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November 19, 2012

Dear Western Alaska fishery stakeholder;

I am pleased to announce publication of results from the Western Alaska Salmon Stock Identification Program (WASSIP), a unique collaboration among stakeholders and scientists to address long-standing questions about harvest patterns of chum and sockeye salmon in Western Alaska fisheries. Spanning more than eight years, WASSIP is the largest salmon genetics study ever attempted, analyzing more than 225,000 samples to determine stock-specific compositions, harvests, and harvest rates of sockeye and chum salmon in subsistence and commercial fisheries from Chignik to Kotzebue.

Complete WASSIP results are contained in nine reports. Foundation for the study is presented in five reports documenting fishery sampling, genetic baselines for each species, and estimated stock-specific escapements for each species. Results of mixed stock fishery analyses are contained within two reports for each species: one documenting estimated stock compositions from genetic analyses; and one providing estimates of stock-specific harvest numbers and harvest rates for chum and sockeye salmon in WASSIP fisheries. The two reports for each species are intimately connected. Stock composition of fishery catches show percentage of harvest represented by various stocks in WASSIP fisheries. These stock percentages were applied to the number of fish harvested in the fisheries to determine stock-specific harvest numbers. Stock-specific harvest numbers for each WASSIP fishery were divided by the total run for each stock to determine the harvest rate. It is essential that stock composition, harvest, and harvest rate results for each species be considered together to gain a complete understanding and full context of study results. All reports can be accessed on the Alaska Department of Fish and Game website (http://www.adfg.alaska.gov/index.cfm?adfg=wassip.reports).

While these results cannot address all questions surrounding fishery impacts on chum and sockeye salmon stocks across this vast geography, WASSIP provided opportunity for representatives of major regional fishery interests to collaborate with technical experts on design of scientific studies to inform regulatory decisions. The many genetic and biometric advances achieved in the project, and the astounding magnitude of sampling efforts, will contribute to our basic understanding of Western Alaska chum and sockeye salmon stocks for many years to come.

Sincerely,

Eric C. Volk

Alaska Department of Fish and Game
WASSIP Advisory Panel Chair

Special Publication No. 12-23

Stock Composition of Chum Salmon Harvests in Fisheries of the Western Alaska Salmon Stock Identification Program (WASSIP), 2007-2009

by
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and
Christopher Habicht

This report was updated in July 2014 by adding Wei Cheng to the acknowledgments section (page 19) and correcting an in-text citation of DeCovich et al. 2012 (page 18).

November 2012

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

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

Mathematics, statistics

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

SPECIAL PUBLICATION NO. 12-23

STOCK COMPOSITION OF CHUM SALMON HARVESTS IN FISHERIES OF THE WESTERN ALASKA SALMON STOCK IDENTIFICATION PROGRAM (WASSIP), 2007-2009

by

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November 2012

This investigation was funded by the State of Alaska and National Oceanographic and Atmospheric Administration under Cooperative Agreement NA06NMF4380094

The Special Publication series was established by the Division of Sport Fish in 1991 for the publication of techniques and procedures manuals, informational pamphlets, special subject reports to decision-making bodies, symposia and workshop proceedings, application software documentation, in-house lectures, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Special Publications are intended for fishery and other technical professionals. Special Publications are available through the Alaska State Library, Alaska Resources Library and Information Services (ARLIS) and on the Internet http://www.adfg.alaska.gov/sf/publications/. This publication has undergone editorial and peer review.

Note: Product names used in this publication are included for completeness but do not constitute product endorsement. The Alaska Department of Fish and Game, in accordance with State of Alaska ethics laws, does not favor one group over another through endorsement or recommendation.

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This document should be cited as:
Templin, W. D., N. A. DeCovich, S. D. Rogers Olive, H. L. Liller, E. K. C. Fox, J. R. Jasper, M. J. Witteveen, T. T. Baker, K. G. Howard, A. R. Munro, E. C. Volk, and C. Habicht. 2012. Stock composition of chum salmon harvests in fisheries of the Western Alaska Salmon Stock Identification Program (WASSIP), 2007–2009. Alaska Department of Fish and Game, Special Publication No. 12-23, Anchorage.

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ABSTRACT

Uncertainty about the magnitude, frequency, location, and timing of stock-specific chum and sockeye salmon harvest in Western Alaska fisheries was the impetus for the Western Alaska Salmon Stock Identification Program (WASSIP). The program was designed to use genetic data for mixed stock analysis (MSA) of fisheries samples to more clearly describe harvest patterns of chum and sockeye salmon stocks in Western Alaska fisheries. Stock composition estimates for temporal strata across fisheries are required to estimate stock-specific harvest numbers and rates. This report describes the methods used to estimate stock compositions for chum salmon, presents stock composition estimates, and provides guidance on how to interpret biases documented in MSA baseline tests when evaluating stock composition estimates of WASSIP catch samples. For WASSIP chum salmon analyses, 143,258 fish were sampled from harvests in 278 fishery strata distributed across time within fisheries from Chignik Area to Kotzebue Sound between 2006 and 2009. Of these, 74,445 samples were selected for analysis from 207 fishery strata between 2007 and 2009. We successfully genotyped 71,656 individual fish from 194 fishery strata for the single nucleotide polymorphism markers designated for WASSIP analyses. Trends in chum salmon stock composition estimates were observed across fisheries and within and among years. In general, fisheries to the north of the Alaska Peninsula caught chum salmon of Coastal Western Alaska origin, while fisheries along the Alaska Peninsula were composed of mixtures of stocks, with fisheries along the southern Alaska Peninsula having the greatest diversity of stocks. These results provide the most comprehensive examination of the stock composition of chum salmon in commercial and subsistence fisheries in Western Alaska.

Key words: Western Alaska Salmon Stock Identification Program, WASSIP, chum salmon, *Oncorhynchus keta*, stock composition, mixed stock analysis, MSA, genetic stock identification, GSI

INTRODUCTION

Chum salmon *Oncorhynchus keta* are a vital subsistence resource for many communities in Western Alaska, where the fish are used extensively for both human and dog food (Wolfe and Spaeder 2009). Chum salmon are also an important commercial species in many areas of Western Alaska. The combination of chum salmon life history, migratory pathways, and the geography of Western Alaska creates the potential for harvesting populations originating from river systems throughout the species range as they return to spawn in natal streams. While a majority of chum salmon harvest in Western Alaska occurs in terminal and inriver fisheries (Linderman and Bergstrom 2009; Menard et al. 2009; Bue et al. 2009), the harvest of nonlocal fish does occur and can bias estimates of total run and stock productivity.

The Western Alaska Salmon Stock Identification Program (WASSIP) is a stakeholder driven program to extensively sample commercial and subsistence fisheries across Western Alaska. It was designed to use genetic data in mixed stock analysis (MSA) to estimate stock proportions, stock-specific harvest numbers and harvest rates of component sockeye and chum salmon stocks in these fishery mixtures. This report summarizes estimated proportions of chum salmon stocks in WASSIP fisheries. Details of WASSIP structure, process, and objectives can be found in Munro et al. (2012) and Habicht et al. (2012b).

MSA has been used effectively for many years to provide estimates of the stock composition of Pacific salmon fishery harvests, and applications in chum salmon were some of the earliest (Beacham et al. 1985). In Alaska, pioneering work was initiated on chum salmon within the Yukon River (Wilmot et al. 1992), but the highly migratory nature of this species meant that applications in marine waters would require a species-wide scope for baseline (Winans et al. 1998, Seeb et al. 2004, Wilmot et al. 1994). Allozymes were the only genetic markers available for the initial studies and large datasets were compiled through collaborative efforts (Kondzela et al. 2002; Seeb et al. 2004), but as the sophistication of genetic techniques increased, applications quickly switched to DNA-based markers such as microsatellites (Beacham et al. 2009) and single

nucleotide polymorphisms (SNPs; Seeb et al. 2011) for increased sensitivity, faster throughput and reduced costs. Population structure and its use in MSA has been well demonstrated in chum salmon across the species range. Examples include Yukon River (Wilmot et al. 1992; Flannery et al. 2010), Alaska Peninsula (Crane and Seeb 2000), Southeast Alaska (Kondzela et al. 1994), British Columbia (Beacham et al. 2008a), Washington (Shaklee et al. 1990), Japan (Beacham et al. 2008b), and in research and bycatch samples from the Bering Sea and North Pacific (Wilmot et al. 1998; Winans et al. 1998).

The two foundational elements of MSA include: 1) representative sampling of fishery catches (catch samples), and 2) the genetic characterization of all stocks that might contribute to the fishery (genetic baseline). Catch samples of chum salmon from 278 fishery strata distributed across time within fisheries from Chignik Area to Kotzebue Sound (Figure 1) were reported in Eggers et al. (2011). A total of 143,258 samples were collected from 2006 to 2009; however, only samples from 2007 to 2009 were analyzed due to funding limitations. For analysis, a total of 74,445 samples were selected from 207 fishery strata over the 3-year period (Eggers et al. 2011).

The genetic baseline used to analyze WASSIP catch samples extends across the North Pacific from Korea to Washington State (DeCovich et al. 2012). This baseline includes 32,817 individuals from 402 collections representing 310 populations. Individuals were assayed at 96 SNP markers that represented 91 loci. Genetic structure was adequate for MSA to provide estimates to 9 regional reporting groups of interest for the purposes of WASSIP.

Here we report genetic analysis of selected catch samples and the estimated stock composition of these catch samples using MSA, anchored by the genetic baseline described in Decovich et al. (2012). Stock compositions are reported as percentages of the samples from the catch. Stock-specific composition estimates are not combined across fishery strata (across fishing periods or districts), because harvest numbers are necessary to provide weights when calculating summary estimates. Extrapolation of these percentages to stock-specific numbers of harvested fish and to stock-specific harvest rates is reported in Munro et al. (2012).

DEFINITIONS

To reduce confusion associated with the methods, results, and interpretation of this study, basic definitions of commonly used genetic and salmon management terms are offered here.

Allele. Alternative form of a given gene or DNA sequence.

Credibility Interval. In Bayesian statistics, a credibility interval is a posterior probability interval. Credibility intervals differ from confidence intervals in frequentist statistics in that they are a direct statement of probability: i.e. a 90% credibility interval has a 90% chance of containing the true answer.

District. Waters open to commercial salmon fishing. Commercial fishing districts, subdistricts and sections in WASSIP commercial fishing areas are defined in statutes listed below under 'Salmon administrative area.'

Escapement (or Spawning Abundance or Spawners). The annual estimated size of the spawning salmon stock (5 AAC 39.222(f))).

F-statistics. Measures used to partition genetic diversity within and among populations in a hierarchical fashion.

Genetic Marker. A known DNA sequence that can be identified by a simple assay.

Genotype. The set of alleles for one or more loci for an individual.

Harvest. The number of salmon taken of a run from a specific stock.

Harvest Rate. The fractional harvest from a stock taken in a fishery.

Locus (Loci, plural). A fixed position or region on a chromosome that may contain more than one genetic marker.

Mixed Stock Analysis (MSA). Method using allele frequencies from populations and genotypes from mixture samples to estimate stock compositions of mixtures.

Polymerase Chain Reaction (PCR). Method which amplifies a single or few copies of a locus across several orders of magnitude, generating millions of copies of the DNA.

Posterior Probability Distribution. The distribution of an unknown quantity, treated as a random variable, conditional on the evidence obtained from an experiment or survey.

Prior Probability Distribution. The distribution that expresses uncertainty and information of an unknown quantity before taking into account data.

Reporting Group. A group of populations in a genetic baseline to which portions of a mixture are allocated during mixed stock analyses; constructed based on a combination of stakeholder needs and genetic distinction and approved by the WASSIP Technical Committee and Advisory Panel. For the purposes of WASSIP chum salmon analyses, reporting groups were defined as: 1) Asia, 2) Kotzebue Sound, 3) Coastal Western Alaska, 4) Upper Yukon River, 5) Northern District, 6) Northwestern District, 7) South Peninsula, 8) Chignik/Kodiak, and 9) East of Kodiak.

Run. The total number of salmon in a stock surviving to adulthood and returning to the vicinity of the natal stream in any calendar year, composed of both the harvest of adult salmon plus the escapement; the annual run in any calendar year. The run is composed of several age classes of mature fish from the stock, derived from the spawning of a number of previous brood years (from 5 AAC 39.222(f)).

Salmon Administrative Area (Area). Geographic areas used to administer the registration of commercial salmon fishing permits (from 20 AAC 05.230). Districts and subdistricts within areas which are used to aid management are further defined by administrative code.

Salmon Stock. A locally interbreeding group of salmon that is distinguished by a distinct combination of genetic, phenotypic, life history, and habitat characteristics or an aggregation of two or more interbreeding groups, which occur in the same geographic area and is managed as a unit (from 5 AAC 39.222(f)). For purposes of this study, a chum salmon *stock* is a composite of populations that spawn within 1 of the 9 geographic regions defined as reporting groups above.

Single nucleotide polymorphism (SNP). DNA sequence variation occurring when a single nucleotide (A, T, C, or G) differs among individuals or within an individual between paired chromosomes.

METHODS

TISSUE SAMPLING

Axillary processes were collected from individual chum salmon sampled from subsistence and commercial harvests in nearshore marine fisheries along the coast of western Alaska. Sampling was conducted to be representative of the harvest in each fishery. Detailed methods for sampling tissue from the harvest and selecting samples for genetic analysis are reported in Eggers et al. (2011). For chum salmon, 278 fishery strata were sampled. These strata were distributed across time within fisheries from the Chignik Area to the Kotzebue Area. A total of 143,258 samples were collected from 2006 to 2009. Of these, 74,445 samples were selected for analysis from 2007 to 2009 collections. Samples collected from the 2006 chum salmon harvests were not analyzed due to insufficient coverage of some fisheries and budget constraints.

LABORATORY ANALYSIS

Assaying genotypes

Some tissue samples were preserved in a solution of dimethyl sulfoxide (DMSO). Before DNA was extracted from these tissues, the DMSO was washed away by rinsing with water. Individual tissues were placed on a mesh screen and rinsed with high pressure water. The longer the sample was preserved in DMSO, the longer it was rinsed. For tissue samples collected in 2007, the rinse was 45 s. For tissue samples collected in 2008–2009, the rinse was 30 s.

DNA extraction and genotyping generally followed the methods in Seeb et al. (2009) and are described in detail in in DeCovich et al. (2012). Briefly, we extracted genomic DNA from tissue samples using a DNeasy® 96 Tissue Kit by QIAGEN® (Valencia, CA). A multiplexed preamplification PCR of 96 SNP markers was used to increase the concentration of template DNA. Reactions were conducted in 10 µL volumes consisting of 4 uL of genomic DNA, 5 µL of 2X Multiplex PCR Master Mix (QIAGEN®) and 1 µL each (2 µM SNP unlabeled forward and reverse primers). Thermal cycling was performed on a Dual 384-Well GeneAmp® PCR system 9700 (Applied Biosystems) at 95°C for 15 min followed by 20 cycles of 95°C for 15 s, 60°C for 4 min, and a final extension at 4°C. The preamplified DNA was then loaded into a Fluidigm® 96.96 Dynamic Array in a post-PCR laboratory at ADF&G. We screened 96 SNP markers using Fluidigm® 96.96 Dynamic Arrays (http://www.fluidigm.com). The Dynamic Arrays were read on a Fluidigm® EP1™ System or BioMark™ System after amplification and scored using Fluidigm® SNP Genotyping Analysis software.

Assays failing to amplify with the Fluidigm system were reanalyzed on the Applied Biosystems platform using the preamplified DNA. Each reaction on this platform was performed in 384-well reaction plates in a 5 µL volume consisting of 5-40 ng/µl of template DNA, 1x TaqMan® Universal PCR Master Mix (Applied Biosystems), and 1x TaqMan® SNP Genotyping Assay (Applied Biosystems). Thermal cycling was performed on a Dual 384-Well GeneAmp® PCR System 9700 (Applied Biosystems) as follows: an initial denaturation of 10 min at 95°C followed by 50 cycles of 92°C for 1 s and annealing/extension temperature for 1 min. The plates were scanned on an Applied Biosystems Prism 7900HT Sequence Detection System after amplification and scored using Applied Biosystems' Sequence Detection Software (SDS) version 2.2.

Genotypes produced on both platforms were imported and archived in the Gene Conservation Laboratory Oracle database, LOKI.

Laboratory quality control

We conducted a quality control analysis (QC) to identify laboratory errors and to measure the background discrepancy rate of our genotyping process. The QC analyses were performed by staff not involved in the original genotyping. The method employed for the catch samples was the same as the *New* QC method outlined in the baseline report (DeCovich et al. 2012) in which 8% of project fish were re-extracted and genotyped for the all SNPs. Discrepancy rates were calculated as the number of conflicting genotypes, divided by the total number of genotypes compared. These rates describe the difference between original project data and QC data for all SNPs and are capable of identifying extraction, assay plate, and genotyping errors. Assuming that the discrepancies among analyses were due equally to errors during the original genotyping and during quality control, error rates in the original genotyping can be estimated as half the rate of discrepancies.

STATISTICAL ANALYSIS

Data retrieval and quality control

We retrieved genotypes from the database, LOKI, and imported them into *R* (R Development Core Team 2010). All subsequent analyses were performed in *R* unless otherwise noted. In order to provide the highest quality estimates of stock composition, it is necessary to only include individual fish for which genotypes can be identified with certainty. To filter out potential problems, 3 quality control measures were conducted once genotypes were retrieved from LOKI. First, we removed individuals that were missing substantial genotypic data from further analyses. We used what we refer to as the *80% rule* which excludes individuals missing genotypes for 20% or more of markers, because these individuals likely have poor-quality DNA. The inclusion of individuals with poor-quality DNA might introduce genotyping errors into the baseline and reduce the accuracies of MSA.

Second, we identified individuals that appeared to be the wrong species. Individuals that amplified well, but displayed signature patterns for other species in their scatter plot distributions across selected loci were identified as nonchum salmon. We were able to determine that the fish was not a chum salmon because we analyzed nonchum salmonid species of Atlantic and Pacific salmon (sockeye, Chinook, pink, and coho salmon) on the 96 markers to identify these species-specific signatures in scatter plot distributions. We only noted that the sample was not a chum and did not report the species.

Third, we identified individuals with duplicate genotypes and removed them from further analyses. Duplicate genotypes can occur as a result of sampling or extracting the same individual twice, and were defined as pairs of individuals sharing the same genotype in 95% of markers screened. The individual with the most missing data from each duplicate pair was removed from further analyses.

The number of chum salmon initially selected for analysis (Eggers et al. 2011), the number genotyped in the laboratory, the numbers excluded for the 3 statistical quality control analyses, and the final number included in MSA were tabulated for each catch sample.

Estimating stock compositions

The stock compositions of WASSIP fishery harvests were estimated using a Bayesian approach to genetic MSA, the Pella-Masuda Model (*BAYES*; Pella and Masuda, 2001). The Bayesian method of MSA estimates 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 chum salmon populations and the reporting groups into which the populations were combined are described in DeCovich et al. (2012).

Prior choice

It was demonstrated during the WASSIP analysis that the choice of prior information about the stock proportions in a fishery, or the prior probability distribution (referred to hereafter as a *prior*) is important to the outcome of the MSA (Jasper et al. 2012, Habicht et al. 2012d). There is not a universally standard method for the selection of a prior in these types of analyses. We predicted the prior effect to be greater with weakly structured baseline stocks, making prior selection especially important for these stocks. Based on WASSIP Technical Committee (TC; described in Munro et al. 2012) input, we developed a novel approach for defining priors based upon 4 steps: 1) within each fishery, determine whether variation is lower within years across time strata or across years within time strata using F_{ST} (Weir and Cockerham 1984); 2) estimate stock composition estimates for the combined strata groups with the smallest interstratum variability using the program *SPAM* (Debevec et al. 2000), excluding the first stratum for each set; 3) use these estimates for the priors in the first stratum for each set; and 4) use the posterior from the first stratum as the prior for the next most-similar stratum (across time strata within years or across years within time strata, based on F_{ST} results) and continue using the posterior of the previous stratum as the prior for the next stratum prior until all strata are analyzed. We called this the *sequential priors* method (Jasper et al. 2012).

This method for defining priors was applicable when more than one stratum from a fishery was available to develop a prior, but cannot be applied to unassociated strata. Unassociated strata are those with no adjacent sampled strata within a fishery, either across time strata within years or across years within time strata. As an example, a fishery that was sampled in only a single temporal stratum in only one of the three years would represent an unassociated stratum. Where these unassociated strata occurred, they were either excluded from further analyses or a prior was determined on a case-by-case basis using expert opinion.

The prior information about stock proportions was incorporated in the form of a Dirichlet probability distribution in which the sum of the prior Dirichlet parameters sum to K and can be interpreted as adding K individuals to the fishery sample known as the *prior count*. While K can be assigned any positive value, we assigned it the the commonly used value of 1 (Pella and Masuda 2001).

BAYES protocol

We ran 5 independent Markov Chain Monte Carlo (MCMC) chains of 40,000 iterations with different starting values and discarded the first 20,000 iterations to remove the influences of the initial start values. We defined the starting values for the first chain such that the first 1/5 of the baseline populations summed to 0.9 and the remaining populations summed to 0.1. Each chain

had a different combination of 1/5 of baseline populations summing to 0.9. We combined the second halves of these chains to form the posterior distribution and tabulated mean estimates, 90% credibility intervals, the probability of an estimate being equal to zero, and standard deviations from a total of 100,000 iterations. For each tabulated measure, summary statistics were based upon the raw posterior, which was calculated out to 6 significant digits.

We also assessed the within- and among-chain convergence of these estimates using the Raftery-Lewis and Gelman-Rubin diagnostics. These statistics compare variation of estimates within a chain (Raftery and Lewis 1996) and the total variation among chains (Gelman and Rubin 1992), respectively. If the Gelman-Rubin diagnostic for any stock group estimate was greater than 1.2 and the Raftery-Lewis diagnostic suggested that each chain had not converged to stable estimates, we reanalyzed the mixture with 80,000-iteration chains following the same protocol.

Reporting quality control

As a final quality control measure, draft stock composition estimates for chum salmon captured in WASSIP fishery strata were distributed to the Advisory Panel (AP; described in Munro et al. 2012), TC, and ADF&G staff for review. Reviewers were asked to provide feedback on fishery strata that had stock composition estimates that were different than might be expected, which might indicate an error in the process. These fishery strata were statistically re-analyzed to look for analysis errors. This re-analysis involved rewriting *R* scripts as if the strata had never been analyzed before, pulling genotypes out of the database, compiling new input files for *BAYES* (using original priors and starting values; Pella and Masuda 2001), running the files through *BAYES*, and comparing the estimates to the released estimates.

RESULTS

TISSUE SAMPLING

Detailed results from sampling the harvest of chum salmon in subsistence and commercial fisheries from 2006 to 2009 are reported in Eggers et al. (2011). Deviations in analyses from this sampling plan occurred and included: 1) increases in the number of samples selected for analysis for some strata, and 2) exclusion from analysis of some strata that were in the original plan.

During the selection of samples for analysis, some adjustments were made to correct minor errors in the sampling report (Eggers et al. 2011) and errors made when selecting fish for analysis. Sampling report errors in the number of samples collected were corrected after counting the number of tissues received. This often reduced the number of samples available for analysis. Errors made when selecting fish initially resulted in selection of samples that were not in proportion to the catch that the samples represented. In making these adjustments, additional fish were analyzed. To provide estimates based on the largest number of samples, we included all fish analyzed within each stratum, which resulted in more fish analyzed than originally proposed in the sampling plan while remaining in proportion to the harvest. Deviations between the number of samples selected in the sampling report and the final number analyzed, and reasons for excluding some samples, are provided in Appendix A1.

Some strata originally proposed for analysis were excluded by the AP because there were insufficient fish available in the sample. A minimum of 100 fish per sample was set as the number needed to provide reliable estimates. We therefore excluded strata from 4 fisheries from analysis:

1) *Kuskokwim, District 5, stratum 3*: included 2007 (n=337), but excluded 2009 (n=91) and 2008 (n=0);
2) *Norton Sound, Subsistence, Subdistrict 5*: excluded 2007 (n=20), 2008 (n=0), and 2009 (n=0);
3) *Norton Sound, Subsistence, Nome area*: included 2007 (n=176), but excluded 2008 (n=12) and 2009 (n=5); and
4) *Port Clarence, Subsistence*: included 2007 (n=365), but excluded 2008 (n=40) and 2009 (n= 0).

