon River/Lake	58.71867	-132.94488
28	7/12/19	152	81380	540	332152	150.434	1	Mainstem Taku River	58.74379	-133.37650
28	7/12/19	153	81386	590	332153	150.434	2	Inklin River	58.77852	-132.14923
28	7/12/19	154	81392	565	332154	150.434	3	Mainstem Taku River	58.84542	-133.19715
28	7/12/19	155	81399	480	332155	150.434	4	Tatsamenie Lake	58.36059	-132.32090
28	7/13/19	156	81405	520	332156	150.434	5	Mainstem Taku River	58.60328	-133.57631
28	7/13/19	157	81411	565	332157	150.434	6	Harvested	–	–
28	7/13/19	158	81416	510	332158	150.434	7	Tulsequah River	58.71765	-133.61091
28	7/13/19	159	81421	530	332159	150.434	8	King Salmon River/Lake	58.71492	-132.90523
28	7/13/19	160	81427	555	332160	150.434	9	Harvested	–	–
28	7/13/19	161	81432	575	332161	150.434	10	Harvested	–	–
28	7/13/19	162	81437	525	332162	150.434	11	Kowatua Creek	58.50054	-132.53920
28	7/13/19	163	81445	590	332163	150.434	12	Mainstem Taku River	58.74208	-133.33858
28	7/13/19	164	81453	565	332164	150.434	13	Sloko River	59.14194	-133.39275
28	7/13/19	165	81457	555	332165	150.434	14	Mainstem Taku River	58.70849	-133.44817
28	7/13/19	166	81463	560	332166	150.434	15	Dropout	–	–
28	7/13/19	167	81469	505	332167	150.434	16	Mainstem Taku River	58.76116	-133.32847
28	7/13/19	168	81475	600	332168	150.434	17	Tulsequah River	58.71753	-133.6067
29	7/14/19	169	81482	540	332169	150.434	18	Mainstem Taku River	58.76040	-133.35482
29	7/14/19	170	81488	515	332170	150.434	19	Nakina River	59.11735	-133.00052
29	7/14/19	171	81494	560	332171	150.434	20	Harvested	–	–
29	7/14/19	172	81500	590	332172	150.434	21	Sloko River	59.11735	-133.00052
29	7/14/19	173	81506	560	332173	150.434	22	Harvested	–	–
29	7/14/19	174	81512	570	332174	150.434	23	No detections	–	–

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
29	7/14/19	175	81519	455	332175	150.434	24	Tulsequah River	58.66750	-133.61088
29	7/14/19	176	81525	450	332176	150.434	25	Mainstem Taku River	58.80608	-133.33179
29	7/15/19	177	81531	460	332177	150.434	26	King Salmon River/Lake	58.72043	-132.92943
29	7/15/19	178	81538	550	332178	150.434	27	Wilms Creek	58.66000	-133.63332
29	7/15/19	179	81542	575	332179	150.434	28	Mainstem Taku River	58.78773	-133.34520
29	7/15/19	180	81550	560	332180	150.434	29	Mainstem Taku River	58.61667	-133.57581
29	7/16/19	181	81557	615	332181	150.434	30	Mainstem Taku River	58.77958	-133.34700
29	7/16/19	182	81562	475	332182	150.434	31	Mainstem Taku River	58.62448	-133.54741
29	7/16/19	183	81570	550	332183	150.434	32	Mainstem Taku River	58.74816	-133.37359
29	7/16/19	184	81574	465	332184	150.434	33	Mainstem Taku River	58.79049	-133.34340
29	7/16/19	185	81580	470	332185	150.434	34	Nakina River	59.08105	-133.01825
29	7/16/19	186	81586	575	332186	150.434	35	Kowatua Creek	58.59829	-132.27697
29	7/17/19	187	81592	590	332187	150.434	36	Harvested	–	–
29	7/17/19	188	81598	535	332188	150.434	37	Little Trapper Lake	58.48958	-132.61444
29	7/17/19	189	81604	540	332189	150.434	38	Mainstem Taku River	58.84960	-133.18516
29	7/17/19	190	81610	460	332190	150.434	39	Mainstem Taku River	58.61995	-133.57407
29	7/18/19	191	81617	610	332191	150.434	40	Little Trapper Lake	58.49312	-132.60185
29	7/18/19	192	81623	580	332192	150.434	41	Mainstem Taku River	58.76053	-133.32614
29	7/18/19	193	81629	540	332193	150.434	42	Dropout	–	–
29	7/18/19	194	81634	555	332194	150.434	43	Mainstem Taku River	58.74501	-133.33619
29	7/18/19	195	81640	550	332195	150.434	44	Mainstem Taku River	58.94580	-133.18294
29	7/18/19	196	81646	565	332196	150.434	45	Mainstem Taku River	58.62447	-133.54742
29	7/18/19	197	81652	540	332197	150.434	46	Dropout	–	–
29	7/19/19	198	81658	435	332198	150.434	47	Nakina River	58.92586	-133.17258
29	7/19/19	199	81664	515	–	150.434	48	King Salmon River/Lake	58.72049	-132.93571
29	7/19/19	200	81670	560	332199	150.434	49	Dropout	–	–
29	7/19/19	201	81676	440	332200	150.434	50	Dropout	–	–
29	7/19/19	202	81682	580	332201	150.434	51	Mainstem Taku River	58.68163	-133.46888
29	7/19/19	203	81688	560	332202	150.434	52	Dropout	–	–
29	7/19/19	204	81694	550	332203	150.434	53	Mainstem Taku River	58.59852	-133.58152
29	7/20/19	205	81700	550	332204	150.434	54	Harvested	–	–
29	7/20/19	206	81706	555	332205	150.434	55	Harvested	–	–
29	7/20/19	207	81712	565	332206	150.434	56	Mainstem Taku River	58.73603	-133.34765
29	7/20/19	208	81718	400	332207	150.434	57	Tulsequah River	58.71870	-133.60861
29	7/20/19	209	81724	545	332208	150.434	58	Sheslay River	58.41321	-132.04121

