Regional Operational Plan SF.1J.2019.01

Operational Plan: Southeast Alaska Marine Boat Sport Fishery Harvest Studies, 2018

by

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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

REGIONAL OPERATIONAL PLAN SF.1J.2019.01

SOUTHEAST ALASKA MARINE BOAT SPORT FISHERY HARVEST STUDIES, 2018

by
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Title	Name	Signature	Date
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ABSTRACT

Marine boat sport anglers throughout Southeast Alaska target and harvest Chinook salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, Pacific halibut *Hippoglossus stenolepis*, lingcod *Ophiodon elongatus*, a variety of rockfish species *Sebastes spp*., and sablefish *Anoploploma fimbria* primarily during April to September. Angler effort, catch, and harvest data will be collected from late April to early September from returning marine boat anglers at the following ports: Yakutat, Elfin Cove, Gustavus, Juneau, Sitka, Petersburg, Wrangell, Ketchikan, Craig, and Klawock. Harvest sampling will be used to collect biological samples and associated data to estimate the age, length, and genetic composition of the Chinook salmon harvest, and Chinook and coho salmon will be inspected for missing adipose fins, indicating the head should be removed to recover a coded wire tag. Contributions of hatchery and wild coded-wire-tagged stocks (both Chinook and coho salmon) to the sport harvest will be estimated for all sampled ports, and the wild mature component of the Chinook salmon harvest in Division of Commercial Fisheries Salmon District 108 (Petersburg-Wrangell) and District 111 (Juneau) will also be estimated. Biological data from harvested Pacific halibut (lengths), lingcod (lengths and sex), and rockfish (lengths) will be collected from guided and unguided marine boat anglers. The length data will be converted via established species-specific, length-weight relationships to estimate average weights by species and angler type.

Key words: Marine boat sport fishery, creel survey, angler effort and harvest, guided angler, unguided angler, age composition, length-at-age, length, weight-length conversion, average weight, coded wire tag, hatchery stocks, wild stocks, Salmon District 108, Salmon District 111, Chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, Pacific halibut, *Hippoglossus stenolepis*, lingcod, *Ophiodon elongatus*, sablefish, *Anoplopoma fimbria*, rockfish species, *Sebastes*, Yakutat, Elfin Cove, Gustavus, Juneau, Sitka, Petersburg, Wrangell, Ketchikan, Craig, Klawock

PURPOSE

The purpose of this project is to characterize the harvest of multiple species of fish in the Southeast Alaska (SEAK) marine recreational (sport) fishery. This project, implemented by the Alaska Department of Fish and Game (ADF&G) and known as the Marine Harvest Studies (MHS) Project, provides preliminary estimates of the harvest of Chinook salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, Pacific halibut *Hippoglossus stenolepis*, rockfish *Sebastes spp.*, and lingcod *Ophiodon elongatus* by the marine boat sport fisheries in SEAK. The MHS Project differs from the ADF&G Statewide Harvest Survey (SWHS)[1] and the ADF&G Saltwater Charter Vessel Logbook (SCVL)[2] programs in that it collects coded wire tag (CWT) information from Chinook and coho salmon and biological data from all focal species. It also allows for inseason and postseason preliminary estimates that are available sooner than provided through the SWHS or the SCVL.

The information needed for managing these fisheries requires the collective reporting of the SWHS and SCVL to be integrated with on-site sampling of the select characteristics of each fishery, such as obtaining lengths of Pacific halibut, collecting CWTs from Chinook and coho salmon, and identifying rockfish species composition, in addition to a number of other parameters associated with these species as well as for lingcod and sablefish *Anoplopoma fimbria*. Although the SWHS provides the authoritative total estimates of the harvest and catch of the corresponding sport fisheries, it was not designed to capture biological information such as length or weight information, identifying the presence of CWTs, or providing species composition data for rockfish species. The SCVL—similarly—does not capture numerous biological aspects of the sport

[1] The annual statewide mail survey of licensed sport anglers in Alaska conducted by ADF&G, Division of Sport Fish. Statewide Harvest Survey (SWHS) estimates from the Alaska Sport Fishing Survey database [Internet]. 1996–present. Anchorage, AK are available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

[2] Estimates from this program are kept in the Saltwater Logbook Database (Alaska Department of Fish and Game, Division of Sport Fish. [Internet] 2006 to present. URL not publicly available as some information is confidential. Contact Research and Technical Services for data requests.

fisheries catch and harvest that is obtained through on-site sampling available through the MHS project. The general study design for this project allows estimated proportions or averages of the specific elements of each fishery to be made (e.g., proportion of the harvest of Chinook salmon that are from Alaskan hatchery production); these proportions and averages can be applied to the corresponding harvest estimates from the SWHS to generate information useful for management of these fisheries.

The harvest estimates from the annual mail-out survey of licensed sport anglers in Alaska (SWHS) does not release final estimates for any year until sometime after June the following year. Final data from the SCVL is similarly only available during the next calendar year, although preliminary information can be obtained in-season upon request. The MHS project will provide preliminary projections of the final estimates that will be derived following the publication of the annual SWHS mail survey harvest estimates from the prior year. The projections are calculated by multiplying observed catch and harvest in each sampled port by an expansion factor for each SWHS area (expansion factors are derived from the ratios of past final SWHS estimates and observed on-site statistics).

BACKGROUND

The Southeast Alaska sport fisheries are diverse, and effort is mostly concentrated around the major communities of Juneau, Ketchikan, Sitka, Wrangell, and Petersburg (Schwan 1984, Suchanek et al. 2002). Substantial effort is also expended near remote fishing lodges and smaller communities throughout the region such as Craig-Klawock, Gustavus, Elfin Cove, and Yakutat. The data needs and impetus for management varies for each of the species across the region, often geographically and temporally.

The approach is to survey sport anglers and sample their catches at primary access points such as harbors and boat launches and use these data together with the SWHS to estimate desired parameters. For example, relative to Chinook salmon the state has an obligation to estimate the contribution of hatchery and wild stocks originating from Southeast Alaska, Canada, and the Pacific Northwest under the US/Canada Pacific Salmon Treaty (Public Law 99-5), so identification of coded wired tags (CWT) is critical. The sport charter harvest of Pacific halibut is managed under a guideline harvest level (GHL) adopted by the North Pacific Fisheries Management Council (NPFMC) and port sampling provides essential data on lengths and average weights needed for estimating harvested biomass by guided and unguided fishers. Harvest per unit effort (HPUE) for coho salmon in the Juneau and Ketchikan marine sport fisheries is used to monitor the relative abundance and movement of coho salmon to inside waters from early June to September depending on the strength of the run, and the Juneau HPUE is specifically cited in 5 AAC 29.110 (Management of Coho Salmon Troll Fishery).

This operational plan documents the study design, sample size goals, sampling schedules, data collection, and recording protocols to be implemented for the MHS Project.

CHINOOK SALMON

The Alaska Board of Fisheries (BOF) continues to allocate 20% of the combined commercial troll and sport U.S.–Canada Pacific Salmon Treaty (Public Law 99-5) catch quota for Chinook salmon to the Southeast Alaska sport fishery.

A preliminary estimate of the annual Southeast Alaska Pacific Salmon Treaty Chinook salmon sport harvest (hereafter referred to as the "Pacific Salmon Treaty harvest") from onsite survey data collected by this project will be provided to the Pacific Salmon Commission in October of the year of the estimate as a preliminary number for accounting purposes. The Pacific Salmon Treaty harvest is defined as the total Chinook salmon harvest, minus harvest of Alaska hatchery fish. Additionally, estimates will be made of preliminary contributions by CWT fish from Alaska and non-Alaska hatcheries, as well as for a few tagged wild stocks that are within the scope of this project.

Data useful for management of Chinook salmon stocks in specific areas of SEAK will also be collected. For example, managers for the Taku River and Stikine River fisheries use inseason harvest information to monitor the return of Chinook salmon to these transboundary rivers. Accordingly, weekly estimates of the Pacific Salmon Treaty harvest will be estimated by this project for Alaska Department of Fish and Game (ADF&G), Division of Commercial Fisheries (CF) Salmon District 108 in the Petersburg-Wrangell area, associated with the Stikine River, and District 111 in the Juneau area (Figure 1), associated with the Taku River. Henceforth, throughout this operational plan, these 2 districts will be referred to as CF Salmon Districts 108 and 111, respectively.

In addition, data on the age composition of Chinook salmon harvests collected in the spring in Juneau, Ketchikan, Petersburg, and Wrangell will be gathered for sibling models used in projections for stocks associated with the Pacific Salmon Treaty and others.

The genetic stock identification of Chinook salmon harvested by the various sport and commercial fisheries in Southeast Alaska is a management tool being evaluated by the Pacific Salmon Commission. Accordingly, genetic samples will be collected in a number of fisheries to address this evaluation. Additionally, heads will be collected from Chinook salmon harvested in the Sitka and Craig-Klawock area for otoliths related to this stock identification effort. After the genetic origin of these outer coast fish is determined, their scales will be aged by each respective state or provincial fishery management agency.

COHO SALMON

Estimates of Alaska hatchery contributions for coho salmon harvested in the sport fisheries in Juneau, Ketchikan, Sitka, Craig-Klawock, Petersburg, Wrangell, Gustavus, Elfin Cove, and Yakutat will be generated by this project and used for evaluation of enhancement projects. Additionally, recovery of tagged indicator stocks of wild coho salmon may be expected—especially in the Juneau fishery—from wild stock tagging programs occurring at Auke Creek, and the Taku and Berners river drainages. Additional tagging projects occurring in the Hugh Smith drainage (southern SEAK, mainland) and Ford Arm drainage (northern SEAK, Chichagof Island) will probably include recovery of coho salmon from the Ketchikan and Sitka fisheries, given their proximity to these tagging locations.

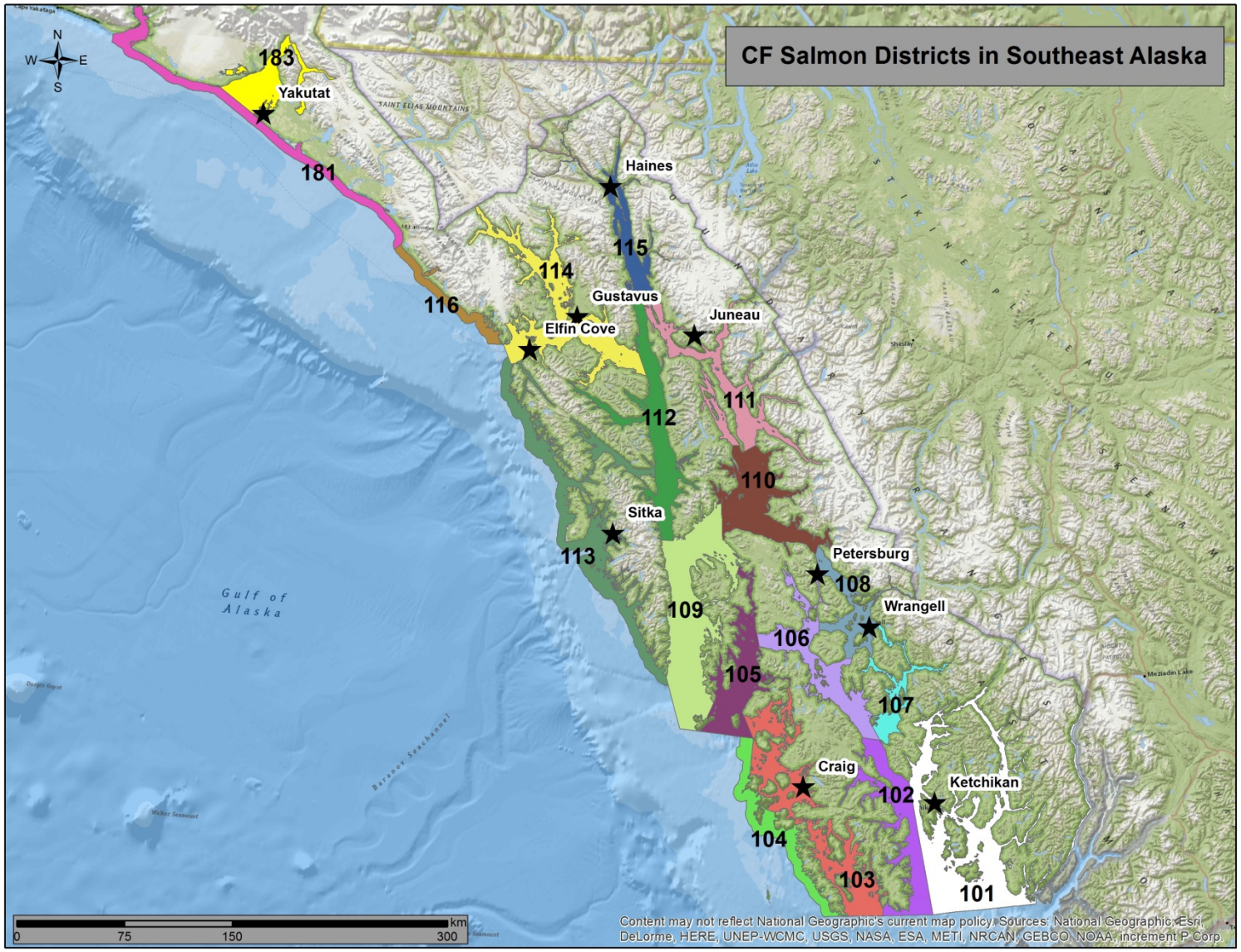

Figure 1.–Delineation of Division of Commercial Fisheries salmon districts in Southeast Alaska.

HALIBUT

Sport charter harvest of Pacific halibut is managed under a Catch Sharing Plan (CSP) adopted by the North Pacific Fishery Management Council (NPFMC) in October 2012 and which went into effect on 13 January, 2014. Prior to this, the fishery was managed under a Guideline Harvest Level (GHL). Under the new CSP, charter businesses can lease commercial individual fishing quota (IFQ) as guided angler fish (GAF) to allow their guided anglers to harvest halibut under private regulations.

Average weights of Pacific halibut in the sport harvest are needed to estimate removals in weight units for purposes of stock assessment and management. Estimates of fishery parameters obtained by this project will be forwarded to project staff for incorporation into a Regional Operational Plan *Estimation and projection of statewide recreational halibut harvest* (Meyer *In prep*). The project described in Meyer (2014) will combine the average weights for both components of the fishery (guided and unguided) from the on-site sampling project described herein with estimates from the SWHS and logbooks to obtain estimates and projections of sport halibut removals in biomass units for both the NPFMC and the International Pacific Halibut Commission (IPHC). Additionally, release information for halibut will be provided to the statewide sport fish bottomfish coordinator for use in estimating total mortalities. These data will be utilized to help assess the performance of the current "reverse slot limit [3] size restrictions" while simultaneously addressing contemporary assumptions about halibut discard mortality rates in the Southeast Alaska halibut sport fishery. Finally, the proportion of unguided halibut harvest that occurs prior to the mean IPHC survey date will also be provided as requested by the IPHC.

ROCKFISH

The recreational fishery for demersal shelf rockfish (DSR) is managed by ADF&G under allocations determined in regulation 5 AAC 28.160 as a percentage of the total allowable catch (TAC) approved by the NPFMC annually. Therefore, this project will estimate species composition and average weights of the sport harvest for the NPFMC using species-specific length-weight relationships. The 7 DSR species are yelloweye *Sebastes ruberrimus*, quillback *S. maliger*, copper *S. caurinus*, canary *S. pinniger*, tiger *S. nigrocinctus*, China *S. nebulosus*, and rosethorn *S. helvomaculatus* rockfish. Numbers of DSR released will also be recorded by species to estimate release mortality. Estimates of species composition, average weight, discard mortality rate (from literature), number of fish released, of particular species and species groupings will be combined with SCVL and SWHS harvest information to obtain estimates of the biomass for the sport fishery in outside waters of SEAK.

Additionally, species composition of the rockfish harvest in all ports will be estimated and an estimate of the percent of change from previous years of the number of yelloweye rockfish harvested by the beginning of August in the ports of Sitka, Ketchikan, Craig-Klawock, Gustavus, Elfin Cove, and Yakutat will be obtained for inseason management purposes.

Since the 2013 season the release of rockfish at depth has been mandatory for guided anglers. This project will assess the proportion of *unguided* anglers currently utilizing deepwater release devices when releasing rockfish. In addition to providing bottomfish managers and researchers with an

[3] Under a reverse slot limit, anglers are allowed to retain fish that are smaller than or larger than the slot, not within. For 2018, the lower and upper bounds of the reverse slot limit are 38 inches and 80 inches, respectively for guided anglers.

estimate of current use, it will allow ADF&G personnel to provide anglers with information about the use of release devices.

LINGCOD

This project will calculate average weights and total harvest biomass of lingcod by the sport fishery in SEAK. Sport harvests (in numbers) of lingcod will continue to be estimated by the SWHS, but stocks are managed by the estimated total biomass of the sport harvest in relation to lingcod management area quotas. Therefore, methods to estimate the average round weight of lingcod harvested in the following sport fisheries will be estimated: Craig-Klawock, Ketchikan, Sitka, Gustavus, Elfin Cove, and Yakutat. The average weight estimates will be combined with projections of the total harvest from the SWHS to obtain preliminary estimates of the biomass of removals of lingcod for the fisheries of concern. Once the final SWHS estimate is available, the finalized biomass estimate will be calculated and reported to the BOF and ADF&G, DCF.

SABLEFISH

The sablefish sport harvest is relatively small compared to other species sport harvested in the region. However, some stocks of sablefish exploited by multiple Southeast Alaska fisheries may need to be managed conservatively. Accordingly, when sablefish are observed by this project, they will be measured for length and their harvest and released numbers recorded as an index of catch rates or sampling levels. When sample sizes are adequate, length data will be used to estimate average weight in the sport harvest. Average weight is needed to express sport harvest estimates in terms of biomass. These estimates will be provided to the National Marine Fisheries Service for catch accounting and assessment.

RELEASED FISH

The numbers of released Chinook salmon (for both large and small categories), halibut, lingcod, sablefish, and rockfish by species or by species grouping will be recorded during angler interviews.

OBJECTIVES

PRIMARY OBJECTIVES

Unless otherwise stated, the objectives for each port in the MHS Project identified below are for all ports separately for the stated duration in Table 1.

Table 1.–Port location, survey duration, and list of primary objectives addressed by sampling in each port in Southeast Alaska for 2018.

	2018		
Port	Start date	End date	Primary Objectives by port
Juneau	7 May	9 Sep	1–4
Sitka, Ketchikan	23 Apr	9 Sep	1-5 (and 6 for Sitka)
Petersburg, Wrangell	23 Apr	26 Aug	1-4
Craig-Klawock,Yakutat	30 Apr	26 Aug	1-5
Elfin Cove, Gustavus	7 May	26 Aug	1-5

The primary objectives for the 2018 MHS Project are as follows:

1) Estimate the preliminary yearly values [4] of the following characteristics of the Chinook salmon harvest:
    a) Total sport harvest, total Alaska hatchery and total non-Alaska hatchery contributions: such that the estimates are within 50 - 90 percentage of the true values 90% of the time for each port (as identified in Appendix A1, A2, and A3)
    b) Relative Alaska hatchery and relative non-Alaska hatchery contributions: such that the estimates are within 5 – 25 percentage points of the true value 90% of the time for each port (as identified in Appendix A1, A2, and A3).
2) Estimate the preliminary yearly values of the following characteristics of the coho salmon harvest:
    a. Total sport harvest, total Alaska hatchery and total non-Alaska hatchery contributions: such that the estimates are within 50 - 100 percentage of the true values 90% of the time for each port (as identified in Appendix A1, A2, and A3)
    b. Relative Alaska hatchery and relative non-Alaska hatchery contributions: such that the estimates are within 5 – 25 percentage points of the true value 90% of the time for each port (as identified in Appendix A1, A2, and A3)
3) Estimate the average net weight of the harvest of Pacific halibut by guided and unguided anglers at each port, such that relative precision is within 20 - 40 percent of the true value 90% of the time for each user group at each port (as identified in Appendix A4).
4) Estimate the average weight of the sport harvest of lingcod by guided and unguided anglers in Sitka, Ketchikan, Craig/Klawock, Gustavus, Elfin Cove, and Yakutat, such that the relative precision for the estimated average weight of the harvest at each port is:
    a) Within 20% - 50% of the true value 80% of the time for the harvest by unguided anglers (as identified in Appendix A5), and
    b) Within 20% of the true value 90% of the time for the harvest by guided anglers (Appendix A5)
5) Estimate the preliminary values of the average weight of harvested rockfish by species and species grouping and by guide status (guided or unguided) at each port, such that the relative precision for the estimated average weight of the harvest is within 20% - 40% of the true value 90% of the time (as identified in appendices A6 – A14).
6) Estimate the age, sex, and length composition by port of the black rockfish landed at Sitka during May through September such that the relative precision of the estimated age, sex and length proportions are within 5% of the true value 95% of the time for guided and unguided anglers (Appendix A15).

SECONDARY OBJECTIVES

In addition to meeting the primary objectives listed above, there are a number of secondary objectives that will address additional management needs. The secondary objectives for 2018 are as follows:

[4] Estimated yearly values are preliminary until final estimates are derived following the publication of the annual SWHS mail survey harvest estimates.

1) Estimate the early season (late April to mid-July) Pacific Salmon Treaty harvest of Chinook salmon for Commercial CF Salmon Districts 108 (Petersburg/-Wrangell) and 111 (Juneau) (Figure 1).
2) Collect genetic tissue samples (pelvic fin clips) and corresponding age structures (scales) from Chinook salmon proportional to the harvest at all sampled ports and provide the proportion of the observed harvest sampled each week to the ADF&G, CF Gene Conservation Laboratory. In addition, the corresponding heads from the sampled Chinook salmon will be collected in Sitka and Craig-Klawock (Craig and Klawock collectively compose the Prince of Wales area) for stock identification purposes (via otoliths).
3) At all ports, sample every adipose-fin clipped Chinook and coho salmon encountered with handheld tag detection wands (wands, hereafter) to identify 'no-tag' fish (those Chinook and coho salmon adipose-fin clipped but without a CWT) to increase CWT recovery efficiency.
4) At all ports, sample 10% of the adipose-intact Chinook salmon encountered with wands to identify the presence of double index tags (DITs).
5) Report postseason the observed weekly harvest per unit effort (HPUE) of Chinook, coho, chum *O. keta*, and pink salmon *O. gorbuscha*, and Pacific halibut by port.
6) Estimate the length compositions of Pacific halibut harvested by guided and unguided anglers at all sampled ports and report these to the IPHC as requested.
7) Estimate the proportion of released Pacific halibut in IPHC area 2C within each of the following length categories: (a) length $\leq$ L, (b) length > L and < U, or (c) length $\geq$ U, where L and U indicate the lower and upper limits of the reverse slot size limit.
8) Estimate the proportion of the Pacific halibut harvest by unguided anglers prior to the mean IPHC survey date[5], such that the precision is within 20 percentage points of the true value 90% of the time.
9) Estimate the preliminary biomass of the sport harvest of lingcod by guided and unguided anglers in Sitka, Ketchikan, Craig/Klawock, Gustavus, Elfin Cove, and Yakutat.
10) Project the yearly preliminary harvests of lingcod and yelloweye rockfish by early August in the ports of Sitka, Ketchikan, Craig-Klawock, Gustavus, Elfin Cove, and Yakutat[6].
11) Measure lengths from sablefish observed during interviews at all surveyed ports and track the catch (i.e., harvest and release) of sablefish in the Southeast Alaska sport fishery.
12) Estimate the preliminary values of the following characteristics of the rockfish harvest:
    a) biomass of total sport removals (harvest and release mortality) for demersal shelf rockfish from the Southeast Outside District (Craig-Klawock, Sitka, Gustavus, Elfin Cove, and Yakutat combined) for each user group (guided and unguided).
    b) species composition for all rockfish harvested by guided and unguided anglers at each port.
13) Estimate the proportion of unguided boat trips that utilize deepwater release devices in the release of at least one rockfish, if rockfish were released on the trip.

[5] Each year the IPHC conducts a longline survey of the Pacific halibut stock. The survey utilizes stations in IPHC Area 2C and 3A. Harvest that occurs prior to the survey has the potential to affect the survey catch. Therefore, the IPHC annually requests estimates of the proportions of noncharter harvest that occurred prior to the average survey date. These estimates, along with similar estimates from the commercial fishery, are used to standardize the longline survey abundance index to account for variation in the amount of harvest prior to the mean date of the survey.

[6] Preliminary estimates of the percent change in harvest of lingcod and yelloweye rockfish in the noted ports from the previous year will be calculated by combining separate estimates for the guided and unguided components of the fishery; these estimates will be utilized for inseason management purposes.

14) Estimate the proportion of the catch of Chinook salmon (both <28 inches: small and ≥28 inches: large), rockfish (yelloweye, other DSR, slope, and pelagic rockfish), halibut, and lingcod that were released, by species or species grouping.

METHODS

The goal of this project is to collect biological and catch, harvest, and effort information from the marine boat sport fishery. The SWHS also collects catch, harvest, and effort information. SWHS harvest estimates are generally bigger than the estimates produced by the MHS project and they are considered to be the final numbers for harvest, although they take up to a year to be finalized. In the interim the harvest numbers produced by this project using a 4-stage design are used in conjunction with a 5-year moving average expansions between the two programs to produce a preliminary estimates. The variance around the preliminary estimates of harvest produced by using the expansion between this project and the SWHS rely not only on this project but on the uncertainty of estimates from the SWHS. The variance around biological information not related to harvest, such as average weight, relies solely on this project.

Procedures for obtaining estimates associated with each of the study objectives will be similar for each of the surveyed locations. The following sections detail the procedures that are common to multiple survey areas. Site-specific differences in procedures are outlined in later sections of this operational plan.

STUDY DESIGN

The general approach for collecting the information necessary to achieve the objectives for this project involves sampling boat parties as they exit the fishery at major harbors and boat ramps at each of the ports selected for surveying. The specific harbors and boat ramps selected for survey represent the majority of the harvest at a particular port[7]. The exclusion of less frequently used access locations should have minimal influence on the inference to the total fishery because they represent only a small portion of the fishery. In some instances, locations with relatively minor use by the fishery were included for sampling when these lower-use locations represent components of the fishing public that may be otherwise unrepresented by sampling only the heavier-use locations (e.g., Starrigavan boat launch in Sitka; although it is a low-use access location, it is primarily used by unguided anglers and may be periodically sampled to achieve adequate samples from that component of the fishery).

The days of the week and periods of time selected for surveying were similarly restricted to those periods wherein the majority of sport boats exit the fishery (determined from historical creel or catch sampling surveys). Because relative use by guided versus unguided segments of each fishery differs during the week (e.g., there is more weekend use by unguided anglers), and within the fishing day (e.g., some guides time their fishing trips related to cruise boat schedules), all parameters of interest must be estimated separately for each of these components of the fishery.

As noted above, the general study design approach for this project is to estimate proportions or averages of the specific elements of each fishery (e.g., proportion of the harvest of Chinook salmon that are from Alaskan hatchery production) and apply these proportions and averages to the corresponding estimate from the SWHS. The information necessary for estimating these

[7] It is recognized that some portion of the harvest returning to private docks or lodges goes unsampled due to an inability to access private property.

proportions will be gathered by measuring characteristics of the catch from intercepted boat parties at the sampled harbors and boat launches. At all ports, "creel technicians" conduct complete interviews, which include gathering information from each intercepted boat party on: effort, harvest and catch, logbook information (if fishing from a registered guide boat), and biological information. During all interviews, the technicians also record information on the number of exiting boat parties, which is used in the estimation process described below. In some instances, the parameter of interest is the magnitude of the harvest or the numbers of fish released by species or species group (e.g., Primary Objective 1a: yearly preliminary estimate of total sport harvest of Chinook salmon). The necessary information to address those needs is also incorporated into the study design (see Data Analysis section for further details).

In Ketchikan, Sitka, and Craig-Klawock, 1 or more "catch technicians" will concentrate their efforts on sampling biological information for salmon and groundfish species. Catch technicians in Sitka and Craig-Klawock will also concentrate on collecting Chinook salmon otolith samples. Catch technicians are stationed at the busiest docks at the busiest times in order to maximize the number of available samples. Throughout the rest of the document, when referred to collectively, creel and catch technicians together will be identified as "technicians."

The design for sampling the harvest and catch is a stratified 4-stage cluster sample survey with sampling days across time representing the first-stage sampling units, access locations (i.e., harbors and boat launches) sampled within a selected day representing the second-stage sampling units, boat parties exiting the fishery during each day at each access location representing the third-stage sampling units, and then finally each fish (by species) representing the fourth-stage or "terminal" sampling unit. (Sukhatme et al. (1984: section 8.10 pages 346–351)). To avoid the potential for subsampling bias within a species, whenever a boat party is contacted for sampling, either all or none of the entire bag (harvest) of a particular species will be sampled, unless specified otherwise in the design.

Accuracy is central to our estimates. Since our fisheries are seasonal in nature, we aim to sample proportionally across the season to maintain accuracy, this takes precedence over a particular number to sample as a sampling goal even though a particular number would give a particular precision. Technicians receive personal feedback via their handheld on the proportion of a species they have sampled during a biweek. Proportions of a species to sample (proportional sampling goals) are set before the season starts and take into account 1) the maximum proportion of species that can be sampled of all the fish that are available to sample at a port during the peak of the season by all technicians, 2) relative precision realistically attainable, and 3) how regulation changes may change the numbers of fish that are available for technicians to sample. The proportional sampling goals are recorded in the creel manual for technicians and will change from year to year. Precision for primary objectives can be found in Appendix A.

Harvest estimates will be calculated for each 2-week time stratum (called biweeks). Annual estimates of harvest will be calculated as the sum of the biweekly estimates; the variance of this estimate will be calculated as the sum of the biweekly estimates of variance. Season wide estimates of averages and proportions will be calculated using season wide strata by port (e.g., Ketchikan) and components of the fishery (i.e., guided and unguided).

The sampling unit selection procedures for this survey will not be done as a random probability-based sample survey in the standard sense but are designed to obtain proportional sampling of the angling effort and harvest. Information on the number of exiting boat parties will be recorded at

each sampled access location during each sampled day for all technicians and when combined with the numbers of fish by species observed on each sampled boat will provide weighting factors for each sampling stage to address the likelihood that sampling will not be exactly proportional to the harvest of all species at all times. The resulting estimation approach is composed of a 4-stage-weighted-average. (see Data Analysis section for further details).

In order to obtain the "preliminary yearly values" associated with the primary objectives, a prediction of the corresponding SWHS harvest estimate needs to be made for each species by location. In order to do this a moving average of the past 5 years (2011 – 2016, for this 2018 Regional Operational Plan) of ratios between the harvest estimates of this project (denominator) and the SWHS (numerator) multiplied by the current-year estimate of harvest (from the Marine Harvest Studies Project).The preliminary harvest estimate (this year's harvest index multiplied by the average ratio) is applied to the observed yearly estimated averages or proportions of interest (e.g., relative Alaska hatchery contribution) to obtain the yearly preliminary values. Note that the expansion factors are developed separately for each SWHS survey area (Figure 2) as follows: Ketchikan represents SWHS Area A, Craig-Klawock is Area B, Petersburg and Wrangell make up Area C, Sitka is Area D, Juneau is Area E, Gustavus and Elfin Cove make up Area G, and Yakutat is Area H.

In order to produce regionwide total estimates of harvest (expanding to include the Haines-Skagway SWHS Area F), a similarly derived 5-year average ratio of the total Southeast Alaska estimate from the SWHS to the sum of SWHS estimates for the survey areas represented in our on-site sampling (i.e., Areas A–E, G, and H) will be used to expand to the total for the region.

The following subsections include descriptions of the general estimation approach employed for specific objectives.

Preliminary Yearly Total Sport Harvest of Chinook and Coho Salmon (Primary Objectives 1a, 2a)

The total predicted harvest estimate for each port corresponding to each SWHS area as obtained by the ratio expansion factor approach described above will compose the estimates of the preliminary yearly total harvest of Chinook and coho salmon for each of those areas. Relative precision for these harvest estimates are provided in Appendix A1.

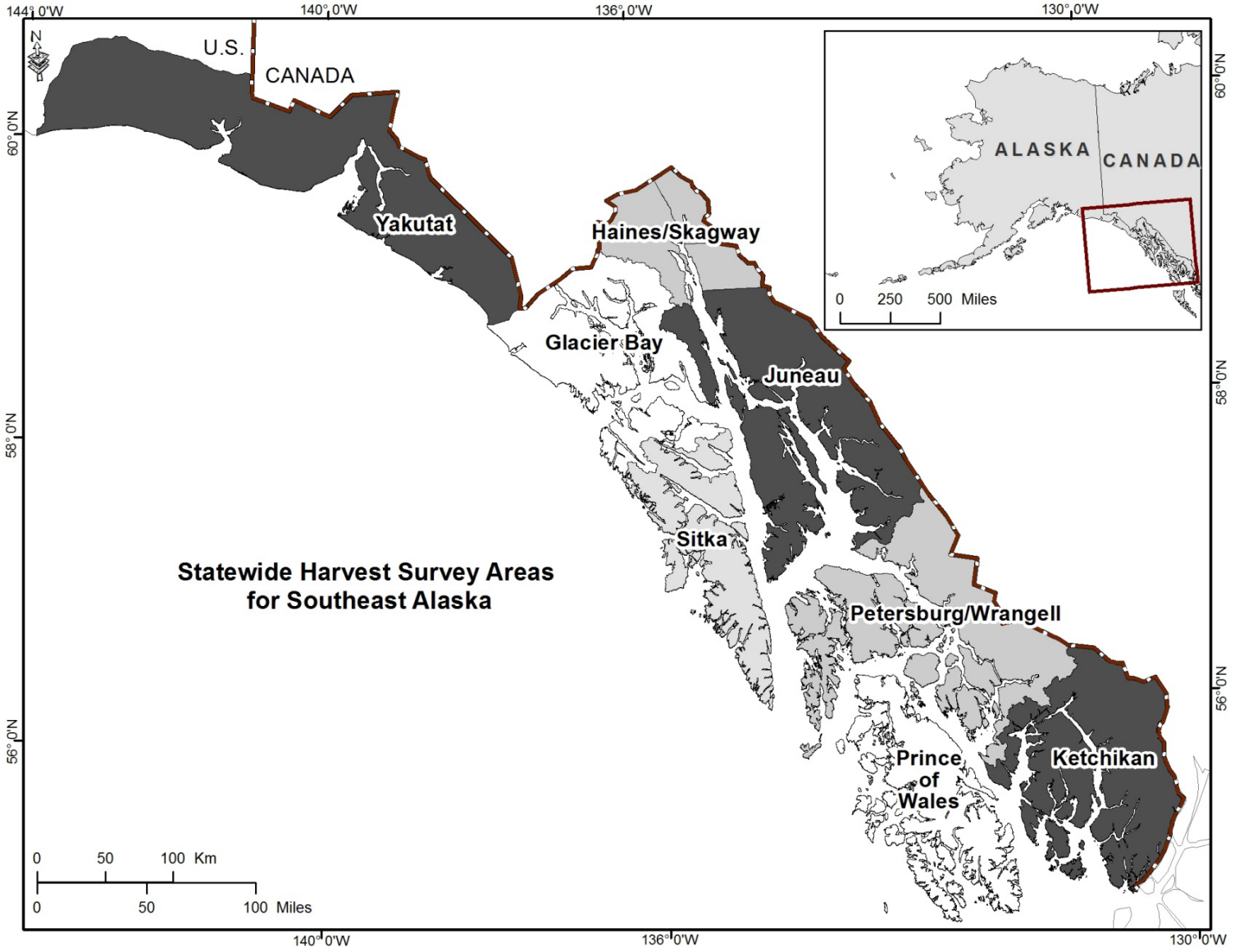

Figure 2.–Delineation of Statewide Harvest Survey (SWHS) areas in Southeast Alaska.