LABORATORY ANALYSIS

Assaying Genotypes

After adjusting for excluded fishery strata, 74,277 individual fish representing harvest in 194 fishery strata were genotyped at the SNP markers designated for WASSIP analyses (Appendix A1). This represents 170 fewer tissue samples and 13 fewer fishery strata than were originally selected for analysis as reported in Eggers et al. (2011).

Laboratory Quality Control

Over 600,000 genotypes were compared during the QC analysis and the overall discrepancy rate for catch samples was 0.64% and ranged from 0.00% to 1.78%. Assuming the errors are equally likely to have occurred in the production and QC genotyping process, the error rate was 0.32% (3 in every 1,000 genotypes). Of this, the discrepancy rate involving alternate homozygotes was 0.02% (2 in every 10,000 genotypes) and the rate involving homozygotes and heterozygotes was 0.62% (6 in every 1,000 genotypes). This level of error was well below the standard set by the laboratory as acceptable (1%).

STATISTICAL ANALYSIS

Data Retrieval and Quality Control

Of the 74,277 fish genotyped, 1,632 fish were excluded from analysis because they were missing genotypes for more than 20% of the loci (an average of 8.4 fish per collection), 3 fish were excluded because they were identified as the wrong species, and 378 fish were excluded because they appeared to represent duplicate samples (1.9 putative duplicate fish per collection). A total of 131 collections (68%) had no duplicate individuals. In the end, a total of 71,656 fish were used to produce stock composition for harvests at 194 fishery strata (Appendix A1). Average sample size of time-area strata was 369 fish with a minimum of 95 fish and a maximum of 639 fish.

Stock Compositions

A total of 970 individual *BAYES* analyses were run—5 chains for each of 194 fishery strata. All chains converged and the last 20,000 iterations of each of the 5 chains were combined to estimate the stock compositions.

Prior choice

All priors used to estimate the stock compositions of chum salmon catches were defined following the F_{ST} approach defined above with the exception of unassociated strata. For chum salmon the AP was able to develop priors for all unassociated strata as follows:

1) *Golovin, Subdistrict 2, Commercial*: The only available stratum was 2008 (n=215). Total harvest for this fishery was 710 fish from 2007 to 2009. AP-derived prior: Use the results from the Moses Point commercial stock composition estimates for the same year as the prior.
2) *Moses Point, Subdistrict 3, Subsistence*: The only available stratum was 2007 (n=128). Total harvest for this fishery was 4,218 fish from 2007 to 2009. AP-derived prior: Use the results from the Moses Point commercial stock composition estimates for the same year as the prior.
3) *Nome Area, Subsistence*: Because collections with fewer than 100 fish were not analyzed, only 2007 was available (n=176); 2008 (n=12) and 2009 (n=5) are too small. Total harvest for this fishery was 4,064 fish from 2007 to 2009. AP-derived prior: 74.4% Coastal Western Alaska, 18.6% Kotzebue, and 1% for each of the 7 remaining reporting groups.
4) *Port Clarence District, Subsistence*: Because collections with fewer than 100 fish were not analyzed, only 2007 was available (n=365); 2008 (n=20) was too small. Total harvest for this fishery was 13,470 fish from 2007 to 2009. AP-derived prior: 46.5% Coastal Western Alaska, 46.5% Kotzebue, and 1% for each of the 7 remaining reporting groups.

Reporting quality control

Reanalysis of all 8 catch samples listed in Table 1 yielded results that were identical to the original analyses.

STOCK COMPOSITION ESTIMATES BY FISHERY

Westward Region

Chignik Area

The Chignik Area fishery was sampled for chum salmon in 4 area strata: Eastern District, Central District, and Western and Perryville districts combined as described in Eggers et al. (2011). Each area stratum had one temporal stratum with samples spread throughout June and July as possible. Commercial fishing continued through most of August; however, those harvests were not sampled.

Eastern District

None of the sampling goals were met in the Eastern District; however, sufficient samples were collected during 2007 and 2009 to estimate harvest composition. During 2007, the East of Kodiak reporting group (43.8%) and the Coastal Western Alaska (CWAK) group (19.7%) were the largest contributors to the harvest; however, Asia (11.1%), Chignik/Kodiak (13.8%) and South Peninsula (10.0%) reporting groups also had notable contributions (Table 2; Figure 2). There were fewer stocks present in 2009 with the Chignik/Kodiak reporting group contributing 83.5% of the catch and only the Asia (5.5%) reporting group contributing 5% or more.

Central District

All 3 sampling strata goals were met in the Central District during 2007 through 2009. Similar to the Eastern District, the Central District had a wide variety of stocks in 2007 and fewer stocks present above 5% in 2009 (Table 3; Figure 3). The Chignik/Kodiak reporting group was the largest contributor in 2007 with 36.1% followed by East of Kodiak (24.6%), Asia (18.6%), and South Peninsula (16.6%). In 2008, there were fewer stocks present above 5% with the Chignik/Kodiak reporting group contributing 83.8% and the Asia group contributing 6.8% to the harvest. In 2009, the Chignik/Kodiak reporting group composed 78.7% of the harvest followed by Asia (11.4%) and East of Kodiak (5.3%).

Western and Perryville districts

All 3 sampling goals were met in the Western and Perryville districts. The Chignik/Kodiak reporting group was consistently the largest contributor; however, other stocks present in large percentages varied by year (Table 4; Figure 4). In 2007, the Chignik/Kodiak group composed 46.2% of the harvest, followed by East of Kodiak (25.3%) and Asia (21.5%). In 2008, the Chignik/Kodiak group provided a larger contribution with 52.5%, followed by Asia (25.2%), South Peninsula (11.0%), and CWAK (6.2%), while the East of Kodiak group was below 5%. In 2009, the Chignik/Kodiak group contributed 38.6% followed by CWAK (29.0%), Asia (19.1%), South Peninsula (5.6%) and East of Kodiak (4.5%).

Southeastern District Mainland

There was one area stratum for the Southeastern District Mainland (SEDM) fishery and one temporal stratum per year. Since the fishery was closed in 2007, only the 2008 and 2009 sample goals were achieved. There were fewer stocks present in large percentages in SEDM compared to other areas (Table 5; Figure 5). Only two reporting groups exceeded a 5% contribution in either year. During 2007, the Chignik/Kodiak group contributed 54.6% of the harvest while the South Peninsula group contributed 40.2%. Similarly, in 2009, Chignik/Kodiak group contributed 58.8% of the harvest and the South Peninsula group contributed 34.3%.

South Alaska Peninsula June Fishery

The June fishery was sampled for chum in 3 area strata including Shumagin Islands Section, Ikatan area, and Unimak District. Each area stratum included 5 temporal strata to represent 5 commercial fishery openings during June. Sample goals were achieved in 40 of the 45 strata and sufficient samples were available for MSA in 43 strata.

Shumagin Islands Section

Sampling goals were achieved in 14 of the 15 sampling strata in the Shumagin Islands from 2007 to 2009; no fishing occurred during the first stratum in 2008. During most sample strata, the majority of the estimated harvest composition was from Asia, CWAK, and East of Kodiak groups (Tables 6–8; Figure 6). In 2007 the CWAK reporting group comprised the majority of the harvest during most strata and increased in percentage during mid-June before decreasing during late June, ranging from 25.5% to 67.4% throughout the month. The Asia group decreased in contribution during the middle of June, ranging from 17.7% to 34.6%. The East of Kodiak group had a similar pattern, ranging from 10.6% to 33.4%. The only other group to exceed a 5% contribution was the Chignik/Kodiak group, 5.3% in the fourth stratum and 8.6% in the fifth stratum. The Asia (25.7% to 43.3%) and CWAK (19.5% to 44.4%) groups continued to dominate the harvests in 2008. The South Peninsula group contributed 0.5% to 11.9%, the

Chignik/Kodiak group contributed 2.4% to 10.5%, and the East of Kodiak group contributed 6.6% to 13.8%. The 2009 harvest compositions were similar, with CWAK contributing from 49.6% to 67.6% and Asia ranging from 17.5% to 35.3%. East of Kodiak contributed 2.9% to 11.2%, Chignik/Kodiak group contributed 0.3% to 10.3%, South Peninsula group contributed 0% to 6.1%, and the Northwestern District contributed 0.9% to 7.3%.

Ikatan area

In the Ikatan area, 11 of the 15 sampling strata goals were achieved and 14 of the strata had enough samples to estimate harvest compositions. Similar to the Shumagin Islands, the CWAK and Asia reporting groups were the two dominant reporting groups in the Ikatan area (Tables 9–11; Figure 7). In 2007, the CWAK group was the largest contributor, ranging from 49.7% to 75.8% while the Asia group ranged from 12.1% to 29.3%. The rest of the groups were variable and contributed smaller percentages, with the East of Kodiak group contributing 4.6% to 11.8%, the Chignik/Kodiak group contributing 0% to 5.3%, the Northwestern District group contributing 0% to 7.9%, and the Northern District group contributing 0% to 5.3%. The stock composition estimates from 2008 followed a similar pattern, with CWAK ranging from 30.2% to 62.9% and Asia ranging from 22.5% to 53.4%. Contributions from the 4 other groups were similar to 2007. CWAK contributed a higher percent in 2009, ranging from 45.3% to 83.6% while the Asia group contribution was slightly smaller with 8.7% to 24.5%. The Northern District, Northwestern District, Chignik/Kodiak, and East of Kodiak groups all contributed smaller percentages that ranged from 0% to 13.1%.

Unimak District

Sample goals were achieved in all strata for the Unimak District and sample sizes were sufficient to estimate harvest compositions in all strata. As with the other two June fishery areas, the CWAK reporting group was usually the most dominant group present, followed by the Asia reporting group (Tables 12–14; Figure 8). In 2007, the CWAK group contributed between 51.0% and 83.3% while the Asia reporting group ranged between 9.5% and 33.6%. Only the Northwestern District (0.5% to 6.9%), Northern District (0% to 8.3%), and East of Kodiak groups (2.6% to 8.5%) contributed more than 5% in at least one stratum. Results from 2008 were similar; the CWAK group ranged from 34.9% to 78.2%, the Asia group ranged from 15.6% to 39.4%, and the Northern District, Northwestern District, Chignik/Kodiak, and East of Kodiak groups made variable contributions across the 5 strata ranging from 0% to 9.6%. In 2009, the CWAK group ranged between 41.3% and 87.3% and the Asia group ranged from 6.8% to 31.3%. The Northern District, Northwestern District, Chignik/Kodiak, and East of Kodiak again had variable contributions ranging from 0% to 14.0% across strata in 2009. The Kotzebue Sound reporting group had one stratum in which the contribution to the harvest was 4.7%.

South Alaska Peninsula Post-June Fishery

Samples were collected in 3 area strata during the post-June fishery in the Shumagin Islands Section, Dolgoi Islands area, and Ikatan area. In the Shumagin Islands, 3 temporal strata were sampled while only one temporal stratum was sampled in the Dolgoi Island and Ikatan areas.

Shumagin Islands Section

Sample goals were achieved in 11 of the 12 sample strata in the Shumagin Island Section; however, samples were sufficient for harvest composition estimates in all 12 strata. There were several reporting groups present in varying percentages during the Shumagin Islands post-June

fishery (Tables 15–17; Figure 9). In 2007 the largest contributing group varied across strata with the Asia reporting group ranging from 19.0% to 30.8% and the Chignik/Kodiak group ranging from 21.2% to 29.7%. The South Peninsula group ranged from 10.9% to 25.9%, the East of Kodiak group ranged from 7.3% to 18.0%, and the CWAK group ranged from 4.3% to 17.7%. The Northwestern District group contributed between 3.7% and 5.7%. No other group contributed more than 5%. Similar to 2007, the Asia group (21.8% to 39.9%) and the Chignik/Kodiak group (16.0% to 41.4%) were the highest contributors in 2008. The South Peninsula (13.4% to 19.3%) and the East of Kodiak group (10.4% to 22.2%) had similar contributions to the harvest as in the previous year. The Northwestern District group contributed a smaller amount with 2.3% to 7.8% of the harvest. The CWAK group (3.3% to 34.8%) and the Asia group (9.1% to 25.3%) were the largest contributors in the first stratum of 2009 but decreased in the second and third strata, while the South Peninsula (9.1% to 42.3%) and the Chignik/Kodiak groups (5.7% to 35.0%) had stronger contributions in the second two strata. The Northern District (1.9% to 9.3%), Northwestern District (4.4% to 7.2%), and the East of Kodiak (3.2% to 5.2%) groups also contributed to the harvest.

Dolgoi Island area

All 3 sample strata goals were reached in the Dolgoi Island area. The largest contributor to harvests in the Dolgoi Island area during the post-June fishery was the South Peninsula reporting group (Table 18; Figure 10). In 2007, the South Peninsula group contributed 51.1% to the harvest and the Chignik/Kodiak group contributed 32.3%. The East of Kodiak group comprised 10.0% of the harvest and was the only other group that contributed more than 5% to the harvest. In 2008, the South Peninsula reporting group contributed 72.8% to the harvest, followed by Asia (11.3%), Chignik/Kodiak (7.5%), and CWAK (4.9%). All other groups contributed 1.4% or less. Similarly in 2009, the South Peninsula group represented 56.2% of the harvest, followed by the Chignik/Kodiak group with 37.4%. No other groups contributed more than 5% of the harvest in 2009.

Ikatan area

While only 2 of the 3 sample goals were achieved from the Ikatan area during the post-June fishery, all 3 had sufficient samples sizes for harvest composition estimates. The Ikatan area had a wider distribution of contributing stocks than other areas in the post-June fishery (Table 19; Figure 11). In 2007, the Northwestern District group was the largest contributor with 25.9% of the harvest, followed by Northern District (18.3%), CWAK (17.7%), Asia (15.5%), and Chignik/Kodiak (12.6%) reporting groups. The South Peninsula and East of Kodiak groups contributed 4.9% and 4.5%, respectively. The South Peninsula group was the largest contributor in 2008 with 35.0% of the harvest, followed by the Asia (30.2%), Northwestern District (11.6%), and CWAK (9.7%) groups. All other groups contributed less than 5%. Similarly in 2009, the South Peninsula reporting group was the largest contributor at 28.2%. The Northwestern District contributed 21.3% followed by CWAK (18.2%), Northern District (16.2%), and Chignik/Kodiak (8.8%). The Asia reporting group contributed 4.7% and was the only other contributor above 2%.

North Alaska Peninsula

Samples were collected in two areas on the North Peninsula, in the Bear River Section and in the Three Hills and Ilnik sections combined. Only 2 of the 6 sampling strata goals were achieved; however, 4 strata had sufficient samples for MSA.

Bear River Section

Due to a fishery closure during 2008, stock composition estimates were only available for strata in 2007 and 2009. In 2007, the Northern District was the primary contributing stock group with 97.4% of the harvest; no other group contributed more than 2% (Table 20; Figure 12). The Northern District group composed the majority of the harvest in 2009 (91.8%), followed by the Northwestern District (7.2%).

Three Hills and Ilnik sections

A fishery closure also precluded any sampling in 2008 in the Three Hills and Ilnik sections; stock composition estimates were available only for 2007 and 2009. Similar to the Bear River Section, the Northern District reporting group was the largest contributor in both years (Table 21; Figure 13). In 2007, the Northern District group contributed 69.9% to the harvest while the CWAK group contributed 22.1% to the harvest. In 2009, the Northern District group contributed 93.3%, while the CWAK group contributed 6.5% to the harvest.

Bristol Bay

Eastside districts

There were 5 temporal strata sampled in the combined Eastside district (Ugashik, Egegik, and Naknek) fisheries from 2007 to 2009 with commercial harvests occurring from June through August (Tables 22–24; Figure 14). Sample goals were met for all but one stratum during the 3 years of sampling. The CWAK reporting group was estimated to be the largest contributor to the harvest during all 3 years (80.8% to 99.9%). The Northern District reporting group accounted for the majority of the remaining composition, accounting for as high as 19.2% of the harvest.

Nushagak District

There were 5 temporal strata sampled in Nushagak District fisheries from 2007 to 2009 with commercial harvests occurring from June through August (Tables 25–27; Figure 15). Sample goals were met for all strata during the 3 years of sampling. In all strata, the majority of the harvest was attributable to the CWAK reporting group (99.4% to 100%).

Togiak District

There were 5 temporal strata sampled in Togiak District fisheries from 2007 to 2009 with commercial harvests occurring from June through August (Tables 28–30; Figure 16). Sample goals were met for all but one stratum during the 3 years of sampling. In all strata, the majority of the harvest is attributable to the CWAK reporting group (99.7% to 100%).

Arctic-Yukon-Kuskokwim Region

Kuskokwim

District 5 (Goodnews)

There were 3 temporal strata sampled in District 5 (Goodnews Bay) from 2007 to 2009 with commercial harvests occurring from June through August (Tables 31–32; Figure 17). In District 5 samples obtained fell short of objectives in most strata for 2006 and 2007 and no sampling occurred in 2008 for chum salmon, but sampling objectives were met in 2 of the 3 strata in 2009. Throughout years and strata, all harvest is attributable to the CWAK reporting group (99.6% to 100%).

District 4 (Quinhagak)

There were 3 temporal strata targeted in District 4 (Quinhagak) from 2007 to 2009 with commercial harvests occurring from June through August (Tables 33–35; Figure 18). In District 4 sample objectives were achieved in all years. Throughout years and strata, all harvest is attributable to the CWAK reporting group (99.9% to 100%).

District 1 (Kuskokwim River)

Three temporal strata were targeted in District 1 (the lower Kuskokwim River below Bethel) from 2007 to 2009 with commercial harvests occurring from June through August (Tables 36–38; Figure 19). In District 1 sampling objectives were met in all but 2 strata where catch occurred. There was no commercial fishery in District 1 for 2007, and samples were obtained from test fisheries. Throughout years and strata, nearly all harvest is attributable to the CWAK reporting group (99.8% to 100%).

Toksook Bay Subsistence

Sampling failed to meet sample size objectives in 3 of 4 years for Toksook Bay; however, harvest composition estimates are available for 2007 to 2009 (Table 39; Figure 20). Catch levels are not specifically known for the Bering Sea coastal communities in the Kuskokwim Area; however they are believed to be a few hundred and are comparable in magnitude to the number of samples taken. All harvest is attributable to the CWAK reporting group (99.5% to 100%) for all years.

Yukon Summer Commercial Fishery

District 1 excluding Black River

Three temporal strata were targeted in June and July summer chum salmon commercial harvests from 2007 to 2009 (Tables 40–42; Figure 21). Sampling objectives were achieved in most strata with the exceptions of early 2008 and 2009 because of no harvest or limited commercial fishing effort. Stock composition estimates were dominated by CWAK stocks (63.0% to 97.0%) across years, but CWAK composition of the harvest consistently dropped from earlier to later strata. The Upper Yukon reporting group showed the opposite trend: early strata contained 3.0% to 18.2% Upper Yukon and the third stratum each year contained 10.6% to 37.0%.

District 1 Black River only

Three temporal strata were targeted in June and July summer chum salmon commercial harvests from 2007 to 2009 (Table 43; Figure 22). In the Black River area of District 1, fishing was limited and partial sampling objectives were achieved in 2006 and 2007 with only 2 strata meeting the sampling objectives. No samples from the Black River were taken in 2008 and 2009 because of low catch. For the strata sampled in 2007, CWAK reporting group was estimated to contribute 93.1% to 99.4% to the harvest composition. The remainder of the harvest composition consisted of Upper Yukon stocks.

Yukon Summer Subsistence Fishery

Hooper Bay

A single temporal collection was assembled each year from catch in Hooper Bay from 2007 to 2009 (Table 44; Figure 23) and sample sizes close to objectives were achieved each year. In all years, harvest was estimated to consist of CWAK reporting group exclusively (99.9% to 100%).

Scammon Bay

A single temporal collection was assembled each year from catch in Scammon Bay from 2007 to 2009 (Table 45; Figure 24). Sample sizes objectives were achieved in 2008 and 2009, but no samples were taken in 2007. The CWAK reporting group was estimated to contribute 93.7% to 96.3% to the harvest. The remainder (3.7% to 6.2%) of the harvest was attributed to Upper Yukon reporting group.

Yukon Fall Commercial Fishery

District 1 excluding Black River

Three temporal strata encompassing July through early September were targeted each year in District 1 fall chum salmon commercial harvests from 2007 to 2009 (Tables 46–48; Figure 25). Harvest did not occur during the first stratum in 2007 and samples were not obtained from the last stratum in 2009. Sample size objectives were achieved in 4 of the 8 strata fished during these years. No samples from District 1 Black River only were taken during the fall commercial fishing season, though little harvest existed during these years. The estimated contribution of Upper Yukon reporting group dominated the harvest (51.7% to 94.9%), with a distinct temporal pattern of lower prevalence in the earliest strata and increased presence in the second and third strata. Kotzebue stocks, though generally small in the overall stock contribution, demonstrated a similar increase from 0% in the first strata to 2.9% to 6.1% in the last strata. CWAK stocks showed trends opposing those seen in the Upper Yukon reporting group: 38.3% to 48.1% in the first strata and 0% to 0.2% in the last strata.

Norton Sound Commercial

Subdistrict 6 (Unalakleet)

Three temporal strata per were targeted in Subdistrict 6 (Unalakleet) during 2007 to 2009 with commercial harvests occurring from July through early September (Tables 49–51; Figure 26). Sample size objectives were obtained for 4 of 9 strata and samples were collected for only 2 of 3 strata in 2007. The vast majority (>95.5%) of harvest sampled were allocated in the estimates to the CWAK reporting group. Remaining group contributions were small (<5%) and generally allocated to the Kotzebue Sound reporting group.

Subdistrict 5 (Shaktoolik)

Three temporal strata per were targeted in Subdistrict 5 (Shaktoolik) from 2007 to 2009 with commercial harvests occurring from July through early September (Tables 52–54; Figure 27). Only 2 of 3 strata were sampled in 2007, and sample sizes only met objectives in 2 of 9 strata. At least 84.6% of harvests were estimated to be from the CWAK reporting group, while 0.1% to 15.3% was allocated to the Kotzebue Sound reporting group. Presence of Kotzebue Sound stocks in the harvest were highly variable among strata and no temporal pattern was present. The estimated proportion of fish attributed to the Kotzebue reporting group was highest in the first stratum in 2007 (15.3%), highest in the last stratum in 2008 (8.6%), and low throughout 2009 harvests (0.1% to 1.1%).

Subdistrict 3 (Moses Point)

A single stratum was targeted each year in Subdistrict 3 (Moses Point) from 2007 to 2009, with commercial harvests occurring from July through early September (Table 55; Figure 28). No samples were obtained in 2009 and sample size objectives were only achieved in 2007. The

CWAK reporting group was estimated to dominate stock proportion (94.5% to 99.5%), with Kotzebue Sound reporting group contributing 5.5% in 2007.

Subdistrict 2 (Golovin)

A single stratum was targeted each year in Subdistrict 2 (Golovin) from 2007 to 2009, with commercial harvests occurring from July through August (Table 56; Figure 29). No samples were obtained in 2007 or 2009 and sample size objectives were not achieved in 2008. All harvest (99.9%) was estimated to be from the CWAK reporting group in 2008.

Port Clarence

A single stratum was targeted each year for Port Clarence commercial harvests from 2007 to 2009 (Table 57; Figure 30). Samples were not obtained in 2009 and sample sizes were low and did not allow for stock contribution estimates in 2008. Sample size objectives, while usable, were not met in 2007. The majority of Port Clarence harvest (93.1%) was estimated to be from the CWAK reporting group in 2007, with the remainder allocating to Kotzebue Sound reporting group (6.9%).

Norton Sound Subsistence

Stebbins area

A single stratum was targeted each year for Stebbins subsistence harvests from 2007 to 2009 (Table 58, Figure 31). No samples were obtained in 2009 and sample size objectives were achieved only in 2007. In the estimates, essentially all harvest (98.9% to 99.7%) was allocated to the CWAK reporting group in 2007 and 2008.

Saint Michael area

A single stratum each year was targeted for St. Michael subsistence harvests from 2007 to 2009 (Table 59; Figure 32). No samples were obtained in 2009 and sample size objectives were not achieved in any year. In the estimates, essentially all harvest (99.6% to 99.8%) was allocated to the CWAK reporting group in 2007 and 2008.