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
29	7/20/19	210	81731	520	332209	150.434	59	Little Trapper Lake	58.49922	-132.60139
29	7/20/19	211	81737	580	332210	150.434	60	Little Trapper Lake	58.48951	-132.59485
29	7/20/19	212	81743	560	332211	150.434	61	Tulsequah River	58.75237	-133.62366
29	7/20/19	213	81749	560	332212	150.434	62	Mainstem Taku River	58.90400	-133.15000
29	7/20/19	214	81756	595	332213	150.434	63	Little Trapper Lake	58.47566	-132.55061
29	7/20/19	215	81760	620	332214	150.434	64	Inklin River	58.77506	-132.09385
29	7/20/19	216	81767	550	332215	150.434	65	Mainstem Taku River	58.71667	-133.38329
30	7/21/19	217	81772	585	332216	150.434	66	Mainstem Taku River	58.90979	-133.15442
30	7/21/19	218	81779	580	332217	150.434	67	Mainstem Taku River	58.77752	-133.32270
30	7/21/19	219	81785	585	332218	150.434	68	Harvested	–	–
30	7/21/19	220	81791	585	332219	150.434	69	Dropout	–	–
30	7/21/19	221	81797	600	332220	150.434	70	Nakina River	59.07773	-133.02600
30	7/21/19	222	81803	475	332221	150.434	71	Dropout	–	–
30	7/21/19	223	81809	570	332222	150.434	72	Mainstem Taku River	–	–
30	7/21/19	224	81815	650	332223	150.434	73	Mainstem Taku River	58.75367	-133.32944
30	7/21/19	225	81822	565	332224	150.434	74	Dropout	–	–
30	7/21/19	226	81828	550	332225	150.434	75	Dropout	–	–
30	7/21/19	227	81835	550	332226	150.434	76	Harvested	–	–
30	7/22/19	228	81840	545	332227	150.434	77	Mainstem Taku River	58.91945	-133.15757
30	7/22/19	229	81846	545	332228	150.434	78	Mainstem Taku River	58.78933	-133.32450
30	7/22/19	230	81852	590	332229	150.434	79	Little Trapper Lake	58.47744	-132.59863
30	7/22/19	231	81858	540	332230	150.434	80	Dropout	–	–
30	7/22/19	232	81864	560	332231	150.434	81	Mainstem Taku River	58.83490	-133.18757
30	7/22/19	233	81870	585	332232	150.434	82	Tatsatua Creek	58.38622	-132.34814
30	7/22/19	234	81876	645	332233	150.434	83	Inklin River	58.90270	-133.13837
30	7/22/19	235	81883	570	332234	150.434	84	Little Trapper Lake	58.49312	-132.60185
30	7/22/19	236	81889	480	332235	150.434	85	King Salmon River/Lake	58.72315	-132.89532
30	7/22/19	237	81895	610	332236	150.434	86	Mainstem Taku River	58.74007	-133.34219
30	7/22/19	238	81901	595	332237	150.434	87	Harvested	–	–
30	7/22/19	239	81907	500	332238	150.434	88	Mainstem Taku River	58.58614	-133.63303
30	7/22/19	240	81913	550	332239	150.434	89	Little Trapper Lake	58.49094	-132.61482
30	7/22/19	241	81919	535	332240	150.434	90	Mainstem Taku River	58.73203	-133.39058
30	7/22/19	242	81925	555	332241	150.434	91	Tulsequah River	58.72944	-133.60858
30	7/22/19	243	81931	560	332242	150.434	92	Mainstem Taku River	58.90772	-133.15308

