Fishery Data Series No. 21-23

Mixed Stock Analysis of Chinook Salmon Harvested in Southeast Alaska Commercial Troll and Sport Fisheries, 2018

by

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NOTE: Figures 3 and 9 of this report were updated on 5/19/2022.

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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)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

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. 21-23

MIXED STOCK ANALYSIS OF CHINOOK SALMON HARVESTED IN SOUTHEAST ALASKA COMMERCIAL TROLL AND SPORT FISHERIES, 2018

by

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Continued)

Figure **Page**

LIST OF APPENDICES

Appendix **Page**

ABSTRACT

Chinook salmon originating in Alaska, British Columbia, and the Pacific Northwest are harvested in Southeast Alaska (SEAK) commercial troll and sport fisheries. Owing to its mixed stock nature, the overall SEAK Chinook salmon fishery is managed as 1 of 3 aggregate abundance-based management fisheries under provisions of the Pacific Salmon Treaty Agreement. The Alaska Department of Fish and Game has used genetic mixed stock analysis to estimate the stock composition of Chinook salmon harvests in the SEAK troll and sport fisheries since 2004 based on a genetic baseline developed by the Genetic Analysis of Pacific Salmonids group for use in Pacific Salmon Treaty fisheries. Genetic methods allow direct estimation of the major stock groups contributing to these fisheries. This project estimated the relative stock composition of troll and sport fishery harvests from fishery accounting year (AY) 2018 (Oct. 1, 2017–Sept. 30, 2018). The major contributors to the troll and sport fisheries ordered from north to south were the *Southeast Alaska/Transboundary River*, *North/Central British Columbia*, *West Coast Vancouver Island*, *South Thompson*, *Washington Coast*, *Interior Columbia River Summer/Fall*, and *Oregon Coast* reporting groups. Collectively, these 7 stock aggregates, referred to as *driver stocks*, accounted for 91% of the troll harvest and 95% of the sport harvest. The *Southeast Alaska/Transboundary River* driver stock was the largest contributor to both the troll (18%) and sport fishery (38%) harvest. Results indicate considerable temporal and spatial variation in the composition of troll and sport harvests in AY 2018, and changes in the relative contributions of driver stocks across years. Stock composition data from this and other stock assessments are being used to provide fisheries information including stock-specific run reconstructions and forecasting of run sizes to transboundary rivers, and separate harvest estimates of SEAK and transboundary river wild and hatchery salmon.

Keywords: Chinook salmon, Southeast Alaska, troll fishery, sport fishery, mixed stock analysis, genetic, microsatellite, Pacific Salmon Treaty

INTRODUCTION

CHINOOK SALMON FISHERY MANAGEMENT

Chinook salmon *Oncorhynchus tshawytscha* is one of the fish species most sought after by sport anglers and the commercial troll fishing industry in Southeast Alaska (SEAK). In SEAK, Chinook salmon are harvested in State of Alaska and Federal Exclusive Economic Zone waters east of Cape Suckling and north of Dixon Entrance (CTC 2004; NPFMC 2012). This area is divided into 4 quadrants for stock assessment purposes: Northern Outside (NO), Northern Inside (NI), Southern Outside (SO), and Southern Inside (SI) for the commercial troll fishery (Figure 1). The sport fisheries predominantly occur around the ports of Juneau, Ketchikan, Sitka, Petersburg, Wrangell, Craig/Klawock, Yakutat, Gustavus, Elfin Cove, Skagway, and Haines (Figure 2). Both the troll and sport fisheries harvest mixed stocks[1] of Chinook salmon, including salmon originating from Alaska, British Columbia (BC), and the Pacific Northwest, and are therefore under the jurisdiction of the Pacific Salmon Treaty (PST). The PST calls for cooperative management and research on fisheries harvesting Chinook salmon from populations in Canada and the U.S. Under the 2009 PST Agreement, Chinook salmon fisheries are structured as either Aggregate Abundance Based Management (AABM) or Individual Stock Based Management (ISBM) fisheries. The SEAK Chinook salmon fishery is one of 3 mixed stock AABM fisheries (2009 PST Agreement, Annex IV, Chapter 3).

The annual all-gear harvest limit for Chinook salmon in SEAK is specified in Chapter 3, Annex IV of the PST and is based on an abundance index (AI) generated by the Pacific Salmon Commission (PSC) Chinook Model. The majority of the PST harvest limit is allocated to the commercial troll and sport fisheries under State of Alaska management plans established by the

[1] In this report, *population* refers to a locally interbreeding group of salmon that is distinguished by a distinct combination of genetic, phenotypic, life-history, and habitat characteristics, and *stock* refers to an aggregation of one or more populations that occur in the same geographic area and are managed as a unit. *Reporting groups* refers to an aggregation of one or more stocks that can be identified using genetic mixed stock analysis.

Alaska Board of Fisheries (BOF; the purse seine fishery is allocated 4.3% of the harvest, the gillnet fishery is allocated 2.9% of the harvest, and the setnet fishery is allocated 1,000 fish; the remaining portion of the annual harvest limit is allocated 80% to the troll fishery and 20% to the sport fishery). Thus, careful monitoring of the harvest in the troll and sport fisheries throughout the season is essential to prevent exceeding the annual harvest limit (Jaenicke et al. 2019; Hagerman et al. 2019). Additionally, the PST requires that the fisheries be managed to achieve escapement goals for SEAK and Transboundary River (TBR) stocks. By regulation, legal-sized Chinook salmon in the troll and sport fisheries must be 71 cm (28 inches) or greater in total length (tip of snout to tail fork), except in special harvest areas—generally terminal in nature—that target Alaska hatchery stocks.

In addition to the provisions of the PST, these fisheries are also managed pursuant to Alaska's *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222), wherein impacts of fishing on salmon escapement are assessed and considered in management decisions, and necessary conservation restrictions may be imposed in order to achieve escapement goals, rebuild, or in some other way conserve a specific salmon stock or group of stocks.

Troll Fishery Overview

The SEAK troll harvest of Chinook salmon occurs over 3 seasonal fisheries: winter, spring, and summer. The winter fishery typically occurs from October 11 to April 30 of the following year, or until the guideline harvest level of 45,000 non-Alaska hatchery-produced Chinook salmon is reached. The fishery is split into "early winter" (October 11–December 31) and "late winter" (January 1–April 30) components, and the open fishing area is restricted to within the troll boundary of the outer coast surf line. The spring troll fishery (May 1 or earlier, through June 30) is managed to target Chinook salmon produced from SEAK hatcheries, many of which are exempt from the annual harvest limit. The summer troll fishery accounts for the majority of the annual Chinook salmon commercial harvest and is closely monitored and managed to prevent exceeding the troll allocation of the annual harvest limit by allowing retention of Chinook salmon during 2 or more periods in most years. The first summer troll fishery opening, beginning July 1 by regulation, allows harvest in the waters of frequent high Chinook salmon abundance and is managed to not exceed 70% of the remaining troll allocation of the annual harvest limit. Once the July fishery is closed, Chinook salmon retention by the troll fleet is not allowed unless it is determined that additional openings will not result in exceeding the annual harvest limit. August (and sometimes September) openings are conducted in years when it is determined that the annual harvest limit will not be exceeded. Unlike the first retention period, if additional openings occur, the waters of frequent high Chinook salmon abundance remain closed to troll gear. However, if after 10 days ADF&G determines that the annual harvest limit for troll Chinook salmon may not be reached by September 20 with those waters closed, the waters of frequent high Chinook salmon abundance reopen.

Sport Fishery Overview

The sport fishery occurs throughout the region, with highest catches around the ports of Sitka, Juneau, Ketchikan, Craig/Klawock, Petersburg, and Wrangell. Most of the sport fishery effort for Chinook salmon in the region occurs May through September when both resident and nonresident participation are at their highest levels. The objectives of the *Southeast Alaska King Salmon Management Plan* were specified by the BOF and direct ADF&G (1) to manage the sport fishery to attain an average harvest of 20% of the all-gear harvest limit after accounting for commercial net harvests; (2) to allow uninterrupted sport fishing in salt waters for Chinook salmon, but not exceeding the sport fishery harvest limit; (3) to minimize regulatory restriction on resident anglers; and (4) to provide stability to the sport fishery by eliminating inseason regulatory changes, except those needed for conservation.

SUMMARY OF 2018 SEASON

The 2018 AI for SEAK fisheries was 1.07, resulting in an all-gear harvest limit of 144,500 treaty Chinook (Hagerman et al. 2019). In addition, ADF&G implemented a 10% reduction to the all-gear harvest limit to conserve SEAK and BC stocks (Hagerman et al. 2019).

In 2017, 9 of the 11 Chinook salmon stocks that ADF&G monitors for escapement did not meet management objectives. Three Chinook salmon indicator stocks had missed the lower bound of their escapement objectives in at least 4 of the past 5 years. Given this "chronic inability, despite use of specific management measures, to maintain escapements within the bounds of the SEG [sustainable escapement goal], BEG [biological escapement goal], OEG [optimum escapement goal], or other specified management objectives for the fishery," ADF&G recommended that Unuk, Chilkat, and King Salmon Rivers be designated as *stock(s) of management concern* (SOC) pursuant to the *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222). The BOF accepted ADF&G's recommendations and adopted SOC action plans for Unuk, Chilkat, and King Salmon Rivers that were designed to conserve these stocks of Chinook salmon (Lum and Fair 2018a and 2018b). The action plan to conserve Unuk River Chinook salmon directed ADF&G to close the winter troll fishery on March 15 (the typical closing date is April 30), notwithstanding any remaining guideline harvest level, and limit spring troll areas to terminal harvest areas and outer coast spring troll areas with low proportional harvests of wild SEAK stocks (Lum and Fair 2018a; Hagerman et al. 2019). Additionally, the action plan to conserve Chilkat and King Salmon River Chinook salmon directed ADF&G to close the waters of Upper Lynn Canal and to modify time and area restrictions of the spring troll fishery (Lum and Fair 2018b).

In 2018, preseason return and escapement forecasts for Chilkat, Taku, Stikine, and Unuk River Chinook salmon were near or below the lower bound of spawning escapement goals, with forecasts to the Taku and Stikine Rivers projected to be the lowest on record. With the majority of SEAK wild Chinook salmon stocks in a period of poor production, restrictive management actions were necessary to help reduce encounters and conserve these stocks. ADF&G implemented the SOC action plans adopted during the 2018 BOF meeting, emergency order restrictions, and additional commercial troll management measures during the 2018 winter, spring, and summer troll fisheries (Hagerman et al. 2019; Lum and Fair 2018a and 2018b). Most of these management actions focused on restrictions between mid-March and early July when the majority of the wild SEAK Chinook salmon harvest occurs in the commercial troll fishery.

In Accounting Year[2] (AY) 2018, the troll fishery harvested 107,565 Chinook salmon, the lowest on record since statehood (Hagerman et al. 2019). The winter fishery harvest was 11,967 fish, of which 7,398 were caught in early winter and 4,569 were caught in late winter. The winter troll fishery closed on March 15 in accordance with new regulations adopted by the BOF from the *Unuk River king salmon stock status and action plan* (Lum and Fair 2018a). In 2018, spring troll fisheries were conducted between May 1 and June 30; however, in accordance with the *Unuk River king salmon stock status and action plan*, open areas were limited to 7 terminal harvest areas and

[2] The PST accounting year begins with the start of the winter fishery on October 11 of the previous calendar year and ends the following September; e.g., AY 2018 is October 1, 2017, through September 30, 2018.

8 spring troll areas in order to conserve wild SEAK Chinook salmon (Lum and Fair 2018a). A total of 8,395 fish were harvested in the spring fishery, which includes harvest in hatchery terminal areas. The total summer fishery harvest was 86,734 fish, of which 58,992 were caught during the first retention period in July, with the remaining 27,742 caught in the second retention period in August (Hagerman et al. 2019).

In 2018, the *Southeast Alaska King Salmon Management Plan* included a daily bag limit of 1 Chinook salmon 71 cm (28 inches) or greater in length (tip of snout to fork of tail) for resident and nonresident anglers. The nonresident annual limit was 3 Chinook salmon between January 1 and June 30 and 1 Chinook salmon thereafter (July 1–December 31); any Chinook salmon harvested by a nonresident angler during the earlier period (January 1–June 30) applied towards the 1-fish annual limit of the later period.

Low returns in 2017 and below-escapement goal preseason forecasts for 2018 indicated that it would probably be another poor return year. In March 2018 more restrictive sport regulations were enacted by emergency order in Yakutat and in the inside waters of Haines/Skagway, Juneau, Petersburg/Wrangell, and Ketchikan Management Areas to protect SEAK wild Chinook stocks, including 3 Chinook stocks identified as stocks of concern (Lum and Fair 2018a and 2018b). These more restrictive measures—effectively fishery closures—remained in place through mid-June for northern SEAK, mid-July for central SEAK, and mid-August for southern SEAK.

In AY 2018, the total sport Chinook salmon harvest was 26,400 fish, including an estimated 6,859 Alaska hatchery fish, the lowest on record since 1988 (Hagerman et al. 2019; CTC 2019a). The vast majority of the harvest occurred in Outside areas (ports of Craig/Klawock, Sitka, Yakutat, Elfin Cove, and Gustavus), followed by harvest in Ketchikan, Inside areas, and Petersburg/Wrangell (Figure 2).

GENETIC MSA

The annual PST Chinook salmon harvest limit for SEAK depends on the projected abundance of Chinook salmon forecasted by the Chinook Technical Committee (CTC) using the PSC Chinook Model (CTC 2019a; Hagerman et al. 2019). The PSC Chinook Model uses catch, escapement, coded wire tag (CWT) recovery, and recruitment information to forecast relative abundance of stocks in PST fisheries. Relative stock proportion information is an important component of the PSC Chinook Model, and currently CWT data are used for this purpose. However, reliance on stock composition estimates solely from CWT data can be problematic because CWTs are only applied to a subset of indicator stocks contributing to the fishery, most of which are hatchery stocks intended to represent wild stocks; and resulting escapement and terminal run size estimates are often not available or are poorly determined for many stocks outside of SEAK. Genetic mixed stock analysis (MSA) provides a complementary set of stock composition estimates for major contributors to the fishery. Where CWT methods are one of the only ways of detecting and estimating stocks of Chinook salmon that are minor contributors to a fishery (because the numeric tags minimize the problem of misclassification and more catch is sampled for CWTs on a coastwide basis [~20%] to recover these tags), genetic MSA is best suited for estimating contributions of major stocks, i.e., those contributing relatively large proportions (≥5%) of the sample. However, genetic MSA cannot currently differentiate between hatchery and wild stocks representing the same brood source and does not include the age information provided by CWTs. Although both MSA and CWT assessments are capable of providing stock composition estimates of harvest, the combination of the 2 methods is expected to be more useful.

Genetic MSA has been used extensively to estimate the relative contribution of genetic aggregates of Chinook salmon to mixed stock fisheries occurring throughout the PST area (unpublished data[3]; Hess et al. 2011; Templin et al. 2011; Beacham et al. 2012). This method uses the genetic variation in allele frequencies at multiple loci among populations (baseline) to estimate the contribution of each stock to a mixture given the multilocus genotypes of fish in the mixture. Since 1999, ADF&G has used MSA based on coastwide baselines (allozymes: Teel et al. 1999; microsatellites: Seeb et al. 2007) to estimate the composition of Chinook salmon harvested in the commercial troll fishery (Crane et al. 2000; Templin et al. 2011; Gilk-Baumer et al. 2013, 2017a, 2017b, and 2018).

Genetic MSA is possible for PST fisheries due to the CTC-funded Genetic Analysis of Pacific Salmonids (GAPS) project, a cooperative project among 10 laboratories with the goal of developing a standardized DNA baseline for stock identification of Chinook salmon.[4] This process began in 2002, and a standardized baseline was available during the summer of 2005 (Seeb et al. 2007). The baseline can be used to identify 44 reporting groups in mixtures with acceptable accuracy and precision (Seeb et al. 2007). For the SEAK fisheries, the 44 reporting groups were combined into 26 reporting groups based on management needs and stock presence (Table 1). The current baseline (version 3.0) contains allele frequencies from 357 populations contributing to PST fisheries, ranging from the Situk River in Alaska to the Central Valley of California (Appendix A1).

Stocks of Chinook salmon originating from streams and hatcheries along the Southeast Alaska, Northern/Central British Columbia, West Vancouver Island, Washington, and Oregon coasts and in the South Thompson and Upper Columbia Rivers[5] consistently contribute more than 5% to the troll and sport harvest in SEAK, and consequently are important stocks that help drive harvest allocations under the PST (Table 1; CTC 2019b). Collectively these 7 aggregate stocks make up a large proportion (typically >90%; Gilk-Baumer et al. 2017a and 2017b, Shedd et al. 2021) of all Chinook salmon annually harvested in SEAK troll and sport fisheries, and thus genetic MSA is the preferred method for providing accurate and precise stock composition estimates for these "driver stocks" in SEAK fisheries (PSC 2008).

The information reported herein are the results of genetic MSA based on the CTC standardized baseline of microsatellites (GAPS version 3.0) to provide independent estimates of the stock composition of Chinook salmon harvested in the SEAK troll and sport fisheries in AY 2018. Results focus primarily on the 7 driver stocks important for SEAK fisheries managed under the PST, although information at broader and finer scales is also provided for context.

OBJECTIVES

The goal of this genetic MSA program was to estimate the stock composition of Chinook salmon harvested in SEAK commercial troll and sport fisheries during AY 2018. Project objectives were as follows:

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3 Blankenship, S., K. I. Warheit, J. Von Bargen, and D. A. Milward. Genetic stock identification determines inter-annual variation in stock composition for legal and sub-legal Chinook captured in the Washington Area-2 non-treaty troll fishery. Unpublished Washington Department of Fish and Wildlife molecular genetics laboratory report submitted to the Pacific Salmon Commission-Chinook Technical Committee, 2007.

4 Moran, P., M. Banks, T. D. Beacham, C. Garza, S. Narum, M. Powell, L. W. Seeb, R. L. Wilmot, and S. Young. Genetic analysis of Pacific salmonids (GAPS): Development of a standardized microsatellite DNA database for stock identification of Chinook salmon. Chinook funding proposal submitted to the US Chinook Technical Committee for funding under the budget increment associated with the US Letter of Agreement, 2004.

5 All summer and fall Chinook salmon transiting Bonneville Dam from June 1 through November 15, 2018, destined for areas above McNary Dam and the Deschutes River.

1. Sample Chinook salmon from the SEAK troll and sport fishery harvests in a representative manner to provide stock composition estimates of the harvest within 5% of the true value 90% of the time.
2. Survey Chinook salmon sampled from the SEAK troll and sport fisheries for individual genotypes at the 13 microsatellite loci in the coastwide baseline (GAPS version 3.0).
3. Estimate the relative contribution of 26 fine-scale reporting groups for the following troll fisheries in AY 2018:
    a. early winter (October–December) and late winter (January–March) troll fisheries in the NO quadrant, and across all quadrants;
    b. spring troll fisheries (May–June) with separate estimates for Chinook salmon harvested in the NO, NI, and SI quadrants; and
    c. summer troll fisheries (July–September) with separate estimates for the first Chinook salmon opening and subsequent openings combined for Chinook salmon harvested across all quadrants and in the NO quadrant alone.
4. Estimate the relative contribution of 26 fine-scale reporting groups to SEAK sport fisheries in the following areas and time periods in AY 2018:
    a. Ketchikan, total season estimate;
    b. Petersburg-Wrangell, total season estimate;
    c. NI (ports of Juneau, Haines, and Skagway), total season estimate; and
    d. Outside (ports of Craig/Klawock, Sitka, Yakutat, Elfin Cove, and Gustavus)
        i. early season estimate (through biweek[6] 13),
        ii. late season estimate (after biweek 13), and
        iii. total season estimate.

METHODS

FISHERY SAMPLING

The standard for precision and accuracy used by ADF&G for genetic MSA is to estimate a stock's proportional contribution within 5% of the true value, 90% of the time (Seeb et al. 2000). A sample size of 400 individuals will provide estimates with the target level of precision under the worst-case scenario (3 stocks contributing equal proportions; Thompson 1987), and ADF&G applies this standard when developing sampling programs for MSA. However, sample sizes for some strata may not meet this target size due to harvest numbers, sampling success, or some combination of both. In cases where sample sizes are fewer than 400 and reduced precision is acceptable, estimates based on smaller sample sizes may be appropriate to inform PST-related questions. Sample sizes of 200 fish provide estimates within approximately 7% of the true value 90% of the time (Thompson 1987). Reducing sample sizes below this threshold increases uncertainty rapidly, so when strata are represented by between 100 and 199 samples, estimates are only reported for broad-scale reporting groups to compensate (JTC 1997). Uncertainty associated with genetic MSA

[6] Sport fishery biweeks run from Monday through Sunday, with biweek 1 beginning January 1 and biweek 2 beginning on the third Monday of the year. All biweeks except the first and last of the year are exactly 14 days long. Biweek calendars for each year are available at https://mtalab.adfg.alaska.gov/CWT/reports/sbp_calendar.aspx?value=biweek (accessed November 18, 2021).

results from sample sizes below 100 fish is considered too high to provide useful information for fisheries management in highly mixed stock fisheries.

Troll Fishery

Sample sizes were set to target a minimum 400 samples per stratum for the following 11 troll fishery strata:

1. Early winter fishery (October–December)
    a. NO quadrant
    b. Regionwide
2. Late winter fishery (January–March)
    a. NO quadrant
    b. Regionwide
3. Spring fishery (May–June)
    a. NO quadrant
    b. NI quadrant
    c. SI quadrant
4. Summer fishery (July–September)
    a. First retention period (July)
        i. NO quadrant
        ii. Regionwide
    b. Second and subsequent retention periods (August–September)
        i. NO quadrant
        ii. Regionwide

When necessary, sample goals were moved between ports within a stratum to achieve minimum sample sizes for some strata (Table 2). Sample sizes in the NO quadrant were set so that stock contributions to the harvest in this quadrant could be estimated for each of the time periods in addition to an all-quadrant estimate. Goals varied among ports depending on expectations for deliveries (processor availability), availability of port samplers, and the vagaries of each seasonal fishery.

Details regarding port sampling procedures are outlined in Buettner et al. (2017). In short, Chinook salmon were targeted for sampling from landings at processors at various SEAK ports (Tables 2 and 3; Figure 1). Fish were selected for sampling without regard to size, sex, presence of an adipose fin, or position in the vessel hold or tote; sampling was conducted in such a manner to be as representative as possible of that week's commercial catch. Axillary processes (the modified and elongated structure found at the anterior base of the pelvic fin) were excised from each fish and dried on Whatman paper. Troll fishery participants were interviewed to determine the quadrant (NO, NI, SO, or SI) from which the Chinook salmon were harvested. At the end of the season, samples were shipped air cargo back to the ADF&G Gene Conservation Laboratory in Anchorage for analysis. Associated data were archived as part of the age-sex-length database maintained by ADF&G.

Sport Fishery

Sample sizes were set to target a minimum of 400 samples per stratum for the following 6 sport fishery strata, with the intention of representing harvest by biweek at each port:

1. Ketchikan, total season;
2. Petersburg and Wrangell, total season;
3. NI (Juneau, Haines, Skagway), total season;
4. Outside (Craig/Klawock, Sitka, Yakutat, Elfin Cove, Gustavus)
    a. early season,
    b. late season, and
    c. total season.

Chinook salmon were collected from boats exiting the sport fishery at major boat harbors and boat ramps at each of the ports selected for surveying (Table 4; Figure 2). Sampling design and sampling details for each port are described in Jaenicke et al. (2019). A tissue section was dissected from the axillary process of each sampled Chinook salmon and dried on Whatman paper. Anglers were interviewed to determine the creel port from which the Chinook salmon were harvested. At the end of the season, samples were shipped back to the ADF&G Gene Conservation Laboratory in Anchorage for analysis. Associated data were archived as part of an age-sex-length database maintained by ADF&G Division of Sport Fish.

MIXED STOCK ANALYSIS

Laboratory Analysis

Samples were assayed for 13 microsatellite loci developed by the GAPS group for use in PST fisheries (CTC standardized baseline loci; Seeb et al. 2007). Genomic DNA was extracted from tissue samples using a NucleoSpin 96 Tissue Kit by Macherey-Nagel (Düren, Germany). Polymerase chain reaction (PCR) was carried out in 10 ul reaction volumes (10 mM Tris-HCl, 50 mM KCl, 0.2 mM each dNTP, 0.5 units Taq DNA polymerase [Promega, Madison, WI]) using an Applied Biosystems (AB, Foster City CA) thermocycler. Primer concentrations, $MgCl_2$ concentrations, and the corresponding annealing temperature for each primer are available in Seeb et al. 2007. PCR fragment analysis was done on an AB 3730 capillary DNA sequencer. A 96-well reaction plate was loaded with 0.5 ul PCR product along with 0.5 ul of GS500LIZ (AB) internal lane size standard and 9.0 ul of Hi-Di (AB). PCR bands were visualized and separated into bin sets using AB GeneMapper software v4.0. All laboratory analyses followed protocols accepted by the CTC.

Genetic data were collected as individual multilocus genotypes. According to the convention implemented by the CTC, at each locus a standardized allele is one that has a recognized holotype specimen from which the standardized allele can be reproduced using commonly applied fragment analysis techniques. By the process of sizing the alleles from the holotype specimens, any individual laboratory should be able to convert allele sizes obtained in the ADF&G laboratory to standardized allele names. Genotype data were stored as GeneMapper (*.fsa) files on a network drive that was backed up nightly. Long-term storage of the data was in an *Oracle* database (LOKI) on a network drive maintained by ADF&G computer services.

Several measures were implemented to ensure the quality of data produced. First, each individual tissue sample was assigned a unique accession identifier. At the time DNA was extracted or analyzed from each sample, a sample sheet was created that linked each individual sample's code to a specific well number in a uniquely numbered 96-well plate. This sample sheet then followed the sample through all phases of the project, minimizing the risk of misidentification of samples through human-induced errors. Second, genotypes were assigned to individuals using a system in which 2 people score the genotype data independently. Discrepancies between the 2 sets of scores were then resolved with 1 of 2 possible outcomes: (1) 1 score was accepted and the other rejected, or (2) both scores were rejected, and no score was retained. Lastly, 8 samples from each 96-well DNA extraction plate were reanalyzed for all loci. This enabled detection and correction of laboratory mistakes and allowed for estimation of genotyping error rates. Error rates were calculated as the number of conflicting genotypes, divided by the total number of genotypes examined.