Alaska Hatchery and Non-Alaska Hatchery Contributions for Chinook and Coho Salmon (Primary Objectives 1b and 2b)

Survey technicians will attempt to inspect all harvested Chinook and coho salmon for a missing adipose fin (indicating the possible presence of a CWT). The number of Chinook and coho salmon inspected for adipose finclips will be recorded, and heads from Chinook and coho salmon with adipose finclips will be collected and identified with a uniquely numbered cinch strap. Cinch-strapped heads from Chinook and coho salmon will be forwarded to the ADF&G Mark, Age, and Tag Laboratory (Tag Lab) for eventual dissection, tag removal, and decoding.

Information from the sampling project as well as the coastwide CWT database will be used to estimate the contributions of Alaska hatchery Chinook and coho salmon using an adaptation of Bernard and Clark's (1996) procedures, as outlined in the Data Analysis section of this plan.

The precision of Alaska hatchery and non-Alaska hatchery contribution estimates of Chinook and coho salmon can be found in Appendix A2 and A3). Accordingly, similar levels of precision are expected in the coming years.

The relative contribution estimates for each species by each CWT grouping will be multiplied by the corresponding preliminary harvest estimate to obtain the preliminary total contribution by CWT grouping.

Early Season Pacific Salmon Treaty Harvest in Districts 108 and 111 (Secondary Objective 1)

Estimates of the yearly Pacific Salmon Treaty Chinook salmon harvest will be obtained by subtracting out the components of the harvest that do not count against the treaty (e.g., Alaskan hatchery harvest) from the total Chinook salmon preliminary harvest estimate (from Secondary Objective 1). The early season estimate of Pacific Salmon Treaty harvest for CF Salmon Districts 108 (Petersburg-Wrangell) and 111 (Juneau), will be obtained in similar manner using the corresponding components of the current year's preliminary harvest estimates (from Objective 1a for late April to mid-July) combined with the past 5 years of recreational harvest timing data in these districts. The relative precision of early season Treaty harvest in Districts 108 and 111 is presented in Appendix A2.

Average Weight Estimates (Primary Objective 3) and Length Composition (Secondary Objective 6) of Pacific Halibut

Pacific halibut landed by boat parties within all surveyed fisheries will be sampled for length in order to estimate average net (headed and eviscerated) weights by user group and port (Primary Objective 3). Survey technicians will assign halibut harvested under GAF a separate halibut code for harvest recording and biological sampling; this is because GAF fish count towards the commercial halibut IFQ from which they are leased, but are still part of the sport HPUE. Measured halibut retained under a GAF permit will not be included in the harvest calculations. All lengths will be measured to the nearest 5 millimeters (mm) using snout to fork (SNF) length. The length of each sampled halibut will be converted to an estimated weight using the regression factor reported by Clark (1992). The estimates for average weight or length will be obtained via the 4-stage weighted average estimation approach.

Periodically[8], the length composition of the halibut harvest, which is the proportion of halibut in each length grouping, by user group and port (Secondary Objective 6) will be estimated using a 4-stage weighted average estimation.

Mean net weights and standard deviations will be computed by port and user group. Because the ports of Petersburg and Wrangell are in the same SWHS area, the data for estimating the mean weight for these two ports were combined. Similarly, Gustavus and Elfin Cove are both in SWHS Area G, and their data were combined for estimation purposes as well. See Appendix A4 for expected relative precision.

Average Weight (Primary Objective 4) and Preliminary Biomass Estimates of Lingcod (Secondary Objective 9)

Lingcod landed by boat parties in Craig-Klawock, Sitka, Ketchikan, Gustavus, Elfin Cove, and Yakutat will be sampled for length in order to estimate the average round weight using the 4 stage sampling design. The average round weight estimates for each user group will then be multiplied by the current year's preliminary estimate of the harvest of lingcod (in numbers) for each user group to obtain the preliminary biomass estimate of the harvest of lingcod at each port. The yearly preliminary estimate of lingcod harvest at each port by user group will be calculated in the same manner as that described in the study design.

Expected precision can be found in Appendix A5. There are no precision goals for Juneau and Wrangell, ports with infrequent harvest of lingcod and a simple mean and variance may be reported for those ports.

Average Weight of All Rockfish species (Primary Objective 5) and Preliminary Estimates of Total Sport Removals in Biomass of Demersal Shelf Rockfish and Rockfish Species Composition (Secondary Objective 12a-b)

Rockfish landed by boat parties at all ports will be identified to species and sampled for length. At the Southeast Outside District sampled ports (Craig-Klawock, Sitka, Gustavus, Elfin Cove, and Yakutat combined) the measured lengths will be converted to a round weight by species and by user group using a length-weight relationship to estimate the average weight for each DSR species. See Table 7 for length-weight relationships and Appendix A6 – A14 for estimates of relative precision.

The preliminary estimate of total sport removals in biomass of Demersal Shelf Rockfish (DSR) will be derived from the weights estimated of all rockfish species in the DSR complex and will mirror the approach outlined for Pacific halibut.

Species composition of landed rockfish will be estimated by port and by user group. The species composition (i.e., percent composition) will be based upon data of the known rockfish species harvested (at least known to major rockfish group [i.e., demersal, pelagic, or slope]), and will exclude the unknown rockfish species harvest.

Age, Sex, and Length Composition of Black Rockfish (Primary Objective 6)

Black rockfish landed by boat parties in Sitka will be sampled for length, sex, and otolith (to determine age). Otoliths will be read by ADF&G SF staff in Homer over the winter. Due to the

[8] The IPHC has periodically requested the length composition estimates. They originally asked for length composition in the early 2000s in relation to what assumptions could be made about sport fishery selectivity. Most recently, they requested another summary in 2009; at that time, we summarized the length composition over the 2005–2009 time period (length composition as proportions in 10 cm length groups).

large number of black rockfish that can be harvested on each vessel, an assigned catch technician is directed to subsample every 4th fish (for ASL) from sampled vessels by design, while additional sampling occurs for length only by all other technicians.

Age data is a multinomial. For a 95% confidence interval the sample size necessary to estimate age proportions to be within 10 percentage points of the estimate is 127, to be within 5 percentage points is 510. (Thompson 2002) For binomial data such as sex, the sample size is even less; however, all black rockfish sampled for age will also be sampled for sex. Since it is expected in Sitka there will be more than 200 unguided and 1,000 guided black rockfish sampled for ASL data, then the precision criteria for Primary Objective 6, as it relates to age and sex should be met.

Expected precision can be found in Appendix A15.

Estimates of Genetic Composition of Chinook Salmon Harvest (Secondary Objective 2)

The genetic composition of the Chinook salmon harvested in the various fisheries (e.g., commercial troll, commercial driftnet, and sport) in Southeast Alaska is being analyzed by the ADF&G, CF Gene Conservation Laboratory (GCL) in Anchorage. A small section (approximately ¾-1 in) of the tip of a Chinook salmon's pelvic fin will be collected. It will be placed onto Whatman's paper and dried out using desiccant packs.

Genetic stock identification techniques will be used to generate regional estimates of the stock composition of the Chinook salmon sport fishery; genetic samples will be obtained by taking a representative sample over time from each port's fishery (Table 2). Chinook salmon harvested in local marine waters will be sampled from anglers bringing back fish to the docks and boat ramps at the sampled ports in Southeast Alaska. Small (<28 in TL) Chinook salmon, which are only allowed to be harvested in the Terminal Harvest Areas (THAs) for abbreviated time periods, will be sampled along with large (≥28 in TL) Chinook salmon harvested and landed at the fishery exit points. The target sample sizes for large Chinook salmon are based on the magnitude of each port's Chinook salmon harvest while addressing minimum sample size requirements provided by the GCL. Stock contribution estimates using genetics will be obtained for several regions—Northern Inside, Outside, Petersburg-Wrangell, and Ketchikan (Figure 3—and CF Salmon Districts 108 and 111 of SEAK (Table 3).

Table 2.–Sampling goals for Chinook salmon genetics by port for the Southeast Alaska sport fisheries during the spring and summer of 2018.

Port	Goal
Juneau	650
Haines	25
Skagway	20
Glacier Bay	80
Sitka	1,500
Yakutat	80
Elfin Cove	80
Craig	500
Petersburg	400
Wrangell	200
Ketchikan	700
Total	4,235

Table 3.–Strata for which stock composition estimates for Chinook salmon caught in Southeast Alaska sport fisheries will be generated each year.

Southeast AK region	Ports	Time strata
Northern Inside	Juneau, Haines, Skagway	All season
Outside	Glacier Bay, Sitka, Yakutat, Elfin Cove, Craig	All season
Outside	Glacier Bay, Sitka, Yakutat, Elfin Cove, Craig	Through biweek 13
Outside	Glacier Bay, Sitka, Yakutat, Elfin Cove, Craig	After biweek 13
Petersburg-Wrangell	Petersburg, Wrangell	All season
Ketchikan	Ketchikan	All season
DCF Salmon District 108	Petersburg, Wrangell	All season
DCF Salmon District 108	Petersburg, Wrangell	Through biweek 14
DCF Salmon District 108	Petersburg, Wrangell	After biweek 14
DCF Salmon District 111	Juneau	All season
DCF Salmon District 111	Juneau	Through biweek 14
DCF Salmon District 111	Juneau	After biweek 14

The actual number of samples used in the genetic analysis will depend on the proportion of harvest that each port contributed to the overall harvest of that region. Stock composition estimates for each area of the fishery will be weighted by harvest by port and biweek and will be treated in total for the entire season with the exception of fish caught in the Outside Region and for CF Salmon Districts 108 and 111. In the Outside Region, when possible, estimates will be further stratified by fish caught through biweek 13 versus those caught after biweek 13; in CF Salmon Districts 108 and 111, when possible, estimates will be further stratified by fish caught through biweek 14 versus those caught after biweek 14. Unbiased estimates of stock composition will be obtained only if the harvest is sampled proportionally during the entire season for all areas of the fishery. Sampling rates by biweekly period within each area and season combination will be compared for proportional sampling (i.e., the number of Chinook salmon by size class sampled for genetic structures will be compared to the index of harvest as obtained from the estimates associated with Objectives 1a and 2).

Results of this comparison will be reported to the CF Gene Conservation Laboratory; if necessary, either the genetics lab will stratify further from the samples obtained (to achieve proportional sampling within each substratum), or the genetics lab will use hierarchical analysis methods to weight the samples obtained (Sara Gilk-Baumer, Fisheries Geneticist II, ADF&G DCF Gene Conservation Laboratory, and Scott McPherson, Fishery Scientist I, ADF&G Division of Sport Fish, personal communication, December 9, 2010 meeting in Douglas).

Note that all Chinook salmon that are genetically sampled will also be sampled for scales and mid eye to tail fork (METF) length at all ports. The genetic sampling requires documenting the age of the individually sampled fish, and thus scales will be taken concurrently with genetic samples. Additionally, the genetics lab has requested sampling of otoliths from Chinook salmon sampled for genetics (and scales) at Sitka and Craig-Klawock; therefore, heads from genetically sampled fish at these ports will be collected for later otolith dissection.

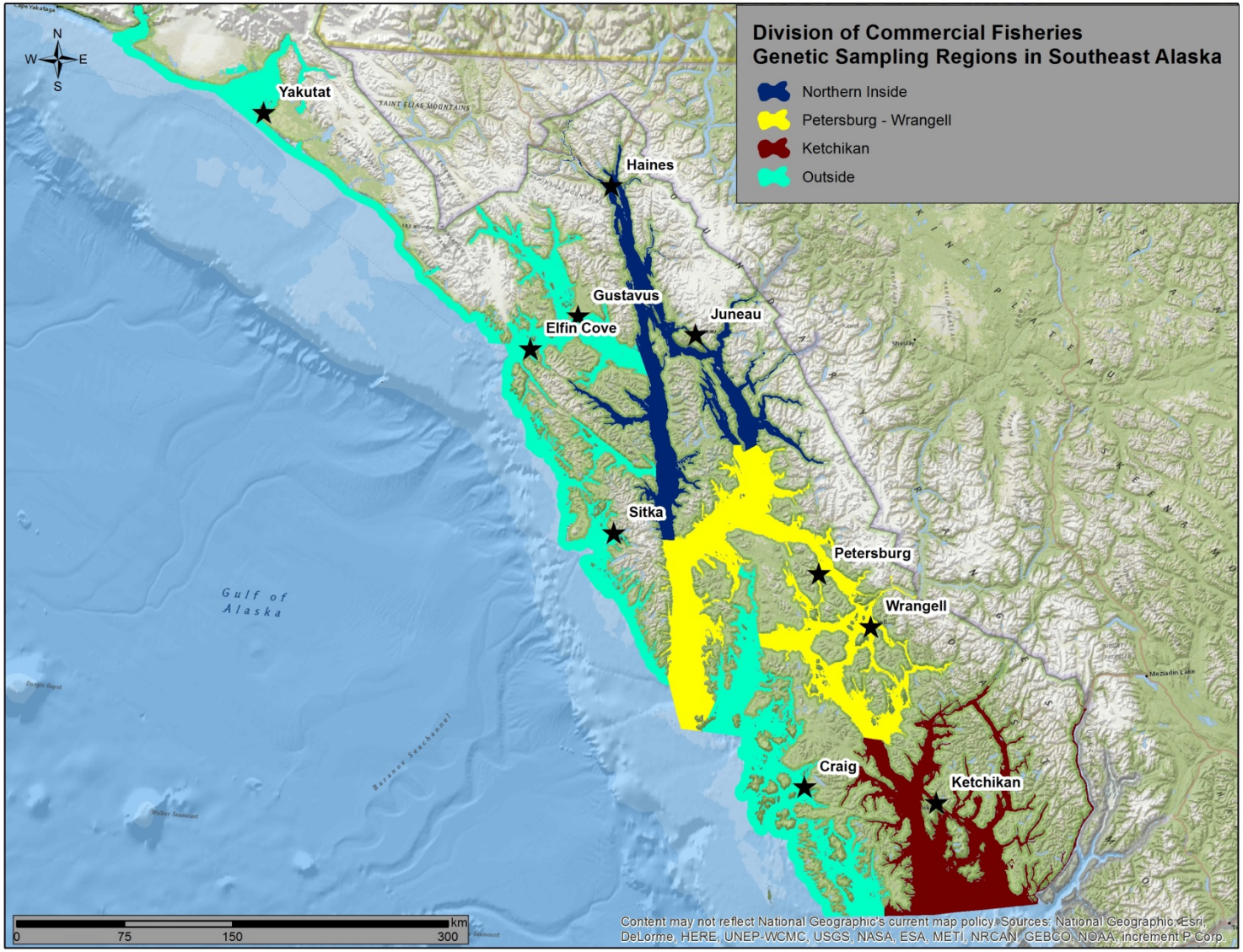

Figure 3.–Delineation of Division of Commercial Fisheries genetic sampling regions in Southeast Alaska.

Note that all Chinook salmon that are genetically sampled will also be sampled for scales and mid eye to tail fork (METF) length at all ports. The genetic sampling requires documenting the age of the individually sampled fish, and thus scales will be taken concurrently with genetic samples. Additionally, the genetics lab has requested sampling of otoliths from Chinook salmon sampled for genetics (and scales) at Sitka and Craig-Klawock; therefore, heads from genetically sampled fish at these ports will be collected for later otolith dissection.

Coded Wire Tag Sampling of Chinook and Coho (Secondary Objectives 3-4)

At all ports, harvested Chinook and coho salmon will be examined for adipose-fin clips, and every adipose-fin clipped Chinook and coho salmon will be sampled with a handheld tag detection wand (wand, hereafter) to identify 'no-tag' fish (those Chinook and coho salmon adipose-fin clipped but without a CWT). Only adipose-fin clipped fish returning a positive signal will have their head removed and sent to the MTA. The exception will be in Sitka and Craig, where heads of all Chinook salmon being selected for paired otolith/genetics/scale samples will be collected-regardless of adipose-fin status or wanding results. The total number of fish sampled and wanded as well as the return signal will be recorded at the docks.

At all ports, 10% of the adipose-intact Chinook salmon encountered will be sampled by wand to identify the presence of double index tags (DITs). The total number of fish sampled, wanded, and returning a positive signal will be recorded at the docks.

Weekly Harvest per Unit Effort of Chinook, Coho, Chum, and Pink Salmon, and Pacific Halibut (Secondary Objective 5)

All boat parties interviewed by technicians will be asked to report the number of targeted rod-hours directed at fishing for salmon and groundfish at each port. This information will be paired with the corresponding numbers of salmon or Pacific halibut harvested on a weekly basis to calculate a weekly HPUE for each species postseason and will be posted on the Division of Sport Fish website in the spring of the following year. These HPUE estimates are only intended as a guideline for use by the public for their information as to the level of effort expended to harvest 1 fish by species on a weekly basis. Measures of sport HPUE may be somewhat biased because of the way data are reported during an interview and should be used with caution to implement management measures in a fishery. Halibut collected using a GAF permit will be included in the HPUE calculations.

Proportion of Pacific Halibut Harvested by Unguided Anglers Prior to Mean IPHC Survey Date (Secondary Objective 8)

The mean IPHC survey date will be identified postseason and then used to post stratify the estimates of harvest before and after that date. The proportion of the harvest before the mean IPHC survey date will then be calculated from these.

Midseason Projected Preliminary Yearly Harvest of Lingcod and Yelloweye Rockfish (Secondary Objectives 10)

By the beginning of August, ADF&G managers need a projection of the relative magnitude of the yearly total harvest of lingcod and yelloweye rockfish in the ports of Sitka, Ketchikan, Craig-Klawock, Gustavus, Elfin Cove, and Yakutat. The projection of the relative magnitude will be made by comparing a projected total harvest for the current year to past-year harvest estimates. The projected total harvest for the year will be estimated by the same ratio expansion approach

used to estimate the preliminary yearly harvest estimates for Chinook and coho salmon described previously (Primary Objectives 1a and 2a). In order to apply this approach midseason (by August), additional information on historical harvest timing from each port will be used to expand the harvest observed through July upwards to the level expected by the end of the year.

Collect Measurements of length from Sablefish (Secondary Objective 11)

Lengths from sampled sablefish will be recorded from snout to fork (SNF) to the nearest 5 mm at all surveyed ports. Sablefish length information will be delivered in raw form to the statewide groundfish coordinator for the Division of Sport Fish.

Estimates of the Proportion of Unguided Boat Trips Utilizing Deepwater Release Devices in the Release of Rockfish (Secondary Objective 13)

During the 2018 sampling season the Marine Harvest Studies Project will collect data on current levels of utilization of rockfish release devices by unguided anglers. Unguided anglers who released rockfish during their trip will be asked if they employed the use of a rockfish release device at least 1 time during the trip; their response will be recorded as a yes-no answer. The ratio of the number of boat trips in which a release device was utilized to the total number of boat trips in which rockfish were released will be used to obtain an estimate of the percentage of unguided boat trips on which release devices were used. In addition, all anglers will be solicited with information pertaining to the merits of utilizing rockfish release devices and their proper use in order to increase public awareness and acceptance of the devices.

Release Estimates for Chinook Salmon, Rockfish, Pacific Halibut, and Lingcod (Secondary Objective 14 and 7)

During all interview samples, boat parties will be asked to report the numbers of released Chinook salmon (both <28 in and ≥28 in, total length [TL]), rockfish (yelloweye, other DSR, slope, and pelagic rockfish), halibut, and lingcod by species (or species grouping for DSR, slope, and pelagic rockfish). These reported values will be combined with the observed-reported numbers of fish harvested to estimate the total catch by species, which are then used to calculate the proportion of the catch that was released. Halibut release data will be collected for size classes below, above, and within the reverse slot size limits. These data will be provided to the Statewide Pacific Halibut Estimation Program to allow the project to estimate the average weight of released halibut and assess the efficacy of the reverse slot limit as a management tool for sport caught halibut. The numbers of fish caught that were released will be used in the 4-stage weighted average to estimate these proportions (see the Data Analysis section for details).

DATA COLLECTION

The project utilizes two different types of sampling technicians: creel technicians and catch technicians. Creel technicians record harvest, effort, and biological samples where catch technicians concentrate on CWT sampling of Chinook and coho salmon and collection of biological samples and harvest related to those samples.

For creel technicians, data will be collected from each boat party interviewed during a scheduled time at a specific location that is selected randomly. All ports will have survey technicians that complete interviews during each scheduled sampling period. Collected information will include number of rods fished, number of anglers fishing, hours fished, trip type (guided or unguided), number of days in trip, location fished, target (e.g., salmon or groundfish), number of fish kept and

released by species, release size category for halibut, and use of a deep-water release device for rockfish. They will also record the logbook number of the charter operator, and whether or not the numbers of fish harvested by species have been physically verified. Catch technicians will record the trip type and number of fish harvested that were sampled. Both technicians will record the number of boats returning to the harbor as follows: 1) sport fishing and interviewed, 2) sport fishing but not interviewed, 3) contacted but not sport fishing, and 4) not contacted but could be sport fishing.

All technicians will also sample harvested fish as scheduled. Harvests of Chinook and coho salmon will be checked for coded-wire tags by looking for adipose finclips or utilizing a T-wand to detect a tag in the head of Chinook salmon with their adipose fin intact. Heads from these fish will be collected and identified with a uniquely numbered cinch strap (assigned by the Tag Lab) and the METF length recorded to the nearest 5 mm.

Chinook salmon selected for genetic sampling will be sampled for scales and will have a portion of their pelvic fin, excised. Five scales will be taken near the preferred area on each Chinook salmon at a point on a diagonal line from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, 2 rows above the lateral line (Welander 1940). If the scales in the preferred location cannot be obtained, another set of scales will be taken from as close to the preferred scale area as possible. However, scales will only be taken from the area bounded dorsally by the fourth row of scales above the lateral line, ventrally by the lateral line, and between lines drawn vertically from the posterior insertion of the dorsal fin and the anterior insertion of the anal fin. If no scales are available in the preferred area on the left side of the fish, scales will be collected from the preferred area on the right side of the fish. Scales will then be mounted on gum cards, and impressions will be made in cellulose acetates (Clutter and Whitesel 1956). The scales will then be aged using ADF&G procedures (S. McPherson, Chinook Salmon Advisor, ADF&G, Division of Sport Fish, Douglas, personnel communication). Lengths to the nearest 5 mm (METF) of these Chinook salmon will also be recorded. In addition, Chinook salmon heads will be collected at the ports of Sitka and Craig-Klawock for the purpose of otolith analysis. Similar to CWT-sampled Chinook salmon, heads collected for otolith sampling will likewise be identified by a uniquely numbered coordination tag (also assigned by the Tag Lab).

Lengths from sampled halibut, rockfish, lingcod, and sablefish will be recorded from snout to fork (SNF) to the nearest 5 mm. In the port of Sitka, black rockfish will be sampled for SNF length, sex and otolith (for aging). The otoliths are to be cleaned and placed in sequentially numbered coin envelopes.

All onsite interview and biological data will be recorded electronically on handheld computers. All data recording procedures are outlined in detail in the current year's Southeast Alaska Marine Harvest Studies Creel Technician Manual (unpublished), which is provided to the field technicians annually.

Site-Specific Procedures

For all ports, the overall sampling design is described in the **Study Design** section of this operational plan. The general design features for sample selection and the data analysis procedures, as described below, are the same for all locations unless otherwise noted.

Prior to the 2011 sampling season, sample selection at the various stages in the multistage study design at Ketchikan, Juneau, and Sitka generally involved random selection from all available

days, time periods within the "angling day," and from the majority of access locations from which sport boat parties exited the sport fishery, and calculations were performed as if the data had been gathered as a simple random sample. Sampling design changes beginning in 2011 include using boat party counts to weight the information collected during interviews in a multistage manner. In Ketchikan, Juneau, and Sitka, access locations with little harvest were dropped unless they included underrepresented species or angler types. In some smaller ports, where there are fewer vessels per access location, the strategy was changed to assign the port as the access location, with each access location within it as sub-harbors, or sub-access location. The creel technicians would then roam between these sub-locations based on use. This strategy will be employed during the 2018 season.

The ports of Juneau, Sitka, Petersburg, and Ketchikan hold salmon derbies that are contained in a period of 3-7 days depending on port. The total number of derby-entered Chinook and/or coho salmon will be known after sampling; therefore, instead of using the estimate number of entered fish, the total count will be used. The derby-entered Chinook and/or coho salmon will be added to the estimates of non-derby entered fish for a total estimated harvest. This number is then expanded to the SWHS during the process of calculating the preliminary values for these fisheries.

At all locations, sampling will be grouped into biweekly periods. Biweeks for 2018 are as follows: 23 April–06 May, 07-20 May, 21 May–3 June, 04-17 June, 18 June–01 July, 02-15 July, 16-29 July, 30 July–12 August, 13–26 August, and 27 August–09 September (the start-end dates for each site differ as noted in Table 1). Holidays include the dates of 28 May, 4 July, and 3 September. Unless specifically stated below, the sampling technicians intercept anglers for 6.5 hours each scheduled day. All weekends and holidays will be worked, and technicians will get 2 consecutive standard days off (SDO) each week. The schedule was generated as follows: first, 2 days off were set, then locations to sample from the access locations were selected at random without replacement (WOR). The scheduling of days and periods to sample within the entire survey were structurally different for derby versus nonderby periods.

Ketchikan, Sitka, and Craig-Klawock also have 1 or more catch technicians to conduct additional CWT sampling of Chinook and coho salmon to increase the proportion of harvested Chinook and coho salmon inspected for adipose finclips and to increase CWT recoveries of wild stock Chinook and coho salmon, all to determine the Alaskan hatchery contributions. The catch technicians will also conduct biological sampling of Chinook salmon and groundfish species. These catch technicians can roam between access locations and sample access locations not covered in a day by the creel technicians.

The following sections outline details regarding specific access locations, days of the week, periods of the day, and allocation of technician shifts that are unique to each major port. Additionally, site-specific details regarding data collection and recording procedures are given in the Southeast Alaska Marine Harvest Studies Creel Technician Manual (unpublished).

Ketchikan Marine Boat Fishery Survey

The Ketchikan marine boat sport fishery will be surveyed from 23 April through 9 September 2018, with the Ketchikan Salmon Derby occurring from 18-19 August, 25-26 August, and 1-3 September, which is a change from prior years. Five access locations will be sampled by a total of 2 to 5 staff, depending upon the period of the survey.

Within the 2 derby biweekly periods (biweeks 17-18), 4 technicians will conduct creel and catch sampling (Table 4). Two of the 4 derby weigh-in stations (Mountain Point [south], Bar Harbor I [in town], and Clover Pass and Knudson Cove [north]) will be covered to sample for CWT. The 7 day derby normally takes place starting the Memorial Day weekend and is a Chinook derby; however, this year the derby was moved to August and will be a coho derby. The derby officials maintain an official count of the total number of fish entered. To ensure the samples are representative of the stock composition, a south-of-town or in-town harbor and a north-of-town harbor will be scheduled.

Table 4.–Summary of study design features for the 2018 onsite catch sampling survey of the Ketchikan marine boat sport fishery in Southeast Alaska.

Biweekly periods	Dates	Number of days sampled	Number of access locations	Number of access locations sampled per day	Derby weigh-in stations sampled (4 total)
9	23 Apr–06 May	10	5	2	0
10	07 May–20 May	10	5	3	0
11	21 May–03 Jun	10	5	3	0
12	04–17 Jun	10	5	3	0
13	18 Jun–01 Jul	10	5	3	0
14	02-15 Jul	10	5	3	0
15	16-29 Jul	10	5	3	0
16	30 Jul–12 Aug	10	5	3	0
17	13-26 Aug	10	5	3	0
Derby Entered	18-19, 25-26 Aug	4	4	2	2
18	27 Aug–09 Sep	10	5	3	0
Derby Entered	1-3 Sep	3	4	2	2

Sitka Marine Boat Fishery Survey

The Sitka marine boat sport fishery will be surveyed from 23 April to 9 September 2018, with the Sitka Chinook Salmon Derby occurring from 26 - 28 May and 2-3 June. Eight access locations in the Sitka marine boat fishery will be sampled by 2 to 6 staff, depending on the period of the survey.

A similar procedure was used for scheduling sampling during the derby biweekly period. The numbers of sampling units scheduled for each year are summarized in Table 5. A catch technician will be stationed at the derby weigh-in station on Crescent Harbor. Additional derby entries will be sampled when the floating weigh-in station delivers to the processing plant. All fish will be counted and sampled for CWT with a subsample taken for GSI and otolith sampling.

Table 5.–Summary of study design features for the 2018 onsite catch sampling survey of the Sitka marine boat sport fishery in Southeast Alaska.

Biweekly periods	Dates	Number of days sampled	Number of access locations	Number of access locations sampled per day	Derby weigh-in stations sampled[9]
9	23 Apr–06 May	10	8	2	0
10	07 May–20 May	10	8	3	0
11	21 May–3 Jun	10	8	3	0
Derby Entered	26-28 May, 2-3 Jun	5	2	2	2
12	04–17 Jun	10	8	3	0
13	18 Jun–01 Jul	10	8	3	0
14	02-15 Jul	10	8	3	0
15	16-29 Jul	10	8	3	0
16	30 Jul–12 Aug	10	8	3	0
17	13-26 Aug	10	8	3	0
18	27 Aug–09 Sep	10	8	2	0

Juneau Marine Boat Fishery Surveys[10]

The Juneau marine boat sport fishery will be surveyed from 07 May through 09 September 2018, with the Golden North Salmon Derby occurring 17-19 August 2018. Six access locations will be sampled by 3 to 5 staff with overlapping morning and evening shifts.

Similarly, within the derby biweekly period, 3–5 creel technicians will conduct creel sampling with additional personnel stationed at each of the derby weigh-in stations (Auke Bay Government, Douglas Harbor, Amalga Harbor, and the floating processor). In Juneau, the derby stations do not keep a count of the total number of entered fish; therefore, all derby-entered Chinook and coho salmon will be counted and sampled for CWT at the weigh-in stations with a subsample of Chinook salmon taken for GSI. The numbers of sampling units by stratum scheduled for 2018 are outlined in Table 6.

[9] In Sitka, derby-entered fish can be entered on a floating tender, so this is considered an access location during the derby. A sampler is unable to be stationed on the tender so sampling is done when the tender offloads at the processing plant.

[10] Due to Chinook fishery closures, the roadside Picnic Cove fishery on Douglas Island will not be sampled in 2018.

Table 6.–Summary of study design features for the 2018 onsite catch sampling survey of the Juneau marine boat sport fishery in Southeast Alaska.

Biweekly periods	Dates	Number of days sampled	Number of access locations	Number of access locations sampled per day	Derby weigh-in stations sampled[11]
10	07 –20 May	10	6	3–4	0
11	21 May– 03 Jun	10	6	3–4	0
12	04–17 Jun	10	6	3–4	0
13	18 Jun–01 Jul	10	6	3–4	0
14	02-15 Jul	10	6	3–4	0
15	16-29 Jul	10	6	3–4	0
16	30 Jul–12 Aug	10	6	3–4	0
17	13-26 Aug	10	6	3–4	0
Derby Entered	17–19 Aug	3	5	5	5
18	27Aug–09 Sep	10	6	2	0

Craig-Klawock Marine Boat Fishery Survey

The Craig-Klawock marine sport fishery will be sampled from 30 April to 26 August 2018. There are 6 access locations in Craig, and 5 access locations in the Klawock area sampled by 2–4 technicians. Creel technicians will be scheduled at either Craig or Klawock and will roam between the access locations based on usage.

Craig and Klawock will each be sampled every day of the biweek, with 1 technician to work in the office on Monday. This design should provide a consistent proportion of sampling effort throughout the season, and maximize the number of Chinook and coho salmon sampled.

Some lodges, at least 2 in Craig, will only allow biological sampling of their fish. Therefore only the catch technicians will sample these docks.

Petersburg Marine Boat Fishery Survey

The Petersburg marine boat fishery will be sampled from 23 April to 26 August 2018. One to 2 technicians will sample the harvest of boat anglers returning to 3 access locations. The 4 day Petersburg Salmon Derby, normally held over the Memorial Day weekend is cancelled for 2018.

Wrangell Marine Boat Fishery Survey

The Wrangell marine boat fishery will be sampled from 23 April to 26 August 2018. One to 2 technicians will sample the harvest of boat anglers returning to 3 access locations in the Wrangell area. Wrangell has 2 shifts per sampling day with each access location randomly chosen with replacement. The time periods of the shifts vary between weekdays and weekend-holidays.

Gustavus Marine Boat Fishery Survey

The Gustavus marine boat fishery will be sampled from 7 May to 26 August 2018. One technician will sample the harvest of boat anglers returning to 1 access location in the Gustavus area. In the spring, the Bartlett Cove access location may also be surveyed.

[11] In Juneau, fish can be entered on a tender, so this is considered an access location during the derby. A sampler is able to be stationed on the tender so sampling is also conducted there.

Elfin Cove Marine Boat Fishery Survey

The Elfin Cove marine boat fishery will be sampled from 7 May to 26 August 2018. One technician will sample the harvest of boat anglers returning to 2 access locations (an inner and outer harbor separated by a narrow channel at Elfin Cove), each with private-lodge docks and one public dock. The technician will be assigned to either the inner or outer harbor each day and will roam between access locations within the assigned harbor.

Yakutat Marine Boat Fishery Survey

The Yakutat marine boat fishery will be sampled from 23 April to 26 August 2018. One technician will sample the harvest of boat anglers returning to 2 access locations.

DATA REDUCTION

Data will be electronically captured on the Marine Harvest Studies application and transmitted at least weekly to a cloud server by all technicians in all ports. From there the relational database located on a Juneau ADF&G server will be triggered to download the data from the cloud server. The data can be accessed and edited via SQL management studio[12], a web viewer, or accessed and read into a statistical analysis system dataset using SAS for Windows. If the application or handheld fail, technicians will revert to recording the data on mark-sense forms, which will be checked and run through an optical scanner with the resulting comma delimited text file imported into SAS for Windows. Steps outlined below are specific to electronic capture but are similar for paper recording.