Subdistrict 3 (Moses Point)

A single stratum each year was targeted for Moses Point subsistence harvests from 2007 to 2009 (Table 60; Figure 33). No samples were obtained in 2008 or 2009 and sample size objectives were not met in 2007, but sufficient samples were available to estimate stock composition for this year. The composition of subsistence harvests were dominated by the CWAK reporting group (99.9%).

Nome Area

A single stratum was targeted each year for Nome area subsistence harvests from 2007 to 2009 (Table 61; Figure 34). While samples were obtained in all years, sample sizes were low and did not allow for stock contribution estimates in 2008 and 2009. Sample size objectives, while usable, were not met in 2007. Essentially all harvest (99.1%) was estimated to be from the CWAK reporting group in 2007.

Kotzebue

A single collection was assembled each year from catch in the Kotzebue Sound District from 2007 to 2009 (Table 62; Figure 35). In the estimates, all harvest (99.4% to 99.9%) in the Kotzebue Sound District apportioned to Kotzebue Sound reporting group.

DISCUSSION

Eggers et al. (2011) documented the unprecedented sampling effort that took place across Western Alaska fisheries from 2006 to 2009 (Eggers et al. 2011). Of the 143,258 chum salmon sampled from harvests in 278 fishery strata distributed across time within fisheries from Chignik Area to Kotzebue Sound between 2006 and 2009, 74,445 samples were selected for analysis from 207 fishery strata between 2007 and 2009. We successfully genotyped 71,656 individual fish from 194 fishery strata for the 96 SNPs chosen specifically for WASSIP MSA (DeCovich et al. 2012). A baseline composed of 32,817 individuals from 402 collections representing 310 populations, genotyped for the same SNPs, was built to make this MSA effort possible. We compared genotypes of catch samples to allele frequencies of baseline populations to estimate the contribution of each reporting group to the catch that each sample represents. Finally, the application of harvest estimates to the stock composition estimates reported here allows for the calculation of stock-specific harvests and harvest rates. In doing so, this work provides a crucial link between the catch samples collected from area-strata described by Eggers et al. (2011) and the stock-specific catches and harvest rates reported by Munro et al. (2012).

INTERPRETING RESULTS

Interpreting the results from this report and the harvest and harvest rates report (Munro et al. 2012) requires knowledge about the precision and accuracy of estimates provided. For stock composition estimates, precision is affected by three main sources of uncertainty: 1) the size and representative nature of the catch sample, 2) the representativeness of the genetic baseline, 3) the ability of the statistical method to estimate stock composition accurately and precisely, which is dependent on the underlying genetic distinctiveness of each stock (Koljonen et al. 2005).

Size and representativeness of the catch samples

We set a minimum sample size of 100 and a target sample size of 400 fish to represent temporal-area strata. Under a worst-case scenario of 2 to 3 stocks contributing equally to the harvest, this level of sampling should provide estimates that are within 8% (n=100) and 5% (n=400) of the true proportion 90% of the time of the time, assuming no genetic error (Thompson 1987). Most of the time, stock compositions are different from these worst-case conditions and greater precision is possible given the target sample sizes.

To increase the representativeness of the catch sample, samples were generally taken over time within a temporal stratum. This sampling design was used to provide better representation of potential changes in stock composition through time but within strata. Specific catch sampling details, including dates sampled, date-specific sample sizes and associated harvest numbers, can be found in Eggers et al. (2011).

Representation of contributing populations

Baseline populations of chum salmon were sampled around the Pacific Rim from Korea to the State of Washington. The final baseline included 32,817 individuals from 402 collections

representing 310 populations. Individuals were assayed for 96 SNP markers that represented 91 loci. Average sample size representing each population was 106 individuals. This baseline contains more than 196 additional populations and almost twice the number of markers as the previously-published baseline (Seeb et al. 2011). Testing of the baseline demonstrated that the baseline performed well for the defined reporting groups (Habicht et al 2012c,e). Complete description of the baseline can be found in DeCovich et al. (2012).

Ability of the statistical method to estimate stock composition accurately and precisely

The accuracy of a stock composition estimate is influenced by biases in allocation of contributions to populations in the baseline. These biases are known to exist, but are not well characterized because they are influenced by both the composition of the mixture (catch sample) and the performance of the statistical model. The best characterized biases are those for mixtures composed of fish from a single reporting group. These biases are caused by a tendency for the model to allocate extra fish to reporting groups that are absent or are present in smaller proportions and, at the same time, allocate away from stocks that are present in larger proportions within the catch sample (Pella and Masuda 2001). Biases in estimation of stock composition are characterized for each reporting group using proof tests as described in DeCovich et al. (2012). We do not provide bias corrections in our estimates.

For chum salmon, most of the designated reporting groups are highly identifiable and we expect little bias associated with estimates for those groups. However, biases are most pronounced among reporting groups that share genetic similarity. The misallocation that arises when fish are drawn from populations that are genetically similar to those of adjacent reporting regions can cause correct allocation in 100% proof tests to fall below 90%. This was observed in the original proof test for Chignik/Kodiak, where the correct allocation was 83% and most misallocation was to the South Peninsula reporting group. This is not surprising as the border separating the 2 reporting groups was drawn along management district lines and several populations are geographically close and genetically similar to each other. When this test was repeated 10 times, the average correct allocation was above the 90% benchmark set for determining whether a reporting group could be considered identifiable (Habicht et al. 2012a).

Misallocations revealed in proof tests are important to remember when interpreting estimates from actual fishery samples. For example, samples from the Chignik area could contain fish from Chignik area populations that are genetically very similar to those from the South Peninsula. This could result in biased estimates with some fish from actual Chignik populations being assigned to the South Peninsula reporting group. This was observed in the proof test for Chignik/Kodiak, where the largest misallocation was to the South Peninsula reporting group (DeCovich et al. 2012).

The precision of stock composition estimates is driven by a combination of sample size and genetic distinction among reporting groups. This measure is well characterized by the posterior distribution of the estimate and is summarized in the results with the 90% credibility interval and the standard deviation. A 90% credibility interval can be interpreted to mean that there is a 90% chance that the true value lies somewhere within this interval, and should be used to guide the interpretation of reported estimates.

VARIABILITY AND MAKING INFERENCES WITHIN AND OUTSIDE OF WASSIP YEARS

Like most other scientific studies, WASSIP analyses represent environmental and fishery conditions during a specific period of time. Nonetheless, these studies are conducted so that future scientific and policy activities may be better informed. We expect that WASSIP results will be cited for many years to come as the most comprehensive data set available to examine stock composition of sockeye and chum salmon in commercial and subsistence fisheries of Western Alaska. However, while this 3-year data set provides some measure of interannual variability in stock composition, some caution must be exercised when extrapolating the results to years not analyzed because changes in relative abundance among reporting groups, prosecution of fisheries, or migratory behavior due to ocean conditions might affect distribution of stock-specific harvests among fisheries.

Results from this 3-year study period, reveal both very consistent stock composition patterns as well as highly variable results. For example, in Eastside Bristol Bay districts CWAK reporting group consistently dominated catch proportions among all years at 80.8% to 99.9%, with North Peninsula stocks accounting for most of the remainder (Tables 22–24; Figures 14–16). On the other hand, while Chignik/Kodiak reporting group consistently represented the largest contribution to fishery samples in Central District of Chignik Area, in 2007 the group accounted for 36.1% of the harvest while representing 83.8% in 2008. Other groups (East of Kodiak, Asia, and South Peninsula) contributed between 16.6% and 24.6% to harvests in 2007 (Table 3; Figure 3) while comprising at most 6.8% in 2008. These comparisons highlight that even this extensive data set over 3 years may provide limited insight into interannual stability of stock composition within fisheries. Longer-term variation in salmon productivity and migratory behavior (Thompson et al. 1992; Hodgson et al. 2006) resulting from decadal scale environmental change, (e.g., Pacific Decadal Oscillation; Mantua et al. 1997) should be considered when extrapolating results from years sampled in WASSIP.

CLOSING REMARKS

The Gene Conservation Laboratory typically conducts 5 large MSA projects annually and each involves samples from approximately 10,000–20,000 fish to represent fishery harvest. Of these, approximately 5,000–8,000 fish are analyzed to estimate stock compositions and stock-specific harvests. The chum salmon portion of WASSIP is an order of magnitude larger, and provides the most comprehensive examination of stock compositions across Western Alaska chum salmon fisheries to date. The stock-specific harvest composition estimates reported here and the subsequent estimates of stock-specific harvest (Munro et al. 2012) provide reliable stock-specific information to fishery managers and regulatory decision makers, improves understanding of stock productivity, and sheds light on the migratory pathways of chum salmon in nearshore marine waters of Western Alaska.

ACKNOWLEDGMENTS

The stock composition estimates reported here represent a great amount of work accomplished by many people working in concert. We thank the following dedicated members of the Gene Conservation Laboratory team Tyler Dann, Eric Lardizabal, Andy Barclay, Nick Decovich, Judy Berger, Zac Grauvogel, Wei Cheng, Paul Kuriscak, Hans Thompson, Erica Chenoweth, Tara Harrington, Christina Cupp, Spencer Brown, Mick Leach, Jim and Melanie O'Rourke, Eric

Newland, Katie Morhmann, April Rochford, Stuart Spaulding, Zac Pechacek, Chloe Dunlap, Tracy Hansen, Drew Hamilton, Brian Collyard, Colton Lipka, Chase Korsmo, and Jordan Palmer for producing quality data in a timely fashion. Gene Conservation Laboratory members Nick Decovich and Andy Barclay provided support with statistical analyses and reporting; Judy Berger archived samples and ensured accurate metadata; Eric Lardizabal provided database support; and Erica Chenoweth provided technical support preparing this report for publication. We thank Penelope Crane and Sara Gilk-Baumer for providing editorial review. We thank Jim and Lisa Seeb for providing the foundation that made this work possible and their support throughout the project. We thank Region 4 staff for their input, assistance and collection sampling, especially Birch Foster. We thank Region 3 staff for their input, assistance and collection sampling, especially Doug Bue and Dani Evenson. We thank Region 2 staff for their input, assistance and collection sampling, especially Chuck Brazil and Fred West. Finally, we thank the Advisory Panel and Technical Committee of WASSIP for their time and effort spent improving this work. Funding for sample collection and laboratory analysis of chum salmon collections was provided by the State of Alaska and the National Oceanographic and Atmospheric Administration under Cooperative Agreement NA06NMF4380094.

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TABLES

Table 1.–Catch strata identified, and reason why they were identified, for re-analysis as part of the reporting quality control measures. A complete statistical re-analysis of these strata uncovered no errors.

Fishery	Year	Stratum	Reason
Eastern District	2007	6/25–7/5	High proportion of East of Kodiak
Western and Perryville districts	2009	6/22–7/31	High proportion of CWAK
Unimak District June	2009	6/12–6/15	Low proportion of Asia compared with other years and strata
Shumagin Islands Section June	2008	6/22–6/25	Dip in Asia proportion mid-season
Ikatan area post-June	2008	7/16–7/31	High proportion of Asia later in season
Three Hills and Ilnik sections	2007	6/20–7/31	High proportion (6%) of East of Kodiak
Eastside Districts - Bristol Bay	2009	6/26–6/30	Low proportion Northern Dist. which seems to be higher earlier on average
District 5 Commercial	2008	7/18–8/31	East of Kodiak proportion of 0.2%

Table 2.–Eastern District, Chignik Area, Westward Region, 2007 and 2009, temporal stratum 1. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2009				
	Stratum 1 (6/25–7/5; H=7,183; n=199)					Stratum 1 (7/1–7/31; H=20,275; n=147)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	11.1	7.5	15.2	0.00	2.4	5.5	2.8	8.9	0.00	1.9
Kotzebue Sound	0.7	0.0	4.0	0.63	1.4	0.0	0.0	0.0	0.91	0.1
CWAK	19.7	14.6	24.9	0.00	3.1	2.0	0.3	4.7	0.00	1.4
Upper Yukon	0.0	0.0	0.1	0.88	0.1	0.1	0.0	0.6	0.86	0.4
Northern Dist.	0.1	0.0	0.6	0.83	0.4	0.2	0.0	1.5	0.71	0.6
Northwestern Dist.	0.8	0.0	3.0	0.29	1.1	0.0	0.0	0.0	0.90	0.3
South Peninsula	10.0	0.6	19.3	0.01	5.8	4.0	0.0	19.0	0.23	6.7
Chignik/Kodiak	13.8	4.8	24.4	0.00	6.1	83.5	68.1	91.2	0.00	7.2
East of Kodiak	43.8	37.6	50.0	0.00	3.8	4.6	2.1	7.9	0.00	1.8

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 3.–Central District, Chignik Area, Westward Region, 2007–2009, temporal stratum 1. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007 Stratum 1 (6/15–7/31; H=14,091; n=380)					2008 Stratum 1 (6/24–7/31; H=30,172; n=397)					2009 Stratum 1 (6/20–7/31; H=42,186; n=362)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	18.6	15.2	22.2	0.00	2.1	6.8	4.8	9.1	0.00	1.3	11.4	8.7	14.4	0.00	1.7
Kotzebue Sound	0.0	0.0	0.0	0.89	0.1	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.92	0.1
CWAK	4.1	2.3	6.2	0.00	1.2	2.3	1.1	3.8	0.00	0.8	3.3	1.8	5.2	0.00	1.0
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.93	0.1	0.0	0.0	0.0	0.89	0.2	0.0	0.0	0.1	0.88	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.1	0.87	0.3
South Peninsula	16.6	9.8	24.0	0.00	4.3	3.1	0.0	12.5	0.08	4.2	1.3	0.0	8.2	0.58	3.2
Chignik/Kodiak	36.1	28.3	43.7	0.00	4.7	83.8	73.8	89.7	0.00	4.8	78.7	71.1	83.3	0.00	4.0
East of Kodiak	24.6	20.8	28.7	0.00	2.4	3.9	1.4	6.8	0.00	1.7	5.3	3.3	7.7	0.00	1.3

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 4.–Western and Perryville districts, Chignik Area, Westward Region, 2007–2009, temporal stratum 1. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2008					2009				
	Stratum 1 (7/9–7/31; H=32,016; n=469)					Stratum 1 (6/24–7/31; H=57,333; n=395)					Stratum 1 (6/22–7/31; H=103,900; n=384)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	21.5	18.4	24.8	0.00	2.0	25.2	21.6	29.0	0.00	2.3	19.1	15.8	22.6	0.00	2.1
Kotzebue Sound	0.0	0.0	0.0	0.88	0.1	0.0	0.0	0.0	0.91	0.1	0.4	0.0	2.8	0.74	1.0
CWAK	2.3	1.1	3.8	0.00	0.8	6.2	3.8	8.7	0.00	1.5	29.0	24.7	33.3	0.00	2.6
Upper Yukon	0.8	0.3	1.6	0.00	0.4	0.0	0.0	0.0	0.92	0.0	0.1	0.0	0.6	0.81	0.3
Northern Dist.	0.3	0.0	1.6	0.57	0.6	0.4	0.0	2.5	0.75	0.9	0.9	0.0	2.7	0.32	1.0
Northwestern Dist.	0.2	0.0	1.0	0.51	0.4	1.6	0.4	3.1	0.01	0.9	1.8	0.6	3.4	0.01	0.9
South Peninsula	3.3	0.0	12.1	0.15	4.3	11.0	0.0	22.6	0.07	6.5	5.6	0.0	12.5	0.03	3.8
Chignik/Kodiak	46.2	36.5	53.0	0.00	5.1	52.5	40.4	63.9	0.00	7.0	38.6	30.7	45.8	0.00	4.6
East of Kodiak	25.3	21.7	29.1	0.00	2.3	3.2	1.1	6.2	0.00	1.6	4.5	2.6	7.0	0.00	1.4

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 5.–Southeastern District Mainland (SEDM) area, Southeastern District, Alaska Peninsula Area, Westward Region, Commercial, 2008 and 2009, temporal stratum 1. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (*P*=0), and SD.

	2008					2009				
	Stratum 1 (7/3–7/31; H=26,347; n=396)					Stratum 1 (7/1–7/31; H=50,968; n=393)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	*P*=0	SD	Mean	5%	95%	*P*=0	SD
Asia	1.8	0.8	3.2	0.00	0.7	1.5	0.5	2.8	0.00	0.7
Kotzebue Sound	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.1
CWAK	1.1	0.4	2.1	0.00	0.5	1.8	0.9	3.1	0.00	0.7
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.1	0.0	0.3	0.85	0.3	0.1	0.0	0.7	0.84	0.4
Northwestern Dist.	0.1	0.0	0.2	0.87	0.3	1.0	0.0	2.4	0.10	0.8
South Peninsula	40.2	29.9	50.8	0.00	6.3	34.3	22.8	48.0	0.00	7.8
Chignik/Kodiak	54.6	43.9	65.1	0.00	6.5	58.8	45.0	70.5	0.00	7.8
East of Kodiak	2.2	0.9	4.3	0.00	1.1	2.6	1.4	4.0	0.00	0.8

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 6.–Shumagin Islands Section (June; statistical areas all 282-XX), Alaska Peninsula Area, Westward Region, 2007, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (*P*=0), and SD.

	Stratum 1 (6/7–6/10; H=36,967; n=399)					Stratum 2 (6/12–6/15; H=30,625; n=399)					Stratum 3 (6/17–6/20; H=26,110; n=400)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	*P*=0	SD	Mean	5%	95%	*P*=0	SD	Mean	5%	95%	*P*=0	SD
Asia	29.3	25.5	33.2	0.00	2.4	21.6	18.3	25.2	0.00	2.1	17.7	14.4	21.1	0.00	2.0
Kotzebue Sound	0.2	0.0	1.4	0.74	0.6	2.8	1.0	5.0	0.00	1.2	0.0	0.0	0.1	0.79	0.1
CWAK	34.7	30.6	38.9	0.00	2.5	47.5	43.0	52.0	0.00	2.7	67.4	63.2	71.5	0.00	2.5
Upper Yukon	0.9	0.0	2.1	0.12	0.7	0.8	0.0	1.9	0.09	0.6	1.3	0.0	2.8	0.09	0.9
Northern Dist.	0.1	0.0	1.1	0.82	0.5	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.8	0.0	1.8	0.10	0.6	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.3	0.75	0.2	2.5	1.1	4.1	0.00	0.9	1.9	0.0	4.1	0.21	1.4
Chignik/Kodiak	0.5	0.0	2.1	0.35	0.7	0.6	0.1	1.7	0.00	0.6	1.1	0.0	4.0	0.00	1.4
East of Kodiak	33.4	29.6	37.4	0.00	2.4	24.1	20.6	27.8	0.00	2.2	10.6	8.1	13.3	0.00	1.6

	Stratum 4 (6/22–6/25; H=26,341; n=411)					Stratum 5 (6/27–6/29; H=24,162; n=397)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	*P*=0	SD	Mean	5%	95%	*P*=0	SD
Asia	27.1	23.4	30.9	0.00	2.3	34.6	30.6	38.8	0.00	2.5
Kotzebue Sound	0.0	0.0	0.0	0.89	0.2	0.7	0.0	3.3	0.62	1.2
CWAK	46.7	42.5	51.0	0.00	2.6	25.5	21.5	29.5	0.00	2.4
Upper Yukon	1.3	0.4	2.6	0.00	0.7	1.2	0.3	2.3	0.00	0.6
Northern Dist.	0.2	0.0	1.2	0.78	0.5	0.0	0.0	0.3	0.79	0.2
Northwestern Dist.	0.0	0.0	0.0	0.91	0.1	2.2	1.0	3.7	0.00	0.8
South Peninsula	2.2	0.8	4.7	0.00	1.2	4.3	0.3	11.2	0.03	3.4
Chignik/Kodiak	5.3	2.4	8.1	0.00	1.8	8.6	1.8	13.8	0.00	3.6
East of Kodiak	17.2	13.9	20.6	0.00	2.0	22.9	19.3	26.6	0.00	2.2

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 7.–Shumagin Islands Section (June; statistical areas all 282-XX), Alaska Peninsula Area, Westward Region, 2008, temporal strata 2–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 2 (6/14–6/15; H=12,832; n=398)					Stratum 3 (6/17–6/20; H=67,110; n=396)					Stratum 4 (6/22–6/25; H=26,886; n=390)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	39.3	35.1	43.5	0.00	2.6	39.6	35.3	43.9	0.00	2.6	25.7	21.9	29.6	0.00	2.3
Kotzebue Sound	3.9	1.7	6.5	0.00	1.5	1.9	0.0	4.2	0.11	1.3	0.0	0.0	0.0	0.83	0.1
CWAK	44.4	39.5	49.3	0.00	3.0	41.5	37.0	46.2	0.00	2.8	42.1	37.6	46.6	0.00	2.8
Upper Yukon	1.1	0.0	3.1	0.14	1.0	2.4	1.1	4.1	0.00	0.9	1.3	0.0	3.2	0.16	1.1
Northern Dist.	1.7	0.4	3.3	0.03	0.9	0.3	0.0	1.9	0.69	0.7	1.3	0.0	3.4	0.34	1.2
Northwestern Dist.	0.1	0.0	0.8	0.77	0.3	1.4	0.0	2.8	0.08	0.8	0.6	0.0	2.6	0.54	1.0
South Peninsula	0.5	0.0	1.9	0.14	0.7	1.8	0.6	3.4	0.00	0.9	9.8	6.3	13.5	0.00	2.3
Chignik/Kodiak	2.4	0.7	4.4	0.01	1.1	3.4	1.6	5.4	0.00	1.2	5.6	2.8	8.8	0.00	1.9
East of Kodiak	6.6	4.5	9.0	0.00	1.4	7.7	5.6	10.1	0.00	1.4	13.8	10.8	16.9	0.00	1.9

	Stratum 5 (6/27–6/29; H=19,655; n=457)				
		90% CI			
Reporting Group	Mean	5%	95%	P=0	SD
Asia	43.3	39.4	47.3	0.00	2.4
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1
CWAK	19.5	15.9	23.6	0.00	2.4
Upper Yukon	0.3	0.0	1.1	0.42	0.4
Northern Dist.	2.2	0.0	4.5	0.22	1.5
Northwestern Dist.	1.9	0.7	3.5	0.01	0.9
South Peninsula	11.9	8.1	16.1	0.00	2.5
Chignik/Kodiak	10.5	6.4	14.7	0.00	2.5
East of Kodiak	10.5	8.0	13.2	0.00	1.6

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 8.–Shumagin Islands Section (June; statistical areas all 282-XX), Alaska Peninsula Area, Westward Region, 2009, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/7–6/10; H=23,623; n=400)					Stratum 2 (6/12–6/15; H=156,305; n=392)					Stratum 3 (6/17–6/20; H=144,212; n=397)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	27.9	24.3	31.7	0.00	2.3	31.7	27.8	35.7	0.00	2.4	35.3	31.3	39.4	0.00	2.5
Kotzebue Sound	0.0	0.0	0.0	0.90	0.1	0.3	0.0	1.9	0.68	0.7	0.1	0.0	0.4	0.86	0.3
CWAK	67.6	63.6	71.5	0.00	2.4	61.8	57.5	66.0	0.00	2.6	54.9	50.6	59.2	0.00	2.6
Upper Yukon	0.1	0.0	0.6	0.84	0.4	0.1	0.0	0.8	0.71	0.3	0.7	0.0	1.6	0.14	0.5
Northern Dist.	0.2	0.0	1.4	0.72	0.5	0.1	0.0	0.4	0.85	0.2	0.6	0.0	2.3	0.47	0.8
Northwestern Dist.	0.9	0.0	2.1	0.07	0.6	1.3	0.4	2.6	0.01	0.7	3.8	2.0	5.9	0.00	1.2
South Peninsula	0.0	0.0	0.3	0.70	0.2	0.0	0.0	0.1	0.89	0.2	0.9	0.0	2.9	0.37	1.0
Chignik/Kodiak	0.3	0.0	0.9	0.00	0.3	1.8	0.4	3.4	0.04	0.9	0.5	0.0	1.8	0.03	0.6
East of Kodiak	2.9	1.6	4.5	0.00	0.9	2.9	1.6	4.5	0.00	0.9	3.4	2.0	5.0	0.00	0.9

