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Commercial Harvest of Klawock Lake Sockeye Salmon in the District 103 and 104 Purse Seine Fisheries, Southeast Alaska, 2018–2021

by

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

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Weights and measures (metric)	
centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm
Weights and measures (English)	
cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd
Time and temperature	
day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s
Physics and chemistry	
all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

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

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

FISHERY DATA SERIES NO. 22-34

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ABSTRACT

Genetic mixed-stock analysis of sockeye salmon (*Oncorhynchus nerka*) harvested in the commercial purse seine fisheries was used to estimate the harvest of Klawock Lake sockeye salmon in southern Southeast Alaska over a 4-year period (2018–2021). The commercial fisheries in management Districts 103 and 104 were targeted because they are terminal to Klawock Lake and most of the commercial harvest of Klawock Lake sockeye salmon probably occurs in those districts. We further split District 103 into 2 spatial strata: Northern District 103 (subdistricts 50–90) and Southern District 103 (subdistricts 11–40). The harvest of Klawock Lake sockeye salmon was highest in Northern District 103 in 3 of 4 years (2018–2020). The total commercial harvest (Districts 103 and 104) of Klawock Lake sockeye salmon was 2,619 fish in 2018, 5,523 fish in 2019, 3,352 fish in 2020, and 6,677 fish in 2021. These data, combined with escapement and subsistence harvests, were used to produce the first estimates of total run size for Klawock Lake sockeye salmon. The total run size varied from year to year, with 13,147 fish in 2018, 14,953 fish in 2019, 19,702 fish in 2020, and 13,600 fish in 2021. Similarly, overall harvest rates varied from 43.9% in 2018 to 59.9% in 2021 (average = 50.9%). Commercial harvest rates were higher in odd years (43.0%) than even years (18.5%), presumably due to increased fishing pressure on more abundant odd-year pink salmon. The subsistence harvest rate averaged 20.1% across all years and averaged higher (27.9%) than the commercial harvest rate in even years.

Keywords: Klawock Lake, sockeye salmon, *Oncorhynchus nerka*, Southeast Alaska, Prince of Wales Island, genetic stock identification, mixed-stock analysis, MSA, purse seine fishery, SNP

INTRODUCTION

Klawock Lake is located on the west coast of Prince of Wales Island, just north of Craig, Southeast Alaska (55° 31′ 18.4″ N 132° 59′ 37.0″ W; Figure 1). The Klawock Lake sockeye salmon (*Oncorhynchus nerka*) run historically provided one of the most important subsistence resources for the Tlingit people of central Prince of Wales Island (Langdon 1977; Ratner et al. 2006) and still supports one of the largest subsistence fisheries in Southeast Alaska (Cartwright and Conitz 2006). From 2002 to 2017, an average 69% of the reported Klawock Lake sockeye salmon subsistence harvest was taken by residents of Klawock, and 91% was harvested by residents of Klawock and Craig combined. During that same period, the Klawock Lake sockeye salmon run provided the largest single source of sockeye salmon for both communities—an average 75% of the reported subsistence harvest of sockeye salmon by Klawock residents, and an average 47% of the reported subsistence harvest of sockeye salmon by Craig residents.

Like many other large sockeye salmon runs in Southeast Alaska, the Klawock Lake run was subjected to intensive commercial exploitation in the late 1800s and early 1900s. Commercial harvest records from 1886 to 1927 indicate annual sockeye salmon harvests in the Klawock River estuary averaged 40,000 fish, with a maximum harvest of 75,000 fish in 1899 (Moser 1899; Rich and Ball 1933). Weir counts conducted from 1930 to 1938, the only information on escapements from that period, averaged 30,000 fish (range: 7,000–65,000 fish; Orrell et al. 1963). Although little information exists regarding Klawock Lake sockeye salmon until the late 1900s, information on subsistence harvest and escapements in recent decades suggests the run is much smaller now than it was historically (Conitz 2010), and the run appears to have declined to very low levels in the past 10 years.

The most complete recent information regarding Klawock Lake sockeye salmon runs was obtained from Alaska Department of Fish & Game (ADF&G) studies conducted from 2001 to 2008 in cooperation with the Klawock Cooperative Association and USDA Forest Service. These studies included annual estimates of spawning escapement (weir counts and mark–recapture studies) and survey estimates of subsistence harvest (Conitz 2010). During that period, escapements averaged 16,200 sockeye salmon and estimated subsistence harvests averaged 4,400 sockeye salmon

(Table 1). The estimated terminal run size (escapement plus subsistence harvest) averaged 20,600 sockeye salmon, and subsistence harvest rates on the terminal run averaged 21% (Table 1).

ADF&G manages subsistence salmon fisheries in Southeast Alaska under the terms of subsistence fishing permits (5 AAC 01.730), and, since 1985, subsistence users have been required to return permits with a record of their harvest. The reported permit harvest tends to under-represent the true community harvest when compared to information generated from surveys (Walker 2009); for example, the reported permit harvest of Klawock Lake sockeye salmon averaged approximately 60% of the harvest estimated from on-the-grounds surveys conducted during 2001–2008 (Table 1; Conitz 2010). Harvests reported on subsistence permits still provide useful information about trends in harvest over time (Geiger et al. 2007). The reported subsistence permit harvest of Klawock Lake sockeye salmon averaged 4,190 fish in the 1990s, declined 30% to an average 2,880 fish from 2000–2010, and declined a further 52% to an average of only 1,390 fish from 2011 to 2017—a total decline of 69%. Spawning escapements also recently declined from an average 17,100 fish from 2001 to 2010 to an average 5,700 fish from 2011 to 2017—a decline of 67%—including the smallest recorded escapement of only 1,086 fish in 2013 (Table 1).

The reasons for the decline in Klawock Lake sockeye salmon abundance, both from historical levels and in recent decades, are not well understood (Woll and Prussian 2016) but could be the result of both natural and anthropomorphic causes. Similar recent declines have also been observed in other well-monitored sockeye salmon stocks in the region. Widely dispersed sockeye salmon populations at Chilkat Lake (northern Southeast Alaska), McDonald Lake (southern Southeast Alaska), and the Nass and Skeena Rivers (northern British Columbia) were all more abundant in the 1980s–1990s than in recent decades (Figure 2), although they experience different rearing environments, migrate through different commercial fisheries, and experience different harvest rates. These common trends suggest the recent decline of Klawock Lake sockeye salmon abundance may in part be a response to changes in broad-scale ocean conditions. In addition, the Klawock Lake run may be one of the most heavily impacted sockeye salmon runs in Southeast Alaska, as a result of decades of large-scale logging of the Klawock River drainage, road building in the drainage, construction of a highway along the lake shore and estuary, development along the lake shore at the mouth of the primary spawning tributary, operation of a salmon hatchery in the river (including various failed attempts at sockeye salmon enhancement), and additional factors that have potentially affected the quality of sockeye salmon spawning and rearing environments in the Klawock system (Cartwright and Conitz 2006; Ratner et al. 2006; Conitz 2010; Stopha 2016; Woll and Prussian 2016).

A significant gap in understanding this decline is the nearly complete lack of information regarding the contribution of Klawock Lake sockeye salmon to the mixed-stock commercial purse seine fisheries prosecuted annually along the west coast of Prince of Wales Island (Figure 1). Sockeye salmon are not targeted in these purse seine fisheries, which are managed based on inseason assessments of pink salmon (*O. gorbuscha*) run strength (Clark et al. 2006); however, the sockeye salmon harvest can be substantial, particularly in District 104, where, on average, mixed-stock harvests are composed of sockeye salmon from Alaska (28%), the Canadian Nass and Skeena Rivers (55%), and other stocks (17%; Andrew W. Piston, ADF&G, Pacific Salmon Commission Northern Boundary Technical Committee, unpublished data 2007–2016, personal communication). Klawock Lake sockeye salmon must migrate through these purse seine fisheries on their return migration and, although the Klawock sockeye salmon harvest has been assumed to represent “a very small, incidental component” of the total sockeye salmon harvest (Conitz 2010), commercial harvest rates and migratory timing are not known.

The need to better understand the commercial harvest of Klawock Lake sockeye salmon, one of the suspected primary sources of mortality on the stock, was identified as a high priority by local and regional stakeholders at the Klawock Lake Sockeye Salmon Stakeholder meeting held in Klawock 14–15 November 2017[1]. Information on the commercial harvest would contribute to a better understanding of all the possible factors in the decline of this important resource. Subsequently, ADF&G initiated a study to estimate the harvest of Klawock Lake sockeye salmon in commercial purse seine fisheries for 4 years (2018–2021) through genetic mixed-stock analysis of sampled harvests. Although Klawock Lake sockeye salmon are probably harvested in at least very small numbers in commercial fisheries throughout southern Southeast Alaska, this study focused on management Districts 103 and 104, which are terminal to Klawock Lake and where most of the commercial harvest of Klawock Lake sockeye salmon likely occurs.

OBJECTIVES

- Estimate the annual contribution of Klawock Lake sockeye salmon to commercial purse seine fishery harvests in Southern District 103 (subdistricts 11–40) in 2018, 2019, 2020, and 2021, such that the estimates are within 7% of the true value with 90% probability.
- Estimate the weekly contribution of Klawock Lake sockeye salmon to commercial purse seine fishery harvest in northern subdistricts of District 103 (subdistricts 50–90) in 2018, 2019, 2020, and 2021, such that the estimates are within 7% of the true value with 90% probability.
- Estimate the weekly contribution of Klawock Lake sockeye salmon to commercial purse seine fishery harvests in District 104 (outer coast of Prince of Wales Island) in 2018, 2019, 2020, and 2021, such that the estimates are within 7% of the true value with 90% probability.

METHODS

Meeting the objectives of this study required collecting sockeye salmon tissue samples and associated data from commercial purse seine fishery salmon landings, processing and analyzing tissue samples, and conducting statistical analyses to estimate stock contributions. This project benefited from ongoing U.S.-Canada genetic stock identification studies (Guthrie et al. 2019; Gilk-Baumer 2021), which are conducted annually to estimate stock contributions in commercial fisheries in support of the Pacific Salmon Treaty, and from the existing ADF&G Commercial Port Sampling Program (Guthrie et al. 2019; Gilk-Baumer 2021). Modifications to these programs were required in order to estimate harvests of Klawock Lake sockeye salmon. Specifically, additional samples were collected each week to ensure genetic estimates would meet precision requirements outlined in the objectives. According to sample theory, under the worst-case scenario (stocks contributing equal proportions) a sample of 205 fish is sufficient to provide weekly estimates of the relative proportions of each reporting group within 7% of the true value 90% of the time (Thompson 1987). Similarly, the sample size will allow for a total seasonal estimate of matching precision. The sampling goal was set to a maximum of 400 sockeye salmon per week from District 103 and 104 purse seine salmon landings to ensure samples were representative of the harvest and

[1] Klawock Lake Sockeye Salmon Stakeholder Meeting held in Klawock 14–15 November 2017 (http://www.seakfhp.org/klawock-lake-sockeye-salmon-stakeholder-meeting-fall-2017/).

to ensure sufficient samples were collected at various ports (Ketchikan and Petersburg). Commercial harvests were summarized by ADF&G statistical weeks, which begin on Sunday at 12:01 AM and end the following Saturday at midnight. Statistical weeks are numbered sequentially starting from the beginning of the calendar year (Appendix A).

District 103 Overview and Sampling Strategy

District 103 encompasses the waters between District 104 and the west coast of Prince of Wales Island (Figure 1). The district is essentially pinched in half at Tlevak Strait, near the northern end of Dall Island. Purse seine fisheries in District 103 are managed inseason based on the strength of domestic pink salmon runs. Purse seine fishery openings in District 103 typically start the last week of July and may extend to the first week of September, depending on pink salmon abundance. Over the 10-year period 2008–2017, sockeye salmon accounted for an average 1% (18,000 fish) and pink salmon accounted for an average 95% (3,475,000 fish) of the total purse seine salmon harvest in District 103. Sockeye salmon harvests in District 103 are generally larger in the northern portion of the district, north of Tlevak Strait, than in the southern portion of the district. Over the 10-year period 2008–2017, an average 14,396 sockeye salmon (range: 950–50,221 fish) were harvested in the northern portion of District 103 and 3,874 sockeye salmon (range: 905–9,425 fish) were harvested in the southern portion of District 103 (Appendix B). During that same period, >90% of the sockeye salmon harvest occurred during a 5-week period, from approximately late July to late August.

Stock composition of District 103 sockeye salmon purse seine harvests has been estimated annually through U.S.-Canada genetic stock identification studies. Sockeye salmon tissue samples collected from the District 103 harvest are processed and analyzed at the ADF&G Gene Conservation Laboratory (GCL). For treaty purposes, sockeye salmon contributions to the District 103 fishery are reported to the following 4 reporting groups: Alaska, Nass, Skeena, and Other. For domestic purposes, this is further increased to 6 reporting groups with the addition of Hugh Smith Lake and McDonald Lake (Appendix G). Thus, stock composition estimates do not normally include Klawock Lake sockeye salmon as a reporting group. In addition, the current U.S.-Canada sampling goal is limited to a small sample of 490 fish from the entire district over the entire season (Buettner et al. 2017). In order to meet the objectives of this study, District 103 was stratified into 2 areas: southern District 103 (subdistricts 11–40; Figure 1) and Northern District 103 (Subdistricts 50–90; Figure 1), sample sizes were increased, and sampling in Northern District 103 was stratified by statistical week.

Southern District 103

Seasonal estimates rather than weekly estimates were sufficient to quantify the harvest of Klawock Lake sockeye salmon in Southern District 103, due to the relatively smaller sockeye salmon harvests in that area.

Northern District 103

Northern District 103 encompasses the area immediately terminal to Klawock Lake through which all Klawock Lake sockeye salmon must migrate; therefore, sampling was stratified by week in order to provide weekly estimates of stock contribution, which could potentially provide valuable information on run timing through the area. Analysis was conducted for each of the 5 consecutive weeks with the largest sockeye salmon harvests (typically late July–late August).

District 104 Overview and Sampling Strategy

District 104 encompasses the waters west of the offshore islands located west of Prince of Wales Island from Cape Muzon north to Cape Lynch (Figure 1). Purse seine fisheries in District 104 start the first Sunday in July. During most of July the fishery is managed to comply with provisions in the Pacific Salmon Treaty to achieve a harvest share of 2.45% of the annual allowable harvest of Canadian Nass and Skeena River sockeye salmon prior to statistical week 31 (Gray et al. 2017; NBTC 2020). From late July through late August the fishery is managed based on the strength of domestic pink salmon runs. Over the 10-year period 2008–2017, sockeye salmon accounted for an average 4% (223,000 fish; Appendix B) and pink salmon accounted for an average 91% (4,899,000 fish) of the total purse seine salmon harvest in District 104. Sockeye salmon harvests in District 104 are substantially larger than in District 103, due primarily to the high proportion of non-Alaska stocks that migrate through offshore waters.

Weekly stock composition of District 104 sockeye salmon purse seine harvests has been estimated annually through U.S.-Canada genetic stock identification studies. Sockeye salmon tissue samples collected from the District 104 harvest are processed and analyzed at the NOAA Auke Bay Laboratory (ABL)[2] in Juneau, Alaska. For treaty purposes, sockeye salmon contribution to the District 104 fishery is reported to the following 5 reporting groups: Alaska, Nass, Skeena, Fraser, and Other. The current U.S.-Canada sampling goal of 260 fish per week was sufficient to also estimate the weekly and seasonal contribution of Klawock Lake sockeye salmon to the District 104 purse seine harvest; however, additional statistical analysis was required (beyond the normal U.S.-Canada analysis) in order to include Klawock Lake as a separate reporting group (see Statistical Analysis section; the additional analysis was conducted at the ADF&G GCL).

Sampling Protocols

Sampling protocols helped ensure weekly samples were as representative of harvests as possible to account for fluctuations in harvest and effort over the course of the season. Deliveries of fish with harvests mixed from more than one fishing district were not sampled, no more than 80 samples were collected from a single vessel delivery, no more than 200 samples were collected from a single tender delivery, samples were collected without regard to size or sex of fish, and, whenever possible, samples were systematically collected from the entire hold as the vessel was offloaded to ensure they were representative of the entire delivery. The sex of each sampled fish was determined from examination of dimorphic sexual characteristics (e.g., kype development, belly shape, and trunk depth). In District 104, the length of every fish was measured from mid eye to tail fork to the nearest 5 mm. In District 103, the length of a subset (generally the first 20 sampled) of fish was measured from mid eye to tail fork to the nearest 5 mm. One scale sample was collected from the preferred area of each sampled fish (i.e., above the lateral line on the left side of the fish on a diagonal downward from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin; INPFC 1963) and placed on an adhesive-coated card. Age, sex, and length data were recorded on standardized ADF&G Age-Sex-Length op-scan data sheets for 2018–2019 and recorded electronically starting in 2020. A 2.5 cm (1 inch) piece of the pelvic fin was removed from each fish and placed on a Whatman filter paper card for dry preservation and genetic analysis.

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[2] National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service, Alaska Fishery Science Center, Auke Bay Laboratories, Ted Stevens Marine Research Institute, Juneau, Alaska.

All tissue cards were shipped to the ADF&G Scale Aging Laboratory in Douglas, Alaska, along with matching scale samples and associated data for weekly inventory. Tissue cards from District 103 were then shipped to the ADF&G GCL in Anchorage, Alaska, for postseason analysis. Tissue cards from District 104 were sent to the NOAA ABL for U.S.-Canada treaty analysis. Following analysis, genotype data for each fish was sent to ADF&G GCL to estimate the contribution of Klawock Lake sockeye salmon. Scale samples were inventoried, prepared for postseason analysis (Clutter and Whitesel 1956), and aged at the scale lab (results of age composition analysis will not be reported here).

ANALYSIS

LABORATORY ANALYSIS

Laboratory analysis of tissue samples from District 103 were conducted by the ADF&G GCL following standardized procedures similar to those described by Dann et al. (2012). Genomic DNA was extracted from tissue samples using a NucleoSpin 96 Tissue Kit by Macherey-Nagel (Düren, Germany). DNA was screened for 96 SNPs using Fluidigm 96.96 Dynamic Arrays (www.fluidigm.com). The Dynamic Arrays were read on a Fluidigm EP1 System after amplification and scored using Fluidigm SNP Genotyping Analysis software. If necessary, SNPs were re-screened on a QuantStudio 12K Flex Real-Time PCR System (Life Technologies) as a backup method for assaying genotypes. Approximately 8% of individuals analyzed for this project were re-extracted and genotyped as a quality control measure to identify laboratory errors and to measure rates of inconsistencies during repeated analyses. The quality control analyses were performed by staff not involved in the original genotyping, and the methods are described in detail in Dann et al. (2012). Genotypes were imported and archived in the GCL Oracle database, LOKI.

Laboratory analysis of tissue samples from District 104 were conducted by the NOAA ABL following the methods described in Guthrie et al. (2019). DNA was screened for 48 SNPs, which are a subset of the 96 SNPs used by the GCL (Guthrie et al. 2019). In 2021 DNA was screened for 85 SNPs, which are a subset of the ADF&G 96 SNPs (Patrick Barry, NOAA, Auke Bay Laboratories, NMFS, Ted Stevens Marine Research Institute, personal communication).

STATISTICAL ANALYSIS

Statistical analysis of District 103 samples was conducted by the ADF&G GCL. Genotypes in the LOKI database were imported into the statistical program R for analysis[3]. Statistical analysis of District 104 samples was conducted by the NOAA ABL; genotype data were then sent to the ADF&G GCL in a standard format and imported into the statistical program R for further analysis. Prior to statistical analysis, 3 statistical quality control analyses were performed to ensure high-quality data: (1) individuals missing >20% of their genotype data (markers) were identified and removed from analyses because this is indicative of low-quality DNA (80% rule; Dann et al. 2012); (2) duplicate individuals were identified as pairs of individuals sharing the same genotype in 95% of markers and removed; and (3) non-sockeye salmon were identified and removed.

The genetic baseline used by the ADF&G GCL and NOAA ABL includes populations representing all major sockeye salmon producing systems in Southeast Alaska and northern British Columbia and representative systems in southern British Columbia and the Pacific Northwest (Rogers Olive

[3] R Core Team. 2022. R: a language and environment for statistical computing. R Foundation for Statistical Computing. Vienna, Austria.

et al. 2018). The baseline used in the 2018 and 2019 analyses consisted of 238 populations. This was increased to 241 populations (Rogers Olive et al. 2018, with minor additions to the Yakutat region) for the 2020 and 2021 analyses (Appendix G). The ADF&G GCL baseline is characterized for 96 SNPs, whereas the NOAA ABL baseline was characterized for 48 SNPs for 2018–2020 and 85 SNPs for 2021. The Klawock Lake sockeye salmon reporting group is highly identifiable with both 96 SNPs (99.1% correct allocation in repeated 100% proof tests) and 48 SNPs (98.3% correct allocation in repeated 100% proof tests). After the baseline update in 2020, further testing was carried out using the R package *rubias* (Moran and Anderson 2019) to ensure that the 7 reporting groups used here (Alaska, Nass, Skeena, Hugh Smith Lake, McDonald Lake, Klawock Lake, Other; Appendix G) met reporting criteria as described in Barclay et al. (2019).