Statistical Analysis

Troll Fishery Mixture Subsampling

Representative mixtures of individuals for MSA were created by subsampling individuals from the collected tissue samples in proportion to harvest by statistical week for each quadrant, or by statistical area in the case of the spring troll fishery. The harvest of Chinook salmon in each quadrant for a given troll fishery opening was obtained from the ADF&G Mark, Tag, and Age Laboratory website (https://mtalab.adfg.alaska.gov/CWT/reports/default.aspx) using the criteria in Table 5. The relative proportion of the total period harvest that was caught in each quadrant was then calculated for each fishery opening.

Eleven mixtures were necessary to generate stock composition estimates for the strata described above. For each fishery/quadrant stratum, individual samples were randomly selected from each statistical week in proportion to harvest. When a stratum was composed of multiple quadrants, individual samples were randomly selected from the entire set of samples in proportion to harvest in each quadrant. For regionwide (all quadrant) estimates, separate mixtures were made to estimate stock contributions for both the NO quadrant and all other quadrants combined. These separate estimates were then pooled into regionwide estimates by weighting by harvest (Templin et al. 2011). When sufficient samples were available, the target sample size for each mixture was 400. When fewer than 400 individuals were available, the maximum number of available samples was used with a minimum sample size of 100 fish. Estimates were generated for samples of 100–199 fish, but only for the broad-scale reporting groups outlined in Table 1. No estimates were generated for sample sizes fewer than 100.

Sport Fishery Mixture Subsampling

Representative mixtures of individuals for MSA were created by subsampling individuals from the collected tissue samples in proportion to harvest by time and sample location (e.g., biweek and port). The inseason estimated Chinook salmon harvest for each biweek and port for a given fishing area was obtained from onsite sampling of sport harvested Chinook salmon by the Division of Sport Fish Southeast Alaska Marine Harvest Studies program (Wendt and Jaenicke 2011; Jaenicke et al. 2019). The total harvest for each port is estimated by the annual Division of Sport Fish Statewide Harvest Survey mailout (Romberg et al. 2018, 2021) that can be downloaded at http://www.adfg.alaska.gov/sf/sportfishingsurvey/. The relative proportion of the total harvest that was caught during each biweek and in each port was then calculated for each fishing area.

A total of 5 mixtures were necessary to generate stock composition estimates for the 6 sport fishery strata described previously. For each time period/port stratum, individual samples were randomly selected from the entire set of samples from that biweek and port. When a stratum was composed of multiple time periods or ports, individual samples were randomly selected in proportion to the harvest in each period or port. For the total season estimate for Outside ports, separate mixtures were made to estimate stock contributions for the early (through biweek 13) and late (after biweek 13) periods. These estimates were then pooled into total season estimates by weighting by harvest each time period's harvest. When sufficient samples were available, the target sample size for each mixture was capped at 400. When the available samples from a given biweek and port were fewer than needed to adequately represent the quadrant in a mixture of 400, the total sample size was reduced to the point where each biweek and port was represented in proportion to harvest. When fewer than 400 individuals were available for sport fishery estimates, a minimum sample of 200 fish was used and there was no weighting for harvest.

BAYES Analysis

The stock composition of fishery mixtures was estimated using the program BAYES (Pella and Masuda 2001). The Bayesian method of MSA is used to estimate the proportion of stocks caught within each fishery using 4 pieces of information: (1) a baseline of allele frequencies for each population, (2) the grouping of populations into the reporting groups desired for MSA, (3) prior information about the stock proportions of the fishery, and (4) the genotypes of fish sampled from the fishery.

The baseline of allele frequencies for Chinook salmon populations was obtained from the GAPS database.[7] Results from 100% proof tests indicate that the fine-scale reporting groups used herein can be identified in mixtures with a 91% correct allocation or better (Gilk-Baumer et al. 2017a, 2017b).

The choice of prior information about stock proportions in a fishery (the prior probability distribution hereafter referred to as the *prior*) is important for increasing MSA accuracy (Habicht et al. 2012a). In this analysis, the estimated stock proportions from the previous year in a given stratum were used as the prior for that stratum (i.e., 2017 estimates were used as prior parameters when generating 2018 estimates). The prior information about stock proportions was incorporated in the form of a Dirichlet probability distribution. The sum of all prior parameters was set to 1 (prior weight), which is equivalent to adding 1 fish to each mixture (Pella and Masuda 2001).

For each fishery mixture, 5 independent Markov Chain Monte Carlo (MCMC) chains of 40,000 iterations were run with different starting values and the first 20,000 iterations were discarded to remove the influence of the start values. We assessed the within- and among-chain convergence of estimates using the Raftery-Lewis (within-chain) and Gelman-Rubin (among-chain) diagnostics. These values measure the convergence of each chain to stable estimates (Raftery and Lewis 1996) and measure the variation of estimates within a chain to the total variation among chains (Gelman and Rubin 1992), respectively. If a Gelman-Rubin diagnostic for any stock group in a mixture was greater than 1.2, the mixture was reanalyzed with 80,000 iterations. If a mixture still had a diagnostic greater than 1.2 after the reanalysis, results

[7] Moran, P., M. Banks, T. D. Beacham, C. Garza, S. Narum, M. Powell, L. W. Seeb, R. L. Wilmot, and S. Young. Genetic analysis of Pacific salmonids (GAPS): Development of a standardized microsatellite DNA database for stock identification of Chinook salmon. Chinook funding proposal submitted to the US Chinook Technical Committee for funding under the budget increment associated with the US Letter of Agreement, 2004.

from the 5 chains were averaged and a note was made in the results. We combined the second half of the 5 chains to form the posterior distribution and tabulated mean estimates, 90% credibility intervals, and standard deviations from a total of 100,000 iterations. In addition, we report the marginal median of the posterior distribution as a measure of central tendency for stock proportions (Pella and Masuda 2001). Misallocations to reporting groups that are either absent or at low proportions within mixtures can occur in MSA when the discriminant methods do not produce perfect identifiability (Pella and Milner 1987; Pella and Masuda 2001). Previous work has shown that the posterior distribution of these misallocations can be highly skewed, and the mean is much more sensitive to extreme values than the median (e.g., Habicht et al. 2012b). Both means and medians are reported in appendix tables, and means are reported in figures and in the text.

For regionwide estimates for the winter and summer troll fisheries, estimates from the NO quadrant and all other quadrants combined were pooled into total area estimates by weighting each quadrant's estimate by their respective harvests (stratified estimator). Similarly, for sport fishery total season estimates from the Outside area, early-season and late-season estimates were pooled into yearly estimates by weighting each season's estimate by their respective harvest proportions (stratified estimator). This analysis is described in detail in Templin et al. (2011).

To better describe annual trends across a longer time frame for the stocks that make up the largest proportion of the SEAK Chinook salmon harvest (i.e., the driver stocks), the 26 fine-scale reporting groups were condensed into 8 reporting groups that consisted of 7 driver stocks and an *Other* group (Table 1). Where possible, these reporting groups were aligned with stock groups used by the CTC for the PSC Chinook Model, and these groups perform well in genetic MSA. Further, the fine-scale groups were combined into 4 broad-scale reporting groups for describing trends on a large geographic scale (Table 1). When reporting groups were combined, credibility intervals were calculated from the raw BAYES output using the new groupings to accurately reflect uncertainty in the estimates.

These reporting groups are large and, in some situations, do not provide the desired resolution. To enable accurate and precise investigation at a finer scale and to improve visualization of results, proportional contributions are also provided graphically for a subset of the fine-scale reporting groups estimated to consistently contribute at least 5% to the harvest in at least 1 seasonal fishery per year. Again, all other stocks are included in an additional *Other* group, and credibility intervals were calculated from the raw BAYES output using the new groupings.

RESULTS

FISHERY SAMPLING

Troll Fishery

A total of 9,340 tissue samples were collected across all seasonal troll fisheries in AY 2018, which is well above the sampling goal of 6,805. Goals were generally met for all fishery periods but were missed at some ports (Table 2).

Sampling of Chinook salmon during the winter fisheries began with the early winter opening on October 11, 2017, and continued until the late winter fishery closed by emergency order on March 15, 2018, to protect local wild stocks. The sampling goals for winter fisheries by port are heavily weighted towards Sitka (64%) where most of the seasonal harvest occurs (typically 60–65%). A total of 698 samples (goal 595) were collected from the early winter troll fishery and 885 samples (goal 580) were collected from the late winter troll fishery. Goals were met for every port in the early winter except Yakutat, Ketchikan, and Craig and in the late winter except for Yakutat, Ketchikan, and Sitka. This was due, in part, to the late winter fishery closing 6 weeks early.

Sampling of Chinook salmon during the spring troll fishery occurred between May and June. Sample goals were met for most ports except Petersburg, Juneau, and Wrangell (Table 2). This was primarily the result of management restrictions in place for AY 2018 that limited harvests for inside ports during this timeframe. There were no samples taken from the NI quadrant; therefore, no estimates were generated.

Sampling of Chinook salmon during the first retention period of the summer troll fishery occurred during July 1−14. The total sample size of 2,351 was sufficient to generate estimates to the fine-scale reporting groups for both the NO quadrant and regionwide strata.

Sampling of Chinook salmon during the second retention period of the summer troll fishery occurred during August 15–19. The total sample size of 1,297 fell well short of the sampling goal of 1,940 samples across the region. However, the total sample size was sufficient to generate estimates to the fine-scale reporting groups for both the NO quadrant and regionwide strata.

Sport Fishery

Sampling of Chinook salmon from SEAK sport fisheries began in April and ended in September. A total of 2,181 tissue samples were collected across 6 months of the sport fishing season in 2018, which is well below the sampling goal of 3,475. With few exceptions, goals were generally not met for outside or inside ports (Table 4). Reduced fishery participation and harvest due to restrictive management actions driven by the low AI and SOC action plans were the primary reasons for not attaining sampling goals.

In Ketchikan, the total sample size of 495 was below the goal of 600. This sample size was sufficient to generate estimates to the fine-scale reporting groups for the Ketchikan area.

A total of 66 samples (goal 450) were collected from Petersburg, and 56 samples (goal 200) were collected from Wrangell (Table 4). The combined total of 122 tissues was sufficient to generate estimates to the fine-scale reporting groups for the Petersburg-Wrangell area.

The sampling goals for NI fisheries by port are heavily weighted towards Juneau (95%) where the vast majority of the fishing effort is concentrated. The total sample size of 267 was below the sampling goal of 600 but was sufficient to generate estimates to the fine-scale reporting groups. No samples were taken in Haines or Skagway due to reduced fishing because of restrictive management actions in AY 2018.

For Outside fisheries, a total of 1,070 samples (goal 1,375) were collected from biweeks 9–13, and 722 samples (goal 815) were collected from biweeks 14–18 (Table 4). Sample goals were met or exceeded for every port except Sitka and Gustavus (biweeks 9–13); and Gustavus, Craig/Klawock, and Sitka (biweeks 14–18). These sampling goals were probably missed in part due to fishery restrictions put in place by the SOC action plans to protect local wild stocks (Lum and Fair 2018a, 2018b).

MIXED STOCK ANALYSIS

Laboratory Analysis

Quality control analyses demonstrated a low error rate for all samples analyzed. A total of 473 fish, or 6,149 genotype comparisons, were examined for quality control. The discrepancy rate was 0.03% over all projects. This translates to an estimated error rate of 0.02%, assuming that laboratory errors are equally likely to occur in projects and quality control evaluations.

Statistical Analysis

Early Winter Troll Fishery

For broad-scale reporting groups, the *Canada* group was the highest contributor during the regionwide early winter troll fishery in AY 2018 (47%), followed by the *US South* (31%), *Alaska* (20%), and *Transboundary* (*TBR*; 2%) reporting groups (Appendix B1).

For driver stock reporting groups, the largest contributor to the regionwide early winter troll fishery was the *Other* group (31%), followed by the *North/Central British Columbia* (*NCBC*; 22%), *SEAK/TBR* (22%), *Interior Columbia Su/F* (18%), and *West Vancouver* (6%) reporting groups (Figure 3; Appendix B2).

For the fine-scale reporting groups, the largest contributors to the regionwide early winter troll fishery were the *BC Coast/Haida Gwaii* (20%), *Interior Columbia River Su/F* (18%), *East Vancouver* (18%), *S Southeast Alaska* (15%), *Puget Sound* (9%), *West Vancouver* (6%), and *Andrew* (5%) reporting groups (Figure 4; Appendix B3).

When considering harvest from the NO quadrant only, the contributions for driver stock reporting groups were similar, with the *Other* reporting group being the largest contributor (32%) followed by the *Interior Columbia River Su/F* (29%), *North/Central British Columbia* (*NCBC*; 21%), *West Vancouver* (9%), and *SEAK/TBR* (8%) reporting groups (Figure 3; Appendix B2).

Late Winter Troll Fishery

For broad-scale reporting groups, the *Canada* group was the highest contributor during this fishery (66%), followed by the *Alaska* (17%) and *US South* (16%) reporting groups. The *TBR* group had a low contribution (1%; Appendix B1).

For driver stock reporting groups, the largest contributor to the regionwide late winter troll fishery was the *West Vancouver* group (39%), followed by the *SEAK/TBR* (18%), *NCBC* (18%), *Other* (18%), and *Interior Columbia River Su/F* (7%) reporting groups (Figure 3; Appendix B2).

For the fine-scale reporting groups, the largest contributor to the regionwide late winter troll fishery was the *West Vancouver* group (39%) followed by the *S Southeast Alaska* (16%), *BC Coast/Haida Gwaii* (14%), *East Vancouver* (8%), and *Interior Columbia Su/F* (7%) reporting groups (Figure 5; Appendix B4).

When considering harvest from the NO quadrant only, the contributions for driver stock reporting groups were similar to regionwide estimates with the *West Vancouver* reporting group being the largest contributor (38%) followed by the *Other* (23%), *NCBC* (18%), *Interior Columbia Su/F* (11%), and *SEAK/TBR* (10%) reporting groups (Figure 3; Appendix B2).

Spring Troll Fishery

During the spring troll fisheries, contributions of the broad-scale reporting groups were highly variable across the 3 quadrants analyzed. In the NO quadrant, the *Alaska* group was the highest contributor (61%), followed by the *Canada* (28%) and *US South* (11%) reporting groups (Appendix B1). In the SO quadrant, the *Canada* group contributed the majority of the harvest (55%), followed by the *Alaska* (40%) and *US South* (5%) reporting groups. In the SI quadrant the *Alaska* group contributed the vast majority of the harvest (95%) followed by the *Canada* group (4%). The *TBR* group had a low contribution (<2%) across all quadrants. In the NI quadrant, there were not enough samples to estimate the contribution, even for the broad-scale reporting groups.

For the driver stock reporting groups, contributions were also variable among quadrants during the spring troll fisheries. The largest contributor to the NO quadrant harvest was the *SEAK/TBR* reporting group (61%), followed by the *West Vancouver* (20%) and *Interior Columbia Su/F* (5%) reporting groups (Figure 3; Appendix B2). In the SI quadrant, the largest contributor was also the *SEAK/TBR* reporting group (96%), with all other driver stock reporting groups contributing less than 2%. In the SO quadrant, the *SEAK/TBR* and *West Vancouver* had the largest contribution (40%), followed by the *Other* (9%) and *NCBC* (7%) reporting groups.

For the fine-scale reporting groups, similar variability between quadrants was observed. In the NO quadrant, the highest proportion of Chinook salmon was from the *Andrew* group (54%), followed by the *West Vancouver* (20%), *S Southeast Alaska* (6%), and *Interior Columbia Su/F* (5%) reporting groups (Figure 6; Appendix B5). In the SI quadrant, the *Alaska* reporting group was the largest contributor, with harvests dominated by the *S Southeast Alaska* reporting group (94%) and all other reporting groups having contributions of less than 2%. In the SO quadrant, *West Vancouver* (39%) was the dominant reporting group, followed by the *S Southeast Alaska* (33%), *Andrew* (8%), *East Vancouver* (6%), and *BC Coast/Haida Gwaii* (6%) reporting groups.

In the NI quadrant, estimates are not available for either the driver stock reporting groups or 26 fine-scale reporting groups because sample sizes were insufficient for meeting the accuracy and precision standards.

Summer Troll Fishery, First Retention Period

For the broad-scale reporting groups during the first retention period of the summer troll fishery, the *US South* reporting group accounted for the majority of the regionwide harvest (52%), followed by the *Canada* (35%) and the *Alaska* (12%) reporting groups. The *TBR* group had a low contribution (<2%; Appendix B1).

For driver stock reporting groups, the greatest contributor to the regionwide harvest during the first retention of the summer troll fishery was the *Washington Coast* reporting group (18%), followed by the *Oregon Coast* (18%), *South Thompson* (17%), *SEAK/TBR* (13%), *Interior Columbia Su/F* (12%), *West Vancouver* (9%), *Other* (7%), and *NCBC* (6%) reporting groups (Figure 3; Appendix B2).

For the fine-scale reporting groups, the first retention period of the summer troll fishery was led by the *Washington Coast* reporting group (18%), followed by the *South Thompson* (17%), *North Oregon Coast* (16%), *Interior Columbia Su/F* (12%), *West Vancouver* (9%), and *S Southeast Alaska* (8%) reporting groups (Figure 7; Appendix B6).

Stock composition in the NO quadrant during the first retention period was similar to estimates for the entire area at the driver stock level of reporting groups, with harvests led by the *Washington Coast* (23%), *Oregon Coast* (19%), and South Thompson (17%) reporting groups (Figure 3;

Appendix B2), followed by the *Interior Columbia Su/F* (11%), *SEAK/TBR* (10%), *Other* (7%), *West Vancouver* (7%), and *NCBC* (6%) reporting groups (Figure 3; Appendix B2).

Summer Troll Fishery, Second Retention Period

For the broad-scale reporting groups during the second retention period of the summer troll fishery, the *US South* reporting group accounted for the majority of the regionwide harvest (54%), followed by the *Canada* (33%) and the *Alaska* (10%) reporting groups—very similar to the first retention period. The *TBR* group had a low contribution (<4%; Appendix B1).

For driver stock reporting groups, the greatest contributor to the regionwide harvest during the second retention of the summer troll fishery was the *West Vancouver* group (19%), followed by the *Washington Coast* (17%), *Oregon Coast* (16%), *Interior Columbia Su/F* (15%), *SEAK/TBR* (13%), *Other* (9%), *NCBC* (7%), and *South Thompson* (5%) reporting groups (Figure 3; Appendix B2).

For the fine-scale reporting groups, the second retention period of the summer troll fishery was led by the *West Vancouver* reporting group (19%) followed by the *Washington Coast* (17%), *Interior Columbia Su/F* (15%), *North Oregon Coast* (12%), *S Southeast Alaska* (8%), and South Thompson (5%) reporting groups (Figure 8; Appendix B7).

Stock composition in the NO quadrant during the second retention period was similar to estimates for the entire area at the driver stock level of reporting groups, with harvests led by the *Washington Coast* (24%), *West Vancouver* (16%), and *Interior Columbia Su/F* (16%) reporting groups (Figure 3; Appendix B2), followed by the *Oregon Coast* (12%), *SEAK/TBR* (10%), *Other* (10%), NCBC (7%), and *South Thompson* (6%) reporting groups.

Ketchikan Area Sport Fishery

For the broad-scale reporting groups, the *Alaska* reporting group accounted for the majority of the Ketchikan area sport fishery harvest (70%), followed by the *Canada* (25%) and *US South* (6%) reporting groups. The *TBR* group had a low contribution (<1%; Appendix B8).

For driver stock reporting groups, the greatest contributor to the Ketchikan area sport fishery harvest was the *SEAK/TBR* reporting group (70%), followed by the *West Vancouver* (13%), *NCBC* (7%), and *Other* (5%) reporting groups (Figure 9; Appendix B9).

Stock contribution in the Ketchikan area sport fishery harvest for the fine-scale reporting groups was dominated by the *S Southeast Alaska* reporting group (67%; Figure 10; Appendix B10). The *West Vancouver* (13%) reporting group was also a notable contributor. No other stocks were present at greater than 5% in this fishery.

Petersburg-Wrangell Area Sport Fishery

For the broad-scale reporting groups, the *Alaska* reporting group was the largest contributor to the Petersburg-Wrangell area sport fishery harvest (73%), followed by the *Canada* (18%), *TBR* (5%), and the *US South* (4%) reporting groups (Appendix B8).

For driver stock reporting groups, the greatest contributor to the Petersburg-Wrangell area sport fishery harvest was the *SEAK/TBR* reporting group (78%), followed by the *NCBC* (17%) reporting group (Figure 9; Appendix B9).

The largest contributor among the fine-scale reporting groups to the sport fishery harvest in the Petersburg-Wrangell area was the *Andrew* (53%) reporting group, which is primarily production from hatcheries that use Andrew Creek broodstock (Figure 10; Appendix B10). Other important contributors were the *S Southeast Alaska* (19%), *Skeena* (11%), *BC Coast/Haida Gwaii* (6%), and *Stikine* (5%) reporting groups. No other stocks were present at greater than 5% in this fishery.

Northern Inside Area Sport Fishery

For the broad-scale reporting groups, the *Alaska* reporting group was the largest contributor to the NI area sport fishery harvest (94%), followed by the *Canada* (5%) reporting group. The *TBR* (4%) and the *US South* aggregates each had low contributions (<1%; Appendix B8).

For driver stock reporting groups, the greatest contributor to the NI area sport fishery harvest was the *SEAK/TBR* reporting group (95%; Figure 9; Appendix B9). No other stocks were present at greater than 5% in this fishery.

Sport fishery harvests in the NI area at the fine scale were dominated by local stocks (Figure 10; Appendix B10). The largest contributor was the *Andrew* reporting group (93%). No other stocks were present at greater than 5% in this fishery.

Outside Area Sport Fishery

For the broad-scale reporting groups, the *Canada* reporting group was the largest contributor to the Outside area all season sport fishery harvest (53%), followed by the *US South* (31%) and *Alaska* (15%) reporting groups (Appendix B8). In the early season, the *Canada* reporting group was the largest contributor (50%), followed by the *US South* (27%) and the *Alaska* (22%) reporting groups. In the late season, the pattern was similar with the *Canada* reporting group accounting for the majority of the harvest (57%), followed by the *US South* (37%) and Alaska (5%) reporting groups. The *TBR* group had low contributions for all time periods analyzed (<1%).

The largest driver stock contributor to the sport fishery over the entire season to the Outside area was the *West Vancouver* reporting group (34%) followed by the *SEAK/TBR* (16*%), Washington Coast* (12%), *Interior Columbia Su/F* (12%), *South Thompson* (9%), *NCBC* (8%), *Other* (6%) reporting groups (Figure 9; Appendix B9).

For fine-scale reporting groups, the greatest contributor to the Outside area sport fishery harvest was the *West Vancouver* reporting group (34%) followed by the *Washington Coast* (12%), *Interior Columbia Su/F* (12%), *Andrew* (8%), and *South Thompson* (9%) reporting groups (Figure 11; Appendix B11).

Similar results were obtained when comparing early and late season estimates in the Outside area for the driver stocks at the driver stock reporting groups. In the early season, the *West Vancouver* reporting group led the harvest (30%), followed by the *SEAK/TBR* (23%), *Interior Columbia Su/F* (11%), *South Thompson* (11%), *Washington Coast* (9%), and *NCBC* (8%) reporting groups (Figure 9; Appendix B9). During the late season, the *West Vancouver* (39%), *Washington Coast* (17%), and *Interior Columbia Su/F* (14%) reporting groups were the largest contributors. The *NCBC* (8%), *Other* (7%), *SEAK/TBR* (6%), and *South Thompson* (6%) reporting groups were also notable contributors.

DISCUSSION

Genetic MSA has been successfully used to estimate the composition of the commercial troll fishery harvest since 1999 (e.g., Gilk-Baumer et al. 2013, 2017a, 2017b, 2018; Shedd et al. 2021). Because the 7 aggregate driver stocks make up the vast majority (>90%) of all Chinook salmon annually harvested in SEAK troll and sport fisheries, these stock aggregates influence the harvest allocations under the PST (Gilk-Baumer et al. 2013; 2017a, 2017b, 2018; Shedd et al. 2021). Genetic MSA is the preferred method to provide accurate and precise harvest estimates for these large aggregates of driver stocks. These estimates indicate that the composition of the harvest varies spatially and by seasonal fishery, but essentially the same constituent stocks are present year to year (Gilk-Baumer et al. 2017a, 2017b, 2018; Shedd et al. 2021).

INTRA-ANNUAL VARIABILITY

Temporal Variability

Comparing the harvest composition among seasonal troll fisheries in AY 2018 reveals considerable variability (Figure 3). The composition of early and late winter fisheries includes a mixture of more stocks than other seasonal fisheries; the 7 driver stocks account for 69% of the early winter harvest and 82% of the later winter harvest (Appendix B2). The early winter fishery was largely composed of the *Other*, *NCBC, SEAK/TBR,* and *Columbia Su/F* driver stocks. The fine-scale reporting group breakdown shows that most of the *Other* driver stock group came from *East Vancouver* and *Puget Sound*. The late winter fishery was dominated by the *West Vancouver* driver stock, followed by *SEAK/TBR*, *NCBC*, and *Other* driver stocks. The fine-scale reporting group breakdown shows that most of the *Other* driver stock group came from *East Vancouver*, *Puget Sound*, and *Willamette Sp*. By contrast, during the spring troll fishery, when fishing effort is directed at harvesting SEAK-origin hatchery stocks, the contribution of SEAK-origin Chinook salmon (hatchery-origin plus natural-origin) is typically considerably higher than at other times of the year. In 2018, the contribution of the *SEAK/TBR* driver stock dominated the spring troll fishery (72%) and was well above the next highest contributor, the *West Vancouver* (15%) stock. More than 97% of the spring harvest composition was accounted for by the 7 driver stocks. The harvest composition in the first retention period of the summer troll fishery was led by the *Oregon Coast* (18%), *Washington Coast* (18%), and *South Thompson* (17%) driver stocks; overall, 93% of harvest was contributed by driver stocks. In the second retention of the summer troll fishery, the *West Vancouver* (19%), *Washington Coast* (17%), *Oregon Coast* (16%), *Interior Columbia Su/F* (15%), and *SEAK/TBR* (13%) driver stock reporting groups were all harvested in similar amounts.