	Stratum 4 (6/22–6/25; H=117,372; n=397)					Stratum 5 (6/27–6/29; H=54,480; n=398)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	25.6	21.9	29.4	0.00	2.3	17.5	14.3	20.9	0.00	2.0
Kotzebue Sound	0.0	0.0	0.0	0.90	0.1	0.1	0.0	0.4	0.86	0.4
CWAK	53.6	49.3	57.8	0.00	2.6	49.6	45.3	53.9	0.00	2.6
Upper Yukon	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.1	0.0	1.0	0.85	0.5	0.4	0.0	2.6	0.72	1.0
Northwestern Dist.	7.3	4.5	10.4	0.00	1.8	4.9	2.7	7.3	0.00	1.4
South Peninsula	2.0	0.2	5.9	0.00	1.9	6.1	2.3	15.1	0.00	3.9
Chignik/Kodiak	3.5	0.0	6.5	0.07	1.8	10.3	0.0	15.3	0.04	3.8
East of Kodiak	7.9	5.6	10.5	0.00	1.5	11.2	8.0	14.6	0.00	2.0

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 9.–Ikatan area (June; statistical area 284-45 through 284-99), Alaska Peninsula Area, Westward Region, 2007, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/7–6/10; H=12,903; n=398)					Stratum 2 (6/12–6/15; H=13,215; n=394)					Stratum 3 (6/17–6/20; H=10,608; n=390)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	13.9	11.0	17.1	0.00	1.9	13.1	10.3	16.1	0.00	1.8	29.3	25.5	33.3	0.00	2.4
Kotzebue Sound	0.0	0.0	0.1	0.88	0.2	0.1	0.0	0.1	0.88	0.3	0.1	0.0	0.2	0.87	0.4
CWAK	73.3	69.3	77.1	0.00	2.4	75.8	71.6	79.7	0.00	2.5	58.2	53.8	62.6	0.00	2.7
Upper Yukon	0.0	0.0	0.0	0.89	0.1	4.2	2.0	6.8	0.00	1.5	2.6	1.1	4.4	0.00	1.0
Northern Dist.	0.7	0.0	2.0	0.15	0.7	0.0	0.0	0.1	0.82	0.2	0.2	0.0	0.9	0.38	0.4
Northwestern Dist.	0.3	0.0	0.9	0.19	0.3	0.0	0.0	0.1	0.80	0.1	0.8	0.2	1.8	0.01	0.5
South Peninsula	0.0	0.0	0.0	0.92	0.0	1.8	0.0	3.5	0.05	1.0	0.3	0.0	1.1	0.17	0.4
Chignik/Kodiak	0.0	0.0	0.1	0.76	0.1	0.5	0.0	2.3	0.18	0.8	0.1	0.0	0.6	0.78	0.3
East of Kodiak	11.8	9.3	14.6	0.00	1.6	4.6	2.9	6.7	0.00	1.2	8.5	6.3	10.9	0.00	1.4

	Stratum 4 (6/22–6/25; H=4,827; n=388)					Stratum 5 (6/27–6/29; H=2,253; n=392)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	12.1	9.3	15.2	0.00	1.8	19.4	16.0	23.0	0.00	2.1
Kotzebue Sound	0.0	0.0	0.0	0.90	0.1	2.4	0.0	5.3	0.17	1.7
CWAK	73.9	69.9	77.7	0.00	2.4	49.7	44.6	54.7	0.00	3.1
Upper Yukon	0.2	0.0	1.1	0.68	0.4	1.6	0.5	3.1	0.01	0.8
Northern Dist.	0.0	0.0	0.0	0.90	0.2	5.3	2.3	8.5	0.00	1.9
Northwestern Dist.	2.5	1.0	4.3	0.00	1.0	7.9	5.1	11.3	0.00	1.9
South Peninsula	1.2	0.2	3.4	0.03	1.0	1.5	0.4	3.0	0.01	0.8
Chignik/Kodiak	2.9	0.2	5.4	0.00	1.5	5.3	2.5	8.4	0.00	1.8
East of Kodiak	7.2	5.1	9.6	0.00	1.4	6.8	4.5	9.3	0.00	1.5

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 10.–Ikatan area (June; statistical area 284-45 through 284-99), Alaska Peninsula Area, Westward Region, 2008, temporal strata 2–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 2 (6/12–6/15; H=10,740; n=382)					Stratum 3 (6/17–6/20; H=10,379; n=396)					Stratum 4 (6/22–6/25; H=10,574; n=199)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	32.2	28.1	36.4	0.00	2.5	22.5	18.9	26.3	0.00	2.2	53.4	47.5	59.3	0.00	3.6
Kotzebue Sound	0.0	0.0	0.0	0.90	0.3	0.3	0.0	1.7	0.62	0.6	0.1	0.0	0.3	0.87	0.6
CWAK	57.8	53.3	62.1	0.00	2.7	62.9	58.5	67.2	0.00	2.6	30.2	24.6	36.0	0.00	3.5
Upper Yukon	0.0	0.0	0.1	0.69	0.1	0.4	0.0	1.5	0.03	0.5	2.7	0.7	5.3	0.00	1.4
Northern Dist.	0.8	0.0	3.0	0.11	1.0	0.9	0.0	3.8	0.49	1.4	0.0	0.0	0.2	0.87	0.2
Northwestern Dist.	4.5	2.5	6.9	0.00	1.3	4.9	2.9	7.1	0.00	1.3	4.1	2.0	7.0	0.00	1.5
South Peninsula	0.3	0.0	2.2	0.70	0.8	1.0	0.0	3.1	0.36	1.1	0.0	0.0	0.0	0.90	0.1
Chignik/Kodiak	0.1	0.0	0.3	0.86	0.3	0.9	0.0	3.9	0.60	1.4	0.2	0.0	1.1	0.68	0.5
East of Kodiak	4.3	2.5	6.3	0.00	1.2	6.2	4.1	8.6	0.00	1.4	9.3	5.9	13.1	0.00	2.2

	Stratum 5 (6/27–6/29; H=2,949; n=377)				
		90% CI			
Reporting Group	Mean	5%	95%	P=0	SD
Asia	23.6	19.8	27.5	0.00	2.3
Kotzebue Sound	0.5	0.0	2.7	0.49	0.9
CWAK	42.7	37.5	47.8	0.00	3.1
Upper Yukon	0.4	0.0	1.2	0.10	0.4
Northern Dist.	13.0	9.0	17.4	0.00	2.6
Northwestern Dist.	11.5	8.0	15.2	0.00	2.2
South Peninsula	2.0	0.2	4.5	0.00	1.3
Chignik/Kodiak	1.2	0.0	4.3	0.25	1.5
East of Kodiak	5.2	3.3	7.4	0.00	1.2

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 11.–Ikatan area (June, statistical area 284-45 through 284-99), Alaska Peninsula Area, Westward Region, 2009, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/7–6/10; H=3,583; n=128)					Stratum 2 (6/12–6/15; H=4,668; n=374)					Stratum 3 (6/17–6/20; H=18,949; n=396)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	21.0	14.9	27.8	0.00	3.9	13.3	10.5	16.4	0.00	1.8	8.7	6.4	11.2	0.00	1.4
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	66.1	58.5	73.3	0.00	4.5	82.0	78.6	85.3	0.00	2.0	83.6	79.5	87.2	0.00	2.3
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.90	0.1	0.3	0.0	0.8	0.02	0.3
Northern Dist.	9.4	4.8	15.0	0.00	3.1	0.1	0.0	0.3	0.87	0.3	1.2	0.0	4.2	0.05	1.4
Northwestern Dist.	0.1	0.0	0.1	0.88	0.3	2.6	1.3	4.2	0.00	0.9	3.0	1.6	4.7	0.00	0.9
South Peninsula	0.0	0.0	0.0	0.90	0.3	0.0	0.0	0.0	0.91	0.1	0.2	0.0	1.9	0.81	0.7
Chignik/Kodiak	0.1	0.0	0.1	0.88	0.5	1.0	0.0	2.2	0.10	0.7	1.9	0.0	3.5	0.08	1.0
East of Kodiak	3.3	0.9	6.6	0.00	1.8	0.9	0.2	2.0	0.00	0.6	1.1	0.4	2.3	0.00	0.6

	Stratum 4 (6/22–6/25; H=31,818; n=396)					Stratum 5 (6/27–6/29; H=16,081; n=398)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	13.9	11.0	16.9	0.00	1.8	24.5	20.9	28.2	0.00	2.2
Kotzebue Sound	0.0	0.0	0.0	0.90	0.2	0.3	0.0	1.7	0.68	0.6
CWAK	77.5	73.7	81.1	0.00	2.2	45.3	40.7	49.9	0.00	2.8
Upper Yukon	0.2	0.0	1.2	0.73	0.6	0.2	0.0	1.4	0.75	0.5
Northern Dist.	0.0	0.0	0.0	0.91	0.1	7.3	3.7	10.9	0.00	2.2
Northwestern Dist.	4.3	2.6	6.2	0.00	1.1	13.1	9.6	16.8	0.00	2.2
South Peninsula	0.6	0.1	1.4	0.00	0.4	0.2	0.0	1.3	0.74	0.6
Chignik/Kodiak	0.0	0.0	0.0	0.90	0.1	1.7	0.0	4.8	0.30	1.7
East of Kodiak	3.6	2.1	5.4	0.00	1.0	7.6	5.1	10.3	0.00	1.6

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 12.–Unimak District (June), Alaska Peninsula Area, Westward Region, 2007, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/7–6/10; H=15,003; n=397)					Stratum 2 (6/12–6/15; H=38,380; n=398)					Stratum 3 (6/17–6/20; H=40,875; n=394)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	9.5	7.0	12.3	0.00	1.6	13.5	10.6	16.5	0.00	1.8	11.6	8.9	14.5	0.00	1.7
Kotzebue Sound	0.0	0.0	0.0	0.89	0.1	0.4	0.0	2.2	0.68	0.8	0.1	0.0	0.3	0.69	0.2
CWAK	83.3	79.6	86.7	0.00	2.2	75.0	70.8	79.0	0.00	2.5	83.2	79.5	86.6	0.00	2.2
Upper Yukon	0.5	0.0	2.2	0.46	0.8	1.9	0.0	3.9	0.05	1.1	0.1	0.0	0.6	0.82	0.3
Northern Dist.	0.0	0.0	0.1	0.88	0.1	0.0	0.0	0.1	0.80	0.2	0.8	0.0	2.9	0.39	1.0
Northwestern Dist.	0.5	0.0	1.2	0.09	0.4	0.5	0.0	1.3	0.04	0.4	1.3	0.4	2.5	0.00	0.6
South Peninsula	0.4	0.0	1.1	0.07	0.4	0.0	0.0	0.0	0.89	0.1	0.1	0.0	0.9	0.76	0.3
Chignik/Kodiak	0.5	0.0	2.0	0.59	0.7	0.3	0.0	0.8	0.00	0.3	0.3	0.0	1.2	0.36	0.4
East of Kodiak	5.3	3.5	7.4	0.00	1.2	8.5	6.3	10.9	0.00	1.4	2.6	1.4	4.1	0.00	0.8

	Stratum 4 (6/22–6/25; H=9,468; n=476)					Stratum 5 (6/27–6/27; H=2,045; n=397)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	33.6	29.8	37.4	0.00	2.3	24.7	21.0	28.5	0.00	2.3
Kotzebue Sound	0.1	0.0	0.3	0.82	0.3	0.1	0.0	0.5	0.79	0.4
CWAK	51.0	46.7	55.3	0.00	2.6	52.7	47.9	57.4	0.00	2.9
Upper Yukon	4.3	2.2	6.6	0.00	1.3	1.4	0.0	3.4	0.06	1.1
Northern Dist.	0.2	0.0	1.3	0.59	0.5	8.3	5.1	11.8	0.00	2.0
Northwestern Dist.	2.8	1.5	4.4	0.00	0.9	6.9	4.1	10.0	0.00	1.8
South Peninsula	0.1	0.0	0.4	0.78	0.2	0.4	0.0	1.2	0.24	0.4
Chignik/Kodiak	1.1	0.1	2.4	0.04	0.7	0.1	0.0	0.3	0.81	0.2
East of Kodiak	6.9	5.0	9.0	0.00	1.2	5.7	3.8	7.7	0.00	1.2

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 13.–Unimak District (June), Alaska Peninsula Area, Westward Region, 2008, temporal stratum 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/7–6/10; H=24,272; n=385)					Stratum 2 (6/12–6/15; H=59,010; n=385)					Stratum 3 (6/17–6/20; H=70,795; n=393)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	15.6	12.5	19.0	0.00	2.0	16.4	13.1	19.9	0.00	2.1	24.1	20.3	27.9	0.00	2.3
Kotzebue Sound	0.1	0.0	0.2	0.87	0.3	0.1	0.0	0.3	0.84	0.2	2.2	0.6	4.3	0.01	1.2
CWAK	78.2	74.2	82.0	0.00	2.4	75.9	71.8	79.7	0.00	2.4	54.2	49.4	59.0	0.00	2.9
Upper Yukon	0.7	0.0	2.4	0.33	0.8	1.2	0.3	2.6	0.01	0.8	0.9	0.3	2.0	0.00	0.5
Northern Dist.	0.0	0.0	0.1	0.88	0.2	0.9	0.0	3.6	0.54	1.3	1.5	0.0	3.5	0.18	1.1
Northwestern Dist.	0.1	0.0	0.3	0.84	0.2	2.6	0.4	4.9	0.03	1.4	5.0	3.1	7.1	0.00	1.2
South Peninsula	0.6	0.0	2.3	0.58	0.9	0.0	0.0	0.0	0.90	0.1	1.5	0.0	5.6	0.46	2.1
Chignik/Kodiak	1.0	0.0	2.7	0.33	1.0	0.2	0.0	1.0	0.66	0.4	3.6	0.0	7.3	0.20	2.5
East of Kodiak	3.8	2.3	5.6	0.00	1.0	2.8	1.5	4.4	0.00	0.9	7.0	4.8	9.5	0.00	1.4

	Stratum 4 (6/22–6/25; H=63,535; n=393)					Stratum 5 (6/27–6/29; H=27,725; n=382)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	24.6	20.8	28.5	0.00	2.3	39.4	35.1	43.8	0.00	2.6
Kotzebue Sound	0.1	0.0	1.0	0.73	0.4	2.0	0.0	4.8	0.22	1.6
CWAK	53.5	48.2	58.5	0.00	3.1	34.9	29.7	40.1	0.00	3.1
Upper Yukon	3.9	1.8	6.2	0.00	1.3	1.2	0.4	2.5	0.00	0.7
Northern Dist.	0.4	0.0	4.0	0.81	1.3	6.8	3.5	10.4	0.00	2.1
Northwestern Dist.	7.6	5.2	10.3	0.00	1.6	1.5	0.5	3.0	0.00	0.8
South Peninsula	0.2	0.0	0.9	0.48	0.4	2.1	0.1	5.7	0.04	1.7
Chignik/Kodiak	4.7	2.7	7.1	0.00	1.4	2.5	0.0	6.4	0.33	2.3
East of Kodiak	4.9	3.1	7.0	0.00	1.2	9.6	7.0	12.5	0.00	1.7

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 14.–Unimak District (June), Alaska Peninsula Area, Westward Region, 2009, temporal strata 1–3. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/7–6/10; H=9,918; n=397)					Stratum 2 (6/12–6/15; H=28,788; n=397)					Stratum 3 (6/17–6/20; H=41,324; n=396)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	26.1	22.4	30.0	0.00	2.3	6.8	4.6	9.3	0.00	1.4	9.6	7.2	12.3	0.00	1.6
Kotzebue Sound	0.0	0.0	0.0	0.90	0.1	0.1	0.0	0.2	0.88	0.5	4.7	2.2	7.6	0.00	1.7
CWAK	63.8	59.7	67.9	0.00	2.5	87.3	83.5	90.6	0.00	2.2	74.8	70.2	79.1	0.00	2.7
Upper Yukon	0.0	0.0	0.0	0.92	0.1	0.5	0.0	2.7	0.58	1.0	0.1	0.0	0.6	0.83	0.3
Northern Dist.	0.0	0.0	0.0	0.91	0.1	2.4	0.8	4.5	0.00	1.2	0.5	0.0	2.9	0.45	1.0
Northwestern Dist.	3.1	1.7	4.9	0.00	1.0	1.9	0.8	3.2	0.00	0.8	4.7	2.9	6.8	0.00	1.2
South Peninsula	3.4	0.0	5.6	0.05	1.4	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.1	0.85	0.3
Chignik/Kodiak	0.2	0.0	2.3	0.84	0.9	0.0	0.0	0.0	0.91	0.1	4.0	2.0	6.3	0.00	1.3
East of Kodiak	3.3	1.8	5.1	0.00	1.0	1.1	0.4	2.1	0.00	0.5	1.5	0.5	3.0	0.00	0.8

	Stratum 4 (6/22–6/25; H=11,147; n=400)					Stratum 5 (6/27–6/29; H=28,259; n=394)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	21.2	17.8	24.7	0.00	2.1	31.3	27.3	35.4	0.00	2.4
Kotzebue Sound	0.1	0.0	0.3	0.87	0.5	0.1	0.0	0.4	0.79	0.3
CWAK	61.7	57.0	66.7	0.00	3.0	41.3	36.3	46.2	0.00	3.0
Upper Yukon	0.0	0.0	0.2	0.69	0.1	0.3	0.0	1.5	0.50	0.6
Northern Dist.	3.1	0.0	6.2	0.14	1.9	4.8	2.1	8.6	0.00	2.0
Northwestern Dist.	7.3	4.8	10.0	0.00	1.6	14.0	11.0	17.3	0.00	1.9
South Peninsula	0.5	0.0	3.3	0.72	1.2	1.6	0.6	3.0	0.00	0.8
Chignik/Kodiak	2.4	0.0	4.9	0.10	1.5	0.1	0.0	0.2	0.76	0.2
East of Kodiak	3.5	2.1	5.3	0.00	1.0	6.5	4.6	8.7	0.00	1.3

Note: Stock composition estimates may not sum to 100% due to rounding errors.
Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 15.–Shumagin Islands Section (post-June), Alaska Peninsula Area, Westward Region, 2007, temporal strata 1–3. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/6–7/12; H=27,921; n=398)					Stratum 2 (7/15–7/21; H=50,764; n=382)					Stratum 3 (7/23–7/31; H=57,805; n=397)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	19.0	15.7	22.6	0.00	2.1	30.5	26.6	34.5	0.00	2.4	30.8	27.0	34.8	0.00	2.4
Kotzebue Sound	0.7	0.0	3.0	0.55	1.1	0.0	0.0	0.0	0.90	0.1	0.3	0.0	1.4	0.53	0.5
CWAK	17.7	13.8	21.6	0.00	2.4	6.7	4.3	9.4	0.00	1.6	4.3	2.5	6.4	0.00	1.2
Upper Yukon	0.1	0.0	0.5	0.77	0.2	0.0	0.0	0.0	0.92	0.0	0.7	0.0	1.8	0.13	0.6
Northern Dist.	0.9	0.0	3.5	0.36	1.3	2.7	0.8	4.9	0.00	1.3	0.1	0.0	0.5	0.73	0.3
Northwestern Dist.	3.7	1.3	6.6	0.00	1.6	5.7	3.0	9.2	0.00	1.9	4.7	2.6	7.5	0.00	1.5
South Peninsula	10.9	5.4	17.7	0.00	3.7	25.9	17.0	35.0	0.00	5.5	20.1	13.2	27.3	0.00	4.3
Chignik/Kodiak	28.9	21.7	35.7	0.00	4.2	21.2	12.4	30.1	0.00	5.4	29.7	22.4	37.2	0.00	4.5
East of Kodiak	18.0	14.8	21.5	0.00	2.1	7.3	5.1	9.9	0.00	1.5	9.3	6.9	12.1	0.00	1.6

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 16.–Shumagin Islands Section (post-June), Alaska Peninsula Area, Westward Region, 2008, temporal strata 1–3. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/6–7/12; H=31,574; n=395)					Stratum 2 (7/14–7/22; H=38,057; n=397)					Stratum 3 (7/23–8/5; H=46,778; n=381)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	39.9	35.8	44.1	0.00	2.5	21.8	18.3	25.4	0.00	2.1	26.0	22.3	29.9	0.00	2.3
Kotzebue Sound	0.0	0.0	0.0	0.90	0.1	0.1	0.0	1.2	0.82	0.5	0.3	0.0	1.8	0.67	0.7
CWAK	9.2	6.7	11.9	0.00	1.6	3.2	1.6	5.0	0.00	1.0	1.8	0.0	3.5	0.04	1.0
Upper Yukon	0.0	0.0	0.1	0.87	0.1	0.2	0.0	0.7	0.35	0.2	0.0	0.0	0.0	0.91	0.1
Northern Dist.	1.4	0.3	2.9	0.00	0.8	1.5	0.4	3.2	0.00	0.9	0.1	0.0	0.5	0.70	0.3
Northwestern Dist.	6.3	3.6	9.3	0.00	1.7	2.3	0.9	4.1	0.00	1.0	7.8	4.5	11.2	0.00	2.0
South Peninsula	16.0	9.5	23.1	0.00	4.2	19.3	10.5	29.0	0.00	5.7	13.4	5.9	22.2	0.00	5.0
Chignik/Kodiak	16.0	9.0	23.0	0.00	4.3	41.4	31.4	50.9	0.00	6.0	28.4	19.8	36.7	0.00	5.2
East of Kodiak	11.3	8.5	14.2	0.00	1.7	10.4	7.4	13.6	0.00	1.9	22.2	18.4	26.2	0.00	2.4

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 17.–Shumagin Islands Section (post-June), Alaska Peninsula Area, Westward Region, 2009, temporal strata 1–3. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/3–7/9; H=28,065; n=331)					Stratum 2 (7/11–7/20; H=25,482; n=397)					Stratum 3 (7/21–7/31; H=64,953; n=398)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	25.3	21.4	29.5	0.00	2.5	13.5	10.7	16.6	0.00	1.8	9.1	6.8	11.7	0.00	1.5
Kotzebue Sound	3.4	1.4	5.8	0.00	1.4	0.0	0.0	0.2	0.71	0.2	0.0	0.0	0.0	0.92	0.0
CWAK	34.8	29.9	39.7	0.00	3.0	19.5	16.0	23.2	0.00	2.2	3.3	1.7	5.2	0.00	1.1
Upper Yukon	0.5	0.0	2.5	0.59	0.9	0.3	0.0	0.8	0.00	0.3	0.0	0.0	0.0	0.92	0.0
Northern Dist.	9.3	5.2	13.5	0.00	2.5	4.1	2.1	6.5	0.00	1.4	1.9	0.6	3.6	0.00	1.0
Northwestern Dist.	6.6	3.9	10.0	0.00	1.9	7.2	4.6	10.3	0.00	1.8	4.4	2.5	6.7	0.00	1.3
South Peninsula	9.1	3.9	14.8	0.00	3.4	26.9	17.8	35.5	0.00	5.4	42.3	31.2	53.4	0.00	6.7
Chignik/Kodiak	5.7	0.6	12.0	0.00	3.5	25.3	16.5	34.8	0.00	5.5	35.0	24.0	46.3	0.00	6.8
East of Kodiak	5.2	2.6	8.0	0.00	1.6	3.2	1.5	5.4	0.00	1.2	4.0	2.3	6.1	0.00	1.2

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 18.–Dolgoi Island area (post-June; statistical areas all 283-XX, and 284-00 through 284-42), Alaska Peninsula Area, Westward Region, 2007–2009, temporal stratum 1. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007 Stratum 1 (7/6–7/31; H=39,090; n=443)					2008 Stratum 1 (7/6–7/31; H=36,557; n=422)					2009 Stratum 1 (7/6–7/31; H=23,771; n=352)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	3.8	2.4	5.5	0.00	1.0	11.3	8.8	14.1	0.00	1.6	2.1	0.8	3.7	0.00	0.9
Kotzebue Sound	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.1	0.0	0.3	0.86	0.2
CWAK	1.9	0.9	3.1	0.00	0.7	4.9	3.1	6.8	0.00	1.1	2.2	1.0	3.8	0.00	0.9
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.1	0.0	0.4	0.72	0.2	0.3	0.0	0.9	0.06	0.3
Northern Dist.	0.2	0.0	0.8	0.32	0.3	1.4	0.0	5.2	0.43	1.9	0.2	0.0	1.2	0.76	0.6
Northwestern Dist.	0.6	0.0	2.2	0.40	0.8	1.0	0.0	2.8	0.33	1.0	0.2	0.0	1.2	0.79	0.5
South Peninsula	51.1	40.3	62.8	0.00	6.8	72.7	62.6	80.2	0.00	5.3	56.2	43.2	69.0	0.00	7.9
Chignik/Kodiak	32.3	20.5	43.4	0.00	6.9	7.5	0.5	18.0	0.00	5.1	37.4	24.5	50.4	0.00	7.9
East of Kodiak	10.0	7.1	13.2	0.00	1.8	1.1	0.4	2.2	0.00	0.6	1.5	0.6	2.8	0.00	0.7