For District 103, the stock composition for each stratum in each year was estimated using the R package *rubias*. The *rubias* package is a Bayesian approach to the conditional genetic stock identification model based upon computationally efficient C code implemented in *R*. It uses a parametric bootstrap approach to identify and correct for biases in reporting group estimates. Specifically, mixture samples in similar proportions to the stock composition estimate are simulated using leave-one-out cross-validation and analyzed to determine reporting group bias. For each mixture analysis, a single Markov Chain Monte Carlo (MCMC) chain with 25,000 iterations was run with 100 parametric bootstraps. The first 5,000 iterations of the chain were discarded to remove the influence of starting values. The prior parameters for each reporting group were defined to be equal (i.e., a flat prior). Within each reporting group, the population prior parameters were divided equally among the populations within that reporting group. Stock composition estimates and the 90% credibility intervals for each mixture were calculated by taking the mean and 5% and 95% quantiles of the posterior distribution from the single chain output. The analysis was used to tabulate summary statistics from these distributions to describe stock compositions.

For District 104, from 2018–2020, the stock composition for each stratum was estimated using the program *BAYES* (Pella and Masuda 2001). For each stratum, 7 MCMC chains starting at various stock proportions were run with 10,000 iterations and the first 5,000 discarded as burn-in. Stock proportions were configured such that 95% of the populations came from one reporting group with weights equally distributed among the populations. The remaining 5% was equally distributed across all other reporting groups. The prior parameters for each population were defined to be equal (i.e., a flat prior) (see Guthrie et al. 2019 for more analysis details). In 2021, NOAA ABL switched analysis methods from *BAYES* to the R package *rubias.* This is the same method used by ADF&G GCL to estimate stock composition in District 103; however, the settings differed slightly. Specifically, ABL staff ran *rubias* with 70,000 MCMC iterations and discarded the first 35,000 as burn-in. Prior parameters were defined in the same manner as ADF&G GCL (i.e., flat prior). Despite the changes in NOAA's genotyping methods in 2021, and the use of different software for genetic mixed-stock analysis (BAYES vs. *rubias*), analyses by both labs utilized the same baseline of populations, sufficient genetic markers, and widely accepted analysis methods to accurately and precisely estimate the proportion of Klawock Lake sockeye salmon in fisheries mixtures.

For all years, genotype data for analyzed fish in District 104 were sent to ADF&G GCL, where they were summarized into reporting groups. Estimates by stratum were stratified, using harvest data, to generate a seasonal estimate. Stock composition estimates of commercial harvest were applied to the reported harvest obtained from ADF&G fish tickets to quantify stock-specific harvests within each season, 2018–2021.

TOTAL RUN SIZE

We estimated the total run size for Klawock Lake sockeye salmon using weir count and harvest information. More specifically, we used estimates of stock-specific harvests, calculated using stock composition estimates from the commercial purse seine fisheries, along with estimated subsistence harvest to calculate a total harvest of Klawock Lake sockeye salmon. Estimates of stock-specific harvests in the commercial purse seine fishery do not account for statistical weeks with unsampled harvests. The estimated subsistence harvest was calculated by expanding the reported subsistence harvest by 1.67 to account for unreported harvest (Conitz 2010). Fish counts from a weir operated by the Klawock River Hatchery (Southern Southeast Regional Aquaculture Association) near the outlet of Klawock Lake were used to estimate the escapement of adult sockeye salmon. We note that escapement values are based solely on adult sockeye salmon and do not include jacks (ocean-age-1 male fish). Total harvest and escapement were added to obtain the estimated total run size each year. Harvest rates were calculated by dividing the total run size by the total harvest for each harvest type. Commercial harvest outside of the District 103 and 104 purse seine fisheries was not included due to lack of stock-specific harvest data.

RESULTS

2018

Sample Size

Sample sizes obtained in 2018 were adequate for producing stock composition estimates for (1) a seasonal estimate from Southern District 103 for statistical weeks 31–34, (2) weekly estimates from Northern District 103 for statistical weeks 30–33, and (3) weekly estimates from District 104 for statistical weeks 29–34 (Table 2). Although there was commercial harvest in Northern District 103 during statistical week 34 (1,791 fish), the authors were unable to sample the catch.

Stock Composition

Southern District 103

In 2018, the stock composition of the Southern District 103 harvest was estimated for a single stratum consisting of statistical weeks 31–34 (Table 3; Figure 3). Stock composition estimates showed the largest contributor was the Alaska reporting group (99.9%). Although the Nass, Skeena, McDonald, Hugh Smith, Other, and Klawock reporting groups were represented in the analysis, they were insignificant contributors to the overall stock composition (<0.01%). Further, the Klawock reporting group had a high probability (94.6%) of the estimate equaling to zero (i.e., was not present in the sampled harvest).

Northern District 103

The stock composition of the Northern District 103 harvest was estimated using 509 sockeye salmon that passed quality control measures. Estimates were produced for a total seasonal estimate and for 4 statistical weeks (30–33) in which adequate samples were collected (Table 3; Figure 4). For the seasonal estimate, by reporting group, Alaska was the largest contributor (49.1%), followed by Klawock (32.4%), Skeena (13.6%), Other (3.1%), McDonald (1.2%), Nass (0.5%), and Hugh Smith (0.1%). There was no clear temporal trend across the season in the proportion of Klawock

Lake fish in the overall harvest. Weekly estimates ranged from 16.3% in statistical week 30 to 43.7% in statistical week 32.

District 104

The stock composition of the District 104 harvest was estimated using 2,005 sockeye salmon that passed quality control measures. Estimates were produced for 6 statistical weeks (29–34) in which adequate samples were collected (Figure 5). It is worth noting that the sample size in statistical week 33 was low ($n = 40$; Table 2). There was no clear temporal trend in the proportion of Klawock Lake fish in the overall harvest for statistical weeks 29–31. Weekly estimates ranged from 2.6% in statistical week 30 to 7.2% in statistical week 31 (Table 3; Figure 5). However, during statistical weeks 32–34, Klawock Lake fish were an insignificant contributor (<0.01%) to the overall harvest.

Stock-specific Harvest

Southern District 103

The stock-specific harvest was calculated for the 7 reporting groups using seasonal harvests in Southern District 103 (Table 3). The total sockeye salmon harvest in Southern District 103 was 9,425 fish. Of these, 9,416 fish were allocated to the Alaska reporting group. The total seasonal harvest of Klawock sockeye salmon in Southern District 103 was one fish (Table 3).

Northern District 103

The stock-specific harvest was calculated for the 7 reporting groups using weekly harvests in Northern District 103 (Appendix C). The total harvest varied by week ranging from 720 fish in statistical week 31 to 1,804 fish in statistical week 32. The harvest of Klawock-origin sockeye salmon ranged from 183 fish in statistical week 30 to 789 fish in statistical week 32 (Appendix C). The total seasonal harvest of Klawock sockeye salmon in Northern District 103 was 1,756 fish (Table 3).

District 104

The stock-specific harvest was calculated for the 7 reporting groups using weekly harvests in District 104 (Appendix C). The total harvest varied by week ranging from 3,758 fish in statistical week 31 to 76,537 fish in statistical week 34. Overall, estimates of the harvest of Klawock Lake sockeye salmon were relatively low. For the weeks in which there was a significant contribution of Klawock Lake sockeye salmon to the stock composition, the estimated harvests were between 263 and 324 fish. One or 2 Klawock Lake sockeye salmon were estimated to be harvested in statistical weeks 32–34. The total seasonal harvest of Klawock Lake sockeye salmon in District 104 was 863 fish (Table 3).

Total Run Size

In 2018, the total run size of Klawock Lake sockeye salmon was 13,147 fish (Table 4). The escapement to Klawock Lake was 7,371 adult sockeye salmon. The estimated total commercial harvest (Districts 103 and 104) was 2,619 fish. The reported subsistence harvest was 1,894 fish. We expanded the reported subsistence rate to account for the approximately 60% reporting rate increased the subsistence harvest to 3,157 fish. We used the expanded subsistence harvest to calculate total run size. Commercial purse seine fisheries in Districts 103 and 104 accounted for a harvest rate of 19.9%, and the subsistence fishery accounted for a harvest rate of 24.0%. The overall harvest rate on the Klawock Lake sockeye salmon stock was 43.9%.

2019

Sample Size

Sample sizes obtained in 2019 were adequate for producing stock composition estimates for (1) a seasonal estimate from Southern District 103 for statistical weeks 32–34, (2) weekly estimates from Northern District 103 for statistical weeks 30–34, and (3) weekly estimates from District 104 for statistical weeks 28, 29, 31, 32, and 33 and a pooled estimate for statistical weeks 34–35 (Table 2). Sampling did not occur in District 104 during statistical week 30 because the fishery was not open. Although there was commercial harvest in Northern District 103 during statistical week 35 (80 fish), the authors were unable to sample the catch.

Stock Composition

Southern District 103

In 2019, the stock composition of the Southern District 103 harvest was estimated for a single stratum consisting of statistical weeks 32–34 (Figure 6; Table 5). Stock composition estimates showed the largest contributor was the Alaska reporting group (98.0%), followed by the Skeena (1.8%), McDonald (0.1%), and Klawock (0.1%) reporting groups. Although the Nass, Hugh Smith, and Other reporting groups were represented in the analysis, they were insignificant contributors to the overall stock composition (<0.01%). It is worth noting that the Klawock reporting group had a high probability (82.3%) of the estimate equaling to zero (i.e., was not present in the sampled harvest).

Northern District 103

The stock composition of the Northern District 103 harvest was estimated using 611 sockeye salmon that passed quality control measures (Table 2). Estimates were produced for a total seasonal estimate and for 5 statistical weeks (30–34) in which adequate samples were collected (Table 2; Figure 7; Appendix D). For the seasonal estimate, by reporting group, Alaska was the largest contributor (40.8%), followed by Klawock (25.9%), Skeena (24.4%), Other (4.3%), McDonald (2.8%), Nass (1.7%), and Hugh Smith (0.1%). There was no clear temporal trend across the season in the proportion of the Klawock Lake fish in the overall harvest. Klawock Lake sockeye salmon appeared relatively consistently throughout the entirety of the sampling period and estimates ranged from 19.0% in statistical week 32 to 33.0% in statistical week 33.

District 104

The stock composition of the District 104 harvest was estimated using 1,594 sockeye salmon that passed quality control measures (Table 2). Estimates were produced for 5 statistical weeks (28, 29, 31, 32, and 33) in which adequate samples were collected and one pooled stratum (statistical weeks 34–35; Figure 8; Appendix D). Estimates of the proportion of Klawock Lake fish in the overall harvest were low and there was no clear temporal trend observed for statistical weeks 28–31. Weekly estimates ranged from 1.1% in statistical week 29 to 3.1% in statistical week 28. However, during statistical weeks 32–35, the Klawock reporting group was not a major contributor (<0.02%) to the overall stock composition.

Stock-specific Harvest

Southern District 103

The stock-specific harvest was calculated for the 7 reporting groups using seasonal harvests in Southern District 103 (Table 4). The total sockeye salmon harvest in Southern District 103 was 6,807 fish. Of these, 6,669 fish were allocated to the Alaska reporting group. The total seasonal harvest of Klawock Lake sockeye salmon in Southern District 103 was 4 fish (Table 5).

Northern District 103

The stock-specific harvest was calculated for the 7 reporting groups using weekly harvests in Northern District 103 (Appendix D). The total harvest varied by week ranging from 630 fish in statistical week 30 to 6,714 fish in statistical week 32. The harvest of Klawock Lake sockeye salmon ranged from 150 fish in statistical week 30 to 2,031 fish in statistical week 33. The total seasonal harvest of Klawock Lake sockeye salmon in Northern District 103 was 4,488 fish (Table 5).

District 104

The stock-specific harvest was calculated for the 7 reporting groups using weekly harvests in District 104 (Appendix D). The total harvest varied by week ranging from 959 fish in statistical week 28 to 99,530 fish in statistical week 33. Overall, estimates of the harvest of Klawock Lake sockeye salmon were relatively low. The largest estimated harvest of Klawock Lake sockeye salmon in District 104 occurred in statistical week 31 (868 fish). This was followed by statistical week 29 (91 fish) and statistical week 28 (29 fish). The estimated harvest in statistical weeks 32, 33, and the pooled weeks 34–35 were less than 20 fish each. The total seasonal harvest of Klawock sockeye salmon in District 104 was 1,020 fish (Table 5).

Total Run Size

In 2019, the total run size of Klawock Lake sockeye salmon was 14,942 fish (Table 4). The escapement to Klawock Lake was 7,368 adult sockeye salmon. The estimated total commercial harvest (Districts 103 and 104) was 5,512 fish. The reported subsistence harvest was 1,237 fish. We expanded the reported subsistence rate to account for the approximately 60% reporting rate increased the subsistence harvest to 2,062 fish. We used the expanded subsistence harvest to calculate total run size. Commercial purse seine fisheries in Districts 103 and 104 accounted for a harvest rate of 36.9% and the subsistence fishery accounted for a harvest rate of 13.8%. The overall harvest rate on the Klawock Lake sockeye salmon stock was 50.7%.

2020

Sample Size

Sample sizes obtained in 2020 were adequate for producing stock composition estimates for the following: (1) seasonal estimate from Southern District 103 for statistical weeks 30–34, (2) a weekly estimate from Northern District 103 for statistical week 30 and pooled weekly estimates for statistical weeks 31–32 and 33–34, and (3) weekly estimates from District 104 for statistical weeks 30–34 (Table 2).

Stock Composition

Southern District 103

In 2020, the stock composition of the Southern District 103 harvest was estimated for a single stratum consisting of statistical weeks 30–34 (Figure 9; Table 6). Stock composition estimates showed the largest contributor was the Alaska reporting group (51.7%), followed by the Skeena (38.5%), Other (4.8%), McDonald (4.4%), Klawock (0.5%), and Nass (0.12%) reporting groups. Although the Hugh Smith reporting group was represented in the analysis, it did not contribute to the overall stock composition.

Northern District 103

The stock composition of the Northern District 103 harvest was estimated using 532 sockeye salmon that passed quality control measures (Table 2). Estimates were produced for a total seasonal estimate, for statistical week 30, and pooled statistical weeks 31–32 and 33–34 (Table 2; Figure 10). For the seasonal estimate, by reporting group, Skeena was the largest contributor (40.3%), followed by Alaska (38.2%), Klawock (10.8%), Other (5.3%), Nass (3.9%), McDonald (0.7%), and Hugh Smith (0.7%). There was no clear temporal trend across the season in the proportion of the Klawock Lake fish in the overall harvest. Klawock Lake sockeye salmon appeared relatively consistently throughout the entirety of the sampling period and estimates ranged from 17.8% in pooled statistical weeks 33–34 to 8.6% in pooled statistical weeks 31–32 (Appendix E).

District 104

The stock composition of the District 104 harvest was estimated using 1,475 sockeye salmon that passed quality control measures (Table 2). Estimates were produced for 5 statistical weeks (30–34) in which adequate samples were collected (Figure 11). Estimates of Klawock Lake fish in the overall harvest were low and there was no clear temporal trend observed across the season. The estimated proportion of Klawock Lake sockeye salmon in the harvest in statistical week 31 was 1.6% and was less than 0.1% in the remaining statistical weeks (Appendix E).

Stock-specific Harvest

Southern District 103

The stock-specific harvest was calculated for the 7 reporting groups using seasonal harvests in Southern District 103 (Table 6). The total sockeye salmon harvest in Southern District 103 was 1,176 fish. Of these, 608 fish were allocated to the Alaska reporting group and 453 fish were of Skeena origin. The total seasonal harvest of Klawock Lake sockeye salmon in Southern District 103 was 6 fish (Table 6).

Northern District 103

The stock-specific harvest was calculated for the 7 reporting groups using weekly harvests in Northern District 103 (Appendix E). The total harvest varied by week ranging from 2,319 fish in statistical week 30 to 16,896 fish in statistical week 31–32. The harvest of Klawock Lake sockeye salmon ranged from 363 fish in statistical week 30 to 1,452 fish in statistical week 31–32. The total seasonal harvest of Klawock Lake sockeye salmon in Northern District 103 was 2,457 fish (Table 6).

District 104

The stock-specific harvest was calculated for the 7 reporting groups using weekly harvests in District 104 (Appendix E). The total harvest varied by week ranging from 6,923 fish in statistical week 30 to 54,157 fish in statistical week 31. Overall, estimates of the harvest of Klawock Lake sockeye salmon were relatively low. The largest estimated harvest of Klawock Lake sockeye salmon in District 104 occurred in statistical week 31 (870 fish). The estimated harvest in statistical weeks 30, 32, 33, and 34 were less than 15 fish each. The total seasonal harvest of Klawock Lake sockeye salmon in District 104 was 889 fish (Table 6).

Total Run Size

In 2020, the total run size of Klawock Lake sockeye salmon was 19,702 fish (Table 4). The escapement to Klawock Lake was 10,058 adult sockeye salmon. The estimated total commercial harvest (Districts 103 and 104) was 3,352 fish. The reported subsistence harvest was 3,775 fish. We expanded the reported subsistence rate to account for the approximately 60% reporting rate increased the subsistence harvest to 6,292 fish. We used the expanded subsistence harvest to calculate total run size. Commercial purse seine fisheries in Districts 103 and 104 accounted for a harvest rate of 17.0%, and the subsistence fishery accounted for a harvest rate of 31.9%. The overall harvest rate on the Klawock Lake sockeye salmon stock was 48.9%.

2021

Sample Size

Sample sizes obtained in 2021 were adequate for producing stock composition estimates for (1) seasonal estimate from Southern District 103 for statistical weeks 30–36, (2) weekly estimates from Northern District 103 for statistical weeks 33, 35, and 36, and (3) weekly estimates from District 104 for statistical weeks 29–36 (Table 2). Although there was commercial harvest in Northern District 103 during statistical weeks 30 (441 fish), 31 (925 fish), 32 (5,264 fish), and 34 (3,748 fish), the authors were unable to sample the catch.

Stock Composition

Southern District 103

In 2021, the stock composition of the Southern District 103 harvest was estimated for a single stratum consisting of statistical weeks 30–36 (Figure 12; Table 7). Stock composition estimates showed the largest contributor was the Skeena reporting group (48.6%), followed by the Alaska (47.2%), Nass (1.6%), McDonald (1.1%), Klawock (1.0%), and Other (0.5%) reporting groups. Although the Hugh Smith reporting group was represented in the analysis, it did not contribute to the overall stock composition.

Northern District 103

The stock composition of the Northern District 103 harvest was estimated using 376 sockeye salmon that passed quality control measures (Table 2). Estimates were produced for a total seasonal estimate and for 3 weekly estimates from statistical weeks 33, 35, and 36 (Table 7; Figure 13). For the seasonal estimate, by reporting group, Skeena was the largest contributor (41.8%), followed by Alaska (27.7%), Klawock (13.6%), Other (13.3%), McDonald (1.3%), Nass (1.2%), and Hugh Smith (1.1%). There was no clear temporal trend across the season in the proportion of Klawock Lake fish in the overall harvest. Klawock Lake sockeye salmon estimates ranged from 3.0% in statistical week 36 to 25.3% in statistical week 35.

District 104

The stock composition of the District 104 harvest was estimated using 1,865 sockeye salmon that passed quality control measures (Table 2). Estimates were produced for 8 statistical weeks (29–36) in which adequate samples were collected (Table 7; Figure 14). Estimates of the stock composition of the Klawock reporting group were relatively low. Similar to the previous study period (2018–2020), there was no clear temporal trend in the abundance of Klawock Lake sockeye salmon in the harvests except for the lack of fish later in the season (e.g., statistical weeks 35 and 36). Statistical week 33 saw the highest contribution of Klawock Lake sockeye salmon (4.5%) followed by statistical weeks 30 (1.5%), 29 (1.3%), 32 (1.2%), and 34 (0.7%). The estimated proportion of Klawock Lake sockeye salmon was <0.01% in statistical weeks 31, 35, and 36.

Stock-specific Harvest

Southern District 103

The stock-specific harvest was calculated for the 7 reporting groups using seasonal harvests in Southern District 103 (Appendix F). The total sockeye salmon harvest in Southern District 103 was 2,894 fish. Of these, 1,406 fish were of Skeena origin and 1,367 were assigned to the Alaska reporting group. The total seasonal harvest of Klawock Lake sockeye salmon in Southern District 103 was 28 fish (Table 7).

Northern District 103

The stock-specific harvest was calculated for the 7 reporting groups using weekly harvests in Northern District 103 (Appendix F). The total harvest varied by week ranging from 1,885 fish in statistical week 36 to 7,332 fish in statistical week 33. The harvest of Klawock Lake sockeye salmon ranged from 56 fish in statistical week 36 to 1,451 fish in statistical week 35. The total seasonal harvest of Klawock Lake sockeye salmon in Northern District 103 was 2,027 fish (Table 7).

District 104

The stock-specific harvest was calculated for the 7 reporting groups using weekly harvests in District 104 (Appendix F). The total harvest varied by week ranging from 15,249 fish in statistical week 29 to 138,502 fish in statistical week 32. The largest estimated harvest of Klawock sockeye salmon in District 104 occurred in statistical week 33 and was 1,922 fish. This was followed by statistical week 32 (1,608 fish), statistical week 30 (521 fish), statistical week 34 (368 fish), and statistical week 29 (203 fish). The estimated harvest in statistical weeks 31, 35, and 36 were 1 or fewer fish each. The total seasonal harvest of Klawock Lake sockeye salmon in District 104 was 4,623 fish (Table 7).

Total Run Size

In 2021, the total run size of Klawock Lake sockeye salmon was 13,600 fish (Table 4). The escapement to Klawock Lake was 5,460 adult sockeye salmon. The estimated total commercial harvest (Districts 103 and 104) was 6,677 fish, which does not include unsampled harvests from statistical weeks 30–32 and statistical week 34. The reported subsistence harvest was 878 fish. After expanding the reported subsistence rate to account for the approximately 60% reporting rate, the subsistence harvest increased to 1,463 fish. The expanded subsistence harvest was used to calculate total run size. Commercial purse seine fisheries in Districts 103 and 104 accounted for a harvest rate of 49.1%, and the subsistence fishery accounted for a harvest rate of 10.8%. The overall harvest rate on the Klawock Lake sockeye salmon stock was 59.9%.