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
30	7/22/19	244	81937	580	332243	150.434	93	Harvested	–	–
30	7/22/19	245	81944	585	332244	150.434	94	Mainstem Taku River	58.73274	-133.38822
30	7/23/19	246	81950	555	332245	150.434	95	Little Trapper Lake	58.47858	-132.56466
30	7/23/19	247	81956	555	332246	150.434	96	Mainstem Taku River	58.69725	-133.45875
30	7/23/19	248	81962	580	332247	150.434	97	Tulsequah River	58.75268	-133.62431
30	7/23/19	249	81968	570	332248	150.434	98	Nakina River	59.09331	-133.01434
30	7/23/19	250	81974	580	332249	150.434	99	Mainstem Taku River	58.90687	-133.14284
30	7/23/19	251	81980	590	332250	150.553	0	Tatsatua Creek	58.70513	-132.28435
30	7/23/19	252	81986	550	332251	150.553	1	Dropout	–	–
30	7/23/19	253	81992	560	332252	150.553	2	Mainstem Taku River	58.61886	-133.55549
30	7/23/19	254	81998	530	332253	150.553	3	Harvested	–	–
30	7/23/19	255	82004	555	332254	150.553	4	Mainstem Taku River	58.78716	-133.33107
30	7/23/19	256	82011	575	332255	150.553	5	No detections	–	–
30	7/23/19	257	82016	535	332256	150.553	6	Mainstem Taku River	58.62032	-133.55059
30	7/23/19	258	82022	575	332257	150.553	7	Dropout	–	–
30	7/23/19	259	82028	520	332258	150.553	8	Inklin River	58.80879	-132.85074
30	7/23/19	260	82034	590	332259	150.553	9	Mainstem Taku River	58.78275	-132.15765
30	7/23/19	261	82040	470	332260	150.553	10	Dropout	–	–
30	7/23/19	262	82046	610	332261	150.553	11	Sheslay River	58.75930	-132.09426
30	7/23/19	263	82052	580	332262	150.553	12	Mainstem Taku River	58.66482	-133.49172
30	7/23/19	264	82058	560	332263	150.553	13	Mainstem Taku River	58.79830	-133.33833
30	7/23/19	265	82064	590	332264	150.553	14	Dropout	–	–
30	7/24/19	266	82071	585	332265	150.553	15	Mainstem Taku River	58.82861	-133.23919
30	7/24/19	267	82077	600	332266	150.553	16	Mainstem Taku River	58.75451	-133.32926
30	7/24/19	268	82083	580	332267	150.553	17	Nakina River	59.06153	-133.03073
30	7/24/19	269	82089	625	332268	150.553	18	Mainstem Taku River	59.07988	-133.02693
30	7/24/19	270	82095	575	332269	150.553	19	Hackett River	58.22384	-131.75842
30	7/24/19	271	82101	425	332270	150.553	20	Mainstem Taku River	58.66292	-133.48971
30	7/24/19	272	82107	615	332271	150.553	21	Mainstem Taku River	58.64712	-133.49792
30	7/24/19	273	82113	570	332272	150.553	22	Little Trapper Lake	58.49273	-132.60986
30	7/24/19	274	82119	570	332273	150.553	23	Mainstem Taku River	58.72903	-133.39452
30	7/24/19	275	82125	635	332274	150.553	24	Dropout	–	–
30	7/24/19	276	82131	555	332275	150.553	25	Tatsatua Creek	58.44691	-132.39980
30	7/24/19	277	82137	575	332276	150.553	26	Harvested	–	–
30	7/24/19	278	82143	560	332277	150.553	27	Dropout	–	–

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
30	7/24/19	279	82149	580	332278	150.553	28	Mainstem Taku River	58.72067	-133.39238
30	7/24/19	280	82155	565	332279	150.553	29	Little Trapper Lake	58.49314	-132.60961
30	7/24/19	281	82162	580	332280	150.553	30	Harvested	–	–
30	7/25/19	282	82168	555	332281	150.553	31	Nakina River	59.08123	-133.02645
30	7/25/19	283	82174	555	332282	150.553	32	Mainstem Taku River	58.67459	-133.48597
30	7/25/19	284	82180	390	332283	150.553	33	Harvested	–	–
30	7/25/19	285	82187	465	332284	150.553	34	Harvested	–	–
30	7/25/19	286	82193	550	332285	150.553	35	Little Trapper Lake	58.49589	-132.60000
30	7/25/19	287	82199	555	332286	150.553	36	Nakina River	59.02830	-133.07858
30	7/25/19	288	82205	510	332287	150.553	37	Kowatua Creek	58.72131	-132.28149
30	7/25/19	289	82211	550	332288	150.553	38	Little Trapper Lake	58.49381	-132.59494
30	7/25/19	290	82217	450	332289	150.553	39	King Salmon River/Lake	58.72000	-132.92591
30	7/25/19	291	82223	555	332290	150.553	40	Harvested	–	–
30	7/25/19	292	82229	570	332291	150.553	41	Mainstem Taku River	58.63696	-133.55340
30	7/26/19	293	82235	540	332292	150.553	42	Harvested	–	–
30	7/26/19	294	82241	535	332293	150.553	43	Harvested	–	–
30	7/26/19	295	82247	530	332294	150.553	44	Tulsequah River	58.70835	-133.59461
30	7/26/19	296	82253	510	332295	150.553	45	Harvested	–	–
30	7/26/19	297	82259	535	332296	150.553	46	Dropout	–	–
30	7/26/19	298	82265	525	332297	150.553	47	No detections	–	–
30	7/26/19	299	82271	580	332298	150.553	48	Mainstem Taku River	58.77195	-133.32258
30	7/26/19	300	82277	545	332299	150.553	49	Harvested	–	–
30	7/26/19	301	82283	565	332300	150.553	50	Harvested	–	–
30	7/26/19	302	82289	540	332301	150.553	51	Harvested	–	–
30	7/26/19	303	82295	555	332302	150.553	52	Little Trapper Lake	58.47981	-132.57308
30	7/26/19	304	82302	550	332303	150.553	53	Mainstem Taku River	58.91603	-133.15767
30	7/26/19	305	82308	515	332304	150.553	54	Harvested	–	–
30	7/26/19	306	82314	475	332305	150.553	55	Mainstem Taku River	58.66620	-133.49073
30	7/27/19	307	82320	460	332306	150.553	56	Nakina River	59.08257	-133.02588
30	7/27/19	308	82326	515	332307	150.553	57	Dropout	–	–
30	7/27/19	309	82332	530	332308	150.553	58	Dropout	–	–
30	7/27/19	310	82338	560	332309	150.553	59	Mainstem Taku River	58.82555	-133.25815
30	7/27/19	311	82344	535	332310	150.553	60	Harvested	–	–
30	7/27/19	312	82350	570	332311	150.553	61	Mainstem Taku River	58.79755	-133.31711
30	7/27/19	313	82356	420	332312	150.553	62	Mainstem Taku River	58.80347	-133.28727

