Operational Plan: Situk River Salmon Enumeration and Sampling Procedures, 2021–2022

by Richard A. Hoffman

February 2021

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative		all standard mathematical	
deciliter	dL	Code	AAC	signs, symbols and	
gram	g	all commonly accepted		abbreviations	
hectare	ha	abbreviations	e.g., Mr., Mrs.,	alternate hypothesis	H _A
kilogram	kg		AM, PM, etc.	base of natural logarithm	е
kilometer	km	all commonly accepted		catch per unit effort	CPUE
liter	L	professional titles	e.g., Dr., Ph.D.,	coefficient of variation	CV
meter	m		R.N., etc.	common test statistics	(F, t, χ^2 , etc.)
milliliter	mL	at	@	confidence interval	CI
millimeter	mm	compass directions:		correlation coefficient	
		east	E	(multiple)	R
Weights and measures (English)		north	Ν	correlation coefficient	
cubic feet per second	ft ³ /s	south	S	(simple)	r
foot	ft	west	W	covariance	cov
gallon	gal	copyright	©	degree (angular)	0
inch	in	corporate suffixes:		degrees of freedom	df
mile	mi	Company	Co.	expected value	Ε
nautical mile	nmi	Corporation	Corp.	greater than	>
ounce	oz	Incorporated	Inc.	greater than or equal to	≥
pound	lb	Limited	Ltd.	harvest per unit effort	HPUE
quart	qt	District of Columbia	D.C.	less than	<
vard	vd	et alii (and others)	et al.	less than or equal to	\leq
, ,	5	et cetera (and so forth)	etc.	logarithm (natural)	ln
Time and temperature		exempli gratia		logarithm (base 10)	log
day	d	(for example)	e.g.	logarithm (specify base)	log ₂ etc.
degrees Celsius	°C	Federal Information		minute (angular)	'
degrees Fahrenheit	°F	Code	FIC	not significant	NS
degrees kelvin	К	id est (that is)	i.e.	null hypothesis	H_0
hour	h	latitude or longitude	lat or long	percent	%
minute	min	monetary symbols	·	probability	Р
second	s	(U.S.)	\$,¢	probability of a type I error	
		months (tables and		(rejection of the null	
Physics and chemistry		figures): first three		hypothesis when true)	α
all atomic symbols		letters	Jan,,Dec	probability of a type II error	
alternating current	AC	registered trademark	®	(acceptance of the null	
ampere	Α	trademark	тм	hypothesis when false)	β
calorie	cal	United States		second (angular)	"
direct current	DC	(adjective)	U.S.	standard deviation	SD
hertz	Hz	United States of		standard error	SE
horsepower	hp	America (noun)	USA	variance	
hydrogen ion activity	nH	U.S.C.	United States	population	Var
(negative log of)	r		Code	sample	var
parts per million	ppm	U.S. state	use two-letter	···· · · · · · · · · · · · · · · · · ·	
parts per thousand	ppt.		abbreviations		
r r	% %		(e.g., AK, WA)		
volts	V				
watts	W				

REGIONAL OPERATIONAL PLAN CF.1J.2021.01

OPERATIONAL PLAN: SITUK RIVER SALMON ENUMERATION AND SAMPLING PROCEDURES, 2021–2022

by

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Signature Page

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PURPOSE

The Alaska Department of Fish and Game, Division of Commercial Fisheries, monitors annual escapements of salmon returning to the Situk River system near Yakutat, Alaska. A weir in the lower river provides the primary mode of enumeration for sockeye *Oncorhynchus nerka* and Chinook *O. tshawytscha* salmon escapements into the Situk River. Information provided by this project is used inseason to manage the Situk-Ahrnklin Inlet commercial set gillnet fishery and the inriver sport fisheries to ensure escapement goals are met and to maximize and sustain the harvest of salmon from the Situk River. A two-person crew will enumerate all species of salmon through the Situk River weir and sample adult sockeye and Chinook salmon for biological characteristics (age, sex, and length). This report provides operational guidelines for the Situk River adult salmon weir project, including salmon enumeration, sampling procedures, and weir protocols.

Key words: Yakutat, Southeast Alaska, Situk River, Chinook salmon, *Oncorhynchus tshawytscha*, sockeye salmon, *Oncorhynchus nerka*, weir, age composition, escapement, operational plan, commercial salmon harvest

BACKGROUND

The Situk River is a small river located approximately 15 km southeast of the city of Yakutat, Alaska (Figure 1). The river is approximately 35.2 km (22 miles) in length and empties out of Mountain and Situk lakes, which make up the headwaters of the drainage. The Situk, Ahrnklin, and Lost rivers all flow into the Situk-Ahrnklin Inlet before entering the Gulf of Alaska. The Situk River sustains relatively large populations of sockeye (*Oncorhynchus nerka*), coho (*O. kisutch*), and pink (*O. gorbuscha*) salmon, a moderate population of Chinook salmon (*O. tshawytscha*), and a small population of chum salmon (*O. keta*). In addition, the Situk River supports the largest run of steelhead (*O. mykiss*) in Alaska, as well as the state's largest steelhead sport fishery (Catterson and Power 2018).

The Situk-Ahrnklin Inlet commercial set gillnet fishery is the oldest and, historically, most productive commercial set gillnet fishery in the Yakutat Management Area (Woods and Zeiser 2010). Over the decade 2011–2020, the fishery accounted for an average 64% of the total commercial salmon harvest in the Yakutat area, worth an average exvessel value of \$1.1 million. The Situk-Ahrnklin commercial sockeye salmon harvest averaged 41,000 fish per year over that same period, approximately 39% of the total commercial harvest of sockeye salmon in the Yakutat area. The Situk River also supports the most important sockeye salmon subsistence fishery in the area. Over the 10 years 2010–2019, the reported Situk River subsistence harvest averaged 3,000 sockeye salmon per year, which represented an average 85% of the total reported sockeye salmon subsistence harvest in the Yakutat area.