DISCUSSION

Stock composition and stock-specific harvest estimates from Districts 103 and 104, throughout the study period, were accurate and successful. However, the statistical weeks in which there were sufficient samples for analysis varied each year. Small harvests in District 103 made it difficult to obtain weekly samples throughout the duration of the fishery, particularly in Northern District 103 in 2021. An additional source of difficulty was the mixing of harvest onboard tenders. Tender vessels occasionally bought fish harvested in adjacent areas or districts and combined them in the same fish hold, making it impossible to obtain samples that were purely from Northern or Southern District 103. Although fish from mixed statistical areas within District 103 are still useful for determining the stock composition in District 103 as a whole, it wasn't possible to use them to answer specific questions revolving around Klawock Lake sockeye salmon (e.g., stock-specific harvest by northern and southern sections).

After the 2018 season, the difficulties of collecting additional samples for this project became clear and plans were made to hire an employee to sample onboard a tender for the remainder of the project. The goal was to have the tender rider intercept and sample fish as they were being delivered, thus eliminating the mixed delivery issue. Unfortunately, in 2019, it wasn't possible to find an employee suited for the job. Furthermore, in 2020, the COVID-19 pandemic made it impossible to employ a tender rider, as processors did not allow extra, nonessential staff onboard their vessels. After 2020, it was determined that the tender rider was not necessary. To overcome any shortages, statistical weeks were pooled to determine whether there were not enough samples in a given week. Although this is not as fine scale as initially desired (i.e., weekly estimates), it was sufficient for investigating the harvest of Klawock-origin sockeye salmon.

In 3 of 4 years, (2018–2020), the harvest of Klawock-origin sockeye salmon was higher in District 103 than in District 104. Within District 103, the harvest of Klawock-origin sockeye salmon was substantially higher in Northern District 103 than in Southern District 103. This was not entirely surprising given the terminal nature of the Northern District to Klawock Lake. This finding highlights the importance of splitting stock composition estimates for District 103 into 2 sections. In doing so, it was possible to identify fine-scale spatial trends in the harvests. By identifying smaller sections within the district, management decisions can be made on a much smaller scale, rather than across broad geographic areas of the entire district.

Although spatial differences are useful in fine-tuning management, it is also useful to examine temporal trends within each area. For example, if a stock of interest is known to appear in harvests later in the season, earlier purse seine openings may be useful in providing opportunity while avoiding the particular stock. However, across all 4 years of the study, it was not possible to identify clear temporal trends in the harvest of Klawock Lake sockeye salmon in Northern District 103. It appears that Klawock-origin sockeye salmon are present in varying proportions throughout the duration of the fishery.

Taken together, the estimated stock-specific harvests along with escapement to Klawock Lake and reported subsistence harvest facilitated the first estimates of total run size and allowed an understanding of the total harvest rate of Klawock Lake sockeye salmon. The total run size varied from year to year, with a minimum of 13,147 fish in 2018 and a maximum of 19,702 fish in 2020. The overall harvest rates varied from 43.9% in 2018 to 59.9% in 2021. Similarly, harvest rates of the commercial purse seine fisheries in Districts 103 and 104 varied widely from 17.0% in 2020, to 49.1% in 2021. The purse seine fleet was provided more fishing time in odd years compared to even years to harvest larger odd-year pink salmon runs, particularly in District 103 (Gray et al. 2019; Thynes et al. 2020, 2021); as a result, the commercial harvest rate on Klawock Lake sockeye salmon averaged higher in odd years (43.0%) compared to even years (18.5%). During even years, the average commercial harvest rate (18.5%) was less than the average subsistence harvest rate (27.9%). Although the commercial fishery harvest rates of Klawock Lake sockeye salmon vary, they contribute a significant portion to the overall harvest rate on the stock.

The 50.7% average overall harvest rate on Klawock Lake sockeye salmon during the study period is substantial in relation to the probable long-term sustainable harvest rate on the stock. The sustainable harvest rate at maximum sustained yield (MSY) can be estimated for stocks with sufficient data to develop a Ricker stock-recruitment model (Ricker 1954; Hilborn and Walters 1992). This harvest rate, referred to as U_{MSY}, is the average harvest rate that is sustainable at the level of escapement and brood year return that corresponds to MSY as estimated from the model. Harvest rates that are chronically larger than U_{MSY} increase the likelihood of reduced abundance in future returns. Stock-recruitment estimates of U_{MSY} for Southeast Alaska sockeye salmon stocks range from about 54% to 75% (Eggers et al. 2009; Eggers and Bernard 2011; Heinl et al. 2014; Brenner et al. 2018; Miller and Heinl 2018; Miller and Pestal 2020; Heinl et al. 2021), just above the estimated average harvest rate observed for Klawock Lake sockeye salmon. Although we do not have the data required to directly estimate U_{MSY} for the Klawock Lake sockeye salmon run, estimates for other Southeast Alaska stocks suggest caution at harvesting at rates higher than those observed during the study period.

A major finding of this study is that Klawock-origin sockeye salmon are present in the commercial harvest, in varying degrees, throughout the fishing season. Given the spatial differences between Northern and Southern District 103, we believe that if management action were to be taken, the best opportunity for reducing commercial harvest of Klawock-origin sockeye salmon would be in Northern District 103. That said, as mentioned previously, there were no clear temporal trends, so management actions at a weekly level may be difficult to implement successfully.

The information gained from this study fills in a gap in the collective knowledge base of Klawock-origin sockeye salmon (i.e., stock-specific harvests and harvest rates from commercial fisheries) and we hope that continued work on this important stock will shed light into their recent declines. Although we do not have funding to run additional samples, we plan to implement our District 103 sampling scheme from the past 4 years moving forward. The additional samples will be stored in the ADF&G GCL and will be available for analysis in the future.

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TABLES AND FIGURES

Table 1.–Escapement, subsistence harvest, and estimated terminal run size of Klawock Lake sockeye salmon, 1985–2017.

Year	Escapement[a]	Reported subsistence harvest	Subsistence permits returned	Estimated subsistence harvest[b]	Estimated terminal run size[c]	Subsistence harvest rate
1985	–	2,336	138	–	–	–
1986	–	2,762	156	–	–	–
1987	–	2,118	117	–	–	–
1988	–	1,851	96	–	–	–
1989	–	3,048	120	–	–	–
1990	–	2,631	100	–	–	–
1991	–	1,989	77	–	–	–
1992	–	4,322	133	–	–	–
1993	–	5,763	162	–	–	–
1994	–	4,848	133	–	–	–
1995	–	3,489	118	–	–	–
1996	–	5,553	159	–	–	–
1997	–	4,746	126	–	–	–
1998	–	4,670	125	–	–	–
1999	–	3,506	124	–	–	–
2000	–	3,015	113	–	–	–
2001	14,000	4,433	130	6,400	20,400	31%
2002	13,631	3,778	116	6,000	19,631	31%
2003	21,300	3,195	91	6,000	27,300	22%
2004	12,442	2,697	80	4,500	16,942	27%
2005	14,840	238	34	175	15,015	1%
2006	14,757	1,859	65	3,100	17,857	17%
2007	17,500	2,042	57	2,600	20,100	13%
2008	21,165	3,000	70	6,700	27,865	24%
2009	19,699	4,296	127	–	–	–
2010	21,549	3,260	99	–	–	–
2011	4,301	2,079	76	–	–	–
2012	2,228	2,327	68	–	–	–
2013	1,086	1,071	53	–	–	–
2014	5,911	1,182	54	–	–	–
2015	7,696	549	29	–	–	–
2016	6,210	1,423	49	–	–	–
2017	12,535	1,100	37	–	–	–

Note: en dashes (–) = no data available.

[a] Escapements from 2001 to 2009 are from Bednarski (2010); escapements from 2010 to 2017 are weir counts (minus jacks) courtesy of Jeff Lundberg, Klawock River Hatchery, Southern Southeast Regional Aquaculture Association.

[b] Subsistence harvest estimated from on-the-grounds surveys, 2001–2008 (Conitz 2010).

[c] Estimated terminal harvest is the escapement plus the estimated subsistence harvest.

Table 2.–Sample size (*n*) and harvest used to estimate the stock composition of the commercial purse seine fishery by year, statistical week, and management district, 2018–2021.

Year	District	Statistical week	*n*	Harvest	Year	District	Statistical week	*n*	Harvest
2018	D103S	31–34	188	9,425	2020	D103S	30–34	90	1,176
2018	D103N	30	142	1,120	2020	D103N	30	188	2,319
2018	D103N	31	115	720	2020	D103N	31–32	180	16,896
2018	D103N	32	149	1,804	2020	D103N	33–34	164	3,600
2018	D103N	33	103	1,777	2020	D104	30	280	6,923
2018	D103N	34	0	1,791	2020	D104	31	380	54,127
2018	D104	29	475	7,558	2020	D104	32	400	48,634
2018	D104	30	437	12,185	2020	D104	33	155	21,002
2018	D104	31	397	3,758	2020	D104	34	260	13,161
2018	D104	32	259	10,770	2021	D103S	30–36	174	2,894
2018	D104	33	40	10,557	2021	D103N	30	0	441
2018	D104	34	397	76,537	2021	D103N	31	0	925
2019	D103S	32–34	181	6,807	2021	D103N	32	0	5,264
2019	D103N	30	180	630	2021	D103N	33	180	7,332
2019	D103N	31	92	2,611	2021	D103N	34	0	3,748
2019	D103N	32	170	6,714	2021	D103N	35	99	5,740
2019	D103N	33	97	6,150	2021	D103N	36	97	1,885
2019	D103N	34	72	1,201	2021	D104	29	298	15,249
2019	D103N	35	0	80	2021	D104	30	305	34,055
2019	D104	28	192	959	2021	D104	31	344	117,498
2019	D104	29	338	8,440	2021	D104	32	265	138,502
2019	D104	31	296	74,565	2021	D104	33	263	42,828
2019	D104	32	258	60,490	2021	D104	34	130	55,722
2019	D104	33	260	99,530	2021	D104	35	130	65,857
2019	D104	34–35	250	27,009	2021	D104	36	130	26,693

Note: Harvest from unsampled weeks was not included in estimates.

Table 3.–Annual estimates of stock composition (%) and stock-specific harvest for Districts 103 South (103S), 103 North (103N), and 104, 2018. Estimates include median, 90% credibility interval (CRI), the probability that the group estimate is equal to zero ($P = 0$), mean, and SD.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103S	31–34	Alaska	100	98.6	100	0	99.9	0.7	9,425	9,290	9,425	9,416	62
		Nass	0	0	0.1	89.5	0	0.1	0	0	7	0	11
		Skeena	0	0	0.4	79.4	0	0.2	0	0	35	2	19
		Other	0	0	0.8	65.5	0.1	0.4	0	0	80	6	39
		McDonald	0	0	0	97.3	0	0.1	0	0	0	0	9
		Hugh Smith	0	0	0.5	91.8	0	0.4	0	0	44	0	41
		Klawock	0	0	0	94.8	0	0.1	0	0	0	1	13
											Total	9,425	
103N	30–33	Alaska	49.1	45.2	53.1	0	49.1	2.4	2,664	2,449	2,878	2,663	130
		Nass	0.4	0.1	1.0	0	0.5	0.3	23	6	56	26	16
		Skeena	13.6	11.5	15.8	0	13.6	1.3	735	626	855	737	69
		Other	3.0	1.6	4.7	0	3.1	1.0	164	86	257	167	52
		McDonald	1.1	0.6	2.0	0	1.2	0.4	61	30	106	64	23
		Hugh Smith	0	0	0.6	0	0.1	0.2	1	0	33	7	12
		Klawock	32.4	28.6	36.2	0	32.4	2.3	1,755	1,552	1,962	1,756	125
											Total	5,421[a]	
104	29–34	Alaska	12.3	10.6	14.4	0	12.4	1.1	14,973	12,901	17,454	15,044	1,385
		Nass	3.1	2.1	4.6	0	3.2	0.8	3,783	2,531	5,571	3,880	938
		Skeena	35.0	32.2	37.8	0	35.0	1.7	42,433	39,126	45,842	42,456	2,041
		Other	48.0	45.1	50.9	0	48.0	1.7	58,224	54,720	61,714	58,226	2,118
		McDonald	0.3	0	0.7	5.3	0.3	0.2	313	0	846	352	257
		Hugh Smith	0.4	0	1	4.5	0.4	0.3	487	0	1,257	544	411
		Klawock	0.7	0.5	0.9	0	0.7	0.1	854	620	1,138	863	159
											Total	121,365	

Note: Stock composition estimates may not sum to 100% and stock-specific harvest estimates may not sum to the total harvest due to rounding error.

[a] The total does not include 1,791 fish harvested in statistical week 34.

Table 4.–Estimated Klawock Lake sockeye salmon total run size and harvest rates, 2018–2021.

Year	Estimated commercial harvest	Reported subsistence harvest[a]	Adjusted subsistence harvest[b]	Total estimated harvest	Escapement[c]	Total run	Commercial harvest rate	Subsistence harvest rate	Total harvest rate
2018	2,619	1,894	3,157	5,776	7,371	13,147	19.9%	24.0%	43.9%
2019	5,512	1,237	2,062	7,574	7,368	14,942	36.9%	13.8%	50.7%
2020	3,352	3,775	6,292	9,644	10,058	19,702	17.0%	31.9%	48.9%
2021	6,677	878	1,463	8,140	5,460	13,600	49.1%	10.8%	59.9%
Average	4,540	1,946	3,244	7,784	7,564	15,348	29.6%	21.1%	50.7%

[a] The reported subsistence harvest as of 19 August 2022.

[b] Reported subsistence harvest expanded by 1.67 based on Conitz (2010).

[c] Escapement equals total weir count of non-jack sockeye salmon; data provided by the Klawock River Hatchery.

Table 5.–Annual estimates of stock composition (%) and stock-specific harvest for Districts 103 South (103S), 103 North (103N), and 104, 2019. Estimates include median, 90% credibility interval (CRI), the probability that the group estimate is equal to zero ($P = 0$), mean, and SD.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103S	32–34	Alaska	98.2	95.7	99.5	0	98.0	1.2	6,685	6,514	6,773	6,669	81
		Nass	0	0	0.1	88.2	0	0.1	0	0	6	1	9
		Skeena	1.6	0.5	3.6	0	1.8	1	109	36	246	122	66
		Other	0	0	0.8	70.8	0	0.4	0	0	57	1	28
		McDonald	0	0	0.9	0	0.1	0.4	3	3	60	10	28
		Hugh Smith	0	0	0	95.3	0	0.1	0	0	0	0	10
		Klawock	0	0	1.1	82.8	0.1	0.5	0	0	75	4	33
											Total	6,807	
103N	30–34	Alaska	40.8	36.6	45.0	0.0	40.8	2.6	7,052	6,338	7,787	7,055	442
		Nass	1.6	0.8	2.7	0.0	1.7	0.6	278	145	470	291	102
		Skeena	24.4	20.8	27.8	0.0	24.4	2.2	4,228	3,600	4,817	4,219	372
		Other	4.2	2.4	6.6	0.0	4.3	1.3	731	411	1,139	747	224
		McDonald	2.7	1.5	4.6	0.0	2.8	0.9	471	256	800	490	164
		Hugh Smith	0.0	0.0	0.5	41.8	0.1	0.2	4	0	86	16	40
		Klawock	26.0	22.1	29.8	0.0	25.9	2.3	4,491	3,817	5,158	4,488	405
											Total	17,306[a]	
104	28–35	Alaska	10.7	8.7	12.8	0	10.7	1.2	28,930	23,644	34,601	29,006	3,336
		Nass	8.6	6.9	10.5	0	8.6	1.1	23,318	18,617	28,420	23,402	2,999
		Skeena	42.7	39.8	45.6	0	42.7	1.8	115,789	107,911	123,644	115,811	4,781
		Other	34.9	32.1	37.7	0	34.9	1.7	94,497	87,048	102,241	94,572	4,607
		McDonald	1.0	0	3.0	12.3	1.2	1.0	2,756	0	8,186	3,378	2,750
		Hugh Smith	1.4	0	3.3	1.7	1.4	1.2	3,852	38	8,939	3,805	3,137
		Klawock	0.3	0.1	0.8	0	0.4	0.2	914	272	2,137	1,020	592
											Total	270,993	

Note: Stock composition estimates may not sum to 100% and stock-specific harvest estimates may not sum to the total harvest due to rounding error.

[a] The total does not include 80 fish harvested in statistical week 35.

Table 6.–Annual estimates of stock composition (%) and stock-specific harvest for Districts 103 South (103S), 103 North (103N), and 104, 2020. Estimates include median, 90% credibility interval (CRI), the probability that the group estimate is equal to zero ($P = 0$), mean, and SD.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103S	30–34	Alaska	51.6	42.6	60.5	0	51.7	5.5	607	501	711	608	64
		Nass	0	0	0.5	0	0.1	0.5	0	0	6	1	5
		Skeena	38.5	30.4	46.7	0	38.5	5.0	452	357	549	453	59
		Other	4.5	0.4	10.2	0	4.8	3.0	53	5	120	56	35
		McDonald	4.2	0.2	9.2	0	4.4	2.7	49	2	109	52	32
		Hugh Smith	0	0	3.7	85.8	0	1.5	0	0	43	0	17
		Klawock	0	0	3.2	66.0	0.5	1.2	0	0	37	6	14
											Total	1,176	
103N	30–34	Alaska	38.2	33.3	42.9	0	38.2	2.9	8,724	7,608	9,795	8,725	667
		Nass	3.8	2.2	6.2	0	3.9	1.2	872	505	1,410	901	277
		Skeena	40.3	35.9	44.7	0	40.3	2.7	9,201	8,193	10,204	9,196	626
		Other	5.2	3.3	7.7	0	5.3	1.4	1,184	755	1,758	1,212	320
		McDonald	0.5	0.2	2.0	0	0.7	0.6	120	56	464	170	145
		Hugh Smith	0.5	0.1	1.8	1.3	0.7	0.5	124	25	410	154	120
		Klawock	10.6	8.1	13.9	0	10.8	1.8	2,426	1,846	3,173	2,457	409
											Total	22,815	
104	30–34	Alaska	4.8	3.6	6.3	0	4.9	0.8	6,971	5,185	9,028	7,023	1,171
		Nass	8.7	7.1	10.4	0	8.7	1.0	12,474	10,272	14,939	12,527	1,427
		Skeena	76.9	74.6	79.0	0	76.8	1.4	110,590	107,280	113,707	110,553	1,953
		Other	8.2	6.9	9.7	0	8.2	0.9	11,788	9,886	13,976	11,843	1,254
		McDonald	0.5	0	1.2	16.9	0.5	0.4	700	0	1,708	724	560
		Hugh Smith	0.1	0	0.8	1.0	0.2	0.3	193	30	1,214	318	396
		Klawock	0.6	0.2	1.1	0	0.6	0.3	841	357	1,581	889	381
											Total	143,877	

Note: Stock composition estimates may not sum to 100% and stock-specific harvest estimates may not sum to the total harvest due to rounding error.

Table 7.–Annual estimates of stock composition (%) and stock-specific harvest for Districts 103 South (103S), 103 North (103N), and 104, 2021. Estimates include median, 90% credibility interval (CRI), the probability that the group estimate is equal to zero ($P = 0$), mean, and SD.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103S	30–36	Alaska	47.3	41.0	53.5	0	47.2	3.8	1,369	1,186	1,547	1,367	111
		Nass	1.4	0.2	3.8	0.8	1.6	1.1	40	6	110	46	32
		Skeena	48.6	42.4	54.8	0	48.6	3.8	1,406	1,226	1,586	1,406	111
		Other	0.3	0	2	31.9	0.5	0.8	8	0	58	14	22
		McDonald	0.7	0.2	3.3	0	1.1	1.1	22	7	95	33	31
		Hugh Smith	0	0	1.2	76.2	0	0.5	0	0	35	0	15
		Klawock	0.7	0	3.1	19.4	1	1.1	21	0	89	28	31
											Total	2,894	
103N	33,35,36	Alaska	27.6	23.9	31.6	0	27.7	2.4	4,127	3,574	4,731	4,136	355
		Nass	1.1	0.4	2.4	0	1.2	0.6	168	61	363	185	96
		Skeena	41.7	37.8	46.2	0	41.8	2.5	6,242	5,648	6,905	6,257	379
		Other	13.3	10.8	16.0	0	13.3	1.6	1,988	1,614	2,388	1,991	241
		McDonald	1.3	0	2.9	15.7	1.3	1	200	0	441	198	143
		Hugh Smith	0.8	0	3.3	0	1.1	1.1	120	1	497	164	165
		Klawock	13.5	10.3	16.9	0	13.6	2	2,017	1,546	2,520	2,027	301
											Total	14,957[a]	
104	29–36	Alaska	8.5	7.3	9.9	0	8.6	0.8	42,432	36,448	49,133	42,561	3,852
		Nass	8.4	7.1	9.8	0	8.4	0.8	41,709	35,484	48,648	41,835	4,005
		Skeena	56.6	54.4	58.8	0	56.6	1.4	281,027	269,807	292,090	280,987	6,762
		Other	21.1	19.4	22.9	0	21.1	1.1	104,717	96,067	113,767	104,783	5,369
		McDonald	1.7	1	2.7	0	1.8	0.5	8,619	4,821	13,421	8,802	2,615
		Hugh Smith	2.6	1.5	3.7	0	2.6	0.7	12,680	7,590	18,484	12,812	3,317
		Klawock	0.9	0.5	1.4	0	0.9	0.3	4,468	2,632	7,119	4,623	1,384
											Total	496,404	

Note: Stock composition estimates may not sum to 100% and stock-specific harvest estimates may not sum to the total harvest due to rounding error.