All technicians will record boat information, effort, harvest, biological data, and photos into the application on their handhelds, currently an Apple iPad Air protected with a Lifeproof fré case and floating lifejacket. The application has built in validations for common warnings and errors to assist the technicians while recording the data (see the Handheld training manual for the list). Technicians are required to review their data, correcting all errors and warnings or making comments as to why the data is incomplete or in error. They will also verify all CWT and otolith strap numbers, and Whatman and scale card numbers to ensure all data was keyed in correctly. Once checked, data and photos are transmitted to the cloud server. Technicians should transmit daily, or at a minimum weekly, with all data transmitted by Sunday night. In addition, all biological samples must also be turned into the area office each Sunday night.

On Monday morning, each designated management office will verify all shifts have been transmitted and download the list of biological data expected in their port. They will compare the list to the physical samples, correct as necessary, and t-wand all CWT heads to see if they detect a tag in the office. The database will be reviewed and corrected at least weekly for any records not passing validation, and any records with CWT data will be verified and marked as clean to flag these records for the tag lab to download the coded wire tag data report. If any errors are found in a CWT record after this point, the tag lab will need to be notified directly about the change.

The biological data will then be shipped to the Douglas office and salmon CWT and otolith heads shipped to the CWT lab in Juneau where any tags present will be removed and decoded. All shipments of cinch-strapped heads will include the date and number of heads in each shipment. The tag lab will access all data associated with these salmon directly from the relational database

[12] Product names used in this publication are included for completeness but do not constitute product endorsement.

via a report table. The tag recovery information from each head will then be entered into the Tag Lab database.

Data will then be run through various SAS error checking programs with feedback passed on to technicians at each stage. After final checking of the SAS datasets, the data will be analyzed according to the procedures outlined below. In conjunction with Tag Lab personnel, the number of fish sampled for adipose finclips and estimated harvest (for the onsite creel survey locations) will also be entered into a related database so that hatchery contribution estimates can be generated directly. Once data are finalized, the data files will be archived on the Douglas server, with all raw data available in the relational database.

Chinook salmon scales will be pressed onto acetates and then read by Division personnel. Ages will be recorded on printouts, keypunched into the Excel spreadsheet, and then imported into the database. Black rockfish otoliths will be read by Division personnel. Ages will be recoded into an Excel spreadsheet, and then imported into the database. Chinook otolith samples will be dissected and processed by the MTA Lab in Juneau, and Chinook genetic samples will be shipped to the Genetics lab in Anchorage. Resulting data from these otolith and genetic samples are not returned to this program, but results remain on the associated Commercial Fisheries database.

DATA ANALYSIS

The data analysis procedures generally involve a 2-step estimation approach. The first step involves estimation of parameters that are intrinsic to the information gathered during the fielding of this project, such as data gathered regarding the characteristics of intercepted boat parties and their harvest during creel or catch sampling, or data derived after laboratory follow-up activities (e.g., CWT analyses). The second step involves expanding these intrinsically-based estimates to the corresponding preliminary yearly projections of the parameter estimates calculated following publication of the final SWHS estimates (extrinsic estimates) of harvest for the corresponding species or species group. Application of the 2-step estimation approach takes place for most of the objectives following the completion of all data collection by this project for the season, although for some objectives, the process occurs at "midseason" milestone dates (e.g., Secondary Objective 10: beginning of August projections related to lingcod and Yelloweye rockfish harvest).

In the following subsections, the general 2-step estimation approach is outlined for both the mid-season and end-of-season projections of the preliminary parameter estimates. These subsections are then followed by specific details regarding application of the estimation approach for each of the objectives.

General Estimation Approach

Intrinsic Parameter Estimates

The general study design for this project involves estimation of proportions or averages of the specific elements of harvest for each fishery from the on-site survey, which are then applied to the corresponding final estimates from the SWHS. The on-site sample survey design is a stratified 4-stage cluster sample survey with the following:

1) days to sample across each time period represent the first-stage sampling units;
2) access locations, the harbors and boat launches sampled within a selected day, represent the second-stage sampling units;

3) the boat parties exiting the fishery during each day at each access location represent the third-stage sampling units; and
4) each fish (by species) represents the fourth-stage or "terminal" sampling unit.

Variance for the fourth stage will most often be zero because technicians are required to take all measurements whenever they take at least 1 measurement from a fish of each species. However, the variance will not be zero if a measurement is lost or a species is subsampled by design (e.g., black rockfish otolith sampling in Sitka). For the point estimate, the fourth stage is necessary regardless of whether variance is zero or not.

For ports where sampling occurs on every day of the biweek—such as Juneau and Craig-Klawock—this 4-stage equation naturally collapses to a 3-stage equation. The expansion for subsampling days then becomes 1 with a variance of zero because all days are sampled. Where estimates reflect abundance, such as the total number of fish harvested, the biweekly estimates and variances will be summed to produce seasonwide estimates and variances. Where estimates are for proportions or averages, only a seasonwide estimate (i.e., with stage 1 being all days in the season), will be reported. The strata used to generate estimates are composed of a combination of general port location (e.g., Ketchikan), time period (e.g., biweek or season), and components of the fishery (guided and unguided). Information on the number of exiting boat parties will be recorded at each sampled access location during each sampled day for all samples, and when combined with the numbers of fish by species observed on each sampled boat will provide weighting factors for each sampling stage to address the likelihood that the sampling will not be exactly proportional to the harvest of all species at all times.

At all ports, the creel technicians gather information from each intercepted boat party on the following parameters: effort, harvest, and catch, logbook information, and biological sampling of the catch. During these scheduled interviews, the creel technicians additionally gather and record information on the number of exiting boat parties used in the weighting estimation process described later. As noted previously, 1 or more technicians at the ports of Ketchikan, Sitka, and Craig-Klawock conduct shifts where only catch sampling occurs. These catch technicians will also collect and record a corresponding count of the number of exiting boat parties. However, to maximize the number of fish (of one or more species or group of species) sampled for CWT and biological characteristics, catch technicians can roam across access locations and focus on busy portions of an access location. Accordingly, the boat counts for these catch technicians will only be a gross measure of the general fishing activity for weighting purposes.

Standard estimation equations will be used to calculate estimates of the intrinsic averages or proportions associated with the objectives for this project for a stratified 4-stage sample survey with days, exit locations, boat parties, and harvested fish by species representing the sampling stages. Additionally, the standard estimation equations for the corresponding variance estimates will be used as approximations of the sampling variance and standard errors (SEs). The equations were adapted from equations in Sukhatme et al. (1984: section 8.10 pages 346–351) for estimating averages for a 3-stage sample survey. The coded-variable approach for obtaining estimates associated with proportions is also per Sukatme et al. (1984: section 2.10, pages 42–45). Because the sampling unit selection procedures for this survey are not done as a random probability-based

sample survey in the standard sense, the corresponding variance and SE estimates are considered approximations[13] as noted above.

The parameters of interest associated with the objectives for this project mostly represent averages or proportions of the corresponding harvest (or in some cases numbers of fish released) by species. In some instances, the parameter of interest is the magnitude of the harvest or the numbers of fish released by species or species group itself (e.g., Primary Objective 1a: total sport harvest of Chinook salmon). The weighting factors associated with the weighting estimation approach provide estimates of the magnitude of the harvest itself. The averages associated with the "*y*" terms in the equations below represent the former parameter estimates (averages or proportions); whereas the "*N*" terms represent the latter parameter estimates (total harvest). Because sampling at all ports is directed at only a portion of the locations from which anglers access the various fisheries, and sampling shifts are by design directed at the busier portions of the day and days of the week, then the estimated harvest is not an unbiased estimate of the harvest by user group at each port for the season in total. Additionally, because the counts of boat parties that are not sampled for creel or catch samples are only approximately accurate, then the expansion associated with the number of boat parties within a sampled shift (access location within a day for creel samples) only provides an approximate estimate of the harvest during the shift. These estimates of harvest (*N*) are used with corresponding final SWHS harvest estimates in expanding up to the preliminary yearly values for the associated parameters via the ratio estimation approach outlined in this operational plan. Accordingly, these intrinsic estimates of harvest are referenced herein as harvest indices.

Calculation of estimates of the CWT contributions for Chinook and coho salmon (Primary Objectives 1b, 2b, and Secondary Objective 1) will not involve direct use of the 4-stage cluster estimating equations. The specific equations for the CWT estimation approach that are adapted from Bernard and Clark (1996) are outlined after the 4-stage cluster estimating equations described below.

Four-stage Estimating Equations

The first step in the 4-stage estimating equation calculation involves estimating an average of the measurement for parameters of interest across all fish by species or species group within a sampled boat party:

$$\bar{y}_{hijk} = \frac{\sum_{o=1}^{n_{mhijk}} y_{hijko}}{n_{mhijk}} \qquad (1)$$

where: n_{mhijk} is the number of fish sampled (where *m* stands for measured) for the average or proportion from the total number harvested by sampled boat party *k*, at sampled access location *j* (i.e., the sampled harbor or boat launch) during sampled day *i* within stratum *h*[14];

[13] The degree of approximation is expected to be slight in that the sample selection process in some instances closely approximates a random sampling process or represents a census or a near census at some of the sampling stages in the 4-stage sampling process. Also, the use of the 4-stage variance estimating equations is expected to represent a better description of the sampling error than the 'naïve' estimators used in past years, wherein the multistage design was ignored and the data on such parameters as species composition for rockfish were treated as if it was obtained by a simple random sampling design with replacement, even though the data were obtained by a multistage sample survey without replacement.

[14] Although strata are defined as the combination of major port, biweek and user group: guided versus unguided, the referencing of strata (or stratum) in these equations is restricted to the distinction between the user groups (guided/unguided) for each port.

and y_{hijko} equals the measurement (or converted measurement) for parameters of interest representing averages (e.g., weight of each fish) for the o^{th} fish sampled from each sampled boat party. In the case of parameters that represent proportions (for example, species composition), then the y_{hijko} equals the coding for proportional estimates as follows:

$$y_{chijko} = \begin{array}{l} 1, \text{ if the fish belongs to the category } c \text{ associated with each proportion;} \\ 0, \text{ otherwise.} \end{array} \quad (2)$$

Note that there would be C separate values of these coded values associated with each category in the proportion. For example, if the proportions of interest had 4 categories ($C = 4$), there would be separate calculations for each of the 4 categories (denoted by the subscript c), and each would then be substituted into Equation 1.

The estimate (from Equation 1) will then be weighted by the relative 'size' of each boat party compared to other boat parties sampled (for the average or proportion) within the same access location sampled within the sampled day, with the weight calculated as follows (wherein 'size' relates to the number of fish by species or species group):

$$w_{4hijk} = \frac{N_{mhijk}}{\overline{N}_{mhij}} \quad (3)$$

where N_{mhijk} is the number of fish by species or species group selected for measurement from each sampled boat party's harvest (note that by design for all species except for black rockfish with otoliths collected, $N_{mhijk} = n_{mhijk}$ the number of fish sampled for the measurement or characteristic of interest for an individual sampled boat, i.e., only complete bags sampled); and $\overline{N}_{mhij}$ is the average across boat parties sampled at each sampled access location within a sampled day, calculated as:

$$\overline{N}_{mhij} = \frac{\sum_{k=1}^{b_{mhij}} N_{mhijk}}{b_{mhij}} \quad (4)$$

where b_{mhij} equals the number of boat parties with species or species group selected for measurement at each access location within each sampled day for the guided and unguided components of the fishery at each port for the average or proportional parameter estimates.

For the parameters involving estimates of the number of fish harvested (or the number of fish caught, or number released)[15], a parallel computation to those noted above in equation 4 is calculated for all fish harvested by species or species group over all the boats interviewed at each sampled access location within each sampled day (i.e., including both fish sampled and measured

[15] A few of the objectives or tasks require the estimation of the number of fish released or the number caught (harvested plus released) by species or species group; in the exposition of the equations in this section of the plan the equations used for estimating the numbers of fish harvested can be used with the number of fish reported released to obtain the estimate of fish released. The numbers released will only be referenced hereafter when necessary.

for the characteristic of interest, and fish that were on boats that were interviewed, but not sampled), as follows:

$$\overline{N}_{hij} = \frac{\sum_{k=1}^{b'_{hij}} N_{hijk}}{b'_{hij}} \quad (5)$$

where N_{hijk} is the number of fish harvested by species (includes measured and unmeasured fish[16]) on an interviewed boat; b'_{hij} is the number of boats interviewed where anglers provided trip information within each sampled access location within each sampled day (includes boats that were interviewed but for which no fish were sampled for the measurement of interest). The b'_{hij} term is a subset of the b_{hij} term, which includes any boat that was known to be sport fishing regardless as to whether they provided information.

The $\overline{N}_{hij}$ term is then used to expand up to the index of the number of fish harvested at the sampled access location within the sampled day within stratum *h* (guided versus unguided), as follows:

$$\hat{N}_{hij} = \frac{\hat{B}_{ij}\hat{b}_{hij}}{b_{ij}}\overline{N}_{hij} = \hat{B}_{hij}\overline{N}_{hij} \quad (6)$$

where b_{ij} is the total number of boat parties that were determined to be sport fishing regardless of strata (i.e., guided plus unguided boats); $\hat{b}_{hij}$ is the estimated number within stratum h (guided or unguided, see equation 8) and $\hat{B}_{ij}$ is the estimated number of sport fishing boat parties expanded for missed boats which are those that are seen exiting but are not interviewed.(note that counts of boat parties are not distinguished by user group, so no *h* subscript denoting guided versus unguided), calculated for technicians as:

$$\hat{B}_{ij} = A_{ij}\frac{b_{ij}}{a_{ij}} \quad (7)$$

where b_{ij} is the total number of boat parties known to be sport fishing (includes noncompliant and missed boats known to be sport fishing where guide status may not be known), a_{ij} is the total number of boat parties that were determined to be sport fishing or were determined to not be sport fishing; and A_{ij} is the number of all boats counted exiting the sampled access location during the sampled day (includes sport fishing and nonsport fishing boats, as well as "missed" boats)[17]. The calculation of these indices of harvest (the $\hat{N}_{hij}$ terms) for use in later expansion to project the final SWHS corresponding estimates of harvest will be limited to using the data from creel

[16] For the catch technician data, the numbers of fish harvested for species or species groups for a boat party are only recorded for the fish that are measured. Accordingly, the catch technician data are essentially treated as self-represented in the weighting process and $N_{hijk} = N_{mhijk}$ in equation 5 and b'_hij = b_mhij.

[17] Note that some boat parties at some access locations are known to never sport fish (see the Data Collection section and the SEAK Marine Harvest Studies Technician Manual [unpublished] for details), these boat parties are not included in either the A_i or the a_i counts.

technician data only (i.e., not including the catch technician data), due to the limitations of catch technicians only recording harvest of sampled fish.

The values of $\hat{b}_{hij}$ for each stratum (guided versus unguided) are estimated by expansion of the proportion of boats in each stratum compared to all sport fishing boats (which may include sport fishing boats that could not be assigned to a stratum), as follows:

$$\hat{b}_{Cij} = b_{ij}\left(\frac{b_{Cij}}{b_{Cij} + b_{Pij}}\right) \quad or \quad \hat{b}_{Gij} = b_{ij}\frac{b_{Pij}}{\left(b_{Cij} + b_{Pij}\right)} \tag{8}$$

where the *C* and P subscripts correspond to the guided (chartered) and unguided (private) strata.

The next step for estimating the averages or proportional parameters involve applying the weight derived in Equation 3 to each of the averages from Equation 1 as follows:

$$\bar{y}_{whijk} = w_{4hijk}\bar{y}_{hijk} \tag{9}$$

which is then used to estimate the average across all boat parties by user group within a sampled access location within each sampled day:

$$\bar{y}_{hij} = \frac{\sum_{k=1}^{b_{mhij}} \bar{y}_{whijk}}{b_{mhij}} \tag{10}$$

The next step in estimating the index of the harvest of fish involves first averaging the number harvested across access locations sampled within each sampled day calculated as:

$$\bar{\hat{N}}_{hi} = \frac{\sum_{j=1}^{q_i} \hat{N}_{hij}}{q_i} \tag{11}$$

where $\hat{N}_{hij}$ is the index of the number of fish harvested by each species or species group for each sampled access location as calculated above in Equation 6; and q_i is the number of access locations sampled within each sampled day (at this stage of the sampling there is no distinction between the guided and unguided components, and hence the dropping of the stratum subscript *h* in regards to the statistic q_i).

The $\bar{\hat{N}}_{hi}$ term is then used to expand up to the index of the number of fish harvested during the sampled day by user group (guided versus unguided), as follows:

$$\hat{N}_{hi} = Q_i\bar{\hat{N}}_{hi} \tag{12}$$

where Q_i is the number of access locations that could have been sampled within each day.

The next step in estimating the average or proportional parameters involves weighting across third-stage sampling units (locations). Ideally, the third-stage sample weights to be used for estimating average or proportional parameters would have involved the estimated harvest index over all sport

fishing boat parties sampled within a day across all access locations, both those sampled for the characteristic of interest and those not sampled (but sport fishing). However, because catch technicians do not record the full harvest (only fish that are sampled) and catch technician information could exists without a matched creel sample with the corresponding estimate of the number of fish harvested within a day[18], then a direct use of the estimated harvest index cannot be used. Accordingly, substitute calculations, including harvest data from creel and catch technicians (denoted by the use of tildes (~)) will be used to approximate the third and second-stage weights;

first, an approximate number of fish harvested by each stratum within each sampled day at each location is calculated[19]:

$$\tilde{N}_{hij} = \frac{\hat{B}_{ij}\hat{b}_{hij}}{b_{ij}}\overline{N}_{hij} \tag{13}$$

These approximate harvest indices are then averaged over all access locations sampled for the average or proportion of interest within a day, as follows[20]:

$$\tilde{\overline{N}}_{hi} = \frac{\sum_{j=1}^{q_i}\tilde{N}_{hij}}{q_i} \tag{14}$$

These terms are then used to calculate the approximate third-stage sample weights as follows:

$$\tilde{w}_{3hij} = \frac{\tilde{N}_{hij}}{\tilde{\overline{N}}_{hi}} \tag{15}$$

This approximate weight is then used for estimating the averages or proportional parameters by applying the weight derived in Equation 15 to each of the averages from Equation 10 as follows:

$$\overline{y}_{whij} = \tilde{w}_{3hij}\overline{y}_{hij} \tag{16}$$

which is then used to estimate the average across all sampled access locations by user group within each sampled day:

$$\overline{y}_{hi} = \frac{\sum_{j=1}^{q_i}\overline{y}_{whij}}{q_i} \tag{17}$$

[18] This may occur if a catch sampler samples a species or species group that are not otherwise observed in the creel interviews occurring on the same day, or if by happenstance a scheduled creel interview shift does not occur (for example, due to sampler illness).

[19] Note that this equation represents an adaptation of equation 6 for averages or proportion estimates.

[20] Note that this equation represents an adaptation of equation 11 for averages or proportion estimates.

This average will then be weighted by the relative 'size' of each sampled day compared to all other days sampled. The second-stage sampling weights to be used for weighting across days will be calculated directly from the estimates of the number of fish harvested as follows:

$$\tilde{w}_{2hi} \approx \frac{\tilde{N}_{hi}}{\tilde{\bar{N}}_{h}} \tag{18}$$

where $\tilde{N}_{hi}$ is the approximate index of the number of fish harvested by each species or species group for each sampled day as calculated by[21]:

$$\tilde{N}_{hi} = Q_i \tilde{\bar{N}}_{hi} \tag{19}$$

where Q_i is the number of access locations that could have been sampled within each day and $\tilde{\bar{N}}_{hi}$ is the approximate average number harvested (across all sampled locations for both creel and catch technicians) from Equation 14.

and $\tilde{\bar{N}}_{h}$ is the approximate average index of the number harvested across sampled days calculated as[22]:

$$\tilde{\bar{N}}_{h} = \frac{\sum_{i=1}^{d} \tilde{N}_{hi}}{d} \tag{20}$$

where d is the number of days sampled for each major port (across all locations for both creel and catch technicians).

The final step for estimating the averages or proportional parameters involve applying the weight derived in Equation 18 to each of the averages from Equation 17 as follows:

$$\bar{y}_{whi} = w_{2hi} \bar{y}_{hi} \tag{21}$$

which is then used to estimate the average across all sampled days by user group:

$$\bar{y}_{h} = \frac{\sum_{j=1}^{d} \bar{y}_{whi}}{d} \tag{22}$$

The overall number of fish harvested by each species or species group is obtained as follows (again only using the creel interview data), first by calculating the average number harvested across sampled days:

$$\bar{\hat{N}}_{h} = \frac{\sum_{i=1}^{d} \hat{N}_{hi}}{d} \tag{23}$$

[21] Note that this equation represents an adaptation of equation 12 for averages or proportion estimates.
[22] Note that this equation represents an adaptation of equation 23 for averages or proportion estimates.

where $\hat{N}_{hi}$ is from Equation 12.

Then the $\overline{\hat{N}}_h$ term is used to expand up to the index of the number of fish harvested by user group (guided versus unguided) for the surveyed season, as follows:

$$\hat{N}_h = D\,\overline{\hat{N}}_h \tag{24}$$

where D is the number of days covering the survey for the time period requested.

The $\bar{y}_h$ from Equation 22, which represents the estimate for the intrinsic parameter for averages or proportions to be used to expand into the yearly preliminary values, in summary, will be calculated as follows:

$$\bar{y}_h = \frac{1}{d_m}\sum_{i=1}^{d_m}\left(\frac{w_{2hi}}{q_{mi}}\sum_{j=1}^{q_{mi}}\left(\frac{\tilde{w}_{3hij}}{b_{mhij}}\sum_{k=1}^{b_{mhij}}\left(\frac{w_{4hijk}}{n_{mhijk}}\sum_{o=1}^{n_{mhijk}} y_{hijko}\right)\right)\right) \tag{25}$$

Summarizing the overall harvest index value by user group is calculated as (equivalent to Equation 24):

$$\hat{N}_h = \frac{D}{d}\sum_{i=1}^{d}\left(\frac{Q_i}{q_i}\sum_{j=1}^{q_i}\left(\hat{B}_{hij}\frac{\sum_{k=1}^{b_{hij}} N_{hijk}}{b'_{hij}}\right)\right) \tag{26}$$

The variance of this harvest index by user group (for each species or species group) will be approximated using the standard 3-stage equation (adapted from Sukhatme et al. 1984)[23]:

$$\begin{aligned}\hat{V}\left[\hat{N}_h\right] \approx & \left\{(1-f_1)D^2\frac{S_{1h}^2}{d}\right\} \\ & + \left\{f_1\frac{D^2}{d\,d'}\sum_{i=1}^{d'}(1-f_{2i})Q_i^2\frac{S_{2hi}^2}{q_i}\right\} \\ & + \left\{f_1\frac{D^2}{d^2}\sum_{i=1}^{d}f_{2i}\frac{Q_i^2}{q_i q'_i}\sum_{j=1}^{q'_i}(1-f_{3ij})\left(\hat{B}_{hij}\right)^2\frac{S_{3hij}^2}{b'_{hij}}\right\}\end{aligned} \tag{27}$$

where: f_1, f_{2i}, and f_{3ij} are the sampling fractions for days, access locations, and boat parties, respectively (i.e., $f_1 = d/D; f_{2i} = q_i/Q_i; f_{3ij} \approx b'_{ij}/\hat{B}_{ij}$)[24]; S_{1h}^2, S_{2hi}^2, and S_{3hij}^2 equal the: (1) among

[23] Note that the estimates of harvest (the N terms) collapse to a 3-stage sample survey estimation as the terminal sampling stage for the numbers of fish by species or species group is the sampled boat party (not the individual fish sampled).

[24] Note that the sampling fraction for sport fishing boat parties is estimated, as some boats are not intercepted and classified as either sport fishing or nonsport fishing boats. However, nearly all boats both interviewed and not interviewed, are generally classified as either sport fishing or nonsport fishing boats (i.e., very few unknowns), therefore the use of an estimate of the sampling fraction for this stage was deemed appropriate.

day, (2) among access location (within day), and the (3) among boat party (within access location) variance components for the harvest index, respectively, which are obtained as:

$$S_{1h}^2 = \frac{\sum_{i=1}^{d}\left(\hat{N}_{hi} - \overline{\hat{N}}_h\right)^2}{d-1} \qquad S_{2hi}^2 = \frac{\sum_{j=1}^{q_i}\left(\hat{N}_{hij} - \overline{\hat{N}}_{hi}\right)^2}{q_i - 1} \qquad S_{3hij}^2 = \frac{\sum_{k=1}^{z_{hij}}\left(N_{hijk} - \overline{N}_{hij}\right)^2}{b'_{hij} - 1} \tag{28}$$

where d' is the number of days in which s_{2hi}^2 can be estimated (i.e., days with at least 2 access locations sampled); and q_i' is the number of locations in which s_{3hij}^2 can be estimated (i.e., locations with either: (1) at least 2 boat parties interviewed, or (2) the number of sport fishing boat parties interviewed equals the estimated number of exiting sport fishing boat parties: $b'_{ij} = \hat{B}_{ij}$).

The variance for the average or proportional parameter estimates (for the average calculated in Equation 25), is approximated by the standard 4-stage equation for averages (adapted from Sukhatme et al. 1984), as follows:

$$\begin{aligned}
\hat{V}[\bar{y}_h] \approx & \left\{(1-f_{m1})\frac{s_{1h}^2}{d_m}\right\} \\
& + \left\{ f_{m1}\frac{1}{d_m\, d''_m}\sum_{i=1}^{d''_m}(1-f_{m2i})(w_{2hi})^2\frac{s_{2hi}^2}{q_{mi}}\right\} \\
& + \left\{ f_{m1}\frac{1}{d_m{}^2}\sum_{i=1}^{d_m} f_{m2i}\frac{1}{q_{mi}\, q''_{mi}}(w_{2hi})^2\sum_{j=1}^{q''_{mi}}(1-f_{m3ij})(\tilde{w}_{3hij})^2\frac{s_{3hij}^2}{b_{hij}}\right\} \\
& + \left\{ f_{m1}\frac{1}{d_m{}^2}\sum_{i=1}^{d} f_{m2i}\frac{1}{q_{mi}^2}(w_{2hi})^2\sum_{j=1}^{q_{mi}} f_{m3ij}\frac{1}{b_{mhij}\, b''_{mhij}}(\tilde{w}_{3hij})^2\sum_{k=1}^{b'_{mhij}}(1-f_{4hijk})(w_{4hijk})^2\frac{s_{4hjik}^2}{n_{mhijk}}\right\}
\end{aligned} \tag{29}$$

where: f_{m1}, f_{m2i}, f_{m3ij}, and f_{4hijk} are the sampling fractions for days, access locations, boat parties, and fish respectively (i.e., $f_{m1} = d_m / D; f_{m2i} = q_{mi} / Q_i; f_{m3ij} \approx b_{mij} / \hat{B}_{ij}$; $f_{4hijk} = n_{mhijk} / N_{mhijk}$); where f_{m3ij} is the sampling fraction for sport fishing boat parties for the estimation of averages and proportions (i.e., $f_{m3ij} \approx b_{mij} / \hat{B}_{ij}$, where b_{mij} is the number of boat parties in which the species or species group had bags measured for the proportion or average regardless of user group); f_{4hijk} is the sampling fractions for fish by species or species group within a sampled boat party (i.e., $f_{4hijk} = n_{mhijk} / N_{mhijk}$) which by design should equal one (and therefore the fourth major term of equation 29 should resolve to zero); the s_{1h}^2, s_{2hi}^2, s_{3hij}^2, and s_{4hijk}^2 terms equal the (1) among day, (2) among access location (within day), (3) among boat party (within access location), and

(4) among fish (within boat party) variance components for the average or proportion estimate, respectively, which will be obtained as:

$$s_{1h}^2 = \frac{\sum_{i=1}^{d_m} \left(\bar{y}_{whi} - \bar{y}_h \right)^2}{d_m - 1} \qquad s_{2hi}^2 = \frac{\sum_{j=1}^{q_{mi}} \left(\bar{y}_{whij} - \bar{y}_{hi} \right)^2}{q_{mi} - 1}$$

$$s_{3hij}^2 = \frac{\sum_{k=1}^{b_{mhij}} \left(\bar{y}_{whijk} - \bar{y}_{hij} \right)^2}{b_{mhij} - 1} \qquad s_{4hijk}^2 = \frac{\sum_{o=1}^{n_{mhijk}} \left(y_{hijko} - \bar{y}_{hijk} \right)^2}{n_{mhijk} - 1} \tag{30}$$

d'' is the number of days in which s_{2hi}^2 can be estimated (i.e., days with at least 2 access locations sampled); q_i'' is the number of locations in which s_{3hij}^2 can be estimated (i.e., locations with either (1) at least 2 boat parties interviewed or (2) the number of sport fishing boat parties interviewed equals the estimated number of exiting sport fishing boat parties: $b_{ij}' = \hat{B}_{ij}$); and b_{mhij}'' is the number of sport fishing boat parties in which s_{4hijk}^2 can be estimated (at least 2 fish measured per species or species group or all fish harvested by the sport fishing boat party sampled).

Across user group (guided versus unguided), biweek, or across port estimates of the numbers of fish harvested by species or species group and the associated variances can be obtained by summation:

$$\hat{N} = \sum_{h=1}^{L} \hat{N}_h \qquad \text{and} \qquad \hat{V}\left[\hat{N}\right] \approx \sum_{h=1}^{L} \hat{V}\left[\hat{N}_h\right] \tag{31}$$

where the terms $\hat{N}_h$ and $\hat{V}\left[\hat{N}_h\right]$ are as calculated above in Equations 26 and 27, respectively; and L is the number of strata to combine (equal to 2 if the combination is just involving user groups, or more if involving combining of port estimates). Note that the overall across user group variance estimate is only approximate as it does not factor in the covariance for that level of post-stratification. Because the guided versus unguided level of stratification is a post-stratification classification, these components are not independently sampled and as such they are not statistically independent as are the 'pre-stratification' classification of individual ports, therefore the variance equation above is only approximate. Accordingly, if across user group estimates of the numbers of fish harvested are desired then an alternative approach that addresses the covariance issue is to ignore the user group distinction when applying the data to Equations 26 and 27.

Across user group (guided versus unguided) or across port estimates of the average or proportions are weighted by the stratum weights of the corresponding stratum, as follows:

$$\bar{y} = \sum_{h=1}^{L} \hat{W}_h \bar{y}_h \qquad \text{where} \qquad \hat{W}_h = \frac{\hat{N}_h}{\hat{N}} \tag{32}$$

where the terms $\hat{N}_h$ reference the stratum estimates of the number of fish harvested (or caught) from Equation 26; and $\hat{N}$ references the across strata estimate from Equation 31. The variance of $\bar{y}$ will be estimated approximately[25] as:

$$\hat{V}[\bar{y}] \approx \sum_{h=1}^{L} \hat{W}_h^2 \, V[\,\bar{y}_h\,] \tag{33}$$

Standard errors of the estimates will be obtained simply by taking the square root of the appropriate variance estimate.

As with the variance estimate for across-user-group estimates of the index of the number of fish harvested, these across-variance estimates for the average or proportional parameter estimates are only approximate due to the covariance terms that are not explicitly calculated. An evaluation of the necessity of incorporating the covariance terms was conducted during the data analysis phase for this project in 2018. It was determined that the covariances on estimates that involve averages and proportions were trivial for all species with a few exceptions. Those exceptions included species that have different size regulation based on guided and unguided harvest, although the exceptions did not involve all ports. In light of this it was determined that the variance in equation 33 is most appropriate.

CWT Contribution Estimating Equations

Hatchery and tagged wild stock contributions and variances will be estimated for the surveys using the procedures outlined by Bernard and Clark (1996). Where the number of a species sampled are the number of that species whose adipose fin is physically inspected. The number of a species harvested for a particular time period t is denoted $\widehat{N}_t$ The time period may stand for the entire season or part for example when estimating early District 108 or 111 harvest. Post season, and once the SWHS is published "final estimates" of cwt harvest can be calculated using the estimate of harvest and variance from the SWHS for $\widehat{N}_t$ for the entire season. There should be caution used when using a very small time periods since that will restrict the number of samples with which to base your estimates on, and one may find no harvest is estimated or alternatively that the estimated number of fish harvested from a particular CWT stock is greater than all of the sport fish harvest of all stocks. This phenomenon is sometimes found when estimating the harvest for small time periods in commercial fisheries too, such as the trawl fishery.

The estimating procedures by Bernard and Clark (1996) that will be used are those appropriate for estimating contributions and variances when total harvest is estimated.

The notation used in the following equations essentially follows that used by Bernard and Clark (1996), with subscripts adapted to avoid confusion with other subscripts used in this operational plan. The first step involves estimating the contribution to each time period in the fishery of each particular tag code. Both the catch sampling and creel sampling data are used within each time period for all the corresponding terms of the equations below, except where noted (e.g., creel samples only):

[25] As with the variance estimate for across user group estimates of the index of the number of fish harvested, these across variance estimates for the average or proportional parameter estimates are only approximate due to the covariance terms that are not explicitly calculated. An evaluation was done in 2018 which determined this equation was appropriate.

$$\hat{r}_{tc} = \hat{N}_t \hat{p}_{tc} \theta_c^{-1}, \tag{34}$$

where $\hat{r}_{tc}$ equals the estimated number of salmon from a hatchery (or wild stock) release identified by the unique tag code *c*, harvested in time period *t*; $\hat{N}_t$ is the estimated total harvest index of salmon (one particular species only) for time period *t*, calculated by applying Equation 31 using the corresponding creel samples only from each time period separately and summing across the 2 user group (guided and unguided) components of the harvest index; θ_c is the proportion of a particular release that contained a CWT of the unique tag code *c*; and $\hat{p}_{tc}$, the estimated fraction of CWT fish caught in time period t that are from cohort c, is calculated as follows:

$$\hat{p}_{tc} = \frac{m_{tc}}{\lambda_t n_t}, \tag{35}$$

where n_t is the number of salmon (1 particular species only) inspected for missing adipose fins from the sampled harvest in time period *t*; corresponding to summing all of the n_{mhijk} terms (as defined for Equation 1) for Chinook or coho salmon inspected for missing adipose fins from all samples within a time period; m_{tc} equals the number of CWTs dissected out of the salmon heads and decoded as the unique tag code *c*, originally sampled from time period *t*; and λ_t is defined as follows:

$$\lambda_t = \frac{a_t' t_t'}{a_t t_t}, \tag{36}$$

where a_t is the number of salmon with a missing adipose fin that were counted from the sampled fish in time period *t*; a_t' equals the number of salmon heads previously marked with a head strap that arrived at the Tag Lab from fish originally sampled from time period *t*; t_t is the number of CWTs that were detected in the salmon heads at the Tag Lab from those salmon sampled in time period *t*; and t_t' equals the number of CWTs that were removed from the salmon heads and decoded, from those salmon sampled in time period *t*.