Similarly, the stock composition of the Outside area sport fishery harvest also shows some seasonal variability (Figure 9). In the early season, the *West Vancouver* was the largest reporting group (30%), followed by the *SEAK/TBR* (23%), *Interior Columbia Su/F* (11%), and *South Thompson* (11%) reporting groups (Appendix B9). The largest contributors to the late season sport fishery were a bit different; *West Vancouver* (39%) was again the primary contributor, but it was followed by the *Washington Coast* (17%) and *Interior Columbia Su/F* (14%) reporting groups. For the early season fishery in AY 2018, 95% of the harvest is attributable to driver stocks, whereas the late season fishery harvest was composed of 93% driver stocks.

Differences in stock composition between troll and sport fisheries may also be due to the timing of the fisheries. In the sport fishery, 95% of the harvests in SEAK occur annually between April and August; by contrast, the troll fishery harvest is spread throughout most of the year. However, in 2018, both fisheries were affected by restrictive management measures implemented in the spring due to the low AI and SOC action plans.

Although the 7 driver stocks accounted for the vast majority of the harvests in AY 2018, the proportional contribution of each stock varied across seasons. The *SEAK/TBR* driver stock aggregate was a primary contributor to both troll fisheries (particularly spring troll fisheries) and all sport fisheries, and present in low proportions for other seasonal fisheries. This reporting group was also more prevalent in early season (biweeks 9–13) than late season (biweeks 14–18) Outside area sport fisheries (Figures 3 and 9). *West Vancouver* stocks accounted for large proportions of the harvest in all seasonal fisheries in AY 2018 and were particularly large contributors during late winter and summer (second retention period) troll fisheries and Outside area sport fisheries (Figures 3 and 9). The *Washington Coast* driver stock was primarily harvested in the summer troll fisheries and both early and late season Outside area sport fisheries. Similarly, the *South Thompson* driver stock was most pronounced in the summer troll fisheries (particularly the first retention) and both early and late season Outside area sport fisheries. The *Oregon Coast* driver stock contributed substantially to the summer troll fishery (particularly in the NO quadrant) but were virtually absent in the winter and spring fisheries; a similar contribution was found across early and late season Outside area sport fisheries. The *Interior Columbia Su/F* driver stock contributed low numbers to most seasonal fisheries but was a large contributor to the summer troll fisheries and the early winter troll fishery. It was also a large contributor to the Outside sport fisheries and a small contributor to many of the Inside sport fisheries, except in the NI area where it was absent. Although the *NCBC* driver stock aggregate made up less than 10% of both annual troll and sport harvests, it was most pronounced in early winter and late winter troll fisheries and in the sport fishery out of Petersburg-Wrangell.

Spatial Variability

Variation in stock composition also occurs spatially among the troll fishery quadrants. In general, stock contribution estimates based on samples from the NO quadrant had the most diverse stock compositions and the highest proportion of stocks originating south of Alaska (Figure 4–8). This was most pronounced in the spring fishery where the SI quadrant had the highest proportion of *Alaska* and *TBR* stocks (making up 96% of the harvest) and the proportion of those stocks in the NO quadrant was 61% (Appendix B1). In the winter troll fisheries, stock contribution estimates for the NO quadrant were often similar to the regionwide estimates, except that the proportion of *SEAK/TBR* stock was much lower in the NO quadrant. For summer fisheries, stock contribution estimates based on samples from the NO quadrant were similar to estimates based on samples from all quadrants (Figure 4–8). This probably reflects the high proportion of fish harvested in this quadrant relative to the other quadrants.

The stock composition of sport fishery harvests also varies greatly by area. The fisheries located in inside waters were composed primarily of *Alaska* and *TBR* stocks (NI: 95%; Petersburg-Wrangell: 78%; Ketchikan: 70%; Figure 10; Appendix B8). Local stocks were the major contributors to fisheries in each of these areas, with more northern (*Alaska* and *TBR*) stocks present in the NI fishery, and the prevalence of nonlocal stocks originating from south of the Alaska/Canada border increasing in the more southern areas of Southeast Alaska. The NI fishery takes place near the ports of Juneau, Haines, and Skagway, which are proximal to the origin of stocks that make up the *N Southeast Alaska* and *Taku* reporting groups. In addition, the *Andrew* reporting group is the broodstock for many hatchery stocks, including the Macaulay Hatchery located in Juneau. The *Andrew* reporting group was the largest contributor to the NI fishery harvest (93%), whereas a smaller share of the harvest was contributed by the *Skeena* (3%) and *BC Coast/Haida Gwaii* (2%) groups (Figure 10; Appendix B10). The largest contributor to the Petersburg-Wrangell area fishery was the local *Andrew* (53%) reporting group (Figure 10; Appendix B10); moreover, *Andrew* is the broodstock used in nearby Crystal Lake Hatchery. The largest contributor to the Ketchikan fishery was the *S Southeast Alaska* reporting group (67%), which includes 14 nearby populations, followed by the *West Vancouver* (13%) reporting group

(Figure 10; Appendix B10). Generally, few non-Alaska or nontransboundary groups were represented in these inside fisheries.

In contrast to inside areas, Chinook salmon sport fishery harvests that took place in the Outside area were composed of a greater variety of stocks with many more fish from non-Alaska reporting groups (Figure 11; Appendix B8). This is similar to the spatial pattern of catch composition observed in troll fisheries occurring in outside quadrants (Figures 3 and 9). Although the sport fishery is more protracted when compared to each seasonal commercial troll fishery and occurs closer to shore, there is overlap in timing and location with the spring and summer commercial troll fisheries that allows comparison of represented reporting groups. Both the sport fishery and the NO quadrant troll fishery harvest a variety of stocks, and the same reporting groups (*SEAK/TBR*, *NCBC*, *West Vancouver*, *South Thompson*, *Washington Coas*t, *Interior Columbia Su/F*, and *Oregon Coast*) are prevalent in both fisheries. In 2018, the Ketchikan area sport fishery and SI quadrant spring troll fishery had the same 3 largest contributors (*SEAK/TBR*, *West Vancouver*, and *NCBC*), but the contributions of those driver stocks were different in each fishery (Figures 3 and 9). The NO quadrant spring troll fishery had much higher proportions of northern stocks than the early season (biweeks 9–13) outside waters sport fishery: *SEAK/TBR* (61% troll; 23% sport) and *West Vancouver* (20% troll; 30% sport), whereas the sport fishery had higher proportions of southern stocks: *Washington Coast* (2% troll; 9% sport), *Interior Columbia Su/F* (5% troll; 11% sport), and *Oregon Coast* (1% troll; 4% sport; Appendices B5 and B11), probably due to increased time and area restrictions on the spring troll fishery.

However, the late season (biweeks 14–18) Outside area sport fishery harvested a higher proportion of fish from northern stocks compared to the first retention period of the NO quadrant summer troll fishery: *NCBC* (6% troll; 8% sport) and *West Vancouver* (7% troll; 39% sport) reporting groups (Figures 3 and 9). The first retention of the NO quadrant summer troll fishery consistently harvested higher proportions of fish from southern stocks, including the *South Thompson* (17% troll; 5% sport), *Washington Coast* (23% troll; 17% sport), and *Oregon Coast* (18% troll; 2% sport) reporting groups; the exception was the *Interior Columbia Su/F* driver stock (11% troll; 14% sport; Appendices B6 and B11). These differences are probably due to where these fisheries take place—sport anglers typically fish closer to the coastline and commercial trollers sometimes operate well offshore.

INTER-ANNUAL TRENDS

Some interesting trends can be observed regarding the composition of SEAK troll and sport fisheries under the current PST fishing regime from the data reported herein and from similar studies dating back to AY 2009 (Gilk-Baumer et al. 2013, 2017a, 2017b, 2018; Shedd et al. 2021). When making inferences on the relative contributions of each stock group to the overall harvest by fishery, it is important to note that the troll fishery harvests substantially more fish than the sport fishery on an annual basis. It is also important to evaluate fishery management trends, which changed substantially in 2018 in response to poor productivity of SEAK and TBR wild stocks and the 2017 BOF SOC action plans.

In recent years, *Interior Columbia Su/F* stocks have experienced extraordinarily high productivity; this has been reflected in their contribution to SEAK fisheries—up to 44% in the troll fisheries and 32% in sport fisheries (Figure 11; Appendices B12 and B13). This period of higher contributions occurred from 2013 through 2016, a period when coastwide abundance was high and corresponding harvest limits were high. Accordingly, this superdominance overshadowed the relative contributions of other stocks, particularly those originating from the Pacific Northwest, which were also experiencing a period of high productivity. In AY 2017, the relative contribution of *Interior Columbia Su/F* stocks was less dominant, yet the stock aggregate was still a major contributor to both troll (24%) and sport (15%) fisheries. However, in AY 2018, the contribution of *Interior Columbia Su/F* declined even further in both the troll fisheries (12%) and the sport fisheries (8%).

In general, there has been an increasing contribution of *SEAK/TBR* stocks across most fisheries in 2017 and 2018, despite a decrease in productivity for *SEAK/TBR* stocks (Figure 11; Appendices B12 and B13). The decline in stock composition of *SEAK/TBR* from 2009–2016 corresponds to decreases in escapements and terminal run sizes and decreased productivity for the constituent stocks (CTC 2017). The increase in stock composition of *SEAK/TBR* over the past 2 years despite conservation measures aimed to protect wild SEAK stocks is due to 3 contributing factors: (1) lower harvest limits in AY 2017 and 2018, which tended to decrease harvest in outside fisheries that encounter the lowest rates of *SEAK/TBR* stocks; (2) the drop-off in contribution of *Interior Columbia Su/F*; and (3) increased targeting of hatchery-origin *SEAK/TBR* stocks instead of wild stocks. Beginning in 2016 and ramping up with the and the 2017 BOF SOC action plans (which contained specific 2018 management prescriptions), conservative management restrictions in time and area have been implemented to shape fisheries away from *SEAK/TBR* wild stocks, reducing the overall harvest of *SEAK/TBR* stocks (including Alaska hatchery fish) despite the *SEAK/TBR* stock proportion. This has been most pronounced during the spring troll fishery and other fisheries occurring in the NO quadrant of the troll fishery, and the Outside area of the sport fishery (Appendices B2 and B9). The conservative management measures put in place to protect wild *SEAK/TBR* stocks in the late winter and spring troll fisheries have shifted harvest to the summer troll fisheries, changing the mixture of stocks harvested.

Between AY 2017 and AY 2018, the proportion of *Interior Columbia Su/F* decreased further, dropping to the fifth ranked contributor to the troll fishery and fourth ranked contributor to the sport fishery. This decrease corresponded with an increase in the prevalence of *SEAK/TBR* and *Washington Coast* driver stocks. Generally, the contributions from *NCBC*, *Washington Coast*, and *Oregon Coast* stocks remained consistent between 2009 and 2018 in both troll and sport fisheries, whereas contributions from *West Vancouver* and *South Thompson* stocks were more variable across years with no discernable pattern (Figure 12). It should be noted that the *West Vancouver* contribution to the sport fisheries has been consistently larger than historical averages for the past 3 years (2015–2017).

Specific comparisons between analyses using the most recent microsatellite baseline (GAPS version 3.0; this report; Gilk-Baumer et al. 2017a, 2017b, 2018), those using older microsatellite baselines (GAPS version 2.2; 2004–2009; Gilk-Baumer et al. 2013), and those using allozyme baselines (1999–2003; Templin et al. 2011) can be made, but they must be interpreted carefully because both the number of populations and reporting groups changed between the studies. Because of these changes in the genetic baselines, comparisons across years prior to 2010 are more reliable at the broadscale level than at the fine-scale level.

APPLICATIONS TO PACIFIC SALMON TREATY

These results provide a comprehensive assessment using MSA to estimate the stock composition of Chinook salmon harvested in SEAK troll and sport fisheries. Stock composition data from this program have been used in several other studies with a broad array of applications:

1. These MSA stock composition estimates have already proven valuable for fishery management in terminal and near-terminal areas and are being used in run reconstructions to generate more accurate stock assessments for transboundary rivers under Chapter One of the PST.
2. These MSA stock composition estimates can be combined with individual assignment, otolith mark, CWT, age, and harvest information to provide independent abundance estimates of some PSC Chinook Model stocks to assist in evaluating the PSC Chinook Model. The current PSC Chinook Model does not reliably determine the composition of the harvest in SEAK because (1) it does not include fish originating from transboundary rivers (e.g., Taku, Stikine, Alsek Rivers); (2) only 1 of its 30 model stocks originates from SEAK and it only represents a small proportion of the natural production of SEAK Chinook salmon; and (3) the model is based on "treaty Chinook" which excludes nearly all of the Southeast Alaska hatchery-produced Chinook salmon harvested in SEAK fisheries. For domestic applications, the preferred way to estimate the composition of the SEAK Chinook salmon harvest is to apply fishery stock composition data from MSA to harvest data. This approach has been successfully applied to the SEAK commercial troll fishery from 1999 through 2014 (Templin et al. 2011; Gilk-Baumer et al. 2013, 2017a, 2018) and SEAK sport fishery from 2004 through 2015 (Gilk-Baumer et al. 2017b).
3. Bernard et al. (2014) investigated using genetic analysis in combination with CWTs to estimate terminal run size of Chinook salmon in 2011 from 4 large stock groups that are major contributors to SEAK troll and sport fisheries: West Coast Vancouver Island, Washington Coast, North Oregon Coast, and Upper Columbia River Falls. This "driver stock" method has proven successful for estimating the terminal run size of several of the stocks that are major contributors to the SEAK fishery.

CONCLUSIONS

1. The fine-scale reporting groups that contributed the highest proportion of Chinook salmon harvest to the SEAK troll fisheries in AY 2018 from largest to smallest are the *Washington Coast*, *West Vancouver*, *Interior Columbia Su/F*, *North Oregon Coast*, *South Thompson*, *S Southeast Alaska*, and *BC Coast/Haida Gwaii*. Other reporting groups, such as *Andrew* and *East Vancouver*, were also major contributors during some of the seasonal fisheries.
2. The fine-scale reporting groups that contributed the highest proportion of harvest to the SEAK sport fishery in 2018 from largest to smallest are the *West Vancouver*, *Andrew*, *S Southeast Alaska*, *Interior Columbia Su/F*, *Washington Coast*, and *South Thompson* reporting groups.
3. The 7 driver stocks (*SEAK/TBR*, *NCBC*, *South Thompson*, *West Vancouver*, *Washington Coast*, *Interior Columbia Su/F*, and *Oregon Coast*) collectively contributed 91% of the regionwide troll harvest and 95% of the season total sport fishery harvest in AY 2018.
4. The winter troll fishery encountered the greatest diversity of stocks, with 31% of the early winter fishery and 18% of the late winter fishery composed of the *Other* driver stock group, which was largely made up of the *East Vancouver*, *Puget Sound*, and *Willamette Sp.* fine-scale stocks.

5. Stocks from SEAK and the associated transboundary rivers were the largest contributors to the spring troll fishery harvest, particularly in the SI quadrant, and to sport fisheries conducted in SEAK inside waters (NI, Petersburg-Wrangell, and Ketchikan areas).
6. Summer and fall-run Chinook salmon originating from the Upper Columbia River were dominant contributors to SEAK fisheries from AY 2013 through AY 2016. Between AY 2017 and AY 2018, the relative contribution of these stocks decreased further, going from the largest contributor to the regionwide troll fishery harvest in 2017 to the fifth largest in AY 2018, behind *SEAK/TBR*, *Washington Coast*, *Oregon Coast*, and *West Vancouver* stocks. *Interior Columbia Su/F* remained the third largest contributor to the overall sport fishery harvest, although its contribution has decreased.
7. Stocks from the West Coast of Vancouver Island were the fourth largest contributor to the troll fishery harvest and second largest contributor to the sport fishery harvests in AY 2018.
8. Overall contributions to the AY 2018 troll fishery more than doubled for both the *Washington Coast* and *Oregon Coast* driver stocks. The *Washington Coast* driver stock also had a proportionally large increase in the sport fisheries, but the *Oregon Coast* contribution to those same fisheries remained static.
9. Troll (NO quadrant) and sport (Outside area) fisheries conducted in outside waters harvested a greater variety of stocks—including those from British Columbia and the Pacific Northwest—than fisheries occurring in inside waters.

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TABLES AND FIGURES

Table 1.–Relationship between populations and reporting groups for Chinook salmon used to report stock composition of Southeast Alaska troll and sport fishery harvests.

	Population	Fine-scale	Driver stocks[a]	Broadscale
1	1	*Situk*	*SEAK/TBR*	*Alaska*
2	2-5	*Alsek*	*SEAK/TBR*	*TBR*
3	6-10	*N Southeast Alaska*	*SEAK/TBR*	*Alaska*
4	11-17	*Taku*	*SEAK/TBR*	*TBR*
5	18-21	*Andrew*	*SEAK/TBR*	*Alaska*
6	22-28	*Stikine*	*SEAK/TBR*	*TBR*
7	29-42	*S Southeast Alaska*	*SEAK/TBR*	*Alaska*
8	43-51	*Nass*	*NCBC*	*Canada*
9	52-78	*Skeena*	*NCBC*	*Canada*
10	79-97	*BC Coast/Haida Gwaii*	*NCBC*	*Canada*
11	98-113	*West Vancouver*	*West Vancouver*	*Canada*
12	114-123	*East Vancouver*	*Other*	*Canada*
13	124-157	*Fraser*	*Other*	*Canada*
14	158-166	*Lower Thompson*	*Other*	*Canada*
15	167-172	*North Thompson*	*Other*	*Canada*
16	173-180	*South Thompson*	*South Thompson*	*Canada*
17	181-212	*Puget Sound*	*Other*	*US South*
18	213-223	*Washington Coast*	*Washington Coast*	*US South*
19	224-226	*West Cascades Sp*	*Other*	*US South*
20	227-240	*Lower Columbia F*	*Other*	*US South*
21	241-246	*Willamette Sp*	*Other*	*US South*
22	247-302	*Columbia Sp*	*Other*	*US South*
23	303-320	*Interior Columbia Su/F*	*Interior Columbia Su/F*	*US South*
24	321-331	*North Oregon Coast*	*Oregon Coast*	*US South*
25	332-339	*Mid Oregon Coast*	*Oregon Coast*	*US South*
26	340-357	*S Oregon/California*	*Other*	*US South*

Note: Population numbers are listed in Appendix A1. Populations were combined into (1) 26 fine-scale reporting groups, (2) 8 driver stock reporting groups including an "Other" group, and (3) 4 broad-scale reporting groups.

[a] Driver stocks are aggregate stocks that consistently make up a large proportion (>5%) of all Chinook salmon harvested annually in Southeast Alaska fisheries, and thus are important stocks that help drive catch allocations under the Pacific Salmon Treaty.

Table 2.–Sampling goals and numbers of fish sampled from troll-caught Chinook salmon landings at processors at ports in Southeast Alaska for mixed stock analysis, AY 2018.

Fishery	Period	Port	Quadrants represented[a]	Sample goal	Samples collected
Winter (October–April)	Early winter (Oct 11–Dec 31)	Craig	SO, SI, NI	50	31
		Juneau	NI, NO	30	56
		Ketchikan	SI	60	35
		Petersburg	NI, SI	25	35
		Sitka	NO	400	508
		Wrangell	NI, SI	0	33
		Yakutat	NO	30	0
				595	698
	Late winter (Jan 1–March 15)	Craig	SO, SI, NI	50	498
		Juneau	NI, NO	30	45
		Ketchikan	SI	80	35
		Petersburg	NI, SI	40	131
		Sitka	NO	350	176
		Yakutat	NO	30	0
				580	885
Spring (May–June)		Craig	SO	300	554
		Juneau	NI, NO	200	0
		Ketchikan	SI, NI	300	1786
		Petersburg	NI, SI	200	0
		Wrangell	SI, NI	100	0
		Sitka	NO	600	1608
		Yakutat	NO	50	161
				1,750	4,109
Summer (July–Sep)	Retention Period 1 (July 1–14)	Craig	SO, NI	500	467
		Hoonah	NO, SO	80	45
		Ketchikan	SI, SO, NI	300	247
		Tender Rider	NO, NI	0	431
		Pelican	NO	60	88
		Petersburg	NI, SI, NO	120	277
		Port Alexander	NI	120	0
		Sitka	NO, SO	700	675
		Wrangell	SI	60	121
				1,940	2,351
	Retention Period 2 (August 15-19)	Craig	SO	500	300
		Hoonah	NO, NI	80	45
		Ketchikan	SI, SO	300	248
		Tender Rider	NO, NI	0	200
		Pelican	NO	60	55
		Petersburg	NI, SI	120	57
		Port Alexander	NI	120	0
		Sitka	NO	700	391
		Wrangell	SI	60	1
				1,940	1,297
		Total		6,805	9,340

[a] Quadrant names are abbreviated as follows: Northern Outside (NO), Northern Inside (NI), Southern Outside (SO), and Southern Inside (SI).

Table 3.–Samples collected by quadrant for each seasonal Chinook salmon troll fishery in Southeast Alaska, 2018.

	Quadrant				
Fishery	NO	SO	NI	SI	Total
Early winter	534	16	57	91	698
Late winter	191	142	265	287	885
Spring	1,769	595	-	1,745	4,109
Summer Retention 1	1,024	555	438	334	2,351
Summer Retention 2	563	375	135	224	1,297

Table 4.–Sampling goals and numbers of fish sampled from sport fishery harvests of Chinook salmon at ports in Southeast Alaska for use in mixed stock analysis, AY 2018.

		AY 2018	
Area/Time	Port	Sample goal	Samples collected
Ketchikan	Ketchikan	600	495
		600	495
Petersburg-Wrangell	Petersburg	450	66
	Wrangell	200	56
		650	122
Northern Inside	Juneau	600	267
	Haines	15	0
	Skagway	20	0
		635	267
Outside/Biweeks 9–13	Craig/Klawock	250	274
	Sitka	1,000	609
	Yakutat	50	72
	Gustavus	50	44
	Elfin Cove	25	71
		1,375	1,070
Outside/Biweeks 14–18	Craig/Klawock	250	187
	Sitka	500	460
	Yakutat	25	37
	Gustavus	15	11
	Elfin Cove	25	27
		815	722
	Total	3,475	2,181

Table 5.–Selection criteria used to generate the Commercial Harvest Expansion Report on the ADF&G OceanAK Database.

Criteria	Values
Years	2018
Species	410
Gear class codes	5
Harvest codes	11, 13
Time code	P
Time value range	1, 54
Area code	Q- Quadrants
Districts	ALL
Quadrants	NE (correspond to NI), NW (correspond to NO), SE (correspond to SI), SW (correspond to SO)
Stat area values	ALL

Source: Data are available at https://mtalab.adfg.alaska.gov/CWT/reports/default.aspx (accessed November 19, 2021).

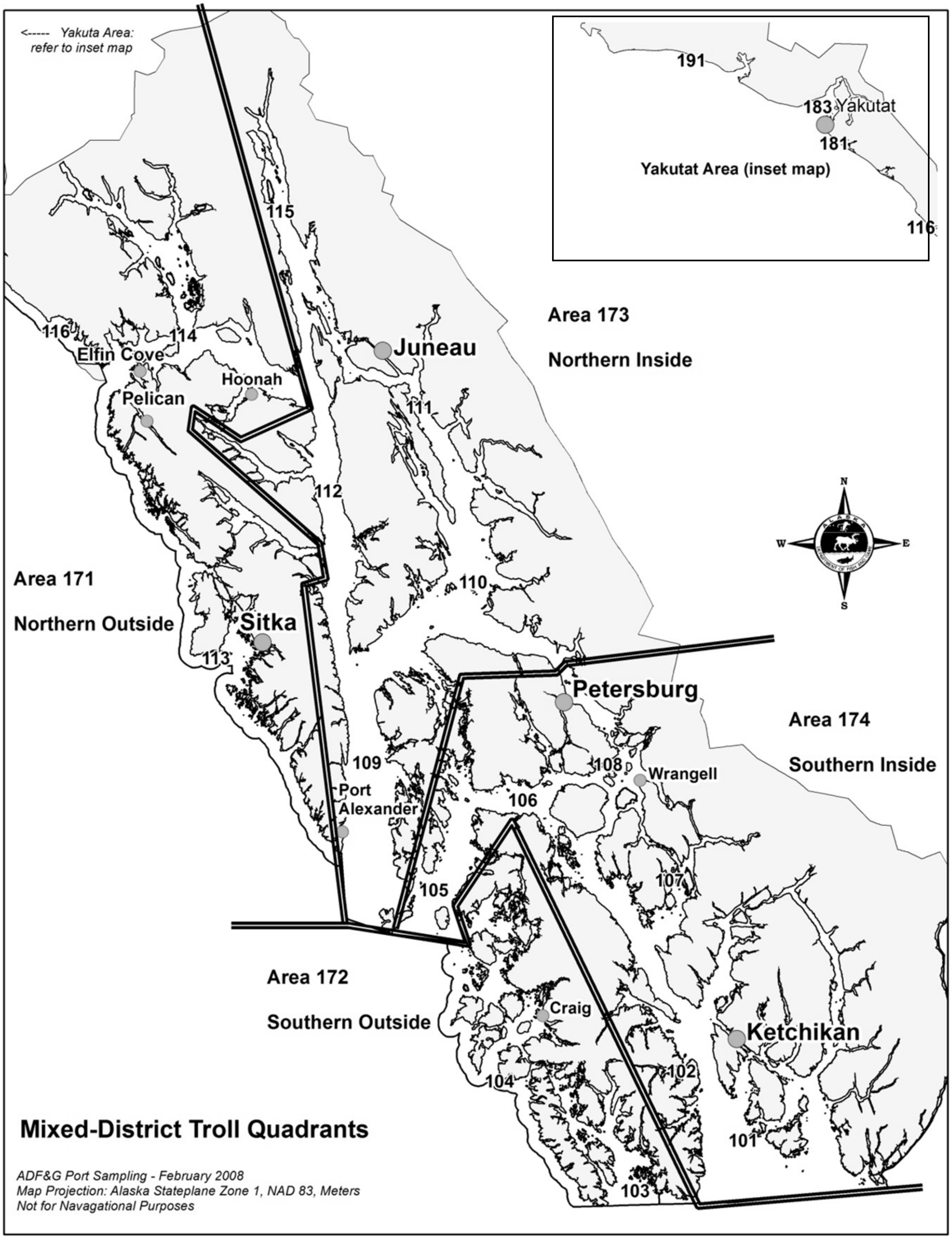

Figure 1.–Location of Southeast Alaska troll fishing quadrants and ports.