[a] The total does not include 10,378 fish harvested in statistical weeks 30, 31, 32, and 34.

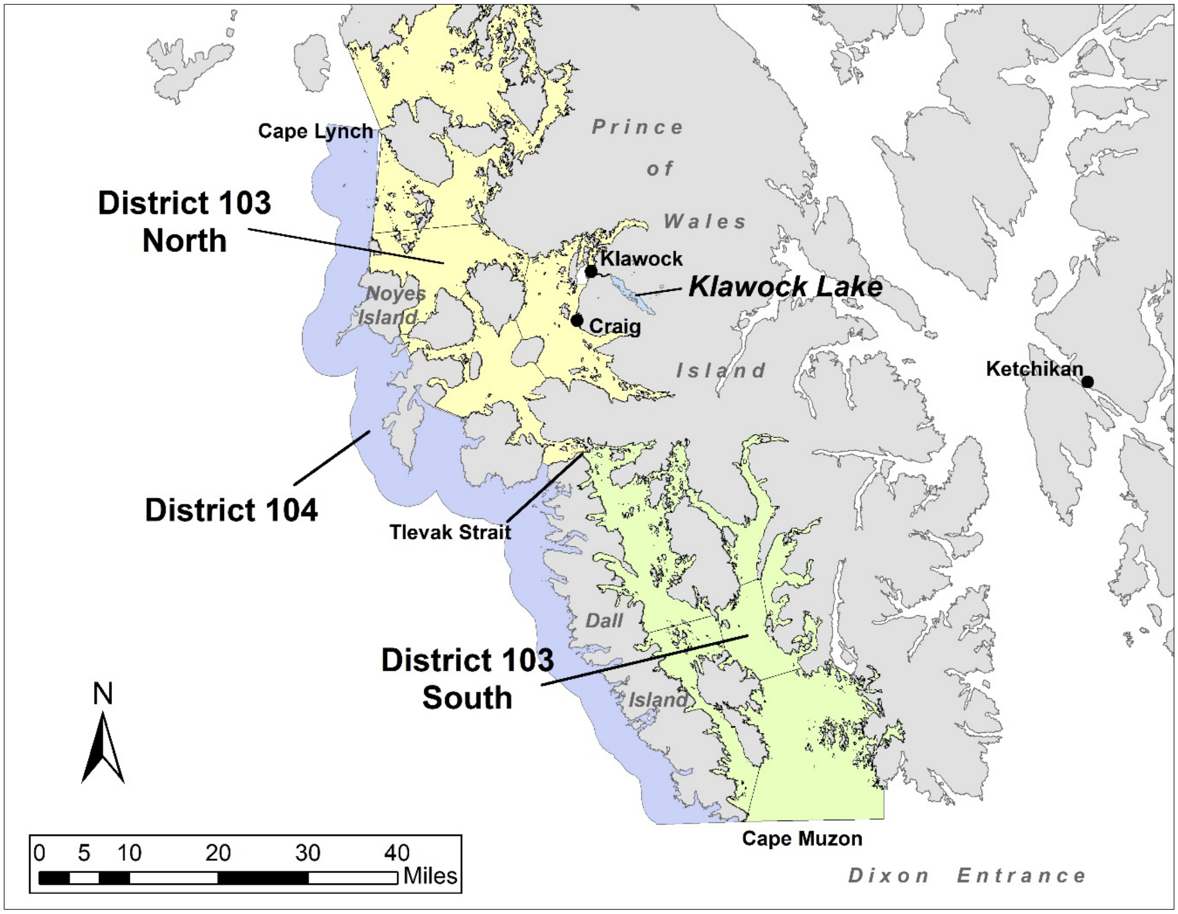

Figure 1.–Map of Prince of Wales Island showing the locations of Klawock Lake and commercial fishing areas in Management District 104 (blue), Northern Management District 103 (yellow; subdistricts 50–90), and Southern Management District 103 (green; subdistricts 11–40).

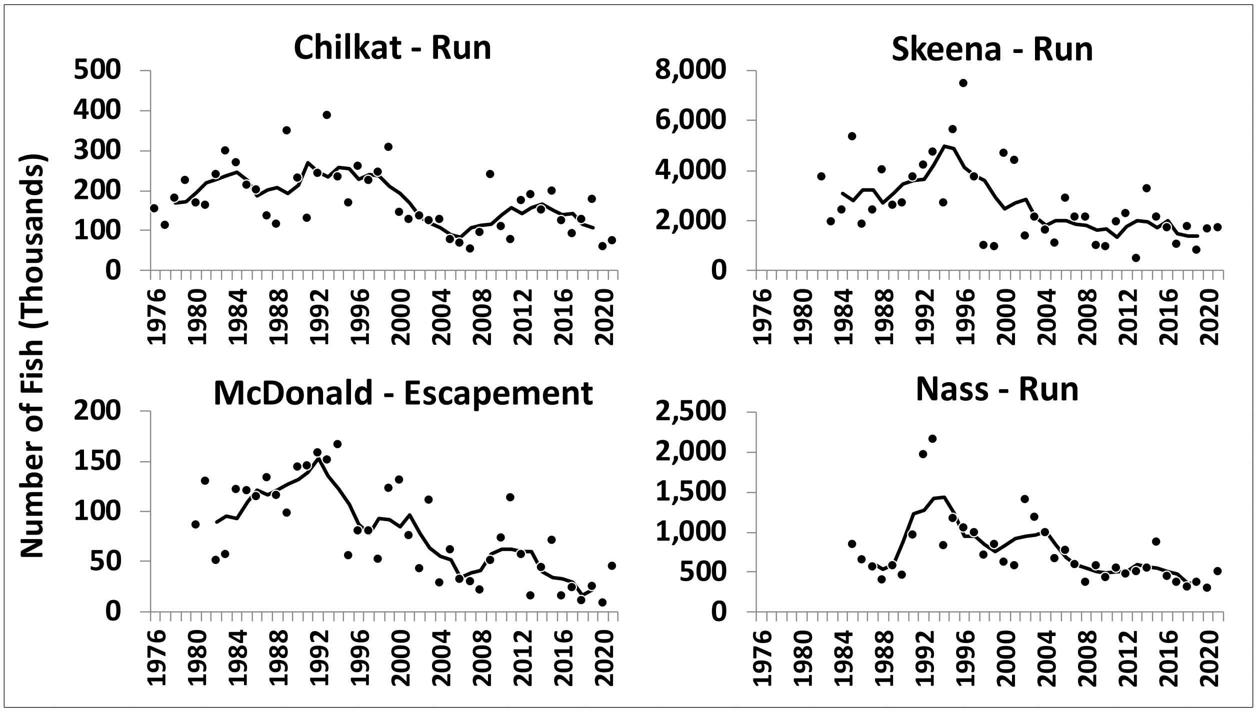

Figure 2.–Annual total runs (thousands) of Chilkat Lake, Skeena River, and Nass River sockeye salmon and annual escapements (thousands) of McDonald Lake sockeye salmon, 1976–2021. The solid black line shows 5-year running average. Note that all 4 sockeye salmon populations exhibit similar long-term trends in abundance—generally more abundant in the 1980s–1990s and less abundant in recent decades. (Nass and Skeena River data provided by Andrew W. Piston, ADF&G, Pacific Salmon Commission, Northern Boundary Technical Committee, unpublished data; Chilkat data updated from Ransbury et al. 2021; McDonald Lake data are unpublished ADF&G data.)

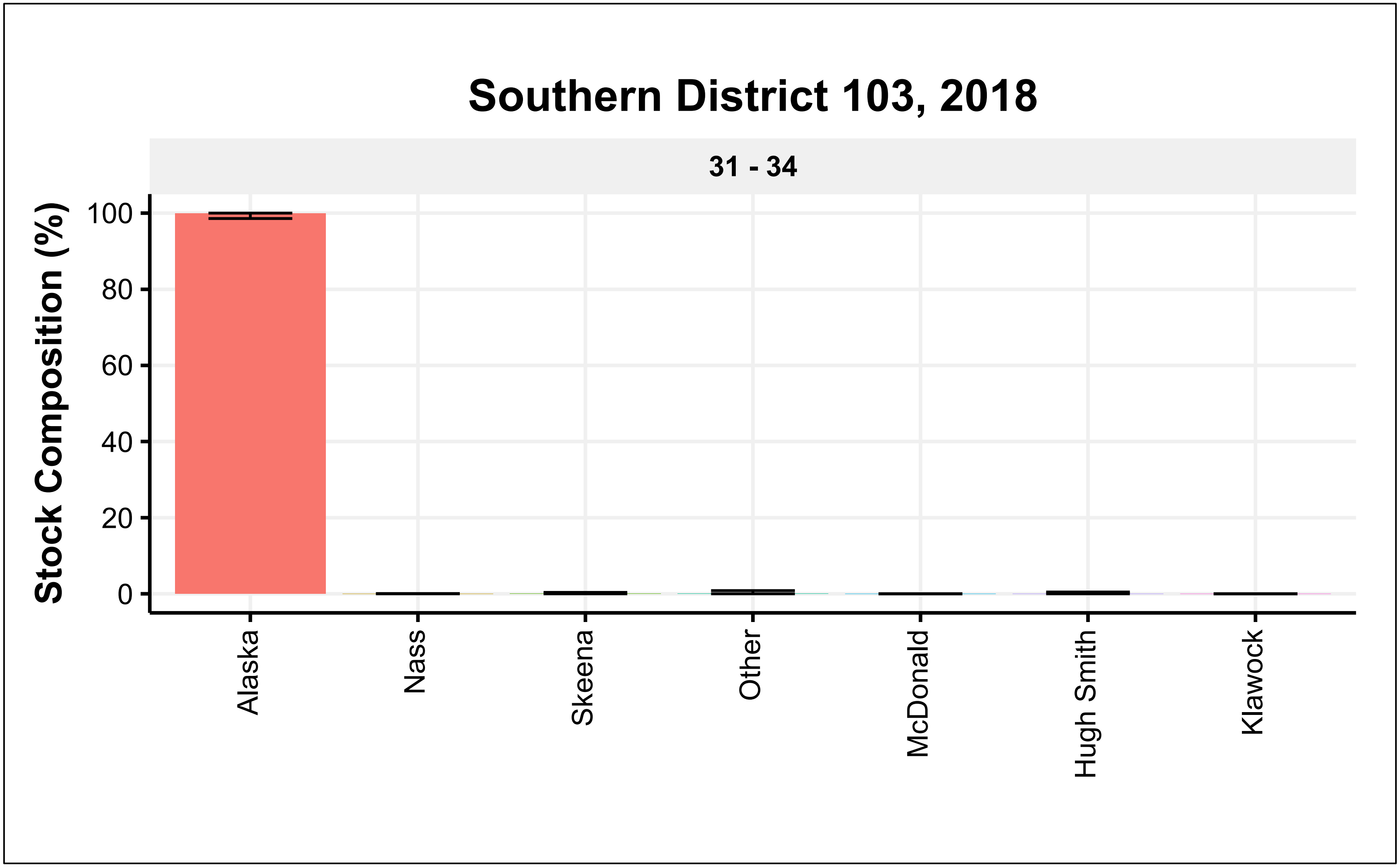

Figure 3.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for Southern District 103 for statistical weeks 31–34, 2018.

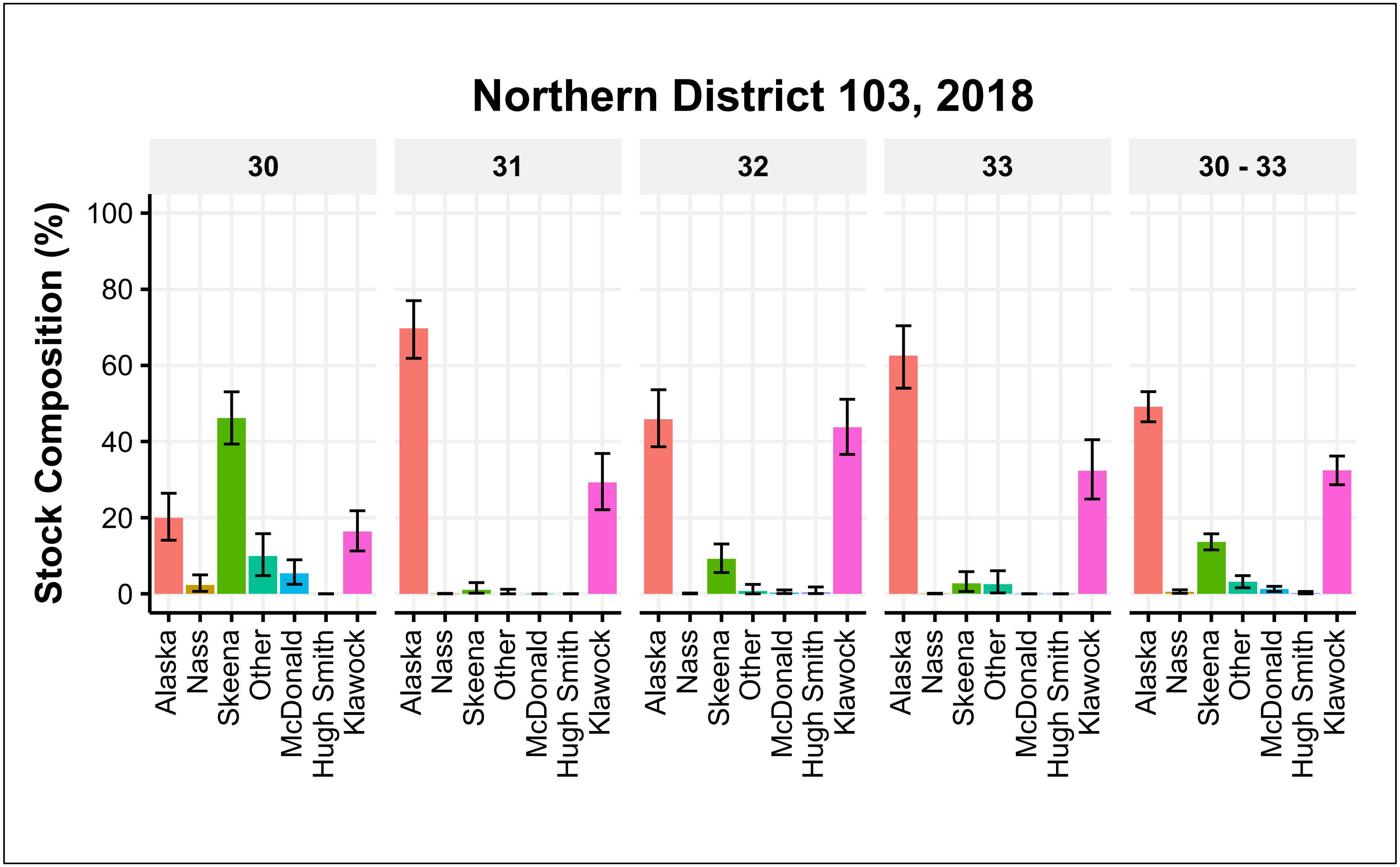

Figure 4.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for Northern District 103 for statistical weeks 30–33, 2018.

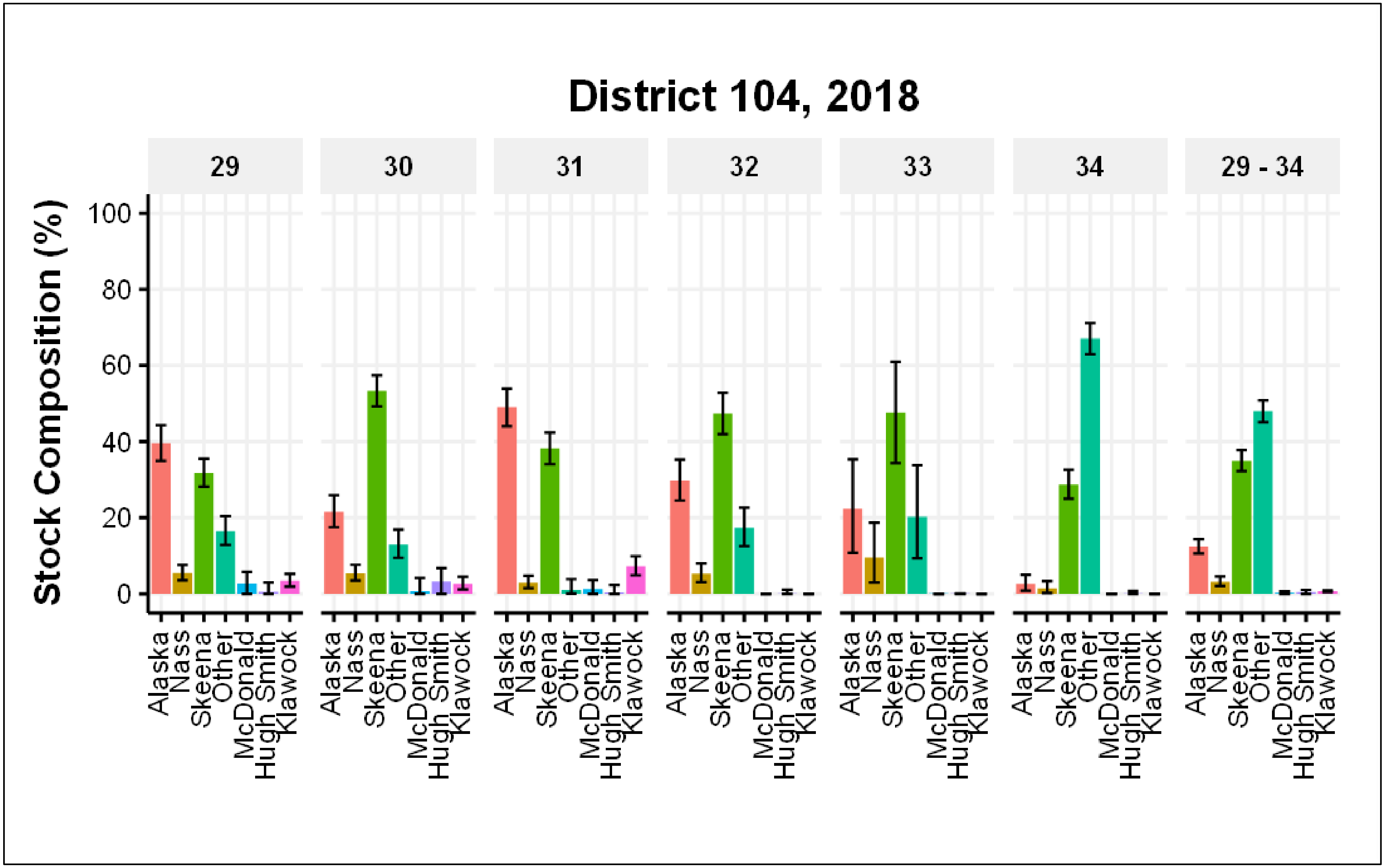

Figure 5.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for District 104 for statistical weeks 29–34, 2018.

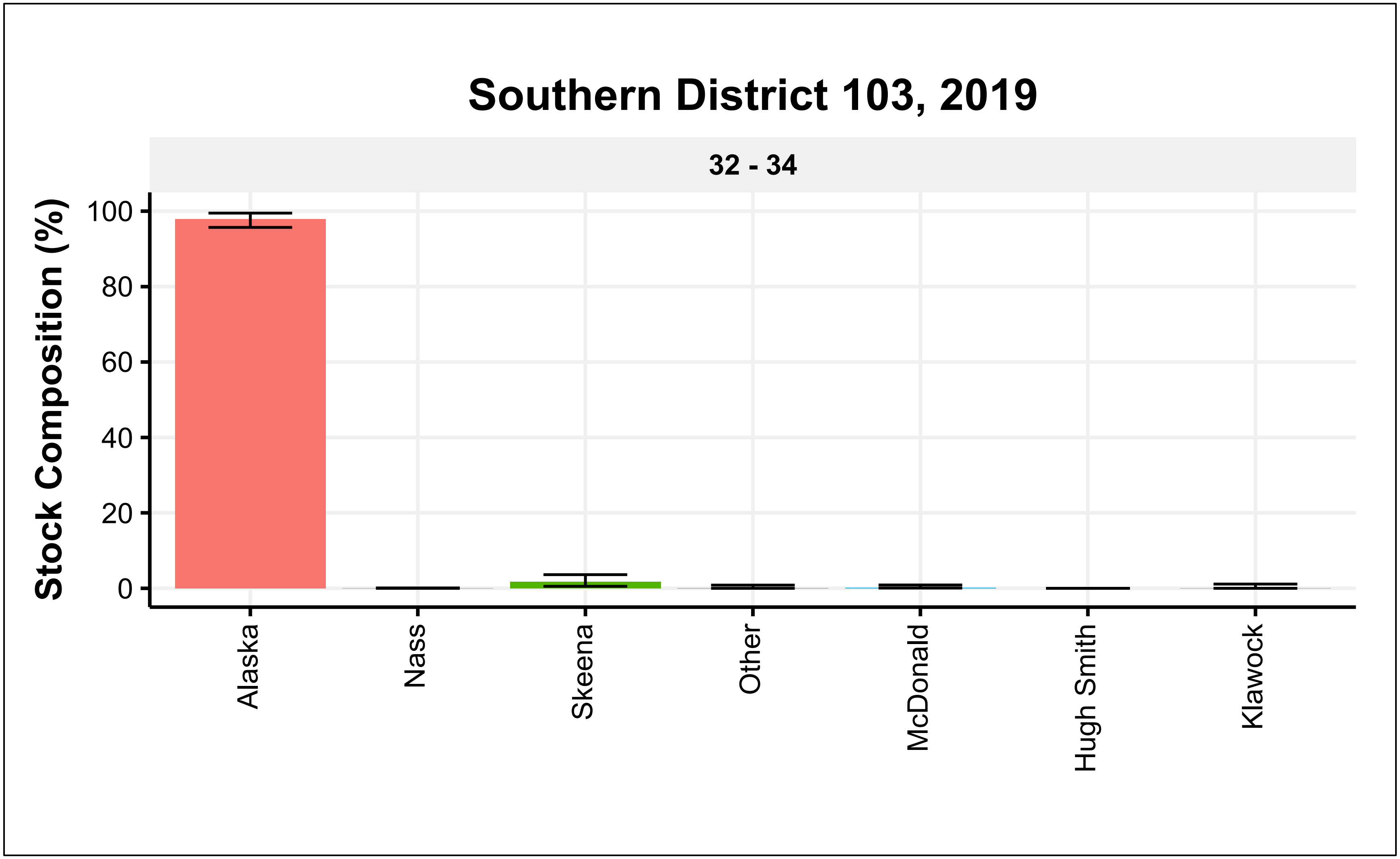

Figure 6.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for Southern District 103 for statistical weeks 32–34, 2019.