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
30	7/27/19	314	82362	565	332313	150.553	63	Harvested	–	–
30	7/27/19	315	82366	560	332314	150.553	64	Mainstem Taku River	58.63904	-133.56667
30	7/27/19	316	82374	525	332315	150.553	65	Harvested	–	–
30	7/27/19	317	82380	600	332316	150.553	66	Harvested	–	–
30	7/27/19	318	82386	605	332317	150.553	67	Harvested	–	–
30	7/27/19	319	82392	570	332318	150.553	68	Dropout	–	–
30	7/27/19	320	82398	580	332319	150.553	69	Harvested	–	–
30	7/27/19	321	82405	565	332320	150.553	70	Dropout	–	–
30	7/27/19	322	82410	575	332321	150.553	71	Dropout	–	–
30	7/27/19	323	82417	495	332322	150.553	72	Dropout	–	–
31	7/28/19	324	82423	550	332323	150.553	73	Dropout	–	–
31	7/28/19	325	82429	570	332324	150.553	74	Harvested	–	–
31	7/28/19	326	82435	535	332325	150.553	75	Harvested	–	–
31	7/28/19	327	82441	370	332326	150.553	76	Mainstem Taku River	58.75528	-133.35772
31	7/28/19	328	82447	560	332327	150.553	77	Mainstem Taku River	58.78501	-133.33541
31	7/28/19	329	82453	565	332328	150.553	78	Harvested	–	–
31	7/28/19	330	82460	580	332329	150.553	79	Harvested	–	–
31	7/28/19	331	82466	570	332330	150.553	80	Mainstem Taku River	58.75602	-133.35756
31	7/28/19	332	82472	560	332331	150.553	81	Harvested	–	–
31	7/28/19	333	82478	520	332332	150.553	82	Harvested	–	–
31	7/28/19	334	82484	565	332333	150.553	83	Dropout	–	–
31	7/28/19	335	82490	605	332334	150.553	84	King Salmon River/Lake	58.79853	-133.23151
31	7/28/19	336	82496	520	332335	150.553	85	Dropout	–	–
31	7/28/19	337	85002	555	332336	150.553	86	Mainstem Taku River	–	–
31	7/28/19	338	85008	440	332337	150.553	87	Dropout	–	–
31	7/28/19	339	85014	545	332338	150.553	88	Dropout	–	–
31	7/28/19	340	85020	545	332339	150.553	89	Harvested	–	–
31	7/29/19	341	85026	510	332340	150.553	90	Mainstem Taku River	58.60166	-133.63175
31	7/29/19	342	85032	410	332341	150.553	91	Mainstem Taku River	58.69447	-133.43468
31	7/29/19	343	85038	500	332342	150.553	92	Harvested	–	–
31	7/29/19	344	85044	570	332343	150.553	93	Harvested	–	–
31	7/29/19	345	85050	535	332344	150.553	94	Harvested	–	–
31	7/29/19	346	85056	465	332345	150.553	95	Mainstem Taku River	58.90326	-133.14767
31	7/29/19	347	85062	565	332346	150.553	96	Nakina River	59.05481	-133.03570

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
31	7/29/19	348	85068	535	332347	150.553	97	Mainstem Taku River	58.78732	-133.34522
31	7/29/19	349	85074	550	332348	150.553	98	Mainstem Taku River	58.79029	-133.30188
31	7/29/19	350	85080	470	332349	150.553	99	Harvested	–	–
31	7/29/19	351	85086	550	332350	150.562	0	Mainstem Taku River	58.69028	-133.49813
31	7/29/19	352	85092	550	332351	150.562	1	Harvested	–	–
31	7/29/19	353	85098	555	332352	150.562	2	Dropout	–	–
31	7/29/19	354	85105	600	332353	150.562	3	Mainstem Taku River	58.71217	-133.4108
31	7/29/19	355	85111	565	332354	150.562	4	Dropout	–	–
31	7/29/19	356	85117	545	332355	150.562	5	Tatsatua Creek	58.43485	-132.39108
31	7/29/19	357	85123	580	332356	150.562	6	Mainstem Taku River	58.57939	-133.61803
31	7/29/19	358	85129	465	332357	150.562	7	No detections	–	–
31	7/29/19	359	85135	540	332358	150.562	8	Mainstem Taku River	58.63501	-133.52918
31	7/29/19	360	85141	560	332359	150.562	9	Dropout	–	–
31	7/29/19	361	85147	535	332360	150.562	10	Tatsamenie Lake	58.40349	-132.35842
31	7/29/19	362	85153	580	332361	150.562	11	Mainstem Taku River	58.60261	-133.57147
31	7/30/19	363	85159	560	332362	150.562	12	Mainstem Taku River	58.57766	-133.63457
31	7/30/19	364	85165	545	332363	150.562	13	Dropout	–	–
31	7/30/19	365	85171	550	332364	150.562	14	Mainstem Taku River	58.70400	-133.44114
31	7/30/19	366	85177	550	332365	150.562	15	Mainstem Taku River	58.91291	-133.14566
31	7/30/19	367	85183	575	332366	150.562	16	Mainstem Taku River	58.89480	-133.04074
31	7/30/19	368	85189	560	332367	150.562	17	Harvested	–	–
31	7/30/19	369	85196	570	332368	150.562	18	Harvested	–	–
31	7/30/19	370	85202	585	332369	150.562	19	Mainstem Taku River	58.79084	-133.33083
31	7/30/19	371	85208	550	332370	150.562	20	Tatsatua Creek	58.43630	-132.39241
31	7/30/19	372	85214	570	332371	150.562	21	Kowatua Creek	58.49500	-132.60287
31	7/30/19	373	85222	565	332372	150.562	22	Harvested	–	–
31	7/30/19	374	85228	455	332373	150.562	23	Mainstem Taku River	58.81416	-133.26354
31	7/30/19	375	85234	565	332374	150.562	24	Dropout	–	–
31	7/30/19	376	85240	580	332375	150.562	25	Harvested	–	–
31	7/30/19	377	85246	580	332376	150.562	26	Mainstem Taku River	58.62101	-133.54974
31	7/30/19	378	85253	585	332377	150.562	27	Dropout	–	–
31	7/30/19	379	85259	450	332378	150.562	28	Mainstem Taku River	58.58492	-133.61191
31	7/30/19	380	85263	620	332379	150.562	29	Mainstem Taku River	58.86391	-133.17196
31	7/30/19	381	85271	595	332380	150.562	30	Mainstem Taku River	58.63547	-133.55514