The Alaska Department of Fish and Game (ADF&G) actively manages fisheries to achieve formal spawning escapement goals for sockeye and Chinook salmon in the Situk River. The sockeye salmon run is managed for a biological escapement goal (BEG) of 30,000–70,000 fish, the range of escapements predicted to produce 90% or more of the estimated maximum sustained yield of sockeye salmon to the fisheries (Clark et al. 1995, 2002). In 1991, the Alaska Board of Fisheries adopted the *Situk-Ahrnklin Inlet and Lost River King Salmon Fisheries Management Plan* (5 AAC 30.365), which specifies management actions designed to achieve Situk River Chinook salmon escapements within the BEG range of 450–1,050 large fish (age 3-ocean and older; McPherson et al. 2005). Action points in the plan regulate the sport and troll fisheries that target Chinook salmon, the Situk-Ahrnklin Inlet set gillnet fishery, which targets sockeye salmon and incidentally harvests Chinook salmon, and the subsistence/personal use fishery.



Figure 1.-Map of the Situk River drainage, Situk-Ahrnklin Inlet, and present weir site.

Inseason management of Situk River Chinook and sockeye salmon fisheries are based on current harvest statistics and daily weir counts. The weir was located about 50 meters downstream of Nine Mile Bridge (Forest Highway 10) in 1971 and from 1976 to 1987. In 1988, the weir site was moved downstream to the lower Situk River, about 2 km above what is locally known as the "Lower Landing", at the end of the Lost River Road (Figure 1). This location is in closer proximity to the Situk-Ahrnklin Inlet set gillnet fishery and provides more timely information for inseason management.

The Situk River weir is operated until the sockeye salmon run is essentially over in early August. Annual sockeye salmon weir counts have averaged approximately 66,500 fish since 1988, and escapements were within or exceeded the BEG range of 30,000-70,000 fish in all years but 2008 and 2018 (Table 1). The weir is also operated throughout the duration of the Chinook salmon run. Spawning escapements (i.e., weir counts minus all upstream sport fishery harvest) of large Chinook salmon, age 3-ocean and older (≥ 660 mm mid eye to fork [MEF] length), averaged about

1,400 fish from 1988 to 2003 but have averaged about 570 fish since 2004 (Table 1). Escapements were below the lower bound of the BEG range of 450–1,050 large fish in five of the past 10 years, which has resulted in progressively restrictive fisheries management in accordance with the Situk River king salmon management plan (Hoffman 2019). The Situk River weir is removed well before the peak of the pink and coho salmon runs, and weir counts of those species are not useful for assessing trends in abundance (Heinl et al. 2017). Very small numbers of chum salmon are also counted at the weir in most years.

The purpose of this report is to provide ADF&G personnel with project objectives and protocols for seasonal operation of the Situk River adult salmon weir. Information provided by this project is used inseason to manage the Situk-Ahrnklin commercial set gillnet fishery and the inriver sport fishery to ensure escapement goals are met and to maximize and sustain the harvest of salmon from the Situk River. In addition, Chinook salmon weir counts and age composition information are used by Division of Sport Fish staff to estimate spawning escapement, reconstruct brood-year returns, and forecast Situk River Chinook salmon runs.

OBJECTIVES

- 1. Enumerate adult salmon by species through the Situk River weir from approximately 10 June to 12 August.
- 2. Estimate the age, sex, and length composition of the Situk River sockeye salmon escapement such that the estimated proportions are within 5% of the true value with at least 95% probability.
- 3. Estimate the age, sex, and length composition of large (≥660 mm MEF length) Situk River Chinook salmon counted at the Situk River weir such that the estimated proportions are within 10% of the true value with at least 95% probability.

				Weir Count			Escapement
	Dates of						Large
Year	Operation ^a	Coho ^b	Pink ^b	Chum	Sockeye ^c	Chinook ^d	Chinook ^e
1988	7 Jun–21 Aug	1,854	78,754	228	46,404	1,080	868
1989	31 May–17 Aug	112	288,246	157	84,383	1,852	637
1990	1 Jun–28 Jul	0	NA	0	61,375	1,274	628
1991	10 Jun-27 Jul	0	4,168	3	69,737	1,622	889
1992	18 Apr–5 Aug	0	29,278	0	76,733	1,985	1,595
1993	10 Jun–5 Aug	0	16,285	0	62,110	4,091	952
1994	21 May–4 Aug	4	79,055	4	72,474	4,416	1,271
1995	10 May–3 Aug	4	66,273	17	42,463	8,231	4,330
1996	6 May–6 Aug	65	157,012	15	61,269	4,151	1,800
1997	7 May–8 Aug	18	466,267	35	42,050	5,001	1,878
1998	3 May–5 Aug	8	97,392	0	50,546	5,333	924
1999	9 May–6 Aug	2	27,386	0	61,544	2,721	1,461
2000	10 May–8 Aug	189	331,510	53	41,554	3,092	1,785
2001	20 May-8 Aug	21	121,267	9	60,334	1,261	656
2002	10 May–8 Aug	40	98,790	21	68,773	1,772	1,000
2003	8 May–8 Aug	1	374,533	12	89,720	3,281	2,117
2004	8 May–9 Aug	224	14,938	552	43,278	1,558	698
2005	8 May–31 Jul	1	281,135	0	66,476	1,064	595
2006	11 May–13 Aug	320	114,779	288	90,351	1,398	295
2007	11 May–15 Aug	39	229,033	18	61,799	2,158	677
2008	11 May–23 Jul	0	1,232	6	22,520	798	413
2009	12 May–5 Aug	12	62,787	5	83,959	1,252	902
2010	11 May–5 Aug	0	92,008	1	53,499	355	167
2011	9 May–7 Aug	52	199,360	112	89,943	1,288	240
2012	1 Jun–7 Aug	13	33,629	11	62,500	628	322
2013	11 Jun–4 Aug	32	133,656	3	118,635	1,045	912
2014	9 Jun–6 Aug	2	28,238	20	102,318	629	475
2015	9 Jun–7 Aug	9	74,729	42	95,093	418	174
2016	19 May–11 Aug	183	42,198	0	57,693	716	329
2017	25 May-10 Aug	370	263,830	0	91,146	2,171	1,187
2018	23 May–7 Aug	16	53,780	0	26,704	990	420
2019	3 May–10 Aug	435	222,895	32	72,561	1,875	623
2020	13 May–7 Aug	42	22,901	9	63,194	4,206	1,197
Average		123	128,355	50	66,459	2,234	982

Table 1.–Salmon counts through the lower Situk River weir and estimated spawning escapements of Chinook salmon, 1988–2020.

^a In 1992 and since 1994, the Division of Sport Fish operated the weir from May to early June to count emigrant steelhead.

^b The Situk weir is not operated through the end of the coho and pink salmon runs and weir counts are not useful for assessing trends in abundance of those species.