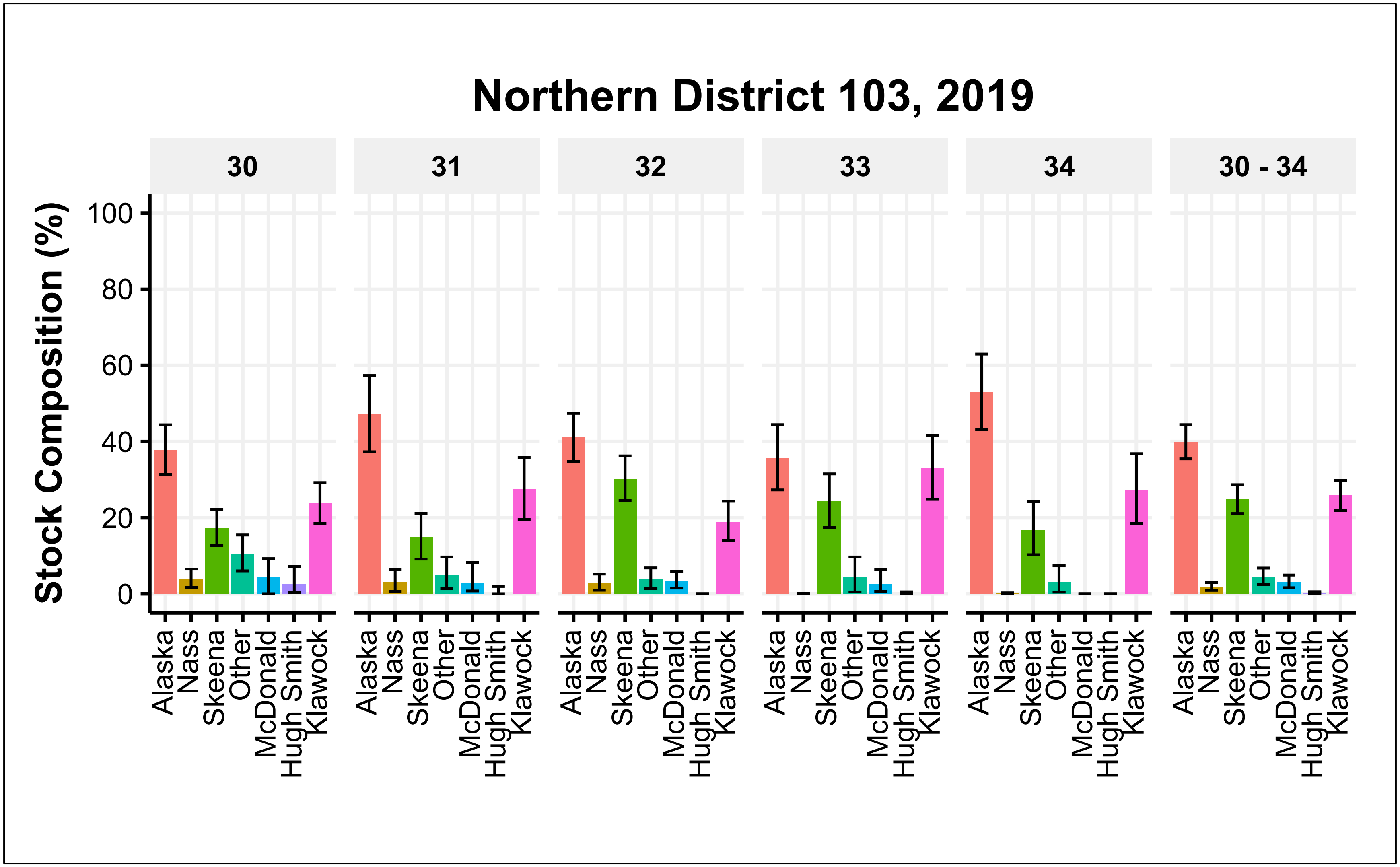

Figure 7.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for Northern District 103 for statistical weeks 30–34, 2019.

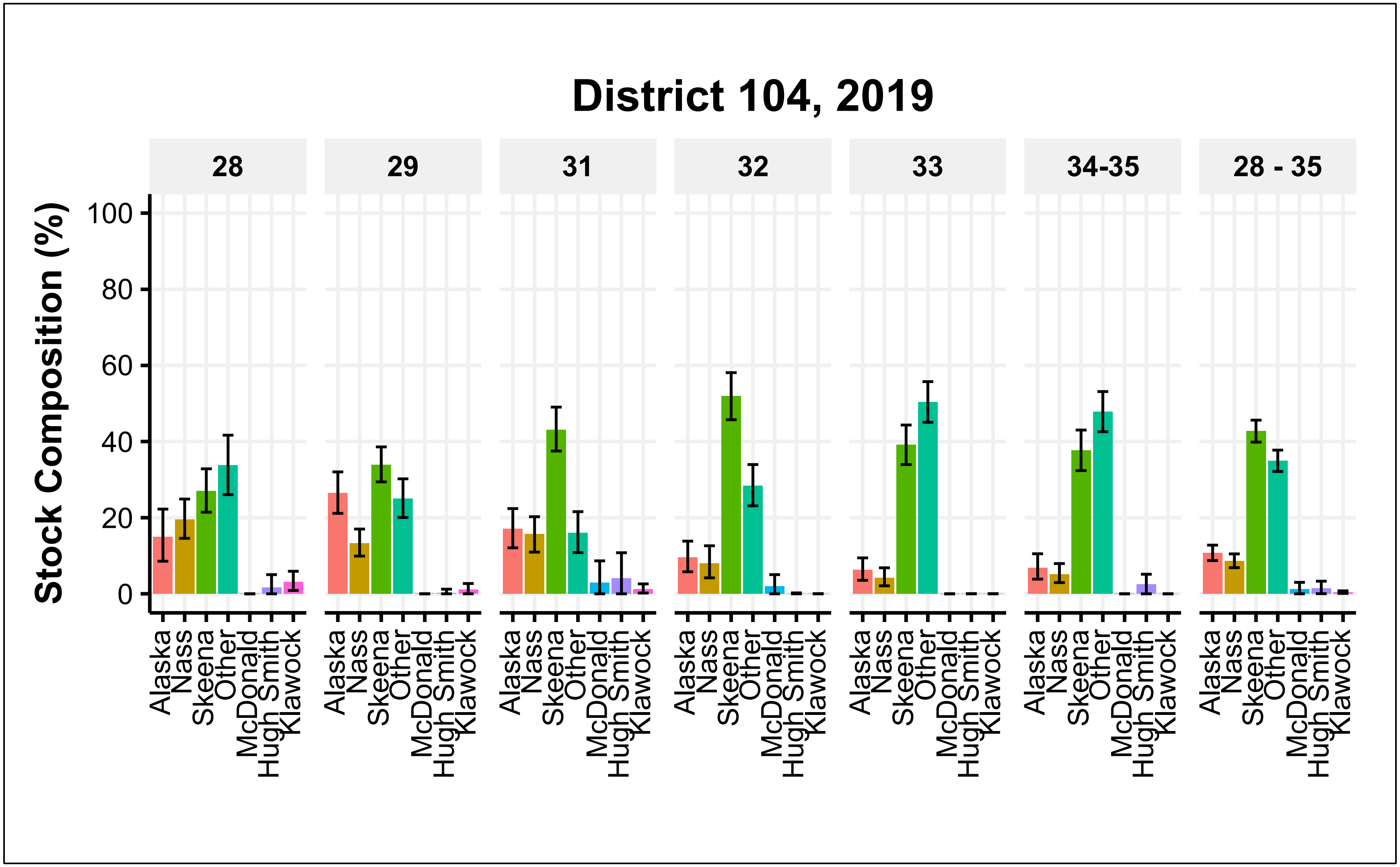

Figure 8.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for District 104 for statistical weeks 28–35, 2019.

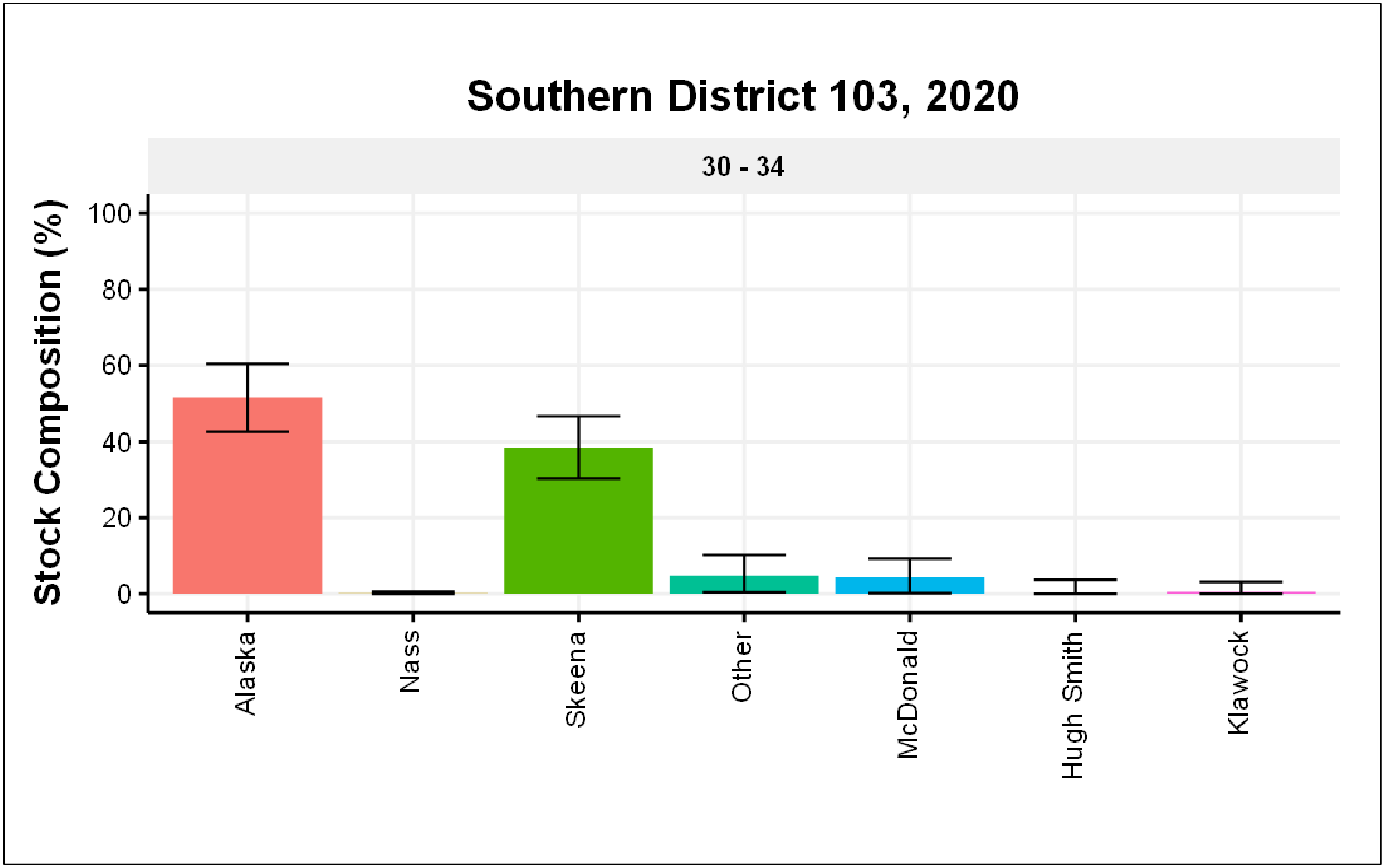

Figure 9.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for Southern District 103 for statistical weeks 30–34, 2020.

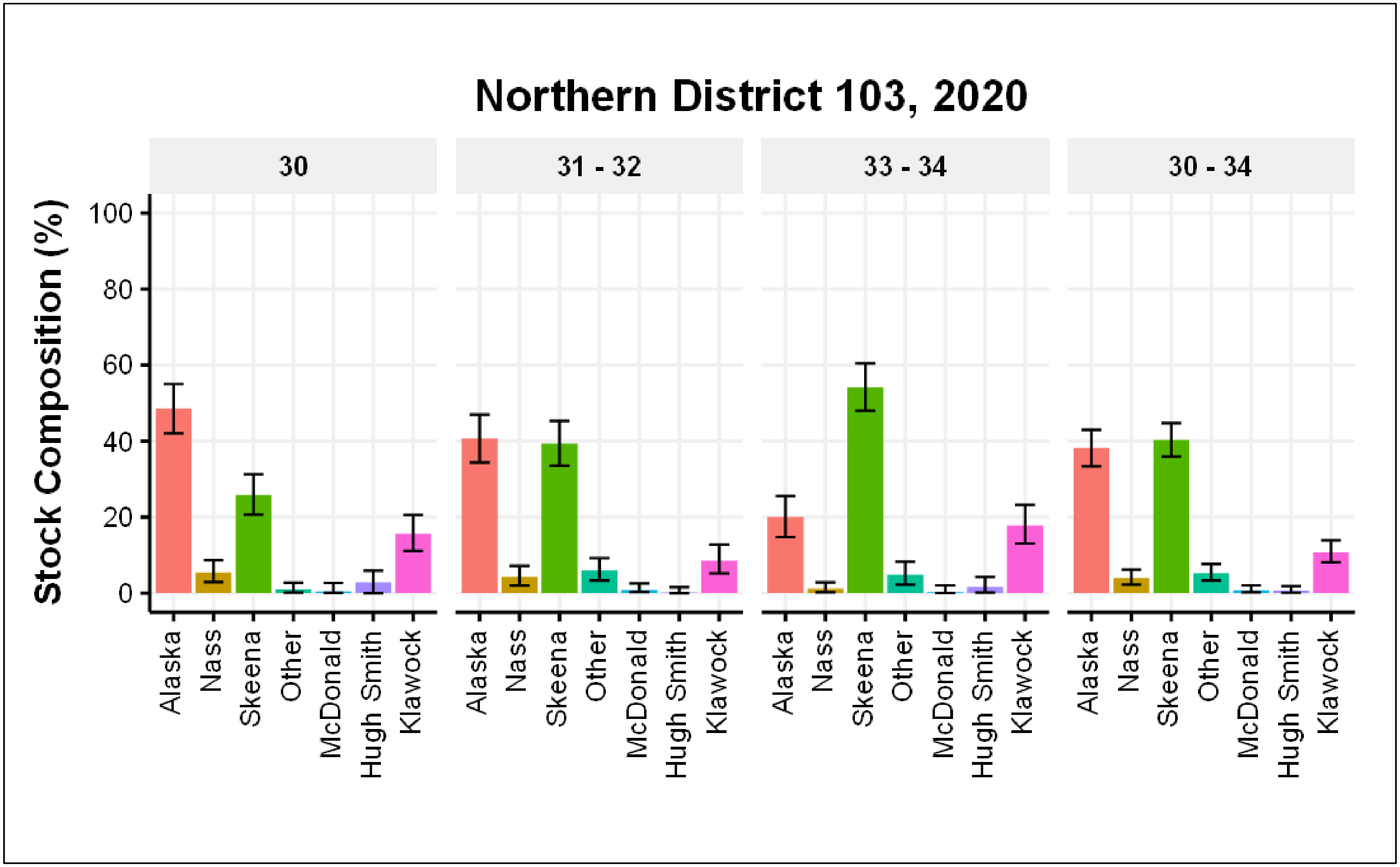

Figure 10.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for Northern District 103 for statistical weeks 30–34, 2020.

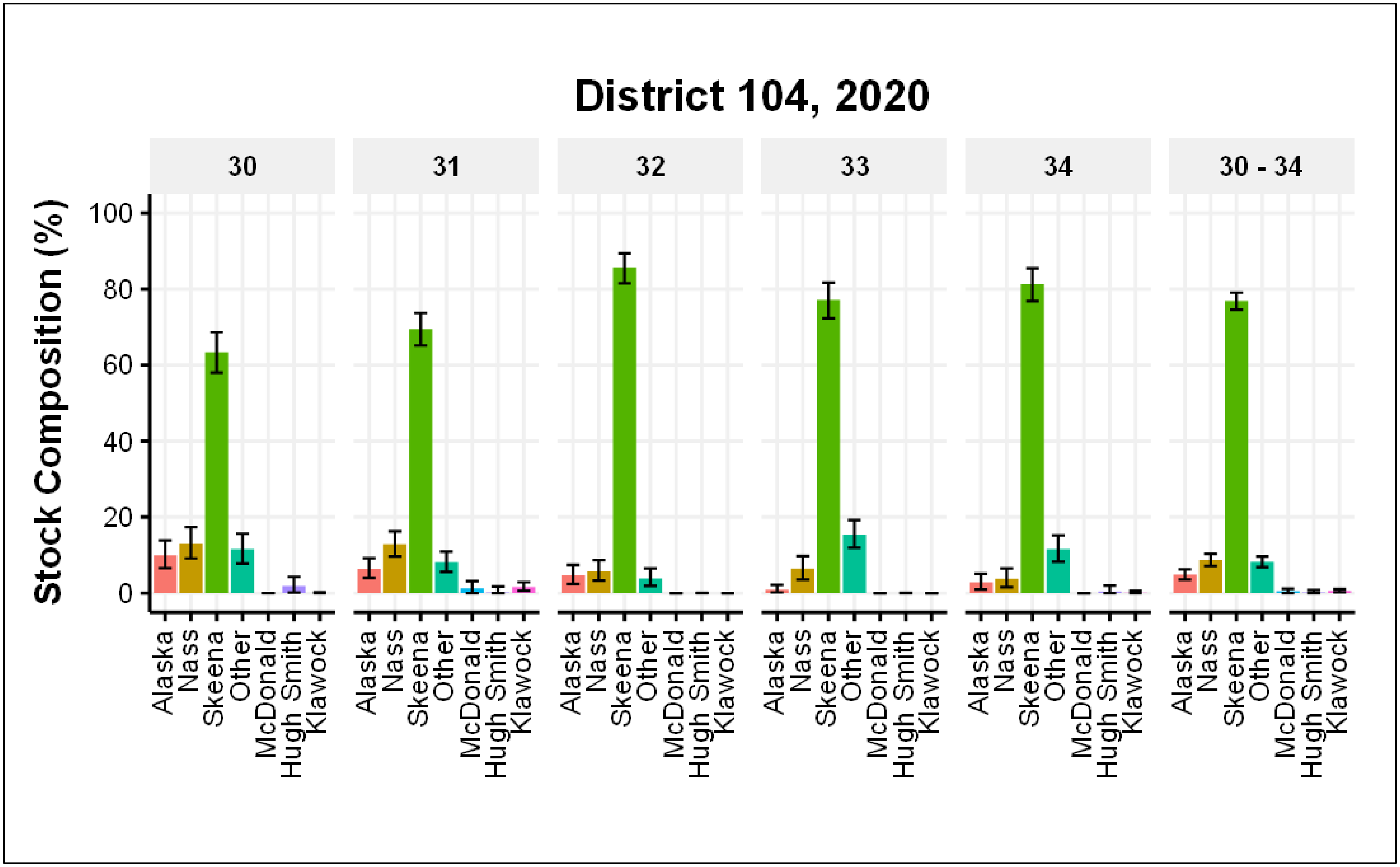

Figure 11.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for District 104 for statistical weeks 30–34, 2020.