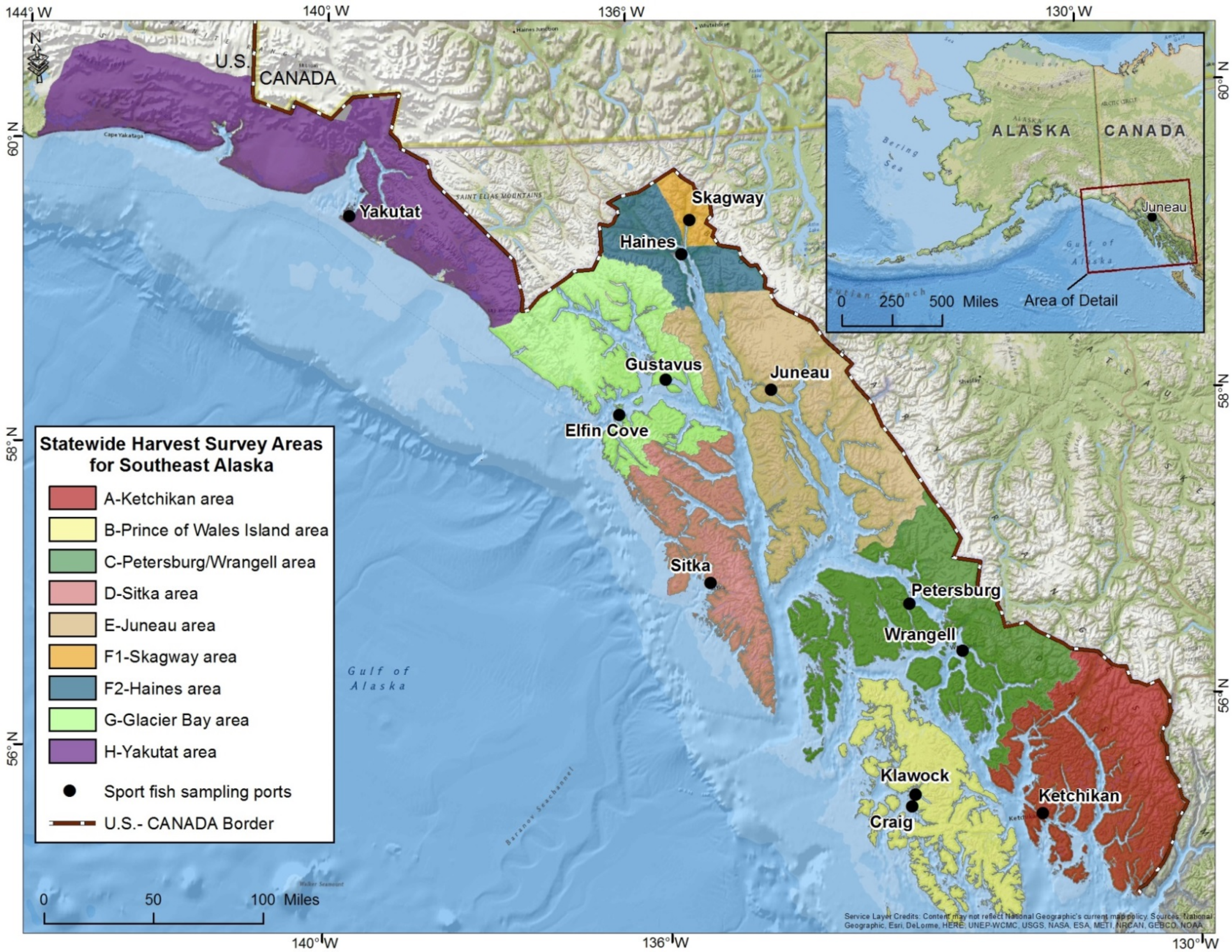

Figure 2.–Location of sport fishing ports in Southeast Alaska.

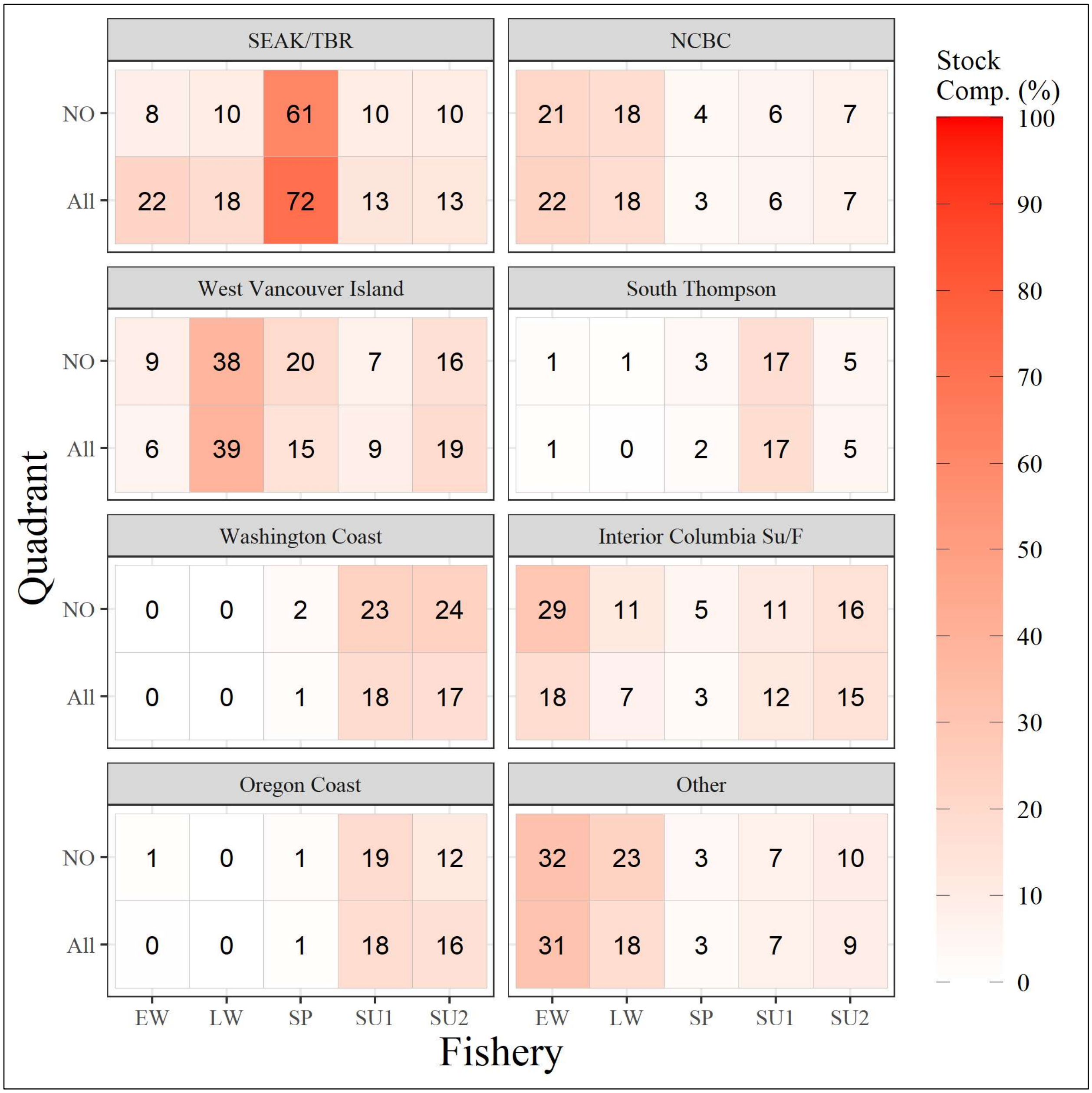

Figure 3.–Heat plot of mean contributions of driver stock reporting groups of Chinook salmon to the troll fishery harvest in Southeast Alaska for the northern quadrant (NO) and all quadrants by the seasonal fishery (All), AY 2018.

Note: Reporting groups are described in Table 1. Driver stocks are aggregate stocks that consistently make up a large proportion (>5%) of all Chinook salmon harvested annually in Southeast Alaska fisheries, and thus are important stocks that help drive catch allocations under the Pacific Salmon Treaty.

Note: Fishery names are abbreviated as follows: Early Winter (EW), Late Winter (LW), Spring (SP), Summer retention period 1 (SU1), and Summer retention period 2 (SU2).

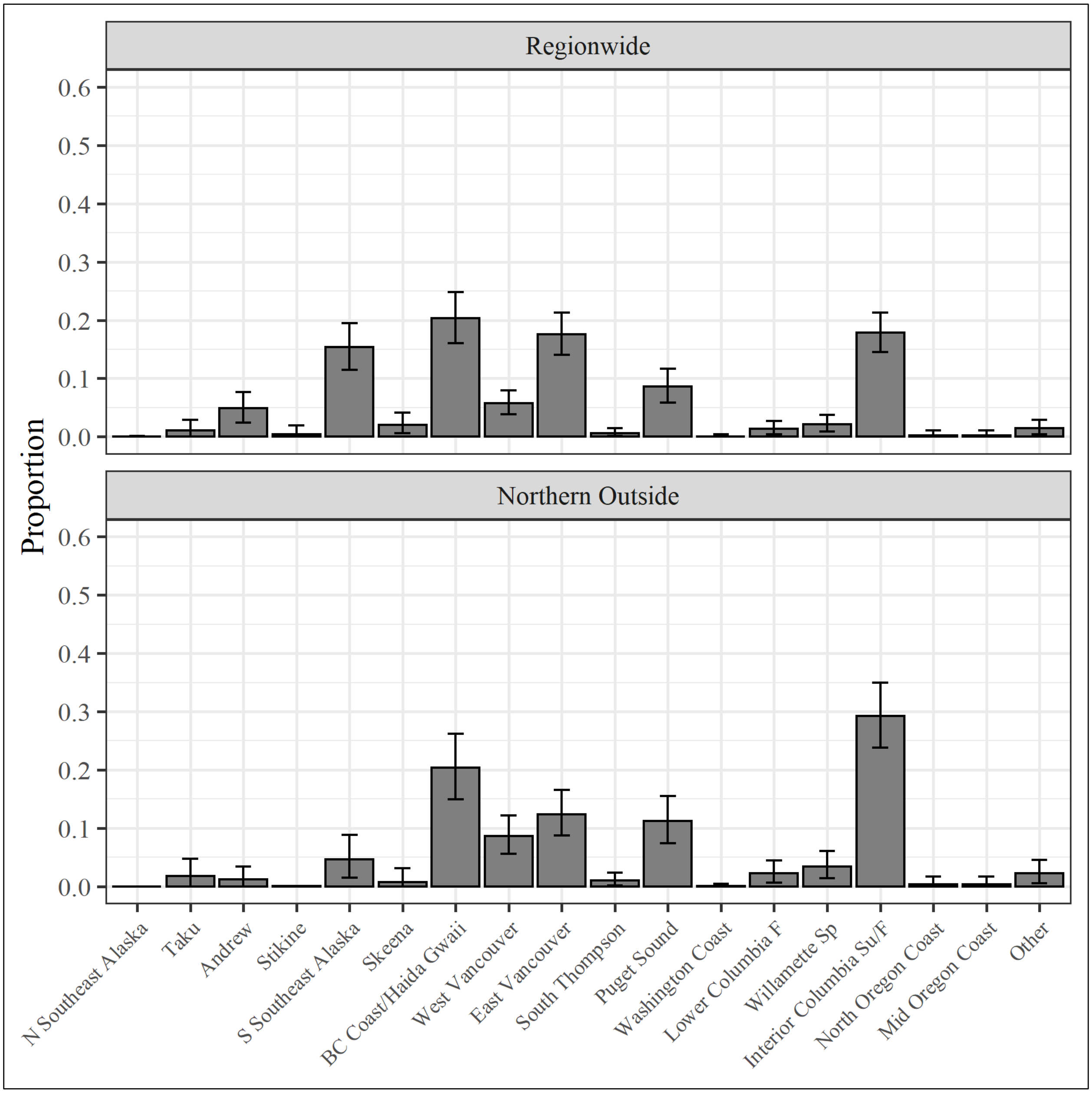

Figure 4.–Estimated contributions and 90% credibility intervals of fine-scale reporting groups of Chinook salmon to the regionwide (upper) and Northern Outside quadrant (lower) early winter troll fishery harvest in Southeast Alaska, AY 2018.

Note: Reporting groups are described in Table 1. The *Other* group consists of those reporting groups that do not contribute more than 5% in any seasonal fisheries. This group includes the *Situk*, *Alsek*, *Nass*, *Fraser*, *Lower Thompson*, *North Thompson*, *West Cascades Sp*, *Columbia Sp*, and *S Oregon/California* reporting groups.

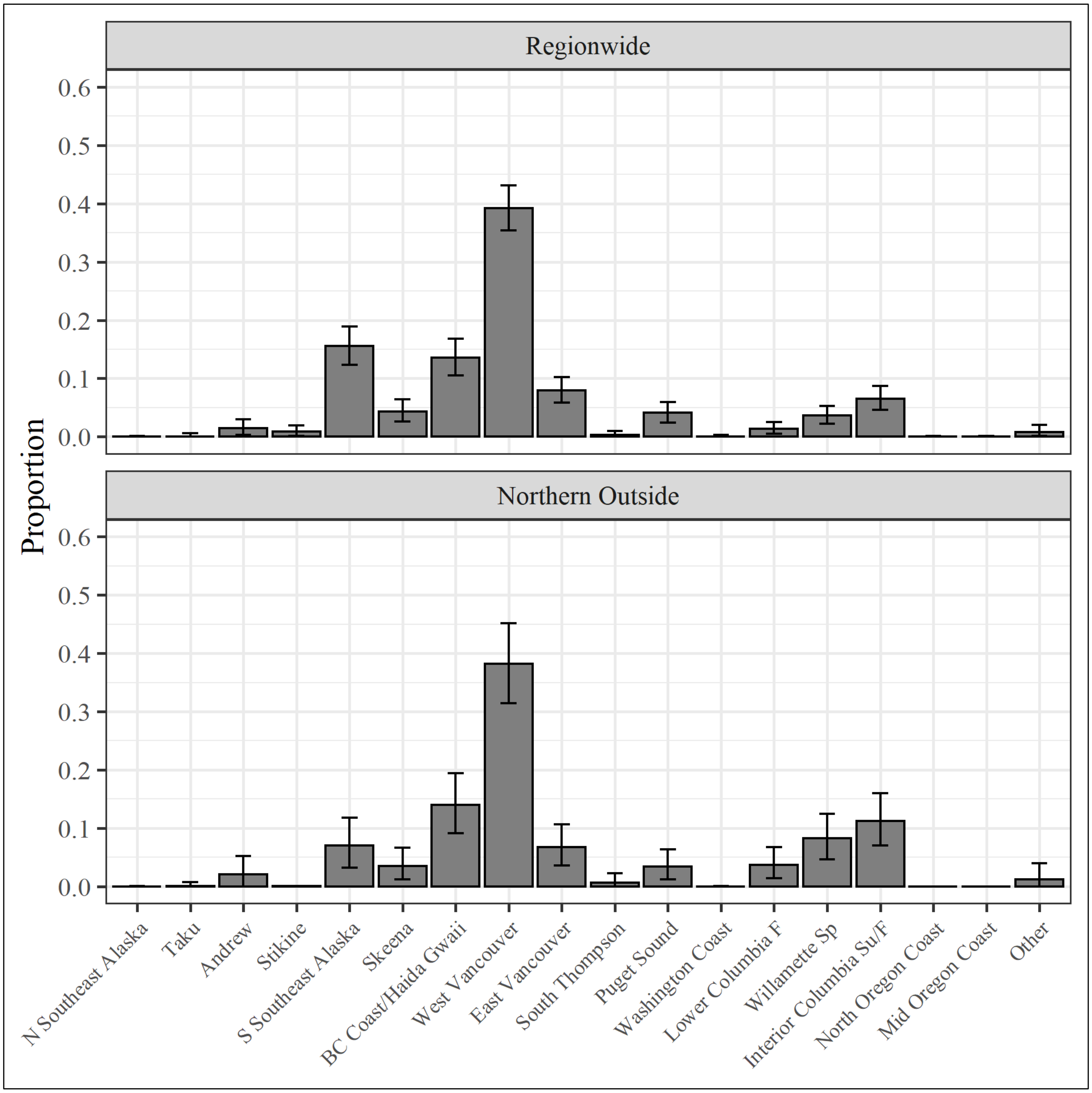

Figure 5.–Estimated contributions and 90% credibility intervals of fine-scale reporting groups of Chinook salmon to the regionwide (upper) and Northern Outside quadrant (lower) late winter troll fishery harvest in Southeast Alaska, AY 2018.

Note: Reporting groups are described in Table 1. The *Other* group consists of those reporting groups that do not contribute more than 5% in any seasonal fisheries. This group includes the *Situk*, *Alsek*, *Nass*, *Fraser*, *Lower Thompson*, *North Thompson*, *West Cascades Sp*, *Columbia Sp*, and *S Oregon/California* reporting groups.

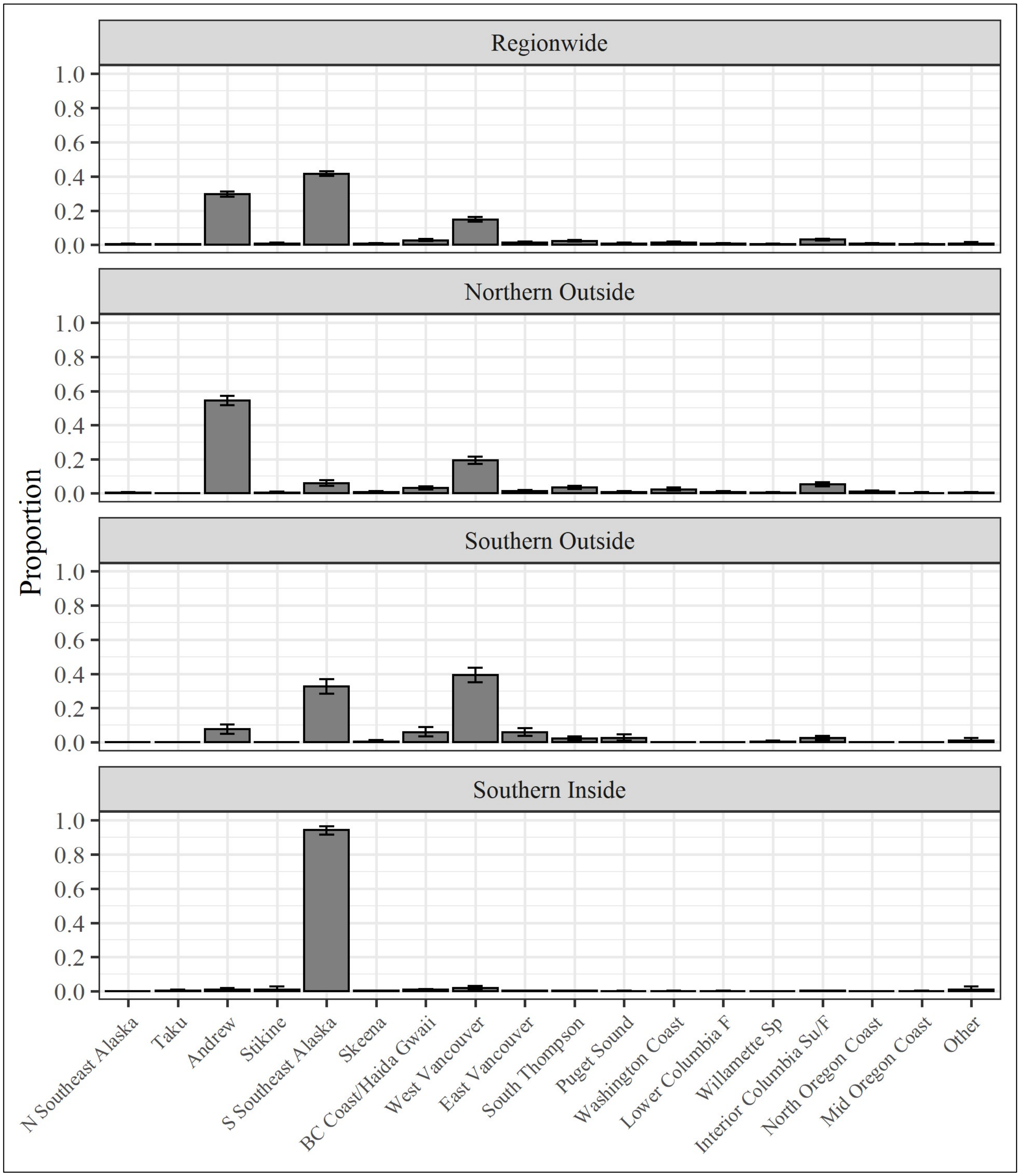

Figure 6.–Estimated contributions and 90% credibility intervals of fine-scale reporting groups of Chinook salmon to the spring troll fishery harvest regionwide and in the Northern Outside and Southern Inside quadrants of Southeast Alaska, AY 2018.

Note: Reporting groups are described in Table 1. The *Other* group consists of those reporting groups that do not contribute more than 5% in any seasonal fisheries. This group includes the *Situk*, *Alsek*, *Nass*, *Fraser*, *Lower Thompson*, *North Thompson*, *West Cascades Sp*, *Columbia Sp*, and *S Oregon/California* reporting groups.

Note: Inadequate sample sizes precluded medium- and fine-scale reporting groups estimates for Spring NI.

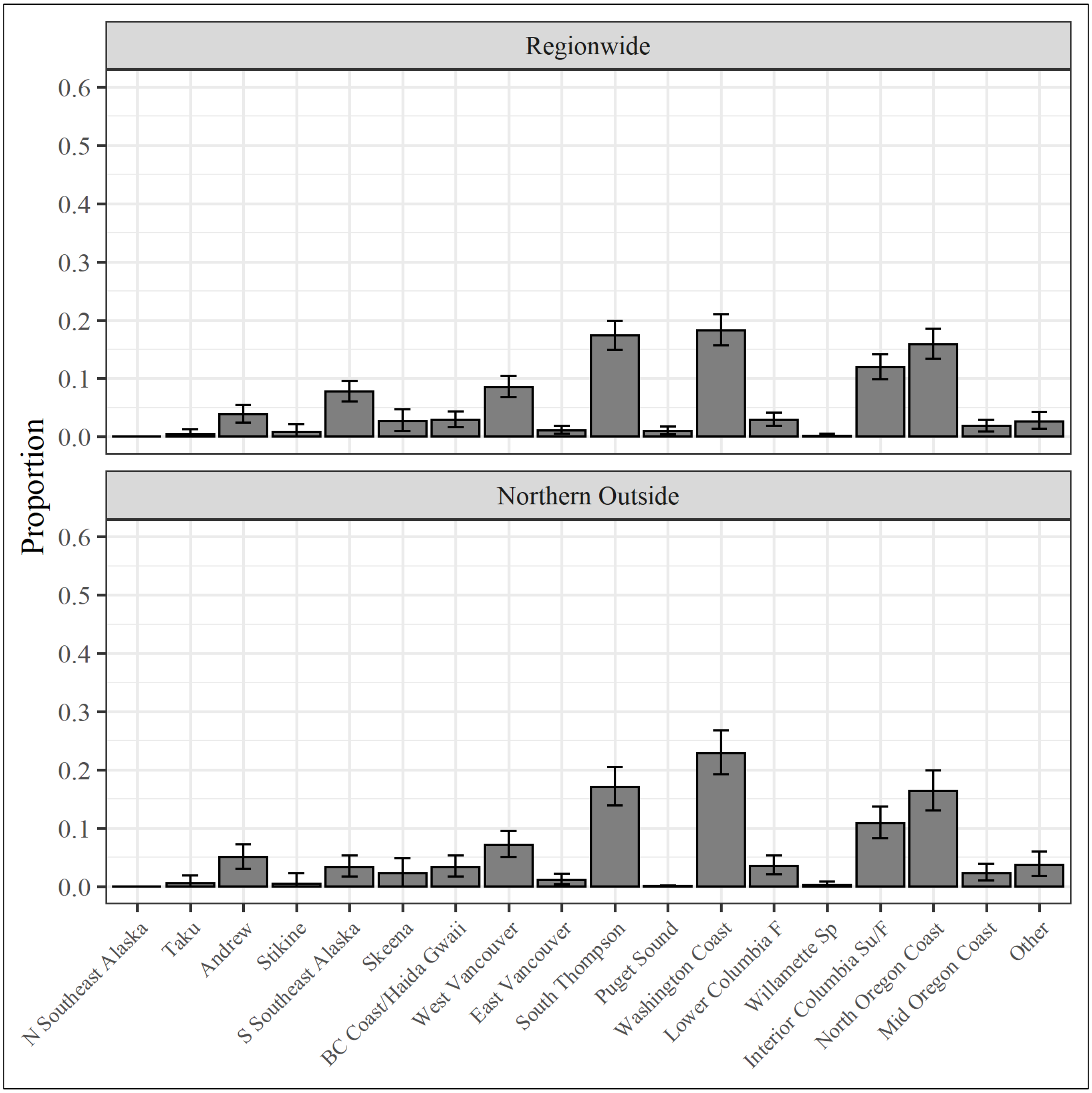

Figure 7.–Estimated contributions and 90% credibility intervals of fine-scale reporting groups of Chinook salmon to the regionwide (upper) and Northern Outside quadrant (lower) first retention period of the summer troll fishery harvest in Southeast Alaska, AY 2018.