^c The Sockeye salmon biological escapement goal range is 30,000–70,000 fish.

^d Total Chinook salmon weir count, all ages combined.

^e Escapement of large (age 3-ocean and older; ≥660 mm MEF length) Chinook salmon is weir counts minus upstream sport fishery harvest (1988–2019 data from CTC (2020); 2020 data are preliminary). The Chinook salmon biological escapement goal range is 450–1,050 large fish.

METHODS

ADULT SALMON WEIR ENUMERATION

The Situk River weir will be installed each year in late April/early May and operated through early August. The weir will be initially configured and operated by Division of Sport Fish staff to count emigrating steelhead kelts through approximately 10 June, at which point Division of Commercial Fisheries staff will take over operations and the weir will be reconfigured to count immigrating salmon. Emigrating steelhead will continue to be recorded and sampled as necessary after 10 June.

The weir is a standard aluminum bi-pod, channel-and-picket design, with a large section of floating panels and resistance boards to accommodate boat traffic on the river. A live trap will be assembled on the upstream side of the weir for capturing and sampling salmon for age, sex, and length (ASL) data. A counting station will be established alongside the live trap, where 1 to 3 pickets will be removed to pass fish for enumeration. A secondary counting station will be established near the western bank of the weir. The use of this secondary counting station will occur during periods of high fish abundance and when river water levels impact fish passage through the primary counting station. White boards (or flash panels) will be placed on the streambed on the upstream side of the counting stations to facilitate accurate identification and enumeration as fish swim through the weir. Spotlights may be used during late evening counts, when low lighting can make it more difficult to differentiate between species.

The feasibility of using a video recording system to count fish through the weir will continue to be tested in 2021 and 2022. The video recording system will be installed at the primary counting station. A workable video counting system would potentially improve the flow of fish through the weir and allow fish to move upstream at night (Van Alen and Mahara 2011; Vinzant and Heinl 2018). The video recording system will be similar to that described by Kerkvleit and Booz (2017). Briefly, it will consist of a $1' \times 2' \times 5'$ aluminum passage chute with an $18'' \times 36'' \times 18''$ camera box attached to one side. A 950 analog drop camera will be mounted inside the camera box and illuminated with SeaMaster light ribbons in the camera box and passage chute. Video will be recorded onto an Amcrest ProHD DVR recorder with a Seagate internal hard drive and external backup hard drive. Hard drives will be switched out as needed and recordings will be reviewed opportunistically in-season. The system will be powered by onsite generator and the video system will only be operated when the weir crew is conducting concurrent visual counts. The weir crew will enumerate fish as they swim through the passage chute to compare identification and fish counts and in case of video system failure.

Two Division of Commercial Fisheries staff (one of whom is the crew leader) will be assigned to this project and additional assistance will be provided as needed during weir installation and removal. It is extremely important that the weir be well maintained to ensure it is fish-tight and to prevent wash outs. The weir will be kept clean of debris and the river substrate will be checked frequently to make sure that holes do not develop through which fish might escape uncounted. Fish are sometimes seen swimming through the gap at the bottom of the floating panels, so weir personnel should pay particularly close attention to this area of the weir. In deeper channels, a dry suit and diving mask will be needed to visually inspect the weir for holes.

Large numbers of fish (>200) should not be allowed to build up behind the weir. If fish accumulate behind the weir, they should be counted through the counting stations. It is important to keep a daily logbook (Rite in the Rain®).

to document daily events in detail, such as weather information, water levels, maintenance performed, number of fish sampled, bear activity, and personnel changes in camp.

AGE, SEX, AND LENGTH COMPOSITION AND SAMPLE SIZE

Sockeye and Chinook salmon will be sampled at the Situk River weir for age, sex, and length data, stratified by statistical week. **The standard statistical week starts on Sunday at 12:01 a.m. and ends on the following Saturday at midnight.** Statistical weeks are numbered sequentially starting from the beginning of the calendar year (see Appendix A for 2021–2023 statistical weeks).

The age composition of the sockeye salmon escapement will be determined from scale samples collected from a minimum of 800 fish. This sample size was selected based on work by Thompson (2002) for estimating proportions of four or more major age classes. A sample size of 510 fish is needed to ensure the estimated proportion of each age class will be within 5% of the true value with at least 95% probability. The sample size was increased to 800 fish to ensure the sampling goal will be met, even if age cannot be determined for more than 35% of sampled fish. In addition, 3 scales will be collected from each sampled fish to increase the number of scales that can be aged.

The age composition of Chinook salmon counted at the weir will be determined from scale samples collected from at least 200 fish. This sample size will be more than needed to ensure estimated proportions of each age class will be within 10% of the true value with at least 95% probability (Thompson 2002), based on an average weir count of 1,400 fish (2011–2020 average) and accounting for an average 30% of scale samples that cannot be aged. The objective criteria match those established for Chinook salmon runs at the Chickamin and Keta rivers and Andrew Creek in Southeast Alaska (Richards 2017). Sampling strategy will be such that an approximately equal number of large Chinook salmon (\geq 660 mm MEF) and small–medium-sized Chinook salmon (<660 mm MEF) will be sampled, based on the average weir count (2011–2020 average). Four scales will be collected from each sampled fish.

DATA COLLECTION

Weir Enumeration

All salmon will be counted by species using mechanical "tally whackers or "clickers" and video. Chinook salmon will be counted and visually classified by size (small, medium, and large). Small-sized fish are <508 mm (<20 in) or less in total length and are age 1-ocean males or "jacks"; medium-sized Chinook salmon are 508–711 mm (20–28 in) in total length and are nearly all age 2-ocean males; large fish are >711 mm (>28 in) in total length and are mostly age 3-ocean and older fish. To facilitate in making size determinations, weir personnel will view passing fish relative to reference marks (508 and 711 mm long) painted on the back wall of the passage chute and on the white flash panels secured to the river bottom upstream of the counting stations. Note that these size classifications for Chinook salmon differ slightly from those used elsewhere in Southeast Alaska, which are also normally based on MEF length (e.g., Richards 2017). Small Chinook and sockeye salmon (age 1-ocean jacks) can, to a small extent, squeeze between the weir pickets and avoid the weir opening and trap. Total counts of small Chinook salmon are assumed to be biased low and the escapement goal is based on large Chinook salmon.