Estimates of across-time period contributions by tag code, as well as by combined tag codes (e.g., all Alaskan hatchery tag codes) will be obtained by summing the estimates across time periods and tag codes, as appropriate:

$$\hat{R} = \sum_t \sum_c \hat{r}_{tc} \tag{37}$$

The estimated relative contribution of a particular tag code or across tag codes is then calculated by dividing through by the corresponding harvest index values for the entire season at a particular access location, as follows:

$$\hat{u}_c = \frac{\sum_t \hat{r}_{tc}}{\sum_t \hat{N}_t} \quad \text{and} \quad \hat{U} = \frac{\hat{R}}{\sum_t \hat{N}_t}, \tag{38}$$

where the $\hat{u}_c$ and $\hat{U}$ terms are the proportional contribution estimates that can then be applied to the projected SWHS estimates of overall Chinook or coho salmon harvest to calculate the corresponding 2018 preliminary values for these parameters.

Estimates of the variance for contributions in a time period will be estimated following the approach outlined by Bernard and Clark (1996):

$$\hat{V}\left[\hat{r}_{tc}\right] = \hat{r}_{tc}^2 \left\{ \frac{\hat{V}\left[\hat{p}_{tc}\right]}{\hat{p}_{tc}^2} + \frac{\hat{V}\left[\hat{N}_t\right]}{\hat{N}_t^2} - \frac{\hat{V}\left[\hat{p}_{tc}\right]\hat{V}\left[\hat{N}_t\right]}{\hat{p}_{tc}^2\ \hat{N}_t^2} \right\}, \tag{39}$$

where $\hat{V}\left[\hat{N}_t\right]$ equals the estimated variance of the overall harvest index estimate for time period *t*, calculated by applying Equation 31 using the corresponding creel samples only from each time period separately, and summing across the guided and unguided components of the harvest index variance; and $\hat{V}[\hat{p}_{tc}]$ is the variance of $\hat{p}_{tc}$, which is estimated approximately using the large-sample approximation formula in Bernard and Clark (1996: their Equation 12). The large-sample approximation will be used because the data collected in the similarly designed surveys conducted in 1995 indicated that this approximation is relatively accurate for this survey:

$$\hat{V}[\hat{p}_{tc}] \approx \frac{\hat{p}_{tc}}{\lambda_t n_t}\left(1 - \lambda_t \hat{\phi}_t \theta_c\right), \tag{40}$$

where

$$\hat{\phi}_t = n_t / \hat{N}_t\ . \tag{41}$$

Estimates of the variance of across-time period contributions by tag code, as well as by combined tag codes will be obtained by the following equation (adapted from Equation 3 in Bernard and Clark 1996):

$$\hat{V}\left[\hat{R}\right] = \sum_t \sum_c \hat{V}[\hat{r}_{tc}] + 2\sum_t \sum_c \sum_{u>c} \hat{Cov}[\hat{r}_{tc}, \hat{r}_{tu}], \tag{42}$$

where $\hat{Cov}[\hat{r}_{tc}, \hat{r}_{tu}]$ is the estimated covariance between the estimated contribution of 2 different tag codes within each time period, which will be calculated from Equation 43 below. Equation 42 is adapted from Equation 14 from Bernard and Clark (1996), and is again the large-sample approximation that was demonstrated to be relatively accurate with the 1995 data:

$$\hat{Cov}[\hat{r}_{tc}, \hat{r}_{tu}] \approx \hat{r}_{tc}\hat{r}_{tu}\ \frac{\hat{V}\left[\hat{N}_t\right]}{\hat{N}_t^2}. \tag{43}$$

Finally, the variance for the relative contribution terms (*u* and *U* terms as defined in Equation 38) will be approximated using parametric boot strapping (Efron and Tibshirani 1993). For each of at least 10,000 iterations of the bootstrap simulation (denoted by the subscript b) a sample R_b^* will be drawn from the normal distribution$\sim N\left(\hat{R}, \hat{V}\left(\hat{R}\right)\right)$, and a sample N_b^* will be drawn from the normal distribution $\sim N\left(\hat{N}, \hat{V}\left(\hat{N}\right)\right)$. For each iteration the statistic:

$$U^* = \frac{R^*}{N^*} \tag{44}$$

will be computed. The variance of $\widehat{U}$ will be estimated by the sample variance of the 10,000 U^* simulated values. Standard errors will be obtained as the square root of the appropriate variance. If the harvest of CWT fish and the harvest of all fish of that species are positively correlated this method may overestimate the variance.

Yearly Preliminary Estimates

The approach for estimating the yearly preliminary values associated with the objectives for this project involves applying the estimates of the intrinsic average and proportion parameters to a projection of the appropriate harvest (or in some cases total catch) for the SWHS. The projection of the harvest will be obtained by expanding the harvest indices (as in Equation 26) by an expansion factor estimated from the most recent 5-year expansion ratio calculated from the SWHS harvest estimates to this projects' corresponding harvest estimates.

The expansion ratios are calculated as an across-year average by user group (guided versus unguided, or combined), with on-site data and estimates from ports combined within each SWHS survey area (e.g., Petersburg and Wrangell would be combined for SWHS Survey Area C):

$$\overline{\pi}_h = \frac{\sum_{p=1}^{z} \hat{\pi}_{hp}}{z} \qquad \text{or by user group combined:} \qquad \overline{\pi} = \frac{\sum_{p=1}^{z} \hat{\pi}_p}{z}, \tag{45}$$

where z is the number of years to average over (set to 5 years[26]); the $\hat{\pi}_{hp}$ and $\hat{\pi}_p$ terms are the corresponding estimated ratios for each year p by user group, calculated as follows:

$$\hat{\pi}_{hp} = \frac{\hat{H}_{hp}}{\hat{N}_{hp}} \qquad \text{or by user group combined:} \qquad \hat{\pi}_p = \frac{\hat{H}_p}{\hat{N}_p} \tag{46}$$

where $\hat{H}_{hp}$ and $\hat{H}_p$ are the corresponding estimates from the SWHS for year p; $\hat{N}_{hp}$ is the on-site harvest index for each year across each user group for lingcod, rockfish, and halibut (obtained from Equation 26); and $\hat{N}_p$ is the across user group harvest index for Chinook and coho salmon[27] for each corresponding year (obtained from Equation 31).

The projected harvest (i.e., preliminary SWHS estimate) is then obtained by applying the across year ratio to this year's harvest index as follows, by user group:

$$\tilde{H}_h = \overline{\pi}_h \, \hat{N}_h \qquad \text{or by user group combined:} \qquad \tilde{H} = \overline{\pi} \, \hat{N} \tag{47}$$

[26] The 5 most recent complete pairs of estimates from the on-site and SWHS data are used to estimate the expansion ratio due to the progressive nature of the corresponding study designs for the 2 projects. For example, the coverage of the on-site survey has probably decreased in magnitude because the number of charter boat-based lodges located away from accessible sampling locations have increased. Accordingly, the most recent data pairs are expected to be better predictors for expansion in the current year. An evaluation of using a time series approach to estimate the expansion ratio may be evaluated to determine if a more accurate expansion ratio would result (i.e., projections closer to final SWHS estimates), in the following years.

[27] For CWT-sampled Chinook and coho salmon user group (guided versus unguided) are combined; accordingly, for those species, the expansion factors ignore the user group distinction (and are derived by the total SWHS harvest and on-site harvest index regardless of user group)

where $\hat{N}_h$ and $\hat{N}$ are from Equations 26 and 31, respectively for this year's data. We cannot sample in every site or at all ports within an SWHS area, although we assume we are getting a representative sample from each SWHS area.

The variance of $\tilde{H}_h$ will be estimated (Goodman 1960) by user group:

$$\hat{V}\left[\tilde{H}_h\right] = \hat{N}_h^2\, \hat{V}\left[\bar{\pi}_{\psi h}\right] + \bar{\pi}_{\psi h}^2\, \hat{V}\left[\hat{N}_h\right] - \hat{V}\left[\bar{\pi}_{\psi h}\right]\hat{V}\left[\hat{N}_h\right] \tag{48a}$$

or by user group combined:

$$\hat{V}\left[\tilde{H}\right] = \hat{N}^2\, \hat{V}\left[\bar{\pi}_{\psi}\right] + \bar{\pi}_{\psi}^{\,2}\, \hat{V}\left[\hat{N}\right] - \hat{V}\left[\bar{\pi}_{\psi}\right]\hat{V}\left[\hat{N}\right], \tag{48b}$$

where $\hat{V}\left[\hat{N}_h\right]$ and $\hat{V}\left[\hat{N}\right]$ are from Equations 27 and 31, respectively for this year's data; and the $\hat{V}\left[\bar{\pi}_{\psi h}\right]$ and $\hat{V}\left[\bar{\pi}_{\psi}\right]$ terms are the variance for the expansion ratios.

The variance estimates $\hat{V}\left[\bar{\pi}_{\psi h}\right]$ will be derived using parametric bootstrapping (Efron and Tibshirani 1993). For each bootstrap iteration (denoted by subscription *b*), a sample $\hat{H}^*_{hp,b}$ will be drawn from the normal distribution $N(\hat{H}_{hp}, Var(\hat{H}_{hp}))$ for each year *p*. Similarly, a sample $\hat{N}^*_{hp,b}$ will be drawn from the normal distribution $N(\hat{N}_{hp}, Var(\hat{N}_{hp}))$ for year *p*. A ratio estimate $\hat{\pi}^*_{hp,b}$ will then be calculated for each year *p* using equation:

$$\hat{\pi}^*_{hp,b} = \frac{\hat{H}^*_{hp,b}}{\hat{N}^*_{hp,b}}. \tag{49}$$

The statistic of the average 5-year ratio $\bar{\pi}^*_{h,b}$ will be calculated by:

$$\bar{\pi}^*_{h,b} = \frac{\sum_{p=1}^{z} \hat{\pi}^*_{hp,b}}{z}. \tag{50}$$

After a large number ($B \geq 10{,}000$) of bootstrap iterations are conducted, the variance estimates of the 5-year ratios will be calculated as the sample variance of the *B* iterations of $\bar{\pi}^*_{h,b}$ using equation:

$$\hat{V}\left[\bar{\pi}_{\psi h}\right] = \frac{\sum_{b=1}^{B} (\bar{\pi}^*_{h,b} - \hat{\bar{\pi}}^*_h)}{B-1} \tag{51}$$

where $\hat{\bar{\pi}}^*_h$ is the average of $\bar{\pi}^*_{h,b}$.

The variance estimates $\hat{V}\left[\bar{\pi}_{\psi}\right]$ of the user group combined can be calculated in the same way by replacing the corresponding variables in equations (49) through (51) with the variables from the user group combined.

Composition of Harvest Estimates (Secondary objective 12)

The SWHS does not provide individual species estimates for rockfish. However, a preliminary estimate and variance of harvest can be applied by substituting $\widehat{N}_{sh}$ in for $\widehat{N}_h$ in Equations 26 and 27 where $\widehat{N}_{sh}$ is the estimate of harvest of the species s in stratum h of interest as calculated by this project. The expansion ratio $\bar{\pi}_h$ will be that which is used for the entire species or species grouping. For rockfish it will be the port/location specific expansion ratio for all rockfish harvest combined.

For instances where a final harvest estimate is desired using the composition from this program and the harvest estimate from the SWHS program (which is publish over a year after harvest has occurred), then one may calculate estimates in the following manner.

Let $\hat{N}_{sh}$ be the individual harvest index value (i.e. from Equation 26) for species or stock group *s*, *stratum h*; and *S* is the total number of different s groups for the appropriate overall total harvest. $\hat{V}\left[\hat{N}_{sh}\right]$ is calculated per Equation 27 for the corresponding s group.

Let $\hat{\delta}_{sh}$ be the estimated proportion of the particular s group within each SWHS Survey Area which can be calculated as:

$$\hat{\delta}_{sh} = \frac{\hat{N}_{sh}}{\sum_{s=1}^{S} \hat{N}_{sh}}, \tag{52}$$

The variance of $\hat{\delta}_{sh}$ calculated approximately using parametric boot strapping (Efron and Tibshirani 1993). For each of at least 10,000 iterations of the bootstrap simulation (denoted by the subscript b) a sample N_b^* will be drawn from the normal distribution$\sim N\left(\widehat{N}_{sh}, \hat{V}\left(\widehat{N}_{sh}\right)\right)$, and a sample $N_{sum,b}^*$ will be drawn from the normal distribution $\sim N(\sum \widehat{N}_{sh}, \hat{V}\left(\sum \widehat{N}_{sh}\right))$ For each iteration the statistic:

$$\delta^* = \frac{N_b^*}{N_{sum,b}^*} \tag{53}$$

will be computed. The variance of $\hat{\delta}_{sh}$will be estimated by the sample variance of the 10,000 δ^* simulated values. For species that make up a large percentage of harvest, harvest of species is positively correlated with harvest of all rockfish. In this instance this method may overestimate the variance.

This proportion can be applied to the SWHS Harvest estimate and the variance calculated by the formula by Goodman (1960) for the variance of a product of random variables:

$$\hat{V}\left(\widehat{N}_{s,swhs}\right) = \hat{\delta}_{sh}^2 \hat{V}\left(\widehat{N}_{swhs}\right) + \hat{V}\left(\hat{\delta}_{sh}\right)\widehat{N}_{swhs}^2 - \hat{V}\left(\hat{\delta}_{sh}\right)\hat{V}\left(\widehat{N}_{swhs}\right) \tag{54}$$

Midseason Projections

Midseason projections for the yearly end-of-season preliminary values are estimated in a similar manner as described for the **Yearly Preliminary Estimates**, with the additional step of expanding

the data and estimates through the end of the appropriate midseason period by historical ratios for the midseason period to the total yearly estimate. For example, if by July 31st, *Y*% of the harvest of yelloweye rockfish has historically occurred before that date, then the harvest index for yelloweye rockfish through the beginning of August would then be expanded upwards by multiplying by the factor of "*100/Y*". Then the equations above (45 through 54) would be applied to this expanded projection of the end-of-season on-site harvest index to obtain the end-of-season 2018 preliminary value. Because these values are used for inseason management milestones at this time, the midseason estimates will be calculated without corresponding estimates of the variances.

Preliminary Yearly Total Sport Harvest of Chinook and Coho Salmon (Primary Objectives 1a and 2a)

The preliminary yearly total sport harvest of Chinook and coho salmon for SEAK will be estimated by the following step-wise process (implemented separately for each species):

1) Estimates of the harvest index for each user group (guided versus unguided) for each port will be calculated using Equation 26, with corresponding variances approximated by Equation 27.

2) The user group harvests will be summed across type (guided plus unguided) for each port, with the variances for these sums approximated by summation (an approximation because the 2 parameters are not estimated independently) using Equation 31.

3) The estimates for SWHS Survey Areas with more than 1 sampled port will be combined by summation and therefore the estimates for Petersburg and Wrangell will be combined to obtain 1 overall harvest index for SWHS Survey Area C; and Gustavus and Elfin Cove estimates will be combined for SWHS Survey Area G. The corresponding variances will also be summed using Equation 31.

4) Next, each SWHS Survey Area's harvest index will be expanded by the most recent 5-year expansion factor ratios for the following areas: Area A = Ketchikan, Area B = Craig-Klawock, *but note below about the east and west sides of Prince of Wales Island*, Area C = Petersburg-Wrangell, Area D = Sitka, Area E = Juneau, Area G = Gustavus-Elfin Cove, and Area H = Yakutat as outlined in Equation 47 (for Chinook and coho user groups are combined). Variances will be calculated as noted in Equations 48 through 49.

   In the Ketchikan area, the expansion factor calculation will take into account harvests from the east side of Princes of Wales Island (a portion of SWHS Survey Area B) because much of the harvest in this area is taken by anglers accessing the fishery from the Ketchikan road system. Similarly, this same portion of SWHS Survey Area B has been "removed" from the expansion factor calculation for expanding the Craig-Klawock harvests.

5) In the next step, each of these expanded projections for the current year's SWHS preliminary values will be summed over each SWHS Survey Area (A through E, G, and H), with variances summed as well.

6) The final step will be to adjust for SWHS Survey Area F (Haines-Skagway), which historically has a low overall Chinook and coho salmon harvest; this expansion comes from the ratio of the percentage of harvest by each species in Area F to the total of SWHS SEAK harvest estimates (SWHS Survey Areas A through H). So, for example, if the Area F harvest of Chinook salmon represents *Y*% of the total SEAK harvest, then the total current

year's preliminary harvest value for all areas except F would be expanded by dividing by "1-(Y/100)" (e.g., if Y% = 4%, then divide the summation obtained in Step 5 by 0.96). The end result will represent the total preliminary yearly value of the harvest by each species. The variance from Step 5 would be multiplied by the square of the expansion (e.g., $(1/0.96)^2$ in the example above) to get the variance of this total (with the standard error equal to the square of the variance).

Hatchery and Non-hatchery Contributions for Chinook and Coho Salmon (Primary Objectives 1b and 2b)

Estimates of the relative and preliminary total harvest contributions of hatchery and nonhatchery CWT-tagged Chinook salmon stocks (Primary Objective 1b) and coho salmon stocks (Primary Objective 2b) will be calculated in a stepwise manner as follows, implemented separately for each species, and each tag code or combinations of tag code (e.g., all Alaska hatchery codes):

1) Estimates of the relative contribution by tag code or combination of tag code will be calculated as outlined in Equation 38, with the variance calculated as in Equation 44. These estimates are calculated with statistics combined across ports that are within the same SWHS Survey Areas in the same grouping manner as described above. The relative contribution estimates by port (or combined port) correspond to the objective criteria listed for Primary Objectives 1b and 2b.

2) For the preliminary total harvest by tag code or combination of tag code estimates of preliminary total harvest by species will be entered into equations 34-43 and estimates and variances calculated accordingly

3) The total contribution estimates by tag code or combined tag code for each species over all survey areas will be obtained by summation across SWHS Survey Areas in a similar manner as described above for the Preliminary Yearly Total Sport Harvest, with variances obtained by summation.

Pacific Salmon Treaty Harvest (Secondary Objective 1)

An *approximation* of the projected Pacific Salmon Treaty harvest (Chinook salmon) can be estimated for SEAK by estimates produced by this project. The term approximation is used since the projected Pacific Salmon Treaty harvest involves allocating harvest referred to as "add on" across different gear types. Therefore, the preliminary and final estimate of PST harvest is only calculated by John Carlisle, (Fishery Scientist) and Randy Petersen, (Biometrician) located at the Division of Commercial Fisheries at ADF&G Headquarters. the calculation involves taking the total estimated harvest and subtracting off the lower 90% CI bound of the AK hatchery contribution then that approximation may be used.

Justification and steps for calculating the early season (late April through mid-July) Pacific Salmon Treaty harvest for DCF Salmon Districts 108 (Petersburg/Wrangell) and 111 (Juneau), follows. Note that in both cases, due to the nature of this information need for addressing Pacific Salmon Treaty requirements inseason, no estimates of variance are required at this time.

DCF Salmon District 108

The Pacific Salmon Treaty requires the U.S. delegation (and in this case, Alaska in particular) to provide weekly estimates of the number of wild Stikine River large (≥28 in) Chinook salmon harvested in District 108 by both sport and commercial fishermen during late April to mid-July.

Large Chinook salmon sport harvest in District 108 is sampled onsite at the ports of Petersburg (north end of District 108) and Wrangell (south end of District 108), and the onsite technicians summarize the District 108–specific information as part of their weekly paperwork. Recoveries of CWTs from large Chinook salmon in District 108 areas from the weekly sport fisheries are used to estimate the relative contribution of Alaska and non-Alaska hatchery fish, and non-Alaska wild fish. The total Alaska wild large Chinook salmon harvest is estimated by subtracting the estimated number of Alaska and non-Alaska hatchery fish, and non-Alaska wild fish from the estimated total harvest. The most recent, available 5-year average[28] of the expansion factor for each port is applied to the relative estimates to project the total harvest of District 8 large Chinook salmon.

DCF Salmon District 11

The Pacific Salmon Treaty requires the U.S. delegation (and in this case, Alaska in particular) to provide weekly estimates of the number of wild Taku River large (≥28 in) Chinook salmon harvested in District 111 by both sport and commercial fishermen during late April to early July. Large Chinook salmon harvested in District 111, which includes the majority of the Juneau-area marine waters, are sampled onsite at the port of Juneau. In addition to the docks and boat launches sampled during mid-April to the end of May, the unique shoreline Chinook salmon fishery at Picnic Cove on the north end of Douglas Island is sampled as it occurs in District 111. The District 111 harvest information is the majority of the entire harvest encountered by onsite personnel in Juneau, so the data are examined and any Chinook salmon information from outside of District 111 is excluded. Recoveries of CWTs from large Chinook salmon from District 111 areas from the weekly sport fisheries are used to estimate the relative contribution of Alaska and non-Alaska hatchery fish, and non-Alaska wild fish. The total wild large Chinook salmon harvest is estimated by subtracting the estimated number of Alaska and non-Alaska hatchery fish, and non-Alaska wild fish from the estimated total harvest. A separate expansion factor for Juneau is used to expand the projected total harvest estimates for District 111.

Average Weight Estimates (Primary Objective 3) and Length Composition (Secondary Objective 6) of Pacific Halibut

Estimates of the mean net weights of halibut harvested at all sampled ports will be made by first converting each length measurement to net weight using the IPHC length-weight relationship:

$$\hat{W}_{hijko} = \alpha\, L_{hijko}^{\beta}, \tag{55}$$

where $\widehat{W}_{hijko}$ is the estimated net weight in pounds of each fish *o* in the *k*th sampled boat party's bag, at access location *j*, on the sampled day *i* for each user group *h* (guided versus unguided), the L_{hijko} is the fork length in centimeters for each halibut measured, and α and β are the estimated regression parameters for the length-to-weight conversion model endorsed by the IPHC (Clark 1992), with α = 6.921 x 10^{-6} and β = 3.24. In this approach, the individual lengths for each fish are converted to weights rather than applying the conversion to a mean length as per the recommendations by Nielsen and Schoch (1980). No correction will be made for transformation bias because the length-weight relationship was based on a large sample and the residual variance is extremely small (William Clark, Quantitative Scientist, IPHC, Seattle WA, personal communication). Mean weight estimates are presented in pounds rather than kilograms because

[28] For purposes of this plan (and germane to both Districts 108 and 111), the analyses was based on the 2011 – 2015 data; in subsequent years, the most recent 5-year time period will be used.

that is the standard unit used by halibut management agencies. The mean weight estimates by user group for each port or combined ports within each SWHS Survey Area are then calculated by substituting the converted weight values ($\hat{W}_{hijko}$) for the y_{hijko} term in Equation 25 resulting in the average net weight by user group at each port or combined port (the combined port estimates are produced by treating each access location at each port as if they were separate access locations in the combined port in the multistage calculations). The estimated variances for these averages will be approximated by a similar substitution into Equation 29, with standard errors calculated as the square root of the variances.

Average Weight and Preliminary Biomass Estimates of Lingcod (Primary Objective 4 and Secondary Objective 9)

The average round weight estimates for lingcod by user group (guided versus unguided) and user group combined for the ports of Sitka, Ketchikan, Craig-Klawock, Gustavus, Elfin Cove, and Yakutat will be calculated in the same manner as described above for the average weight of halibut. The corresponding estimates for the regression parameters are α = 7.9 x 10^{-6} and β = 3.07 for round weight in kilograms, with total length measured in centimeters for use in Equation 56. The values for α and β are those used by the DCF (Dave Carlile, Herring and Groundfish Biometrician, ADF&G Juneau, personal communication, Jan 5, 2000). The mean weight estimates by user group and in total for each port or combined ports within each SWHS Survey Area are then calculated by substituting the converted weight values for the y_{hijko} term in Equation 25; the combined port estimates are produced by treating each access location at each port as if they were separate access locations in the combined port in the multistage calculations. The estimated variances for these averages will be approximated by similar substitution into Equation 29, with standard errors calculated as the square root of the variances.

The preliminary biomass estimate for each SWHS Survey Area will then be estimated by multiplying the average weights for each port (or combined ports within each SWHS Survey Area) by the corresponding preliminary harvest estimate (by user group and user group combined), as follows:

$$\tilde{W}_h = \overline{w}_h \tilde{H}_h \quad \text{and} \quad \tilde{W} = \overline{w}\, \tilde{H} \tag{56}$$

where $\overline{w}_h$ and $\overline{w}$ are the average weight estimates by user group and by user group combined as calculated by Equation 25 (with weight substituted for "*y*"); and $\tilde{H}_h$ and $\tilde{H}$ are equal to the preliminary harvest of lingcod in numbers of fish for each user group and user group combined as obtained by Equation 47. The variance of the estimated biomass will be calculated by the equation of Goodman (1960) as follows:

$$\hat{V}\left[\tilde{W}_h\right] = \overline{w}_h^2\, \hat{V}\left[\tilde{H}_h\right] + \hat{V}\left[\overline{w}_h\right] \tilde{H}_h^2 - \hat{V}\left[\tilde{H}_h\right] \hat{V}\left[\overline{w}_h\right] \text{ and} \tag{57a}$$

$$\hat{V}\left[\tilde{W}\right] = \overline{w}^2\, \hat{V}\left[\tilde{H}\right] + \hat{V}\left[\overline{w}\right] \tilde{H}^2 - \hat{V}\left[\tilde{H}\right] \hat{V}\left[\overline{w}\right] \tag{57b}$$

where $\hat{V}\left[\overline{w}_h\right]$ and $\hat{V}\left[\overline{w}\right]$ are from Equation 29; and $\hat{V}\left[\tilde{H}_h\right]$ and $\hat{V}\left[\tilde{H}\right]$ are from Equations 48a and48b, respectively.

Rockfish Species Composition, Average Weight Estimates, and Preliminary Biomass Removals of Demersal Shelf Rockfish (Primary Objective 5 and Secondary Objectives 12a and 12b)

Species Composition of Rockfish

The species composition of rockfish will be estimated as proportions of the rockfish harvest at each port ($\hat{p}_{sg}$) (or combined ports within a SWHS Survey Area) and calculated as outlined in Equation 52, with corresponding variances from Equation 54.

Average Weight of Rockfish

The average weight for each rockfish species and species grouping by user group $\overline{w}_{sh}$will be estimated as described above for halibut and lingcod. The parameters for converting lengths to weight were developed for major species in the harvest from paired length and weight data (sexes combined) collected by this project during 2006 and 2007. Parameters for species or species groups with low sample sizes are obtained from the fisheries literature (Table 7).

The preliminary harvest biomass of DSR by user group in the Southeast Outside District (Craig, Sitka, Gustavus, Elfin Cove, and Yakutat combined) and variances will be estimated as described above for lingcod, by applying Equations 56 through 57a and 57b to the corresponding terms for each individual DSR species separately. In applying these equations, the terms $\tilde{H}_h$ and $\hat{V}\left[\tilde{H}_h\right]$ will be replaced by the corresponding values for each DSR species; i.e., $\tilde{H}_{sh}$ and $\hat{V}\left[\tilde{H}_{sh}\right]$ as calculated in Equations 52 and 54, respectively. The preliminary estimate of the harvest biomass of all DSR species will be calculated as the sum of the individual harvest biomass estimates of each DSR species within each user group and across the corresponding ports. The overall variance will similarly be obtained by summation across the species and port values.

Table 7.–Coefficients for estimating round weight in kilograms from total length in centimeters for rockfish species to be employed in Southeast Alaska rockfish weight evaluation from sport fisheries.

Species or groups with large sample sizes	α	β	Species or groups with small sample sizes	α	β
Black	0.000109	2.495	Silvergrey	0.000060	2.586
Bocaccio	0.000057	2.614	Tiger	0.000030	2.839
Canary	0.000112	2.472	Vermilion	0.000183	2.373
China	0.000066	2.643	Yellowtail	0.000075	2.539
Copper	0.000011	3.099	Dark	0.000047	2.729
Dusky	0.000039	2.737	Other pelagic	0.000084	2.559
Quillback	0.000033	2.820	Other demersal	0.000025	2.892
Rougheye	0.000010	3.103	Other slope	0.000037	2.726
Shortraker	0.000048	2.724			
Yelloweye	0.000024	2.902			

Preliminary Estimation of Release Mortality Biomass

To achieve Secondary Objective 12b, the biomass of the rockfish harvest and release mortality must be estimated. Release mortality rates are defined as the proportion of released fish that die in the short term as a result of injuries associated with capture, handling, and release. Like the preliminary estimate of the harvest biomass, preliminary estimates of release mortality biomass,

or just simply release biomass $\widehat{RB}_{sh}$, will be calculated as the sum of the individual mortality biomass estimates by each of the DSR species within each user group and across the corresponding ports. The overall variance will similarly be obtained by summation across the species, port, and user group values.

Release mortality biomass is based on the product of the estimated average weight of a species by user group $\bar{w}_{sh}$, the estimated discard mortality rate $\hat{d}_{sh}$, and the estimated number of fish of that species released by user group $\hat{R}_{sh}$. The average weight by species by user group is estimated by this project using Equations 25–33 from harvested fish and it is assumed that they represent released fish. Discard mortality rates are based on the fisheries literature. Rates differ by user group because all nonpelagic rockfish released by guided anglers are required to be released using a deep-water release (recompression) device. Nonguided anglers are currently not required to release rockfish using deep-water release devices and their release mortality rate is assumed to be 100%. The number of releases of a species is not observable by technicians and comparisons of creel and logbook data indicate that releases are not always captured in creel interviews. So for both guided and unguided anglers, the release rate by species or species grouping ($\hat{r}_s$) will be the maximum of either the value from charter logbooks or creel data. The estimated number of releases will be determined as follows:

$$\hat{R}_{sh} = \tilde{H}_{sh}\frac{\hat{r}_s}{1-\hat{r}_s}. \tag{58}$$

This equation is derived by solving the equation for release rate (*r*) below for number of releases (*R*) and observed harvest (H):

$$\hat{r}_s = \frac{R_s}{H_s+R_s}. \tag{59}$$

The variance of $\hat{R}_{sh}$ will be calculated as the product of variances via Goodman's equation (1960). The variance of $\frac{\hat{r}_s}{1-\hat{r}_s}$ will be simulated via bootstrapping as outline in Efron and Tibshirani (1993):

$$V(\hat{R}_{sh}) = (\tilde{H}_{sh})^2 V\left(\frac{\hat{r}_s}{1-\hat{r}_s}\right) + V(\tilde{H}_{sh})\left(\frac{\hat{r}_s}{1-\hat{r}_s}\right)^2 - V(\tilde{H}_{sh})V\left(\frac{\hat{r}_s}{1-\hat{r}_s}\right). \tag{60}$$

Release mortality biomass $\widehat{RB}_{sh}$ by species or species grouping and user group will be estimated as follows:

$$\widehat{RB}_{sh} = \bar{w}_{sh}\hat{d}_{sh}\hat{R}_{sh} \tag{61}$$

Variance of $\widehat{RB}_{sh}$ will be found by iteratively using Goodman's equation (1960). The variance of the $\bar{w}_{sh}\hat{d}_{sh}$ product is found first:

$$V(\widehat{wd}_{sh}) = (\bar{w}_{sh})^2 V(\hat{d}_{sh}) + V(\bar{w}_{sh})(\hat{d}_{sh})^2 - V(\bar{w}_{sh})V(\hat{d}_{sh}). \tag{62}$$

Then the release biomass variance $V(\widehat{RB}_{sh})$ is determined by finding the variance of the $\widehat{wd}_{sh}\hat{R}_{sh}$ product:

$$V(\widehat{RB}_{sh}) = V(\widehat{wd}_{sh}\hat{R}_{sh}) = (\widehat{wd}_{sh})^2 V(\hat{R}_{sh}) + V(\widehat{wd}_{sh})(\hat{R}_{sh})^2 - V(\widehat{wd}_{sh})V(\hat{R}_{sh}) \tag{63}$$

Age, Sex, and Length Composition of Black Rockfish (Primary Objective 6)

Estimates of age, and sex and length will be calculated using Equation 25 with variance calculated using Equation 29.

Weekly Harvest per Unit Effort of Chinook, Coho, Chum, and Pink Salmon, and Pacific Halibut (Secondary Objective 5)

Values of HPUE will be calculated as unweighted means because the objectives are primarily directed at providing information as a measure of the hours necessary to harvest the species in question (Secondary Objective 5). This objective is directed at providing information to the stakeholders involved, which are the general angling public. The measures of HPUE are summarized as weekly values (Secondary Objective 5) and the impact from not weighting is expected to be relatively minor, although the validity of this assumption will be evaluated during the postseason data analysis. The calculation process for the unweighted HPUE values first involves obtaining the mean HPUE for all rods fished in each interviewed boat party (creel samples only):

$$\overline{HPUE}_{hijk} = \frac{N_{hijk}}{e_{hijk} v_{hijk}} \tag{64}$$

where N_{hijk} is as defined previously (see Equation 5), e_{hijk} is the targeted[29] effort (boat-hours) of each interviewed boat party, and v_{hijk} is the targeted number of rods fished by the interviewed boat party.

Then, the mean HPUE for each week will be obtained over all boat parties interviewed within each of the corresponding periods:

$$\overline{HPUE}_{p} = \frac{\sum_{h=1}^{L} \sum_{i=1}^{d_p} \sum_{j=1}^{q_i} \sum_{k=1}^{b_{hij}} \overline{HPUE}_{hijk}}{\sum_{h=1}^{L} \sum_{i=1}^{d_p} \sum_{j=1}^{q_i} b_{hij}} \tag{65}$$

where all terms are as defined previously in this plan (however, d_p is defined as only including the days sampled within each corresponding period p). Because these values are used informational purposes only, the mean HPUE estimates will be calculated without corresponding estimates of the variance.

Proportion of Pacific Halibut Harvested by Unguided Anglers Prior to Mean IPHC Survey Date (Secondary Objective 8)

The proportion of the Pacific halibut harvested by unguided anglers prior to the mean IPHC survey date will be as follows for each port (or combined port):

$$\hat{p}_{u(d<\overline{ID})} = \frac{\hat{N}_{u(d<\overline{ID})}}{\left(\hat{N}_{u(d<\overline{ID})} + \hat{N}_{u(d\geq\overline{ID})}\right)} \tag{66}$$

[29] Boat-hours are recorded as fishing for salmon versus fishing for groundfish. The HPUE for Chinook and coho salmon will be calculated using the "salmon-hours" and the HPUE for halibut will use the "groundfish-hours."

where $\hat{p}_{u(d<\overline{ID})}$ is the proportion of the halibut harvest index for the unguided component[30] of the fishery for the date *d* less than the mean IPHC survey date ($\overline{ID}$), $\hat{N}_{u(d<\overline{ID})}$ is the harvest index using creel samples only for the unguided component prior to the mean IPHC survey date (as previously noted the mean date will be provided by IPHC) at each port by using Equation 26 on this restricted data set, and $\hat{N}_{u(d\geq\overline{ID})}$ is the unguided harvest index for dates greater than or equal to the mean IPHC survey date (again from Equation 26 on those restricted dates). The variance of $\hat{p}_{u(d<\overline{D})}$ will be calculated approximately as (adapted from Mood et al. 1974):

$$\hat{V}\left[\hat{p}_{u(d<\overline{ID})}\right] \approx \frac{\left(\hat{N}_{u(d<\overline{ID})} + \hat{N}_{u(d\geq\overline{ID})}\right)^2 \hat{V}\left[\hat{N}_{u(d\geq\overline{ID})}\right] + \hat{N}^2_{u(d\geq\overline{ID})}\,\hat{V}\left[\hat{N}_{u(d<\overline{ID})}\right]}{\left(\hat{N}_{u(d<\overline{ID})} + \hat{N}_{u(d\geq\overline{ID})}\right)^4} \qquad (67)$$

where the corresponding variance terms are calculated from Equation 27 on the 2 sets of data restricted by date.