Note: Reporting groups are described in Table 1. The *Other* group consists of those reporting groups that do not contribute more than 5% in any seasonal fisheries. This group includes the *Situk*, *Alsek*, *Nass*, *Fraser*, *Lower Thompson*, *North Thompson*, *West Cascades Sp*, *Columbia Sp*, and *S Oregon/California* reporting groups.

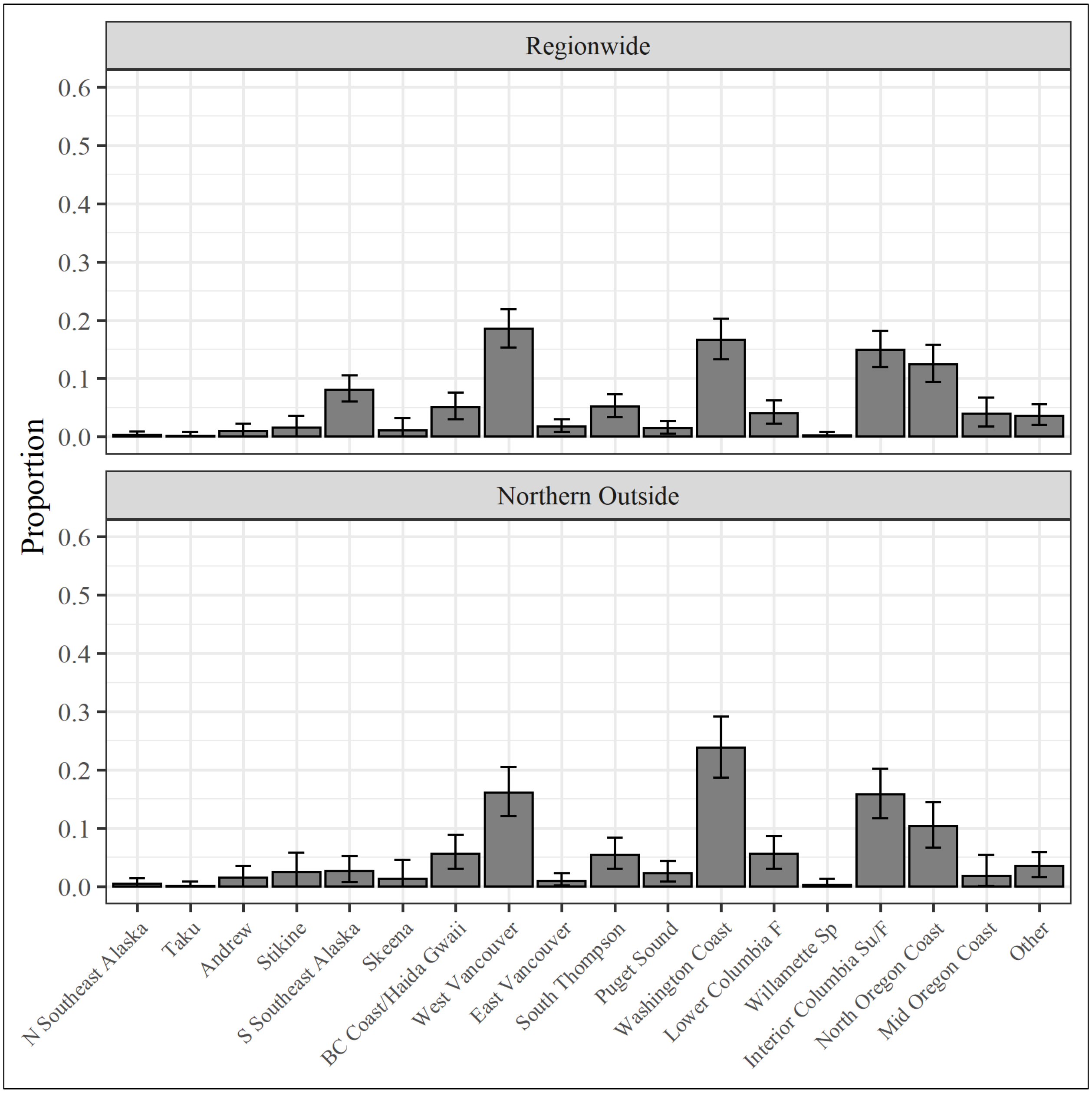

Figure 8.–Estimated contributions and 90% credibility intervals of fine-scale reporting groups of Chinook salmon to the regionwide (upper) and Northern Outside quadrant (lower) second retention period of the summer troll fishery harvest in Southeast Alaska, AY 2018.

Note: Reporting groups are described in Table 1. The *Other* group consists of those reporting groups that do not contribute more than 5% in any seasonal fisheries. This group includes the *Situk*, *Alsek*, *Nass*, *Fraser*, *Lower Thompson*, *North Thompson*, *West Cascades Sp*, *Columbia Sp*, and *S Oregon/California* reporting groups.

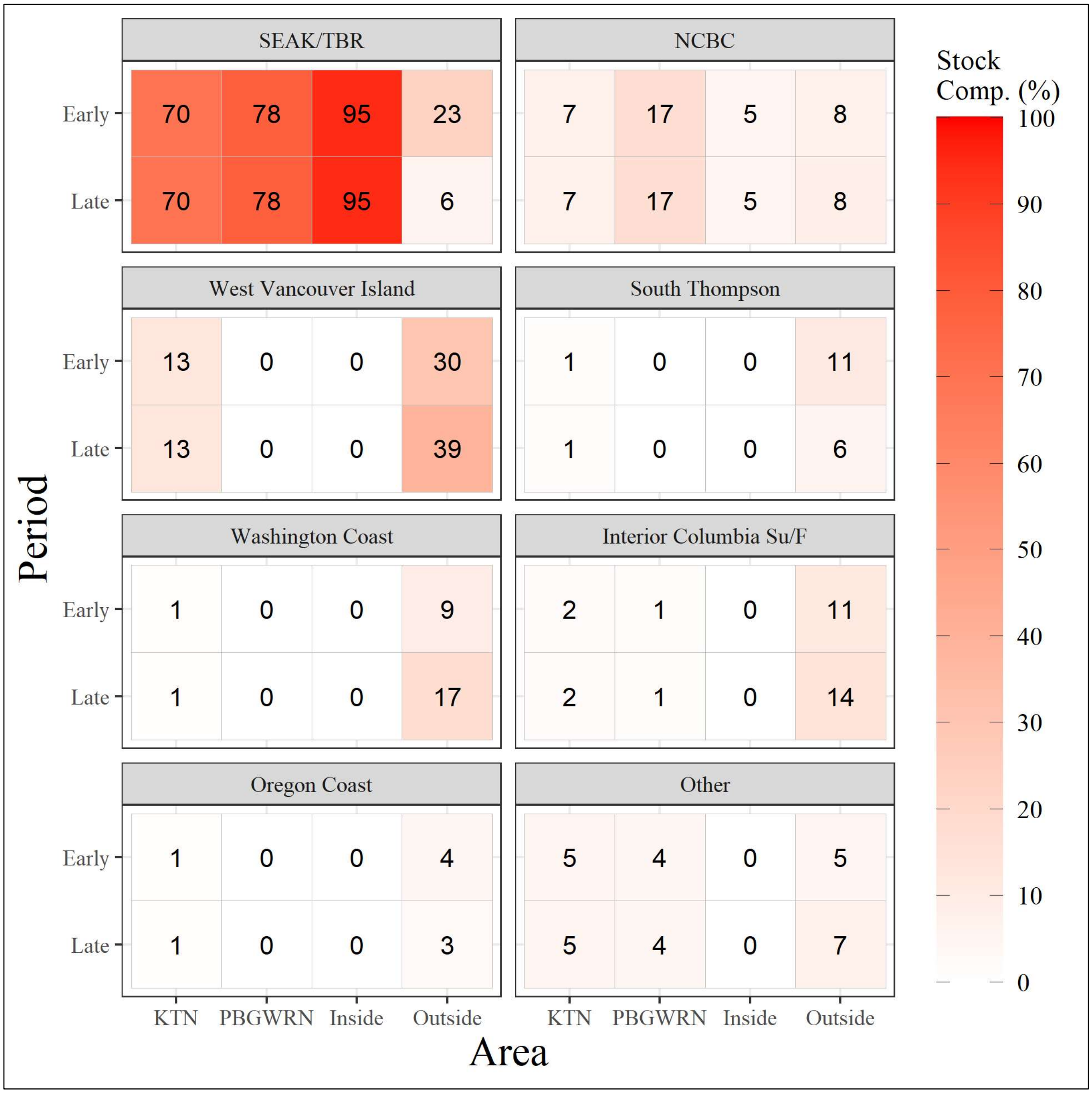

Figure 9.–Heat plot of mean contributions of driver stock reporting groups of Chinook salmon to the sport fishery harvest in Southeast Alaska by area and time period (for the Outside area only), AY 2018.

Note: Reporting groups are described in Table 1. Driver stocks are aggregate stocks that consistently make up a large proportion (>5%) of all Chinook salmon harvested annually in Southeast Alaska fisheries, and thus are important stocks that help drive catch allocations under the Pacific Salmon Treaty.

Note: Fishery names are abbreviated as follows: Ketchikan (KTN) and Petersburg-Wrangell (PBGWRN).

Note: Period names for the Outside area are Early (biweeks 9–13) and Late (biweeks 14–18).

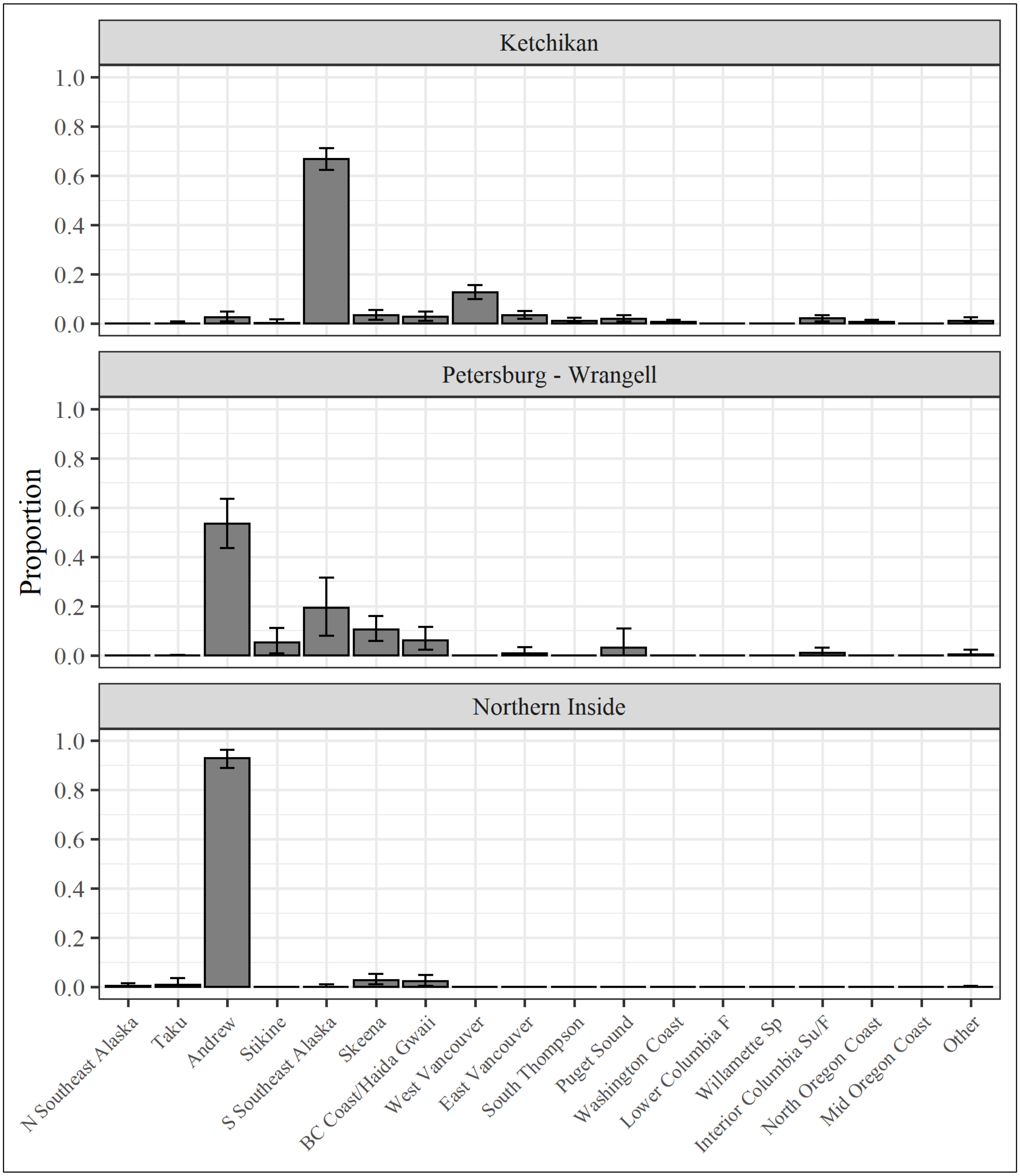

Figure 10.–Estimated contributions and 90% credibility intervals of fine-scale reporting groups of Chinook salmon to the Ketchikan, Petersburg-Wrangell, Northern Inside (Juneau, Haines, and Skagway) area sport fishery harvests in Southeast Alaska, AY 2018.

Note: Reporting groups are described in Table 1. The *Other* group consists of those reporting groups that do not contribute more than 5% in any seasonal fisheries. This group includes the *Situk*, *Alsek*, *Nass*, *Fraser*, *Lower Thompson*, *North Thompson*, *West Cascades Sp*, *Columbia Sp*, and *S Oregon/California* reporting groups.

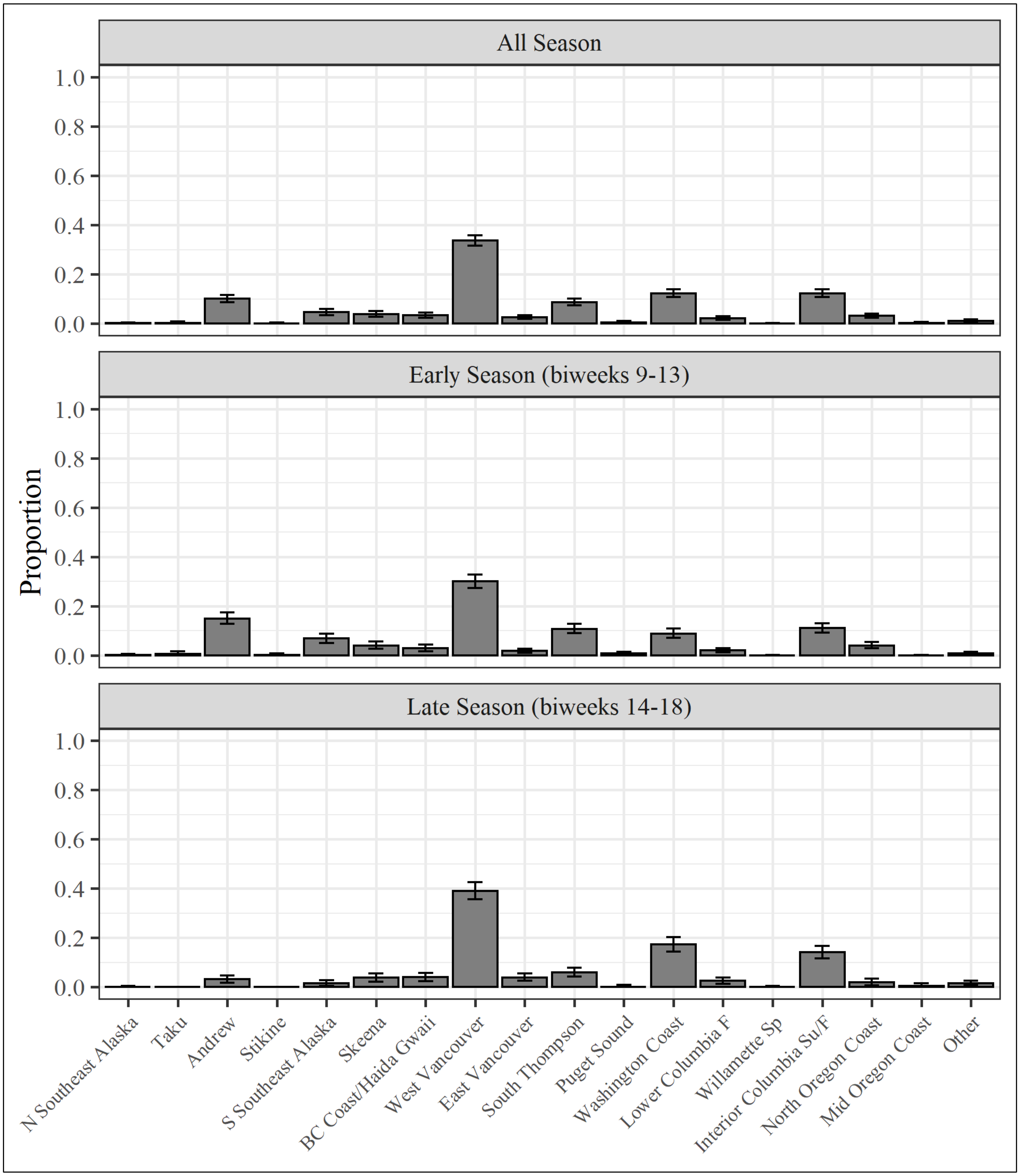

Figure 11.–Estimated contributions and 90% credibility intervals of fine-scale reporting groups of Chinook salmon to the early season (biweeks 9–13), late season (biweeks 14–18), and total season Outside area sport fishery harvest in Southeast Alaska, AY 2018.

Note: Reporting groups are described in Table 1. The *Other* group consists of those reporting groups that do not contribute more than 5% in any seasonal fisheries. This group includes the *Situk*, *Alsek*, *Nass*, *Fraser*, *Lower Thompson*, *North Thompson*, *West Cascades Sp*, *Columbia Sp*, and *S Oregon/California* reporting groups.

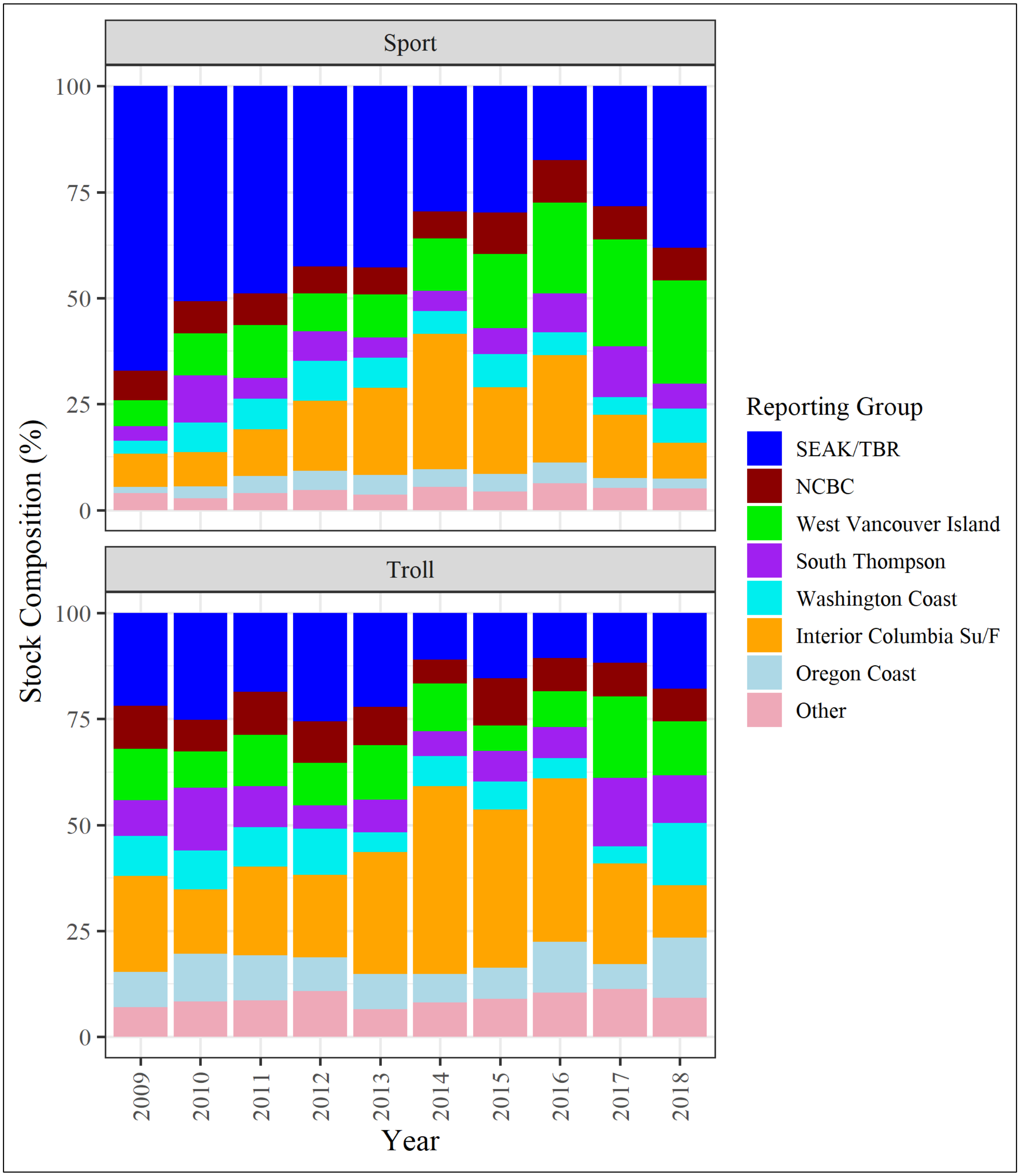

Figure 12.–Mean contributions (stacked bars; scale on the left) and annual harvest (line; scale on the right) of driver stock reporting groups of Chinook salmon to the annual regionwide troll (upper) and sport (lower) fishery harvest in Southeast Alaska, AY 2009–2018.

Note: Reporting groups are described in Table 1. Driver stocks are aggregate stocks that consistently make up a large proportion (>5%) of all Chinook salmon harvested annually in Southeast Alaska fisheries, and thus are important stocks that help drive catch allocations under the Pacific Salmon Treaty.

APPENDIX A: BASELINE POPULATIONS

Appendix A1.–Location and collection details for each population of Chinook salmon included in the coastwide baseline of microsatellite data.

	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
1	*Situk*	1	Situk River	127		W	Adult	1988, 1990, 1991, 1992
2	*Alsek*	2	Blanchard River	349		W	Adult	2000, 2001, 2002, 2003
		3	Goat Creek	62		W	Adult	2007, 2008
		4	Klukshu River	238		W	Adult	1987, 1989, 1990, 1991, 2000, 2001
		5	Takhanne River	196		W	Adult	2000, 2001, 2002, 2003, 2008
3	*N Southeast Alaska*	6	Big Boulder Creek	138		W	Adult	1992, 1995, 2004
		7	Tahini River--Macaulay Hatchery	77		H	Adult	2005
		8	Tahini River	119		W	Adult	1992, 2004
		9	Kelsall River	153		W	Adult	2004
		10	King Salmon River	143		W	Adult	1989, 1990, 1993
4	*Taku*	11	Dudidontu River	233		W	Adult	2002, 2004, 2005, 2006
		12	Kowatua Creek	288		W	Adult	1989, 1990, 2005
		13	Little Tatsamenie River	684		W	Adult	1999, 2005, 2006, 2007
		14	Little Trapper River	74		W	Adult	1999
		15	Upper Nahlin River	132		W	Adult	1989, 1990, 2004
		16	Nakina River	428		W	Adult	1989, 1990, 2004, 2005, 2006, 2007
		17	Tatsatua Creek	171		W	Adult	1989, 1990
5	*Andrew*	18	Andrew Creek	131		W	Adult	1989, 2004
		19	Andrew Creek–Crystal Hatchery	207		H	Adult	2005
		20	Andrew Creek–Macaulay Hatchery	135		H	Adult	2005
		21	Andrew Creek–Medvejie Hatchery	177		H	Adult	2005
6	*Stikine*	22	Christina River	164		W	Adult	2000, 2001, 2002
		23	Craig River	96		W	Adult	2001
		24	Johnny Tashoots Creek	62		W	Adult	2001, 2004, 2005, 2008
		25	Little Tahltan River	126		W	Adult	2001. 2004
		26	Shakes Creek	164		W	Adult	2000, 2001, 2002, 2007
		27	Tahltan River	80		W	Adult	2008
		28	Verrett River	482		W	Adult	2000, 2002, 2003, 2007
7	*S Southeast Alaska*	29	Chickamin River	126		W	Adult	1990, 2003
		30	King Creek	136		W	Adult	2003
		31	Butler Creek	190		W	Adult	2004
		32	Leduc Creek	43		W	Adult	2004
		33	Humpy Creek	124		W	Adult	2003
		34	Chickamin River–Little Port Walter H.	218		H	Adult	1993, 2005
		35	Chickamin River–Whitman Hatchery	193		H	Adult	2005
		36	Clear Creek	134		W	Adult	1989, 2003, 2004

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Appendix A1.–Page 2 of 10.