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 19.–Ikatan area (post-June; statistical area 284-45 through 284-99), Alaska Peninsula Area, Westward Region, 2007–2009, temporal stratum 1. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2008					2009				
	Stratum 1 (7/6–7/31; H=3,612; n=296)					Stratum 1 (7/6–7/31; H=11,674; n=443)					Stratum 1 (7/6–7/31; H=13,288; n=390)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	15.5	11.9	19.4	0.00	2.3	30.2	26.6	34.0	0.00	2.3	4.7	3.0	6.6	0.00	1.1
Kotzebue Sound	0.2	0.0	1.6	0.67	0.6	2.3	1.0	4.0	0.00	0.9	1.4	0.0	3.1	0.07	1.0
CWAK	17.7	13.3	22.7	0.00	2.9	9.7	7.0	12.6	0.00	1.7	18.2	14.3	22.3	0.00	2.4
Upper Yukon	0.4	0.0	1.7	0.43	0.6	1.4	0.5	2.5	0.00	0.6	0.0	0.0	0.2	0.83	0.2
Northern Dist.	18.3	11.8	25.2	0.00	4.1	3.5	0.7	7.4	0.00	2.1	16.2	10.6	22.5	0.00	3.6
Northwestern Dist.	25.9	19.4	32.6	0.00	4.0	11.6	7.8	15.7	0.00	2.4	21.3	15.3	28.4	0.00	4.0
South Peninsula	4.9	0.7	10.5	0.00	3.0	35.0	28.0	41.3	0.00	4.1	28.2	12.8	40.4	0.00	8.9
Chignik/Kodiak	12.6	6.4	19.7	0.00	4.1	3.0	0.0	9.4	0.13	3.4	8.8	0.1	25.4	0.00	8.9
East of Kodiak	4.5	2.4	7.0	0.00	1.4	3.3	2.0	5.0	0.00	0.9	1.3	0.5	2.4	0.00	0.6

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 20.–Bear River Section, Northern District, Alaska Peninsula Area, Westward Region, 2007 and 2009, temporal stratum 1. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007 Stratum 1 (6/11–7/31; H=23,270; n=310)					2009 Stratum 1 (6/8–7/28; H=14,154; n=378)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.3	0.0	1.2	0.34	0.4	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.2	0.87	0.2	0.0	0.0	0.0	0.92	0.0
CWAK	0.3	0.0	1.2	0.36	0.4	0.1	0.0	0.0	0.89	0.5
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northern Dist.	97.4	93.7	99.9	0.00	2.0	91.8	87.3	95.7	0.00	2.6
Northwestern Dist.	2.0	0.0	5.5	0.09	1.8	7.2	3.6	11.4	0.00	2.4
South Peninsula	0.0	0.0	0.0	0.86	0.1	0.1	0.0	0.2	0.87	0.4
Chignik/Kodiak	0.1	0.0	0.2	0.84	0.3	0.2	0.0	1.2	0.73	0.5
East of Kodiak	0.0	0.0	0.0	0.86	0.1	0.6	0.1	1.5	0.00	0.5

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 21.–Three Hills and Ilnik sections, Northern District, Alaska Peninsula Area, Westward Region, 2007 and 2009, temporal stratum 1. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2009				
	Stratum 1 (6/20–7/31; H=36,278; n=385)					Stratum 1 (6/27–7/28; H=12,818; n=171)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
Kotzebue Sound	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	22.1	15.3	29.2	0.00	4.2	6.5	0.0	22.4	0.05	8.0
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northern Dist.	69.9	62.2	77.3	0.00	4.6	93.3	77.5	100.0	0.00	8.0
Northwestern Dist.	1.1	0.0	3.7	0.34	1.3	0.1	0.0	0.3	0.85	0.3
South Peninsula	0.1	0.0	0.2	0.87	0.3	0.0	0.0	0.0	0.91	0.1
Chignik/Kodiak	0.5	0.0	2.9	0.55	1.0	0.1	0.0	0.2	0.87	0.4
East of Kodiak	6.3	4.2	8.7	0.00	1.4	0.0	0.0	0.2	0.58	0.2

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 22.–Eastside districts (Ugashik, Egegik, and Naknek-Kvichak districts), Bristol Bay Area, Central Region, 2007, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/12–6/26; H=19,748; n=295)					Stratum 2 (6/27–6/29; H=21,890; n=260)					Stratum 3 (6/30–7/5; H=53,548; n=338)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.1	0.88	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.1	0.0	0.2	0.87	0.3	0.0	0.0	0.0	0.92	0.1
CWAK	89.0	80.8	96.3	0.00	4.7	99.9	99.2	100.0	0.00	0.4	99.7	98.5	100.0	0.00	0.7
Upper Yukon	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
Northern Dist.	10.9	3.6	19.1	0.00	4.7	0.1	0.0	0.3	0.50	0.3	0.2	0.0	1.4	0.25	0.7
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.1	0.0	0.5	0.76	0.2	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

	Stratum 4 (7/6–7/15; H=297,094; n=325)					Stratum 5 (7/16–8/31; H=391,663; n=364)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	80.8	72.2	89.3	0.00	5.3	98.2	93.1	100.0	0.00	2.5
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northern Dist.	19.2	10.7	27.7	0.00	5.3	1.8	0.0	6.9	0.28	2.5
Northwestern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
East of Kodiak	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 23.–Eastside districts (Ugashik, Egegik, and Naknek-Kvichak districts), Bristol Bay Area, Central Region, 2008, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/9–6/26; H=17,283; n=444)					Stratum 2 (6/27–7/1; H=31,293; n=344)					Stratum 3 (7/2–7/10; H=117,073; n=394)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.1	0.0	0.6	0.86	0.4	0.0	0.0	0.0	0.91	0.1
CWAK	86.9	79.0	94.1	0.00	4.6	99.8	99.1	100.0	0.00	0.8	88.9	82.1	100.0	0.00	4.6
Upper Yukon	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northern Dist.	13.0	5.9	21.0	0.00	4.6	0.1	0.0	0.0	0.90	0.8	11.1	0.0	17.9	0.06	4.6
Northwestern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.89	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.89	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

	Stratum 4 (7/11–7/17; H=155,773; n=390)					Stratum 5 (7/18–8/21; H=144,031; n=391)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.1	0.0	1.0	0.77	0.4
CWAK	92.6	87.6	96.7	0.00	2.8	99.1	95.9	100.0	0.00	1.5
Upper Yukon	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.1
Northern Dist.	7.2	3.1	12.2	0.00	2.8	0.5	0.0	3.6	0.58	1.4
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.1	0.0	0.4	0.76	0.2
South Peninsula	0.0	0.0	0.1	0.86	0.1	0.1	0.0	0.4	0.82	0.2
Chignik/Kodiak	0.1	0.0	0.6	0.64	0.2	0.1	0.0	0.5	0.77	0.2
East of Kodiak	0.1	0.0	0.4	0.72	0.2	0.1	0.0	0.4	0.85	0.2

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 24.–Eastside districts (Ugashik, Egegik, and Naknek-Kvichak districts), Bristol Bay Area, Central Region, 2009, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/15–6/25; H=26,739; n=386)					Stratum 2 (6/26–6/30; H=40,632; n=349)					Stratum 3 (7/1–7/6; H=58,075; n=376)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	93.3	85.1	100.0	0.00	4.7	99.6	96.7	100.0	0.00	1.2	90.6	82.7	99.7	0.00	4.9
Upper Yukon	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northern Dist.	6.7	0.0	14.9	0.05	4.7	0.4	0.0	3.3	0.82	1.2	9.4	0.2	17.3	0.02	4.9
Northwestern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0

	Stratum 4 (7/7–7/11; H=107,247; n=375)					Stratum 5 (7/12–8/31; H=206,012; n=358)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	90.1	81.5	99.8	0.00	5.2	99.2	95.3	100.0	0.00	2.0
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northern Dist.	9.9	0.1	18.5	0.03	5.2	0.5	0.0	4.5	0.82	2.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.1	0.87	0.2
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.89	0.1
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.2	0.0	0.9	0.64	0.3

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 25.–Nushagak District, Bristol Bay Area, Central Region, 2007, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/11–6/27; H=265,860; n=607)					Stratum 2 (6/28–7/7; H=472,835; n=600)					Stratum 3 (7/8–7/12; H=144,692; n=409)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.9	100.0	0.00	0.1	100.0	99.9	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0

	Stratum 4 (7/13–7/17; H=51,215; n=428)					Stratum 5 (7/18–8/12; H=18,680; n=506)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.7	100.0	0.00	0.2	100.0	99.9	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.1	0.86	0.1	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.93	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.93	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 26.–Nushagak District, Bristol Bay Area, Central Region, 2008, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/9–6/29; H=141,546; n=591)					Stratum 2 (6/30–7/5; H=157,623; n=625)					Stratum 3 (7/6–7/11; H=134,421; n=605)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.1
CWAK	99.9	99.6	100.0	0.00	0.2	100.0	99.9	100.0	0.00	0.1	99.4	97.2	100.0	0.00	0.9
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.1
Northern Dist.	0.0	0.0	0.0	0.88	0.1	0.0	0.0	0.0	0.93	0.0	0.4	0.0	2.6	0.74	0.9
Northwestern Dist.	0.0	0.0	0.2	0.80	0.1	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.3	0.73	0.1	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.91	0.0
Chignik/Kodiak	0.0	0.0	0.1	0.84	0.1	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.1	0.85	0.1
East of Kodiak	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.2	0.0	0.5	0.13	0.2

	Stratum 4 (7/12–7/15; H=45,039; n=580)					Stratum 5 (7/16–8/15; H=13,701; n=498)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.1	0.86	0.1
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.90	0.1
CWAK	100.0	99.8	100.0	0.00	0.1	100.0	99.7	100.0	0.00	0.2
Upper Yukon	0.0	0.0	0.0	0.89	0.1	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0
South Peninsula	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 27.–Nushagak District, Bristol Bay Area, Central Region, 2009, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/7–6/27; H=211,577; n=625)					Stratum 2 (6/28–7/2; H=252,478; n=615)					Stratum 3 (7/3–7/4; H=69,026; n=627)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.90	0.2	0.1	0.0	0.6	0.85	0.3
CWAK	100.0	99.9	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.2	99.9	99.4	100.0	0.00	0.4
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.93	0.0
Northwestern Dist.	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.93	0.0
South Peninsula	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0
East of Kodiak	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0

	Stratum 4 (7/5–7/9; H=125,675; n=627)					Stratum 5 (7/10–8/18; H=86,327; n=639)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
CWAK	100.0	99.9	100.0	0.00	0.1	100.0	99.9	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0
South Peninsula	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0
East of Kodiak	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.93	0.0

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 28.–Togiak District, Bristol Bay Area, Central Region, 2007, temporal strata 1–5. Regional reporting group-specific stock composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/18–6/28; H=10,514; n=391)					Stratum 2 (7/2–7/9; H=66,310; n=302)					Stratum 3 (7/10–7/15; H=36,473; n=384)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.8	100.0	0.00	0.1	99.7	98.9	100.0	0.00	0.4	100.0	99.8	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.3	0.0	1.0	0.09	0.3	0.0	0.0	0.0	0.92	0.0

	Stratum 4 (7/16–7/20; H=33,326; n=394)					Stratum 5 (7/21–8/4; H=55,863; n=384)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.1
CWAK	99.7	99.1	100.0	0.00	0.3	100.0	99.8	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.90	0.2	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.3	0.0	0.8	0.02	0.3	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding errors.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 29.–Togiak District, Bristol Bay Area, Central Region, 2008, temporal strata 1–5. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/18–6/27; H=6,067; n=397)					Stratum 2 (6/30–7/4; H=47,097; n=397)					Stratum 3 (7/5–7/11; H=73,635; n=399)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.8	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

	Stratum 4 (7/12–7/16; H=57,148; n=386)					Stratum 5 (7/17–8/6; H=118,020; n=394)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.8	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 30.–Togiak District, Bristol Bay Area, Central Region, 2009, temporal strata 1–5. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/22–6/30; H=8,584; n=395)					Stratum 2 (7/1–7/2; H=10,078; n=394)					Stratum 3 (7/3–7/7; H=17,019; n=243)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
Kotzebue Sound	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.8	100.0	0.00	0.1	99.7	99.2	100.0	0.00	0.3	100.0	99.7	100.0	0.00	0.2
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.2
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.1
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.3	0.0	0.8	0.02	0.3	0.0	0.0	0.0	0.92	0.0

	Stratum 4 (7/8–7/11; H=24,694; n=376)					Stratum 5 (7/13–8/27; H=80,996; n=386)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.8	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 31.–District 5 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/19–7/4; H=3,092; n=250)					Stratum 2 (7/6–7/16; H=2,213; n=185)					Stratum 3 (7/18–8/31; H=2,546; n=317)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.90	0.2	0.2	0.0	1.1	0.83	0.6	0.0	0.0	0.0	0.90	0.1
CWAK	99.8	98.8	100.0	0.00	0.5	99.8	98.7	100.0	0.00	0.7	99.6	98.9	100.0	0.00	0.4
Upper Yukon	0.0	0.0	0.1	0.88	0.2	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.1	0.0	0.8	0.67	0.3	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.3	0.80	0.2
Chignik/Kodiak	0.0	0.0	0.2	0.85	0.2	0.0	0.0	0.0	0.92	0.1	0.1	0.0	0.3	0.80	0.2
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1	0.2	0.0	0.8	0.29	0.3

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 32.–District 5 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region, 2009, temporal strata 1–2. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/22–6/30; H=4,028; n=398)					Stratum 2 (7/6–7/17; H=10,696; n=398)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.93	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.8	100.0	0.00	0.2	99.9	99.6	100.0	0.00	0.2
Upper Yukon	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.2	0.86	0.2
Northern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 33.–District 4 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/14–6/28; H=9,501; n=394)					Stratum 2 (7/2–7/16; H=18,338; n=400)					Stratum 3 (7/18–8/31; H=34,393; n=400)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.1	0.0	0.6	0.84	0.4	0.0	0.0	0.0	0.89	0.2
CWAK	100.0	99.8	100.0	0.00	0.1	99.9	99.3	100.0	0.00	0.4	99.9	99.7	100.0	0.00	0.3
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.90	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 34.–District 4 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region, 2008, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/14–6/26; H=9,356; n=391)					Stratum 2 (7/1–7/14; H=25,144; n=395)					Stratum 3 (7/16–8/29; H=22,533; n=391)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.1	0.88	0.2	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.7	100.0	0.00	0.2	100.0	99.8	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Northern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 35.–District 4 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region, 2009, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/15–6/30; H=13,741; n=393)					Stratum 2 (7/6–7/15; H=41,409; n=400)					Stratum 3 (7/16–8/24; H=36,008; n=396)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.8	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.2	100.0	99.8	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.89	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 36.–District 1 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/7–6/26; H=449; n=388)					Stratum 2 (6/27–7/11; H=1,369; n=397)					Stratum 3 (7/12–8/24; H=12,209; n=357)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.8	100.0	0.00	0.2	100.0	99.9	100.0	0.00	0.1	99.9	99.3	100.0	0.00	0.3
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0	0.1	0.0	0.6	0.84	0.3
Northern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 37.–District 1 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region, 2008, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/20–6/24; H=19,463; n=398)					Stratum 2 (6/27–6/27; H=7,804; n=377)					Stratum 3 (7/12–8/25; H=3,249; n=297)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.2
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.1	0.88	0.2	0.0	0.0	0.1	0.89	0.3
CWAK	100.0	99.8	100.0	0.00	0.1	99.9	99.6	100.0	0.00	0.3	99.8	98.9	100.0	0.00	0.5
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.1	0.0	0.7	0.76	0.3
Northern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 38.–District 1 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region, 2009, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/23–6/26; H=23,615; n=393)					Stratum 2 (7/1–7/18; H=43,603; n=395)					Stratum 3 (7/28–8/22; H=9,572; n=396)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.1
CWAK	100.0	99.8	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.1	100.0	99.8	100.0	0.00	0.1
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 39.–Toksook Bay Subsistence, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region, 2007–2009, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2008					2009				
	Stratum 1 (Season; H=2,042[a]; n=312)					Stratum 1 (Season; H=2,042[a]; n=394)					Stratum 1 (Season; H=2,042[a]; n=110)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.3	0.0	0.9	0.04	0.3	0.0	0.0	0.0	0.91	0.1
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.7	100.0	0.00	0.2	99.5	98.5	100.0	0.00	0.6	99.9	99.4	100.0	0.00	0.4
Upper Yukon	0.0	0.0	0.1	0.83	0.2	0.1	0.0	0.1	0.88	0.4	0.0	0.0	0.0	0.90	0.2
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.2	0.85	0.1	0.0	0.0	0.0	0.91	0.2
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.1	0.0	0.5	0.63	0.2	0.0	0.0	0.0	0.91	0.1
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.91	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.1	0.86	0.1	0.0	0.0	0.0	0.91	0.1
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

[a] No subsistence survey conducted, harvest for season estimated as average harvest between 1990 and 2011. In 2008 there were 600 fish harvested during period samples were collected (Eggers et al. 2011).

Table 40.–District 1 Commercial marine areas excluding Black River (summer), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/19–6/22; H=1,548; n=393)					Stratum 2 (6/26–7/2; H=7,867; n=385)					Stratum 3 (7/6–7/15; H=2,367; n=393)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.2	0.0	0.7	0.25	0.3	0.0	0.0	0.0	0.92	0.1
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	97.0	94.1	100.0	0.00	1.7	94.0	90.1	97.5	0.00	2.3	89.4	85.5	93.0	0.00	2.3
Upper Yukon	3.0	0.0	5.9	0.04	1.7	5.8	2.3	9.7	0.00	2.3	10.6	7.0	14.5	0.00	2.3
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 41.–District 1 Commercial marine areas excluding Black River (summer), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region, 2008, temporal strata 2–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 2 (7/2–7/5; H=1,973; n=387)					Stratum 3 (7/8–7/14; H=2,639; n=390)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.1
CWAK	92.7	86.7	99.2	0.00	3.7	74.6	67.9	80.9	0.00	4.0
Upper Yukon	7.2	0.8	13.3	0.00	3.7	25.3	19.0	32.0	0.00	4.0
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses

Table 42.–District 1 Commercial marine areas excluding Black River (summer), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region, 2009, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (*P*=0), and SD.

	Stratum 1 (6/29–7/2; H=2,560; n=342)					Stratum 2 (7/3–7/8; H=2,551; n=296)					Stratum 3 (7/10–7/15; H=1,729; n=295)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	*P*=0	SD	Mean	5%	95%	*P*=0	SD	Mean	5%	95%	*P*=0	SD
Asia	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.90	0.2	0.0	0.0	0.0	0.91	0.1
CWAK	81.7	76.3	86.9	0.00	3.2	74.2	67.8	80.2	0.00	3.8	63.0	54.5	71.5	0.00	5.2
Upper Yukon	18.2	13.1	23.7	0.00	3.2	25.8	19.7	32.2	0.00	3.8	37.0	28.4	45.4	0.00	5.2
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 43.–District 1 Commercial Black River only (summer), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal strata 1–2. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/19–6/22; H=1,635; n=397)					Stratum 2 (6/26–7/2; H=2,080; n=116)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.2
CWAK	99.4	97.7	100.0	0.00	0.8	93.1	82.1	100.0	0.00	5.8
Upper Yukon	0.6	0.0	2.2	0.16	0.8	6.9	0.0	17.8	0.14	5.8
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
East of Kodiak	0.0	0.0	0.0	0.90	0.0	0.0	0.0	0.0	0.91	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 44.–Coastal District Subsistence (Hooper Bay summer), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region, 2007–2009, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2008					2009				
	Stratum 1 (Season; H=12,234; n=314)					Stratum 1 (Season; H=12,007; n=377)					Stratum 1 (Season; H=9,200; n=363)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.91	0.1
CWAK	100.0	99.8	100.0	0.00	0.2	100.0	99.7	100.0	0.00	0.2	99.9	99.6	100.0	0.00	0.4
Upper Yukon	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.91	0.2	0.0	0.0	0.0	0.90	0.3
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.89	0.1
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 45.–District 1 Black River Subsistence (Scammon Bay summer), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region, 2008 and 2009, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (*P*=0), and SD.