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
31	7/30/19	382	85277	520	332381	150.562	31	Nakina River	59.05841	-133.02502
31	7/30/19	383	85283	580	332382	150.562	32	Harvested	–	–
31	7/30/19	384	85289	550	332383	150.562	33	Harvested	–	–
31	7/30/19	385	85295	415	332384	150.562	34	Harvested	–	–
31	7/30/19	386	85301	525	332385	150.562	35	Dropout	–	–
31	7/31/19	387	85307	560	332386	150.562	36	Mainstem Taku River	58.91865	-133.14747
31	7/31/19	388	85313	570	332387	150.562	37	Dropout	–	–
31	7/31/19	389	85319	545	332388	150.562	38	Kowatua Creek	58.50000	-132.52316
31	7/31/19	390	85325	580	332389	150.562	39	Mainstem Taku River	58.92337	-133.16601
31	7/31/19	391	85331	590	332390	150.562	40	Mainstem Taku River	58.79105	-133.30205
31	7/31/19	392	85337	600	332391	150.562	41	Mainstem Taku River	58.78869	-133.33407
31	7/31/19	393	85343	565	332392	150.562	42	Dropout	–	–
31	7/31/19	394	85349	590	332393	150.562	43	Mainstem Taku River	58.60112	-133.5765
31	7/31/19	395	85355	550	332394	150.562	44	Dropout	–	–
31	8/1/19	396	85359	620	332395	150.562	45	Mainstem Taku River	58.69193	-133.47311
31	8/1/19	397	85365	580	332396	150.562	46	Mainstem Taku River	58.69179	-133.44176
31	8/1/19	398	85371	545	332397	150.562	47	Sheslay River	58.73996	-132.11583
31	8/1/19	399	85377	530	332398	150.562	48	Mainstem Taku River	58.79248	-133.32772
31	8/1/19	400	85383	560	332399	150.562	49	Mainstem Taku River	58.64907	-133.50378
31	8/1/19	401	85390	540	332400	150.562	50	Dropout	–	–
31	8/1/19	402	85396	530	332401	150.562	51	Mainstem Taku River	58.79701	-133.28975
31	8/2/19	403	85402	480	332402	150.562	52	Mainstem Taku River	58.74338	-133.38157
31	8/2/19	404	85408	425	332403	150.562	53	Mainstem Taku River	58.71217	-133.4108
31	8/2/19	405	85414	590	332404	150.562	54	Mainstem Taku River	58.79084	-133.33083
31	8/2/19	406	85420	445	332405	150.562	55	Mainstem Taku River	58.97817	-133.18333
31	8/2/19	407	85426	580	332406	150.562	56	No detections	–	–
31	8/2/19	408	85432	560	332407	150.562	57	Mainstem Taku River	58.65906	-133.49577
31	8/2/19	409	85438	590	332408	150.562	58	Dropout	–	–
31	8/2/19	410	85444	565	332409	150.562	59	Harvested	–	–
31	8/3/19	411	85450	470	332410	150.562	60	Mainstem Taku River	58.66041	-133.49185
31	8/3/19	412	85456	550	332411	150.562	61	Kowatua Creek	58.40821	-132.36631
31	8/3/19	413	85462	575	332412	150.562	62	Harvested	–	–
31	8/3/19	414	85468	620	332413	150.562	63	Mainstem Taku River	58.72445	-133.37634
31	8/3/19	415	85474	520	332414	150.562	64	Harvested	–	–
31	8/3/19	416	85480	570	332415	150.562	65	Mainstem Taku River	58.69617	-133.43134