	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
7	*S Southeast Alaska*	37	Cripple Creek	141		W	Adult	1988, 2003
	(cont.)	38	Gene's Lake	92		W	Adult	1989, 2003, 2004
		39	Kerr Creek	151		W	Adult	2003, 2004
		40	Unuk River–Little Port Walter H.	149		H	Adult	2005
		41	Keta River	200		W	Adult	1989, 2003, 2004
		42	Blossom River	190		W	Adult	2004
8	*Nass*	43	Cranberry River	158		W	Adult	1996, 1997
		44	Damdochax River	63	Su	W	Adult	1996
		45	Ishkheenickh River	192			Adult	2004, 2006
		46	Kincolith River	220	Su	W	Adult	1996, 1999
		47	Kiteen River	54			Adult	2006
		48	Kwinageese River	67	Su	W	Adult	1996, 1997
		49	Meziadin River	45			Adult	1996
		50	Oweegie Creek	147	Su	W	Adult	1996, 1997, 2004
		51	Tseax River	198			Adult	1995, 1996, 2002, 2006, 2008
9	*Skeena*	52	Cedar River	112	Su	W	Adult	1996
		53	Ecstall River	149	Su	W	Adult	2000, 2001, 2002
		54	Exchamsiks River	106			Adult	1995, 2009
		55	Exstew River	140			Adult	2009
		56	Gitnadoix River	170			Adult	1995, 2009
		57	Kitsumkalum River (Lower)	449	Su	W	Adult	1996, 1998, 2001, 2009
		58	Kasiks River	60			Adult	2006
		59	Zymagotitz River	119			Adult	2006, 2009
		60	Zymoetz River (Upper)	54			Adult	1995, 2004, 2009
		61	Kispiox River	88			Adult	1995, 2004, 2006, 2008
		62	Kitseguecla River	258			Adult	2009
		63	Kitwanga River	169			Adult	1996, 2002, 2003
		64	Shegunia River	78			Adult	2009
		65	Sweetin River	60			Adult	2004, 2005, 2008
		66	Bear River	99			Adult	1991, 1995, 1996, 2005
		67	Kluakaz Creek	98			Adult	2007, 2008, 2009
		68	Kluayaz Creek	144			Adult	2007, 2008, 2009
		69	Kuldo Creek	170			Adult	2008, 2009
		70	Osti Creek	90			Adult	2009
		71	Sicintine River	105		W	Adult	2009
		72	Slamgeesh River	125			Adult	2004, 2005, 2006, 2007, 2008, 2009
		73	Squingala River	259			Adult	2008, 2009

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Appendix A1.–Page 3 of 10.

	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
9	*Skeena (cont.)*	74	Sustut River	337	Su	W	Adult	1995, 1996, 2001, 2002, 2005, 2006
		75	Babine River	105	Su	H	Adult	1996
		76	Bulkley River (Upper)	206	Su	W	Adult	1991, 1998, 1999
		77	Morice River	105			Adult	1991, 1995, 1996
		78	Suskwa River	85			Adult	2004, 2005, 2009
10	*BC Coast/Haida Gwaii*	79	Yakoun River	131			Adult	1989, 1996, 2001
		80	Atnarko Creek	142	Su	H	Adult	1996
		81	Chuckwalla River	46			Adult	1999, 2001, 2005
		82	Dean River	175			Adult	2002, 2003, 2004, 2006
		83	Dean River (Upper)	176			Adult	2001, 2002, 2003, 2004, 2006
		84	Docee River	42			Adult	1999, 2002, 2007
		85	Kateen River	128			Adult	2004, 2005
		86	Kilbella River	50			Adult	2001, 2005
		87	Kildala River	197			Adult	1999, 2000
		88	Kitimat River	135	Su	H	Adult	1997
		89	Kitlope River	181			Adult	2004, 2006
		90	Takia River	46			Adult	2002, 2003, 2006
		91	Wannock River	129	F	H	Adult	1996
		92	Capilano River	75			Adult	1999
		93	Cheakamus River	54	F		Adult	2006, 2007, 2008
		94	Devereux River	148	F	W	Adult	1997, 2000
		95	Klinaklini River	198	F	W	Adult	1997, 1998, 2002
		96	Phillips River	287			Adult	2000, 2004, 2006, 2007, 2008
		97	Squamish River	181	F	H	Adult	2003
11	*West Vancouver*	98	Burman River	218			Adult	1985, 1989, 1990, 1991, 1992, 2000, 2002, 2003
		99	Conuma River	140	F	H	Adult	1997
		100	Gold River	258			Adult	1983, 1985, 1986, 1987, 1992, 2002
		101	Kennedy River (Lower)	320			Adult	2005, 2007, 2008
		102	Marble River	136	F	H	Adult	1996, 1999, 2000
		103	Nahmint River	43			Adult	2002, 2003
		104	Nitinat River	125	F	H	Adult	1996
		105	Robertson Creek	124	F	H	Adult	1996, 2003
		106	San Juan River	175			Adult	2001, 2002
		107	Sarita River	137	F	H	Adult	1997, 2001
		108	Tahsis River	174	F	W	Adult	1996, 2002, 2003
		109	Thornton Creek	158			Adult	2001
		110	Tlupana River	58			Adult	2002, 2003

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Appendix A1.–Page 4 of 10.

	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
11	*West Vancouver (cont.)*	111	Toquart River	68			Adult	1999, 2000
		112	Tranquil Creek	227	F	W	Adult	1996, 1999, 2004
		113	Zeballos River	148			Adult	2002, 2005, 2006, 2007, 2008
12	*East Vancouver*	114	Chemainus River	202			Adult	1996, 1999
		115	Nanaimo River (Fall)	122	F	H	Adult	1996, 2002
		116	Nanaimo River (Summer)	166	Su	H	Adult	1996, 2002
		117	Nanaimo River (Spring)	94	Sp	W	Adult	1998
		118	Nanaimo River (Upper)	114			Adult	2003, 2004
		119	Nimpkish River	68			Adult	2004
		120	Puntledge River (Fall)	279	F	H	Adult	2000, 2001
		121	Puntledge River (Summer)	255	Su	H	Adult	1998, 2000, 2006
		122	Qualicum River	79	F	H	Adult	1996
		123	Quinsam River	143	F	H	Adult	1996, 1998
13	*Fraser*	124	Harrison River	216	F		Adult	1999, 2002
		125	Big Silver Creek	54	Sp	W	Adult	2004, 2005, 2006, 2007, 2008
		126	Birkenhead River	154	Sp	W	Adult	1998, 1999, 2001, 2002, 2005, 2006
		127	Pitt River (Upper)	65	Sp	W	Adult	2004, 2005, 2006, 2007, 2008
		128	Maria Slough	271	Su	W	Adult	1999, 2000, 2001, 2002, 2005
		129	Baezaeko River	80			Adult	1984, 1985
		130	Bridge River	157			Adult	1996
		131	Cariboo River	76	Su	W	Adult	1996, 2007, 2008
		132	Cariboo River (Upper)	166	Sp	W	Adult	2001
		133	Chilcotin River	201	Sp	W	Adult	1996, 1997, 1998, 2001
		134	Chilcotin River (Lower)	173	Sp	W	Adult	1996, 2000, 2001
		135	Chilko River	144	Sp	W	Adult	1995, 1999, 2001, 2002
		136	Cottonwood River (Upper)	118			Adult	2004, 2007, 2008
		137	Elkin Creek	190	Su	W	Adult	1996
		138	Endako River	42			Adult	1997, 1998, 2000
		139	Nazko River	179			Adult	1983, 1984, 1985
		140	Nechako River	128	Su	W	Adult	1992, 1996
		141	Portage Creek	138			Adult	2002, 2004, 2005, 2006, 2008
		142	Quesnel River	119	Su	W	Adult	1996, 1997
		143	Stuart River	125	Su	W	Adult	1996
		144	Taseko River	120			Adult	1997, 1998, 2002
		145	Bowron River	78	Sp	W	Adult	1997, 1998, 2001, 2003
		146	Fontoniko Creek	46			Adult	1996
		147	Goat River	46			Adult	1997, 2000, 2001, 2002

-continued-

	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
13	*Fraser (cont.)*	148	Holmes River	100			Adult	1996, 1999, 2000, 2001, 2002
		149	James Creek	53			Adult	1984, 1988
		150	McGregor River	119			Adult	1997
		151	Morkill River	152	Su	W	Adult	2001
		152	Salmon River (Fraser)	153	Sp	W	Adult	1996, 1997
		153	Slim Creek	113	Sp	W	Adult	1996, 1998, 2001
		154	Swift Creek	120	Sp	W	Adult	1996, 2000
		155	Fraser River above Tete Jaune	183			Adult	2001
		156	Torpy River	135	F	W	Adult	2001
		157	Willow River	37	Sp	W	Adult	1997, 2002, 2004
14	*Lower Thompson*	158	Coldwater River	109			Adult	1995, 1997, 1998, 1999
		159	Coldwater River (Upper)	69			Adult	2004, 2005, 2006
		160	Deadman River	256	Sp	H	Adult	1997, 1998, 1999, 2006
		161	Lois River	259	Sp	W	Adult	1997, 1999, 2001, 2006, 2008
		162	Nicola Hatchery	135	Sp	H	Adult	1998, 1999
		163	Nicola River	88			Adult	1998, 1999
		164	Spius Creek	52			Adult	1998, 1999
		165	Spius Creek (Upper)	82			Adult	2001, 2006
		166	Spius Hatchery	95	Sp	H	Adult	1996, 1997, 1998
15	*North Thompson*	167	Blue River	57			Adult	2001, 2002, 2003, 2004, 2006, 2007
		168	Clearwater River	112	Su	W	Adult	1997
		169	Finn Creek	174			Adult	1996, 1998, 2002, 2006, 2008
		170	Lemieux Creek	56			Adult	2001, 2002, 2004, 2006
		171	North Thompson River	77			Adult	2001
		172	Raft River	105	Su	W	Adult	2001, 2002, 2006, 2008
16	*South Thompson*	173	Adams River	76	Su	H	Adult	1996, 2001, 2002
		174	Bessette Creek	103			Adult	1998, 2002, 2003, 2004, 2006, 2008
		175	Eagle River	76			Adult	2003, 2004
		176	Shuswap River (Lower)	93			Adult	1996, 1997
		177	Shuswap River (Middle)	149	Su	H	Adult	1997, 2001
		178	South Thompson River	73			Adult	1996, 2001
		179	Salmon River	126			Adult	1997, 1998, 1999
		180	Thompson River (Lower)	175	F	W	Adult	2001, 2008
17	*Puget Sound*	181	Dungeness River	123		W	Adult	2004
		182	Elwha Hatchery	209	F	H	Adult/Juv	1996, 2004
		183	Elwha River	139		W	Adult/Juv	2004, 2005
		184	Upper Cascade River	43	Sp	W	Adult	1998, 1999

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Appendix A1.–Page 6 of 10.

	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
17	*Puget Sound (cont.)*	185	Marblemount Hatchery	91	Sp	H	Adult	2006
		186	North Fork Nooksack River	137	Sp	H,W	Adult	1998, 1999
		187	North Fork Stilliguamish River	290	Su	H,W	Adult	1996, 2001, 2004
		188	Samish Hatchery	74	F	H	Adult	1998
		189	Upper Sauk River	120	Sp/Su	W	Adult	1994, 1998, 1999, 2006
		190	Skagit River (Summer)	99	Su	W	Adult	1994, 1995
		191	Skagit River (Lower; Fall)	95	F	W	Adult	1998, 2006
		192	Skagit River (Upper)	53	Su	W	No data	1998
		193	Skykomish River	73	Su	W	Adult	1996, 2000
		194	Snoqualmie River	49		W	No data	2005
		195	Suiattle River	122	Sp	W	Adult	1989, 1998, 1999
		196	Wallace Hatchery	191	Su	H	Adult	1996, 2004, 2005
		197	Bear Creek	204	Su/F	W	Adult	1998, 1999, 2003, 2004
		198	Cedar River	170	Su/F	W	Adult	1994, 2003, 2004
		199	Nisqually River–Clear Creek Hatchery	132	F	H	Adult	2005
		200	Grovers Creek Hatchery	95	Su/F	H	Adult	2004
		201	Hupp Springs Hatchery	90	Sp	H	Adult	2002
		202	Issaquah Creek	166	Su/F	H,W	Adult	1999, 2004
		203	Nisqually River	94	Su/F	W	Adult	1998, 1999, 2000, 2006
		204	South Prairie Creek	78	F	W	Adult	1998, 1999, 2002
		205	Soos Creek	178	F	H	Adult	1998, 2004
		206	Univ of Washington Hatchery	125	Su/F	H	Adult	2004
		207	Voights Hatchery	93	F	H	Adult	1998
		208	White River	146	Sp	H	Adult	1998
		209	George Adams Hatchery	131	F	H	Adult	2005
		210	Hamma Hamma River	128	F	W	Adult	1999, 2000, 2001
		211	North Fork Skokomish River	87	F	W	Adult	1998, 1999, 2000, 2004, 2005, 2006
		212	South Fork Skokomish River	96	Su/F	H,W	Adult	2005, 2006
18	*Washington Coast*	213	Forks Creek Hatchery	140	F	H	Adult	2005
		214	Hoh River (Fall)	115	F	W	Adult	2004, 2005
		215	Hoh River (Spring/Summer)	138	Sp/Su	W	Adult	1995, 1996, 1997, 1998, 2005, 2006
		216	Hoko Hatchery	73	F	H,W	Adult	2004, 2006
		217	Humptulips Hatchery	60	F	H	Adult	1990
		218	Makah Hatchery	128	F	H	Adult	2001, 2003
		219	Queets River	53	F	W	Adult	1996, 1997
		220	Quillayute River	52	F	W	Adult	1995, 1996
		221	Quinault River	54	F	W	Adult	1995, 1997, 1998

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	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
18	*Washington Coast (cont.)*	222	Quinault Hatchery	82	F	H	Adult	2001, 2006
		223	Sol Duc Hatchery	94	Sp	H	Adult	2003
19	*West Cascades Sp*	224	Cowlitz Hatchery (Spring)	124	Sp	H	No data	2004
		225	Kalama Hatchery	133	Sp	H	No data	2004
		226	Lewis Hatchery	116	Sp	H	No data	2004
20	*Lower Columbia F*	227	Abernathy Creek	89	F	W	Adult	1995, 1997, 1998, 2000
		228	Abernathy Hatchery	91	F	H	Adult	1995
		229	Coweeman River	109	F	W	Adult	1996, 2006
		230	Cowlitz Hatchery (Fall)	116	F	H	No data	2004
		231	Elochoman River	88	F	W	Adult	1995, 1997
		232	Green River	55	F	W	Adult	2000
		233	Lewis River (Fall)	79	F	W	Adult	2003
		234	Lewis River (Lower; Summer)	83	F	W	Adult	2004
		235	Lewis River (Summer)	128	F	W	Adult	2004
		236	Sandy River (Fall)	106	F	W	Adult	2002, 2004
		237	Washougal River	108	F	W	Adult	1995, 1996, 2006
		238	Big Creek Hatchery	95	F	H	Juvenile	2004
		239	Elochoman Hatchery	94	F	H	Juvenile	2004
		240	Spring Creek	194	F	H	Juvenile	2001, 2002, 2006
21	*Willamette Sp*	241	Sandy River (Spring)	63	Sp	W	Adult	2006
		242	McKenzie Hatchery	127	Sp	H	Adult	2002, 2004
		243	McKenzie River	90	Sp	W	Juvenile	1997
		244	North Fork Clackamas River	62	Sp	W	Juvenile	1997
		245	North Santiam Hatchery	125	Sp	H	Adult	2002, 2004
		246	North Santiam River	83	Sp	W	Juvenile	1997
22	*Columbia Sp*	247	Klickitat Hatchery	82	Sp	H	Adult	2002, 2006
		248	Klickitat River (Spring)	40	Sp	W	Adult	2005
		249	Shitike Creek	127	Sp	H	Juvenile	2003, 2004
		250	Warm Springs Hatchery	127	Sp	H	No data	2002, 2003
		251	Granite Creek	54	Sp	W	Adult	2005, 2006
		252	John Day River (upper mainstem)	65	Sp	W	Adult	2004, 2005, 2006
		253	Middle Fork John Day River	83	Sp	W	Adult	2004, 2005, 2006
		254	North Fork John Day River	105	Sp	W	Adult	2004, 2005, 2006
		255	American River	116	Sp	W	Adult	2003
		256	Upper Yakima Hatchery	179	Sp	H	Adult	1998
		257	Little Naches River	73	Sp	W	Adult	2004
		258	Yakima River (Upper)	46	Sp	W	Adult	1992, 1997
		259	Naches River	64	Sp	W	Adult	1989, 1993

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	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
22	*Columbia Sp* (cont.)	260	Carson Hatchery	168	Sp	H	No data	2001, 2004, 2006
		261	Entiat Hatchery	127	Sp	H	Juvenile	2002
		262	Little White Salmon Hatchery (Spring)	93	Sp	H	Juvenile	2005
		263	Methow River (Spring)	85	Sp	H	Juvenile	1998, 2000
		264	Twisp River	122	Sp	W	Adult	2001, 2005
		265	Wenatchee Hatchery	43	Sp	H	Adult	1998, 2000
		266	Wenatchee River	62	Sp	W	Adult	1993
		267	Tucannon River	112	Sp/Su	W	Adult	2003
		268	Chamberlain Creek	45	Sp/Su	W	Juvenile	2006
		269	Crooked Fork Creek	100	Sp/Su	W	Juvenile	2005, 2006
		270	Dworshak Hatchery	81	Sp/Su	H	Adult	2005
		271	Lochsa River	125	Sp/Su	H	Adult	2005
		272	Lolo Creek	92	Sp/Su	W	Adult/Juv	2001, 2002
		273	Newsome Creek	75	Sp/Su	W	Adult	2001, 2002
		274	Rapid River Hatchery	136	Sp/Su	H	No data	1997, 1999, 2002
		275	Rapid River Hatchery	46	Su	H	Juvenile	2001, 2002
		276	Red River/South Fork Clearwater	172	Sp/Su	H	Adult	2005
		277	Catherine Creek	111	Sp/Su	W	Adult	2002, 2003
		278	Lookingglass Hatchery	188	Sp/Su	H	Juvenile	1994, 1995, 1998
		279	Minam River	136	Sp/Su	W	No data	1994, 2002, 2003
		280	Wenaha Creek	46	Sp/Su	W	Juvenile	2002
		281	Imnaha River	132	Sp/Su	W	No data	1998, 2002, 2003
		282	Bear Valley Creek	45	Sp/Su	W	Juvenile	2006
		283	Johnson Creek	186	Sp/Su	W	Adult/Juv	2001, 2002, 2003
		284	Johnson Hatchery	92	Sp/Su	H	Juvenile	2002, 2003, 2004
		285	Knox Bridge	90	Su	W	Juvenile	2001, 2002
		286	McCall Hatchery	80	Su	H	Juvenile	1999, 2001
		287	Poverty Flat	88	Su	W	Juvenile	2001, 2002
		288	Sesech River	115	Sp/Su	W	No data	2001, 2002, 2003
		289	Stolle Meadows	91	Su	W	Juvenile	2001, 2002
		290	Big Creek	142	Sp/Su	W	Adult	2001, 2002, 2003
		291	Big Creek (Lower)	74	Su	W	Juvenile	1999, 2002
		292	Big Creek (Upper)	87	Su	W	Juvenile	1999, 2002
		293	Camas Creek	42	Sp/Su	W	Juvenile	2006
		294	Capehorn Creek	51	Sp/Su	W	Juvenile	2006
		295	Marsh Creek	95	Su	W	Juvenile	2001, 2002
		296	Decker Flat	78	Su	W	Juvenile	1999, 2002
		297	Valley Creek (Lower)	94	Su	W	Juvenile	1999, 2002

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	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
22	*Columbia Sp (cont.)*	298	Valley Creek (Upper)	95	Su	W	Juvenile	1999, 2002
		299	East Fork Salmon River	141	Sp/Su	W	Adult	2004, 2005
		300	Pahsimeroi River	71	Sp/Su	W	Adult	2002
		301	Sawtooth Hatchery	260	Sp/Su	H	Adult/Juv	2002, 2003, 2005, 2006
		302	West Fork Yankee Fork	59	Sp/Su	W	Juvenile	2005
23	*Interior Columbia Su/F*	303	Hanford Reach	163	Su/F	W	No data	1999, 2000, 2001
		304	Klickitat River (Summer/Fall)	149	Su/F	W	Adult	1994, 2005
		305	Little White Salmon Hatchery (Fall)	94	Su/F	H	Juvenile	2006
		306	Marion Drain	131	Su/F	W	Adult	1989, 1992
		307	Methow River (Summer)	115	Su/F	W	No data	1992, 1993, 1994
		308	Okanagan River	72	Su/F	W	Adult	2000, 2002, 2003, 2004, 2006, 2007, 2008
		309	Priest Rapids Hatchery	181	Su/F	H	Juvenile	1998, 1999, 2000, 2001
		310	Priest Rapids Hatchery	67	Su/F	H	Adult	1998
		311	Umatilla Hatchery	90	F	H	Adult	2006
		312	Umatilla Hatchery	94	Su/F	H	Adult	2003
		313	Wells Dam Hatchery	128	Su/F	H	No data	1993
		314	Wenatchee River	119	Su/F	W	Adult	1993
		315	Yakima River (Lower)	102	Su/F	W	Adult	1990, 1993, 1998
		316	Deschutes River (Lower)	101	F	W	No data	1999, 2001, 2002
		317	Deschutes River (Upper)	128	Su/F	W	Juvenile	1998, 1999, 2002
		318	Clearwater River	88	F	W	Adult	2000, 2001, 2002
		319	Lyons Ferry	185	F	H	Adult	2002, 2003
		320	Nez Perce Tribal Hatchery	123	F	H	Adult	2003, 2004
24	*North Oregon Coast*	321	Alsea River	108	F	W	Adult	2004
		322	Kilchis River	44	F	Unk	Adult	2000, 2005
		323	Necanicum Hatchery	50	F	H,W	Adult	2005
		324	Nehalem River	131	F	W	Adult	2000, 2002
		325	Nestucca Hatchery	119	F	H	Adult	2004, 2005
		326	Salmon River	83	F	Unk	Adult	2003
		327	Siletz River	107	F	W	Adult	2000
		328	Trask River	123	F	W	Adult	2005
		329	Wilson River	120	F	W	Adult	2005
		330	Yaquina River	113	F	W	Adult	2005
		331	Siuslaw River	105	F	W	Adult	2001
25	*Mid Oregon Coast*	332	Coos Hatchery	58	F	H	Adult	2005
		333	Coquille River	118	F	W	Adult	2000
		334	Elk River	129	F	H	Adult	2004
		335	South Coos Hatchery	73	F	H	Adult	2005

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	Fine-scale reporting group	Pop No.[a]	Population	N	Run time[b]	Origin[c]	Life stage	Collection date
25	*Mid Oregon Coast (cont.)*	336	South Coos River	45	F	W	Adult	2000
		337	South Umpqua Hatchery	128	F	H,W	Adult	2002
		338	Sixes River	107	F	W	Adult	2000, 2005
		339	Umpqua Hatchery	132	Sp	W	Adult	2004
26	*S Oregon/California*	340	Applegate Creek	110	F	W	Adult	2004
		341	Cole Rivers Hatchery	126	Sp	H	Adult	2004
		342	Klaskanine Hatchery	96	F	H	Juvenile	2009
		343	Chetco River	136	F	W	Adult	2004
		344	Klamath River	111	F	W	Adult	2004
		345	Trinity Hatchery (Fall)	144	F	H	Adult	1992
		346	Trinity Hatchery (Spring)	127	Sp	H	Adult	1992
		347	Eel River	122	F	W	Adult	2000, 2001
		348	Russian River	142	F	W	Juvenile	2001
		349	Battle Creek	99	F	W	Adult	2002, 2003
		350	Butte Creek	61	F	W	Adult	2002, 2003
		351	Feather Hatchery (Fall)	129	F	H	Adult	2003
		352	Stanislaus River	61	F	W	Adult	2002
		353	Butte Creek	101	Sp	W	Adult	2002, 2003
		354	Deer Creek	42	Sp	W	Adult	2002
		355	Feather Hatchery (Spring)	144	Sp	H	Adult	2003
		356	Mill Creek	76	Sp	W	Adult	2002, 2003
		357	Sacramento River (Winter)	95	W	H,W	Adult	1992, 1993, 1994, 1995, 1997, 1998, 2001, 2003, 2004

Note: Blank cells indicate no data.

[a] Population numbers and reporting group numbers correspond to the population and reporting group numbers referenced in Table 1.

[b] Run timing components are abbreviated as Sp (spring), Su (summer), F (fall), and W (winter).

[c] Origin categories are abbreviated as H (hatchery), W (wild), and Unk (unknown).

APPENDIX B: ESTIMATED CONTRIBUTION

Appendix B1.–Estimated contributions of broad-scale reporting groups of Chinook salmon to the Southeast Alaska troll fishery harvest, AY 2018.

Fishery	Quadrant	Sample size	Reporting group	Mean	SD	Median	90% CI 5%	90% CI 95%
Early Winter	All	314	*Alaska*	0.203	0.025	0.202	0.163	0.245
			TBR	0.015	0.012	0.014	0.000	0.038
			Canada	0.467	0.032	0.467	0.415	0.519
			US South	0.314	0.024	0.314	0.275	0.355
	NO	197	*Alaska*	0.059	0.023	0.057	0.025	0.100
			TBR	0.018	0.016	0.016	0.000	0.047
			Canada	0.437	0.040	0.437	0.372	0.502
			US South	0.486	0.037	0.486	0.426	0.547
Late Winter	All	467	*Alaska*	0.172	0.021	0.171	0.139	0.207
			TBR	0.010	0.006	0.009	0.003	0.021
			Canada	0.658	0.025	0.658	0.616	0.699
			US South	0.160	0.018	0.160	0.131	0.191
	NO	137	*Alaska*	0.095	0.027	0.093	0.054	0.144
			TBR	0.002	0.006	0.000	0.000	0.011
			Canada	0.632	0.043	0.633	0.561	0.701
			US South	0.271	0.038	0.270	0.211	0.336
Spring	NO	980	*Alaska*	0.606	0.016	0.606	0.579	0.631
			TBR	0.003	0.004	0.001	0.000	0.011
			Canada	0.283	0.014	0.283	0.260	0.306
			US South	0.108	0.010	0.108	0.092	0.126
	All	1,756	*Alaska*	0.713	0.010	0.713	0.696	0.730
			TBR	0.006	0.004	0.005	0.001	0.014
			Canada	0.218	0.009	0.218	0.204	0.233
			US South	0.063	0.006	0.063	0.054	0.073
	SO	385	*Alaska*	0.402	0.026	0.402	0.359	0.446
			TBR	0.001	0.003	0.000	0.000	0.003
			Canada	0.545	0.028	0.545	0.499	0.590
			US South	0.052	0.013	0.051	0.032	0.076
	SI	391	*Alaska*	0.949	0.014	0.951	0.924	0.969
			TBR	0.011	0.009	0.007	0.001	0.030
			Canada	0.037	0.011	0.036	0.023	0.058
			US South	0.003	0.003	0.002	0.000	0.008
Summer Retention 1	All	677	*Alaska*	0.116	0.014	0.116	0.095	0.139
			TBR	0.016	0.009	0.015	0.004	0.032
			Canada	0.347	0.020	0.347	0.314	0.381
			US South	0.521	0.020	0.521	0.488	0.553
	NO	370	*Alaska*	0.083	0.016	0.082	0.058	0.111
			TBR	0.015	0.012	0.013	0.000	0.038
			Canada	0.339	0.027	0.339	0.295	0.384
			US South	0.563	0.027	0.563	0.519	0.606
Summer Retention 2	All	424	*Alaska*	0.095	0.015	0.094	0.071	0.121
			TBR	0.034	0.014	0.033	0.013	0.057
			Canada	0.333	0.027	0.333	0.290	0.378
			US South	0.538	0.026	0.538	0.495	0.581
	NO	207	*Alaska*	0.047	0.018	0.045	0.022	0.079
			TBR	0.053	0.022	0.052	0.019	0.092
			Canada	0.301	0.035	0.300	0.244	0.360
			US South	0.599	0.035	0.599	0.541	0.656

Note: Successfully genotyped sample sizes, standard deviation (SD), and 90% credibility intervals (CI) are provided.