The survey dates at each port are expected to cover the most, but not all, of the unguided halibut harvest. Accordingly, the proportions estimated by Equation 66 may be slightly biased.

Yearly Midseason Projection of Preliminary Lingcod and Yelloweye Rockfish Harvested (Secondary Objective 10)

A midseason (through the beginning of August) projection of the annual yearly preliminary harvest of lingcod and yelloweye rockfish associated with the SWHS Survey Areas covered by the ports of Sitka, Ketchikan, Craig-Klawock, Gustavus, Elfin Cove, and Yakutat will be made by the procedures outlined in the **Midseason Projections** section above. The weekly summaries of lingcod and yelloweye rockfish harvest will be summed through August 2 and compared to a similar sum from past years. This comparison will be used to evaluate whether or not the total harvest of yelloweye rockfish and lingcod will be greater or less than in recent years.

Estimates of the Proportion for Chinook Salmon, Rockfish, Pacific Halibut, and Lingcod (Secondary Objective 7, 13, 14)

The proportion of catch of Chinook salmon (both <28 in TL and ≥28 in TL), rockfish (yelloweye, other DSR, slope, and pelagic), halibut, and lingcod released by the sport fishery at each port (or combined port within a SWHS Survey Area, secondary objective 14) will be calculated as outlined above for the intrinsic 4-stage cluster estimating equations using a coded version of the observed catch from creel samples only. Specifically, each fish reported caught (both the harvest and the reported number of fish released) by species or species grouping for each interviewed boat party will be coded as a "1" for a released fish, and a "0" for a harvested (kept) fish, per Equation 2. Then these coded values will be used in Equation 25 to obtain the estimated proportion of fish released. The corresponding variance will be calculated by substituting the coded values into Equation 29. Across–user group overall estimates of the proportion released and the associated variance will then be calculated per Equations 32 and 33. In applying Equations 25, 29, 32, and 33, both the 4-stage cluster sampling weights and the stratum weights will be calculated using the numbers of fish for each species or species group that were caught (including numbers harvested, plus number released) instead of the numbers harvested. So the numbers caught (c_{hijk}) will be

[30] The subscript *u* represents unguided and does not reference the tag code terms *U* or *u* as referenced previously in this plan in Equation 38.

substituted for the n_{hijk} terms in these equations. Logbook data is used to calculate release percentage for rockfish biomass estimates.

The proportion of released halibut by reverse slot limit category (secondary objective 7) will be calculated using the same 4-stage equations noted above calculating each of the 3 groups separately: a) length ≤ lower slot, b) length between lower and upper slots, c) length ≥ upper slot and coded as "1" in release category, and "0" not in release category. Only creel technician data will be used as catch technicians do not record releases.

The proportion of unguided vessels that utilize a deep-water release device (secondary objective 13) for at least one released rockfish on a given trip will also be calculated using the same 4-stage equations noted above coded as "1" for device used and "0" for device not used. Only creel technician trips where rockfish are released and where the technician noted they asked the anglers if they utilized a device or not will be included.

SCHEDULE AND DELIVERABLES

Field activities associated with surveying the marine boat sport fisheries will occur from 23 April to 09 September 2018. Weekly summaries of harvest rates will be produced for the 2013–2017 seasons and will be posted on the Division of Sport Fish website.

Data editing and analysis activities will be initiated in early May each year. Projections of treaty Chinook salmon harvests will be made 2 times. The midseason estimate of the treaty Chinook salmon harvest will be an inseason projection produced yearly by late June (covering the 23 April to 15 July time period) for use in helping manage the commercial fisheries to obtain the overall Pacific Salmon Treaty quota for Southeast Alaska

During August-September, after the latest SWHS final numbers are produced, staff will calculate the mean 5-year expansion factor values from the Marine Harvest Studies Project to the SWHS by port for estimates of the current years preliminary SWHS values.

Final error correction, reduction, and analysis of each year's survey data will be completed by the third week of October. Postseason preliminary estimates of the SEAK harvest of Chinook and coho salmon for the season will be produced by the end of October each year.

All cinch-strapped salmon heads will be submitted to the Tag Lab by the end of September each year. Final decoding of the tag recoveries for CWT-tagged salmon will be completed by mid-October each year. Contribution estimates to the fisheries will be completed by early November each year.

All Pacific halibut length data will be corrected by the first of October each year. Mean weight estimates and estimated proportion of unguided harvest prior to the mean IPHC survey date will be provided by the second week of October each year. Scales from Chinook salmon will be read by the following mid-January each year. Age composition and length-at-age estimates for Chinook salmon will be produced by the following mid-February each year.

All the Chinook salmon genetic samples collected during the creel survey season will be sent to the ADF&G, CF Gene Conservation Laboratory by early October each year. Information on the age composition of the sampled Chinook salmon will be provided to the ADF&G, CF Gene Conservation Laboratory by the following mid-February each year. Report writing will be initiated in early December each year and a draft report will be provided by April each following year. The

draft report will document the yearly preliminary values associated with each of the objectives for this project at that time. Following the completion of final estimates from the SWHS for each of the years, anticipated by August-September, a draft report for this project will be updated to include final estimates for each of this project's objectives. The final draft will be submitted for regional review by the following November 30 each year, followed by submission for publication as an ADF&G Fishery Data Series Report.

The deliverable products along with milestone dates are summarized in Table 8, with additional details.

The computer files associated with analyzing the creel survey data (e.g., the SAS data and program files, and auxiliary files) will be archived when the report is finalized (see Appendix B1). A draft operational plan for the 2019 field season will be produced by 18 March 2019.

Table 8.–Yearly deliverable product schedule for the Southeast Alaska Marine Boat Sport Fishery Harvest Studies project in 2018.

When	Product	To whom	Title
May–early July	DCF Salmon Districts 108 & 111 wild Chinook salmon harvest estimates	Ed Jones	Fish and Game Coordinator
Late June	Projected Chinook salmon harvest prior to July 1, 2018 commercial troll opening	Grant Hagerman and Judy Lum	Comm. Fish Troll Biologist & Region 1 Supervisor
Early August	Midseason preliminary projections of rockfish and lingcod harvest in outside districts	Bob Chadwick	Region 1 Management Coordinator
Mid October	Preliminary projected postseason Chinook harvest & CWT info	Grant Hagerman and Judy Lum	Comm. Fish Troll Biologist & Region 1 Supervisor
Mid October	Preliminary projected inseason coho salmon harvest	Leon Shaul & Judy Lum for PSC	Comm. Fish Coho Biologist & Region 1 Supervisor
Mid October	Average halibut weights, proportion of unguided harvest prior to mean IPHC survey date.	Sport Fish statewide groundfish coordinator & IPHC	Statewide Groundfish Coordinator – Division of Sport Fish
October	Average DSR weights & total biomass removal estimates (harvest and release)	Bob Chadwick & Andrew Olson	Region 1 Management Coordinator & Comm. Fish Groundfish manager
Mid November	Final projected post season Chinook salmon harvest & CWT info	Grant Hagerman and Judy Lum	Comm. Fish Troll Biologist & Region 1 Supervisor
Mid November	Final projected inseason coho harvest	Leon Shaul & Judy Lum for PSC	Comm. Fish Coho Biologist & Region 1 Supervisor
November	Biweekly sampling rate	Sara Gilk-Baumer	ADF&G, DCF Gene Conservation Laboratory coordinator
January (of following year)	Average lingcod weights & biomass harvest estimates	Bob Chadwick	Region 1 Management Coordinator
January (of following year)	Age composition of Chinook salmon stocks	Ed Jones	Fish and Game Coordinator
November (of following year)	Draft FDS report for project incorporating SWHS estimates	Jeff Nichols	Region 1 Regional Research Coordinator

RESPONSIBILITIES

Michael Jaenicke, Fishery Biologist III

Duties: Coordinates all aspects of the project. Assists biometrician with study design and schedule generation. Performs and coordinates data analyses in conjunction with biometrician. Lead author of final report and provides inseason data to appropriate personnel. Provides support and advice to direct supervisors of the project personnel.

Diana Tersteeg, Research Analyst II

Duties: Performs data analyses in conjunction with project leader and biometrician. Responsible for oversight of continued development and maintenance of the handheld computer data entry software and SQL database. Design and write programs or queries using various statistical software packages such as SAS or database programs. Create statistically valid reports and technically detailed tables and figures necessary to meet the annual reporting requirements of the program. Provides assistance with operational planning and report writing.

Matt Catterson (Yakutat), Dan Teske (Juneau), Patrick Fowler (Petersburg-Wrangell), Craig Schwanke (Craig-Klawock), and Kelly Reppert (Ketchikan), Fishery Biologist III

Duties: Performs day-to-day oversight, supervision, and logistics of onsite creel sampling personnel at local port(s). Coordinates shipment of heads and data to Juneau office.

David Love (Juneau), Jason Pawluk (Sitka), Fishery Biologist II

Duties: Performs day-to-day oversight, supervision, and logistics of onsite creel sampling personnel at Juneau, Gustavus, and Elfin Cove (Love) and Sitka (Pawluk).

Michael Wood, Fisheries Technician IV.

Duties: In Ketchikan performs day-to-day oversight, supervision, and logistics of onsite creel sampling personnel at Ketchikan. Coordinates shipment of heads and data to Juneau office.

Craig Monaco, Fisheries Technician III,

Duties: As crew leader in Sitka, helps supervise and train creel survey personnel in addition to checking and editing data. Coordinates shipment of heads and data to Juneau office, assist in schedule generation, derby sampling, and other office activities.

Jiaqi Huang, Biometrician II

Duties: Provides input in sampling design and allocation, and designs scheduling procedures and incorporates into operational plan. Provides procedures for calculation of estimates and standard errors. Assist in report writing. Also reviews operational plan and final report.

Bruce Kruger, Mary Jo Lord-Wild, and Allen Hoffman, Fisheries Technician III

Duties: Conduct catch sampling in remote locations as schedule dictates and provide summaries of data on a weekly basis. In addition, notes potential sampling problems and advise on possible solutions.

Fisheries Technician II's and III's

Duties: Conduct creel or catch sample surveys as schedule dictates and provide summaries of data on a weekly basis.

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APPENDIX A: ESTIMATES OF HARVEST AND RELATIVE PRECISION AND SAMPLE SIZE GOALS

Appendix A1.–Sample size and relative precision for Chinook and coho salmon total harvest observed in 2015 and goals for 2018 by port (Objective 1a and 2a).

Area	Species	Harvested Fish Encountered	Harvested Fish Inspected for Adclips	2015 Harvest Estimate RP[a]	2018 RP Goal
Ketchikan	Chinook	1,851	1,685	45%	50%
	coho	8,670	8,130	43%	50%
Craig-POW	Chinook	4,762	4,709	33%	50%
	coho	14,269	14,200	38%	50%
Petersburg/Wrangell	Chinook	903	804	50%	50%
	coho	892	792	54%	50%
Sitka	Chinook	9,383	6,464	17%	50%
	coho	15,787	9,315	19%	50%
Juneau	Chinook	1,313	1,016	24%	50%
	coho	7,546	6,483	62%	80%
Glacier Bay	Chinook	1,432	1,303	39%	50%
	coho	3,148	2,842	48%	50%
Yakutat	Chinook	221	183	81%	90%
	coho	1,433	1,292	107%	100%
District 108	Chinook	618	552	50%	50%
District 111	Chinook	587	499	24%	50%

[a] RP = Relative Precision for 90% Confidence Interval

Appendix A2.–Relative precision for Chinook and coho salmon total contribution (AK Hatchery and Non-AK Hatchery) observed in 2015 and goals for 2018 by port (Objective 1b and 2b).

Area	Species	2015 AK Hatchery Total Contribution RP[a]	2018 AK Hatchery Total Contribution RP Goal	2015 Non-AK Hatchery Total Contribution RP	2018 Non-AK Hatchery Total Contribution RP Goal
Ketchikan	Chinook	50%	60%	58%	60%
	coho	43%	50%		
Craig-POW	Chinook	51%	60%	38%	60%
	coho	41%	60%	– [b]	– [b]
Petersburg/Wrangell	Chinook	66%	80%	– [b]	– [b]
	coho	83%	90%	– [b]	– [b]
Sitka	Chinook	36%	60%	27%	60%
	coho	35%	60%	– [b]	– [b]
Juneau	Chinook	35%	60%	– [b]	– [b]
	coho	71%	80%	– [b]	– [b]
Glacier Bay	Chinook	76%	80%	53%	60%
	coho	70%	80%	– [b]	– [b]
Yakutat	Chinook	– [c]	– [c]	– [b]	– [b]
	coho	– [c]	– [c]	– [b]	– [b]
District 108	Chinook	67%	60%	– [b]	– [b]
District 111	Chinook	38%	60%	– [b]	– [b]

[a] RP = Relative Precision for 90% Confidence Interval

[b] Relative Precision is not estimated for harvests < 100 fish

[c] Hatchery Contribution in Yakutat is not estimated and therefore there is no goal for Relative Precision

Appendix A3.–Precision for Chinook and coho salmon relative contribution (AK Hatchery and Non-AK Hatchery) observed in 2015 and goals for 2018 by port (Objective 1b and 2b).

Area	Species	2015 AK Hatchery Relative Contribution Precision[a]	2018 AK Hatchery Relative Contribution Precision Goal	2015 Non-AK Hatchery Relative Contribution Precision[a]	2018 Non-AK Hatchery Relative Contribution Precision Goal
Ketchikan	Chinook	11%	15%	2%	5%
	coho	6%	10%	–[b]	–[b]
Craig-POW	Chinook	2%	10%	2%	5%
	coho	7%	10%	–[b]	–[b]
Petersburg/Wrangell	Chinook	16%	20%	2%	–[b]
	coho	21%	25%	–[b]	–[b]
Sitka	Chinook	3%	10%	2%	5%
	coho	5%	10%	–[b]	–[b]
Juneau	Chinook	15%	20%	1%	–[b]
	coho	5%	10%	–[b]	–[b]
Glacier Bay	Chinook	5%	10%	6%	10%
	coho	7%	10%	–[b]	–[b]
Yakutat	Chinook	–[c]	–[c]	–[b]	–[b]
	coho	–[c]	–[c]	–[b]	–[b]
District 108	Chinook	19%	20%	–[b]	–[b]
District 111	Chinook	21%	25%	–[b]	–[b]

[a] Absolute Precision for 90% Confidence Interval

[b] Precision is not estimated for harvests < 100 fish

[c] Hatchery Contribution in Yakutat is not estimated

Appendix A4.–Sample size and relative precision for Pacific halibut observed in 2017 and goals for 2018 by port and angler class.

Port	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Ketchikan	Private	1254	16%	59%	20%	50%
Craig_Klawock	Private	271	14%	24%	20%	20%
Petersburg	Private	513	18%	74%	20%	50%
Wrangell	Private	93	37%	86%	40%	100%
Sitka	Private	121	31%	13%	30%	15%
Juneau	Private	1453	15%	45%	20%	50%
Gustavus	Private	209	18%	34%	20%	30%
Elfin Cove	Private	458	18%	83%	30%	50%
Yakutat	Private	43	33%	10%	20%	40%
Ketchikan	Charter	951	11%	58%	20%	50%
Craig_Klawock	Charter	728	8%	21%	20%	20%
Petersburg	Charter	167	15%	86%	20%	50%
Wrangell	Charter	24	25%	96%	40%	100%
Sitka	Charter	1175	9%	18%	20%	15%
Juneau	Charter	397	21%	62%	20%	50%
Gustavus	Charter	606	15%	33%	20%	30%
Elfin Cove	Charter	595	10%	66%	20%	50%
Yakutat	Charter	227	12%	17%	20%	40%

Appendix A5.–Sample size and relative precision for lingcod observed in 2017 and goals for 2018 by port and angler class.

Port	Angler Class	2017: Number of Fish Sampled	2017: Confidence Interval	2017: Relative Precision	2017: Percent Sampled of Observed Harvest	2018: Confidence Interval	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Ketchikan	Private	96	80	20%	82%	80	25%	100%
Craig_Klawock	Private	186	80	9%	92%	80	20%	90%
Sitka	Private	49	80	36%	42%	80	50%	75%
Gustavus	Private	.	80	.	.	80		100%
Elfin Cove	Private	24	80	20%	96%	80	25%	100%
Yakutat	Private	35	80	14%	97%	80	20%	100%
Ketchikan	Charter	130	90	21%	76%	90	20%	100%
Craig_Klawock	Charter	662	90	11%	96%	90	20%	90%
Sitka	Charter	179	90	12%	39%	90	20%	75%
Gustavus	Charter	22	90	34%	92%	90	20%	100%
Elfin Cove	Charter	67	90	16%	96%	90	20%	100%
Yakutat	Charter	144	90	15%	94%	90	20%	100%

Appendix A6.–Sample size and relative precision for rockfish observed in 2017 and goals for 2018 by species and angler class in the Ketchikan area.

Site	Species	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Ketchikan	Quillback rockfish	Private	325	12%	58%	20	40%
Ketchikan	Copper rockfish	Private	54	25%			100%
Ketchikan	Yelloweye rockfish	Private	227	16%	73%	20	50%
Ketchikan	China rockfish	Private	8	41%			100%
Ketchikan	Tiger rockfish	Private	10	35%			100%
Ketchikan	Canary rockfish	Private	.	.		na	100%
Ketchikan	Rosethorn rockfish	Private	.	.		na	100%
Ketchikan	Dusky rockfish	Private	60	21%			100%
Ketchikan	Black rockfish	Private	68	34%	88%	35	80%
Ketchikan	Quillback rockfish	Charter	400	12%	48%	20	40%
Ketchikan	Copper rockfish	Charter	82	22%			100%
Ketchikan	Yelloweye rockfish	Charter	242	18%	55%	20	50%
Ketchikan	China rockfish	Charter	13	22%			100%
Ketchikan	Tiger rockfish	Charter	24	23%			100%
Ketchikan	Canary rockfish	Charter	3	47%		na	100%
Ketchikan	Rosethorn rockfish	Charter	.	.		na	100%
Ketchikan	Dusky rockfish	Charter	81	23%			100%
Ketchikan	Black rockfish	Charter	658	22%	68%	20	80%

Appendix A7.–Sample size and relative precision for rockfish observed in 2017 and goals for 2018 by species and angler class in the Prince of Wales Island (Craig_Klawock) area.

Site	Species	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Craig_Klawock	Quillback rockfish	Private	67	24%	62%	25	60%
Craig_Klawock	Copper rockfish	Private	39	39%			100%
Craig_Klawock	Yelloweye rockfish	Private	91	23%	67%	20	75%
Craig_Klawock	China rockfish	Private	5	78%			100%
Craig_Klawock	Tiger rockfish	Private	2	22%			100%
Craig_Klawock	Canary rockfish	Private	2	33%			100%
Craig_Klawock	Rosethorn rockfish	Private	2	0%			100%
Craig_Klawock	Dusky rockfish	Private	2	0%			100%
Craig_Klawock	Black rockfish	Private	110	24%	23%	25	10%
Craig_Klawock	Quillback rockfish	Charter	149	19%	53%	20	60%
Craig_Klawock	Copper rockfish	Charter	230	13%			100%
Craig_Klawock	Yelloweye rockfish	Charter	358	19%	73%	20	75%
Craig_Klawock	China rockfish	Charter	31	18%			100%
Craig_Klawock	Tiger rockfish	Charter	6	15%			100%
Craig_Klawock	Canary rockfish	Charter	76	20%			100%
Craig_Klawock	Rosethorn rockfish	Charter	.	.		na	100%
Craig_Klawock	Dusky rockfish	Charter	7	44%			100%
Craig_Klawock	Black rockfish	Charter	257	16%	5%	20	10%

Appendix A8.–Sample size and relative precision for rockfish observed in 2017 and goals for 2018 by species and angler class in the Petersburg area.

Site	Species	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Petersburg	Quillback rockfish	Private	6	35%		na	100%
Petersburg	Copper rockfish	Private	1	0%			100%
Petersburg	Yelloweye rockfish	Private	18	61%			100%
Petersburg	China rockfish	Private	.	.		na	100%
Petersburg	Tiger rockfish	Private	2	0%		na	100%
Petersburg	Canary rockfish	Private	.	.		na	100%
Petersburg	Rosethorn rockfish	Private	.	.		na	100%
Petersburg	Dusky rockfish	Private	75	45%			100%
Petersburg	Black rockfish	Private	1	0%			
Petersburg	Quillback rockfish	Charter	1	0%		na	100%
Petersburg	Copper rockfish	Charter	.	.		na	100%
Petersburg	Yelloweye rockfish	Charter	32	43%			100%
Petersburg	China rockfish	Charter	.	.		na	100%
Petersburg	Tiger rockfish	Charter	.	.		na	100%
Petersburg	Canary rockfish	Charter	.	.		na	100%
Petersburg	Rosethorn rockfish	Charter	.	.		na	100%
Petersburg	Dusky rockfish	Charter	129	29%			100%
Petersburg	Black rockfish	Charter	26	59%			

Appendix A9.–Sample size and relative precision for rockfish observed in 2017 and goals for 2018 by species and angler class in the Wrangell area.

Site	Species	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Wrangell	Quillback rockfish	Private	7	55%		na	100%
Wrangell	Copper rockfish	Private	.	.		na	100%
Wrangell	Yelloweye rockfish	Private	4	43%			100%
Wrangell	China rockfish	Private	.	.		na	100%
Wrangell	Tiger rockfish	Private	.	.		na	100%
Wrangell	Canary rockfish	Private	.	.		na	100%
Wrangell	Rosethorn rockfish	Private	.	.		na	100%
Wrangell	Dusky rockfish	Private	.	.		na	100%
Wrangell	Black rockfish	Private	.	.			
Wrangell	Quillback rockfish	Charter	3	52%		na	100%
Wrangell	Copper rockfish	Charter	1	0%		na	100%
Wrangell	Yelloweye rockfish	Charter	.	.			100%
Wrangell	China rockfish	Charter	.	.		na	100%
Wrangell	Tiger rockfish	Charter	.	.		na	100%
Wrangell	Canary rockfish	Charter	.	.		na	100%
Wrangell	Rosethorn rockfish	Charter	.	.		na	100%
Wrangell	Dusky rockfish	Charter	7	78%		na	100%
Wrangell	Black rockfish	Charter	3	0%			

Appendix A10.–Sample size and relative precision for rockfish observed in 2017 and goals for 2018 by species and angler class in the Sitka area.

Site	Species	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Sitka	Quillback rockfish	Private	41	23%	34%	20	35%
Sitka	Copper rockfish	Private	29	31%			100%
Sitka	Yelloweye rockfish	Private	79	27%	34%	30	25%
Sitka	China rockfish	Private	.	.		na	100%
Sitka	Tiger rockfish	Private	1	0%		na	100%
Sitka	Canary rockfish	Private	13	27%			100%
Sitka	Rosethorn rockfish	Private	.	.		na	100%
Sitka	Dusky rockfish	Private	6	32%			100%
Sitka	Black rockfish	Private	106	32%	16%	30	5%
Sitka	Quillback rockfish	Charter	108	23%	20%	20	35%
Sitka	Copper rockfish	Charter	72	19%			100%
Sitka	Yelloweye rockfish	Charter	311	12%	25%	20	25%
Sitka	China rockfish	Charter	18	37%			100%
Sitka	Tiger rockfish	Charter	6	34%		na	100%
Sitka	Canary rockfish	Charter	76	20%			100%
Sitka	Rosethorn rockfish	Charter	2	34%		na	100%
Sitka	Dusky rockfish	Charter	22	71%			100%
Sitka	Black rockfish	Charter	698	11%	6%	20	5%

Appendix A11.–Sample size and relative precision for rockfish observed in 2017 and goals for 2018 by species and angler class in the Juneau area.

Site	Species	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Juneau	Quillback rockfish	Private	111	18%			100%
Juneau	Copper rockfish	Private	1	0%		na	100%
Juneau	Yelloweye rockfish	Private	40	34%			100%
Juneau	China rockfish	Private	.	.		na	100%
Juneau	Tiger rockfish	Private	.	.		na	100%
Juneau	Canary rockfish	Private	.	.		na	100%
Juneau	Rosethorn rockfish	Private	.	.		na	100%
Juneau	Dusky rockfish	Private	265	21%			100%
Juneau	Black rockfish	Private	27	38%			100%
Juneau	Quillback rockfish	Charter	38	31%			100%
Juneau	Copper rockfish	Charter	.	.		na	100%
Juneau	Yelloweye rockfish	Charter	6	74%			100%
Juneau	China rockfish	Charter	.	.		na	100%
Juneau	Tiger rockfish	Charter	1	0%		na	100%
Juneau	Canary rockfish	Charter	.	.		na	100%
Juneau	Rosethorn rockfish	Charter	.	.		na	100%
Juneau	Dusky rockfish	Charter	186	29%			100%
Juneau	Black rockfish	Charter	5	26%			100%

Appendix A12.–Sample size and relative precision for rockfish observed in 2017 and goals for 2018 by species and angler class in the Gustavus area.

Site	Species	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Gustavus	Quillback rockfish	Private	1	0%		na	100%
Gustavus	Copper rockfish	Private	.	.		na	100%
Gustavus	Yelloweye rockfish	Private	6	94%		na	75%
Gustavus	China rockfish	Private	1	0%		na	100%
Gustavus	Tiger rockfish	Private	.	.		na	100%
Gustavus	Canary rockfish	Private	.	.		na	100%
Gustavus	Rosethorn rockfish	Private	.	.		na	100%
Gustavus	Dusky rockfish	Private	.	.		na	100%
Gustavus	Black rockfish	Private	18	54%		na	50%
Gustavus	Quillback rockfish	Charter	28	48%		na	100%
Gustavus	Copper rockfish	Charter	2	7%		na	100%
Gustavus	Yelloweye rockfish	Charter	56	32%		na	75%
Gustavus	China rockfish	Charter	10	63%		na	100%
Gustavus	Tiger rockfish	Charter	4	48%		na	100%
Gustavus	Canary rockfish	Charter	.	.		na	100%
Gustavus	Rosethorn rockfish	Charter	.	.		na	100%
Gustavus	Dusky rockfish	Charter	16	110%		na	100%
Gustavus	Black rockfish	Charter	55	56%		na	50%

Appendix A13.–Sample size and relative precision for rockfish observed in 2017 and goals for 2018 by species and angler class in the Elfin Cove area.

Site	Species	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Elfin Cove	Quillback rockfish	Private	61	20%	100%	20	75%
Elfin Cove	Copper rockfish	Private	14	19%			100%
Elfin Cove	Yelloweye rockfish	Private	68	20%	96%	20	80%
Elfin Cove	China rockfish	Private	8	50%			100%
Elfin Cove	Tiger rockfish	Private	1	0%			100%
Elfin Cove	Canary rockfish	Private	.	.		na	100%
Elfin Cove	Rosethorn rockfish	Private	2	0%		na	100%
Elfin Cove	Dusky rockfish	Private	34	46%			100%
Elfin Cove	Black rockfish	Private	67	33%	11%	40	10%
Elfin Cove	Quillback rockfish	Charter	182	13%	97%	20	75%
Elfin Cove	Copper rockfish	Charter	48	27%			100%
Elfin Cove	Yelloweye rockfish	Charter	173	15%	96%	20	80%
Elfin Cove	China rockfish	Charter	31	26%			100%
Elfin Cove	Tiger rockfish	Charter	15	16%			100%
Elfin Cove	Canary rockfish	Charter	8	13%			100%
Elfin Cove	Rosethorn rockfish	Charter	.	.		na	100%
Elfin Cove	Dusky rockfish	Charter	42	27%			100%
Elfin Cove	Black rockfish	Charter	121	19%	5%	20	10%

Appendix A14.–Sample size and relative precision for rockfish observed in 2017 and goals for 2018 by species and angler class in the Yakutat area.

Site	Species	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 90% CI	2017: Percent Sampled of Observed Harvest	2018: Relative Precision Goal for 90% CI	2018: Sampling Goals
Yakutat	Quillback rockfish	Private	22	107%	92%	na	100%
Yakutat	Copper rockfish	Private	8	20%			100%
Yakutat	Yelloweye rockfish	Private	.	.	.	na	100%
Yakutat	China rockfish	Private	2	33%			100%
Yakutat	Tiger rockfish	Private	.	.		na	100%
Yakutat	Canary rockfish	Private	.	.		na	100%
Yakutat	Rosethorn rockfish	Private	.	.		na	100%
Yakutat	Dusky rockfish	Private	1	0%			100%
Yakutat	Black rockfish	Private	10	21%	3%	20	10%
Yakutat	Quillback rockfish	Charter	115	15%	95%	20	100%
Yakutat	Copper rockfish	Charter	32	25%			100%
Yakutat	Yelloweye rockfish	Charter	58	34%	95%	35	100%
Yakutat	China rockfish	Charter	38	34%			100%
Yakutat	Tiger rockfish	Charter	.	.		na	100%
Yakutat	Canary rockfish	Charter	.	.		na	100%
Yakutat	Rosethorn rockfish	Charter	.	.		na	100%
Yakutat	Dusky rockfish	Charter	38	21%			100%
Yakutat	Black rockfish	Charter	144	25%	7%	20	10%

Appendix A15.–Sample size and relative precision for black rockfish lengths observed in 2017 and goals for 2018 by angler class in the Sitka area.

Site	Angler Class	2017: Number of Fish Sampled	2017: Relative Precision for 80% CI	2017: Relative Precision for 90% CI	2017: Relative Precision for 95% CI	2017: Percent Sampled of Observed Harvest	2018: Sampling Goals
Sitka	Private	106	25.36%	32.54%	38.77%	16.41%	5.00%
Sitka	Charter	698	8.32%	10.67%	12.72%	6.27%	5.00%

APPENDIX B: EXAMPLE COMPUTER FILES

Appendix B1.–Computer data files and analysis programs developed for the 2018 Southeast Alaska marine boat sport fishery survey.

Effort, Catch, and Harvest Estimation Files (in KMC18EST.ZIP, JMC18EST.ZIP, PMC18SAM.ZIP, SMC18EST.ZIP, WMC18SAM.ZIP, CMC18SAM.ZIP, and KLAWOCK18.ZIP)	
c18KTN.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Ketchikan, 2018
c18KLW.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Klawock, 2018
c18CRG.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Craig, 2018
c18PTB.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Petersburg, 2018
c18WRG.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Wrangell, 2018
c18SIM.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Sitka, 2018
c18JNM.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Juneau, 2018
c18ECM.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Elfin Cove, 2018
c18GVM.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Gustavus, 2018
c18YAK.dta	Data file (ASCII) containing interview information recorded on mark-sense interview forms (PORT SAMPLING INTERVIEW VERSION 1.2) recorded at Yakutat, 2018
AMS18.SAS	SAS program to create basic interview SAS save files from mark-sense interview data files. 'a' stands for the letter of each site respectively: A_KTN for Ketchikan, C_PTB for Petersburg, C_WRG for Wrangell, D_SIT for Sitka, E_JNU for Juneau, B_CRG for Craig, B_KLW for Klawock, G_ELF for Elfin Cove, G_GUS for Gustavus. Creates revised interview SAS save files with stratification information added to them, have non-finfish (i.e., shellfish) data removed, and/or have multi-line interviews collapsed to one record per interview. Also creates SAS temporary files with only the sampling information associated with each sample for each survey location and day.
A_CHEst.SAS	SAS programs to estimate effort, catch, and harvest with associated variances using SAS save files created by AMS18.SAS. Program operates on one species at a time within the program, as determined by an array of species codes and an internal input file named 'SPECLIST.DAT'. See above for explanation of 'a'.
Coded Wire Tag Contribution Estimation Files (in CWT18.ZIP)	
SPRT_EXPNS14.XLS	Data file from tag lab with sampling information for each biweekly period at each fishery.
SFCON18.XLS	Data file from tag lab with recovery information for each adipose finclipped coho and Chinook salmon sampled.
SEN18CWT.SAS	SAS program to do basic contribution estimates.
SEN18CO1.SAS	SAS program to summarize contributions across tag codes for main tables.
SEN18CWP.SAS	SAS program to list tags, contributions, and variances for appendices.
SEN18CW3.SAS	SAS program to summarize contributions at ports with catch sampling programs.

Note: Data files (*.DTA) are archived at Alaska Department of Fish and Game, Division of Sport Fish, Research and Technical Services, 333 Raspberry Rd., Anchorage, AK 99518-1599.

Appendix B2.–List of SAS program files used in 2018 analyses.

2018 SAS Files

All programs are located in S:\creel\2018\2018 SAS files\Programs unless otherwise noted

Libname locations:

1. (SPSF) S:\creel\2018\2018 SAS files\PSF\
    a. Yearly effort and harvest files by site
2. (SPSF3) S:\creel\2018\2018 SAS files\PSF\EST_output\.
    a. Yearly estimated harvest files by site
3. (PSF) S:\creel\A_PSF_SAS datasets
    a. Final datasets by year – MSE and EST
    b. Multi-year harvest comparison files
    c. Multi-year effort (hours/days fished) files
    d. Rockfish release device data
4. (SAWL) S:\creel\2018\2018 SAS files\AWL
    a. Yearly biological files by site
5. (AWL) S:\creel\AWL_SAS datasets
    a. Final biological files by year
6. (AWL-PSF) S:\creel\2018\2018 SAS files\AWL_PSF
    a. Files combining AWL and MSE by year
7. (CAT) S:\creel\Catch_Rates_SAS datasets
    a. HPUE
8. (Catch_S) S:\Creel\A Catch Sampling CWT_SAS datasets
    a. Catch Sampling data
    b. Cwt counts
9. (CWT) S:\Creel\CWT_SAS datasets
    a. Data from the CF Tag Lab
10. (Logbook) S:\creel\Logbook_SAS datasets
    a. Charter logbook data
11. (Lookup) S:\creel\A_PSF_SAS lookup
    a. Area lookup cross reference files
12. (Mhs_Prod) mhs_prod odbc dsn=MHS_prod schema=dbo
    a. SQL database
13. (SWHS) S:\creel\SWHS Estimates_SAS datasets
    a. SWHS data in SAS format
    b. MHS-SWHS projections
14. (SPECLIST) S:\creel\A_PSF_SAS speclist
    a. List of species for EST to run
    b. These were historically in the SPSF library and remain there, either are fine to use in these cases. But these are not year specific, which is fine as you are just calling a group of species. Only an issue if need a specific group for a specific year.