The weir crew will record daily weir counts on daily and cumulative counting forms as described in Appendix B. Note the times that the counting station was opened and closed and record the daily and cumulative counts of Chinook and sockeye salmon. In the comments section on the right side of the page, document other salmon species, net marked fish, holes in the weir, predation, and other observations. The crew leader will review forms for accuracy. The daily totals for all species will then be recorded on a radio form (Appendix C). This form will be used to relay the total daily counts (from the previous day) to the Yakutat ADF&G office via VHF radio each morning at 9:00 a.m.

Physical Data

Situk River discharge rate (cfs) and temperature (°C) will be obtained each morning at 9:00 a.m. from the USGS National Water Information System website for USGS station 15129500 SITUK R NR YAKUTAT AK at (https://nwis.waterdata.usgs.gov/ak/nwis/ub?). Daily physical conditions will be recorded on the radio form (Appendix C) by office staff.

Age, Sex, and Length Sampling

Sockeye and Chinook salmon will be the only species sampled. Procedures for sampling and recording data are outlined in detail in Appendix D. All fish sampled for scales will be measured (mm) from mid eye to tail fork (Appendix E), and the sex will be determined from examination of external dimorphic sexual maturation characteristics such as snout and kype development, belly shape, and shape of vent opening (Appendix F). Scales will be collected from the preferred area of the fish; i.e., the left side of the fish, two scale rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963; Appendix G) and placed on a scale card (Appendix H). Corresponding data will be recorded on (ASL) optical scan forms (Appendices I and J).

Sockeye Salmon

Daily sampling goals for sockeye salmon will be determined by **multiplying the total weir passage since the last sampling event by 1% (.01).** That number will be the sampling target for that day. As long as 1% of the sockeye salmon run since the last sampling event are sampled, sampling events can be spread out to 3 times a week over 3 non-consecutive days. This will yield a more representative sample for each statistical week. Once sampling goals are calculated, weir staff will open the trap long enough to capture enough sockeye salmon to achieve the sampling goal for that day. In the event the trap contains many more sockeye salmon than needed, a systematic sample should be taken from the sockeye salmon in the trap (e.g., every-other sockeye salmon will be sampled). Three scales will be collected from all sockeye salmon sampled.

Chinook Salmon

Chinook salmon will be sampled at a rate of approximately 1 out of every 3 fish. Sampling strategy will be such that an approximately equal number of large Chinook salmon ($\geq 660 \text{ mm MEF}$) and small-medium-sized Chinook salmon (< 660 mm MEF) will be sampled, based on the average weir count (2011–2020 average). The sampling rate may be adjusted in-season based on actual run size, river conditions, in-river management considerations, and potential disruption of the movement of other more abundant species through the weir. Chinook salmon will be handled as carefully and efficiently as possible to reduce stress. If a Chinook salmon shows signs of severe stress, that individual will immediately be released without sampling.

Every Chinook salmon sampled will also be inspected for the presence of the adipose fin. Although unlikely, if a sampled Chinook salmon is missing its adipose fin, the fish will be sacrificed, measured for length (MEF), internally inspected to determine sex, and sampled for age (scale

sample), and its head will be removed and sent to the ADF&G Mark, Age and Tag Laboratory for coded wire tag analysis. All other captured Chinook salmon will be sampled for length, sex (visually and based on morphological characteristics), and sampled for scales. Four scales will be collected from the preferred area on all Chinook salmon sampled.

DATA REDUCTION

Weir Counts

Weir counts will be entered daily (or as timely as possible) into the ADF&G database at the Yakutat ADF&G office using the Zander data entry application on the ADF&G OceanAK website. Data to be entered include temperature (°C), brief comments, and fish numbers by count type, maturity, and species. Information from the video camera will be reviewed opportunistically inseason and compared to daily counts.

It is important that a count of 0 be entered into Zander for any species/maturity type that might reasonably be expected to be present if none are counted on a given day. Sockeye and Chinook (all size types) salmon, for example, should be expected on any given day that the weir is operated; thus, enter 0 into Zander for all days when no fish are counted through the weir when the counting station is open. Conversely, there is no need enter in a count of 0 for coho salmon until at least 1 coho salmon has been counted at the weir, after which all counts of 0 should be entered in for all days when none are counted (same for pink and chum salmon). If counts for missing days must be interpolated due to high water events or other problems (see Passage Estimates below), those counts will be entered as "Calculated Values".

To ensure accuracy, entered data should be checked against the raw data forms each time they are entered into the database. Once the project is completed, daily weir counts for the entire season should be downloaded from OceanAK and double-checked again to ensure they are accurate and complete (e.g., there should be no counts of "jack" pink salmon) and compared to video counts. All raw data including daily counting forms, radio forms, and camp logbooks will be stored at the Yakutat ADF&G office.

Age, Sex, Length Data

Completed ASL forms and scale cards will be delivered to the Yakutat ADF&G office **on a weekly basis.** The project leader will review all data for accuracy and immediately send the data to Juneau to be reviewed and analyzed inseason.

DATA ANALYSIS

Passage Estimates

In some years, brief periods of flooding may require removal of pickets to prevent structural damage to the weir. Upstream salmon passage will be estimated for days the weir is inoperable. Estimates will be assumed to be zero if passage is likely negligible based on historical or inseason information; otherwise, estimates for missed passage will be calculated following methods used at the Kogrukluk River weir in western Alaska (Hansen and Blain 2013). If the weir is not in operation for all of one day, an estimate for that day (\hat{n}_i) will be calculated as the average of the number of fish counted on the two days before $(n_b \text{ and } n_{b-1})$ and the two days after $(n_a \text{ and } n_{a+1})$ the missing day:

$$\hat{n}_{i} = \left(\frac{(n_{b} + n_{b-1} + n_{a} + n_{a+1})}{4}\right). \tag{1}$$

If the weir is not fish-tight for a period of two or more days, passage estimates for the missing days will be calculated using linear interpolation. This method is appropriate for short periods of inoperability when fish passage is reasonably assumed to have a linear relationship with time. Average fish counts from the two days before and two days after the inoperable period will be used to estimate the counts during the period of missed passage. The estimated fish count (\hat{n}) on day (i) of the inoperable period, where D is the total number of inoperable days, will be estimated as:

$$\hat{n}_{i} = \left(\frac{n_{b} + n_{b-1}}{2}\right) + i \left(\frac{(n_{a} + n_{a+1}) - (n_{b} + n_{b-1})}{2(D+1)}\right).$$
(2)

Estimated counts will be entered into the Zander weir data entry application as "Calculated Values".