Appendix B2.–Estimated contributions of driver stock reporting groups of Chinook salmon to the Southeast Alaska troll fishery harvest by season and quadrant, AY 2018.

	Early Winter regionwide (*n* = 314)					Early Winter northern outside (*n* = 197)				
				90% CI					90% CI	
Reporting group	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
SEAK/TBR	0.218	0.025	0.218	0.178	0.260	0.077	0.025	0.075	0.040	0.121
NCBC	0.224	0.027	0.223	0.181	0.270	0.211	0.034	0.209	0.157	0.269
West Vancouver	0.058	0.013	0.057	0.038	0.080	0.086	0.020	0.085	0.056	0.121
South Thompson	0.006	0.004	0.005	0.001	0.015	0.010	0.007	0.009	0.002	0.024
Washington Coast	0.001	0.002	0.000	0.000	0.004	0.001	0.003	0.000	0.000	0.005
Interior Columbia Su/F	0.178	0.021	0.178	0.145	0.213	0.293	0.034	0.292	0.239	0.349
Oregon Coast	0.004	0.005	0.003	0.000	0.014	0.007	0.008	0.004	0.000	0.023
Other	0.310	0.028	0.310	0.265	0.356	0.316	0.035	0.315	0.259	0.375
	Late Winter regionwide (*n* = 467)					Late Winter northern outside (*n* = 137)				
SEAK/TBR	0.182	0.021	0.182	0.149	0.217	0.097	0.028	0.095	0.055	0.146
NCBC	0.180	0.021	0.179	0.146	0.216	0.176	0.035	0.175	0.123	0.236
West Vancouver	0.392	0.023	0.392	0.354	0.431	0.382	0.042	0.381	0.314	0.451
South Thompson	0.003	0.003	0.002	0.000	0.010	0.006	0.008	0.003	0.000	0.023
Washington Coast	0.001	0.001	0.000	0.000	0.003	0.000	0.002	0.000	0.000	0.001
Interior Columbia Su/F	0.066	0.012	0.065	0.047	0.087	0.112	0.027	0.110	0.070	0.160
Oregon Coast	0.000	0.001	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.001
Other	0.176	0.019	0.175	0.145	0.208	0.227	0.036	0.226	0.169	0.288
	Spring regionwide (*n* = 1,756)					Spring northern outside (*n* = 980)				
SEAK/TBR	0.719	0.009	0.719	0.703	0.734	0.609	0.015	0.609	0.583	0.634
NCBC	0.034	0.005	0.034	0.026	0.043	0.038	0.006	0.038	0.028	0.050
West Vancouver	0.149	0.007	0.149	0.137	0.161	0.195	0.012	0.195	0.176	0.216
South Thompson	0.021	0.003	0.020	0.016	0.026	0.034	0.006	0.034	0.026	0.044
Washington Coast	0.013	0.003	0.012	0.008	0.018	0.024	0.006	0.023	0.015	0.034
Interior Columbia Su/F	0.030	0.004	0.030	0.024	0.037	0.052	0.007	0.052	0.041	0.064
Oregon Coast	0.007	0.002	0.006	0.003	0.011	0.012	0.004	0.012	0.006	0.020
Other	0.028	0.004	0.028	0.022	0.034	0.035	0.006	0.034	0.026	0.046
	Spring southern outside (*n* = 385)					Spring southern inside (*n* = 391)				
SEAK/TBR	0.403	0.026	0.403	0.360	0.447	0.960	0.011	0.961	0.939	0.975
NCBC	0.070	0.018	0.069	0.043	0.102	0.018	0.009	0.016	0.007	0.035
West Vancouver	0.394	0.025	0.394	0.352	0.436	0.017	0.007	0.016	0.009	0.029
South Thompson	0.020	0.008	0.019	0.009	0.034	0.001	0.001	0.001	0.000	0.003
Washington Coast	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001
Interior Columbia Su/F	0.023	0.008	0.022	0.012	0.038	0.001	0.001	0.001	0.000	0.003
Oregon Coast	0.000	0.001	0.000	0.000	0.001	0.001	0.002	0.000	0.000	0.003
Other	0.089	0.016	0.088	0.064	0.117	0.002	0.002	0.001	0.000	0.006
	Summer 1 regionwide (*n* = 677)					Summer 1 northern outside (*n* = 370)				
SEAK/TBR	0.132	0.015	0.132	0.109	0.157	0.098	0.019	0.097	0.069	0.130
NCBC	0.062	0.012	0.061	0.042	0.083	0.063	0.017	0.062	0.037	0.092
West Vancouver	0.085	0.011	0.085	0.068	0.104	0.071	0.014	0.070	0.050	0.095
South Thompson	0.173	0.015	0.173	0.149	0.199	0.170	0.020	0.170	0.139	0.204
Washington Coast	0.183	0.016	0.182	0.157	0.210	0.229	0.023	0.228	0.192	0.268
Interior Columbia Su/F	0.119	0.013	0.119	0.098	0.141	0.109	0.017	0.108	0.083	0.137
Oregon Coast	0.177	0.016	0.177	0.152	0.204	0.187	0.021	0.186	0.152	0.223
Other	0.068	0.011	0.068	0.050	0.088	0.074	0.016	0.073	0.050	0.100

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	Summer 2 regionwide (*n* = 424)					Summer 2 northern outside (*n* = 207)				
				90% CI					90% CI	
Reporting group	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
SEAK/TBR	0.128	0.019	0.128	0.099	0.161	0.101	0.025	0.099	0.062	0.144
NCBC	0.069	0.018	0.067	0.042	0.100	0.069	0.024	0.067	0.035	0.112
West Vancouver	0.185	0.020	0.184	0.153	0.219	0.161	0.025	0.160	0.121	0.204
South Thompson	0.052	0.012	0.051	0.034	0.073	0.055	0.016	0.053	0.030	0.084
Washington Coast	0.167	0.021	0.166	0.133	0.203	0.238	0.032	0.237	0.187	0.292
Interior Columbia Su/F	0.149	0.019	0.148	0.119	0.181	0.158	0.026	0.157	0.117	0.202
Oregon Coast	0.164	0.021	0.163	0.130	0.199	0.122	0.026	0.120	0.082	0.166
Other	0.087	0.016	0.086	0.062	0.115	0.098	0.022	0.096	0.064	0.136

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

Note: Reporting groups are described in Table 1.

Appendix B3.–Estimated contributions of fine-scale reporting groups of Chinook salmon to the harvest for the early winter troll fishery regionwide and in the Northern Outside quadrant of Southeast Alaska, AY 2018.

		Regionwide (n = 314)					Northern Outside Quadrant (n = 197)				
					90% CI					90% CI	
	Reporting group[a]	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
1	*Situk*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
2	*Alsek*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
3	*N Southeast Alaska*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
4	*Taku*	0.011	0.010	0.009	0.000	0.029	0.018	0.016	0.015	0.000	0.047
5	*Andrew*	0.049	0.016	0.048	0.025	0.077	0.012	0.011	0.010	0.000	0.034
6	*Stikine*	0.004	0.007	0.000	0.000	0.019	0.000	0.003	0.000	0.000	0.000
7	*S Southeast Alaska*	0.154	0.024	0.153	0.115	0.195	0.047	0.023	0.044	0.015	0.088
8	*Nass*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
9	*Skeena*	0.021	0.011	0.019	0.006	0.041	0.007	0.012	0.000	0.000	0.032
10	*BC Coast/Haida Gwaii*	0.203	0.027	0.203	0.161	0.248	0.203	0.034	0.202	0.149	0.262
11	*West Vancouver*	0.058	0.013	0.057	0.038	0.080	0.086	0.020	0.085	0.056	0.121
12	*East Vancouver*	0.175	0.022	0.175	0.140	0.213	0.124	0.024	0.123	0.087	0.165
13	*Fraser*	0.003	0.003	0.002	0.000	0.010	0.005	0.005	0.004	0.000	0.016
14	*Lower Thompson*	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
15	*North Thompson*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
16	*South Thompson*	0.006	0.004	0.005	0.001	0.015	0.010	0.007	0.009	0.002	0.024
17	*Puget Sound*	0.086	0.018	0.085	0.059	0.117	0.112	0.025	0.111	0.075	0.155
18	*Washington Coast*	0.001	0.002	0.000	0.000	0.004	0.001	0.003	0.000	0.000	0.005
19	*West Cascades Sp*	0.010	0.007	0.009	0.001	0.023	0.016	0.011	0.014	0.002	0.038
20	*Lower Columbia F*	0.014	0.007	0.013	0.004	0.027	0.023	0.012	0.021	0.007	0.045
21	*Willamette Sp*	0.021	0.009	0.020	0.009	0.037	0.034	0.014	0.033	0.014	0.061
22	*Columbia Sp*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
23	*Interior Columbia Su/F*	0.178	0.021	0.178	0.145	0.213	0.293	0.034	0.292	0.239	0.349
24	*North Oregon Coast*	0.002	0.004	0.000	0.000	0.010	0.004	0.006	0.000	0.000	0.017
25	*Mid Oregon Coast*	0.002	0.004	0.000	0.000	0.010	0.003	0.006	0.000	0.000	0.017
26	*S Oregon/California*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000

Note: n = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

[a] Run timing components are abbreviated as Sp (spring), Su (summer), and F (fall).

Appendix B4.–Estimated contributions of fine-scale reporting groups of Chinook salmon to the harvest for the late winter troll fishery regionwide and in the Northern Outside quadrant of Southeast Alaska, AY 2018.

		Regionwide (*n* = 467)					Northern Outside Quadrant (*n* = 137)				
					90% CI					90% CI	
	Reporting group[a]	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
1	*Situk*	0.001	0.002	0.000	0.000	0.007	0.004	0.007	0.000	0.000	0.018
2	*Alsek*	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
3	*N Southeast Alaska*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
4	*Taku*	0.001	0.003	0.000	0.000	0.006	0.001	0.005	0.000	0.000	0.008
5	*Andrew*	0.015	0.008	0.014	0.003	0.030	0.021	0.017	0.019	0.000	0.052
6	*Stikine*	0.009	0.005	0.009	0.002	0.019	0.000	0.002	0.000	0.000	0.000
7	*S Southeast Alaska*	0.155	0.020	0.155	0.123	0.190	0.070	0.026	0.067	0.032	0.118
8	*Nass*	0.001	0.003	0.000	0.000	0.007	0.001	0.007	0.000	0.000	0.007
9	*Skeena*	0.043	0.012	0.042	0.026	0.065	0.035	0.017	0.032	0.012	0.066
10	*BC Coast/Haida Gwaii*	0.136	0.019	0.135	0.105	0.168	0.140	0.032	0.138	0.091	0.195
11	*West Vancouver*	0.392	0.023	0.392	0.354	0.431	0.382	0.042	0.381	0.314	0.451
12	*East Vancouver*	0.079	0.013	0.078	0.059	0.102	0.067	0.022	0.065	0.036	0.106
13	*Fraser*	0.003	0.003	0.002	0.000	0.008	0.000	0.001	0.000	0.000	0.000
14	*Lower Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
15	*North Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
16	*South Thompson*	0.003	0.003	0.002	0.000	0.010	0.006	0.008	0.003	0.000	0.023
17	*Puget Sound*	0.041	0.011	0.040	0.024	0.060	0.034	0.016	0.031	0.012	0.063
18	*Washington Coast*	0.001	0.001	0.000	0.000	0.003	0.000	0.002	0.000	0.000	0.001
19	*West Cascades Sp*	0.001	0.003	0.000	0.000	0.008	0.003	0.008	0.000	0.000	0.020
20	*Lower Columbia F*	0.014	0.006	0.013	0.005	0.025	0.037	0.017	0.035	0.014	0.068
21	*Willamette Sp*	0.037	0.009	0.036	0.023	0.053	0.082	0.024	0.080	0.047	0.125
22	*Columbia Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
23	*Interior Columbia Su/F*	0.066	0.012	0.065	0.047	0.087	0.112	0.027	0.110	0.070	0.160
24	*North Oregon Coast*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
25	*Mid Oregon Coast*	0.000	0.001	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000
26	*S Oregon/California*	0.001	0.002	0.000	0.000	0.006	0.003	0.006	0.000	0.000	0.015

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

[a] Run timing components are abbreviated as Sp (spring), Su (summer) and F (fall).

Appendix B5.–Estimated contributions of fine-scale reporting groups of Chinook salmon to the harvest for the spring troll fishery regionwide and in the Northern Outside, Southern Outside, and Southern Inside quadrants of Southeast Alaska, AY 2018.

		Regionwide (n = 1,756)					Northern Outside Quadrant (n = 980)				
					90% CI					90% CI	
	Reporting group[a]	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
1	*Situk*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	*Alsek*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	*N Southeast Alaska*	0.002	0.001	0.001	0.000	0.004	0.003	0.002	0.003	0.001	0.007
4	*Taku*	0.001	0.001	0.001	0.000	0.003	0.000	0.001	0.000	0.000	0.001
5	*Andrew*	0.296	0.009	0.296	0.281	0.311	0.543	0.017	0.544	0.516	0.571
6	*Stikine*	0.005	0.004	0.004	0.000	0.013	0.003	0.004	0.000	0.000	0.011
7	*S Southeast Alaska*	0.415	0.008	0.416	0.402	0.428	0.059	0.010	0.059	0.044	0.077
8	*Nass*	0.004	0.003	0.003	0.000	0.010	0.000	0.001	0.000	0.000	0.001
9	*Skeena*	0.005	0.002	0.005	0.003	0.009	0.008	0.003	0.008	0.004	0.014
10	*BC Coast/Haida Gwaii*	0.025	0.004	0.025	0.019	0.031	0.030	0.006	0.030	0.021	0.040
11	*West Vancouver*	0.149	0.007	0.149	0.137	0.161	0.195	0.012	0.195	0.176	0.216
12	*East Vancouver*	0.012	0.002	0.012	0.009	0.017	0.012	0.004	0.011	0.007	0.018
13	*Fraser*	0.001	0.001	0.001	0.000	0.003	0.002	0.001	0.002	0.000	0.005
14	*Lower Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	*North Thompson*	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.002
16	*South Thompson*	0.021	0.003	0.020	0.016	0.026	0.034	0.006	0.034	0.026	0.044
17	*Puget Sound*	0.006	0.002	0.006	0.003	0.010	0.007	0.003	0.007	0.003	0.013
18	*Washington Coast*	0.013	0.003	0.012	0.008	0.018	0.024	0.006	0.023	0.015	0.034
19	*West Cascades Sp*	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.002
20	*Lower Columbia F*	0.005	0.001	0.004	0.002	0.007	0.009	0.003	0.008	0.005	0.013
21	*Willamette Sp*	0.003	0.001	0.002	0.001	0.005	0.004	0.002	0.004	0.002	0.008
22	*Columbia Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	*Interior Columbia Su/F*	0.030	0.004	0.030	0.024	0.037	0.052	0.007	0.052	0.041	0.064
24	*North Oregon Coast*	0.006	0.002	0.005	0.003	0.009	0.011	0.004	0.010	0.005	0.017
25	*Mid Oregon Coast*	0.001	0.001	0.000	0.000	0.004	0.002	0.002	0.000	0.000	0.007
26	*S Oregon/California*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001

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Appendix B5.–Page 2 of 2.

		Southern Inside Quadrant (*n* = 391)					Southern Outside Quadrant (*n* = 385)				
					90% CI					90% CI	
	Reporting group[a]	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
1	*Situk*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
2	*Alsek*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	*N Southeast Alaska*	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
4	*Taku*	0.002	0.003	0.001	0.000	0.008	0.000	0.001	0.000	0.000	0.000
5	*Andrew*	0.007	0.005	0.006	0.003	0.016	0.075	0.016	0.074	0.050	0.102
6	*Stikine*	0.008	0.009	0.005	0.000	0.027	0.000	0.002	0.000	0.000	0.001
7	*S Southeast Alaska*	0.942	0.014	0.943	0.916	0.962	0.327	0.026	0.327	0.284	0.371
8	*Nass*	0.009	0.008	0.007	0.000	0.025	0.007	0.007	0.006	0.000	0.021
9	*Skeena*	0.001	0.002	0.001	0.000	0.004	0.004	0.004	0.003	0.000	0.013
10	*BC Coast/Haida Gwaii*	0.008	0.003	0.008	0.004	0.013	0.059	0.017	0.057	0.034	0.089
11	*West Vancouver*	0.017	0.007	0.016	0.009	0.029	0.394	0.025	0.394	0.352	0.436
12	*East Vancouver*	0.001	0.001	0.000	0.000	0.003	0.059	0.013	0.058	0.038	0.082
13	*Fraser*	0.000	0.001	0.000	0.000	0.001	0.002	0.004	0.000	0.000	0.011
14	*Lower Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	*North Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	*South Thompson*	0.001	0.001	0.001	0.000	0.003	0.020	0.008	0.019	0.009	0.034
17	*Puget Sound*	0.000	0.001	0.000	0.000	0.001	0.025	0.010	0.024	0.011	0.044
18	*Washington Coast*	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001
19	*West Cascades Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	*Lower Columbia F*	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
21	*Willamette Sp*	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.002	0.000	0.009
22	*Columbia Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	*Interior Columbia Su/F*	0.001	0.001	0.001	0.000	0.003	0.023	0.008	0.022	0.012	0.038
24	*North Oregon Coast*	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25	*Mid Oregon Coast*	0.000	0.002	0.000	0.000	0.003	0.000	0.001	0.000	0.000	0.001
26	*S Oregon/California*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

[a] Run timing components are abbreviated as Sp (spring), Su (summer) and F (fall).

Appendix B6.–Estimated contributions of fine-scale reporting groups of Chinook salmon to the harvest for the first retention period of the summer troll fishery regionwide and in the Northern Outside quadrant of Southeast Alaska, AY 2018.

		Regionwide (*n* = 677)					Northern Outside (*n* = 370)				
					90% CI					90% CI	
	Reporting group[a]	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
1	*Situk*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
2	*Alsek*	0.004	0.004	0.003	0.000	0.011	0.005	0.005	0.003	0.000	0.015
3	*N Southeast Alaska*	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
4	*Taku*	0.004	0.004	0.003	0.000	0.013	0.006	0.007	0.004	0.000	0.019
5	*Andrew*	0.038	0.009	0.038	0.024	0.054	0.050	0.013	0.049	0.031	0.072
6	*Stikine*	0.008	0.007	0.006	0.000	0.021	0.004	0.008	0.000	0.000	0.023
7	*S Southeast Alaska*	0.077	0.011	0.077	0.060	0.096	0.033	0.011	0.032	0.016	0.053
8	*Nass*	0.006	0.005	0.004	0.000	0.016	0.008	0.008	0.006	0.000	0.024
9	*Skeena*	0.027	0.011	0.027	0.010	0.047	0.022	0.016	0.023	0.000	0.049
10	*BC Coast/Haida Gwaii*	0.029	0.008	0.028	0.016	0.043	0.033	0.011	0.032	0.017	0.053
11	*West Vancouver*	0.085	0.011	0.085	0.068	0.104	0.071	0.014	0.070	0.050	0.095
12	*East Vancouver*	0.011	0.004	0.010	0.005	0.019	0.011	0.006	0.010	0.003	0.022
13	*Fraser*	0.015	0.007	0.014	0.005	0.027	0.023	0.010	0.022	0.008	0.042
14	*Lower Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	*North Thompson*	0.001	0.001	0.000	0.000	0.004	0.001	0.002	0.000	0.000	0.005
16	*South Thompson*	0.173	0.015	0.173	0.149	0.199	0.170	0.020	0.170	0.139	0.204
17	*Puget Sound*	0.010	0.004	0.010	0.004	0.017	0.000	0.001	0.000	0.000	0.002
18	*Washington Coast*	0.183	0.016	0.182	0.157	0.210	0.229	0.023	0.228	0.192	0.268
19	*West Cascades Sp*	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
20	*Lower Columbia F*	0.029	0.007	0.029	0.018	0.042	0.035	0.010	0.035	0.020	0.054
21	*Willamette Sp*	0.002	0.002	0.001	0.000	0.005	0.003	0.003	0.002	0.000	0.008
22	*Columbia Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	*Interior Columbia Su/F*	0.119	0.013	0.119	0.098	0.141	0.109	0.017	0.108	0.083	0.137
24	*North Oregon Coast*	0.159	0.015	0.159	0.134	0.185	0.164	0.021	0.163	0.130	0.199
25	*Mid Oregon Coast*	0.018	0.006	0.018	0.009	0.029	0.023	0.009	0.022	0.010	0.039
26	*S Oregon/California*	0.000	0.001	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

[a] Run timing components are abbreviated as Sp (spring), Su (summer) and F (fall).

Appendix B7.–Estimated contributions of fine-scale reporting groups of Chinook salmon to the harvest for the second retention period of the summer troll fishery regionwide and in the Northern Outside quadrant of Southeast Alaska, AY 2018.

		Regionwide (*n* = 424)					Northern Outside (*n* = 207)				
					90% CI					90% CI	
	Reporting group[a]	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
1	*Situk*	0.001	0.003	0.000	0.000	0.002	0.001	0.005	0.000	0.000	0.002
2	*Alsek*	0.017	0.008	0.016	0.006	0.030	0.027	0.012	0.026	0.010	0.050
3	*N Southeast Alaska*	0.003	0.003	0.002	0.000	0.009	0.005	0.005	0.003	0.000	0.014
4	*Taku*	0.001	0.003	0.000	0.000	0.008	0.001	0.004	0.000	0.000	0.008
5	*Andrew*	0.010	0.007	0.009	0.001	0.023	0.015	0.011	0.014	0.000	0.035
6	*Stikine*	0.015	0.011	0.015	0.000	0.036	0.025	0.018	0.023	0.000	0.058
7	*S Southeast Alaska*	0.081	0.014	0.080	0.060	0.105	0.027	0.014	0.024	0.008	0.053
8	*Nass*	0.007	0.005	0.006	0.000	0.016	0.000	0.001	0.000	0.000	0.000
9	*Skeena*	0.011	0.011	0.007	0.000	0.032	0.013	0.016	0.005	0.000	0.045
10	*BC Coast/Haida Gwaii*	0.051	0.014	0.050	0.030	0.076	0.056	0.018	0.055	0.030	0.088
11	*West Vancouver*	0.185	0.020	0.184	0.153	0.219	0.161	0.025	0.160	0.121	0.204
12	*East Vancouver*	0.018	0.007	0.017	0.008	0.030	0.010	0.007	0.008	0.002	0.023
13	*Fraser*	0.008	0.006	0.006	0.001	0.019	0.006	0.006	0.004	0.000	0.017
14	*Lower Thompson*	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	*North Thompson*	0.003	0.004	0.001	0.000	0.010	0.000	0.001	0.000	0.000	0.000
16	*South Thompson*	0.052	0.012	0.051	0.034	0.073	0.055	0.016	0.053	0.030	0.084
17	*Puget Sound*	0.015	0.007	0.014	0.005	0.027	0.023	0.011	0.021	0.008	0.043
18	*Washington Coast*	0.167	0.021	0.166	0.133	0.203	0.238	0.032	0.237	0.187	0.292
19	*West Cascades Sp*	0.001	0.003	0.000	0.000	0.008	0.000	0.001	0.000	0.000	0.000
20	*Lower Columbia F*	0.041	0.012	0.040	0.023	0.062	0.056	0.017	0.054	0.030	0.087
21	*Willamette Sp*	0.002	0.003	0.000	0.000	0.008	0.003	0.005	0.000	0.000	0.013
22	*Columbia Sp*	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
23	*Interior Columbia Su/F*	0.149	0.019	0.148	0.119	0.181	0.158	0.026	0.157	0.117	0.202
24	*North Oregon Coast*	0.124	0.019	0.124	0.094	0.157	0.103	0.024	0.102	0.067	0.145
25	*Mid Oregon Coast*	0.039	0.015	0.038	0.017	0.067	0.018	0.018	0.011	0.000	0.054
26	*S Oregon/California*	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

[a] Run timing components are abbreviated as Sp (spring), Su (summer) and F (fall).

Appendix B8.–Estimated contributions of broad-scale reporting groups of Chinook salmon to the Southeast Alaska sport fishery harvest, AY 2018.