Current Core Programs:

1. **Data_extract_from_SQL_V3.sas**. Creel and catch data. Requires SAS 9.4
    a. Purpose: Pulls data from the SQL database and transforms to file setup required by SAS.
    b. Input: SQL database
    c. Output: SPSF.Target_input_18_site.sas8dat

d. Output: SAWL.Biological_input_2018_all
e. Output: S:\creel\2018\2018 SAS files\All Error Output\AWL forms**AWL_errors_2018_date.xlsx** (misc. sampling errors)
f. Output: S:\creel\2018\2018 SAS files\All Error Output\PSF Forms**PSF_errors_2018_date.xlsx** (misc. interview errors)
g. Output: S:\Creel\2018\2018 SAS files\PSF**Shift_rpt.xlsx** (list of all shifts transmitted)
h. Notes: For 2018 had to rewrite everywhere it dealt with DE, data came in completely in 2018 where only partially in 2017.
i. Notes: Need to filter in SQL first to only grab shifts in the current year to take processing time off of SAS at a minimum. Should be able to do other filtering/joining in SQL to further minimize SAS processing requirements

2. **AMS18.sas** – creel and catch data. Requires SAS 9.4
    a. Purpose: Only grabs creel data and starts analyzing data, and creates all datasets required by the EST program.
    b. Input: SPSF.Target_input_17_site
    c. Output: SPSF.X_site_2018_mc_mse, _msi, _mss (creel)
    d. Output: SPSF.X_site_2018_mcd_mse, _msi, _mss (catch)
    e. Output: SPSF.X_site_2018_mcb_mse, _msi, _mss (de)
    f. Output: PSF._2018_MSE_Logbook (creel)
    g. Output: PSF._2018_MSE_CC_Logbook (catch & de)
    h. Output: SPSF._2018_Chinook_sampling
    i. Note: 2018 incorporated program: Msi_merge.sas into AMS
    j. Output: PSF._&year._mc_msi (creel) and PSF._&year._mcd_msi (catch) and PSF._&year._mcb_msi (de)
    k. Output: S:\creel\2018\2018 SAS files\All Error Output\ PSF Forms\ **Error_MSA_year_site_mc/mcd_date.xlsx** (Error files)
    l. Output: S:\creel\2018\2018 SAS files\All Error Output\ PSF Forms**Missing_areas_date.xlsx** (records with missing areas)
3. **2018 Error_check_creel_interview_data_app.sas**
    a. Purpose: general error check and looks at illegal harvest
    b. Input: SPSF. X_site_2018_mc_mse
    c. Output: S:\creel\2018\2018 SAS files\ALL Error Output\PSI forms\ 2018_SE_error_check_alt_
4. **Derby_import_program_V4_BW_SW.sas**
    a. Purpose: grab derby entered information
    b. Input: S:\Creel\A Catch Sampling CWT\Derby Entered Numbers_SW.xlsx
    c. Output: S:\Creel\A Catch Sampling CWT_SAS datasets\derby_entered.sas7bdat
5. **Logbook_import_2018.sas**
    a. Purpose: pulls in current checked out logbooks (have to have excel file open for SAS to import data).
    b. Input: S:\creel\Loogbook\Logbook Checkout\Logbook_2018.xls
    c. Output: SPSF.Logbook_2018
6. **Logbook_merge_2018_MSE.sas**
    a. Purpose: Merges creel dataset with Logbook checkout to verify numbers recorded are valid.
    b. Input: PSF._2018_MSE_logbook
    c. Output: S:\creel\2018\2018 SAS files\All Error output\PSI forms\SE_2018_MISSING_LB_&sysdate.xml"
7. **Cat18_macro_hpue_fds_wGAF.sas** (located in: S:\Creel\Catch_Rates\2018)
    a. Located in: S:\Creel\Catch_Rates\2018
    b. Purpose: Calculates HPUE

c. Input: SPSF. X_site_2018_mc_mse
d. Output: S:\Creel\Catch_Rates\2018\CAT17_boat_date.xlsx
e. Output: S:\Creel\Catch_Rates_SAS datasets\X_xxx_2018_hpue.sas7bdat

8. **Five_yr_avg_HPUE_2013-2017_compare 2018.sas** (located in: S:\Creel\Catch_Rates_5 yr programs)
    a. Located in: S:\Creel\Catch_Rates_5 yr programs
    b. Purpose: Compares HPUE for each Site over last 5 years to current year
    c. Input: S:\Creel\Catch_Rates_SAS datasets\X_xxx_year_hpue.sas7bdat
    d. Output: S:\Creel\Catch_Rates\Multi Year\ SITE_HPUE_2012_2016_compare_2018
9. **A_CHEst18.sas**
    a. Purpose: Calculates estimated harvest index based on area and specific locations
    b. Input: SPSF.X_site_2018_mc_mse and SPSF.X_site_2018_mc_mss
    c. Output: SPSF3.X_site_2018_est_area
    d. Output: S:\creel\2018\2018 SAS files\PSF\EST_output\log files
10. **A_AWL18.sas**
    a. Purpose: pull in awl data and format and organize by spec group
    b. Input: SAWL.Biological_input_2018_all
    c. Output: SAWL.ALL_18_MC_AWL
    d. Output: SAWL.ALL_2018awl_KS_mc_01
    e. Output: SAWL.ALL_2018awl_ha_mc_01
    f. Output: SAWL.ALL_2018awl_lc_mc_01
    g. Output: SAWL.ALL_2018awl_rf_mc_01
    h. Output: SAWL.ALL_2018awl_sb_mc_01
    i. Output: S:\creel\2018\2018 SAS files\All Error Output\AWL forms**Bio_AWL_errors_date.xlsx** (awl errors)
    j. Added a % include statement at bottom so runs the below 5 species specific programs
    k. Added a % include to run the convert program to convert the xml files to xlsx.
11. **2018_Halibut_Port_ALL.sas** (called in A_AWL18.sas)
    a. Purpose: analyze SEAK halibut data
    b. Input: sawl.All_&cyear.awl_ha_mc_01
    c. Output: awl.SE_HA_&cyear._awl_logbook
    d. Output: creel/AWL/2018/Halibut/17_SE_AWL_LEN_WT_16AUG17.xlsx

The below have similar purpose, input and output as Halibut run.

12. **2018_Chinook_Port_ALL_V2.sas** (called in A_AWL18.sas)
13. **2018_Rockfish_Port_ALL_V2.sas** (called in A_AWL18.sas)
14. **2018_Lingcod_Port_ALL_V2.sas** (called in A_AWL18.sas)
15. **2018_Sablefish_Port_ALL_V2.sas** (called in A_AWL18.sas)
16. **MHS_CWT_Sample_Numbers_w_DIT_V5.sas** – *requires SAS 9.4 as uses ods excel. - this one takes a **while** to run and you cannot make changes to the database while it is running. Need to run right after running Data extract or will get records that may not match up since this one is run directly from the database.*
    a. Purpose: To grab CWT sample numbers from all files to report number sampled, checked for CWT, not clipped wanded, and number detected (takes a little while to run as accesses a database view).
    b. Purpose: Also added in an output looking at sampling percentages.
    c. Input: Mhs_prod.V_Rpt_CWTSamples – view contractors created (this is what takes so long to run (~15-20 min)– grabbing the view data. Look at getting this information from some other means possibly.
    d. Input: sawl.Biological_input_2018_all (from Data_extract_from_SQL_2018_v3.sas)
    e. Input: spsf.target_input_17_ALL (from Data_extract_from_SQL_2018_v3.sas)
    f. Input: cwt._2018_cwt_all2 (from TagLab_import_sport_report_V2b.sas)

g. Output: catch_s.CWT_Report_2018
h. Output: S:\creel\2018\2018 SAS files\CWT**_2018_CWT_Report_date.xlsx** (list of what will go to the tag lab (use this to check for unreleased heads, needs review=Y)).
i. Output: S:\creel\2018\2018 SAS files\CWT**CWT_numSampled_&cyear.xlsx** (summary of all fish checked for cwt – with estimated harvest by biweek. Compare this to the CWT sport expansion report)
j. Output: S:\creel\2018\2018 SAS files\ALL Error Output\CWT forms**Error_CWT_numSignaled_&cyear.xlsx** (signaled/not signaled errors)
k. Output: S:\creel\2018\2018 SAS files\All Error Output\CWT forms**Error_CWT_numsampled_2018.xlsx** (finds errors where number wanded or checked for CWT or tag detected are incorrect or not filled in).
l. Output: S:\creel\2018\Weekly Sampling Summaries**Sampling Percentage Summary_*year_date*.xlsx**
m. Output: S:\creel\2018\2018 SAS files\All Error Output\AWL forms**biosamples without a target_date.xlsx** (records where tech noted sampled fish but none kept)
n. Output: S:\creel\2018\2018 SAS files\All Error Output\PSF forms**Species in two different targetID_date.xlsx** (must adjust or area cannot be assigned)

17. **MHS_CWT_merge_TAGlab_CWT.sas –** *must run [16 and 43] before can run this file*
    a. Purpose: to merge creel and taglab data to look at interviews noted as detected and see if there was a tag or not.
    b. Input: catch_s.CWT_report_2018 (from MHS_CWT_Sample_Numbers_w_DIT_V5.sas);
    c. Input: cwt._2018_cwt_all2 (from TagLab_import_sport_report_V2b.sas)
    d. Output: S:\Creel\2018\2018 SAS files\CWT\CWT_MHS_tag_merge.csv

Average and Proportion Variance Equations

18. **AWL_Variance_V3_2018.sas**
    a. Purpose: to grab all biological data and variables required to calculate the 4th stage variance equations
    b. Input: awl.se_*species_year*_awl_logbook; PSF._*year*_mc_msi and mcd_msi
    c. Output: AWL_PSF.NumFMeas_4_V2_&yr

19. **EST_CHEst*YR*_avg_var_v12_alt.sas**
    a. Purpose: calculate weighted averages and associated variance.
    b. Input: spsf. *port*_15_mc_mse; spsf.*port*_15_mc_mss; AWL_PSF.*port*_CS_15_mse_hijk; AWL_PSF.*port*_CS_15_mss; AWL_PSF.NumFMeas_4_V2_&yr
    c. Output: S:\creel\2018\2018 SAS Files\AWL_PSF\Output\
        i. _year_BIO_WEIGHTED_MEAN_DATE.xlsx
        ii. _year_biological_sampling_precision_date.xlsx
    d. Notes: has code at start of program to narrow down the RF in the speclist to only include RF that had been caught in at least 1 port

20. **EST_CHEst15_prop_V6a.sas**
    a. Purpose: calculated proportions and associated variance
    b. Input: spsf.*port*_18_mc_mse; spsf. *port*_18_mc_mss; spsf. *port*_18_mc_msi; awl_psf.
    c. Output: awl_psf.SEAK_2018_prop_rel_all
    d. Output: awl_psf.SEAK_2018_prop_rel_rf
    e. Output: awl_psf.SEAK_2018_RF_comp_all
    f. Output: S:\Creel\&year.\&year. SAS files\AWL_PSF\Output\
        i. &year._weighted proportion released w_var_&sysdate..xlsx
        ii. &year._weighted rf composition w_var_&sysdate..xlsx

21. **A_CHEst_AWL_output_all.sas**
    a. Purpose: to pull together estimated harvest and SE and average and var by GF or LC_area if there are multiple sites per Area.
        i. Averages_2018_EST_AWL_merge_date.xlsx
        ii. Rockfish proportion composition
        iii. Release composition
    b. Input: psf._2018_est_bf_areas
    c. Input: psf._2018_est_all
    d. Input: awl_psf.SEAK_2018_ALL_AVG_*species*
    e. Output: S:\creel\2018\2018 SAS Files\AWL_PSF\Output\
        i. Averages: _2018_EST_AWL_merge_date.xlsx
        ii. Rockfish proportion composition: _2018_EST_Prop_merge_date.xlsx
        iii. Release composition: _2018_EST_PROP_rel_merge_date.xlsx
22. **Run R program** to combine data by SWHS_area, GF_area, or LC_area. Files located in S:\creel\2018\2018 SAS Files\AWL_PSF\Output and will output here too.
    a. Purpose: To take averages and proportions from all sites and SWHS, GF, and LC areas and pull them together running a simulation to get a weighted average or proportion and SE.
    b. Run the following with the associated files:
        i. Combining areas_dlt.r which calls: _2018_EST_AWL_merge_*date*.xlsx
        ii. Combining areas_prop_rel_alt_dlt.r which calls: _2018_EST_PROP_rel_merge_*date*.xlsx
        iii. Combining areas_prop_comp_alt_dlt.r which calls: _2018_EST_PROP_merge_*date*.xlsx
    c. Output from above: S:\creel\2018\2018 SAS Files\AWL_PSF\Output\
        i. Averages: Mean_Weight_Results_alt.csv
        ii. Release composition: Proportion_CombinedArea_rel_Results_alt.csv
        iii. Rockfish prop composition: Proportion_CombinedArea_RF_comp_Results_alt.csv
23. **R_import_data_join.sas**
    a. Purpose: to import the csv file that results from the R program to join the newly combined dat
    b. Output: S:\creel\2018\2018 SAS Files\AWL_PSF\Output_2018_EST_AVG_PROP_final_output_date.xlsx

Reporting Database Programs: under Reports

24. **Data_export_to_SQL_EST_2018.sas** (has macro to change year)
    a. Purpose: to export EST data to the database
    b. Input: PSF._year_EST_ALL.sas
    c. Output: SQL database

25. **Data_export_to_SQL_HPUE.sas** (macro to change year)
    a. Purpose: to export HPUE data to database
    b. Input: CAT.X_site_year_HPUE
    c. Output: SQL database

26. **MHS_Report_unlock.sas** (administrator usage only!)
    a. Purpose: to reflect what can and cannot be overwritten in the database

27. **Check_deleted_records.sas**
    a. Purpose: to look at deleted records
    b. Input: SQL schema=History
    c. Output: work file

Additional Programs

28. **EST_Multi_YR_SUM_2018.sas** (Located in S:\Creel\A_PSF\SAS Programs)
    a. Purpose: Compares est output over last 5 years
    b. Input: PSF._&YR._est_all
    c. Output: S:\creel\A_PSF\Multi Year_&syear._&eyear._EST_Cum_&Vname._&spec._&sysdate..xml
29. **RF_Rel_Dev_by_Boat.sas**
    a. Purpose: quick look at use of deep water release device on vessels that released NPL rockfish
    b. Input: SPSF.Target_input_17_all (intermediate file)
    c. Output: S:\creel\A_PSF\Rockfish\Use of RF release device_2018
30. **TagLab_import_sport_report.sas** (Located in S:\Creel\CWT\). This program was updated in 2018 to account for changes to the Tag Lab database updates.
    a. Purpose: import TagLab sport report records into SAS
    b. Input: S:\creel\cwt\xxxx_sport_report_date.xlsx
    c. Output: cwt._year_cwt_all
31. **TagLab_import_number_sampled.sas** (Located in S:\Creel\CWT\).
    a. Purpose: import TagLab number sampled records into SAS
    b. Input: S:\creel\cwt\xxxx_number_sampled_date.xlsx
    c. Output: cwt._year_num_samp_all
32. **TagLab_import_number_sampled.sas** (Located in S:\Creel\CWT\).
    a. Purpose: import TagLab CWT sport expansion report into SAS
    b. Input: S:\creel\cwt\xxxx_sport_expansion_date.xlsx
    c. Output: cwt._year_cwt_exp_all

APPENDIX C: MARINE HARVEST STUDIES PROGRAM REVIEW DOCUMENTATION AND ASSOCIATED FILES

Marine Creel Review – Pre- and Post-meeting feedback

Creel Review Agenda – April 9-10, 2018

Meeting Expectations:

- Develop a consolidated list of management needs for all species in Southeast Alaska
- Identify program objectives to address management needs (i.e., how are management needs met)
- Identify Study Design considerations needed to meet program objectives and ultimately, the management needs
    - Workflow, deliverables, inseason and post-season accounting, and communication of workflow and responsibilities

April 9 – Day 1

8:30 – 9:00 am – Introduction and overview agenda **(Jeff Nichols)**

9:00 – 9:30 am – Marine Harvest Survey Program History **(Jeff Nichols, Bob Chadwick)**

9:30 – 9:45 am – SWHS and Logbook History **(Bob Clark, Jim Hasbrouck)**

- Use for inseason and post-season estimates **(Jeff Nichols, Mike Jaenicke)**

10:00 – 11:45 am – Management Needs and Priorities **(Bob Chadwick, Ed Jones, Scott Meyer)**

1:00 – 4:15 pm – Program/project metrics required to address management needs **(Group)**

4:15 – 4:30 pm – Day 1 Wrap-up **(Group)**

April 10 – Day 2

8:30 – 9:00 am – Day 1 recap **(Jeff Nichols)**

9:00 – 11:45 am – Study Design/Methods **(Group)**

1:00 – 4:00 – Data flow/processing, deliverables, roles and responsibilities (**Group)**

4:00 - 4:30 – Meeting Wrap-up and final action items **(Group)**

Management Data Needs Matrix generated during the Marine Harvest Studies Program Review

Species/Species Group Focus	Management Need (WHY is this necessary for management?)	HOW could we meet the Management Need	Metric to meet the management need (what are we going to measure?)	Study Design Considerations	Would this management need be met under the current design?	Would this management need be met under the current design in a timely fashion?	Is the data/estimate adequate enough under the current design to meet this management need?
king salmon	Estimate final SEAK Total King Salmon Harvest (September, following year)	SWHS	Total harvest in numbers	SWHS SEAK total and by sampling location	Yes, further discussion required on time and area required.	Yes	Yes (evaluate the use of charter logbooks in estimating guided harvest)
king salmon	Estimate final SEAK Total King Salmon Treaty Harvest (September, following year)	SWHS & Creel Data (CWT)	Total treaty harvest in numbers.	Biweekly and by sampling location	Yes, further discussion required on time and area required.	Yes	Yes
king salmon	Preseason SEAK King Salmon Harvest	Previous Years SWHS, Creel	Total harvest in numbers	SEAK total	Yes	Yes, need a deadline and	Yes

	Projection (April 1)	(CWT) & Logbook Data				document method.	
king salmon	Mid-Season SEAK Total King Salmon Harvest and Treaty Harvest Projection to inform managers on available harvest limit (by July 7-15?)	SWHS & Creel Data (CWT)	Total harvest and treaty harvest in numbers	SEAK total and treaty	Yes	No, based on data gathered from (1) above, need a deadline and document method.	N/A
king salmon	Post Season Preliminary SEAK King Salmon Harvest and Treaty Harvest Projection (Mid-September)	SWHS & Creel Data (CWT)	Total harvest and treaty harvest along with AK hatchery contributions in numbers	SEAK total and treaty	Yes, further discussion required on time and area required.	No, need a deadline and document method	Yes

king salmon	Inseason King Salmon Total Harvest and Transboundary River Wild Stock Harvest in District 108 and District 111	SWHS & Creel Data (CWT)	Total harvest and associated CWT sampling statistics to generate CWT contribution estimates and resulting transboundary river wild stock harvest	District 108 and District 111 total and transboundary wild	Yes	Yes, deadline is weekly by COB Wed thru SW29 and need to document method.	Yes
king salmon	Post Season King Salmon Total Harvest and Transboundary River Wild Stock Harvest in District 108 and District 111	SWHS, Creel Data (GSI)	Total harvest coupled with GSI program to generate detailed stock comp and estimates of transboundary river wild stock harvest	District 108 and District 111 total and transboundary wild	Yes	Yes, based on (6) above, provided by end of Sept and need to document method.	Yes
king salmon	Postseason Estimate Chilkat and Unuk King	SWHS, Creel Data (CWT)	Total harvest and associated CWT	CWT contribution estimates rely on total	Yes, further discussion required on	No, need a deadline and relies on timely	Yes

	Salmon Harvest, using CWT methodology		sampling statistics to generate CWT contribution estimates	harvest, variance and all associated CWT sampling statistics by location and area.	time and area required.	reporting of harvest and variance of harvest for use in detailed CWT contribution estimates	
king salmon	Postseason Estimate Harvest of SEAK Wild King Salmon stocks	SWHS, Creel Data (CWT & GSI)	Total harvest, associated CWT sampling statistics and GSI program to generate estimates of SEAK wild.	Total harvest, total harvest of SEAK origin (hatchery and wild) thru GSI, and total harvest of SEAK hatchery (CWT) and total harvest of SEAK wild (total SEAK minus SEAK hatchery)	Yes, further discussion required on time and area required.	Yes, tied to (1) above and GSI program	Yes
coho salmon	Postseason Estimate CWT contributions	SWHS & Creel (CWT)	Total harvest and associated CWT sampling	CWT contribution estimates rely on total harvest,	Yes, further discussion required on	No, need a deadline and relies on timely reporting of	Yes

	Coho Salmon stocks		statistics to generate CWT contribution estimates	variance and all associated CWT sampling statistics by location and area.	time and area required.	harvest and variance of harvest for use in detailed CWT contribution estimates	
Lingcod	Lingcod harvest biomass by management area	SWHS & Creel	harvest in numbers & length (to derive average weight)	postseason (annual), area (lingcod management area)	Yes	Yes	Yes
Lingcod	Sex composition of lingcod by management area to evaluate stock assessment.	Creel	sex of all sampled fish	postseason (annual), area (lingcod management area)	Yes	Yes	Yes
Rockfish - DSR	Estimate sport removals (biomass) of DSR of the outside waters	SWHS, Creel & Logbook	total RF harvest forecast, proportion of harvest,	SWHS area	Yes	consider earlier deadline	Yes

	of the eastern gulf for assessment and to stay within allocation.		species composition, average weight, and release ratio in outside waters				
Rockfish - Pelagic	Estimate sport removals (biomass) of pelagic RF by management area for assessment purposes	SWHS, Creel & Logbook	total mortality/total removals (in numbers, average weight, release proportion by depth of pelagic rockfish in SEI.	By species, depth, and management area.	Yes	Yes	Yes
Rockfish - Nonpelagic	Estimate sport removals (biomass) of nonpelagic RF of the inside waters of SEAK for fisheries/harves	SWHS, Creel & Logbook	total mortality/total removals (in numbers, average weight, release proportion by depth of	By species, depth, and management area.	Yes	Yes	Yes

	t assessment purposes		nonpelagic rockfish in SEI.				
Rockfish - black rockfish	Estimate sex, age, length, composition of black RF in the CSEO stock assessment	Creel	ASL composition of the CSEO black rockfish harvest	by sex.	Yes	Yes	Yes
Rockfish - all species	Estimate DWR release rate by species by unguided anglers release rate, evaluation of outreach program, not needed starting 2020	Creel	proportion of vessel trips that used a DWR to release at least one fish.	by species, by port	Yes	Yes	Yes
Rockfish - all species	Rockfish SEO harvest biomass for obligatory NMFS harvest accounting and	Creel, SWHS, Logbook	Species Composition, average weight, proportion of rockfish harvest by	by species, and SWHS area	Yes	Yes	Yes

	stock assessment		NMFS area (650) in Areas B, D, G, and H.				
Rockfish - black and yelloweye	Estimate various harvest/removal parameters of black and yelloweye rockfish by rockfish management area as dictated by rockfish management Leadership Planning Team	Creel, SWHS, Logbook	harvest & removals in numbers & length (to derive average weight), harvest & removals in weight, species comp, release ratio, Age (black) Sex, length	by species and finest resolution of geographic area	Yes	This is a new management need and hasn't been implemented yet	It appears so
Halibut	Estimation of sport halibut harvest in units of mass (preliminary and final for previous year). Stock assessment and	Creel, SWHS, Logbook	Mean weight of halibut harvest.	by SWHS area by user group (and by IPHC in Area G).	Yes	Yes	Yes

	management of guided section						
Halibut	Estimate halibut release mortality in the sport fishery	Creel, SWHS, Logbook	Proportion of charter halibut released.	by SWHS area and size class (size classes defined by length limits).	Yes	Yes	Yes
Halibut	Proportion of unguided harvest that occurred prior to mean date of IPHC survey, by SWHS area, final estimate for prior year. For IPHC stock assessment (adjustment to CPUE survey index).	Creel	Proportion of harvest taken prior to mean survey date in previous year (don't need SE)	by SWHS area.	Yes	Yes	Yes
Sablefish	Sablefish SEO harvest biomass for obligatory NMFS harvest accounting and	Creel, SWHS	Mean net wt (lb)	by SWHS area.	Yes	Yes	Yes

	stock assessment						
Sablefish	Estimate sablefish mortality in NSEI to stay within the AHO	SWHS, Creel & Logbook	average weight, harvest in numbers	none	Yes	Yes	Yes

Feedback—Pre-Workshop:

Chadwick:

- Manage for domestic king salmon treaty harvest allocation
- Account for king salmon treaty harvest in D-8 and D-11
- Manage sustainably for 52 salmon escapement goals
- Manage for domestic allocations of 7 lingcod GHLs
- Manage for domestic allocation of the Outside DSR allocation
- Manage inside sport fishery for sustainable DSR populations
- Estimate sablefish mortality in NSEI

Jones:

1. The coastwide standard for CWT sampling rate is 20% per the Action Plan by the CWT Expert Panel w link : CWT_Expert_Panel_RecommendationsMarch2008

2. Although not documented anywhere that I can find, the PSC TTC agreed to increase sampling rates in the terminal areas of District 108 and District 111 from April 23 through July 15 to increase precision in CWT (for inseason) and GSI (for final postseason) estimates of Taku and Stikine Chinook salmon proportions in the total terminal harvests during this time period. This began in response to the Chinook directed fisheries that were approved in 2004 for implementation in 2005 and costs associated w these additional sampling needs were covered by soft sources fr the LOA and NEF in the marine sampling programs for sport and commercial. Generally speaking, this resulted in rates between 30-50% for both fisheries and both areas.

3. The Pacific Salmon Treaty (Ch 3(9)(d)) states, "AABM fisheries shall be managed annually so as not to exceed the catch limits (or total mortalities) designated for the applicable abundance index value for each AABM fishery as provided in Table 1 below and shall be monitored over time to evaluate the effect of the catch limits on the aggregate and stock-specific harvest rates and escapements;" and the word annually is key here as it right now the current negotiation package contains a penalty clause associated with annual performance. If a Party goes over, their catch-limit the following year gets decreased accordingly and it's a one-side penalty as a Party cannot recoup any underages. At present, we have simply accumulated overages/underages over each 10 yr Annex period, but if this change goes through, Alaska will need to more accurately estimate their combined gear catch by say mid-Summer in order to either curtail fisheries in the event of an overage OR ramp up fisheries in the event of an underage. The costs and benefits in this case are presumably mostly specific to the second summer troll fishery in August ... in other words, if the sport looks to be over, then the second summer troll fishery will need to be curtailed; if the sport looks to be under, then the second summer troll fishery will 'mop up' any remaining catch. At a minimum, having an accurate estimate of sport harvest fr the prior yr will be necessary to set the correct catch limit for the current yr if a penalty exists. Hopefully this makes sense.

4. Given what we just endured at the BOF meeting, personally I believe we would benefit greatly if we could generate sport catch estimates for the existing areas we currently

generate estimates but do so by a few additional time strata (let alone inseason w a timely postseason). Ideally we would be able to match-up w the troll fisheries (winter, spring, summer 1, summer 2) as those fisheries and impacts of each were constantly being looked at during this recent BOF cycle. I don't know how difficult it would be to estimate sport harvest say October to April (~winter troll), May and June (spring troll), July (summer 1) and August and September (~summer 2), but that would be ideal.

5. Harvest Precision, we do not have a data standard for harvest ... in this case it would be specific to sport up and down the coast and Alaska would be the gold standard for sure ... and just so you have it, I've attached the CTC C&E report covering data standards for Escs and Goals (appendices at end).

6. Table below is from 2004 CCT report (Standardized Fishing Regimes for Southeast Alaska Chinook Fisheries). It was provided to highlight when sport harvest estimates stopped being generated by Creel Census and was replaced by SWHS (this is presumably only related to final estimates produced a year later)

Table 3. Estimated matrix of years where estimates of incidental mortalities from direct fishery sampling programs are available for commercial and sport harvests of Chinook salmon in SEAK fisheries from 1985 to 2002.

	Troll			Net				Sport
Year	Winter	Spring	Summer	Purse Seine	Drift Net	Set Net	Trap	
1985	No	No	Observer	Observer	No	No	No	Creel Census
1986	No	No	Observer	Observer	No	No	No	Creel Census
1987	No	No	Observer	Observer	No	No	No	Creel Census
1988	No	No	Observer	Ratio[2]	No	No	No	Creel Census
1989	No	No	Regression[1]	Ratio[2]	No	No	No	Creel Census
1990	No	No	Regression[1]	Ratio[2]	No	No	No	SWHS[3]
1991	No	No	Regression[1]	Ratio[2]	No	No	No	SWHS[3]
1992	No	No	Regression[1]	Ratio[2]	No	No	No	SWHS[3]
1993	No	No	Regression[1]	Ratio[2]	No	No	No	SWHS[3]
1994	No	No	Regression[1]	Ratio[2]	No	No	No	SWHS[3]
1995	No	No	Regression[1]	Ratio[2]	No	No	No	SWHS[3]
1996	No	No	Regression[1]	Ratio[2]	No	No	No	SWHS[3]
1997	No	No	Regression[1]	Ratio[2]	No	No	No	SWHS[3]
1998	No	No	Observer	Ratio[2]	No	No	No	SWHS[3]
1999	No	No	Observer	Ratio[2]	No	No	No	SWHS[3]
2000	No	No	Observer	Ratio[2]	No	No	No	SWHS[3]
2001	No	No	Logbook	Ratio[2]	No	No	No	SWHS[3]
2002	No	No	Logbook	Ratio[2]	No	No	No	SWHS[3]

[3]Statewide Harvest Survey.

Fowler:

Below is the consolidated management comments regarding the marine creel project review. I understand that Mr. Chadwick remains out of the office and has not had a chance to review or add a regional perspective. In this document comments that applied across the region were consolidated and listed first while comments specific to individual ports are listed under their respective port. Several management areas have ideas on ways to increase king salmon sampling rates for their respective ports. I've bulleted these items in this document for simplicity although management staff often provided a much more detailed description. Ultimately, I believe ideas to increase king salmon sampling rates will require discussion and idea sharing between creel project staff and management staff for each port where there is a concern.

Management Staff Review of the Marine Creel Program

What's currently working regionwide:

- Diana's in person assistance with training is much appreciated and valuable.
- Handheld devices are easier for technicians and save staff time. The app continues to improve.
- Memo regarding expectations and personal leave is useful to set standards with technicians.
- The transition to Whatman sampling was well prepared for and appears to be successful.
- Management staff supervisors are better engaged with sampling staff in their respective ports since overtaking supervision. Improved communication between management staff, samplers and the public.
- Receiving coding for timesheets for multiple pay periods in advance is appreciated.
- Technical support for Ipads from Diana and Jessica has been timely and very helpful.
- Ipads allow sampling mistakes to be caught earlier and corrected sooner.
- Weekly data summary outputs provided by project staff has assisted the ports with processing CWT and GSI samples.
- The newly developed online accessible database could be a great tool to increase access to information for management staff. Management staff would benefit from a brief training and collective discussion on ways these reports could be used to better manage sampling crews and gage sampling performance.

What's could be improved regionwide:

- The use of STNP positions creates some inefficiencies and problems due to the 120 day time limit: Maximizing STNP sampling time during the busiest 120 day period can create inefficiency when STNP positions require a separate training session due to a later start date than other technicians, sampling is reduced on the fringe season, STNP positions are more difficult to retain employee's in (this increases time spent training and decreases overall performance). If funding and hiring approvals were possible seasonal positions with a PCN would be preferred over STNP's.
- Similar to the budget coding provided for timesheets, supplying each port supervisor with a budget code and spending cap for purchasing supplies at the start of the season would increase efficiency and reduce the number of individual requests for budget codes.

- Conducting inseason/end of season performance reviews and providing that information to management staff would help identify and addressed problems quickly.
    - For example, are inseason sampling objectives on track to being met in each port? If not do priorities of samplers need to be adjusted or other actions taken (e.g. stop sampling for coho salmon and focus only on king salmon).
    - An end of season review of sampling performance for each port and a resulting discussion with management staff could enable improvements for the future.
    - Inseason performance data for each technician could provide feedback to empower samplers and also identify and correct underperformance.
- Improve the speed and repeatability of data requests. Many of our data requests are repeated on an annual basis. Establishing a defined method of how each request is generated would hopefully increase speed and repeatability so that any one of several staff familiar with the information could generate these reports.

Juneau specific comments:

- Sampling hours & locations sampled appear to be efficiently structured to achieve maximum sampling rates.
- The lead technician hired last season has been very helpful to assist in a variety of tasks ultimately improving the quality of data collected.
- Some samplers could greatly improve their individual performance.
- In expectation of retiring technicians in Gustavus and Elfin Cove is it possible to hire the next technician this season to allow overlap/training with existing staff?
- Sampling priorities and objectives may need to change recognizing king salmon nonretention regulations in place prior to June 15. A discussion on how this might impact data and sampling actions would be appreciated.
- If biological sampling of king salmon needs to increase here are some ideas:
    - Add a catch sampler to Elfin Cove.
    - Sample prior to 10am at North Douglas and Statter launch ramp.
    - Consider ways to sample king salmon landed at Shelter Island lodge.

Ketchikan specific comments:

- Ketchikan management staff has several questions and suggestions regarding ways to increase sampling efficiencies in the Ketchikan area, a discussion with management staff on current sampling deficiencies and ways to improve would be appreciated. Topics include:
    - Use of catch vs creel samplers.
    - Modifying the direction on sampling priorities.
    - Selecting sampling locations for catch samplers.
    - Modifying the selected sampling locations.
    - Sampling methodology (can sampling be prioritized temporally).
    - Modifications to derby sampling.

Petersburg specific comments:

- Due to conflicts with other training events, project staff has not been available to conduct training in the Petersburg area. The AMB has been conducting training but requests the

manual and training materials be available two weeks prior to the time of training to allow time to prepare.

Sitka specific comments:

- Ideas for increasing sampling efficiencies:
    - Consider split shifts again to capture early and later returning anglers.
    - Cross train creel and catch samplers to do both jobs.

P.O.W. specific comments:

- Start dates of the project may need to be examined and revised; the early weeks of May are very slow for samplers.

Yakutat specific comments:

- Improved coordination with charter vessels operating out of lodges may increase sampling rates.

Meeting Notes (Nichols, Lum, Hasbrouck, Jones, Meyer):

Hasbrouck (after 1st day):

Tuesday we should focus on expectations for the meeting before thinking about prioritization; doubt we'll have time (and/or energy) to discuss prioritization. Make sure we've identified all management needs and then spend a few minutes cleaning up the table/matrix. For example:

1. The group took a different approach describing/articulating management needs for rockfish and halibut than for salmon.
2. At least some of the rows for rockfish and halibut contain metrics in the cell for management needs.
3. The column of "HOW" for most/all rows for rockfish and halibut should perhaps contain SWHS and logbook in addition to creel.