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
31	8/3/19	417	85486	445	332416	150.562	66	Mainstem Taku River	58.66545	-133.49346
32	8/4/19	418	85492	540	332417	150.562	67	Mainstem Taku River	58.77488	-133.32323
32	8/4/19	419	85498	440	332418	150.562	68	Mainstem Taku River	58.78840	-133.34555
32	8/4/19	420	85504	405	332419	150.562	69	Dropout	–	–
32	8/4/19	421	85510	550	332420	150.562	70	Mainstem Taku River	58.62259	-133.5498
32	8/4/19	422	85517	560	332421	150.562	71	Mainstem Taku River	58.79574	-133.30136
32	8/4/19	423	85523	560	332422	150.562	72	Kowatua Creek	58.74486	-132.25717
32	8/4/19	424	85529	565	332423	150.562	73	Harvested	–	–
32	8/4/19	425	85535	565	332424	150.562	74	Mainstem Taku River	58.76936	-133.17475
32	8/4/19	426	85541	555	332425	150.562	75	Dropout	–	–
32	8/5/19	427	85547	495	332426	150.562	76	Tatsatua Creek	58.32393	-132.34913
32	8/5/19	428	85553	560	332427	150.562	77	Kowatua Creek	58.49500	-132.60287
32	8/5/19	429	85559	535	332428	150.562	78	Mainstem Taku River	58.79248	-133.32772
32	8/5/19	430	85565	580	332429	150.562	79	Mainstem Taku River	58.71238	-133.43981
32	8/5/19	431	85571	580	332430	150.562	80	Mainstem Taku River	58.71718	-133.38196
32	8/5/19	432	85577	555	332431	150.562	81	Tatsatua Creek	58.37757	-132.31228
32	8/5/19	433	85583	570	332432	150.562	82	Mainstem Taku River	58.79668	-133.29233
32	8/5/19	434	85589	550	332433	150.562	83	Mainstem Taku River	58.71129	-133.41361
32	8/5/19	435	85596	530	332434	150.562	84	Mainstem Taku River	58.73758	-133.37653
32	8/5/19	436	85601	420	332435	150.562	85	Tatsatua Creek	58.48243	-132.37975
32	8/6/19	437	85607	595	332436	150.562	86	Harvested	–	–
32	8/6/19	438	85613	570	332437	150.562	87	Harvested	–	–
32	8/6/19	439	85619	555	332438	150.562	88	Nakina River	59.09850	-133.01628
32	8/6/19	440	85625	550	332439	150.562	89	Mainstem Taku River	58.73381	-133.39111
32	8/6/19	441	85631	565	332440	150.562	90	Harvested	–	–
32	8/6/19	442	85637	595	332441	150.562	91	Sheslay River	58.67988	-132.16542
32	8/6/19	443	85644	545	332442	150.562	92	Dropout	–	–
32	8/6/19	444	85650	560	332443	150.562	93	Dropout	–	–
32	8/6/19	445	85656	550	332444	150.562	94	Dropout	–	–
32	8/6/19	446	85662	535	332445	150.562	95	Harvested	–	–
32	8/7/19	447	85668	565	332446	150.562	96	Mainstem Taku River	58.72445	-133.37634
32	8/7/19	448	85675	550	332447	150.562	97	Mainstem Taku River	58.65328	-133.54238
32	8/7/19	449	85680	575	332448	150.562	98	Mainstem Taku River	58.73115	-133.38949
32	8/8/19	450	85686	535	332449	150.562	99	Wilms Creek	58.65116	-133.62601
32	8/8/19	451	85692	455	332450	150.584	0	Tulsequah River	58.76349	-133.65107

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
32	8/8/19	452	85699	555	332451	150.584	1	Wilms Creek	58.63288	-133.62760
32	8/8/19	453	85704	550	332452	150.584	2	Mainstem Taku River	58.80083	-133.30692
32	8/9/19	454	85710	520	332453	150.584	3	Mainstem Taku River	58.69638	-133.42925
32	8/9/19	455	85716	560	332454	150.584	4	Dropout	–	–
32	8/9/19	456	85722	545	332455	150.584	5	Harvested	–	–
32	8/9/19	457	85728	625	332456	150.584	6	Wilms Creek	58.64923	-133.62652
32	8/10/19	458	85736	520	332457	150.584	7	Kowatua Creek	58.51218	-132.45056
32	8/10/19	459	85743	530	332458	150.584	8	Mainstem Taku River	58.64715	-133.53405
32	8/10/19	460	85749	565	332459	150.584	9	Mainstem Taku River	58.72718	-133.37127
32	8/10/19	461	85756	505	332460	150.584	10	Tatsamenie Lake	58.39843	-132.37682
32	8/10/19	462	85762	520	332461	150.584	11	Dropout	–	–
32	8/10/19	463	85770	580	332462	150.584	12	Harvested	–	–
32	8/10/19	464	85774	555	332463	150.584	13	Kowatua Creek	58.72879	-132.27128
33	8/11/19	465	85779	430	332464	150.584	14	Mainstem Taku River	58.64867	-133.54324
33	8/11/19	466	85785	580	332465	150.584	15	Mainstem Taku River	58.73640	-133.38291
33	8/11/19	467	85791	535	332466	150.584	16	Mainstem Taku River	58.83793	-133.18533
33	8/11/19	468	85797	555	332467	150.584	17	Harvested	–	–
33	8/11/19	469	85803	550	332468	150.584	18	Mainstem Taku River	58.71487	-133.42675
33	8/11/19	470	85809	535	332469	150.584	19	Harvested	–	–
33	8/11/19	471	85815	555	332470	150.584	20	Harvested	–	–
33	8/11/19	472	85821	550	332471	150.584	21	Kowatua Creek	58.50196	-132.58815
33	8/12/19	473	85827	600	332472	150.584	22	Harvested	–	–
33	8/12/19	474	85833	590	332473	150.584	23	King Salmon River/Lake	58.80000	-133.23140
33	8/12/19	475	85839	555	332474	150.584	24	Mainstem Taku River	58.69290	-133.48579
33	8/12/19	476	85845	550	332475	150.584	25	Dropout	–	–
33	8/12/19	477	85851	570	332476	150.584	26	Harvested	–	–
33	8/12/19	478	85857	535	332477	150.584	27	Tulsequah River	58.67944	-133.61666
33	8/12/19	479	85863	570	332478	150.584	28	Mainstem Taku River	58.78527	-133.32064
33	8/13/19	480	85869	555	332479	150.584	29	Little Trapper Lake	58.48389	-132.5851
33	8/13/19	481	85875	430	332480	150.584	30	Harvested	–	–
33	8/13/19	482	85881	550	332481	150.584	31	Mainstem Taku River	58.74281	-133.36059
33	8/13/19	483	85887	505	332482	150.584	32	Tatsamenie Lake	58.37109	-132.32032
33	8/13/19	484	85893	450	332483	150.584	33	Mainstem Taku River	58.76590	-133.35238
33	8/13/19	485	85899	520	332484	150.584	34	Mainstem Taku River	58.73543	-133.37416
33	8/13/19	486	85905	560	332485	150.584	35	Mainstem Taku River	58.74578	-133.36747