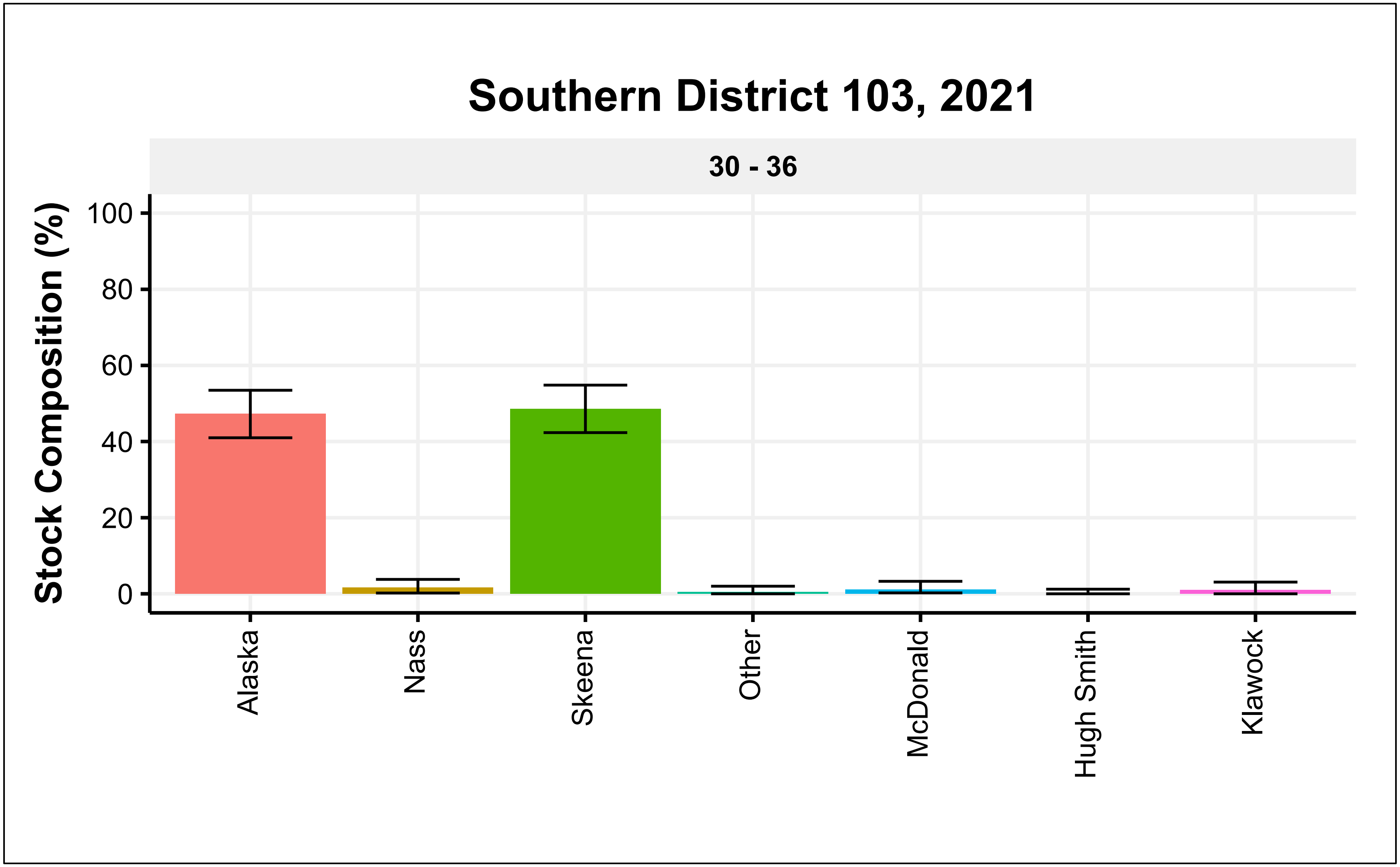

Figure 12.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for Southern District 103 for statistical weeks 30–36, 2021.

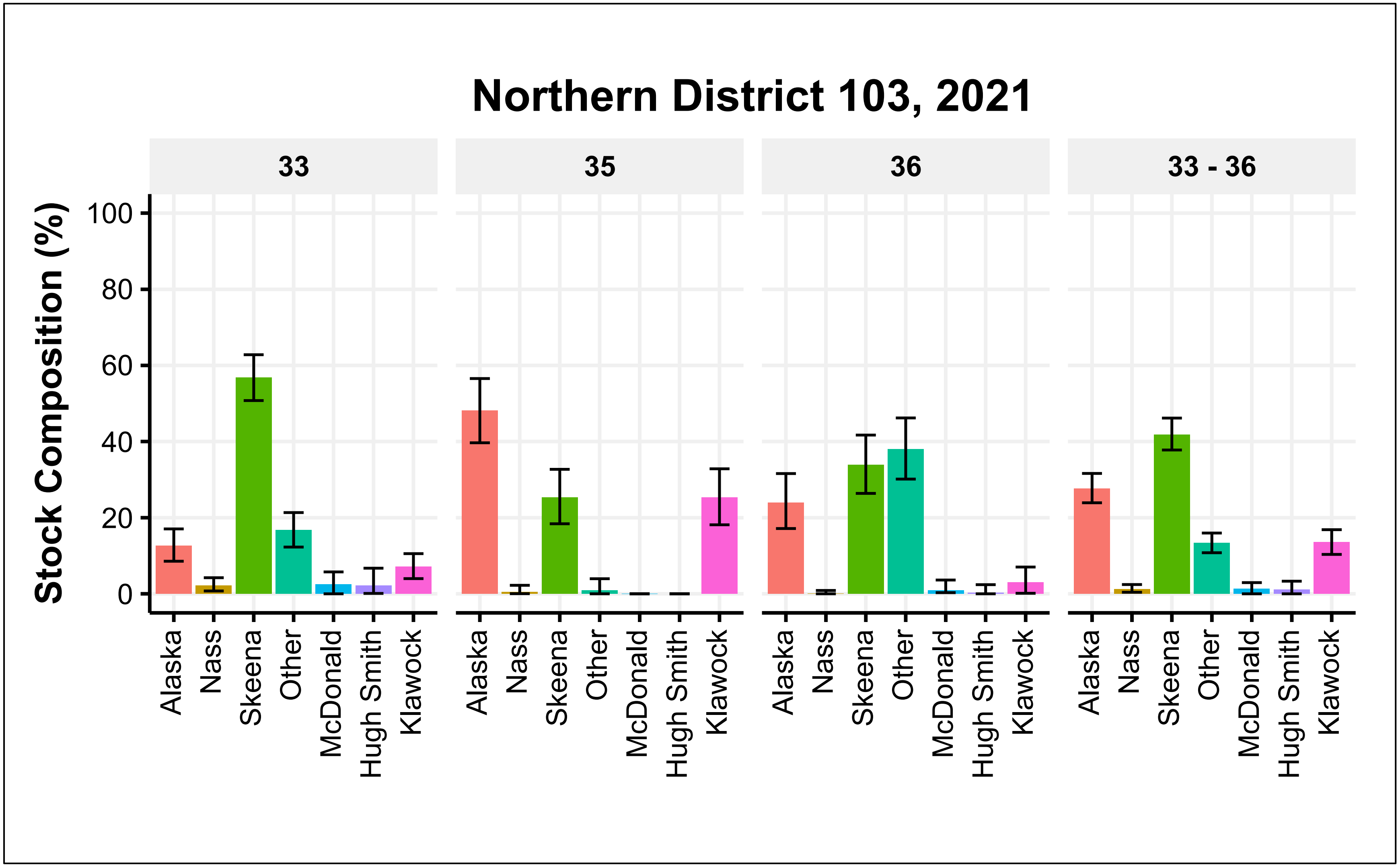

Figure 13.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for Northern District 103 for statistical weeks 33–36, 2021.

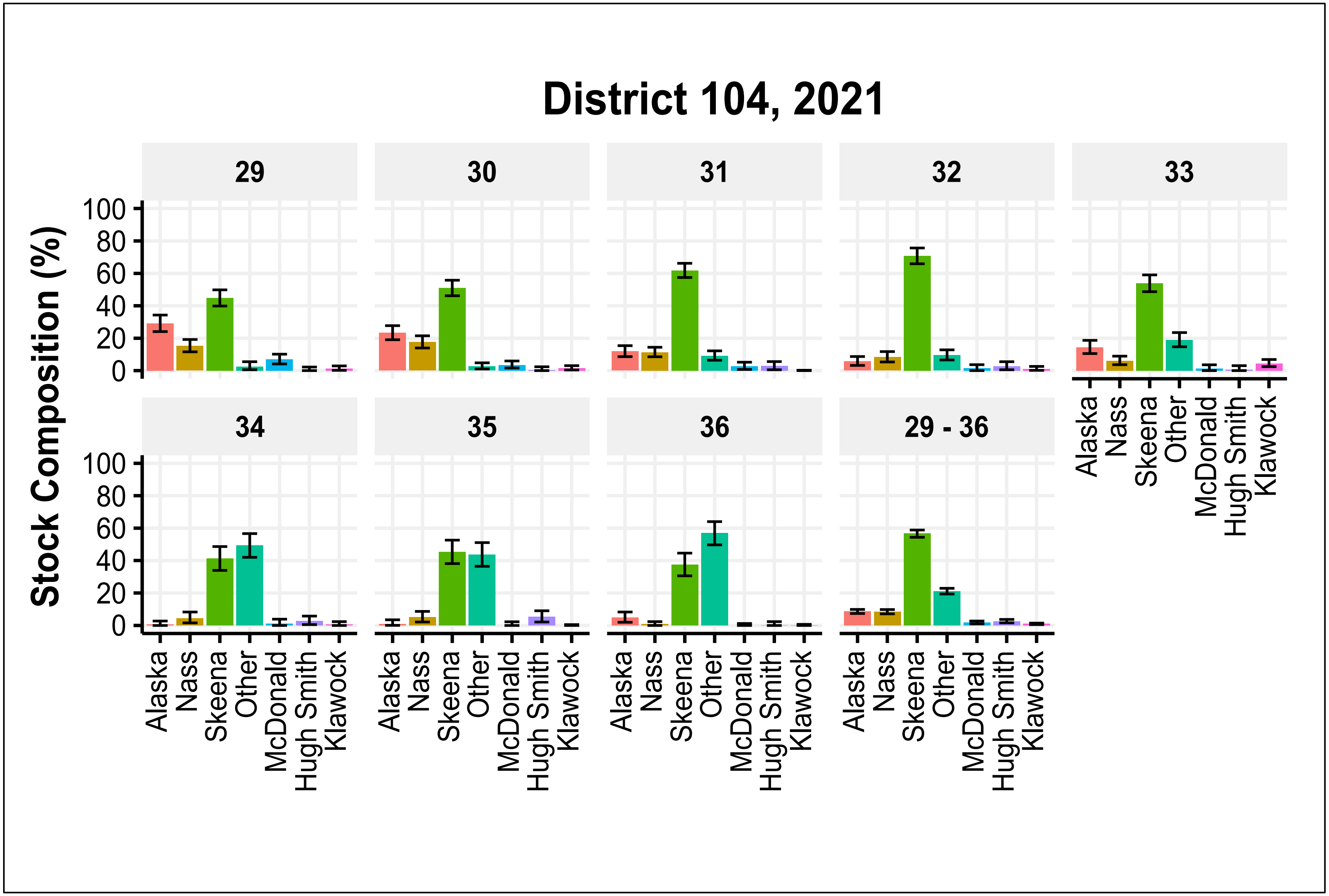

Figure 14.–Mean stock composition and 90% credible interval of the commercial purse seine fishery for District 104 for statistical weeks 29–36, 2021.

APPENDICES

Appendix A.–ADFG statistical weeks (sampling periods) and corresponding calendar dates, 2018–2021.

Statistical	2018		2019		2020		2021	
week	Start date	End date	Start date	End date	Start date	End date	Start date	End date
27	1-Jul	7-Jul	30-Jun	6-Jul	28-Jun	4-Jul	27-Jun	3-Jul
28	8-Jul	14-Jul	7-Jul	13-Jul	5-Jul	11-Jul	4-Jul	10-Jul
29	15-Jul	21-Jul	14-Jul	20-Jul	12-Jul	18-Jul	11-Jul	17-Jul
30	22-Jul	28-Jul	21-Jul	27-Jul	19-Jul	25-Jul	18-Jul	24-Jul
31	29-Jul	4-Aug	28-Jul	3-Aug	26-Jul	1-Aug	25-Jul	31-Jul
32	5-Aug	11-Aug	4-Aug	10-Aug	2-Aug	8-Aug	1-Aug	7-Aug
33	12-Aug	18-Aug	11-Aug	17-Aug	9-Aug	15-Aug	8-Aug	14-Aug
34	19-Aug	25-Aug	18-Aug	24-Aug	16-Aug	22-Aug	15-Aug	21-Aug
35	26-Aug	1-Sep	25-Aug	31-Aug	23-Aug	29-Aug	22-Aug	28-Aug
36	2-Sep	8-Sep	1-Sep	7-Sep	30-Aug	5-Sep	29-Aug	4-Sep
37	9-Sep	15-Sep	8-Sep	14-Sep	6-Sep	12-Sep	5-Sep	11-Sep

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

Appendix B.–Commercial purse seine harvest of sockeye salmon by statistical week in management Districts 104 and 103 (north and south), 2008–2017. (Dashes indicate weeks when no fishery occurred.)

	Management District 104										
Week[a]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg.
27	–	–	–	–	372	–	–	–	–	–	372
28	376	914	326	2,130	1,504	5,152	21,410	6,387	27,951	–	7,350
29	2,531	3,097	2,800	9,287	8,488	3,250	31,860	5,844	71,681	7,492	14,633
30	3,355	11,960	1,491	13,863	7,936	4,700	61,105	31,642	10,714	4,544	15,131
31	8,252	50,177	3,010	37,917	8,184	11,408	137,734	134,450	71,087	19,349	48,157
32	10,323	7,288	3,175	109,375	26,728	15,995	208,272	144,861	177,143	16,269	71,943
33	9,721	18,947	3,417	23,091	13,946	25,454	106,425	77,730	32,687	9,662	32,108
34	5,488	10,410	1,435	2,403	4,636	10,873	87,533	63,456	14,726	20,025	22,099
35	1,059	6,578	1,744	2,480	599	5,202	47,502	29,916	–	19,182	12,696
36	49	–	453	1,958	–	848	–	–	–	1,501	962
Total	41,154	109,371	17,851	202,504	72,393	82,882	701,841	494,286	405,989	98,024	222,630

	Management District 103: Northern Subdistricts 50–90										
Week	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg.
30	–	378	–	–	–	696	1,977	86	2,797	529	1,077
31	589	6,785	–	–	107	1,977	4,791	1,279	616	33	2,022
32	412	3,722	20	6,764	1,154	1,115	3,520	24,260	5,216	1,240	4,742
33	2,103	2,443	1	5,104	839	1,022	7,478	10,786	769	1,171	3,172
34	1,165	2,131	657	2,127	174	886	7,461	6,972	62	2,726	2,436
35	203	991	272	1,467	–	735	3,259	6,019	–	2,955	1,988
36	71	–	–	552	–	73	–	819	–	387	380
37	–	–	–	14	–	–	–	–	–	–	14
Total	4,543	16,450	950	16,028	2,274	6,504	28,486	50,221	9,460	9,041	14,396

	Management District 103: Southern Subdistricts 11–40										
Week	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg.
30	–	–	–	–	–	47	23	0	744	–	271
31	200	722	35	–	–	20	1,368	310	164	–	403
32	0	1,454	485	155	360	305	2,844	1,168	2,330	466	1,063
33	74	1,539	1,881	1,524	502	662	568	2,088	3,641	1,340	1,382
34	585	678	444	1,402	181	470	1,280	2,232	301	1,931	950
35	29	203	427	23	–	81	196	431	–	232	203
36	14	–	90	7	–	3	–	0	–	473	98
37	3	–	–	–	–	–	–	–	–	–	3
38	0	–	–	–	–	–	–	–	–	–	0
Total	905	4,596	3,362	3,111	1,043	1,588	6,279	6,229	7,180	4,442	3,874

Note: En dashes (–) indicated weeks where no fishery occurred.

[a] Weeks are numbered ADF&G statistical weeks. Average opening dates are 5 July (week 28) to 6 September (week 37).

Appendix C.–Weekly estimates of stock composition (%) and stock-specific harvest for Districts 103 North (103N) and 104, 2018. Estimates include median, 90% credibility interval (CRI), the probability that the group estimate is equal to zero ($P = 0$), mean, and SD.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103N	30	Alaska	19.8	14.1	26.4	0	19.9	3.8	221	157	296	223	43
103N	30	Nass	2.0	0.6	5.0	0	2.3	1.4	23	7	56	26	16
103N	30	Skeena	46.2	39.3	53.1	0	46.2	4.2	517	440	594	517	47
103N	30	Other	9.8	4.8	15.8	0	9.9	3.4	110	53	177	111	38
103N	30	McDonald	5.1	2.5	8.9	0	5.4	2.0	58	28	100	60	22
103N	30	Hugh Smith	0	0	0	94.8	0	0.4	0	0	0	0	4
103N	30	Klawock	16.1	11.2	21.8	0	16.3	3.3	181	126	244	183	36
103N	31	Alaska	69.8	61.9	77	0	69.7	4.6	503	445	554	502	33
103N	31	Nass	0	0	0.1	90.2	0	0.2	0	0	1	0	1
103N	31	Skeena	0.8	0.2	2.9	0	1.1	0.9	6	1	21	8	7
103N	31	Other	0	0	1.2	72.8	0	0.6	0	0	8	0	4
103N	31	McDonald	0	0	0	96.2	0	0.1	0	0	0	0	0
103N	31	Hugh Smith	0	0	0	95.0	0	0.2	0	0	0	0	1
103N	31	Klawock	29.1	22.1	36.9	0	29.3	4.6	209	159	265	211	33
103N	32	Alaska	45.7	38.6	53.6	0	45.9	4.4	824	697	967	827	80
103N	32	Nass	0	0	0.2	90.0	0	0.2	0	0	4	0	3
103N	32	Skeena	8.9	5.6	13.1	0	9.1	2.3	161	100	236	164	42
103N	32	Other	0.5	0	2.4	19.8	0.7	0.9	9	0	44	13	16
103N	32	McDonald	0.1	0.1	1.0	0	0.2	0.4	1	1	18	4	8
103N	32	Hugh Smith	0.1	0.1	1.8	0	0.4	0.6	1	1	32	7	11
103N	32	Klawock	43.8	36.6	51.1	0	43.7	4.4	791	661	922	789	79

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Appendix C.–Page 2 of 4.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103N	33	Alaska	62.8	54.0	70.4	0	62.5	5.0	1,116	960	1,251	1,111	89
103N	33	Nass	0	0	0.1	87.5	0	0.2	0	0	2	0	3
103N	33	Skeena	2.4	0.6	5.8	0.1	2.7	1.6	43	11	104	48	29
103N	33	Other	2.1	0.2	6.1	2.3	2.4	1.8	37	4	108	43	32
103N	33	McDonald	0	0	0	97.6	0	0.1	0	0	0	0	1
103N	33	Hugh Smith	0	0	0	94.2	0	0.1	0	0	0	0	2
103N	33	Klawock	32.1	24.9	40.5	0	32.3	4.8	570	442	719	574	85
											Total	5,421	
104	29	Alaska	39.6	34.9	44.3	0	39.6	2.8	2,991	2,640	3,348	2,992	214
104	29	Nass	5.4	3.6	7.6	0	5.5	1.2	407	273	575	413	93
104	29	Skeena	31.8	28.2	35.5	0	31.8	2.2	2,404	2,130	2,686	2,405	169
104	29	Other	16.4	12.8	20.4	0	16.5	2.3	1,238	970	1,544	1,244	175
104	29	McDonald	2.9	0	5.8	21.7	2.7	1.9	217	0	435	204	145
104	29	Hugh Smith	0	0	3.0	64.1	0.5	1.1	0	0	224	37	83
104	29	Klawock	3.4	1.9	5.3	0	3.5	1.0	257	146	399	263	77
104	30	Alaska	21.6	17.5	25.9	0	21.6	2.5	2,632	2,133	3,154	2,636	309
104	30	Nass	5.3	3.5	7.6	0	5.4	1.3	641	425	930	655	154
104	30	Skeena	53.4	49.3	57.4	0	53.4	2.5	6,503	6,003	6,994	6,502	303
104	30	Other	12.9	9.5	16.9	0	13.0	2.3	1,572	1,155	2,059	1,584	275
104	30	McDonald	0	0	4.1	73.6	0.7	1.5	0	0	504	86	178
104	30	Hugh Smith	3.2	0	6.7	11.8	3.3	2.0	394	0	820	398	248
104	30	Klawock	2.6	1.2	4.5	0	2.7	1.0	313	141	546	324	124

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			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	*P* = 0	Mean	SD	Median	5%	95%	Mean	SD
104	31	Alaska	49.0	44.0	53.9	0	49.0	3.0	1,842	1,655	2,027	1,841	113
104	31	Nass	2.8	1.5	4.8	0	2.9	1.0	105	55	179	110	38
104	31	Skeena	38.2	34.0	42.4	0	38.2	2.5	1,435	1,280	1,593	1,436	95
104	31	Other	0.5	0.1	3.9	0	1.1	1.3	20	2	146	40	48
104	31	McDonald	1.1	0	3.6	34.6	1.3	1.3	40	0	136	47	48
104	31	Hugh Smith	0	0	2.3	71.5	0.3	0.8	0	0	87	13	32
104	31	Klawock	7.1	4.9	9.9	0	7.2	1.5	268	183	372	272	58
104	32	Alaska	29.8	24.5	35.3	0	29.8	3.3	3,207	2,641	3,799	3,212	351
104	32	Nass	5.2	3.1	8.0	0	5.3	1.5	558	333	860	572	161
104	32	Skeena	47.4	41.9	52.8	0	47.3	3.3	5,100	4,517	5,685	5,099	355
104	32	Other	17.2	12.5	22.7	0	17.4	3.1	1,854	1,347	2,439	1,869	333
104	32	McDonald	0	0	0	95.6	0	0.1	0	0	0	1	14
104	32	Hugh Smith	0	0	1.0	82.3	0.1	0.6	0	0	112	16	68
104	32	Klawock	0	0	0	92.5	0	0.1	0	0	0	1	9
104	33	Alaska	21.9	10.8	35.3	0	22.4	7.5	2,315	1,135	3,731	2,360	795
104	33	Nass	8.9	3.0	18.7	0	9.6	4.9	936	314	1,979	1,013	517
104	33	Skeena	47.5	34.3	60.9	0	47.6	8.1	5,014	3,623	6,430	5,021	855
104	33	Other	19.5	9.3	33.8	0	20.3	7.5	2,057	984	3,569	2,139	793
104	33	McDonald	0	0	0	93.3	0.1	0.8	0	0	0	11	86
104	33	Hugh Smith	0	0	0.1	86.2	0.1	0.8	0	0	12	11	81
104	33	Klawock	0	0	0	91.9	0	0.2	0	0	0	2	23

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			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	*P* = 0	Mean	SD	Median	5%	95%	Mean	SD
104	34	Alaska	2.4	0.8	5.0	0	2.6	1.3	1,872	603	3,828	2,004	994
104	34	Nass	1.3	0.2	3.3	0.1	1.5	1.0	990	171	2,524	1,117	741
104	34	Skeena	28.7	25.0	32.6	0	28.7	2.3	21,960	19,115	24,970	21,993	1,783
104	34	Other	67.1	62.9	71.1	0	67.1	2.5	51,359	48,179	54,437	51,349	1,907
104	34	McDonald	0	0	0	96.0	0	0	0	0	0	3	37
104	34	Hugh Smith	0	0	0.7	83.6	0.1	0.4	0	0	560	69	285
104	34	Klawock	0	0	0	93.6	0	0	0	0	0	2	18
											Total	121,365	

Note: Stock composition estimates may not sum to 100% and stock-specific harvest estimates may not sum to the total harvest due to rounding error.