	2008					2009				
	Stratum 1 (Season; H=6,117; n=383)					Stratum 1 (Season; H=3,600; n=397)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	*P*=0	SD	Mean	5%	95%	*P*=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.1
CWAK	93.7	90.6	96.4	0.00	1.8	96.3	93.5	98.7	0.00	1.6
Upper Yukon	6.2	3.6	9.4	0.00	1.8	3.7	1.3	6.5	0.01	1.6
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 46.–District 1 Commercial marine areas excluding Black River (fall), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal strata 2–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 2 (8/14–8/24; H=27,294; n=143)					Stratum 3 (8/26–9/9; H=11,558; n=220)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.91	0.1	3.6	1.7	6.1	0.00	1.4
Kotzebue Sound	0.2	0.0	2.0	0.81	0.9	2.9	1.2	5.3	0.00	1.3
CWAK	4.8	0.8	9.3	0.01	2.6	0.0	0.0	0.1	0.80	0.2
Upper Yukon	94.9	90.6	98.4	0.00	2.4	93.4	90.2	96.1	0.00	1.8
Northern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.1
Northwestern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.1
South Peninsula	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 47.–District 1 Commercial marine areas excluding Black River (fall), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region, 2008, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/17–7/25; H=13,066; n=386)					Stratum 2 (7/29–8/1; H=37,647; n=285)					Stratum 3 (8/26–9/10; H=16,991; n=394)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.2	0.86	0.1	0.0	0.0	0.1	0.87	0.2	2.1	0.9	3.5	0.00	0.8
Kotzebue Sound	0.1	0.0	1.1	0.82	0.5	0.0	0.0	0.0	0.90	0.2	6.1	3.9	8.6	0.00	1.5
CWAK	48.1	42.7	53.6	0.00	3.3	9.2	5.1	13.7	0.00	2.6	0.2	0.0	1.3	0.79	0.5
Upper Yukon	51.7	46.2	57.0	0.00	3.3	90.5	85.9	94.5	0.00	2.6	91.7	88.9	94.1	0.00	1.6
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.2	0.0	0.9	0.64	0.4	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.1	0.0	0.9	0.72	0.4	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 48.–District 1 Commercial marine areas excluding Black River (fall), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region, 2009, temporal strata 1–2. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/18–7/22; H=6,810; n=303)					Stratum 2 (7/29–8/5; H=4,181; n=278)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.90	0.1
CWAK	38.3	31.3	46.0	0.00	4.5	7.3	4.0	11.4	0.00	2.3
Upper Yukon	61.7	54.0	68.7	0.00	4.5	92.6	88.6	96.0	0.00	2.3
Northern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 49.–Subdistrict 6 (Unalakleet) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal strata 1–2. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/18–7/21; H=2,003; n=396)					Stratum 2 (7/22–7/31; H=5,790; n=398)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.2	0.0	1.2	0.77	0.5	0.5	0.0	2.5	0.35	0.9
CWAK	99.8	98.8	100.0	0.00	0.6	99.5	97.5	100.0	0.00	1.0
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.89	0.1	0.0	0.0	0.0	0.92	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 50.–Subdistrict 6 (Unalakleet) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2008, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/8–7/15; H=1,522; n=344)					Stratum 2 (7/17–7/29; H=9,554; n=399)					Stratum 3 (7/30–9/12; H=6,572; n=263)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.1	0.87	0.1	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.91	0.1	4.4	0.0	10.0	0.23	3.4	0.6	0.0	3.9	0.35	1.5
CWAK	100.0	99.8	100.0	0.00	0.2	95.5	90.0	100.0	0.00	3.4	99.2	95.7	100.0	0.00	1.6
Upper Yukon	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1	0.2	0.0	1.5	0.67	0.6
Northern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.90	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 51.–Subdistrict 6 (Unalakleet) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2009, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/8–7/15; H=4,942; n=300)					Stratum 2 (7/16–7/28; H=7,211; n=396)					Stratum 3 (7/29–9/11; H=8,494; n=300)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.1	0.0	0.0	0.89	0.4	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	0.0	0.0	0.0	0.89	0.3	0.2	0.0	1.1	0.63	0.8	0.3	0.0	2.3	0.83	1.1
CWAK	99.9	99.3	100.0	0.00	0.5	99.8	98.7	100.0	0.00	0.8	98.3	95.2	100.0	0.00	1.8
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.89	0.2	1.4	0.0	3.9	0.30	1.4
Northern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 52.–Subdistrict 5 (Shaktoolik) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal strata 1–2. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/18–7/21; H=1,294; n=200)					Stratum 2 (7/22–8/2; H=2,868; n=399)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	15.3	5.9	24.6	0.00	5.7	8.1	3.6	13.3	0.00	3.0
CWAK	84.6	75.4	94.1	0.00	5.7	91.9	86.7	96.4	0.00	3.0
Upper Yukon	0.0	0.0	0.0	0.89	0.2	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 53.–Subdistrict 5 (Shaktoolik) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2008, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/9–7/22; H=1,816; n=200)					Stratum 2 (7/23–8/5; H=2,208; n=344)					Stratum 3 (8/6–9/9; H=2,018; n=393)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.2	0.83	0.1	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	3.4	0.0	10.6	0.13	3.7	0.2	0.0	1.7	0.66	0.8	8.6	3.8	14.4	0.01	3.3
CWAK	96.1	88.9	99.9	0.00	3.7	99.7	98.2	100.0	0.00	0.9	91.1	85.3	96.0	0.00	3.3
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.3	0.0	1.4	0.57	0.5
Northern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.89	0.1	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.5	0.0	1.5	0.04	0.5	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 54.–Subdistrict 5 (Shaktoolik) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2009, temporal strata 1–3. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/10–7/21; H=7,631; n=145)					Stratum 2 (7/22–8/4; H=2,069; n=144)					Stratum 3 (8/5–9/11; H=1,241; n=106)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
Kotzebue Sound	1.1	0.0	6.0	0.38	2.2	0.1	0.0	0.0	0.89	0.4	0.1	0.0	0.0	0.90	0.4
CWAK	98.8	94.0	100.0	0.00	2.2	99.9	99.5	100.0	0.00	0.5	99.8	98.6	100.0	0.00	0.8
Upper Yukon	0.0	0.0	0.0	0.87	0.1	0.0	0.0	0.0	0.91	0.1	0.1	0.0	0.7	0.85	0.6
Northern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
South Peninsula	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1
East of Kodiak	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1	0.0	0.0	0.0	0.91	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 55.–Subdistrict 3 (Moses Point) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2007 and 2008, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2008				
	Stratum 1 (7/10–8/29; H=4,567; n=393)					Stratum 1 (7/5–8/30; H=304; n=197)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Kotzebue Sound	5.5	0.9	9.8	0.02	2.6	0.5	0.0	3.5	0.52	1.3
CWAK	94.5	90.1	99.1	0.00	2.6	99.5	96.5	100.0	0.00	1.3
Upper Yukon	0.0	0.0	0.0	0.87	0.1	0.0	0.0	0.0	0.91	0.2
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 56.–Subdistrict 2 (Golovin) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2008, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (7/1–8/22; H=623; n=214)				
		90% CI			
Reporting Group	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.1
Kotzebue Sound	0.0	0.0	0.0	0.89	0.3
CWAK	99.9	99.4	100.0	0.00	0.5
Upper Yukon	0.1	0.0	0.0	0.89	0.3
Northern Dist.	0.0	0.0	0.0	0.92	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.1
South Peninsula	0.0	0.0	0.0	0.98	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.94	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 57.–Port Clarence District Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (Season; H=7,637; n=361)				
		90% CI			
Reporting Group	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0
Kotzebue Sound	6.9	1.8	12.3	0.00	3.2
CWAK	93.1	87.7	98.1	0.00	3.2
Upper Yukon	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.92	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 58.–Stebbins area subsistence, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2007 and 2008, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2008				
	Stratum 1 (Season; H=4,980; n=380)					Stratum 1 (Season; H=4,116[a]; n=95)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.88	0.0	0.0	0.0	0.0	0.91	0.1
Kotzebue Sound	0.1	0.0	0.9	0.73	0.5	0.0	0.0	0.0	0.90	0.4
CWAK	98.9	96.3	100.0	0.00	1.3	99.7	98.0	100.0	0.00	0.9
Upper Yukon	0.9	0.0	3.4	0.20	1.2	0.2	0.0	1.5	0.81	0.8
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
East of Kodiak	0.0	0.0	0.0	0.81	0.0	0.0	0.0	0.0	0.91	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

[a] No subsistence survey conducted, harvest for season estimated as average harvest between 1994 and 2011.

Table 59.–St. Michael area subsistence, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2007 and 2008, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2008				
	Stratum 1 (Season; H=2,119; n=274)					Stratum 1 (7/27–7/27; H=2,845[a]; n=160)				
		90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.90	0.1	0.0	0.0	0.0	0.92	0.1
Kotzebue Sound	0.2	0.0	1.0	0.62	0.7	0.2	0.0	0.5	0.86	0.9
CWAK	99.6	98.1	100.0	0.00	0.9	99.8	98.8	100.0	0.00	1.0
Upper Yukon	0.2	0.0	1.1	0.59	0.5	0.0	0.0	0.0	0.89	0.3
Northern Dist.	0.0	0.0	0.0	0.92	0.1	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

[a] No subsistence survey conducted, harvest for season estimated as average harvest between 1994 and 2011.

Table 60.–Subdistrict 3 (Moses Point) subsistence, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (Season; H=2,334; n=126)				
		90% CI			
Reporting Group	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.91	0.1
Kotzebue Sound	0.0	0.0	0.0	0.90	0.3
CWAK	99.9	99.5	100.0	0.00	0.4
Upper Yukon	0.0	0.0	0.0	0.91	0.2
Northern Dist.	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.91	0.1
South Peninsula	0.0	0.0	0.0	0.91	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.91	0.1
East of Kodiak	0.0	0.0	0.0	0.91	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.
Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 61.–Nome area subsistence, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, 2007, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	Stratum 1 (6/29–7/15; H=2,938; n=166)				
		90% CI			
Reporting Group	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.91	0.1
Kotzebue Sound	0.9	0.0	4.4	0.12	1.6
CWAK	99.1	95.6	100.0	0.00	1.6
Upper Yukon	0.0	0.0	0.0	0.91	0.1
Northern Dist.	0.0	0.0	0.0	0.91	0.1
Northwestern Dist.	0.0	0.0	0.0	0.92	0.1
South Peninsula	0.0	0.0	0.0	0.91	0.1
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.1
East of Kodiak	0.0	0.0	0.0	0.91	0.1

Note: Stock composition estimates may not sum to 100% due to rounding error.
Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

Table 62.–Kotzebue District Commercial, Kotzebue Area, Arctic-Yukon-Kuskokwim Region, 2007–2009, temporal stratum 1. Regional reporting group-specific stock-composition estimates (%) including mean, 90% credibility interval, the probability that the estimate is equal to zero (P=0), and SD.

	2007					2008					2009				
	Stratum 1 (7/17–8/31; H=147,087; n=403)					Stratum 1 (7/21–8/29; H=190,550; n=401)					Stratum 1 (7/10–8/31; H=187,562; n=396)				
		90% CI					90% CI					90% CI			
Reporting Group	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD	Mean	5%	95%	P=0	SD
Asia	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.91	0.1
Kotzebue Sound	99.8	98.8	100.0	0.00	0.6	99.9	99.1	100.0	0.00	0.4	99.4	96.5	100.0	0.00	1.2
CWAK	0.2	0.0	1.1	0.65	0.6	0.0	0.0	0.0	0.89	0.2	0.4	0.0	3.4	0.76	1.2
Upper Yukon	0.0	0.0	0.0	0.91	0.1	0.1	0.0	0.7	0.80	0.3	0.1	0.0	1.0	0.73	0.4
Northern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Northwestern Dist.	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
South Peninsula	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
Chignik/Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0
East of Kodiak	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0	0.0	0.0	0.0	0.92	0.0

Note: Stock composition estimates may not sum to 100% due to rounding error.

Note: H is the number of chum salmon reported to have been harvested and n is the final number of samples used in genetic analyses.

FIGURES

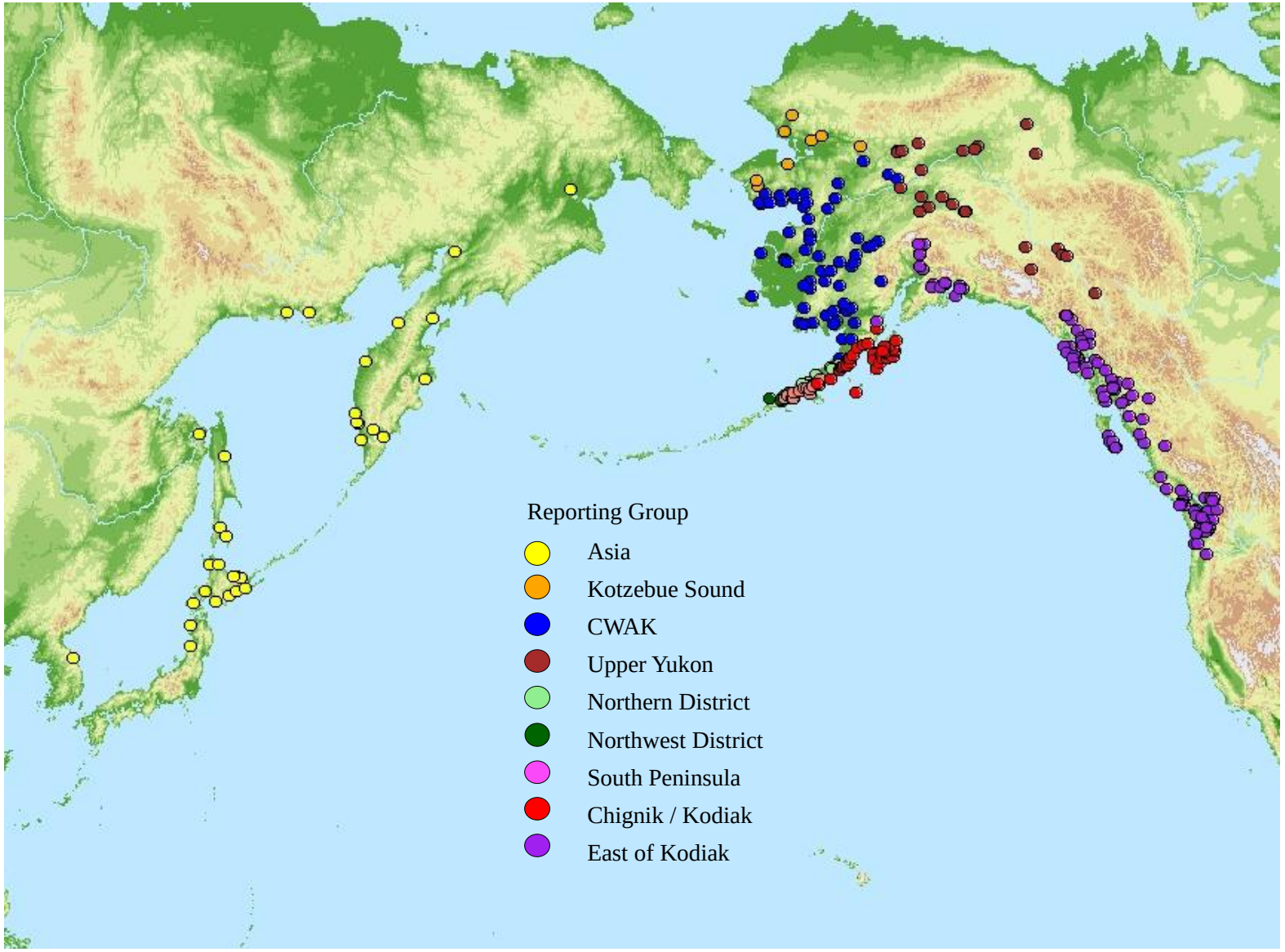

Figure 1.– Map of collections in the WASSIP chum salmon baseline. Each dot represents a collection, and the color of the dot represents the reporting group membership of the collection.

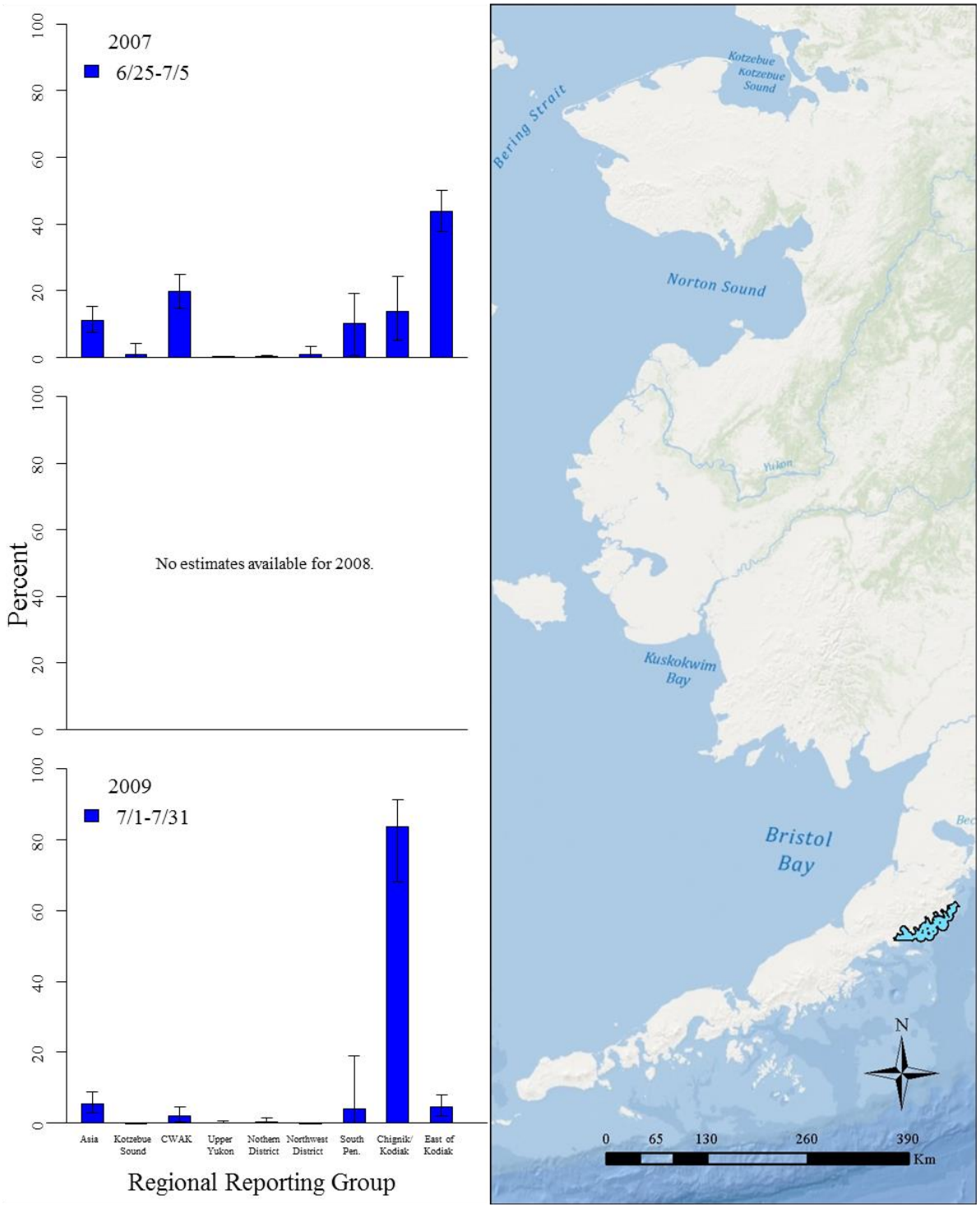

Figure 2.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Eastern District, Chignik Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

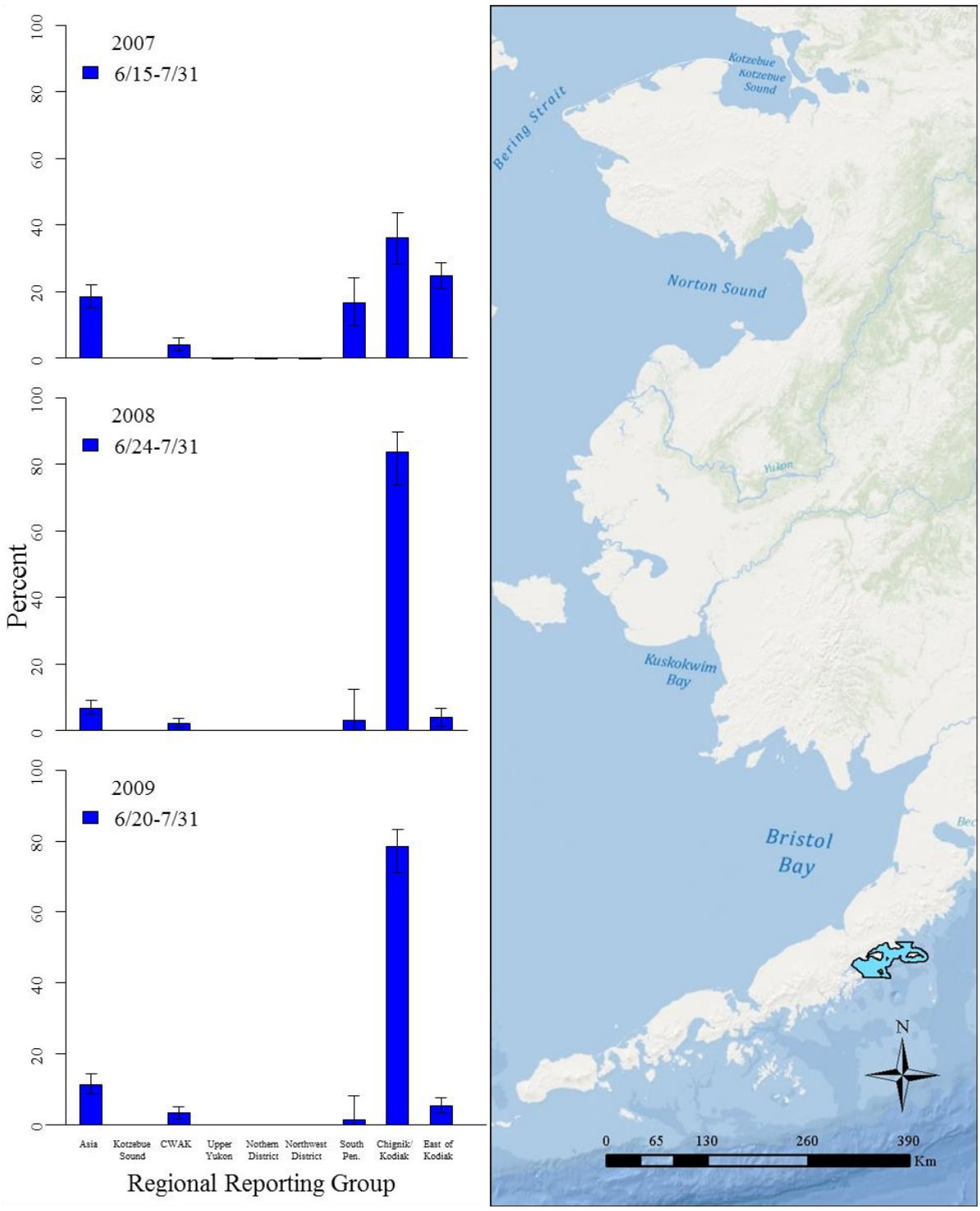

Figure 3.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Central District, Chignik Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

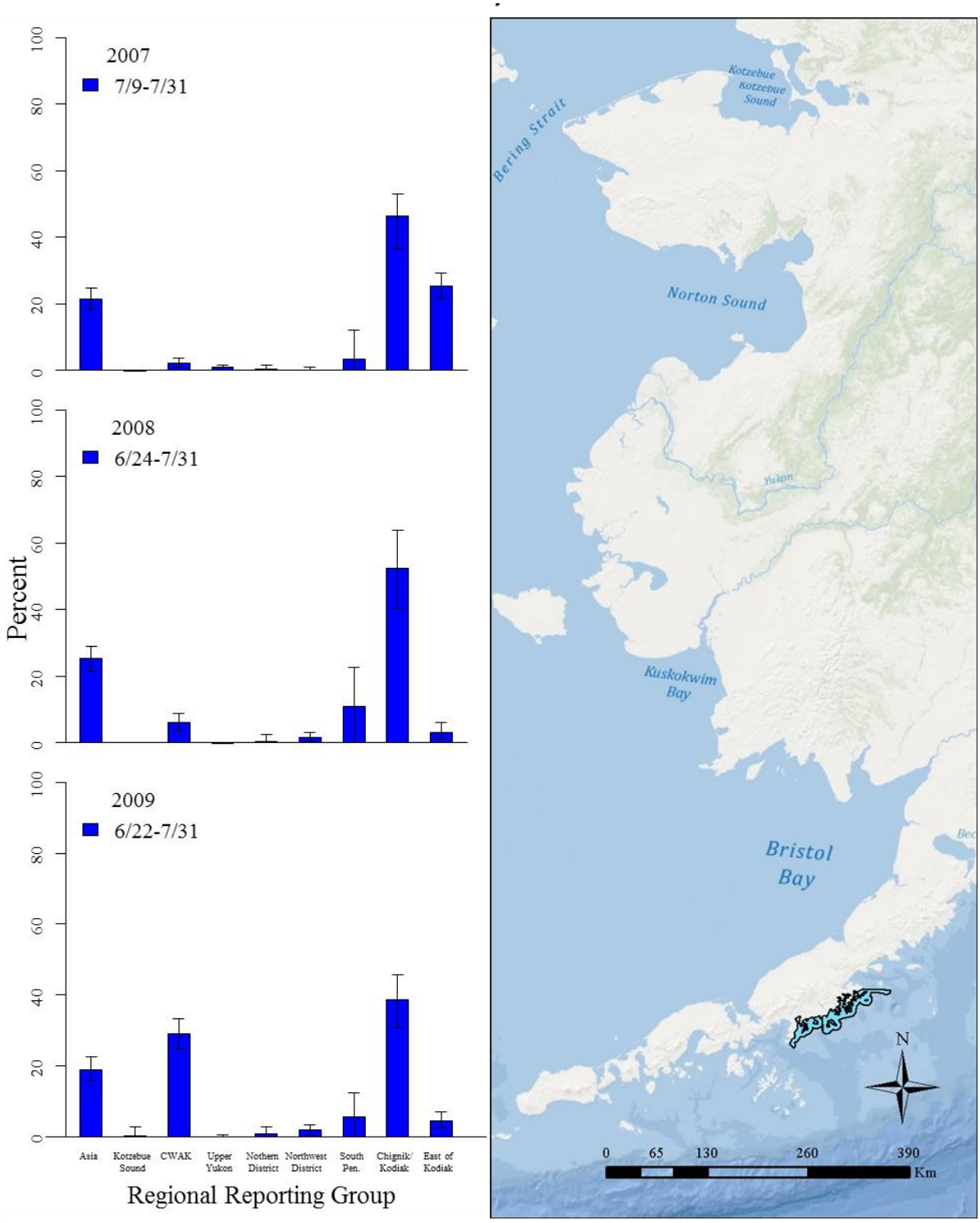

Figure 4.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Western and Perryville districts, Chignik Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