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
33	8/14/19	487	85911	570	332486	150.584	36	Harvested	–	–
33	8/14/19	488	85917	535	332487	150.584	37	Dropout	–	–
33	8/15/19	489	85923	465	332488	150.584	38	Mainstem Taku River	58.65947	-133.49575
33	8/15/19	490	85929	605	332489	150.584	39	Dropout	–	–
33	8/15/19	491	85935	520	332490	150.584	40	Tatsatua Creek	58.43228	-132.38628
33	8/16/19	492	85941	570	332491	150.584	41	Harvested	–	–
33	8/16/19	493	85947	520	332492	150.584	42	Tatsatua Creek	58.42815	-132.38519
33	8/16/19	494	85953	505	332493	150.584	43	Mainstem Taku River	58.82233	-133.26246
33	8/17/19	495	85960	510	332494	150.584	44	Mainstem Taku River	58.65763	-133.52148
34	8/18/19	496	85965	545	332495	150.584	45	Mainstem Taku River	58.57663	-133.63486
34	8/19/19	497	85971	550	332496	150.584	46	Mainstem Taku River	58.74476	-133.37845
34	8/19/19	498	85977	555	332497	150.584	47	Dropout	–	–
34	8/19/19	499	85983	550	332498	150.584	48	Dropout	–	–
34	8/20/19	500	85989	540	332499	150.584	49	Mainstem Taku River	58.64060	-133.54435
34	8/20/19	501	85995	540	332500	150.584	50	Inklin River	58.63638	-132.26623
34	8/20/19	502	86002	555	332501	150.584	51	Mainstem Taku River	58.70693	-133.45096
34	8/21/19	503	86008	515	332502	150.584	52	Mainstem Taku River	58.74155	-133.34042
34	8/21/19	504	86014	525	332503	150.584	53	Mainstem Taku River	58.77786	-133.33008
34	8/22/19	505	86020	605	332504	150.584	54	Mainstem Taku River	58.75131	-131.91950
34	8/22/19	506	86026	555	–	150.504	41	Dropout	–	–
34	8/22/19	507	86028	520	332505	150.584	55	Mainstem Taku River	58.61796	-133.55720
34	8/23/19	508	80638	530	332506	150.584	56	Mainstem Taku River	58.73773	-133.37943
34	8/23/19	509	80644	550	332507	150.584	57	Mainstem Taku River	58.70275	-133.45239
34	8/23/19	510	80650	530	332508	150.584	58	Mainstem Taku River	58.64301	-133.50836
34	8/24/19	511	86057	535	332509	150.584	59	Mainstem Taku River	58.69602	-133.42865
34	8/24/19	512	86064	570	332510	150.584	60	Inklin River	58.61804	-132.14976
35	8/25/19	513	86070	545	332511	150.584	61	Harvested	–	–
35	8/25/19	514	86076	540	332512	150.584	62	Mainstem Taku River	58.69197	-133.48999
35	8/26/19	515	86082	545	332513	150.584	63	Dropout	–	–
35	8/26/19	516	86088	565	332514	150.584	64	Mainstem Taku River	58.77626	-132.34096
35	8/27/19	517	86094	510	332515	150.584	65	Mainstem Taku River	58.63682	-133.54729
35	8/28/19	518	86100	535	332516	150.584	66	Mainstem Taku River	58.43228	-132.38628
35	8/28/19	519	86106	435	332517	150.584	67	Mainstem Taku River	58.64598	-133.54632
35	8/29/19	520	86112	535	332518	150.584	68	Inklin River	58.77931	-132.48035
35	8/29/19	521	86118	540	332519	150.584	69	Mainstem Taku River	58.72289	-133.41342

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Statistical week	Tag date	Sample number	Spaghetti tag number	METF (mm)	GSI sample vial #	Radiotag frequency (MHz)	Radiotag pulse code	Final location	Latitude	Longitude
35	8/29/19	522	86125	555	332520	150.584	70	Sheslay River	58.41197	-132.03960
35	8/30/19	523	86131	525	332521	150.584	71	Inklin River	58.81422	-132.92126
35	8/31/19	524	86138	515	332522	150.584	72	Mainstem Taku River	58.76873	-133.34119
35	8/31/19	525	86144	535	332523	150.584	73	Nakina River	58.97778	-133.19324
36	9/1/19	526	86150	540	332524	150.584	74	Mainstem Taku River	58.76628	-133.34480
36	9/2/19	527	86156	545	332525	150.584	75	Dropout	–	–
36	9/4/19	528	86162	490	332526	150.584	76	Dropout	–	–
36	9/5/19	529	86168	525	332527	150.584	77	Dropout	–	–
36	9/6/19	530	86174	540	332528	150.584	78	Mainstem Taku River	58.69602	-133.42865
37	9/8/19	531	86180	555	332529	150.584	79	Dropout	–	–
37	9/9/19	532	86186	530	332530	150.584	80	Dropout	–	–
37	9/11/19	533	86192	560	332531	150.584	81	Mainstem Taku River	58.59834	-133.58197
37	9/14/19	534	86198	545	332532	150.584	82	Dropout	–	–

Note: en dash (–) = no data.

Appendix G.–The genetic stock identification analysis results, with 90% credible intervals (C.I.), of radiotagged sockeye salmon at the Canyon Island fish wheels, 2019.