Area	Period	Sample size	Reporting group	Mean	SD	Median	90% CI 5%	90% CI 95%
Ketchikan	All Season	372	*Alaska*	0.695	0.026	0.696	0.652	0.737
			TBR	0.003	0.007	0.000	0.000	0.020
			Canada	0.247	0.025	0.246	0.207	0.288
			US South	0.055	0.012	0.054	0.036	0.077
Craig	All Season	401	*Alaska*	0.148	0.019	0.147	0.118	0.180
			TBR	0.020	0.010	0.020	0.005	0.037
			Canada	0.687	0.025	0.688	0.646	0.727
			US South	0.144	0.018	0.144	0.115	0.175
Sitka	All Season	778	*Alaska*	0.166	0.015	0.166	0.141	0.192
			TBR	0.008	0.006	0.006	0.001	0.020
			Canada	0.454	0.019	0.454	0.423	0.486
			US South	0.372	0.018	0.372	0.343	0.401
Petersburg-Wrangell	All Season	96	*Alaska*	0.727	0.067	0.732	0.612	0.829
			TBR	0.052	0.032	0.047	0.010	0.111
			Canada	0.179	0.044	0.175	0.113	0.255
			US South	0.042	0.043	0.021	0.001	0.123
Northern Inside	All Season	177	*Alaska*	0.936	0.022	0.938	0.897	0.967
			TBR	0.010	0.013	0.005	0.000	0.037
			Canada	0.053	0.018	0.051	0.027	0.086
			US South	0.001	0.002	0.000	0.000	0.004
Outside	All Season	1,302	*Alaska*	0.152	0.011	0.152	0.135	0.170
			TBR	0.006	0.004	0.006	0.001	0.013
			Canada	0.531	0.015	0.531	0.507	0.556
			US South	0.310	0.013	0.310	0.289	0.332
	Biweeks 9–13	771	*Alaska*	0.221	0.017	0.221	0.194	0.249
			TBR	0.006	0.006	0.005	0.000	0.017
			Canada	0.503	0.019	0.503	0.471	0.535
			US South	0.270	0.017	0.270	0.243	0.297
	Biweeks 14–18	531	*Alaska*	0.053	0.011	0.053	0.036	0.073
			TBR	0.006	0.004	0.005	0.001	0.013
			Canada	0.572	0.023	0.572	0.534	0.610
			US South	0.368	0.022	0.368	0.333	0.404

Note: Successfully genotyped sample sizes, standard deviation (SD), and 90% credibility intervals (CI) are provided.

Note: Reporting groups are described in Table 1.

Appendix B9.–Estimated contributions of driver stock reporting groups of Chinook salmon to the Southeast Alaska sport fishery harvest by area and season, AY 2018.

	Ketchikan (*n* = 372)					Petersburg-Wrangell (*n* = 96)					Northern Inside (*n* = 177)				
				90% CI					90% CI					90% CI	
Reporting group	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
SEAK/TBR	0.699	0.026	0.699	0.656	0.740	0.779	0.057	0.783	0.680	0.865	0.946	0.018	0.948	0.913	0.973
NCBC	0.073	0.017	0.072	0.047	0.102	0.169	0.043	0.166	0.104	0.244	0.053	0.018	0.051	0.026	0.086
West Vancouver	0.128	0.017	0.127	0.100	0.157	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
South Thompson	0.012	0.006	0.011	0.004	0.023	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Washington Coast	0.007	0.005	0.006	0.001	0.016	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
Interior Columbia Su/F	0.021	0.008	0.020	0.010	0.035	0.011	0.010	0.008	0.001	0.032	0.000	0.001	0.000	0.000	0.000
Oregon Coast	0.007	0.005	0.006	0.001	0.016	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
Other	0.054	0.012	0.054	0.036	0.076	0.040	0.042	0.021	0.000	0.120	0.001	0.002	0.000	0.000	0.005

	Craig (*n* = 401)					Sitka (*n* = 778)				
				90% CI					90% CI	
Reporting group	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
SEAK/TBR	0.168	0.020	0.168	0.136	0.203	0.174	0.015	0.173	0.149	0.199
NCBC	0.092	0.017	0.091	0.066	0.121	0.067	0.011	0.066	0.049	0.086
West Vancouver	0.481	0.025	0.481	0.440	0.523	0.281	0.016	0.281	0.255	0.308
South Thompson	0.078	0.014	0.077	0.056	0.102	0.082	0.010	0.081	0.065	0.099
Washington Coast	0.031	0.010	0.030	0.016	0.049	0.161	0.014	0.161	0.138	0.184
Interior Columbia Su/F	0.089	0.015	0.088	0.065	0.115	0.136	0.012	0.136	0.116	0.157
Oregon Coast	0.009	0.007	0.007	0.001	0.022	0.039	0.008	0.039	0.027	0.052
Other	0.051	0.012	0.050	0.034	0.072	0.060	0.009	0.060	0.046	0.076

	Outside All Season (*n* = 1,302)					Outside Biweeks 9–13 (*n* = 771)					Outside Biweeks 14–18 (*n* = 531)				
				90% CI					90% CI					90% CI	
Reporting group	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
SEAK/TBR	0.158	0.011	0.158	0.141	0.177	0.227	0.017	0.227	0.200	0.255	0.059	0.012	0.059	0.041	0.080
NCBC	0.077	0.009	0.077	0.063	0.092	0.076	0.012	0.075	0.057	0.096	0.079	0.014	0.078	0.057	0.102
West Vancouver	0.337	0.013	0.337	0.316	0.359	0.300	0.017	0.300	0.273	0.328	0.391	0.021	0.391	0.356	0.426
South Thompson	0.088	0.008	0.088	0.075	0.102	0.108	0.012	0.108	0.089	0.127	0.059	0.011	0.059	0.043	0.078
Washington Coast	0.124	0.010	0.123	0.108	0.140	0.089	0.011	0.089	0.072	0.108	0.173	0.018	0.173	0.145	0.203
Interior Columbia Su/F	0.123	0.009	0.123	0.108	0.139	0.111	0.011	0.110	0.092	0.130	0.141	0.016	0.141	0.116	0.168
Oregon Coast	0.035	0.006	0.034	0.026	0.045	0.041	0.008	0.041	0.029	0.055	0.026	0.008	0.025	0.013	0.041
Other	0.058	0.007	0.058	0.047	0.070	0.048	0.008	0.048	0.035	0.062	0.072	0.012	0.071	0.053	0.093

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

Note: Reporting groups are described in Table 1.

Appendix B10.–Estimated contributions of fine-scale reporting groups of Chinook salmon to the sport fishery harvest in Ketchikan, Petersburg-Wrangell, Sitka, Craig, and Northern Inside (Juneau, Haines, and Skagway) areas of Southeast Alaska, 2018.

		Ketchikan (*n* = 372)					Petersburg-Wrangell[b] (*n* = 96)					Northern Inside Quadrant (*n* = 177)				
					90% CI					90% CI					90% CI	
	Reporting group[a]	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
1	*Situk*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
2	*Alsek*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
3	*N Southeast Alaska*	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.005	0.006	0.003	0.000	0.016
4	*Taku*	0.001	0.004	0.000	0.000	0.008	0.000	0.002	0.000	0.000	0.001	0.010	0.013	0.004	0.000	0.037
5	*Andrew*	0.027	0.012	0.026	0.010	0.048	0.534	0.061	0.534	0.434	0.634	0.929	0.022	0.931	0.889	0.962
6	*Stikine*	0.002	0.006	0.000	0.000	0.017	0.051	0.032	0.046	0.009	0.111	0.000	0.002	0.000	0.000	0.000
7	*S Southeast Alaska*	0.668	0.027	0.669	0.624	0.712	0.192	0.073	0.191	0.079	0.315	0.002	0.005	0.000	0.000	0.012
8	*Nass*	0.012	0.008	0.010	0.003	0.026	0.003	0.010	0.000	0.000	0.021	0.000	0.002	0.000	0.000	0.000
9	*Skeena*	0.033	0.012	0.032	0.016	0.055	0.105	0.031	0.102	0.058	0.161	0.029	0.013	0.027	0.011	0.053
10	*BC Coast/Haida Gwaii*	0.028	0.012	0.026	0.011	0.048	0.061	0.029	0.057	0.022	0.117	0.023	0.014	0.021	0.005	0.049
11	*West Vancouver*	0.128	0.017	0.127	0.100	0.157	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
12	*East Vancouver*	0.034	0.010	0.033	0.020	0.051	0.009	0.012	0.004	0.000	0.033	0.000	0.001	0.000	0.000	0.000
13	*Fraser*	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001
14	*Lower Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
15	*North Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
16	*South Thompson*	0.012	0.006	0.011	0.004	0.023	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
17	*Puget Sound*	0.020	0.008	0.019	0.009	0.035	0.031	0.041	0.000	0.000	0.110	0.000	0.001	0.000	0.000	0.000
18	*Washington Coast*	0.007	0.005	0.006	0.001	0.016	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
19	*West Cascades Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
20	*Lower Columbia F*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
21	*Willamette Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
22	*Columbia Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
23	*Interior Columbia Su/F*	0.021	0.008	0.020	0.010	0.035	0.011	0.010	0.008	0.001	0.032	0.000	0.001	0.000	0.000	0.000
24	*North Oregon Coast*	0.007	0.005	0.006	0.001	0.016	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
25	*Mid Oregon Coast*	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
26	*S Oregon/California*	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000

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Appendix B10.–Page 2 of 2.

	Reporting group[a]	Craig (*n* = 401) Mean	SD	Median	90% CI 5%	95%	Sitka (*n* = 778) Mean	SD	Median	90% CI 5%	95%
1	*Situk*	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.002	0.000	0.006
2	*Alsek*	0.000	0.000	0.000	0.000	0.000	0.004	0.003	0.004	0.001	0.009
3	*N Southeast Alaska*	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.004
4	*Taku*	0.020	0.010	0.020	0.005	0.037	0.003	0.005	0.000	0.000	0.015
5	*Andrew*	0.074	0.014	0.073	0.052	0.099	0.130	0.014	0.129	0.107	0.153
6	*Stikine*	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
7	*S Southeast Alaska*	0.074	0.015	0.073	0.051	0.100	0.033	0.009	0.032	0.019	0.048
8	*Nass*	0.001	0.002	0.000	0.000	0.005	0.007	0.004	0.006	0.002	0.014
9	*Skeena*	0.056	0.014	0.055	0.035	0.079	0.026	0.008	0.025	0.014	0.039
10	*BC Coast/Haida Gwaii*	0.036	0.011	0.035	0.020	0.055	0.034	0.008	0.034	0.021	0.049
11	*West Vancouver*	0.481	0.025	0.481	0.440	0.523	0.281	0.016	0.281	0.255	0.308
12	*East Vancouver*	0.036	0.010	0.035	0.021	0.053	0.021	0.005	0.020	0.013	0.030
13	*Fraser*	0.000	0.001	0.000	0.000	0.000	0.004	0.002	0.004	0.001	0.008
14	*Lower Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	*North Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	*South Thompson*	0.078	0.014	0.077	0.056	0.102	0.082	0.010	0.081	0.065	0.099
17	*Puget Sound*	0.003	0.003	0.002	0.000	0.008	0.008	0.004	0.007	0.003	0.015
18	*Washington Coast*	0.031	0.010	0.030	0.016	0.049	0.161	0.014	0.161	0.138	0.184
19	*West Cascades Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	*Lower Columbia F*	0.012	0.006	0.011	0.004	0.024	0.024	0.006	0.023	0.015	0.034
21	*Willamette Sp*	0.000	0.000	0.000	0.000	0.000	0.004	0.002	0.003	0.001	0.008
22	*Columbia Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	*Interior Columbia Su/F*	0.089	0.015	0.088	0.065	0.115	0.136	0.012	0.136	0.116	0.157
24	*North Oregon Coast*	0.005	0.005	0.004	0.000	0.016	0.039	0.008	0.039	0.027	0.052
25	*Mid Oregon Coast*	0.003	0.005	0.000	0.000	0.014	0.000	0.001	0.000	0.000	0.002
26	*S Oregon/California*	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

[a] Run timing components are abbreviated as Sp (spring), Su (summer) and F (fall).

[b] Results did not converge at 80,000 iterations in BAYES. Results are an average of all 5 chains.

Appendix B11.–Estimated contributions of fine-scale reporting groups of Chinook salmon to the total season, early season (biweeks 9–13), and late season (biweeks 14–18) sport fishery harvest in outside waters (Craig/Klawock, Sitka, Yakutat, Gustavus, and Elfin Cove) of Southeast Alaska, 2018.

		Total season (*n* = 1,302)					Early season (*n* = 771)					Late season (*n* = 531)				
					90% CI					90% CI					90% CI	
	Reporting group[a]	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
1	*Situk*	0.002	0.001	0.001	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.004	0.003	0.003	0.001	0.010
2	*Alsek*	0.002	0.001	0.002	0.001	0.005	0.000	0.000	0.000	0.000	0.000	0.006	0.004	0.005	0.001	0.013
3	*N Southeast Alaska*	0.002	0.001	0.002	0.001	0.005	0.003	0.002	0.002	0.000	0.006	0.002	0.002	0.001	0.000	0.006
4	*Taku*	0.003	0.003	0.002	0.000	0.010	0.005	0.006	0.004	0.000	0.016	0.000	0.001	0.000	0.000	0.002
5	*Andrew*	0.102	0.009	0.101	0.087	0.117	0.150	0.014	0.150	0.127	0.174	0.032	0.009	0.031	0.018	0.048
6	*Stikine*	0.001	0.002	0.000	0.000	0.005	0.001	0.003	0.000	0.000	0.009	0.000	0.001	0.000	0.000	0.000
7	*S Southeast Alaska*	0.047	0.007	0.046	0.035	0.059	0.068	0.011	0.068	0.051	0.088	0.015	0.007	0.014	0.006	0.028
8	*Nass*	0.004	0.002	0.004	0.001	0.008	0.006	0.004	0.006	0.001	0.013	0.001	0.003	0.000	0.000	0.007
9	*Skeena*	0.039	0.007	0.039	0.029	0.051	0.040	0.009	0.040	0.026	0.056	0.038	0.010	0.037	0.023	0.056
10	*BC Coast/Haida Gwaii*	0.034	0.006	0.033	0.024	0.045	0.029	0.008	0.029	0.017	0.045	0.040	0.010	0.039	0.025	0.058
11	*West Vancouver*	0.337	0.013	0.337	0.316	0.359	0.300	0.017	0.300	0.273	0.328	0.391	0.021	0.391	0.356	0.426
12	*East Vancouver*	0.027	0.005	0.026	0.019	0.035	0.018	0.005	0.017	0.011	0.027	0.039	0.009	0.039	0.026	0.055
13	*Fraser*	0.002	0.001	0.002	0.001	0.005	0.001	0.001	0.001	0.000	0.004	0.004	0.003	0.003	0.000	0.009
14	*Lower Thompson*	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001
15	*North Thompson*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	*South Thompson*	0.088	0.008	0.088	0.075	0.102	0.108	0.012	0.108	0.089	0.127	0.059	0.011	0.059	0.043	0.078
17	*Puget Sound*	0.006	0.003	0.005	0.002	0.011	0.008	0.004	0.008	0.003	0.016	0.002	0.003	0.000	0.000	0.009
18	*Washington Coast*	0.124	0.010	0.123	0.108	0.140	0.089	0.011	0.089	0.072	0.108	0.173	0.018	0.173	0.145	0.203
19	*West Cascades Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	*Lower Columbia F*	0.022	0.005	0.022	0.015	0.030	0.020	0.005	0.020	0.012	0.030	0.026	0.008	0.025	0.014	0.040
21	*Willamette Sp*	0.001	0.001	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.001	0.001	0.002	0.000	0.000	0.006
22	*Columbia Sp*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	*Interior Columbia Su/F*	0.123	0.009	0.123	0.108	0.139	0.111	0.011	0.110	0.092	0.130	0.141	0.016	0.141	0.116	0.168
24	*North Oregon Coast*	0.032	0.006	0.032	0.023	0.042	0.041	0.008	0.040	0.029	0.054	0.019	0.008	0.018	0.008	0.034
25	*Mid Oregon Coast*	0.003	0.002	0.002	0.000	0.007	0.000	0.001	0.000	0.000	0.002	0.006	0.005	0.005	0.000	0.015
26	*S Oregon/California*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

[a] Run timing components are abbreviated as Sp (spring), Su (summer) and F (fall).

Appendix B12.– Estimated contributions of driver stock reporting groups of Chinook salmon to the annual Southeast Alaska troll fishery harvest, AY 2009–2018.

	AY 2009 (*n* = 1,629)					AY 2010 (*n* = 3,197)				
				90% CI					90% CI	
Reporting group	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
SEAK/TBR	0.219	0.009	0.219	0.204	0.234	0.252	0.008	0.252	0.238	0.266
NCBC	0.101	0.008	0.101	0.089	0.115	0.075	0.006	0.075	0.066	0.085
West Vancouver	0.121	0.008	0.121	0.108	0.136	0.085	0.006	0.085	0.076	0.094
South Thompson	0.085	0.008	0.084	0.071	0.099	0.148	0.008	0.148	0.135	0.161
Washington Coast	0.094	0.009	0.094	0.08	0.11	0.092	0.007	0.092	0.081	0.104
Interior Columbia (Su/F)	0.226	0.012	0.226	0.206	0.246	0.152	0.008	0.152	0.139	0.165
Oregon Coast	0.084	0.009	0.083	0.069	0.099	0.112	0.007	0.112	0.1	0.125
Other	0.07	0.007	0.07	0.058	0.083	0.084	0.006	0.083	0.074	0.094
	AY 2011 (*n* = 5,198)					AY 2012 (*n* = 3,288)				
SEAK/TBR	0.186	0.006	0.186	0.177	0.196	0.255	0.009	0.255	0.241	0.269
NCBC	0.101	0.005	0.101	0.093	0.11	0.099	0.007	0.099	0.088	0.111
West Vancouver	0.121	0.005	0.121	0.113	0.129	0.1	0.006	0.1	0.091	0.109
South Thompson	0.097	0.005	0.097	0.09	0.105	0.055	0.005	0.055	0.048	0.063
Washington Coast	0.092	0.005	0.092	0.085	0.1	0.109	0.007	0.108	0.097	0.12
Interior Columbia (Su/F)	0.21	0.006	0.21	0.2	0.22	0.194	0.008	0.194	0.181	0.208
Oregon Coast	0.107	0.005	0.107	0.099	0.114	0.08	0.006	0.08	0.07	0.091
Other	0.086	0.004	0.086	0.078	0.093	0.108	0.006	0.108	0.098	0.119
	AY 2013 (*n* = 2,095)					AY 2014 (*n* = 3,465)				
SEAK/TBR	0.221	0.01	0.221	0.205	0.238	0.11	0.006	0.109	0.1	0.12
NCBC	0.091	0.008	0.091	0.079	0.104	0.056	0.005	0.056	0.049	0.064
West Vancouver	0.127	0.008	0.127	0.114	0.141	0.113	0.007	0.113	0.102	0.125
South Thompson	0.078	0.008	0.078	0.065	0.091	0.059	0.006	0.059	0.05	0.069
Washington Coast	0.047	0.007	0.046	0.036	0.058	0.071	0.008	0.071	0.059	0.085
Interior Columbia (Su/F)	0.287	0.012	0.287	0.267	0.308	0.443	0.013	0.443	0.422	0.464
Oregon Coast	0.083	0.009	0.083	0.069	0.098	0.067	0.008	0.067	0.055	0.08
Other	0.066	0.007	0.066	0.056	0.077	0.081	0.007	0.081	0.069	0.093
	AY 2015 (*n* = 2,816)					AY 2016 (*n* = 3,850)				
SEAK/TBR	0.154	0.007	0.154	0.143	0.165	0.106	0.005	0.106	0.099	0.115
NCBC	0.111	0.008	0.111	0.099	0.124	0.078	0.005	0.078	0.071	0.086
West Vancouver	0.06	0.005	0.06	0.052	0.069	0.084	0.005	0.083	0.075	0.092
South Thompson	0.072	0.007	0.072	0.06	0.085	0.074	0.006	0.073	0.064	0.084
Washington Coast	0.067	0.008	0.066	0.054	0.08	0.048	0.006	0.047	0.038	0.057
Interior Columbia (Su/F)	0.373	0.013	0.373	0.352	0.393	0.386	0.01	0.386	0.369	0.403
Oregon Coast	0.074	0.009	0.073	0.06	0.088	0.12	0.008	0.12	0.107	0.133
Other	0.09	0.007	0.09	0.079	0.102	0.105	0.006	0.104	0.095	0.115
	AY 2017 (*n* = 3,128)					AY 2018 (*n* = 3,638)				
SEAK/TBR	0.118	0.007	0.118	0.106	0.13	0.178	0.01	0.178	0.162	0.194
NCBC	0.079	0.007	0.079	0.068	0.091	0.078	0.009	0.078	0.064	0.093
West Vancouver	0.192	0.008	0.192	0.179	0.205	0.127	0.008	0.127	0.114	0.141
South Thompson	0.161	0.008	0.161	0.148	0.175	0.112	0.009	0.112	0.098	0.128
Washington Coast	0.041	0.005	0.041	0.033	0.05	0.147	0.011	0.147	0.13	0.165
Interior Columbia (Su/F)	0.237	0.01	0.237	0.221	0.254	0.123	0.009	0.123	0.109	0.138
Oregon Coast	0.059	0.006	0.059	0.049	0.07	0.143	0.01	0.142	0.126	0.16
Other	0.113	0.008	0.113	0.1	0.126	0.092	0.008	0.092	0.079	0.106

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

Note: Reporting groups are described in Table 1.

Appendix B13.–Estimated contributions of driver stock reporting groups of Chinook salmon to the annual Southeast Alaska sport fishery harvest, AY 2009–2018.

	AY 2009 (*n* = 1,229)					AY 2010 (*n* = 1,349)				
				90% CI					90% CI	
Reporting group	Mean	SD	Median	5%	95%	Mean	SD	Median	5%	95%
SEAK/TBR	0.671	0.012	0.671	0.651	0.691	0.508	0.011	0.508	0.491	0.525
NCBC	0.07	0.008	0.07	0.057	0.085	0.075	0.009	0.075	0.061	0.091
West Vancouver	0.061	0.007	0.061	0.05	0.072	0.099	0.008	0.099	0.085	0.113
South Thompson	0.035	0.006	0.034	0.026	0.044	0.112	0.009	0.112	0.097	0.127
Washington Coast	0.031	0.005	0.031	0.023	0.04	0.07	0.008	0.07	0.057	0.083
Interior Columbia (Su/F)	0.078	0.007	0.078	0.067	0.09	0.08	0.008	0.08	0.067	0.094
Oregon Coast	0.015	0.004	0.014	0.009	0.021	0.028	0.006	0.028	0.019	0.038
Other	0.039	0.006	0.039	0.03	0.05	0.027	0.005	0.027	0.019	0.037
	AY 2011 (*n* = 1,795)					AY 2012 (*n* = 1,619)				
SEAK/TBR	0.489	0.01	0.489	0.472	0.506	0.426	0.013	0.426	0.405	0.446
NCBC	0.075	0.007	0.075	0.063	0.088	0.063	0.009	0.063	0.05	0.079
West Vancouver	0.124	0.008	0.124	0.111	0.137	0.09	0.008	0.089	0.076	0.104
South Thompson	0.05	0.006	0.05	0.041	0.059	0.069	0.008	0.069	0.057	0.083
Washington Coast	0.072	0.007	0.072	0.061	0.084	0.095	0.009	0.095	0.081	0.111
Interior Columbia (Su/F)	0.11	0.008	0.11	0.098	0.122	0.165	0.01	0.164	0.148	0.182
Oregon Coast	0.041	0.005	0.041	0.032	0.05	0.046	0.007	0.046	0.035	0.058
Other	0.039	0.005	0.039	0.031	0.049	0.047	0.006	0.047	0.037	0.057
	AY 2013 (*n* = 1,736)					AY 2014 (*n* = 2,052)				
SEAK/TBR	0.428	0.01	0.428	0.413	0.444	0.296	0.007	0.296	0.283	0.308
NCBC	0.063	0.007	0.062	0.052	0.074	0.064	0.006	0.064	0.054	0.074
West Vancouver	0.102	0.008	0.101	0.089	0.114	0.124	0.008	0.124	0.111	0.136
South Thompson	0.048	0.006	0.048	0.039	0.058	0.048	0.005	0.047	0.04	0.056
Washington Coast	0.071	0.007	0.07	0.059	0.082	0.053	0.006	0.053	0.045	0.063
Interior Columbia (Su/F)	0.206	0.01	0.206	0.19	0.223	0.319	0.01	0.319	0.303	0.336
Oregon Coast	0.046	0.006	0.046	0.036	0.056	0.043	0.005	0.042	0.035	0.051
Other	0.037	0.005	0.036	0.029	0.045	0.054	0.006	0.054	0.045	0.064
	AY 2015 (*n* = 1,913)					AY 2016 (*n* = 1,921)				
SEAK/TBR	0.299	0.01	0.298	0.283	0.315	0.175	0.009	0.175	0.16	0.191
NCBC	0.098	0.008	0.098	0.085	0.112	0.1	0.009	0.1	0.085	0.115
West Vancouver	0.175	0.01	0.175	0.159	0.192	0.214	0.011	0.214	0.195	0.233
South Thompson	0.061	0.007	0.061	0.05	0.074	0.092	0.009	0.092	0.078	0.107
Washington Coast	0.078	0.008	0.078	0.065	0.091	0.053	0.007	0.053	0.043	0.065
Interior Columbia (Su/F)	0.205	0.011	0.204	0.186	0.223	0.254	0.013	0.254	0.233	0.275
Oregon Coast	0.041	0.007	0.041	0.031	0.052	0.049	0.007	0.049	0.038	0.061
Other	0.044	0.006	0.043	0.034	0.054	0.063	0.008	0.063	0.051	0.076
	AY 2017 (*n* = 2,809)					AY 2018 (*n* = 1,947)				
SEAK/TBR	0.283	0.009	0.283	0.269	0.297	0.381	0.009	0.381	0.366	0.397
NCBC	0.079	0.007	0.079	0.069	0.091	0.077	0.007	0.077	0.065	0.089
West Vancouver	0.252	0.008	0.252	0.238	0.266	0.244	0.009	0.244	0.229	0.259
South Thompson	0.119	0.006	0.119	0.109	0.13	0.059	0.005	0.059	0.05	0.068
Washington Coast	0.042	0.004	0.042	0.035	0.049	0.081	0.006	0.081	0.071	0.091
Interior Columbia (Su/F)	0.149	0.007	0.149	0.138	0.16	0.084	0.006	0.084	0.074	0.094
Oregon Coast	0.024	0.003	0.024	0.019	0.029	0.024	0.004	0.024	0.018	0.03
Other	0.052	0.005	0.052	0.044	0.06	0.05	0.005	0.05	0.042	0.06

Note: *n* = successfully genotyped sample size, SD = standard deviation, and 90% CI = 90% credibility intervals.

Note: Reporting groups are described in Table 1.