The group did a good job putting info in the table so we don't need to belabor or rehash the discussion, just take a little time cleaning things up. Then complete the rest of the table before jumping into the agenda topics for Day 2 (study design consideration, methods, data flow, etc).

Please know I'm not trying to dictate meeting agenda or discussion, just offering suggestions. This is a SEAK meeting, not my place to try running the show. You and Judy did a good job getting us through first day, Ed and Bob (Chadwick) weren't bashful speaking up and it was great that Patrick/Kelly/Troy engaged, too.

Meyer (after 2nd day) (to which Diana has already provided requested data):

Diana,

Based on yesterday's discussion, I'd like to take a look at unguided halibut harvest timing (like a cumulative run timing curve) for 2C and 3A. If the timing is consistent from year to year, I was thinking we could simply apply the cumulative harvest proportion to the harvest forecast to come up with the unguided harvest prior to the IPHC survey. That could potentially free you folks from having to provide that number (though you could calculate it every once in a while to make sure it's not changing).

I have access to Southcentral Region interview data but not Southeast. If possible, can you send the following raw data (boat-trip interview data) from Southeast interviews from the last 3 years (2013-2017)?

year
date
swhs_area
classn
No_hal_kept

Feel free to include additional variables if they are needed to estimate harvest by date. Or, if you don't have time to extract those variables, maybe send raw interview files (SAS7BDAT format) and I will extract the data myself.

I should be able to look at this next week (I'll squeeze it in). If the cumulative harvest timing curves are consistent from year to year, I will let you know and you can drop that objective.

Nichols:

(from Day 1): RECOGNIZE: even though we may identify a new sampling design that addresses all of our management needs, we have to have a discussion and perhaps Action Items (to do tasks) that take care of the issues which currently exist (communication, timeliness, repeatability, responsibilities, workflow) and which will continue in the future w/out some strategic changes

- Hopefully there is time to start this in the afternoon of day 2; but if not, schedule some time on Wednesday or establish a hard date further out to actually have this discussion

(Following Day 2):

- We should state why we are generating certain estimates (for example…why are we generating several inseason king salmon harvest projections? Answer to inform CF on the available harvest limit)
- We might add another column to get to this information
- ACTION ITEM – detail exactly how our post-season preliminary estimate is produced and share and vet with the CTC
- Can the logbook data be used to generate the post-season preliminary king salmon harvest estimate
- ACTION ITEM – run a port by port and SEAK total analyses comparing king salmon harvest estimates obtained from a creel-SWHS 5 year expansion (for all anglers) to a creel-SWHS (unguided) + creel-logbook (guided)
- ACTION ITEM – we need a full accounting and explicit accounting
- What management needs were not met by deadlines
- ACTION ITEM – how do we assess whether or not we have sufficient # of coordination/research analyses staff under the MHS program?
    - How would you change the roles and responsibilities?
- ACTION ITEM – mid December sampling stats are updated
- ACTION ITEM – we should evaluate how many more fish (king salmon) we can get our hands on by expanding our effort at the docks—in other words, in the KTN area can we figure out (through logbook)
- If hatchery CWT mark rates was higher we wouldn't have to sample at as high of sampling rates (20%) to get the same precision; if those CWT mark rates are less than the anticipated 10%, then we should be sampling at a higher rate than 30%

- ACTION ITEM - Ask Andrew if we can just provide an average value for preliminary SEO DSR for the current year, rather than providing an estimate—it doesn't get used for anything anyways (Scott Meyer could look into this)
- ACTION ITEM – another management need that is emerging is providing our black and yelloweye rockfish data (harvest, release, average weight, etc) in the preferred consistent format identified by the LPT
    - Consider adding this to the matrix
- ACTION ITEM – send a request to all participants asking for their notes. Jeff to compile, merge, and produce final accounting
- ACTION ITEM related to (Proportion of unguided harvest that occurred prior to mean date of IPHC survey, by SWHS area, final estimate for prior year. For IPHC stock assessment (adjustment to CPUE survey index)) – Scott thinks we could just go with a roving 3-year recent average (still needs updated every year to include the most recent year), but this would eliminate a data request
- We need to consider whether or not we need to ask on the onsite creel program for residency (This would significantly increase the number of questions asked during a creel interview)
    - Scott suggested we get residency from the logbook and that we shoudlnt need to get it from the creel program; Bob is not so sure and thinks we need to talk about this
- Ask the question if we could employ the use of video cameras to account for missed boats

Post-Meeting Feedback and 3rd day (managers and Hansen)

Lum:

Wednesday morning (8AM – 12 PM) we will be meeting with a smaller group of people to address improvements to the creel that will ensure that annual deliverables are met. This will included data flow inseason and post season, responsibilities, automation of annual data requests, on site sampling issues, communication between management and MHS staff, sampling rates, and any other needs to ensure the program operates well. A good starting point is to review the 'Management Staff Review of the Marine Creel Program'.

Post Meeting Feedback

Nichols (original request for additional information):

I believe we had a productive couple of days, but our work is far from over. Our most immediate need is wrapping up the 2-day review (and ½ day this morning with smaller break-out group) by way of getting some input in writing from each of the participants. Here is what I would like to propose and request:

- Everybody reviews the attached Management Needs matrix; anybody with feedback, additions/subtractions, etc—please send me a response in simple bulleted form
- Everybody (in this instance…I'm asking everybody) sends me 5 bullet statements related to the review (what was missed, accounting of Action Items, highlights, lowlights, where we might go from here, etc)

- Anybody who took notes and is willing to share those notes—please send to me in digital form—either word document if you did so on your computer, simple scanned PDF of paper notes, or transcribe your paper notes into something more consumable by another person if you take as short-hand notes as I do occasionally
- I will do my best to compile and assimilate into a single cohesive document; as was done before (in 2011) but in lesser fashion, this will be incorporated into the 2018 (and likely 2019, but probably in revised/updated fashion) Operational Plan to document any suggested changes in methodology, study design, workflow and the rationale behind it.

The discussion this morning with the break-out group will also be incorporated into this documentation. If possible, I'd like to have people's homework assignment as described above by next Monday.

Clark:

Here are some suggested edits of the management data needs workbook relative to salmon catch estimation:

- Cells C5 and C6 should be the same as cell C4.
- Add the word "Postseason" to the beginning of cells B9, B10, and B11.

Here are my 5 bulleted statements related to the review:

- The MHS review is timely due to potential changes in the treaty annex for Chinook (SEAK and TBR). However, more frequent reviews are needed (biannually?) to ensure that objectives of the program do not creep away from required management needs.
- There is a need to standardize and fully document (in the Op Plan and in Reports) the secondary analyses (using primary statistics from the MHS along with other information) needed to support management decisions. Timely ADF&G data series reporting of results of the MHS could fully support this need. Adaptive methods (e.g., rolling averages, model selection methods, error estimation and correction) should be employed in development of these analyses.
- While the allocative aspects of treaty catch in the recreational fishery have been worked out by the BOF, there remains a joint SF/CF responsibility to stay **under** the current treaty **limit**. While there is currently no payback for overages of the limit, there may be in the future and the MHS program will be integral to upholding this responsibility. Within the agency, trust in how the MHS generates final estimates of treaty catch in the recreational fishery is low at the moment. Increasing the rigor of inseason and postseason catch estimation will help to increase that trust.
- I believe the marine guide logbooks are a huge and largely untapped resource for pre- and inseason catch estimation/modeling. More work needs to be done to tap into this potential.
- Nothing in the MHS is broken; it is a solid and worthwhile program. I believe the review served to help refocus the program on its responsibilities and new opportunities to provide managers with the best science.

Jones:

Nice feedback Mr Clark! Some additional thoughts below. It would be informative:

- to know the proportion of surveyed and un-surveyed area by location (gets at the prop of the total harvest available to *creel/catch* sampling program);
- to see a comparison of chartered angler Chinook (maybe other ssp) harvests from the *creel/catch*, *logbook* and *SWHS* methods (perhaps already done?) and if these 3 methods match-up (I thought I heard mention of that), then any discrepancy between *creel/catch* or a combination of *creel/catch+logbook* and the *SWHS* is by default due to unchartered anglers;
- to see an update to the relationship between total Chinook (other ssp?) harvest by location from the *creel/catch* and the *SWHS* programs; and
- to see total Chinook (other ssp?) harvest from the *creel/catch* for unchartered plus *logbook* for chartered by location and how it compares to the total Chinook harvest from the *SWHS* (I believe this would be analogous to the method used for halibut).

Emphasize:

- the continued need to sample the sport fishery in SEAK on a biweekly basis at 20%+ rate for Chinook and coho CWTs and provide estimates of harvest and associated CWT sampling stats by location (JNU, PSB/WRG/KTN, SIT) while gathering tissues for GSI and sampling ASL and other ...
- the need to sample District 108 and 111 by statistical week at 30%+ (original goal in 2005; might see if it's IDd in the 2005 OP) for Chinook CWTs and provide estimates of harvest and associated sampling stats thru SW30 while gathering tissues for final GSI estimate and sampling for ASL and other ...

And Bob's last bullet is spot-on. Although we may need to make a few adjustments, the MHS program isn't broken and through the use of *creel/catch*, *logbook*, and *SWHS* we already gather the bulk of the information required to achieve domestic and treaty obligations.

At this time I do not have any edits to the spreadsheet and thanks for letting me sit in w you folks!~

Fowler:

Jeff, here are my bulleted items and perspective.

- I believe this meeting was extremely productive to identify concerns and improve communications/understanding across all parties. To be effective in implementing best practices it will take continued efforts to follow up on action items, answer questions, and explore ideas that were not fully satisfied at this meeting. I appreciate your efforts to document, which allows us to capture items from this meeting and track what changes might be made in the future along with the why or why not. In whatever format (post season meeting, white paper, ect..) continued follow up and review is critical.
- While the 20% sampling goal is mandated by the treaty it is still valuable to identify precision in the currently observed sampling rates for domestic management purposes and sampling rates we feel comfortable with given the actual annual conditions (eg current low KS abundance). Clearly presenting this information I believe would help to address Bob Clark's identified concern regarding trust in the estimates produced. As others have

mentioned, it may also be time to prepare another review of comparison between SWHS, creel and logbook (Some version of this performance review may be something we want to standardize and preform on an annual basis or include as deliverable in the op plan on whatever schedule is reasonable and appropriate)

- The work flow of the project could be improved. As discussed, the schedule of deliverables, additional staff, and a more automated generation of estimates are all valid ideas to seek improvement. While some of these items may take time to implement I would start with the schedule of deliverables and map out what it will take to achieve those this year (or identify what cannot be achieved this year and why).
- Looks like I only have 3 major bullet points to add…but I would like to share a thought that I had during this meeting in Juneau. I'm inspired by the intelligence and diligence of my coworkers, it is pleasure working with the entire group.

I have no additional modifications to the matrix.

Tydingco:

- We discussed in detail the annual data needs and talked about a timeline for filling these. I think it would be helpful for all to have a draft (additional column) in the Management Matrix with these dates. There are dates listed in the first five items.
- One of the (obvious) benefits of the meeting was getting folks on the same page as far as the objectives of the creel program and the data needs and limitations. This was very helpful for me to have it all in one meeting instead of dealing with a piece at a time. Also nice to put management needs in context.
- We discussed managing creel needs in the light of inadequate staffing and there was some helpful guidance, but the discussion was not fully fleshed out. This is especially relevant to me as we are still in need of most of our creel technical staff and don't currently have any of those positions filled, and some are supposed to start next week. A question I see coming in the next month may be, "If we only have two people of a 6 person crew, what do we focus on for the summer?" We've got this covered for a short time as we have some backup.

Nichols:

- I found it interesting that the whole room struggled with distinguishing management needs from program objectives, which actually was a bit of a discussion topic, and necessarily so.
- We spent quite a bit of time discussion treaty obligations related to Chinook, which were effectively led by Bob Clark and Ed Jones. I believe everybody in the room walked away with a clearer understanding of the needs, as well as how this review would lead to improvements in the MHS program, while not necessarily reverting back to some design employed in the past
- Transparency, documentation, and repeatability (along with accuracy and precision) are key to this program's success; to this end, it was noted that the methods for estimates germane to the Treaty (and possibly for domestic management purposes inseason) should be fully documented and shared (perhaps vetted with CTC folks).
- At one point in the discussions, there seemed to be a minor consensus or suggestion that the MHS program could be assisted by adding staff members, mostly to assist with the flow of data after initial collection. This would free up Mike and Diana's time so that they could be

more responsive to data requests as well as providing more efficient communication to managers on a weekly basis to stay on top of how technicians collect data
    - **This interestingly was never revisited; nor was there any mention of how RTS could possibly play a role in assisting with analyses**
- It needs to be noted that the Management Needs matrix only captures those data requests associated with annual reporting; that is to say—these have and needed to be addressed for years (with the possible exception of some midseason estimates). What the matrix does not capture are all those special requests generated by BOF needs, or new management requests generated b/c of changes in management/regulation where we need to evaluate how actions curtailed harvest to meet some reduction objective

Hansen:

The only action items I have was for Jiaqi to write some guidelines for the managers discussing 4 items:

1. How and when to adjust the sampling schedule if a tech (or 2) is sick or on vacation.
2. How a King closure affects sampling
3. Can techs switch from an assigned dock to roaming between docks part way through a shift?
4. Should they sample as many fish as possible during the derby (maybe even add office staff)?

I think the plan was to include these guidelines in the op plan. I know he was working on it and Diana needed to check to be sure her programs could handle the deviations (esp. the assigned switching to roaming). Honestly, I don't think we should let the SAS program dictate the sampling, if switching mid shift increases the sample and reduces the variance and Jiaqi can make the math work Diana will just have to adjust the SAS code. I guess the problem could be the handhelds? Anyway, wait to see what Jiaqi recommends.

My only other comment about the matrix is that I don't know if all the data requests Mike gets from the managers are in the matrix. I don't know what calculations/estimates are in Mike's spreadsheets.

Ed listed off a few additional estimates he would like.

My suggestion is that all the data/estimate requests be secondary objectives in the op plan and how the estimates are calculate would then also be in the op plan (Bob Clark's suggestion). I know this will not happen this year but it should definitely be in next year's plan.

From: Huang, Jiaqi (DFG)
Sent: Wednesday, May 02, 2018 3:37 PM
To: Nichols, Jeff V (DFG) <jeff.nichols@alaska.gov>; Hansen, Patricia A (DFG) <pat.hansen@alaska.gov>; Jaenicke, Mike J (DFG) <mike.jaenicke@alaska.gov>; Tersteeg, Diana L (DFG) <diana.tersteeg@alaska.gov>
Subject: RE: Answers to some sampling questions.

Hi all,

I need to amend and clarify my answer to question (1) below.

(1) Is it okay to roam among the docks(access locations) and sample where more harvest occurs?
After discussing with Diana, I realize there are two types of roaming. I need to clarify that.

(i) The first type of roaming is roaming away from a pre-assigned access location (dock) to a busier one, or changing the dock assignment to busier docks daily. My answer in the previous email applies to this type. Roaming away from a less busy dock (access location) to a busier one will yield biased-high harvest / catch estimates for the same reason I mentioned in the previous email. So once a dock (access location) is randomly assigned, it is NOT a good idea for creel technicians to be assigned to another busier dock, although this type of roaming is not likely to affect the CWT or average length or proportion estimates.

(ii) The other type of roaming is roaming within an assigned dock (accession location). As Diana pointed out that usually there are multiple sub-docks within a single assigned dock. In that case, it is okay to roaming among these sub-docks as long as the creel technicians do not roam away from this pre-assigned location, since these sub-docks are still considered as one access location.

Diana also clarified that there are the two types of samplers, the creel technicians and catch technicians.
"In MHS there are two types of samplers, creel technicians and catch technicians. The creel tech's data is used to create the harvest estimate, in addition to collecting CWT and biological samples; they sample based on preassigned randomly selected harbors. Catch technicians collect CWT and biological samples and have the ability to roam to any harbor assigned as a MHS access location, as their data is not used for harvest estimates. "

Clear as mud? Let me know if you have any question.

Jiaqi Huang

Biometrician

From: Huang, Jiaqi (DFG)
Sent: Tuesday, April 24, 2018 10:14 AM
To: Nichols, Jeff V (DFG) <jeff.nichols@alaska.gov>; Hansen, Patricia A (DFG) <pat.hansen@alaska.gov>; Jaenicke, Mike J (DFG) <mike.jaenicke@alaska.gov>; Tersteeg, Diana L (DFG) <diana.tersteeg@alaska.gov>
Cc: Power, Sarah J (DFG) <sarah.power@alaska.gov>
Subject: Answers to some sampling questions.

Hi all,

Pat has passed on to me some sampling questions that arose during the review meeting. Here are my opinions towards these questions.

(1) Is it okay to roam among the docks(access locations) and sample where more harvest occurs?
Generally no (for harvest estimate). Here is the reason. In multi-stage sampling, within each stage we sample *n* units out of *N* all possible units. We then calculate the average (x) of these *n* units and expand this average to the whole population *N* in order to get the total (T=x*N) for that stage. Docks are one of the stages. For example, we sample 2 docks out of 5 in one port for Chinook harvest. Then we calculate the average harvest for these 2 docks and finally expand the average to all 5 docks to get the total harvest for the port. If we roam towards the 2 docks that have more harvest, we will end up getting a larger (than reality) average harvest from the two docks we sample. Then we end up getting a biased-high total harvest when we expand this average to the total 5 docks. So roaming to the docks that have more harvest will get us biased-high estimate for harvest.

However, roaming among docks will NOT affect the CWT contribution or average length estimates or proportion estimates, because these estimates do not involve expanding to the whole population. Sampling as many fish as possible will actually improve these estimates. Can we maybe send some technicians roaming for this information and meanwhile keep some technicians at the original dock scheduled, so that we will still have the harvest information we need and at the same time collect more CWT/length information at other docks?

(2) Can we not go out sampling during Chinook closure?
If all we need is Chinook information, we can stay in during the Chinook closure. But are other fisheries going on during Chinook closure? Do we still need to sample coho, halibut or lingcod? If so, we still need to sample for these fisheries during Chinook closure.

(3) How many days can we afford to miss without much impact on our estimates?
This is a difficult one to answer. According to the op plan, we are sampling 10 days every bi-week (14 days) at most ports. It is a pretty good fraction (10/14) for sampling days. Generally, cutting sample size by half will double the variance. I would say, try not to miss more than 3 days of sampling during a bi-week sampling period. That is sampling at least 7 days during a bi-week period (keeping the sampling fraction above 7/14). Also try not to miss derby days. Those days are good opportunities to easily sample for CWT.

Let me know if you have any more questions. More discussion is welcomed. I also attached my reply to Kelly's questions about CWT sampling. Thanks.

Jiaqi

From: Hansen, Patricia A (DFG)
Sent: Thursday, April 19, 2018 9:14 AM
To: Nichols, Jeff V (DFG) <jeff.nichols@alaska.gov>
Subject: RE: Southeast Marine Creel Program Review

Hey Jeff,
The only action items I have was for Jiaqi to write some guidelines for the managers discussing 4 items:

5. How and when to adjust the sampling schedule if a tech (or 2) is sick or on vacation.
6. How a King closure affects sampling
7. Can techs switch from an assigned dock to roaming between docks part way through a shift?
8. Should they sample as many fish as possible during the derby (maybe even add office staff)?

I think the plan was to include these guidelines in the op plan. I know he was working on it and Diana needed to check to be sure her programs could handle the deviations (esp. the assigned switching to roaming). Honestly, I don't think we should let the SAS program dictate the sampling, if switching mid shift increases the sample and reduces the variance and Jiaqi can make the math work Diana will just have to adjust the SAS code. I guess the problem could be the handhelds? Anyway, wait to see what Jiaqi recommends.

My only other comment about the matrix is that I don't know if all the data requests Mike gets from the managers are in the matrix. I don't know what calculations/estimates are in Mike's spreadsheets.
Ed listed off a few additional estimates he would like.
My suggestion is that all the data/estimate requests be secondary objectives in the op plan and how the estimates are calculate would then also be in the op plan (Bob Clark's suggestion). I know this will not happen this year but it should definitely be in next year's plan.

I thought the meeting went well – you did an excellent job Jeff – thank you!

Pat

From: Tydingco, Troy A (DFG)
Sent: Tuesday, April 17, 2018 3:40 PM
To: Nichols, Jeff V (DFG) <jeff.nichols@alaska.gov>
Subject: RE: Southeast Marine Creel Program Review

Hey Jeff- sorry to take so long to get back to you on this….I've only got three additional bullets.

- We discussed in detail the annual data needs and talked about a timeline for filling these. I think it would be helpful for all to have a draft (additional column) in the Management Matrix with these dates. There are dates listed in the first five items.
- One of the (obvious) benefits of the meeting was getting folks on the same page as far as the objectives of the creel program and the data needs and limitations. This was very helpful for me to have it all in one meeting instead of dealing with a piece at a time. Also nice to put management needs in context.

We discussed managing creel needs in the light of inadequate staffing and there was some helpful guidance, but the discussion was not fully fleshed out. This is especially relevant to me as we are still in need of most of our creel technical staff and don't currently have any of those positions filled, and some are supposed to start next week. A question I see coming in the next month may be, "If we only have two people of a 6 person

From: Fowler, Patrick A (DFG)
Sent: Saturday, April 14, 2018 10:34 PM
To: Chadwick, Robert E (DFG) <bob.chadwick@alaska.gov>; Tydingco, Troy A (DFG) <troy.tydingco@alaska.gov>; Pawluk, Jason A (DFG) <jason.pawluk@alaska.gov>; Teske, Daniel J (DFG) <daniel.teske@alaska.gov>; Love, David C (DFG) <david.love@alaska.gov>; Fowler, Patrick A (DFG) <patrick.fowler@alaska.gov>; Schwanke, Craig J (DFG) <craig.schwanke@alaska.gov>; Catterson, Matthew R (DFG) <matt.catterson@alaska.gov>; Wood, Michael A (DFG) <mike.wood@alaska.gov>; Reppert, Kelly S (DFG) <kelly.reppert@alaska.gov>
Cc: Nichols, Jeff V (DFG) <jeff.nichols@alaska.gov>
Subject: Marine creel review

Good afternoon managers of creel staff.
In the course of the marine creel program review this last week, we identified several challenges the project is faced with this season. Among other topics, reduced king salmon abundance (and their availability for sampling), sampling in areas of king salmon non-retention, and ideas to increase king salmon biological samples were discussed. Combined with the apparent region wide staffing shortage this may create unique sampling conditions in your port that should be evaluated on a port specific level. We've been asked to use our local knowledge to identify how staffing shortages, king salmon restrictions, or other considerations may impact the project as well as share new ideas. Similar to the management review (pros/cons list) which you provided input for earlier this year I'll combine our individual responses into a collective document.

This is an especially good time to address items that might involve changes to the sampling structure (exit points sampled, times sampled, staffing levels, ect…) as biometric staff will be reviewing these items and providing creel project staff with guidance which could be used as a guideline for when it is appropriate and to what extent sampling operations may be modified into the future.

To provide you some feedback and fuel the thinking process for this exercise, we did discuss all items that were included in the management review and to pass on some of the conclusions relating to sampling structure:

- For the 2018 season the project will follow similar staffing levels and start dates despite large areas of king salmon nonretention recognizing 1) there are many other objectives other than king salmon that also necessitate sampling during this time period and 2) king salmon release information will be valuable and creel produced estimates are accepted to be more reliable than SWHS catch estimates. That said, specific modifications to sampling structure focused on collecting additional king salmon samples will be evaluated and ideas/identifying problems specific to your port are welcome.
- The project would benefit from increased sampling of private boats harvesting king salmon although sampling at remote lodges is generally not practical or cost effective. An expansion of marine creel estimates is made to account for locations where we do not sample. Adding/modifying exit locations and/or staffing levels to target areas that most efficiently collect samples will be considered.
- In the face of staffing shortages modifications may be made to prioritize exit points with a greater number of interviews and biological samples.
- Modifying staffing schedules to different time periods or days off will also be considered although union rules may limit flexibility.

A more thorough report of the results of this meeting will be forthcoming soon. I understand we are all incredibly busy this time of year and a due date for this item will be discussed on the Monday teleconference.

From: Fowler, Patrick A (DFG)
Sent: Saturday, April 14, 2018 10:43 PM
To: Nichols, Jeff V (DFG) <jeff.nichols@alaska.gov>
Subject: RE: Southeast Marine Creel Program Review

Jeff, here are my bulleted items and perspective.

- I believe this meeting was extremely productive to identify concerns and improve communications/understanding across all parties. To be effective in implementing best practices it will take continued efforts to follow up on action items, answer questions, and explore ideas that were not fully satisfied at this meeting. I appreciate your efforts to document, which allows us to capture items from this meeting and track what changes might be made in the future along with the why or why not. In whatever format (post season meeting, white paper, ect..) continued follow up and review is critical.
- While the 20% sampling goal is mandated by the treaty it is still valuable to identify precision in the currently observed sampling rates for domestic management purposes and sampling rates we feel comfortable with given the actual annual conditions (eg current low KS abundance). Clearly presenting this information I believe would help to address Bob Clark's identified concern regarding trust in the estimates produced. As others have mentioned, it may also be time to prepare another review of comparison between SWHS, creel and logbook (Some version of this performance review may be

something we want to standardize and preform on an annual basis or include as deliverable in the op plan on whatever schedule is reasonable and appropriate)

- The work flow of the project could be improved. As discussed, the schedule of deliverables, additional staff, and a more automated generation of estimates are all valid ideas to seek improvement. While some of these items may take time to implement I would start with the schedule of deliverables and map out what it will take to achieve those this year (or identify what cannot be achieved this year and why).
- Looks like I only have 3 major bullet points to add…but I would like to share a thought that I had during this meeting in Juneau. I'm inspired by the intelligence and diligence of my coworkers, it is pleasure working with the entire group.

I have no additional modifications to the matrix.

From: Nichols, Jeff V (DFG)
Sent: Friday, April 13, 2018 4:09 PM
To: Clark, Robert A (DFG); Jones, Ed L (DFG); Hasbrouck, James J (DFG); Hansen, Patricia A (DFG); Meyer, Scott C (DFG); Huang, Jiaqi (DFG); Tydingco, Troy A (DFG); Reppert, Kelly S (DFG); Fowler, Patrick A (DFG); Power, Sarah J (DFG); Tersteeg, Diana L (DFG); Chadwick, Robert E (DFG); Lum, Judy L (DFG)
Subject: RE: Southeast Marine Creel Program Review

Appreciate the input received thus far and thanks Bob for this quote….I've never seen it before but it sure rings true.

Please don't forget your homework assignment folks!

Have a great weekend

From: Reppert, Kelly S (DFG)
Sent: Thursday, April 12, 2018 3:55 PM
To: Tersteeg, Diana L (DFG) <diana.tersteeg@alaska.gov>; Fowler, Patrick A (DFG) <patrick.fowler@alaska.gov>; Tydingco, Troy A (DFG) <troy.tydingco@alaska.gov>; Love, David C (DFG) <david.love@alaska.gov>; Chadwick, Robert E (DFG) <bob.chadwick@alaska.gov>; Nichols, Jeff V (DFG) <jeff.nichols@alaska.gov>; Lum, Judy L (DFG) <judy.lum@alaska.gov>
Subject: FW: MHS sampling question.

FYI…

From: Hansen, Patricia A (DFG)
Sent: Thursday, April 12, 2018 9:52 AM
To: Huang, Jiaqi (DFG); Reppert, Kelly S (DFG)
Subject: RE: MHS sampling question.

Thanks Jiaqi.

We talked in the meeting about how it would be helpful for you to lay out some rules regarding missing techs and a few other things.

I can talk to you about it Monday.

Pat

From: Huang, Jiaqi (DFG)
Sent: Thursday, April 12, 2018 9:46 AM
To: Hansen, Patricia A (DFG) <pat.hansen@alaska.gov>; Reppert, Kelly S (DFG) <kelly.reppert@alaska.gov>
Subject: RE: MHS sampling question.

Hi all,

I assume all these questions are with regards to CWT sampling.

Kelly wanted to know if they could increase the sampling during the derby time (or time when a lot of fish are on the docks) to increase the number the number of fish to examined for CWTs? The CWT codes change over time so it seems to me that you would bias the overall sample if the derby was heavily sampled – but you are more familiar with this project than me.
I think it is legit to do that in your case. Here is the reason. First of all, I want to point out that we are not using 4-stage sampling for hatchery contribution calculation. The estimated hatchery contribution is calculated based on the proportion of # of CWTs out of all inspected fish. So essentially the proportion of # CWTs out of all inspected fish is the key parameter that we are after. As we increase the number of samples (fish inspected), we expect that more number of CWTs can be recovered, meanwhile that proportion estimate stays the same.

CWT sampling is a lot like mark-recapture study. So I generally suggest sampling proportional to harvest (if there are more boats / more harvest, we sample more) so that the sampling can be representative. Just like mark-recapture, CWT sampling are rarely chosen randomly, but samples can be representative without randomly chosen, which is true for most mark-recapture studies. So if there is a chance to sample more for CWTs during derby time (or when more fish are on the docks), I would definitely do that. It would improve that proportion estimate I mentioned above.

Pat, what is the concern of codes changing over time? I am not aware of that.

A couple other questions:
1. How does an early season King closure affect sampling? Could they sample less early in the season?

Does King closure means less King harvest? If so, yes. Just like I said before, I would suggest sampling proportional to harvest. However, what about other species? We still need to sample for coho CWTs, right? Do they harvest less coho during King closure too?

2. If a technician gets sick how does that affect the estimates – at what point do we really start to affect the estimate (tech gone for a whole week or both techs on PL for a week).
This is a hard one to answer. If two techs are away for one week and come back and sample at the same rate for the next week. And if we assume that the proportion of # cwt out of all sample is the same throughout the two weeks, then there will not affect our point estimate. But the variance of the estimate will get larger. And also if they miss the derby week, they would lose a great opportunity to sample for CWTs. But if they miss the King closure week, I would not feel remorse. Again we also have other sampling needs (harvest, catch, ASL, harlibut, rock fish, and etc) apart from CWTs. If we assume the week we miss is same as the week after, our estimate will not be affected. But the uncertainty will surely go up because we miss one week of information especially when some estimates are stratified by bi-weeks.

Let me know if you have any more follow-up question. Thanks.

Jiaqi

From: Hansen, Patricia A (DFG)
Sent: Wednesday, April 11, 2018 11:15 AM
To: Huang, Jiaqi (DFG) <jiaqi.huang@alaska.gov>; Reppert, Kelly S (DFG) <kelly.reppert@alaska.gov>
Subject: MHS sampling question.

Jiaqi,
Kelly wanted to know if they could increase the sampling during the derby time (or time when a lot of fish are on the docks) to increase the number the number of fish to examined for CWTs? The CWT codes change over time so it seems to me that you would bias the overall sample if the derby was heavily sampled – but you are more familiar with this project than me.

Could you get back to her.
Thanks
Pat

A couple other questions:

1. How does an early season King closure affect sampling? Could they sample less early in the season?
2. If a technician gets sick how does that affect the estimates – at what point do we really start to affect the estimate (tech gone for a whole week or both techs on PL for a week).

From: Jones, Ed L (DFG)
Sent: Wednesday, April 11, 2018 5:16 PM
To: Power, Sarah J (DFG) <sarah.power@alaska.gov>; Clark, Robert A (DFG) <bob.clark@alaska.gov>; Nichols, Jeff V (DFG) <jeff.nichols@alaska.gov>; Hasbrouck, James

J (DFG) <james.hasbrouck@alaska.gov>; Hansen, Patricia A (DFG) <pat.hansen@alaska.gov>; Meyer, Scott C (DFG) <scott.meyer@alaska.gov>; Huang, Jiaqi (DFG) <jiaqi.huang@alaska.gov>; Tydingco, Troy A (DFG) <troy.tydingco@alaska.gov>; Reppert, Kelly S (DFG) <kelly.reppert@alaska.gov>; Fowler, Patrick A (DFG) <patrick.fowler@alaska.gov>; Tersteeg, Diana L (DFG) <diana.tersteeg@alaska.gov>; Chadwick, Robert E (DFG) <bob.chadwick@alaska.gov>; Lum, Judy L (DFG) <judy.lum@alaska.gov>
Subject: RE: Southeast Marine Creel Program Review

Hi Sara, thanks for this but I need to point out a few things here (in red below).

From: Power, Sarah J (DFG)
Sent: Wednesday, April 11, 2018 3:29 PM
To: Jones, Ed L (DFG); Clark, Robert A (DFG); Nichols, Jeff V (DFG); Hasbrouck, James J (DFG); Hansen, Patricia A (DFG); Meyer, Scott C (DFG); Huang, Jiaqi (DFG); Tydingco, Troy A (DFG); Reppert, Kelly S (DFG); Fowler, Patrick A (DFG); Tersteeg, Diana L (DFG); Chadwick, Robert E (DFG); Lum, Judy L (DFG)
Subject: RE: Southeast Marine Creel Program Review

I sent some suggestions to Pat & Jiaqi yesterday, for posterity here they are and then some:

In regards to 20% sample rate:

1. Find out why a 20% sample rate was suggested.

THIS IS NOT A SUGGESTION, IT'S A REQUIREMENT UNDER THE TREATY. Here is the link to the most recent paper I could find.

   http://www.rmpc.org/files/Action_Plan_in_Response_to_CWT_Expert_Panel_RecommendationsMarch2008.pdf (Obtain paper from Ed Jones.) If it relates to precision what would be required to meet that precision (with or without meeting the 20% rate)?

2. If you added another sampler how much might you increase the sampling percentage at major ports? (Perhaps = (current sample %)/(current # of techs), but might be a little more complicated than that.)
3. Analyze how hatchery tag rates affect precision. What increase of tagging rate would decrease precision by X amount (or decrease the on-dock sample rate by X amount.) What increase of tagging rate would offset the need of additional samplers?

In concept your idea is great here BUT I seriously doubt all of the CWTd stocks on the coast will be tagged at higher rates simply because Alaska wants to decrease its sampling rate; you get the point!

In regards to expansion from creel to SWHS:

4. Develop expansion rates using logbook data for charter harvest and compare to current methods for both predictive potential and variance. (Moreover can logbooks be timely to use for charter info?)
5. For non-charter harvest examine if another method for expansion from creel to SWHS could be used that has better predictive potential.

6. Jiaqi or Rich Chapell can calculate expansion factors for Haines in the same it is done for the rest of the SEAK creel. Personally I don't think Mike should be the one doing that.

I disagree, any expansion factors should be an output by Mike working w biometric staff and NOT the area management biologists for many reasons.

7. Note: This was not discussed but should be noted: The (5 year) expansion factors were being developed as we recovered 5 years of paired SWHS-creel data. The final bit of that data would have come out in 2016. I think some of the difficulties were a result of mixing up the Preliminary (expanded) estimate and the creel estimate. I believe that has been cleared up.