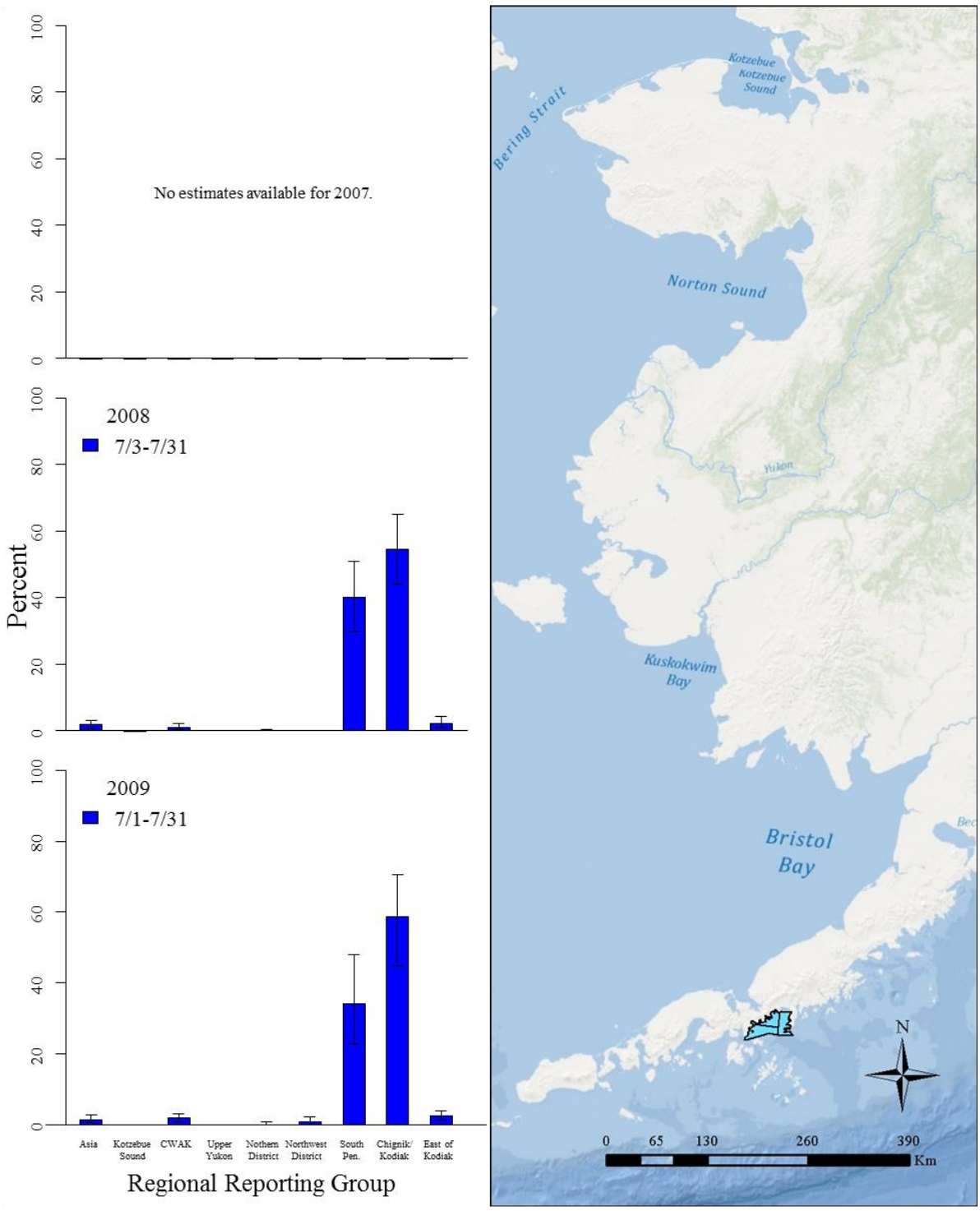

Figure 5.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Southeastern District Mainland (SEDM) area, Southeastern District, Alaska Peninsula Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

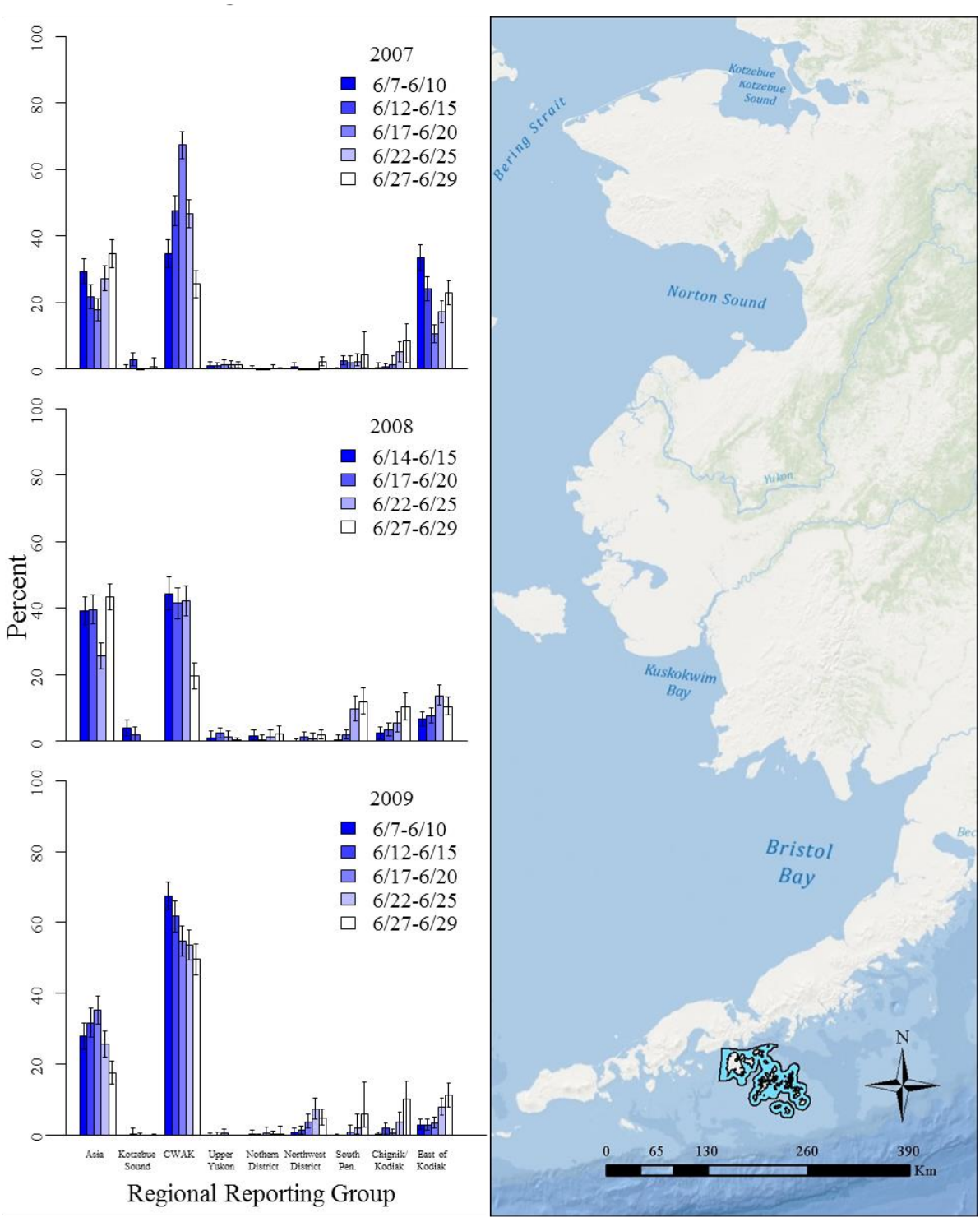

Figure 6.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Shumagin Islands Section (June; statistical areas all 282-XX), Alaska Peninsula Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

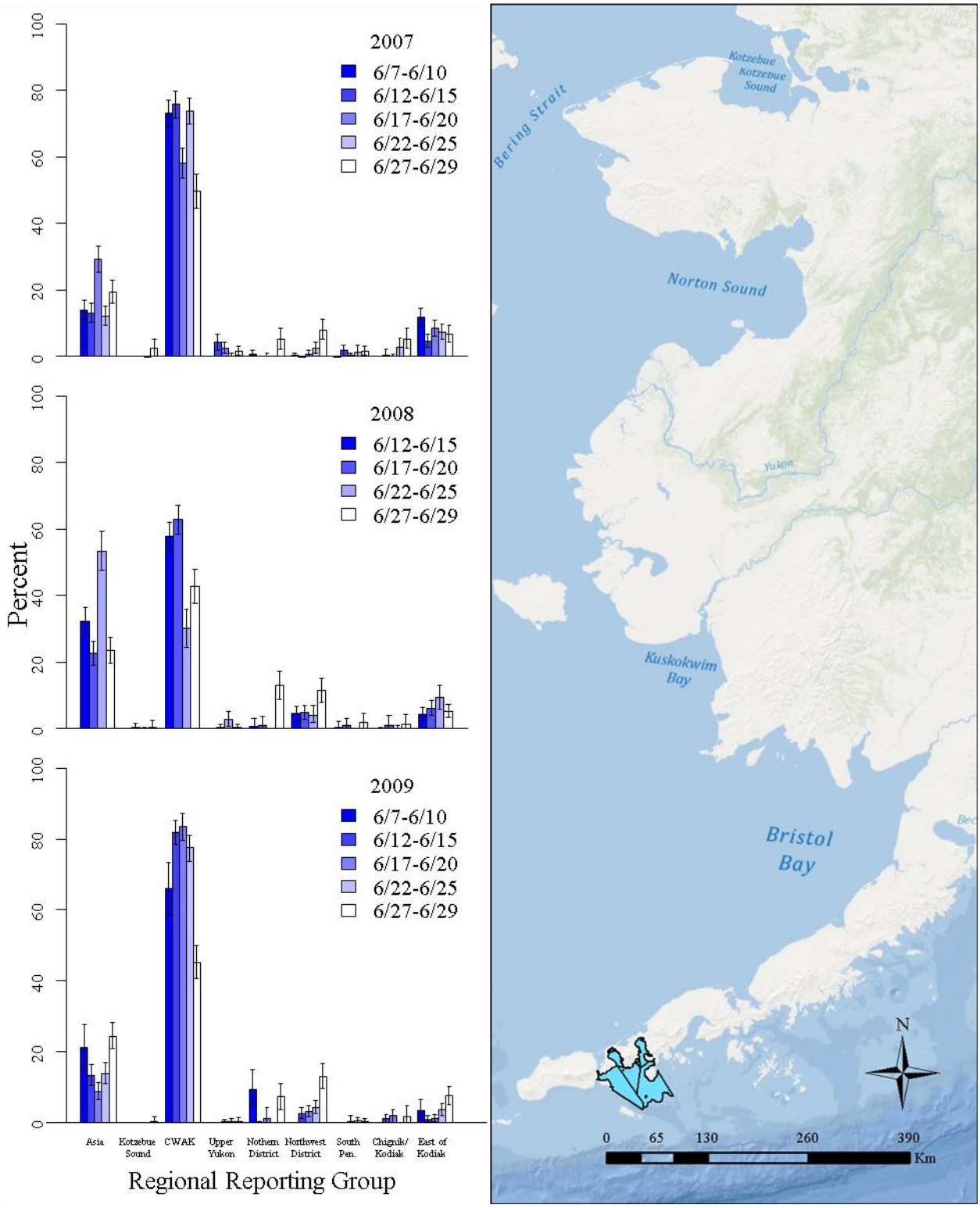

Figure 7.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Ikatan area (June; statistical area 284-45 through 284-99), Alaska Peninsula Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

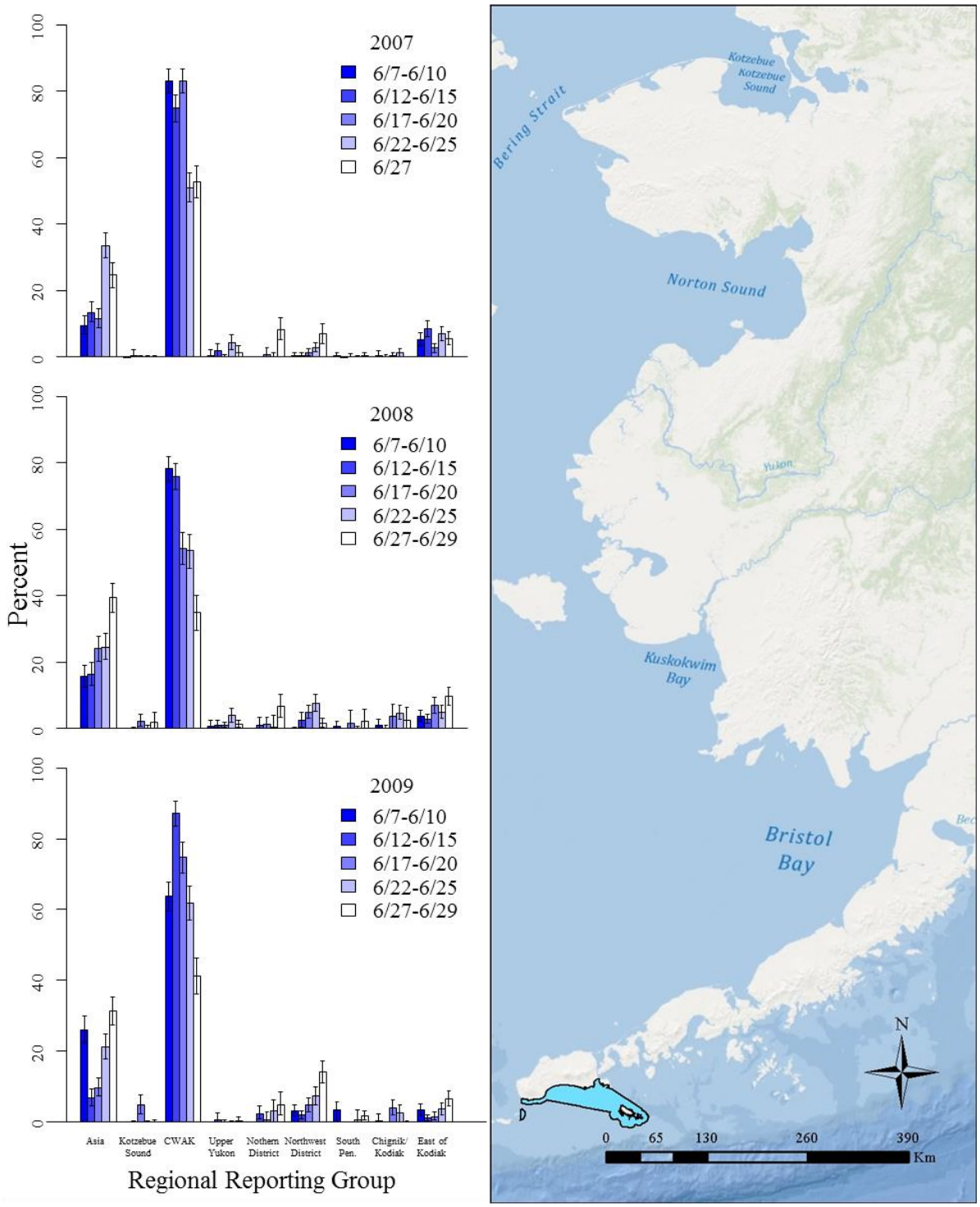

Figure 8.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Unimak District (June), Alaska Peninsula Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

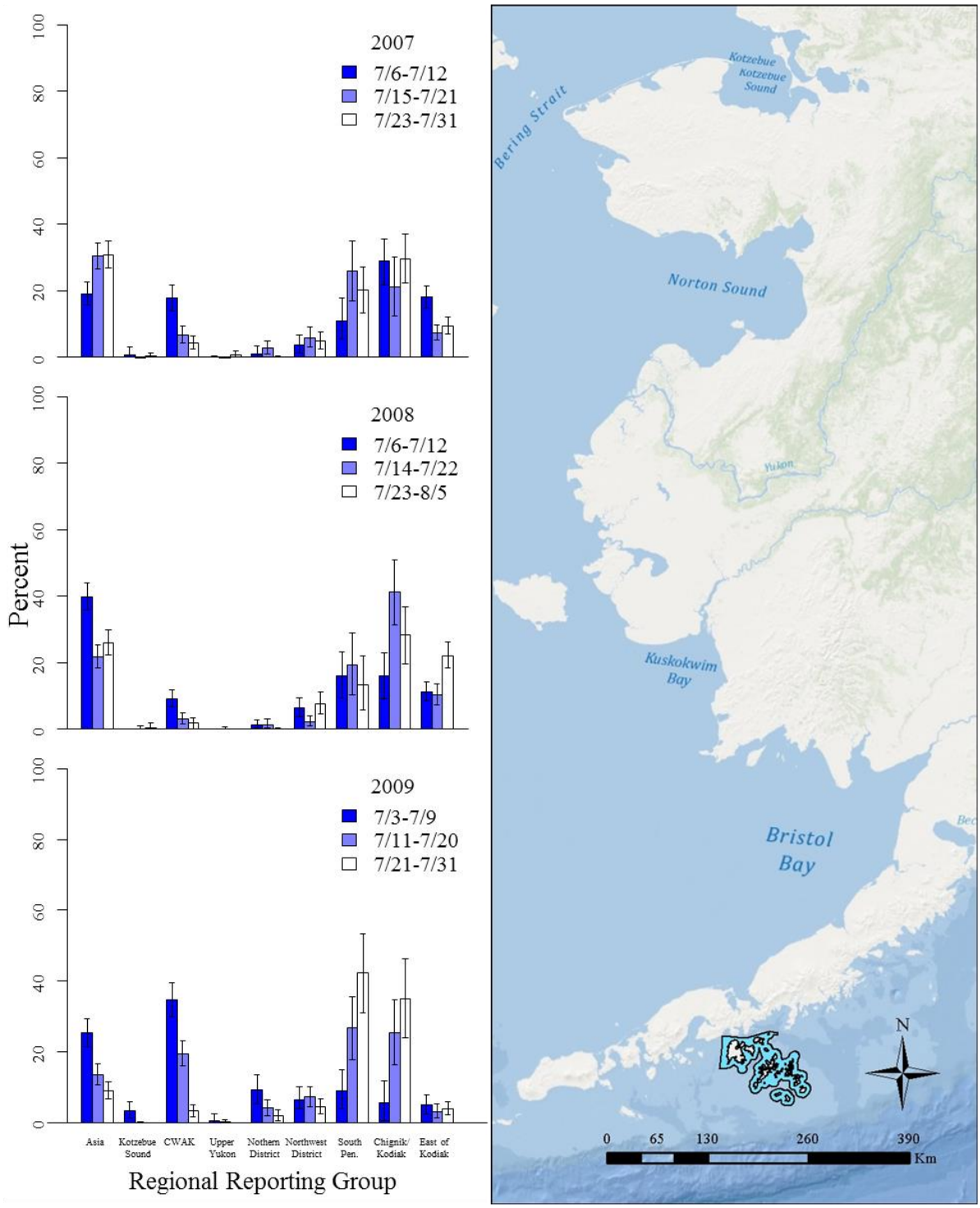

Figure 9.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Shumagin Islands Section (post-June), Alaska Peninsula Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

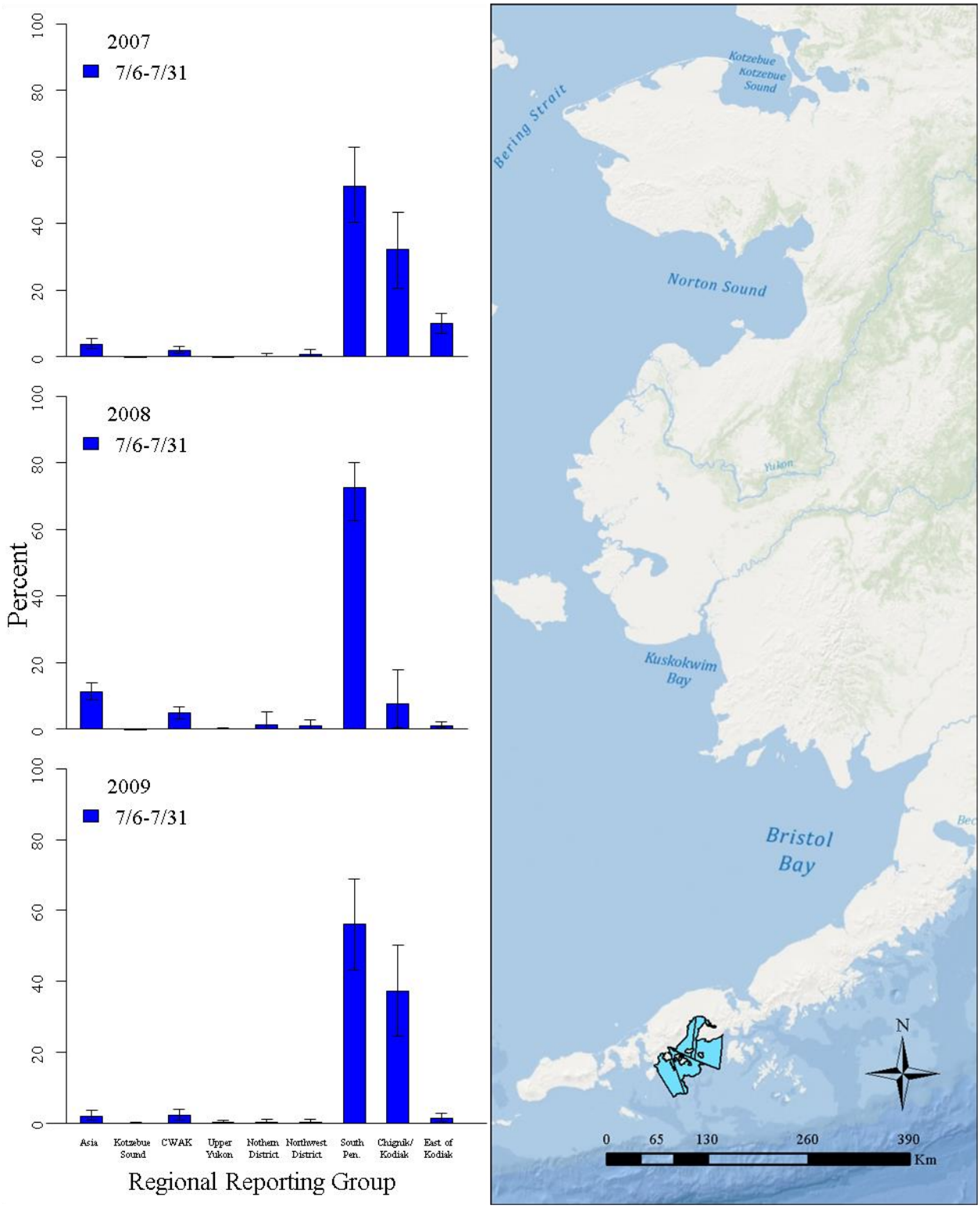

Figure 10.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Dolgoi Island area (post-June; statistical areas all 283-XX, and 284-00 through 284-42), Alaska Peninsula Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

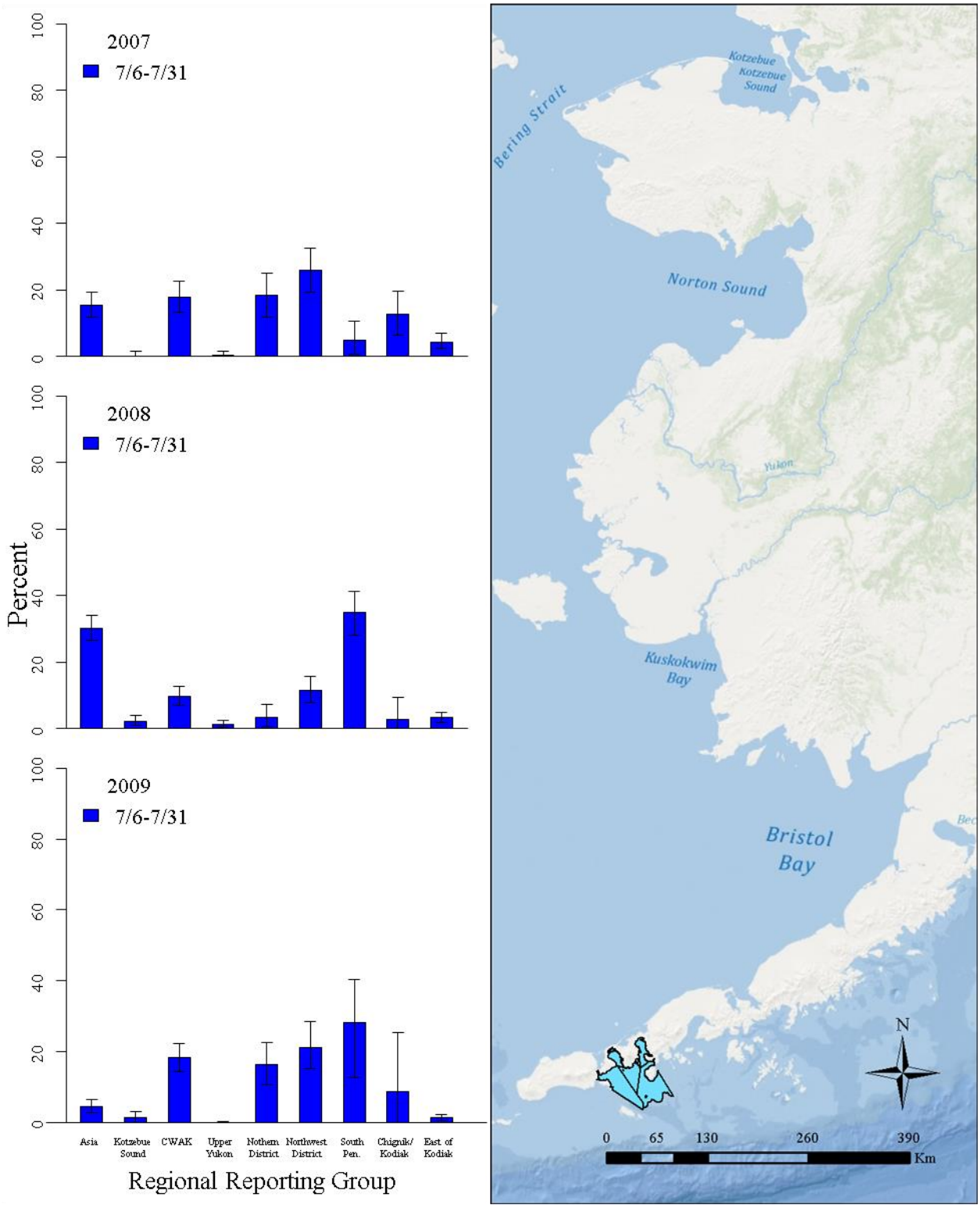

Figure 11.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Ikatan area (statistical area 284-45 through 284-99), Alaska Peninsula Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