Appendix D.–Weekly estimates of stock composition (%) and stock-specific harvest for Districts 103 North (103N) and 104, 2019. Estimates include median, 90% credibility interval (CRI), the probability that the group estimate is equal to zero ($P = 0$), mean, and SD.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103N	30	Alaska	37.7	31.4	44.4	0	37.8	4.0	237	198	280	238	25
103N	30	Nass	3.6	1.7	6.5	0	3.8	1.5	23	11	41	24	9
103N	30	Skeena	17.1	12.7	22.2	0	17.3	2.9	108	80	140	109	18
103N	30	Other	10.2	6	15.5	0	10.4	2.8	64	38	97	66	18
103N	30	McDonald	4.5	0	9.2	11.6	4.5	2.9	28	0	58	28	18
103N	30	Hugh Smith	2.0	0.3	7.2	0	2.6	2.4	13	2	45	16	15
103N	30	Klawock	23.7	18.5	29.2	0	23.8	3.3	150	117	184	150	21
103N	31	Alaska	47.3	37.3	57.3	0	47.2	6.0	1,234	974	1,496	1,233	157
103N	31	Nass	2.7	0.6	6.4	0.3	3.0	1.8	70	16	166	79	48
103N	31	Skeena	14.7	9.1	21.2	0	14.8	3.7	383	239	553	387	97
103N	31	Other	4.4	1.4	9.7	0	4.8	2.6	115	37	253	126	67
103N	31	McDonald	0.7	0.7	8.2	0	2.7	2.7	19	19	215	70	71
103N	31	Hugh Smith	0	0	2.0	86.4	0	0.9	0	0	51	0	25
103N	31	Klawock	27.3	19.5	35.9	0	27.4	5.0	712	510	936	716	131
103N	32	Alaska	41	34.8	47.4	0	41.0	3.8	2,753	2,334	3,183	2,756	255
103N	32	Nass	2.6	0.9	5.2	0	2.8	1.3	176	64	350	188	89
103N	32	Skeena	30.2	24.5	36.2	0	30.2	3.5	2,025	1,647	2,431	2,027	237
103N	32	Other	3.5	1.4	6.8	0	3.7	1.7	234	95	457	251	113
103N	32	McDonald	3.2	1.5	6.0	0	3.4	1.4	217	101	400	229	93
103N	32	Hugh Smith	0	0	0	95.1	0	0.2	0	0	0	0	12
103N	32	Klawock	18.6	14.0	24.3	0	18.8	3.2	1,250	941	1,632	1,264	212

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			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103N	33	Alaska	35.5	27.3	44.4	0	35.6	5.2	2,185	1,678	2,730	2,192	321
103N	33	Nass	0	0	0.1	89.4	0	0.2	0	0	8	0	12
103N	33	Skeena	24.0	17.4	31.5	0	24.3	4.3	1,478	1,073	1,939	1,496	267
103N	33	Other	3.9	0.5	9.7	2.6	4.4	2.8	243	30	595	268	171
103N	33	McDonald	2.2	0.6	6.3	0	2.6	1.8	138	36	386	163	112
103N	33	Hugh Smith	0	0	0.5	92.2	0	0.4	0	0	31	0	24
103N	33	Klawock	33.1	24.8	41.7	0	33.0	5.1	2,035	1,527	2,562	2,031	313
103N	34	Alaska	52.9	43.1	63.0	0	52.9	6.1	635	518	756	636	73
103N	34	Nass	0	0	0.2	88.3	0	0.3	0	0	3	0	3
103N	34	Skeena	16.4	10.2	24.3	0	16.7	4.3	196	123	291	200	52
103N	34	Other	2.5	0.4	7.3	0.9	3.1	2.2	31	5	88	37	26
103N	34	McDonald	0	0	0	97.8	0	0.1	0	0	0	0	1
103N	34	Hugh Smith	0	0	0	95.3	0	0.2	0	0	0	0	3
103N	34	Klawock	27.2	18.5	36.8	0	27.3	5.6	326	222	442	328	67
											Total	17,306	
104	28	Alaska	14.7	8.6	22.2	0	14.9	4.2	141	82	213	143	40
104	28	Nass	19.4	14.6	24.9	0	19.5	3.2	186	140	239	187	30
104	28	Skeena	26.9	21.5	32.8	0	27.0	3.5	258	206	315	259	33
104	28	Other	33.7	26.0	41.7	0	33.8	4.7	324	250	400	324	46
104	28	McDonald	0	0	0	94.6	0	0.3	0	0	0	0	3
104	28	Hugh Smith	1.3	0	5.0	32.6	1.7	1.8	13	0	48	16	17
104	28	Klawock	2.9	0.9	5.9	0.8	3.1	1.6	28	8	57	29	15

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			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
104	29	Alaska	26.4	21.1	32.0	0	26.5	3.3	2,230	1,783	2,702	2,235	280
104	29	Nass	13.2	9.9	17.0	0	13.3	2.2	1,114	837	1,436	1,122	183
104	29	Skeena	33.9	29.4	38.6	0	33.9	2.8	2,860	2,481	3,256	2,864	235
104	29	Other	25.0	20.1	30.2	0	25.0	3.1	2,109	1,694	2,547	2,112	260
104	29	McDonald	0	0	0	94.5	0	0.3	0	0	0	3	22
104	29	Hugh Smith	0	0	1.2	81.8	0.2	0.7	0	0	102	14	58
104	29	Klawock	1.0	0	2.7	18.2	1.1	0.9	83	0	229	91	75
104	31	Alaska	17.0	12.1	22.4	0	17.1	3.1	12,653	8,993	16,698	12,727	2,339
104	31	Nass	15.7	10.9	20.2	0	15.7	2.8	11,722	8,164	15,091	11,694	2,087
104	31	Skeena	43.0	37.5	49.0	0	43.1	3.5	32,078	27,955	36,553	32,144	2,611
104	31	Other	15.9	10.8	21.6	0	16.0	3.3	11,828	8,077	16,099	11,929	2,445
104	31	McDonald	0	0	8.7	49.6	2.9	3.3	0	0	6,461	2,158	2,482
104	31	Hugh Smith	4.3	0	10.8	39.7	4.1	4.1	3,174	0	8,052	3,045	3,071
104	31	Klawock	1.0	0.2	2.6	0.6	1.2	0.8	761	158	1,947	868	567
104	32	Alaska	9.5	5.8	13.8	0	9.6	2.4	5,717	3,497	8,362	5,792	1,481
104	32	Nass	7.8	4.2	12.6	0	8.0	2.6	4,693	2,538	7,637	4,847	1,577
104	32	Skeena	52	45.7	58.1	0	52.0	3.8	31,462	27,659	35,151	31,436	2,281
104	32	Other	28.3	23.1	33.9	0	28.4	3.3	17,118	13,966	20,531	17,166	1,992
104	32	McDonald	1.9	0	5.0	27.7	2.0	1.7	1,128	0	3,050	1,184	1,052
104	32	Hugh Smith	0	0	0.2	85.6	0.1	0.5	0	0	133	54	312
104	32	Klawock	0	0	0	90.6	0	0.1	0	0	9	10	67

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Appendix D.–Page 4 of 4.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	*P* = 0	Mean	SD	Median	5%	95%	Mean	SD
104	33	Alaska	6.2	3.5	9.4	0	6.3	1.8	6,151	3,518	9,384	6,259	1,779
104	33	Nass	4.0	2.1	6.8	0	4.2	1.5	3,986	2,068	6,790	4,148	1,451
104	33	Skeena	39.1	33.9	44.3	0	39.1	3.1	38,925	33,788	44,117	38,940	3,133
104	33	Other	50.4	45.0	55.7	0	50.4	3.2	50,121	44,825	55,486	50,129	3,233
104	33	McDonald	0	0	0	94.9	0	0.1	0	0	0	12	117
104	33	Hugh Smith	0	0	0	88.1	0	0.2	0	0	19	23	194
104	33	Klawock	0	0	0	89.8	0	0.1	0	0	36	19	119
104	34–35	Alaska	6.6	3.9	10.5	0	6.8	2.0	1,795	1,040	2,839	1,849	550
104	34–35	Nass	5.0	2.9	7.9	0	5.2	1.6	1,351	790	2,145	1,394	420
104	34–35	Skeena	37.7	32.4	43.0	0	37.7	3.2	10,169	8,744	11,618	10,177	873
104	34–35	Other	47.8	42.6	53.1	0	47.8	3.2	12,911	11,495	14,349	12,915	864
104	34–35	McDonald	0	0	0	93.5	0.1	0.4	0	0	1	14	96
104	34–35	Hugh Smith	2.4	0	5.1	12.2	2.4	1.6	655	0	1,388	658	428
104	34–35	Klawock	0	0	0	92.8	0	0.1	0	0	0	1	14
											Total	270,993	

Note: Stock composition estimates may not sum to 100% and stock-specific harvest estimates may not sum to the total harvest due to rounding error.

Appendix E.–Weekly estimates of stock composition (%) and stock-specific harvest for Districts 103 North (103N) and 104, 2020. Estimates include median, 90% credibility interval (CRI), the probability that the group estimate is equal to zero ($P = 0$), mean, and SD.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103N	30	Alaska	48.6	42.0	55	0	48.6	3.9	1,127	975	1,276	1,126	92
103N	30	Nass	5.4	2.9	8.6	0	5.5	1.7	124	67	201	127	40
103N	30	Skeena	25.9	20.7	31.2	0	25.9	3.2	601	479	724	601	75
103N	30	Other	0.8	0.1	2.8	0	1.1	0.9	19	3	64	25	20
103N	30	McDonald	0.1	0.1	2.7	0	0.5	1.0	2	2	63	11	23
103N	30	Hugh Smith	2.9	0	5.9	9.8	2.9	1.8	66	0	138	67	41
103N	30	Klawock	15.5	11.1	20.6	0	15.6	2.9	359	258	477	363	67
103N	31–32	Alaska	40.6	34.3	47	0	40.7	3.9	6,864	5,798	7,941	6,880	652
103N	31–32	Nass	4.1	2.0	7.2	0	4.3	1.6	697	339	1,214	729	274
103N	31–32	Skeena	39.3	33.5	45.3	0	39.3	3.6	6,644	5,662	7,650	6,646	610
103N	31–32	Other	5.8	3.4	9.2	0	6.0	1.8	980	567	1,558	1,013	312
103N	31–32	McDonald	0.4	0.3	2.6	0	0.9	0.8	71	53	435	148	142
103N	31–32	Hugh Smith	0	0	1.6	70.8	0.2	0.6	0	0	271	28	104
103N	31–32	Klawock	8.4	5.2	12.8	0	8.6	2.3	1,422	880	2,160	1,452	391
103N	33–34	Alaska	19.9	14.7	25.6	0	20.0	3.4	716	531	920	719	121
103N	33–34	Nass	1.0	0.2	2.8	0	1.2	0.8	36	9	101	44	30
103N	33–34	Skeena	54.2	48.0	60.4	0	54.2	3.8	1,950	1,727	2,175	1,950	137
103N	33–34	Other	4.6	2.3	8.3	0	4.9	1.9	167	81	298	175	67
103N	33–34	McDonald	0	0	2.0	0	0.3	0.8	1	1	73	11	28
103N	33–34	Hugh Smith	1.4	0.2	4.2	0	1.7	1.3	51	6	153	59	47
103N	33–34	Klawock	17.7	13.1	23.2	0	17.8	3.1	636	470	837	642	111
											Total	22,815	

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			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
104	30	Alaska	9.9	6.6	13.8	0	10.0	2.2	687	455	957	693	153
104	30	Nass	12.9	9.1	17.4	0	13.0	2.5	895	633	1,201	903	174
104	30	Skeena	63.5	58.0	68.6	0	63.4	3.2	4,393	4,016	4,748	4,389	223
104	30	Other	11.5	7.8	15.7	0	11.6	2.4	794	538	1,084	801	166
104	30	McDonald	0	0	0	92.3	0.1	0.3	0	0	2	4	24
104	30	Hugh Smith	1.7	0.2	4.3	3.4	1.9	1.3	114	11	297	130	88
104	30	Klawock	0	0	0.3	87.3	0	0.2	0	0	18	3	15
104	31	Alaska	6.3	4.0	9.2	0	6.4	1.6	3,408	2,152	4,974	3,466	861
104	31	Nass	12.8	9.7	16.3	0	12.9	2.0	6,930	5,247	8,814	6,968	1,086
104	31	Skeena	69.5	65.2	73.7	0	69.5	2.6	37,649	35,286	39,905	37,628	1,399
104	31	Other	8.0	5.6	10.9	0	8.1	1.6	4,353	3,045	5,928	4,402	881
104	31	McDonald	1.3	0	3.1	19.3	1.3	1.0	693	0	1,698	717	558
104	31	Hugh Smith	0	0	1.7	79.1	0.2	0.6	0	0	928	107	346
104	31	Klawock	1.5	0.6	2.9	0	1.6	0.7	822	342	1,557	870	378
104	32	Alaska	4.6	2.4	7.4	0	4.7	1.5	2,239	1,167	3,596	2,290	741
104	32	Nass	5.6	3.3	8.7	0	5.7	1.6	2,728	1,614	4,212	2,795	797
104	32	Skeena	85.7	81.5	89.4	0	85.6	2.4	41,697	39,633	43,455	41,643	1,161
104	32	Other	3.7	1.9	6.5	0	3.9	1.4	1,796	918	3,159	1,885	696
104	32	McDonald	0	0	0	96.2	0	0.1	0	0	0	2	25
104	32	Hugh Smith	0	0	0.1	86.9	0	0.2	0	0	31	18	117
104	32	Klawock	0	0	0	93.3	0	0	0	0	0	2	23
104	33	Alaska	0.8	0.2	2.2	0	1.0	0.6	175	40	452	201	132
104	33	Nass	6.4	3.6	9.8	0	6.5	1.9	1,341	749	2,055	1,364	399
104	33	Skeena	77.2	72.3	81.6	0	77.1	2.8	16,209	15,189	17,147	16,194	595

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			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
104	33	Other	15.3	11.9	19.2	0	15.4	2.2	3,215	2,510	4,034	3,236	465
104	33	McDonald	0	0	0	96.2	0	0.1	0	0	0	1	11
104	33	Hugh Smith	0	0	0.1	85.7	0	0.1	0	0	23	6	31
104	33	Klawock	0	0	0	93.2	0	0	0	0	0	1	9
104	34	Alaska	2.7	1.0	5.1	0	2.8	1.3	356	130	672	372	168
104	34	Nass	3.6	1.6	6.5	0	3.8	1.5	477	206	858	497	201
104	34	Skeena	81.4	76.8	85.4	0	81.3	2.6	10,712	10,112	11,246	10,700	346
104	34	Other	11.4	8.3	15.2	0	11.5	2.1	1,506	1,087	2,004	1,520	279
104	34	McDonald	0	0	0	96.0	0	0.1	0	0	0	1	7
104	34	Hugh Smith	0	0	2.0	51.8	0.4	0.7	0	0	262	58	96
104	34	Klawock	0	0	0.7	69.6	0.1	0.3	0	0	86	14	35
											Total	143,877	

Note: Stock composition estimates may not sum to 100% and stock-specific harvest estimates may not sum to the total harvest due to rounding error.

Appendix F.–Weekly estimates of stock composition (%) and stock-specific harvest for Districts 103 North (103N) and 104, 2021. Estimates include median, 90% credibility interval (CRI), the probability that the group estimate is equal to zero ($P = 0$), mean, and SD.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
103N	33	Alaska	12.5	8.6	17	0	12.6	2.6	915	627	1,249	925	190
103N	33	Nass	2.0	0.7	4.2	0	2.2	1.1	144	53	310	160	82
103N	33	Skeena	56.7	50.8	62.8	0	56.8	3.6	4,160	3,723	4,606	4,164	268
103N	33	Other	16.7	12.3	21.3	0	16.7	2.8	1,223	899	1,564	1,224	202
103N	33	McDonald	2.5	0	5.8	20.1	2.5	1.9	180	0	422	181	141
103N	33	Hugh Smith	1.6	0.1	6.7	0	2.2	2.2	115	6	494	160	164
103N	33	Klawock	6.9	4.0	10.5	0	7.1	2.0	508	293	773	520	149
103N	35	Alaska	48.1	39.7	56.6	0	48.1	5.0	2,759	2,276	3,247	2,760	288
103N	35	Nass	0	0	2.2	0	0.4	0.8	1	1	127	24	48
103N	35	Skeena	25.2	18.4	32.7	0	25.3	4.4	1,447	1,056	1,876	1,455	254
103N	35	Other	0.5	0	4.0	33.8	0.9	1.6	26	0	228	51	91
103N	35	McDonald	0	0	0	0	0	0	0	0	0	0	1
103N	35	Hugh Smith	0	0	0	95.2	0	0.1	0	0	0	0	6
103N	35	Klawock	25.2	18.1	32.8	0	25.3	4.4	1,445	1,041	1,884	1,451	253
103N	36	Alaska	23.8	17.1	31.6	0	23.9	4.4	448	323	595	451	82
103N	36	Nass	0	0	0.9	82.8	0.1	0.5	0	0	17	1	9
103N	36	Skeena	33.8	26.4	41.7	0	33.9	4.7	638	497	786	638	88
103N	36	Other	37.9	30.1	46.2	0	38	4.9	715	568	871	717	92
103N	36	McDonald	0.3	0.3	3.6	0	0.9	1.2	6	6	68	17	22
103N	36	Hugh Smith	0	0	2.4	72.3	0.2	1.0	0	0	45	4	19
103N	36	Klawock	2.7	0.1	7.0	4.1	3.0	2.1	51	3	132	56	40
											Total	14,957	

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			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
104	29	Alaska	29.1	24.1	34.3	0	29.1	3.1	4,435	3,676	5,231	4,443	473
104	29	Nass	2.1	0.6	5.5	0.2	2.5	1.6	321	85	839	378	240
104	29	Skeena	6.8	4.1	10.2	0	7	1.8	1,044	631	1,551	1,061	280
104	29	Other	1.2	0.2	2.9	1.6	1.3	0.8	183	30	442	203	128
104	29	McDonald	0	0	2.2	58.5	0	1.1	0	0	342	0	175
104	29	Hugh Smith	15.2	11.6	19.2	0	15.2	2.3	2,312	1,768	2,926	2,325	353
104	29	Klawock	44.9	39.9	49.8	0	44.9	3	6,840	6,085	7,599	6,840	460
104	30	Alaska	23.3	19.1	27.7	0	23.3	2.6	7,928	6,502	9,443	7,942	897
104	30	Nass	2.4	1	4.8	0	2.6	1.2	834	337	1,650	894	413
104	30	Skeena	3.4	1.6	6	0	3.6	1.3	1,175	544	2,030	1,215	454
104	30	Other	1.4	0.4	3.1	0.2	1.5	0.8	481	134	1,041	521	283
104	30	McDonald	0.1	0	2.4	47.3	0.4	1	27	0	817	125	350
104	30	Hugh Smith	17.5	14	21.5	0	17.6	2.3	5,974	4,769	7,318	6,001	775
104	30	Klawock	51	46.2	55.8	0	51	2.9	17,352	15,727	19,002	17,357	996
104	31	Alaska	11.8	8.6	15.4	0	11.9	2.1	13,850	10,122	18,138	13,960	2,454
104	31	Nass	9	6.4	12.2	0	9.1	1.8	10,602	7,554	14,373	10,736	2,076
104	31	Skeena	2.6	0.8	5.2	0.3	2.8	1.4	3,095	884	6,157	3,261	1,616
104	31	Other	0	0	0.3	78.9	0	0.2	0	0	344	0	191
104	31	McDonald	2.8	0.5	5.6	2.1	2.9	1.5	3,341	635	6,601	3,442	1,811
104	31	Hugh Smith	11.3	8.6	14.5	0	11.4	1.8	13,263	10,082	16,989	13,359	2,105
104	31	Klawock	61.9	57.5	66.2	0	61.9	2.7	72,780	67,528	77,829	72,741	3,138

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Appendix F.–Page 3 of 4.

			Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
District	Statistical weeks	Reporting group	Median	5%	95%	$P = 0$	Mean	SD	Median	5%	95%	Mean	SD
104	32	Alaska	5.6	3.2	8.7	0	5.7	1.7	7,717	4,439	12,027	7,907	2,318
104	32	Nass	8.2	5.4	11.7	0	8.3	1.9	11,384	7,412	16,259	11,553	2,698
104	32	Skeena	70.9	65.9	75.7	0	70.9	3	98,231	91,275	104,791	98,152	4,125
104	32	Other	9.4	6.6	12.8	0	9.5	1.9	13,048	9,143	17,795	13,203	2,643
104	32	McDonald	1.4	0	3.7	6.4	1.5	1.1	1,873	0	5,076	2,115	1,583
104	32	Hugh Smith	2.7	0.6	5.5	2.2	2.9	1.5	3,797	787	7,672	3,964	2,098
104	32	Klawock	1	0.2	2.7	1.5	1.2	0.8	1,412	209	3,687	1,608	1,092
104	33	Alaska	14.2	10.5	18.7	0	14.3	2.5	6,081	4,512	7,996	6,144	1,058
104	33	Nass	6	3.7	9	0	6.1	1.6	2,588	1,585	3,835	2,632	686
104	33	Skeena	53.9	48.7	59.1	0	53.9	3.1	23,079	20,868	25,294	23,084	1,347
104	33	Other	18.9	14.7	23.5	0	19	2.7	8,106	6,317	10,053	8,137	1,139
104	33	McDonald	1.2	0	3.6	17.5	1.4	1.2	527	0	1,542	588	521
104	33	Hugh Smith	0.4	0	3.1	38.4	0.8	1.2	178	0	1,332	321	515
104	33	Klawock	4.4	2.5	6.9	0	4.5	1.4	1,872	1,059	2,958	1,922	581
104	34	Alaska	0.3	0	2.7	32	0.7	1	152	0	1,498	375	552
104	34	Nass	4.2	1.6	8.3	0	4.5	2.1	2,355	893	4,619	2,505	1,149
104	34	Skeena	41.2	33.9	48.6	0	41.2	4.5	22,959	18,891	27,089	22,974	2,495
104	34	Other	49.2	42	56.7	0	49.3	4.4	27,439	23,414	31,567	27,452	2,474
104	34	McDonald	0.6	0	3.8	30.3	1	1.4	314	0	2,138	563	784
104	34	Hugh Smith	2.4	0.5	5.7	0	2.7	1.6	1,330	286	3,195	1,485	902
104	34	Klawock	0.4	0	2.3	19.7	0.7	0.8	235	0	1,283	368	461

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District	Statistical weeks	Reporting group	Stock composition						Stock-specific harvest				
				90% CRI						90% CRI			
			Median	5%	95%	*P* = 0	Mean	SD	Median	5%	95%	Mean	SD
104	35	Alaska	0.1	0.1	3.5	0	0.8	1.2	91	41	2,301	522	812
104	35	Nass	4.7	2.1	8.7	0	5	2	3,105	1,382	5,714	3,270	1,335
104	35	Skeena	45.3	38.1	52.6	0	45.3	4.4	29,814	25,121	34,625	29,835	2,895
104	35	Other	43.7	36.5	51.1	0	43.7	4.4	28,767	24,015	33,626	28,786	2,926
104	35	McDonald	0	0	2.2	73.5	0	1	0	0	1,467	0	688
104	35	Hugh Smith	5	2.1	9.1	0	5.2	2.1	3,317	1,378	5,965	3,444	1,414
104	35	Klawock	0	0	0.5	79.6	0	0.3	0	0	353	0	202
104	36	Alaska	4.5	1.9	8.2	0	4.8	1.9	1,214	518	2,201	1,269	517
104	36	Nass	0.5	0	2.4	15.2	0.7	0.8	127	0	630	191	221
104	36	Skeena	37.4	30.6	44.6	0	37.5	4.3	9,984	8,172	11,901	10,004	1,136
104	36	Other	57	49.7	64	0	56.9	4.3	15,209	13,275	17,090	15,197	1,158
104	36	McDonald	0	0	1.2	76.4	0	0.6	0	0	315	0	157
104	36	Hugh Smith	0	0	2.4	71.6	0.1	1	0	0	629	31	272
104	36	Klawock	0	0	0.7	79.3	0	0.4	0	0	182	1	104
											Total	496,404	

Note: Stock composition estimates may not sum to 100% and stock-specific harvest estimates may not sum to the total harvest due to rounding error.

Appendix G.–Reporting group, location, ADF&G collection code, and the number (*n*) of sockeye salmon used in the genetic baseline for mixed-stock analysis of the purse seine catch in management Districts 103 and 104.

Reporting group	Location	ADF&G collection code	*n*
Alaska	Ahrnklin River	SAHRN07	90
Alaska	Akwe River	SAKWE09.SAKWE16[a]	186
Alaska	Antler-Gilkey River	SANTGILK13	53
Alaska	Bainbridge Lake	SBAIN10	95
Alaska	Banana Lake - Klutina	SBANA08	80
Alaska	Bar Creek - Essowah Lake	SBAR04	95
Alaska	Bartlett River - Creel survey	SBART13	69
Alaska	Bear Hole - tributary Klutina	SBEARH08	94
Alaska	Bering Lake	SBERI91	95
Alaska	Berners River	SBERN03.SBERN13	165
Alaska	Big Lake - Ratz Harbor Creek	SBIGLK10.SBIGLA14	161
Alaska	Chilkat Lake	SCKAT13	189
Alaska	Chilkat Lake early run	SCKAT07E.SCKAT07L	190
Alaska	Chilkat Mainstem - Bear Flats	SBEARFL07	95
Alaska	Chilkat Mainstem - Mosquito Lake	SMOSQ07	95
Alaska	Chilkat River - Mule Meadows	SMULE03.SMULE07	190
Alaska	Chilkoot Lake - beaches	SCHILB07	251
Alaska	Chilkoot Lake - Bear Creek	SCHILBC07	233
Alaska	Chilkoot River	SCHIK03	159
Alaska	Clear Creek at 40 Mile	SCLEAR07	86
Alaska	Coghill Lake	SCOGH91.SCOG92HL.SCOG92ES.SCOGH10	378
Alaska	Crescent Lake	SCRES03	194
Alaska	Dangerous River	SDANG09	95
Alaska	East Alsek River	SEAST03B	94
Alaska	Eek Creek	SEEK04.SEEK07	50
Alaska	Eshamy Creek	SESHAR08.SESHA91	185
Alaska	Eyak Lake - Hatchery Creek	SEYAK10	95
Alaska	Eyak Lake - Middle Arm	SEYAM07	95
Alaska	Eyak Lake - South beaches	SEYASB07	87
Alaska	Falls Lake - East Baranof Island	SFALL03.SFALL10	190
Alaska	Fillmore Lake - Hoffman Creek	SFILLM05	52
Alaska	Fish Creek - off East Fork Gulkana River	SFISHC08	95
Alaska	Ford Arm Creek	SFORD13	199
Alaska	Ford Arm Lake weir	SFORD04	207
Alaska	Gulkana River - East Fork	SGULK08EF	75
Alaska	Hasselborg Lake	SHASSEL12.SHASSELR13	209
Alaska	Hatchery Creek - Sweetwater	SHATC03.SHATC07	142

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Reporting group	Location	ADF&G collection code	*n*
Alaska	Heckman Lake	SHECK04.SHECK07	189
Alaska	Helm Lake	SHELM05	94
Alaska	Hetta Creek - early run	SHETT10E	95
Alaska	Hetta Creek - late run	SHETT03.SHETT08.SHETT09L	281
Alaska	Hetta Creek - middle run	SHETT09M	95
Alaska	Hoktaheen - marine waters	SHOKTAM14	47
Alaska	Hoktaheen - upper lake main inlet	SHOKTAI04	47
Alaska	Hoktaheen - upper lake outlet	SHOKTAO04	49
Alaska	Italio River	SITAL17[a]	41
Alaska	Kah Sheets Lake	SKAHS03	96
Alaska	Kanalku Creek	SKANA07.SKANA10.SKANAL13	319
Alaska	Kegan Lake	SKEGA04	95
Alaska	Klag Bay Stream outlet	SKLAG09	200
Alaska	Klakas Lake	SKLAK04	95
Alaska	Klutina Lake - inlet	SKLUTI08.SKLUTI09	95
Alaska	Klutina River - mainstem	SKLUT08	95
Alaska	Kook Lake	SKOOK12E.SKOOK13	148
Alaska	Kook Lake - late	SKOOK07.SKOOK10L.SKOOK12L	194
Alaska	Kunk Lake - Etolin Island system	SKUNK03	96
Alaska	Kushtaka Lake	SKUSH07.SKUSH08	189
Alaska	Kutlaku Lake	SKUTL03	95
Alaska	Kutlaku Lake	SKUTL12	78
Alaska	Kutlaku Lake	SKUTL13	50
Alaska	Lace River	SLACE13	63
Alaska	Lake Creek	SAUKE13baseline.SLAKECR14	318
Alaska	Lake Eva	SLEVA12	115
Alaska	Long Lake weir	SLONGLK05	95
Alaska	Lost/Tahwah Rivers	SLOST03B.SLOST03C[a]	139
Alaska	Luck Lake - P.O.W. Island	SLUCK04	94
Alaska	Mahlo River	SMAHL08	94
Alaska	Mahoney Creek	SMAHO03.SMAHO07	153
Alaska	Main Bay	SMAIN91	96
Alaska	Martin Lake	SMART07.SMART08	187
Alaska	Martin River Slough	SMARTR08	95
Alaska	McGilvery Creek	SKART92.SMCGI03.SMCGI04.SMCGI16	472

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Appendix G.–Page 3 of 7.

Reporting group	Location	ADF&G collection code	*n*
Alaska	McKinley Lake	SMCKI07	95
Alaska	McKinley Lake	SMCKI08	95
Alaska	McKinley Lake	SMCKI91	95
Alaska	McKinley Lake - Salmon Creek	SMCKSC07	93
Alaska	Mendeltna Creek	SMEND08.SMEND09	188
Alaska	Mentasta Lake	SMENT08	95
Alaska	Mill Creek Weir Early - Virginia Lake	SMILLC07E	94
Alaska	Mill Creek Weir Late - Virginia Lake	SMILLC07L	95
Alaska	Miners Lake	SMINE91.SMINE09	191
Alaska	Necker Bay	SNECKER91.SNECKER93	95
Alaska	Neva Lake weir	SNEVA08	94
Alaska	Neva Lake weir	SNEVA09.SNEVA13	255
Alaska	North Berg Bay inlet	SNBERG91	53
Alaska	North Berg Bay inlet	SNBERG92	100
Alaska	Old Situk	SOSITU07	163
Alaska	Pavlof River	SPAVLOF12.SPAVLOFR13	174
Alaska	Paxson Lake - outlet	SPAXSO09	75
Alaska	Petersburg Lake	SPETL04	95
Alaska	Red Bay Lake	SREDBL04	95
Alaska	Redfish Lake Beaches	SREDB93	94
Alaska	Redoubt Lake - outlet	SREDOUBT13	200
Alaska	Salmon Bay Lake	SSALM04.SSALM07	170
Alaska	Salmon Creek - Bremner	SSALMC08	93
Alaska	Salmon Lake weir	SSALML07.SSALML08	185
Alaska	Sarkar - Five Finger Creek	SSARK00.SSARF05	91
Alaska	Seclusion Lake - in lake	SSECLK14.SSECLKIN14	117
Alaska	Shipley Lake	SSHIP03	94
Alaska	Sitkoh Lake	SSITK03.SSITK11.SSITK12	351
Alaska	Situk Lake	SSITU07	159
Alaska	Situk Lake	SSITU13	190
Alaska	Snettisham Hatchery	SSNET06.SSPEE07	190
Alaska	Snettisham Hatchery - Speel Lake	SSPEE13	146
Alaska	Sockeye Creek	SSOCK17.SSOCK18[a]	136
Alaska	Speel Lake	SSPEE03	95
Alaska	St. Anne Creek	SSANN05.SSTACR08	186
Alaska	Steamboat Lake - Bremner	SSTEAM08	95
Alaska	Steep Creek	SSTEE03	91

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Reporting group	Location	ADF&G collection code	*n*
Alaska	Swede Lake	SSWEDE08	95
Alaska	Tanada Creek weir	STANA05	94
Alaska	Tanada Lake - lower outlet	STANAO09	95
Alaska	Tanada Lake - shore	STANAS09	93
Alaska	Tawah Creek	STAWA17[a]	94
Alaska	Thoms Lake	STHOM04.STHOM14	93
Alaska	Tokun Lake	STOKUN08.STOKUN09	189
Alaska	Tonsina Lake	STONSL09	94
Alaska	Unuk River - Gene's Lake	SGENE07	95
Alaska	Unuk River - Gene's Lake	SGENE08	69
Alaska	Vivid Lake	SVIVID93	48
Alaska	Windfall Lake	SWIND03.SWIND07	142
Hugh Smith	Hugh Smith - Cobb Creek	SCOBB07	99
Hugh Smith	Hugh Smith Lake	SHSMI92.SHUGH13	155
Hugh Smith	Hugh Smith Lake - Bushmann Creek	SHUGH04	150
Klawock	Inlet Creek - Klawock	SINCK03.SINCK08.SHALF08	212
Klawock	Klawock-Three Mile Creek	STHRE04.STHRE10	181
McDonald	McDonald Lake - Hatchery Creek	SMCDO01.SMCDO03.SMCDO07.SMCDO13	368
Nass	Nass - Bonney Creek	SBONN01.SBONN12	164
Nass	Nass - Bowser Lake	SBOWS01	94
Nass	Nass - Damdochax Creek	SDAMD01	93
Nass	Nass - Gingit Creek	SGING97	94
Nass	Nass - Hanna Creek	SHANNA06	93
Nass	Nass - Kwinageese	SKWIN01.SKWIN12U	76
Nass	Nass - Meziadin Beach	SMERI01.SMEZIB06	186
Nass	Nass - Tintina Creek	STINT06	94
Nass	Skeena - Kispiox River	SKISP02	53
Other	Stikine - Chutine Lake	SCHUTL09.SCHUT11	224
Other	Taku - King Salmon Lake	SKSLK10.SKSLK11	214
Other	Taku - Kuthai Lake	SKUTH06	171
Other	Taku - Tatsatua Lake (Tatsatua)	SLTAT11.SLTAT12[a]	153
Other	Taku - Little Trapper	SLTRA90.SLTRA06	237
Other	Stikine - Andy Smith Slough	SFOWL07.SFOWL08.SFOWL09.SANDY07.SANDY09	54
Other	Stikine - Bronson Slough	SBRON08.SBRON09	78
Other	Stikine - Christina Lake	SCHRI11.SCHRI12	70
Other	Stikine - Chutine River	SCHUT08	94
Other	Stikine - Craig River	SCRAIG06.SCRAIG07.SCRAIG08	38

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Reporting group	Location	ADF&G collection code	*n*
Other	Stikine - Devil's Elbow	SDEVIL07.SDEVIL08	148
Other	Stikine - Devil's Elbow	SDEVIL09	53
Other	Stikine - Iskut River	SISKU85.SISKU86.SISKU02.SISKU06.SISKU08.SISKU09	153
Other	Stikine - Iskut River (Craigson Slough)	SISKU07	42
Other	Stikine - Porcupine River	SPORCU07.SPORCU11	74
Other	Stikine - Scud River	SSCUD07.SSCUD08.SSCUD09	191
Other	Stikine - Shakes Slough Creek	SSHAKS06.SSHAKES07.SSHAKS09	67
Other	Taku - Fish Creek	SFISHCR09.SFISHCR10	159
Other	Taku - Hackett River	SHACK08	52
Other	Taku - Sustahine Slough	SSUSTA08.SSHUST09	185
Other	Taku - Tulsequah River	STULS07.STULS08.STULS09	156
Other	Taku - Tuskwa Creek	STUCH08.SCHUNK09.STUSK08.SBEARSL09.STUSKS08.STUSKS09	356
Other	Taku - Yehring Creek	SYEHR07.SYEHR09	171
Other	Taku - Yellow Bluff	SYELLB08.SYELLB10.SYELLB11	81
Other	Taku Mainstem - Taku River	STAKU07	95
Other	Taku Mainstem - Takwahoni/Sinwa	STAKWA09	67
Other	Taku - Nahlin River	SNAHL03.SNAHL04.SNAHL05.SNAHL06.SNAHL07.SNAHL12[a]	341
Other	Taku - Tatsamenie Lake	STATS05.STATS06	288
Other	Alsek - Blanchard River	SBLAN07	89
Other	Alsek - Blanchard River	SBLAN09	62
Other	Alsek - Border Slough	SBORD07.SBORD08	71
Other	Alsek - Border Slough	SBORD09.SBORD11	70
Other	Alsek - Datlasaka Creek	SDATLAS12	95
Other	Alsek - Goat Creek	SGOATC07.SGOATC12	56
Other	Alsek - Klukshu River	SKLUK07	94
Other	Alsek - Klukshu River Weir late	SKLUK06	95
Other	Alsek - Kudwat (Little Tatshenshini Lake)	SLTATS01.SLTATS03	65
Other	Alsek - Kudwat (Tatshenshini) - Bridge/Silver	SBRIDGE11.SBRIDGE12	105
Other	Alsek - Kudwat (Tatshenshini) - Kwatini	SKWAT11	65
Other	Alsek - Kudwat (Tatshenshini) - Stinky Creek	SSTINKY11	40
Other	Alsek - Kudwat (Upper Tatshenshini)	SUTATS03	95
Other	Alsek - Kudwat Creek (Tatshenshini)	SKUDW09.SKUDW10.SKUDW11	100
Other	Alsek - Neskataheen Lake	SNESK07	195

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Reporting group	Location	ADF&G collection code	*n*
Other	Alsek - Tweedsmuir	STWEED07	48
Other	Alsek - Tweedsmuir	STWEED09	46
Other	Alsek - Vern Ritchie	SVERNR09.SVERNR10	114
Other	Bloomfield Lake	SBLOOM05	93
Other	Central - Kitlope Lake	SKITL06	95
Other	Central Coast - Amback Creek	SAMBA04	91
Other	Columbia River - Okanagan River	SOKAN02	95
Other	Fraser - Adams River - Shuswap late	SLADA02.SADAM07	187
Other	Fraser - Birkenhead	SBIRK07	90
Other	Fraser - Chilko Lake	SCHILK01	87
Other	Fraser - Chilliwack Lake	SCHILW04	89
Other	Fraser - Cultus Lake	SCULT02	91
Other	Fraser - Fraser Lake	SFRAS96	85
Other	Fraser - Gates Creek	SGATES09	90
Other	Fraser - Harrison River	SHARR07	95
Other	Fraser - Lower Horsefly River	SLHOR01.SUHOR01.SHORSE07	274
Other	Fraser - Middle Shuswap River	SMSHU02	91
Other	Fraser - Nahatlatch - Nahatlatch River	SNAHAT02	92
Other	Fraser - North Thompson	SNTHOM05	95
Other	Fraser - Raft River	SRAFT01	84
Other	Fraser - Scotch River	SSCOT00	91
Other	Fraser - Stellako River	SSTEL07	94
Other	Fraser - Tachie River	STACH01	94
Other	Fraser - Trembleur - Kynock	SKYNO97	94
Other	Fraser - Weaver Creek	SWEAV01	88
Other	Great Central Lake	SGCENLK02	95
Other	Issaquah Creek - Puget Sound Drainage	SISSA96	82
Other	Kitimat River	SKITIM10	93
Other	Lake Pleasant - Soleduck River	SLAKE97	76
Other	Lake Wenatchee	SWENA98	95
Other	Mitchell River	SMITCH01	94
Other	QCI - Naden River	SNADE95	95
Other	QCI - Yakoun Lake	SYAKO93	70
Other	Stikine - Little Tahltan	SLTAH90	95
Other	Stikine - Tahltan Lake	STAHL06	196

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Reporting group	Location	ADF&G collection code	*n*
Other	Tankeeah River	STANK03	47
Other	Tankeeah River	STANK05	47
Other	Vancouver Island - Quatse River	SQUAT03	95
Skeena	Kitwanga River	SKITW12	92
Skeena	Skeena - Alastair Lake	SALAS87.SALAS06	118
Skeena	Skeena - Four Mile Creek	SFMILE06	85
Skeena	Skeena - Fulton River	SFULT06	95
Skeena	Skeena - Grizzly Creek	SGRIZ87	76
Skeena	Skeena - Kitsumkalum Lake	SKALUM06	56
Skeena	Skeena - Kitsumkalum Lake	SKALUM12	94
Skeena	Skeena - Lakelse Lake (Williams)	SLAKEL06	93
Skeena	Skeena - Lower Tahlo River	SLTAH94	78
Skeena	Skeena - McDonell Lake (Zymoetz River)	SMCDON02.SMCDON06	131
Skeena	Skeena - Morrison	SMORR07	92
Skeena	Skeena - Motase Lake	SMOTA87	47
Skeena	Skeena - Nangeese River	SNANG06	40
Skeena	Skeena - Nanika River	SNANI88.SNANI07	113
Skeena	Skeena - Pierre Creek	SPIER06	95
Skeena	Skeena - Pinkut Creek	SPINK94.SPINK06	187
Skeena	Skeena - Salix Bear	SSALIX87.SSALIX88	94
Skeena	Skeena - Slamgeesh River	SSLAM06	95
Skeena	Skeena - Stephens Creek	SSTECR01	95
Skeena	Skeena - Sustut River	SSUST01	79
Skeena	Skeena - Swan Lake	SSWANLK06	93
Skeena	Skeena - Tahlo Creek	STAHLO07	95
Skeena	Skeena - Upper Babine River	SUBAB06	95

[a] These populations were added, or additional collections were pooled with existing populations, between the 2018/2019 analysis and the 2020/2021 analysis.