In regards to CWT harvest

8. CWT harvest: Already any individual can calculate CWT harvest independent of Mike, for the area and time periods the tag lab reports provided Mike has reported the Preliminary (AKA expanded) Harvest. An additional column for variance would allow others to calculate variance around that estimate as well.
9. Mike will provide the Preliminary (AKA expanded) Harvest estimates (and ~~potentially~~ variances, see above) to the stock assessment and the tag lab. A year later those harvest estimates _*could*_ be replaced by SWHS numbers since that is the definitive at this time (if we are saying the SWHS is the best estimate, then yes, it will ultimately replace any placeholders). That might make it so everyone has and can calculate the same numbers. Since Jiaqi is the biometrician on both projects he may be able to facilitate this.
10. Suggestion: Analyze how CWT harvest rates change through biweeks historically, if they don't change considerably then consolidate adjacent biweeks. (Maybe early season, midseason, late season) in an effort to reduce variance and create more robust estimates.(Negative, basic harvest data must be gathered on a bi-weekly basis; whoever does the CWT analysis can make decisions on whether or not to roll-up strata.

In regards to CWT harvest rate report for smaller areas.

11. In order to do calculations with expansions to SWHS, areas in the SWHS would have to match up to the areas the creel records. Currently they don't, at least not in all areas. (Maybe this can be changed?)
12. Assuming the expansion for a port is the same for the smaller area you can get an estimate, however you would need all of the following:
    a. Spatiotemporal areas to be large enough that the probability of detecting a tag is not low.
    b. Spatiotemporal areas to be large enough that the variance on estimates of (non-CWT) harvest are not too large.
    c. CWT tag recoveries to be recorded and reported by the tag lab on their database at the smallest spatial area desired.

A reasonable alternative that managers might be able to use to determine where and when CWT'd fish are being caught is to know what areas decoded cwt's were caught, and to map them out in space and time.

In regards to data requests being possible or not, and biometric input:

13. I heard Mike say that he cannot (or isn't allowed to) say no to a data request which cannot be reasonably filled with the data at hand. I also know that Mike gets a lot of data

requests that the supporting biometrician knows nothing about. I would suggest that adding the input of a biometrician to the discussion might clear some of that up.

14. Before this meeting I did not know Mike put together a salmon harvest pre-season projection. After reviewing much of Mikes work I have confidence that he would have provided the best available information. But here again it would be good to have the biometrician in on the calculations, and for the methods used for a particular year to be documented. (I also think Mike should be at liberty to use the method he thinks is best for any particular year as long as it is documented.)
15. Use your biometrician. We are a resource here to serve you. By doing so you may (although we aren't perfect either) help to clear up misunderstandings. One thing that is "broken" relates directly to this section ... many data requests are not filled in a timely manner and that HAS to change and I believe scripted out "due dates" will help solve some of this. However, it could be that Mike et al. are simply overloaded and more power is needed in the MHS program to alleviate some of the workload. I don't know but this must change.

In regards to info being accessible:

16. Like I mentioned above, with some training people can determine the CWT harvest from data provided on the tag lab public website. Ed Jones is an expert on this.(I don't know if expert is the correct term here, but yes, I've done a ridiculous amount of CWT contributions since the mid-90s)
17. You now have a database accessible to managers. Hooray. Learn to use it. ☺

Also here are some things that are not captured in the management needs matrix:

It was good to hear the history of the creel. It would be nice to have some of that information captured in a paper if anyone has the time to do so. These are some notes I have from that portion of the meeting. Please correct me if my paraphrasing is incorrect. I am also adding my own thoughts.

The creel was established in 1960, the State Wide Harvest Survey (SWHS) in 1977. In the early years of the SWHS estimates tracked closely to the creel (at least for the metrics presented in the graphs provided.) In 1990 the SWHS started estimating catch, that is harvest and release not just harvest and became the definitive source for harvest/catch estimates. It is also during this time period that we see that the SWHS harvest numbers depart from those of the creel, by a large enough factor that an expansion factor to get from creel to SWHS should be used.
Creel was never in all ports nor all seasonal or daily time periods so this jump cannot be solely attributed to that, but there was speculation related to the increasing charter business. (Maybe private lodges not sampled by creel.)

The historical SWHS response rates have ranged from 47% to about 40% today.
(Sarah's thoughts: For a mail out survey those are excellent response rates. There still may be non-response bias, of particular concern would be if those that did not catch much did not respond, as that would bias SWHS high. However according to discussion logbook and SWHS data track well, so this concerned would be more geared to non-charted harvest. I am guessing someone has examined this before.)

In the early – mid 2000's there was criticism of the program (Correct me if I am wrong, but I believe it was from the ground fish arena, perhaps the International Pacific Halibut Commission.) that within and between boat variance was not taken into account. This was resolved in the 2011 calculations. Also in 2011 less frequently dropped docks were dropped in an effort to increase biological sampling and reduce costs. It is noteworthy to recognize there are some locations (private docks/lodges) that creel was (perhaps always) excluded from and presently creel is considered an index of harvest.

In 2011 both the creel and the SWHS were redesigned so it was recognized that it would take several years to develop an stable expansion factor. A five year moving average is currently used, which takes into account sampling and process error. The 2011- 2015 expansion factors applied to the 2011-2016 creel estimates to expand to the preliminary estimate for that year. (creel*expansion = preliminary estimate of what SWHS might be.) It should be noted that since it takes 1.5 years for a SWHS to come out that the 2018 expansion factor relies on paired creel - SWHS data from 2012-2016

It can and should be evaluated if the 5 year moving average, or another method to developed the expansion factor should be used. – However give everyone plenty of notice if another method is used. Since changes in the expansion factor was a cause of consternation for the CWT sampling rate and estimates Mike has provided.

Forgive the long email but hopefully it might serve someone reflecting back on this review many years from now. (very thorough notes and appreciated but a few things needed some counter here)

Also, thanks for inviting me and listening to my input. It was an honor to serve you these past 10 years. – Also I am not too far away – just on the Comfish side of things.

Sarah

From: Clark, Robert A (DFG)
Sent: Wednesday, April 11, 2018 12:22 PM
To: Jones, Ed L (DFG) <ed.jones@alaska.gov>; Nichols, Jeff V (DFG) <jeff.nichols@alaska.gov>; Hasbrouck, James J (DFG) <james.hasbrouck@alaska.gov>; Hansen, Patricia A (DFG) <pat.hansen@alaska.gov>; Meyer, Scott C (DFG) <scott.meyer@alaska.gov>; Huang, Jiaqi (DFG) <jiaqi.huang@alaska.gov>; Tydingco, Troy A (DFG) <troy.tydingco@alaska.gov>; Reppert, Kelly S (DFG) <kelly.reppert@alaska.gov>; Fowler, Patrick A (DFG) <patrick.fowler@alaska.gov>; Power, Sarah J (DFG) <sarah.power@alaska.gov>; Tersteeg, Diana L (DFG) <diana.tersteeg@alaska.gov>; Chadwick, Robert E (DFG) <bob.chadwick@alaska.gov>; Lum, Judy L (DFG) <judy.lum@alaska.gov>
Subject: RE: Southeast Marine Creel Program Review

Thanks Ed,

This review has touched off some memories from my past service with DSF and the division's longstanding efforts to produce the best science-based management of sport fisheries in North America. For those of you who have not had the IPMP (Bleiker) SDIC training (or have forgotten what was taught), here is an interesting quote from Hans Bleiker that is apropos whenever we review/revise programs that provide crucial (and often controversial) information for proper management of the resource. Some of you might remember that I had this quote pasted to the wall of my office for many years.

> There are a number of ways to destroy agency credibility (Bleiker 1995). These include (1) allowing someone else to be the first or best source of information, (2) dismissing legitimate concerns or dealing with them as if they were silly or phony, (3) letting others bring up the big, controversial, painful issues--and then getting defensive about them, (4) becoming unavailable for people, including the press, and (5) pretending to know more or less than we really know. We see fish and wildlife agencies doing these things with alarming regularity.

This is not to say that DSF has these issues, only to remember how easy it is for any of us to fall into these traps…

Thanks again for the good discussions.

Bob

From: Jones, Ed L (DFG)
Sent: Wednesday, April 11, 2018 11:46 AM
To: Clark, Robert A (DFG); Nichols, Jeff V (DFG); Hasbrouck, James J (DFG); Hansen, Patricia A (DFG); Meyer, Scott C (DFG); Huang, Jiaqi (DFG); Tydingco, Troy A (DFG); Reppert, Kelly S (DFG); Fowler, Patrick A (DFG); Power, Sarah J (DFG); Tersteeg, Diana L (DFG); Chadwick, Robert E (DFG); Lum, Judy L (DFG)
Subject: RE: Southeast Marine Creel Program Review

Nice feedback Mr Clark! Some additional thoughts below.

It would be informative:

- to know the proportion of surveyed and un-surveyed area by location (gets at the prop of the total harvest available to *creel/catch* sampling program);
- to see a comparison of chartered angler Chinook (maybe other ssp) harvests from the *creel/catch*, *logbook* and *SWHS* methods (perhaps already done?) and if these 3 methods match-up (I thought I heard mention of that), then any discrepancy between *creel/catch* or a combination of *creel/catch+logbook* and the *SWHS* is by default due to unchartered anglers;
- to see an update to the relationship between total Chinook (other ssp?) harvest by location from the *creel/catch* and the *SWHS* programs; and

- to see total Chinook (other ssp?) harvest from the ***creel/catch*** for unchartered plus ***logbook*** for chartered by location and how it compares to the total Chinook harvest from the ***SWHS*** (I believe this would be analogous to the method used for halibut).

Emphasize:

- the continued need to sample the sport fishery in SEAK on a biweekly basis at 20%+ rate for Chinook and coho CWTs and provide estimates of harvest and associated CWT sampling stats by location (JNU, PSB/WRG/KTN, SIT) while gathering tissues for GSI and sampling ASL and other ...
- the need to sample District 108 and 111 by statistical week at 30%+ (original goal in 2005; might see if it's IDd in the 2005 OP) for Chinook CWTs and provide estimates of harvest and associated sampling stats thru SW30 while gathering tissues for final GSI estimate and sampling for ASL and other ...

And Bob's last bullet is spot-on. Although we may need to make a few adjustments, the MHS program isn't broken and through the use of ***creel/catch***, ***logbook***, and ***SWHS*** we already gather the bulk of the information required to achieve domestic and treaty obligations.

At this time I do not have any edits to the spreadsheet and thanks for letting me sit in w you folks!~

From: Clark, Robert A (DFG)
Sent: Wednesday, April 11, 2018 8:32 AM
To: Nichols, Jeff V (DFG); Hasbrouck, James J (DFG); Hansen, Patricia A (DFG); Meyer, Scott C (DFG); Huang, Jiaqi (DFG); Tydingco, Troy A (DFG); Reppert, Kelly S (DFG); Fowler, Patrick A (DFG); Power, Sarah J (DFG); Tersteeg, Diana L (DFG); Jones, Ed L (DFG); Chadwick, Robert E (DFG); Lum, Judy L (DFG)
Subject: RE: Southeast Marine Creel Program Review

Hi Jeff,

Here are some suggested edits of the management data needs workbook relative to salmon catch estimation:

- Cells C5 and C6 should be the same as cell C4.
- Add the word "Postseason" to the beginning of cells B9, B10, and B11.

Here are my 5 bulleted statements related to the review:

- The MHS review is timely due to potential changes in the treaty annex for Chinook (SEAK and TBR). However, more frequent reviews are needed (biannually?) to ensure that objectives of the program do not creep away from required management needs.
- There is a need to standardize and fully document (in the Op Plan and in Reports) the secondary analyses (using primary statistics from the MHS along with other information) needed to support management decisions. Timely ADF&G data series reporting of results of the MHS could fully support this need. Adaptive methods (e.g., rolling

averages, model selection methods, error estimation and correction) should be employed in development of these analyses.
- While the allocative aspects of treaty catch in the recreational fishery have been worked out by the BOF, there remains a joint SF/CF responsibility to stay **under** the current treaty **limit**. While there is currently no payback for overages of the limit, there may be in the future and the MHS program will be integral to upholding this responsibility. Within the agency, trust in how the MHS generates final estimates of treaty catch in the recreational fishery is low at the moment. Increasing the rigor of inseason and postseason catch estimation will help to increase that trust.
- I believe the marine guide logbooks are a huge and largely untapped resource for pre- and inseason catch estimation/modeling. More work needs to be done to tap into this potential.
- Nothing in the MHS is broken; it is a solid and worthwhile program. I believe the review served to help refocus the program on its responsibilities and new opportunities to provide managers with the best science.

I did not take notes, but wanted to say thank you for the opportunity to participate in the review.

Bob

From: Nichols, Jeff V (DFG)
Sent: Wednesday, April 11, 2018 8:27 AM
To: Hasbrouck, James J (DFG); Hansen, Patricia A (DFG); Meyer, Scott C (DFG); Huang, Jiaqi (DFG); Tydingco, Troy A (DFG); Reppert, Kelly S (DFG); Fowler, Patrick A (DFG); Power, Sarah J (DFG); Tersteeg, Diana L (DFG); Jones, Ed L (DFG); Chadwick, Robert E (DFG); Lum, Judy L (DFG); Clark, Robert A (DFG)
Subject: Southeast Marine Creel Program Review

Good morning folks.

I believe we had a productive couple of days, but our work is far from over. Our most immediate need is wrapping up the 2-day review (and ½ day this morning with smaller break-out group) by way of getting some input in writing from each of the participants. Here is what I would like to propose and request:

- Everybody reviews the attached Management Needs matrix; anybody with feedback, additions/subtractions, etc—please send me a response in simple bulleted form
- Everybody (in this instance…I'm asking everybody) sends me 5 bullet statements related to the review (what was missed, accounting of Action Items, highlights, lowlights, where we might go from here, etc)
- Anybody who took notes and is willing to share those notes—please send to me in digital form—either word document if you did so on your computer, simple scanned PDF of paper notes, or transcribe your paper notes into something more consumable by another person if you take as short-hand notes as I do occasionally
- I will do my best to compile and assimilate into a single cohesive document; as was done before (in 2011) but in lesser fashion, this will be incorporated into the 2018 (and likely

2019, but probably in revised/updated fashion) Operational Plan to document any suggested changes in methodology, study design, workflow and the rationale behind it.

The discussion this morning with the break-out group will also be incorporated into this documentation.

If possible, I'd like to have people's homework assignment as described above by next Monday.

Thanks for everybody's engagement and input

Jeff

Appendix C3.–Marine Harvest Studies Program Action Items and Timeline as identified during the program review.

April-May (pre- and early-Inseason) 2018 Summary

As a result of the creel program review, a number of activities and action items were identified which would have immediate, short-term benefits to the program if implemented preseason or shortly thereafter. These fall into several broad categories: 1) summarizing and distilling input from creel program review participants; 2) Regional Operational Plan updates and revisions; 3) communication improvements – streamlining the flow of information between area managers and creel program leader and research analyst; 4) clarifying & revising data needs for management; and 5) clarifying sampling design 'rules' for unique situations.

Inseason 2018 Summary

Activities and action items to be completed inseason (May – September) involve continuation of many preseason tasks, special evaluations of sampling design components, and fulfilling known data requests which are captured in the Management Needs matrix for in-season reporting.

Postseason 2018 and Beyond Summary

Following the 2018 sampling season, specific one-time and iterative activities will be used to assess the effects of changes implemented across various aspects to the creel program and to identify information gaps and emerging or new needs. Plans for future Operational Planning and project reporting are included.

April-May (pre- and early-Inseason) 2018:

- Jeff – Send a request to all participants asking for their notes. Jeff to compile, merge, and produce final accounting, from which 3 products are produced: management needs matrix, Action Item List, and meeting notes assimilation
    - **Friday, April 20**: Jeff sends draft Action Item list to Fowler, Lum for initial review
    - Once feedback is provided, Nichols to send out the Management Needs matrix and list of Action Items (prioritized by short-term and long-term) to all participants and Director Brookover
        - **Deadline is April 28; Delivery occurred May 9**
    - **May 11:** Meeting notes are distributed to all creel program review participants
- Jeff – send Jiaqi's parameter estimate and data flow schematics to Mike and Diana for review **(April 20th); Completed April 23rd**
    - Jiaqi to update if needed and include as appendices in the ROP **(1st week of May); Completed May 1**
- Mike – Mike will need to provide FY18 LDP coding (perhaps working with Judy, Jeff, and Brian) by **April 28th** (for use in the 1st timesheet once tech's hit the dock); **Completed April 27th**
    - Mike needs to identify the default timing windows (when a particular budget code CANT be used for whatever reason) – **this needs done by June 15th**
    - Jeff should look at the LOA grant and see when spending can occur **(April 28th)**; **Completed April 20th --** LOA funding is aligned with our FY calendar
- Mike – provides FY18 Line 300 – 400 budget coding to all managers for incidental and supplies spending ($400 was discussed) – **April 28th; Completed April 30th**

- Scott and Jeff – Related to (Proportion of unguided harvest that occurred prior to mean date of IPHC survey, by SWHS area, final estimate for prior year). For IPHC stock assessment (adjustment to CPUE survey index)) – Scott thinks we could just go with a roving 3-year recent average (still needs updated every year to include the most recent year), but this would eliminate a data request
    - Scott Meyer will confirm if this is possible; Nichols to connect with Scott on this issue at the Rockfish workshop **(April 24 – 26); Completed April 22nd –** Scott confirmed with Ray Webster of IPHC that this approach is sufficient; Scott laid out some ground rules and approach (especially for the private sector) that we will want to reference (see email from 4/22)
- Mike – another management need that is emerging is providing our black and yelloweye rockfish data (harvest, release, average weight, etc) in the preferred consistent format identified by the LPT
    - Consider adding this to the matrix, as this will be an annual need and has been completed **April 20**
    - Each fall (post season preliminary; final previous year) this data should be provided to the rockfish Leadership Planning Team (LPT)
- Diana – update the Data Reduction section of the ROP based on discussion from Wednesday, 4/11
    - This needs done before the ROP is published (signed off on prior to sampling, but **these updates may have to occur ~ 1st week of May); Completed April 24th**
- Pat and Jeff – update the ROP objective language related to black rockfish ASL based on Scott's feedback
    - This needs done before the ROP is published (signed off on prior to sampling, but **these updates may have to occur ~ 1st week of May); Completed April 17th**
- Jeff, Diana, Jiaqi – several portions of the ROP need updated before it is finalized, including new appendices tables that Diana provided (both RP tables and the 3 documents related to Monday morning work flow, database basics, and reporting basics) and any of the objectives where precision criteria is identified, we need to put in there what we really expect to see (based off of the 2015 analyses and appendices tables
    - Jeff needs to incorporate the Monday morning data flow/responsibility document into the 2018 ROP
        - Monday Morning Duties – each area office completes these in entirety
        - MHS Database Basics – KTN office will take care of WRG-PSG; SIT will take care of SIT; JNU will take care of all others (Yakutat should try, but connectivity is an issue)
    - This needs done before the ROP is published (signed off on prior to sampling, but **these updates may have to occur ~ 1st week of May); narrative and relevant data for each of the ROP sections obtained by May 1;** Jeff still needs to integrate and format all into the final draft of the ROP and then gather signatures before publication **(anticipated mid-May)**
- Jeff and Mike – confirm we are obtaining sufficient information in 2018 to estimate king salmon incidental mortality (IM: release mortality)
    - Document methods and vet with Chadwick prior to CTC June 4 – June 8 meeting **(May 25)**

- Jiaqi, with assistance from Mike & Diana will write some guidelines for the managers related to 4 items, which will be captured in the 2018 ROP as an appendix (This needs done before the ROP is published (signed off on prior to sampling, but **these updates need to occur ~ 1st week of May; email exchanges have already occurred with answers to some questions (April 15 – May 2).**
    - How and when to adjust the sampling schedule if a tech (or 2) is sick or on vacation.
    - How a King closure affects sampling
    - Can techs switch from an assigned dock to roaming between docks part way through a shift?
    - Should they sample as many fish as possible during the derby (maybe even add office staff)?
- Patrick – coordinate responses from managers regarding potential port specific program modifications related to the need to increase biological samples collected and address staffing shortages…also related to items above (**initial email to managers prior to 4/23; 4/23 teleconference further discussions occurred**; email exchanges b/t Kelly and Jiaqi provided some answers to questions; **summary to be produced by May 15th; similar to above action item, some of this dialogue and answers from Jiaqi to be incorporated into the 2018 ROP**
- Jeff, Judy, Pat, and Matt – interview candidates for the new Biometrician I/II/III
    - **Interviews will be May 14**
- Jeff, Diana, and Mike – review work completed since Creel Review meeting and reestablish priorities for the month of May-June **(May 11th)**
    - At this time, a priority of work for Diana is completing all of the estimates and RP's for all years other than 2015 (priority is on 2011-2017 for estimates and finalizing 2018 programs, the latter of which is a higher priority); ideally 2018 programs would be updated before the 1st inseason king salmon harvest estimate is required **(July 1; 2011 – 2017 estimates to be completed afterwards)**
        - Diana has competing & conflicting work priorities, much of which involves her daily needs related to reviewing data that comes in every week from the creel sampling. This cannot be ignored but as much of this work as possible should be done by the Juneau FWT III, which would free up time for Diana to work on the historic estimates of RP and 2018 programs **(weekly meetings with Diana and Mike will shed light on progress and help prioritize her time)**
    - Diana and Mike should put together a complete list of items/tasks that they believe is necessary along with an estimate of the time involved in each – this will be a topic of discussion and will help setting priorities **(May 15th) .**
- Dave Love and Judy – make official Jess' help for handheld and error checking when she has time at the front counter; make sure she knows the number of hours per day/per week she can spend on this activity **(May 15th).**
- Jeff – populate the SharePoint folder with relevant information pertaining to the Creel program review meeting **(May 15th)**
- Diana – Get IT to secure network folder (S/Creel) to limited access for read/write privileges as deemed appropriate by Mike and Diana **(June 1). –** of key importance is maintaining the current file structure as SAS libnames and output is hardcoded

Inseason 2018:

- Mike and Jeff – detail exactly how our Chinook salmon in-season and post-season preliminary estimates will be produced and share and vet with the CTC, management staff, and biometrician; this will lead to transparency and repeatability
    - indicate what information is used and how it is obtained. This can be documented in the op plan…i.e. this is *how* we get the sport harvest number. We might have to wait to incorporate into the 2019 ROP considering the due date
    - **due by May 30th,** so that Jeff can travel with this down to the CTC meeting (June 4 – 8)
- Pat – Pat to look into this mandate for a 20% sampling rate and if that is based on any measure of precision and if there is any way we can justify sampling at a lower or higher rate, either based on lesser abundance or harvest
    - For the same reasons identified for the above objective, which allows evaluation and feedback from CTC, **May 30th would be ideal, for the June 4 – 8 CTC meeting**
- Jeff – Ask Andrew Olson if we can just provide an average value (which years? Last 2, 3, 5—this needs nailed down) for preliminary SEO DSR for the current year, rather than providing an estimate—it doesn't get used for anything anyways (Scott Meyer could look into this)
    - It appears as if Scott Meyer may have been tasked with this, but given he retires in 10 days, it would not seem possible. Therefore Jeff Nichols will look into this and discuss with Andrew. **June 1 deadline for that discussion; email sent to Andrew on May 9 requesting his consideration**
- Jiaqi, Mike, Diana, Jeff, area managers – evaluate how many more fish (king salmon) we can get our hands on by expanding our effort at the docks—in other words, in the KTN area can we figure out (through logbook)
    - 1st logbook data will not be available until after June 1; summaries of sampling rate should be produced by port weekly so we no what are target is **(begin weekly summaries ~ May 21; begin logbook evaluation once data becomes available (after June 1 (for May data if available) and again after June data becomes available--~ July)**
    - Evaluate how increased sampling of the derbies can increase sampling rate, assuming their will be king salmon retention during the derbies (**June – August depending on opening of derbies by location)**
    - **a timeline for this action is likely to be long-term (repeated annually as fishery management changes in response to abundance since it may be impossible to adjust sampling design for the 2018 season**
- Tersteeg and office FWTIII – provide inseason outreach to techs (inseason training) **on a weekly or as needed basis** (all such outreach should go directly through area manager who will follow up with the individual tech's unless directed otherwise by manager)
- Mike, Jeff, Judy – provide FY19 LDP and Line 300-400 coding to Area Managers **(July 10)**

Postseason 2018 and Beyond:

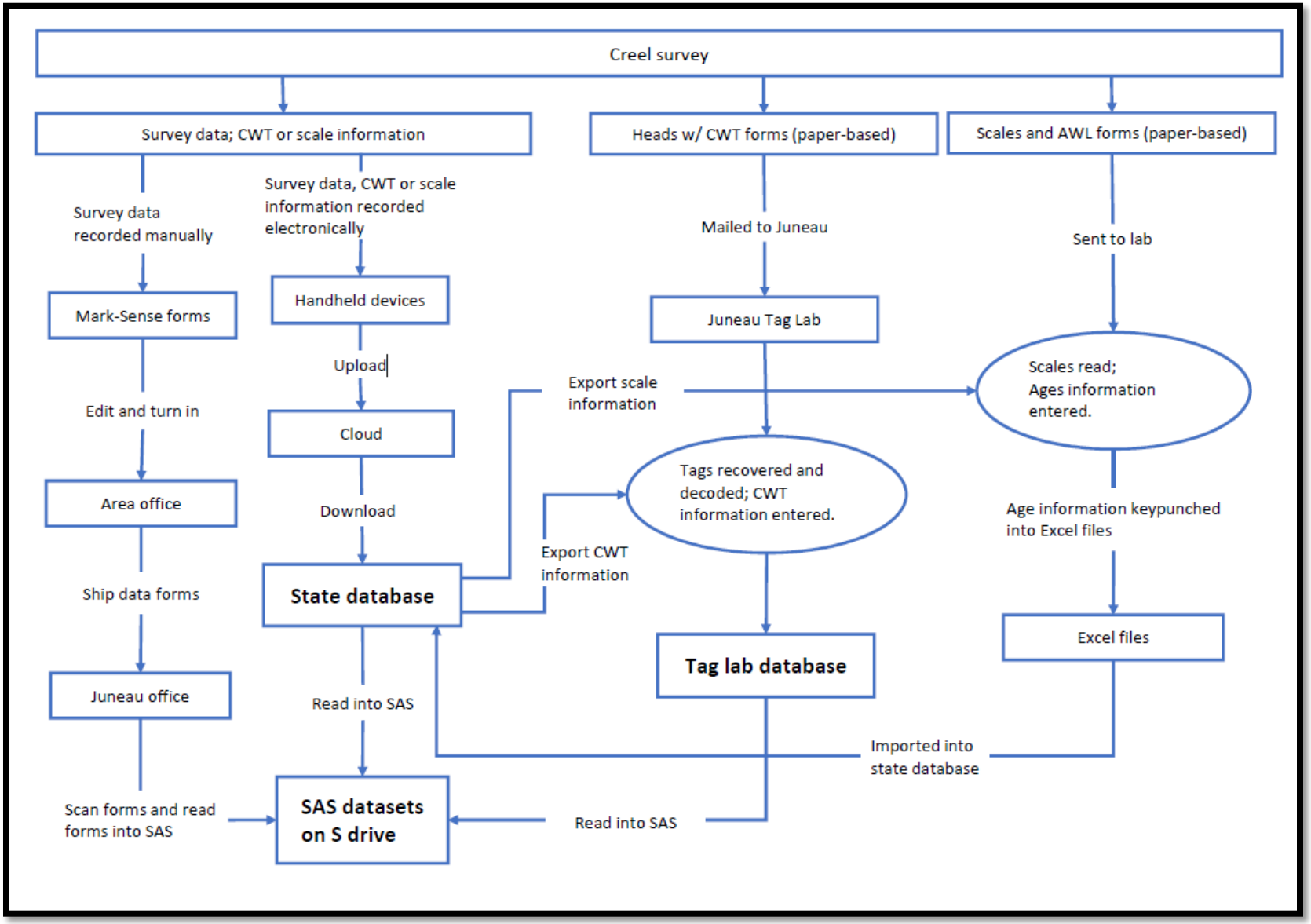
- Jiaqi and Pat (??) – evaluate if the logbook data be used to generate the post-season preliminary king salmon harvest estimate?
    - Jiaqi and/or Pat were going to look into this **(this could be evaluated using 2017 data; it would need to be completed by mid-September to be useful for PSC purposes and the October meeting)**

    - Also evaluate what bias is there in using log book data and/or SWHS? What do we know about the public reporting on king salmon? (this question may need further fleshed out and should be evaluated with the above action item **(mid-September)**
    - Variance is ignored on the expansion factor. Jiaqi/Hansen to look at regression method as opposed to the 5-year running average **(mid-September or earlier if possible)**
- Nichols, Lum, RTS – how do we assess whether or not we have sufficient # of coordination/research analyses staff under the MHS program?
    - How would you change the roles and responsibilities?
    - This is going to have to be an Action Item addressed over the long-term; Nichols suggests that a small team be organized to work on this (Nichols, Lum, Hasbrouck/Hansen, ??) – **initial discussion could happen this summer in b/t notable data requests; otherwise it becomes a postseason discussion (November 2018 pending RTS availability**
- Diana, Mike, Jiaqi – Sampling stats are updated (I think this refers to the relative precision for all years in addition to 2015 (or at least from 2011-2017))
    - **I had recorded this as a mid-December (2018) deadline**, but this should really be a top priority for Diana and Jiaqi, while allowing for the necessary day-day data collection/review needs of the MHS program and Jiaqi's other biometric obligations
- Bob, Jeff, Diana, Mike, Jiaqi (and RTS?) – We need to consider whether or not we need to ask on the onsite creel program for residency (This would significantly increase the number of questions asked during a creel interview)
    - Scott suggested we get residency from the logbook and that we shouldn't need to get it from the creel program; Bob is not so sure and thinks we need to talk about this
        - Because of handheld limitations, this is likely not possible for 2018 and therefore should be considered during development of the 2019 ROP **(December 2018 – January 2019)**
        - **dlt** – this will require some outside the box thinking, we can easily ask how many anglers are residents and how many are non-residents when asking # angler total; however, the way the app is currently set up, it is not designed to collect effort and harvest based on individual residency, it would require a monetary investment to redesign the app and database to incorporate the design change depending on how different the collection is.
- Jiaqi, Mike, Diana, Jeff – Ask the question if we could employ the use of video cameras to account for missed boats and what effect this might have on precision or our estimates
    - This is something that could not be employed until after the 2018 season, but the discussion could still be had with Jiaqi as to benefits in precision, accuracy, etc. and the tradeoff with more complex study design (**during 2019 ROP development: December 2018 – January 2019**)
        - Privacy issues need to be considered;
        - Would require additional funding for a FWT to review tapes
- The creel program should produce a weekly report that identifies progress towards achieving sampling goals (genetics, CWT sampling, ASL, etc)
    - **dlt** – the biosample download will give all samples, but the program needs updated for what is requested to also include CWT sampling **(Jeff and Diana to revisit this priority by June 10th)**

- Diana – provide to the managers every Monday afternoon sampling and submission errors (includes review of the database and feedback to individual tech).
    - Changed the manager's meeting to 1PM to accommodate this **(implemented following first week of port sampling (1st week of May)** and will continue throughout the season)
- Diana, Mike, Jeff – Evaluate sampling objectives by port (where we are not meeting sampling goals) – evaluate inseason to adjust samplers.
    - The program related to sampling goals (CWT, genetics, ASL) mentioned above first needs updated so this can be tracked **(Jeff and Diana to revisit this priority by June 10th)**
    - Evaluate king salmon program objectives and sampling goals in light of fishery closures; identify ways to minimize the effects of these closures on objectives and sampling goals/rates **(Jeff, Jiaqi, Mike and Diana to revisit this priority by June 10th)**
- Jeff, Mike, Diana, Bob – Develop a mechanism for post season review with feedback to managers…e.g. were sampling objectives achieved? Are there special considerations that managers should be aware of when utilizing creel data from that year? Identify ways to improve the following year.
    - Nichols suggests this happen by way of an area review meeting in conjunction with a written annual report; not sure if it's worthy of publication but it needs to be completed and distributed to area management staff (needs to happen prior to development of 2019 ROP and possibly near the same time as postseason estimates are produced **(October 2018),** especially as the season is still fresh in people's minds
- Jones, Chadwick, Lum, Nichols – Review the need, cost/benefit for DIT sampling and vet as necessary with the CTC **(~ December 2018 – January 2019** in time for postseason and annual PSC meetings; update 2019 ROP as necessary)
- Mike, Diana, Jiaqi – catch up on FDS reporting (3 time intervals: 2005 – 2010; 2011 – 2017; annual thereafter)
    - 2011 – 2017 **(draft to RRC February 2019)**
    - 2005 – 2010 **(draft to RRC November 2019)**
    - Annual thereafter **(2018 produced by February 2020)**
- Mike, Diana, Jiaqi – Develop the 2019 ROP
    - **Draft to RRC January 2019**
- Jeff and Diana (and RTS) – meet as a group to decide how the creel database will be maintained now that the contract with RDI has expired and how/when historic data will be properly absorbed and archived **(August 2018, pending availability from RTS).**
    - **dlt** - Need ETL code modified for each year (to incorporate data collection changes). Determine if import from raw data is (dta files) or if we import it from SAS. As data goes in, process will have to create all keys. RDI created ETL code to import paper (dta) based on how the data was collected in 2016. It seems like it would be easy to pay them to modify to have separate ETL code based on the year and port (based on the port, some bubbles mean something different than others)
    - Also consider the need for additional funding and potential grant opportunities (NOAA-LOA, PSC, NOAA S-K)
    - Provide a database access manual in the future; it may have to wait till all the data is absorbed in case historic and contemporary data is different or additional queries and reports are produced

        - Database 'How To' documents are currently under development and will be incorporate into a tech manual **(this will likely be a living document, evolving as changes to the database occur)**
- Nichols (from the Management Needs matrix) – Define the timeline for each deliverable for 2018 and consider time to allow for adequate review.
    - **(June 1)** – ALL data requests will be produced at least 3 days before the due date to allow internal review time before finalizing the deliverable
- Jeff, Mike, Diana, Jiaqi, and Area Managers – identify what the "core" level of staffing on the docks is in order to meet sampling goals and objectives **(evaluate post-season (October 2018**) during area review meeting)
- Mike and Diana – Look at cost of "regional training" pre-season for technicians in a centralized location as opposed to training by management area
    - Compare and contrast with current approach (**October 2018** during area review meeting)
- Creel Review Team – perform biannual review of the creel program to ensure program objectives stay consistent and relevant to required management needs
    - **Fall-winter of 2020 (and every 2 years thereafter)**, possibly in tandem with Area Review Meeting

Appendix C4.–Illustration of the flow of data from data collection through archive.



Appendix C5.–Illustration of various parameter estimates are produced.