Age, Sex, and Length Composition

Sockeye and Chinook salmon scale samples will be analyzed at the Region 1 Scale Aging Laboratory in Douglas, Alaska. Scale impressions will be made in cellulose acetate and prepared for analysis as described by Clutter and Whitesel (1956). Scales will be examined under moderate ($70\times$) magnification to determine age. Age classes will be designated by the European aging system where freshwater and saltwater years are separated by a period (e.g., 1.3 denotes a fish with one freshwater and three ocean years) (Koo 1962). Age, length, and sex data will be entered into the Region 1 fisheries database by Douglas staff.

SCHEDULE AND DELIVERABLES

Division of Commercial Fisheries staff will take over operation of the weir on approximately 10 June. The weir will be removed on approximately 12 August. Daily and cumulative salmon counts will be communicated to managers at the Yakutat office and entered into the Zander data entry application on the ADF&G OceanAK website. Scale samples will be forwarded to the ADF&G aging lab in Douglas on a weekly basis throughout the season. A final, error-checked Excel file with daily weir counts will be forwarded to appropriate Division of Sport Fish staff at the end of the season.

Weekly and cumulative sockeye salmon counts compared to the recent 10-year average and lower and upper bounds of the sockeye salmon escapement goal will be provided to the public and updated inseason on the ADF&G Division of Commercial Fisheries website at:

http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareasoutheast.salmon#fishcounts.

Daily and cumulative weir counts of all species of salmon will also be provided to the public and updated inseason on the ADF&G Division of Sport Fish website at:

http://www.adfg.alaska.gov/sf/FishCounts/.

RESPONSIBILITIES

- Richard Hoffman, Fishery Biologist II, Area Management Biologist. Oversight of all aspects of project, including operational planning, permit acquisition, equipment inventory.
- Hannah Christian, Fishery Biologist I, Project Leader. Supervises project field crew and assists with all aspects of the project, including operational planning, training, field work, and data analysis.
- Fish and Wildlife Technician III, Crew Leader. Under general supervision is responsible for all aspects of field operations and equipment and camp maintenance. Ensures that scheduled field work is conducted and completed in a safe and timely manner. Directs the work of field assistants and ensure consistency and accuracy of data. Collects data and reports inseason weir counts to ADF&G management staff.
- Fish and Wildlife Technician II, Crew. Under direct supervision assists with all aspects of field operations, data collection, equipment and camp maintenance, and general field camp duties.
- Program Technician. Provides administrative support to the project and enters weir counts into Zander.

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APPENDICES

	202	21	202	22	202	23
Statistical Week	Beginning Date	Ending Date	Beginning Date	Ending Date	Beginning Date	Ending Date
23	30-May	5-Jun	29-May	4-Jun	4-Jun	10-Jun
24	6-Jun	12-Jun	5-Jun	11-Jun	11-Jun	17-Jun
25	13-Jun	19-Jun	12-Jun	18-Jun	18-Jun	24-Jun
26	20-Jun	26-Jun	19-Jun	25-Jun	25-Jun	1-Jul
27	27-Jun	3-Jul	26-Jun	2-Jul	2-Jul	8-Jul
28	4-Jul	10-Jul	3-Jul	9-Jul	9-Jul	15-Jul
29	11-Jul	17-Jul	10-Jul	16-Jul	16-Jul	22-Jul
30	18-Jul	24-Jul	17-Jul	23-Jul	23-Jul	29-Jul
31	25-Jul	31-Jul	24-Jul	30-Jul	30-Jul	5-Aug
32	1-Aug	7-Aug	31-Jul	6-Aug	6-Aug	12-Aug
33	8-Aug	14-Aug	7-Aug	13-Aug	13-Aug	19-Aug
34	15-Aug	21-Aug	14-Aug	20-Aug	20-Aug	26-Aug
35	22-Aug	28-Aug	21-Aug	27-Aug	27-Aug	2-Sep

Appendix A.-Statistical weeks (sampling periods) and corresponding calendar dates, 2021–2023.

Note: A new statistical week always begins on a Sunday.

Date: 7/4/	19											
	Soc	keye		Chinook						Other St	pecies	Comments: Weather, net marks,
Time Devied	Daily	Cum.	Da	aily Cou	nts	Cum. Daily				Caba	predation, holes in the wier, visbility, behind the weir	
0400	157	157	L	Ô	1	D D		(-	River others behind weir
1100/	637	794	3	5	0	3	10	١	1,037	7		
1600/1700	57	851	١	3	6	Ч	8	7	383	(-	~ 200 fish behind were but not moving
2300/2359	123	974	0	2	0	L)	10	7	618	1	-	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,												
Daily Total		974			I	Ч	10	7	2,038	8		
Previous Day	s Total	34,000				314	573	723	100,200	215	-	
Total Cumula	tive	34,974				318	583	730	102,238	223		

Appendix B.-Situk River weir daily and cumulative salmon count form and procedures.

PROCEDURE FOR FILLING OUT A DAILY SALMON COUNT FORM:

- Begin a new reporting form each day and record the date.
- A counting/sampling day begins at 00:01 hours and ends at 23:59 hours. Record times in military format (e.g., 3:00 p.m. = 15:00 hours).
- Each day, copy the season total cumulative for sockeye and Chinook (large = L, medium = M, and small = S) salmon and other species over from the previous day's sheet and enter them into the appropriate fields marked "Previous Day's Cum" at the bottom of the form.
- After each count, record the times when the fish counting station was opened and closed in the "Time Period" column. If no fish were counted when counting station was opened, note times and indicate 0 fish under each column.
- After each count, add the count from that time period (under "Daily Counts") to the running daily cumulative column (under "Cum. Daily") for sockeye salmon. For Chinook salmon add the daily counts to the daily cumulative for each size class (e.g., add daily count for large to daily cumulative for large Chinook salmon).
- At the end of each day, the last daily cumulative number recorded for sockeye salmon and each size class of Chinook salmon should be the same number recorded in the "Daily Total" row at the bottom of the sheet. The "Daily Total" is then added to the "Previous Days Cum" to equal the "Total Cumulative" count for the season.
- Record other species counts in the appropriate columns.
- Enter notes such as bad water visibility, holes in the weir, etc., into the "comments" section.
- Double-check all computations before reporting numbers to the Yakutat ADF&G office staff at the daily radio check.