Statistical week	Number genotyped	Reporting group	Mean	SD	C.I. 5%	C.I. 95%
23–26	56	Other	0.016	0.025	0.000	0.064
		Kuthai Lake	0.287	0.063	0.191	0.396
		King Salmon Lake	0.138	0.045	0.073	0.220
		Little Trapper Lake	0.000	0.002	0.000	0.000
		Tatsatua Lake	0.000	0.001	0.000	0.000
		Tatsamenie Lake	0.000	0.001	0.000	0.000
		Nahlin River	0.070	0.034	0.024	0.134
		Mainstem Taku River	0.489	0.067	0.381	0.602
		Chutine Lake	0.000	0.001	0.000	0.000
27	50	Other	0.000	0.029	0.000	0.059
		Kuthai Lake	0.077	0.037	0.026	0.144
		King Salmon Lake	0.246	0.060	0.152	0.348
		Little Trapper Lake	0.080	0.038	0.029	0.154
		Tatsatua Lake	0.000	0.001	0.000	0.000
		Tatsamenie Lake	0.000	0.003	0.000	0.000
		Nahlin River	0.000	0.002	0.000	0.000
		Mainstem Taku River	0.597	0.070	0.481	0.710
		Chutine Lake	0.000	0.001	0.000	0.000
28	61	Other	0.000	0.017	0.000	0.033
		Kuthai Lake	0.030	0.023	0.004	0.075
		King Salmon Lake	0.225	0.052	0.143	0.311
		Little Trapper Lake	0.151	0.047	0.083	0.234
		Tatsatua Lake	0.000	0.002	0.000	0.000
		Tatsamenie Lake	0.000	0.000	0.000	0.000
		Nahlin River	0.000	0.001	0.000	0.000
		Mainstem Taku River	0.595	0.062	0.492	0.696
		Chutine Lake	0.000	0.001	0.000	0.000
29	46	Other	0.011	0.033	0.000	0.070
		Kuthai Lake	0.045	0.029	0.010	0.106
		King Salmon Lake	0.086	0.040	0.033	0.161
		Little Trapper Lake	0.208	0.060	0.118	0.312
		Tatsatua Lake	0.000	0.006	0.000	0.000
		Tatsamenie Lake	0.000	0.002	0.000	0.000
		Nahlin River	0.000	0.001	0.000	0.000
		Mainstem Taku River	0.650	0.070	0.529	0.761
		Chutine Lake	0.000	0.001	0.000	0.000
30	107	Other	0.028	0.024	0.000	0.074
		Kuthai Lake	0.000	0.001	0.000	0.000
		King Salmon Lake	0.034	0.018	0.010	0.067
		Little Trapper Lake	0.104	0.032	0.055	0.159
		Tatsatua Lake	0.051	0.031	0.000	0.101
		Tatsamenie Lake	0.111	0.031	0.065	0.165
		Nahlin River	0.000	0.001	0.000	0.000
		Mainstem Taku River	0.671	0.053	0.584	0.761
		Chutine Lake	0.000	0.002	0.000	0.000

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Statistical week	Number genotyped	Reporting group	Mean	SD	C.I. 5%	C.I. 95%
31	93	Other	0.000	0.016	0.000	0.030
		Kuthai Lake	0.010	0.010	0.000	0.030
		King Salmon Lake	0.021	0.015	0.004	0.051
		Little Trapper Lake	0.042	0.022	0.013	0.082
		Tatsatua Lake	0.055	0.025	0.021	0.102
		Tatsamenie Lake	0.071	0.029	0.032	0.123
		Nahlin River	0.000	0.001	0.000	0.000
		Mainstem Taku River	0.801	0.045	0.724	0.869
		Chutine Lake	0.000	0.000	0.000	0.000
32	46	Other	0.000	0.021	0.000	0.042
		Kuthai Lake	0.000	0.001	0.000	0.000
		King Salmon Lake	0.024	0.021	0.004	0.065
		Little Trapper Lake	0.152	0.054	0.069	0.247
		Tatsatua Lake	0.000	0.002	0.000	0.000
		Tatsamenie Lake	0.138	0.051	0.065	0.230
		Nahlin River	0.000	0.001	0.000	0.000
		Mainstem Taku River	0.686	0.070	0.564	0.795
		Chutine Lake	0.000	0.003	0.000	0.000
33	31	Other	0.089	0.075	0.000	0.223
		Kuthai Lake	0.000	0.002	0.000	0.000
		King Salmon Lake	0.000	0.002	0.000	0.000
		Little Trapper Lake	0.042	0.047	0.001	0.136
		Tatsatua Lake	0.031	0.042	0.010	0.128
		Tatsamenie Lake	0.148	0.071	0.048	0.274
		Nahlin River	0.000	0.004	0.000	0.000
		Mainstem Taku River	0.690	0.099	0.525	0.848
		Chutine Lake	0.000	0.003	0.000	0.000
34–37	38	Other	0.033	0.043	0.000	0.118
		Kuthai Lake	0.000	0.002	0.000	0.000
		King Salmon Lake	0.000	0.001	0.000	0.000
		Little Trapper Lake	0.006	0.020	0.000	0.052
		Tatsatua Lake	0.066	0.059	0.008	0.179
		Tatsamenie Lake	0.228	0.066	0.130	0.345
		Nahlin River	0.000	0.004	0.000	0.000
		Mainstem Taku River	0.667	0.087	0.521	0.806
		Chutine Lake	0.000	0.001	0.000	0.000
Total	528	Other	0.005	0.006	0.000	0.016
		Kuthai Lake	0.045	0.009	0.031	0.062
		King Salmon Lake	0.086	0.012	0.067	0.107
		Little Trapper Lake	0.083	0.013	0.063	0.105
		Tatsatua Lake	0.032	0.009	0.019	0.048
		Tatsamenie Lake	0.075	0.011	0.057	0.095
		Nahlin River	0.005	0.005	0.001	0.014
		Mainstem Taku River	0.668	0.023	0.631	0.705
		Chutine Lake	0.000	0.000	0.000	0.000