						DW		SAMPLING			
2013		СНІМООК		SOCKETE			CUDIOOK SOCKEVI				
Water	L/M/S	L/M/S		-	-		DEMARKS	Deilu	Cum	C DILC	
DATE Level Tem	p Daily	Cum	Daily	Cum	Daily	Cum	REMARKS	Dany	Cum	Daily	Cu
7/1/2013	/ /										
7/2/2013	1 1	1 1					*				-
7/3/2013	1 1	1 1									-
7/4/2013	1 1	1 1									_
7/5/2013	1 1	1 1									_
7/6/2013	1 1	1 1									_
7/7/2013	1 1	1 1									
7/8/2013	1 1	1 1									
7/9/2013	1 1	1 1									
7/10/2013	1 1	1 1						1			_
7/11/2013	1 1	1 1									_
7/12/2013	1 1	1 1									_
7/13/2013	1 1	1 1									
7/14/2013	1 1	1 1									
7/15/2013	1 1	1 1									_
7/16/2013	/ /	1 1									
7/17/2013	1 1	1 1									
7/18/2013	1 1	1 1									
7/19/2013	1 1	/ /									
7/20/2013	1 1	/ /									_
7/21/2013	1 1	1 1									
7/22/2013	/ /	1 1									
7/23/2013	1 1	1 1									
7/24/2013	1 1	1 1									
7/25/2013	1 1	1 1									
7/26/2013	1 1	1 1									
7/27/2013	1 1	1 1									
7/28/2013	1 1	1 1									
7/29/2013	. 1 1	1 1				121					
7/30/2013	11	1 1									

Appendix C.-Situk River weir daily and cumulative count radio form and procedures.

Every morning at 9:00 a.m., weir counts will be relayed to the Yakutat Fish and Game office by VHF radio on channel 10. If there are problems with the radio, a Garmin communication device (DeLorme InReach) will be used. It is imperative that you contact the office every day at this time, otherwise staff will assume there is an emergency and come out to the weir site to check on you.

VHF RADIO COMMUNICATION PROTOCOL AND ETIQUETTE

- When calling another person on the radio, clearly identify the recipient and yourself. For example, "Fish and Game, Fish and Game, this is Situk River Weir on Channel 10."
- Once you've established clear communications and the recipient is ready to record information, you will relay the previous day's data as recorded on the radio form.
- You can read the numbers straight across the row without specifying what each number represents as long as you are clear and give a short pause between each number.
- The remarks are used for other species such as steelhead, chum, and coho. Say "over" each time you are done talking and "Situk weir clear" after your final transmission.
- Note that Channel 16 is for hailing and distress messaging only. This channel should never be used for casual conversation or performing a radio check.

Appendix D.–Procedures for sampling adult salmon for age, sex, and length.

The following sections provide detailed explanation of how to collect salmon scale samples and record data. If you have any questions, ask your co-worker or supervisor for clarification. Scales must be readable and properly organized to be useful, so follow proper technique when sampling.

For sampling you will need:

- Clipboard with age, sex, and length (ASL) forms
- Pencils (No. 2)
- Pre-labeled scale cards (for both Chinook and sockeye salmon)
- Wax paper inserts
- Forceps (tweezers)
- Plastic scale card holders (optional)
- Measuring tape/measuring board
- Dip net
- Gloves

SCALE CARDS

A scale card (also called a gum card) is a gum-backed sheet for mounting individual scales collected from a fish. Each card has 40 positions, numbered 1 through 40. Scale samples are placed on the cards in sequential order but working down in columns instead of rows because you will take more than one scale from each fish.

It is important to keep scale cards dry at all times. A wet scale card is useless, as the scales will fall off and prevent a readable impression from being taken. If the scale card does get wet (really wet), the scales should be remounted onto a new scale card and great care should be taken to keep each scale in its original position. The completed scale card should be allowed to dry completely before storing. All scale cards should be stored with a sheet of wax paper placed between them to keep the cards from sticking to each other, and the cards should be kept in a moisture-proof container or pressed between paper towels while drying.

SCALE SAMPLING PROCEDURES

Pluck the scale from the "preferred area" of the fish using forceps (tweezers). The preferred scales are located on the left side of the fish, two scale rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior origin of the anal fin (Appendix G). If the preferred scales are missing, reabsorbed, or obviously deformed, try the preferred area on the right side of the fish or sample a different fish. **Do not sample scales outside of the preferred area.**

After plucking scales from the fish, **take time to clean the scale and make sure the scales are mounted correctly on the scale card.** Remove all slime, grit, and as much skin (silver color) as possible from them by wiping the under surface (the side adhering to the fish) on the back of your hand or between fingers. Moisten cleaned scales and mount them on the appropriate number on the scale card. Mount scales with the anterior end (the end of the scale pointing toward the fish's head when plucked) pointed toward the top of the scale card (Appendix G).

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Avoid collecting scales that are regenerated, torn, or misshapen. Patches of regenerated scales are often visible on the fish as a scar or patch of irregularly shaped scales. Regenerated scales have irregular patterns and often have a clear or blank area visible in the middle of the scale, all of which makes them useless for determining the fish's age.

It is essential that scales be cleaned before they are mounted on the scale card. If all the silvercolored skin, slime, and dirt are not removed, the scale will not adhere well to the card. In addition, slime and dirt on the scales or on the gum card will obscure the scale and render it useless for determining the fish's age (which is the purpose of the entire sampling process).

Do not turn the scale over when mounting it on the gum card. The ridged or sculptured side of the scale should always face up, as it does on the outer surface of the fish. The age of the fish is determined from the pattern of these ridges on the outer surface of the scale. The underside of the scale, the side facing the fish's body, is perfectly smooth and thus not useful for determining age. Scales that are accidentally placed upside down (inverted) on the scale card can often be spotted later, because the edges of the scale will start to pull away from the card as they dry. The ridges can easily be detected by lightly scratching the surface of the scale with a fingernail or tweezers.

It is very important that all scales be mounted on the scale card pointed in exactly the same direction. The anterior portion of the scale (the end of the scale that points toward the fish's head) should be oriented toward the top of the card. Uniform orientation makes it much easier to view and age the scales at the ADF&G aging laboratory. If the scales are pointing in different directions, they will have to be remounted at the lab, so it is essential to mount them correctly at the time they are collected.

SOCKEYE SALMON SCALE SAMPLING

The same scale card and same ASL form will be used for sockeye salmon throughout a statistical week (Sunday through Saturday) until it is filled. For example, if 20 fish are sampled one day, then the next day 15 more fish are sampled, the scale samples will go on the SAME ASL form until it is filled up. On the ASL form, simply write the new sampling date on the line in the right margin of the form that corresponds to the fish number (Appendix I). When sampling sockeye salmon, you will collect THREE SCALES from each fish. For the first sockeye salmon sampled, mount the three scales over scale-card boxes 1, 11, and 21 (working down in a column instead of across rows). Scales from the second fish sampled will be placed on scale-card boxes 2, 12, and 22. Repeat for the remainder of the fish sampled (See Appendix H). Sockeye salmon ASL forms will have up to 4 scale cards associated with them if 40 fish are sampled within the same statistical week. It is important that scale card number and information match the information entered on the corresponding optical scan (ASL) form. Remember to always start a new scale card and new corresponding ASL form at the beginning of each statistical week.

CHINOOK SALMON SCALE SAMPLING

Chinook salmon will be sampled like sockeye salmon; however, you will **collect FOUR SCALES from each fish.** The **same scale card and same ASL form** will be used for Chinook salmon during a statistical week (Sunday through Saturday) unless you trap more than 10 Chinook salmon during that week. For the first Chinook salmon sampled, mount the 4 scales over scale-card boxes 1, 11, 21, and 31 (working down in a column instead of across rows). Mount the second set of

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scales (from fish number 2) on scale-card boxes 2, 12, 22, and 32, and so forth, as shown in Appendix H. Chinook salmon ASL forms will have up to 4 scale cards associated with them if 40 fish are sampled within the same statistical week. On the ASL form, simply write the sampling date on the line in the right margin of the form that corresponds to the fish number (see Appendix J). Always start a new scale card and a new ASL form for BOTH species when you begin a new statistical week (every Sunday).

FILLING OUT A SCALE CARD (example shown in Appendix H)

Species:

Write name of species out completely, as shown on the reverse side of the ASL form (i.e., Chinook, sockeye). Do not abbreviate.

Card No:

Scale cards are numbered sequentially beginning with "001" and continue through the entire season. Each species will have its own card numbering series. Do not repeat or omit scale card numbers.

Locality:

Write out the name of the system being sampled (i.e., Situk River weir).

Stat. Code:

Write the 3-digit district (182), then the 2-digit subdistrict (70), then the 3-digit stream number (010) (i.e., **182-70-010** for the Situk River).

Sampling date:

Record the date when fish were sampled. This should match the date on the corresponding ASL form.

Gear:

Write out completely (i.e., weir trap). Do not abbreviate.

Collector(s):

Record the last name of the persons sampling and their respective jobs. The fish wrestler (W), the data recorder (R), and the scale plucker (P); e.g., Hoffman (W), Sommerville (P, R).

Remarks:

Record any pertinent information (e.g., for sockeye salmon you would record: 3 scales/fish, # of fish sampled, and corresponding ASL #).

COMPLETING THE OPTICAL SCAN FORMS (examples shown in Appendices I and J)

Salmon from many systems throughout the state are sampled for age, sex, and length annually by field crews. To be useful, data must be recorded neatly and accurately on the optical scan forms. Complete each section on the left side of the optical scan form using a No. 2 pencil and darken the

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corresponding ovals as shown in the figures. It is imperative that you darken the oval completely and neatly. Make every effort to darken the entire oval because the optical scanner that reads and records the data from the optical scan forms often misses partially filled or lightly filled ovals but avoid pressing so hard as to indent the paper. Do not stack forms when filling them out and label only one form at a time to avoid "the carbon paper effect" and resulting stray marks. It is essential that the forms are reviewed at the end of each day to ensure that all data are filled in and appropriately marked.

ASL Header Section

Description: SPECIES/ DIST., SUB-DIST, OR STREAM/ GEAR/ PORT OR ESCAPEMENT SYSTEM/ WEEK.

Write the description information in the header of the ASL above the appropriate sections, following the examples shown in appendices I and J; for the Situk weir. For sockeye salmon this will be "Sockeye/ Dist. 182-70-010/weir/Situk River Escapement /Week 26".

Continue filling out the entries along the left side of the **optical scan form** (Appendices I and J) as described below:

Card:

CARD:	0	1	2	3	4	5	6	7	8	9
001	0	1	2	3	4	5	6	7	8	9
001	0	1	2	3	4	5	6	7	8	9

Scale cards are numbered sequentially throughout the season starting with 001 and continuing where previously left off. A separate numbering sequence will be used for each species so be sure you are using the correct scale card number. Since each scale card can hold samples from a maximum of 10 fish, each ASL form can have up to four associated scale cards (40 total sampled fish). The first scale card of the sequence for each ASL form should be recorded and appropriate blocks filled in, while the other associated scale cards should be written in where the ASL form states "CARD #" between each 10-row section.

Species:

The code numbers for each species are listed on the reverse side of the ASL form.

SPECIES: 1	1	2	3	4	5	
Chinook = 1						
SPECIES: 2	1	2	3	4	5	
Sockeye = 2						

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Day, Month, Year:

Fill in the appropriate blocks for the first date that fish were sampled.

DAY:	0	1	2	3						
24	0	1	2	3	4	5	6	7	8	9
MONTH:	0	1								
06	0	1	2	3	4	5	6	7	8	9
YEAR:	0	1	2	3	4	5	6	7	8	9
18	0	0	2	3	4	5	6	7	8	9

District:

The Situk River is in District 182.

DISTRICT:	0	1	2	3	4	5	6	7	8	9
187	0	1	2	3	4	5	6	7	8	9
102	0	1	2	3	4	5	6	7	8	9

Sub-District:

The Situk River is in Subdistrict 70.

SUB-	0	1	2	3	4	5	6	7	8	9
DISTRICT: 70	0	1	2	3	4	5	6	7	8	9

Stream:

The stream number for the Situk River is 010.

STREAM:	0	1	2	3	4	5	6	7	8	9
010	0	1	2	3	4	5	6	7	8	9
010	0	1	2	3	4	5	6	7	8	9

Port: Leave Blank

Statistical Week:

List the statistical week in which you are sampling. Refer to the statistical week calendar found in Appendix A for this number.

STAT.		0	1	2	3	4	5	6	7	8	9
WEEK	26	0	1	2	3	4	5	6	7	8	9

Project:

The project code for sampling at a weir site is 3. Refer to the reverse side of the ASL form to see codes.

	PROJECT: 3	3	1	2	3	4	5	6	7	8	9
--	------------	---	---	---	---	---	---	---	---	---	---

Gear:

The gear code is 14 = Weir. Refer to the reverse side of the ASL form to see codes.

GEAR:	0	1	2	3	4	5	6	7	8	9
14	0	1	2	3	4	5	6	7	8	9

Length Type:

Use length type 2 (mid eye to fork of tail).

			_							
LENGTH TYPE: 2	0	1	2	3	4	5	6	7	8	9

Number of Cards:

Mark 1, 2, 3, or 4 as appropriate, for number of scale cards used when sampling Chinook and sockeye salmon.

# CARDS: 4	1	2	3	4	

User Code Definitions: Leave blank.

Sex Column:

Fill in the appropriate M (male) or F (female) block for each Chinook and sockeye salmon sampled.

#	SF	X
1	Μ	F
2	Μ	F
3	Μ	F

Length Columns:

Measure fish from **mid eye to fork of tail (MEF) to the nearest 5mm (Appendix E).** Mark (1) in the "T" column for fish > 999 mm in MEF length.

Т					10	0S								L	EN	GT	H								1	's				
1	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
1	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
1	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9

Appendix D.-Page 7 of 7.

SOME REMINDERS

- It is extremely important to keep the optical scan forms flat, dry, and clean. Fish slime and water curling will cause the optical scanning reader machine to reject the entire optical scan form. If unnecessary pencil marks, dark spots, etc. are visible, they need to be erased or the machine will misinterpret the mark. It is essential to fill in all information and darken the circles completely.
- Record length by blackening the appropriate column circles on the optical scan form. Column 3 on the optical scan form is used for fish over 999 millimeters long. Measure all salmon to the nearest 5 millimeters.
- Optical scan forms should be carefully reviewed and edited before submitting to the immediate supervisor. This is extremely important and cannot be emphasized enough. Recheck header information on optical scan forms and make sure all available information is filled in. Card numbers should not be repeated. Crew leaders should take time to ensure that the circles are being blackened correctly; if the circles are not darkened properly or are sloppily marked the optical scanner will record the information incorrectly or miss it entirely. Keep marks within each circle and completely fill them. Do not mark outside the circles.
- Transfer important comments from scale cards to optical scan forms. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write any necessary comments in the top margin (not on the left side) or on the reverse side of the optical scan form. If no room is available on the optical scan form to completely explain the remarks, use a separate piece of paper.
- If the optical scan forms get terribly wrinkled or blotched, they should be copied to a new form before submitting to the area office. The optical scanning machine is extremely sensitive to wrinkles and blotches and will misread or reject the sheets.
- Look down the form from 2 angles after the data have been recorded to pick up any glaring mistakes. A common error, for instance, is placing both the 1 and 9 of a 419 mm fish in the 10's column with nothing in the 1's column.
- It is important for post-season editing that all information is provided on every ASL form and scale card. Include such information as who wrestled the fish, plucked the scale, and filled out the forms. It is the responsibility of the crew leader to make sure all information is entered correctly. The project leader will also double-check the forms before sending the data to Juneau.

Appendix E.-Measuring adult salmon length.

The snout of a salmon changes as the fish approaches sexual maturity, changing the total length of the fish. As a result, length measurements are made from the middle of the eye to the fork of the tail. The length is always **rounded** and recorded to the <u>nearest 5 millimeters (mm)</u>. Examples of rounded lengths are: 561–562 mm rounded to 560 mm, 563–567 mm rounded to 565 mm, and 568–569 mm rounded to 570 mm.

A fish measuring trough is used at the Situk River weir site. The procedure for measuring mid eye to fork of tail length is as follows:

- 1. Place the salmon flat, right side down, in the measuring trough. If you are the one wrestling the salmon, orient the salmon with its head on your right, the tail in your left hand, and the salmon's dorsal surface (back) towards you. This puts the salmon in the correct orientation for the plucker (P) and recorder (R) to remove the preferred scale from the fish's left side if the plucker is standing on the other side of the measuring trough.
- 2. Line the eye of the salmon up with the end of the measuring tape, then hold the salmon's head with your right hand. Gently sliding your thumb into the salmon's mouth and grasping the lower jaw works well for larger fish.
- 3. Flatten and spread the tail against the board with your left hand. Read the mid eye to fork of tail length to the nearest 5 millimeters and record the length on the ASL form.





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Appendix F.–Determining the sex of salmon.

External sexing of salmon can be difficult, depending on the species and sexual maturity of the fish, and requires practice and attention to detail in order to be accurate. Sex determination requires examination of a combination of characteristics: 1) the head of the fish, for the development of a long snout and kype in males (shown in the photo below); 2) the vent, on the underside of the fish, for the presence of an ovipositor in females; and 3) the belly, which becomes rounder and fuller in females as their eggs develop.

1) Male sockeye and Chinook salmon may have longer snout than females and develop more of a hooked top jaw/nose and hooked kype (lower jaw) as they mature, as illustrated by the fish on the right. Female salmon tend to have a rounder, shorter nose/face and lack the hooked top jaw, as illustrated by the fish on the left.



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2) Examining the fish's vent is another helpful procedure to determine male or female salmon.



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Appendix G.-Preferred scale sampling area on an adult salmon.



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

Species: SOCKENE Card No: D. Q. SHUK BIVER Locality: Stat. Code: 1 8 2 - 7 0 - 0 1 0 -Sampling Date: Mo 0 Day 20 Year 2018 Gear ... WENT TTO ? Collector(s): Somerville Remarks: 3 Stales/Fish ASL# Species: CHINOOK Card No: # # 1 Ø Locality: _____HUK BOVER Stat. Code: 1 8 2 - 7 03 - 00 1 00 -Sampling Date: Mo _ LO _ Day_ 20 Year 2018 Ø Gear Weir trap Collector(s): Somerville Remarks: 4 scales/Fish ASL# 100055

Appendix H.–Examples of sockeye and Chinook salmon scale cards.



Appendix I.-Example of completed optical scan (ASL) form for sockeye salmon.



Appendix J.-Example of completed optical scan (ASL) form for Chinook salmon.