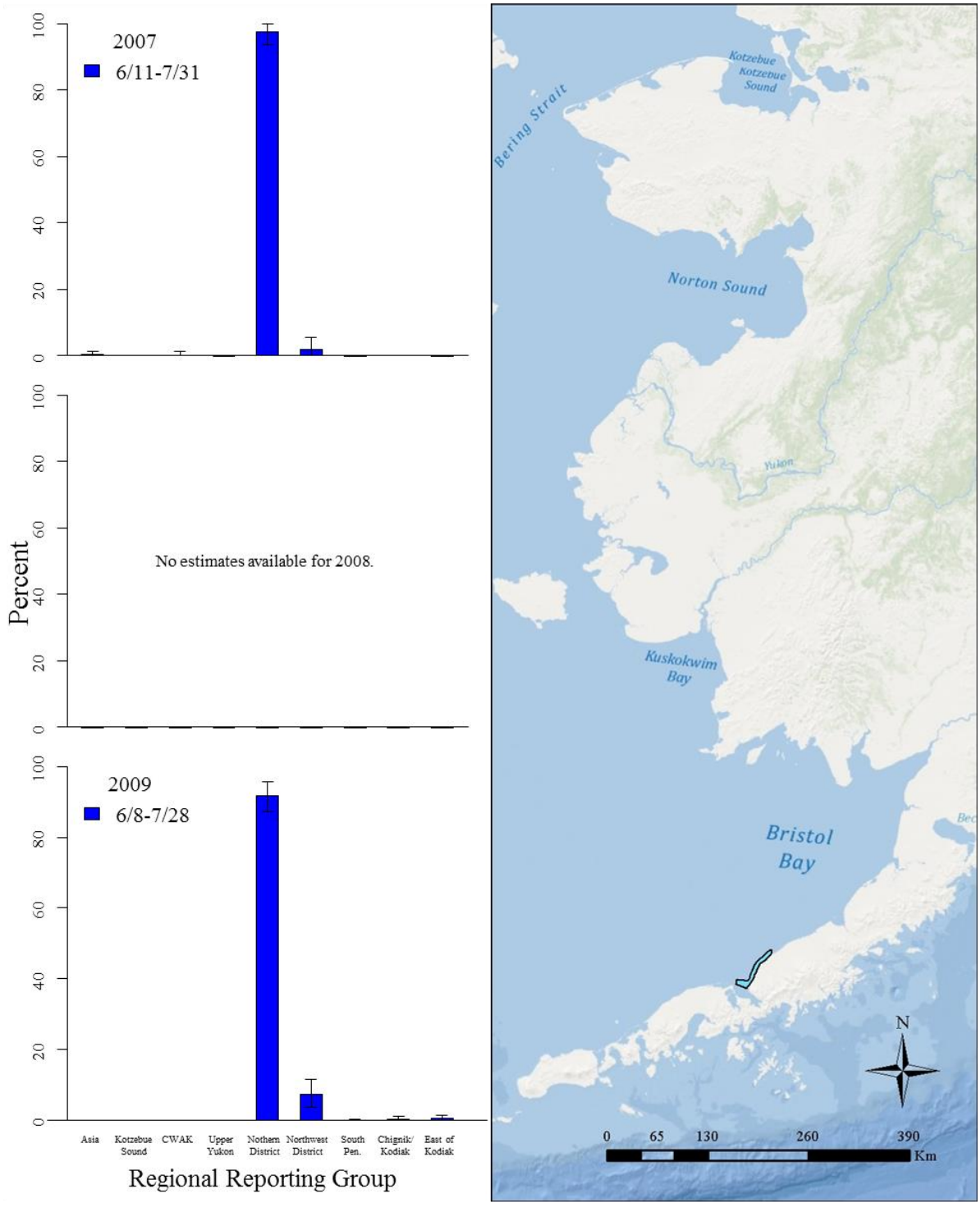

Figure 12.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Bear River Section, Northern District, Alaska Peninsula Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

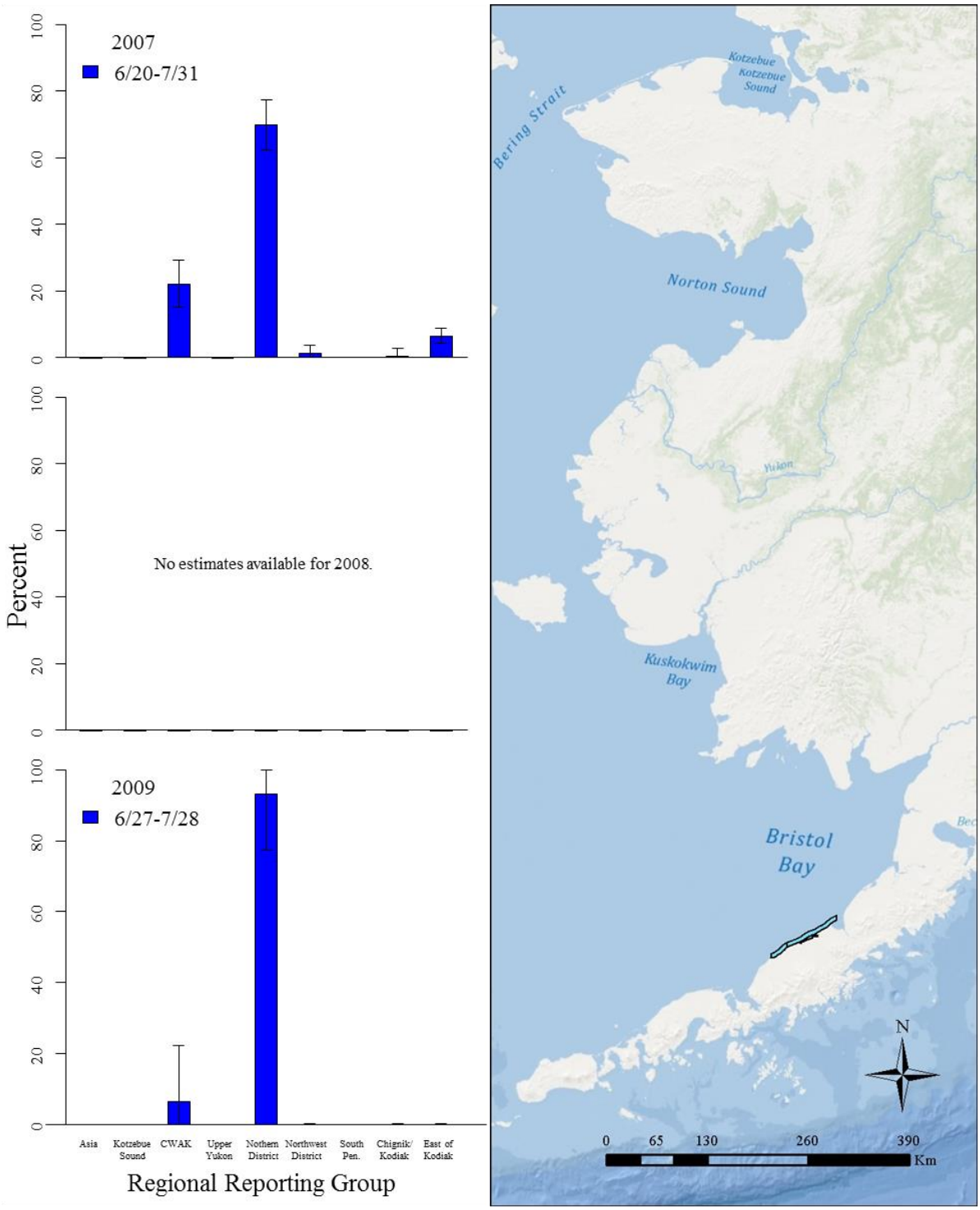

Figure 13.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Three Hills and Ilnik sections, Northern District, Alaska Peninsula Area, Westward Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

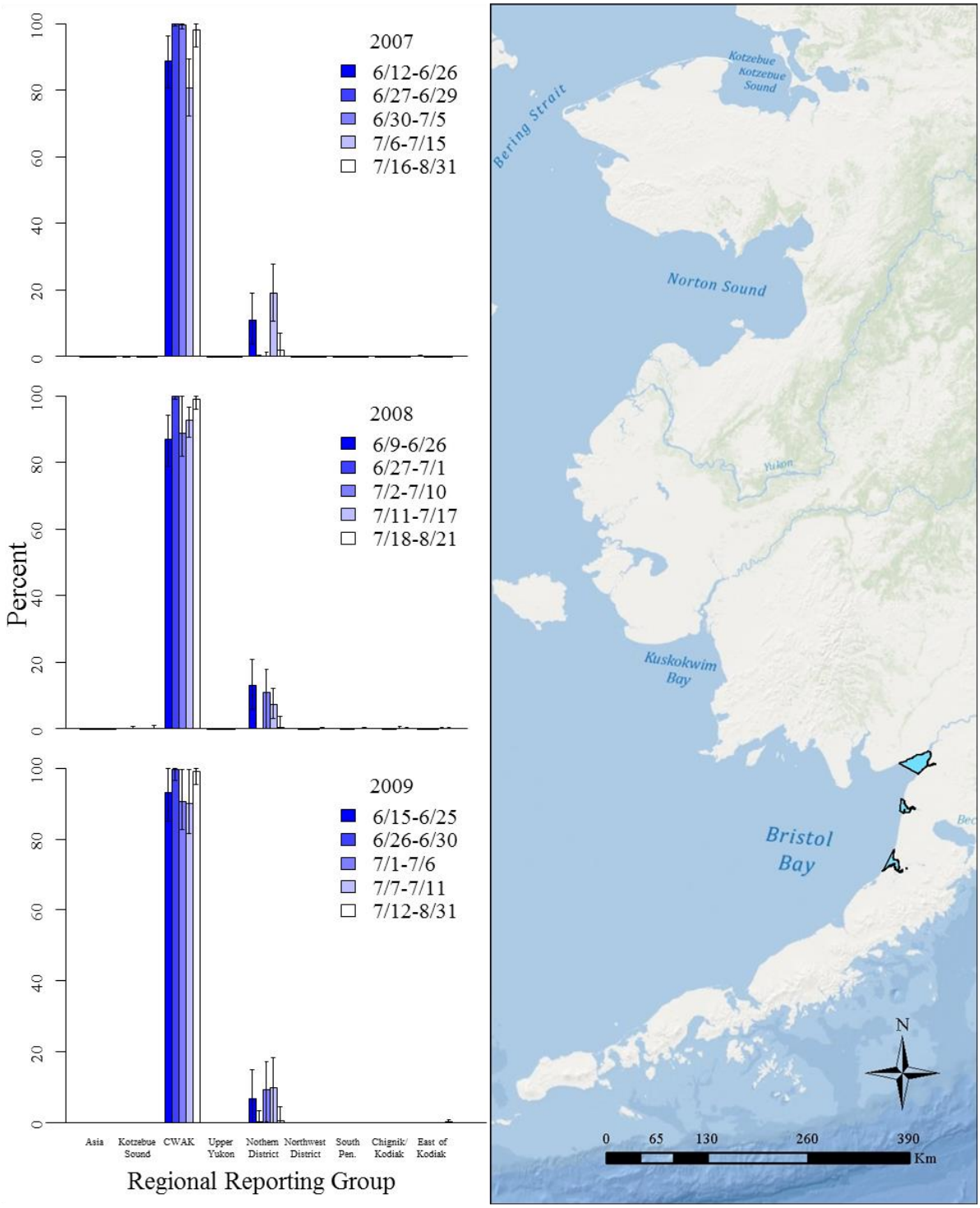

Figure 14.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Eastside districts (Ugashik, Egegik, and Naknek-Kvichak districts), Bristol Bay Area, Central Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

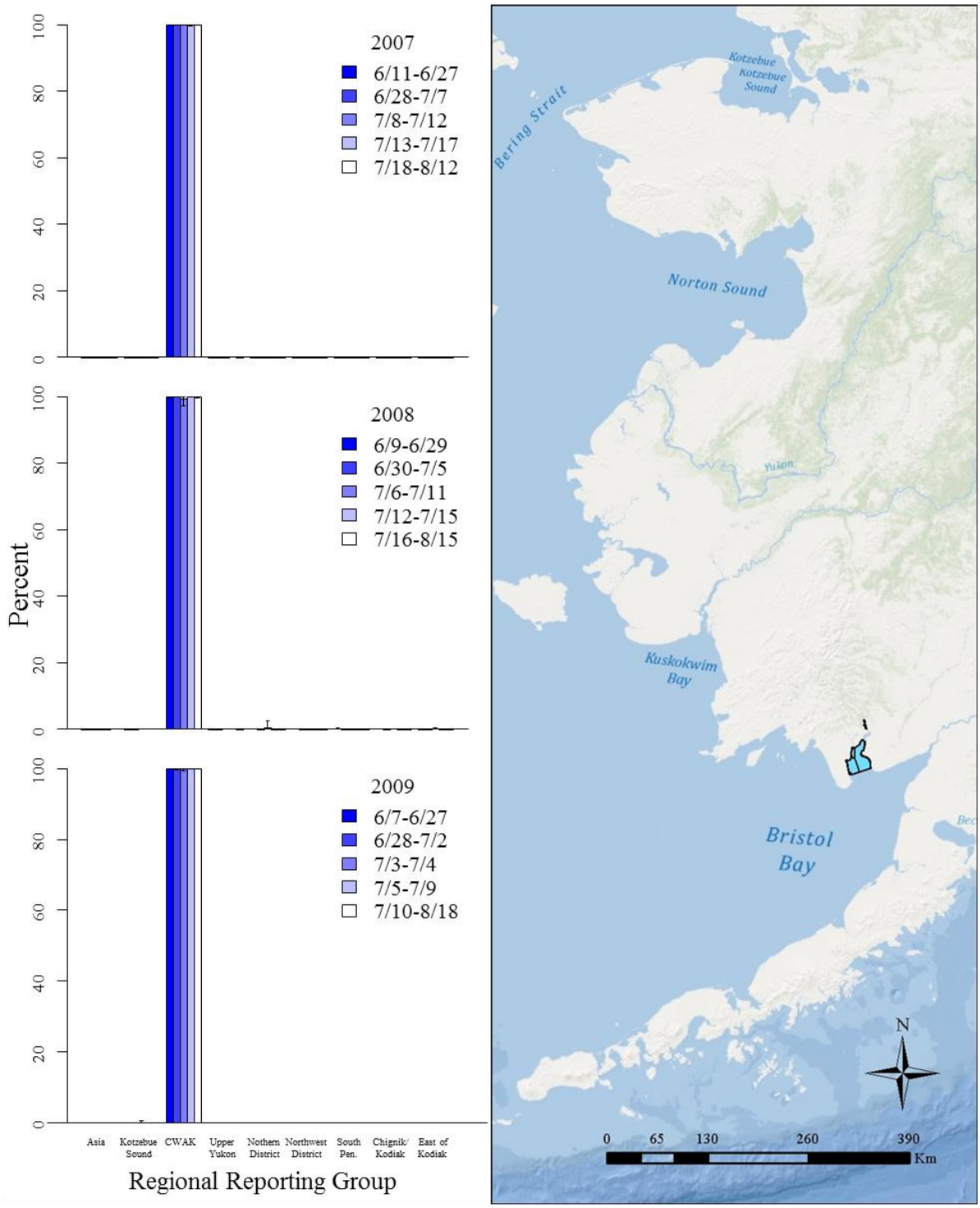

Figure 15.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Nushagak District, Bristol Bay Area, Central Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

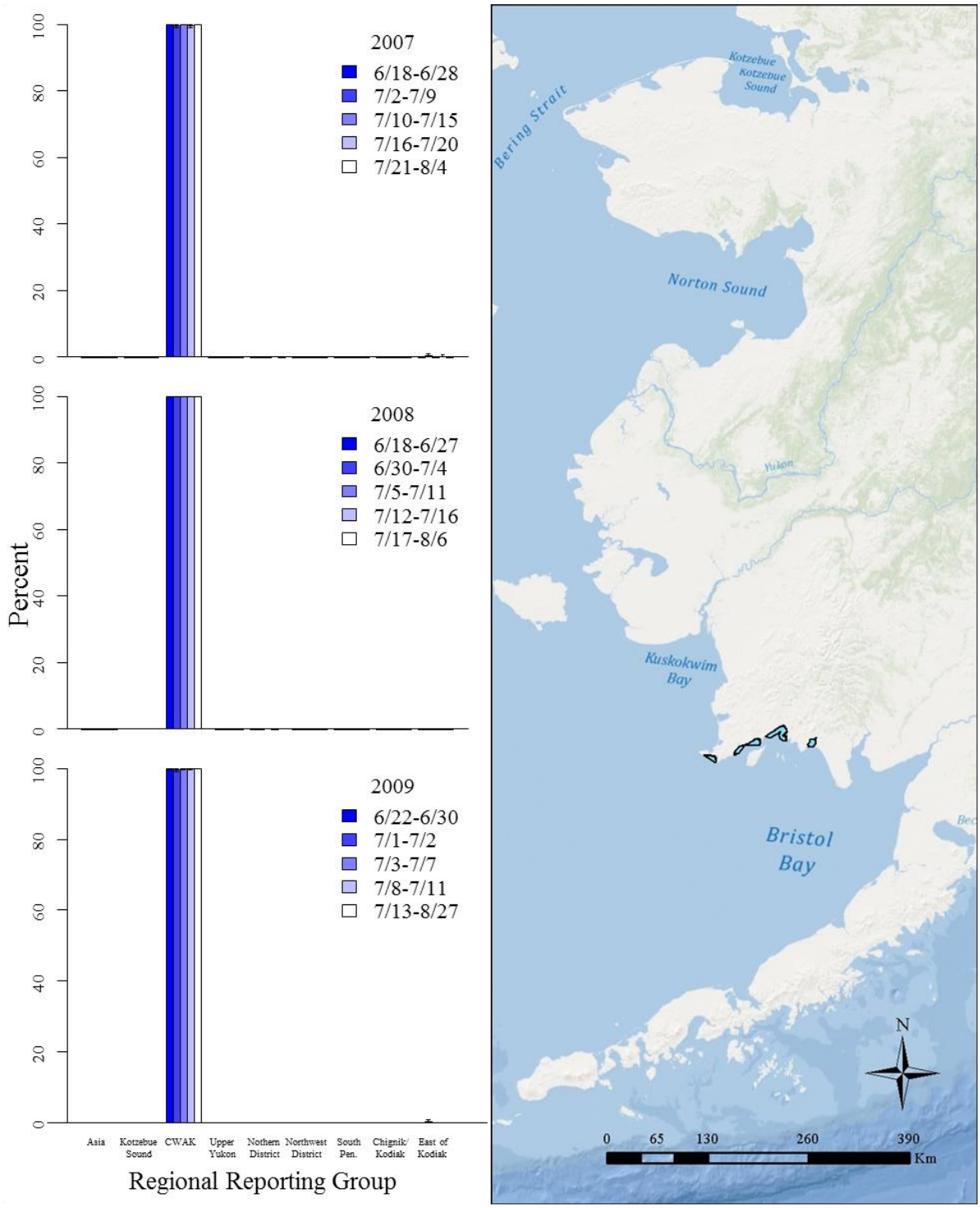

Figure 16.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Togiak District, Bristol Bay Area, Central Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

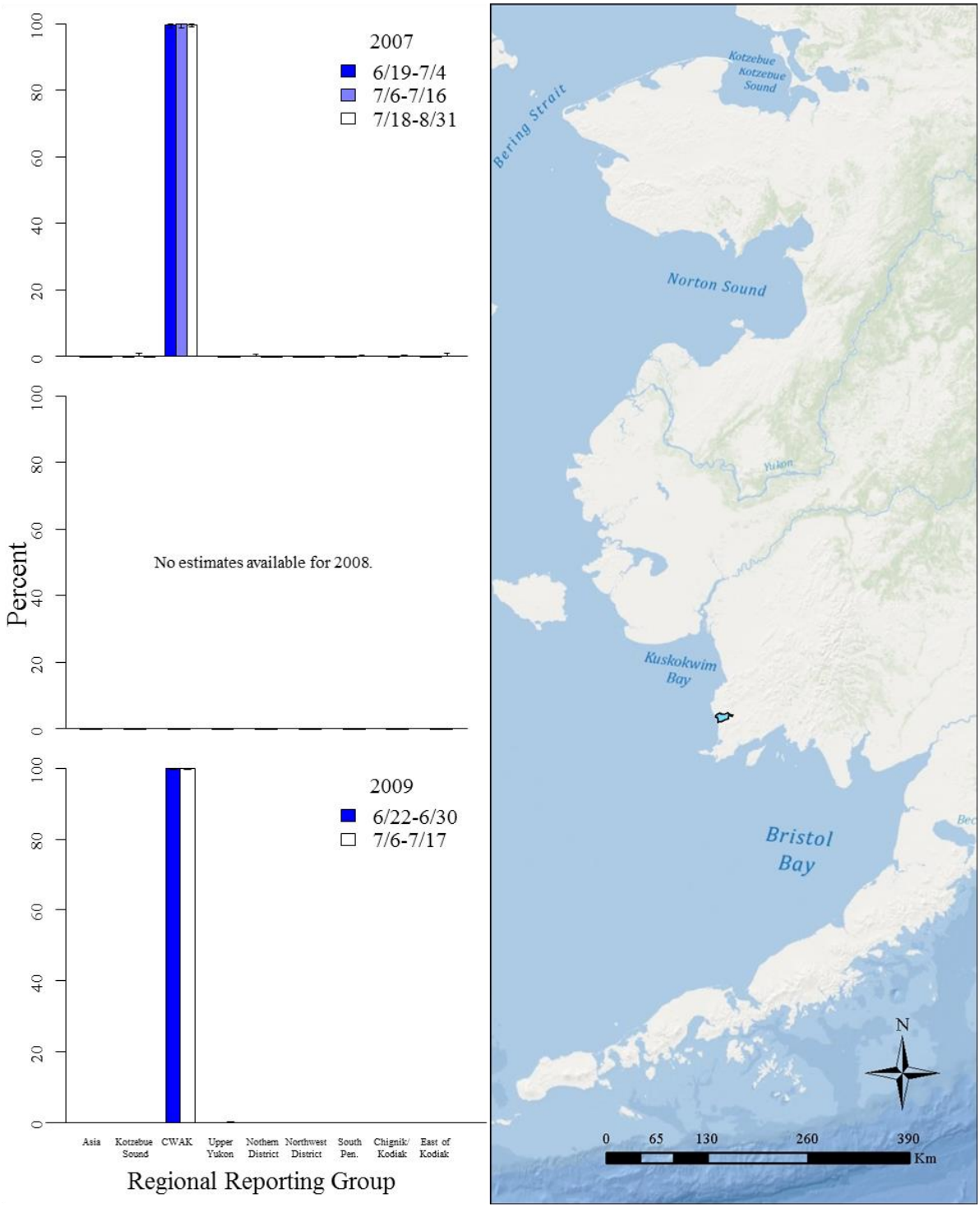

Figure 17.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from District 5 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

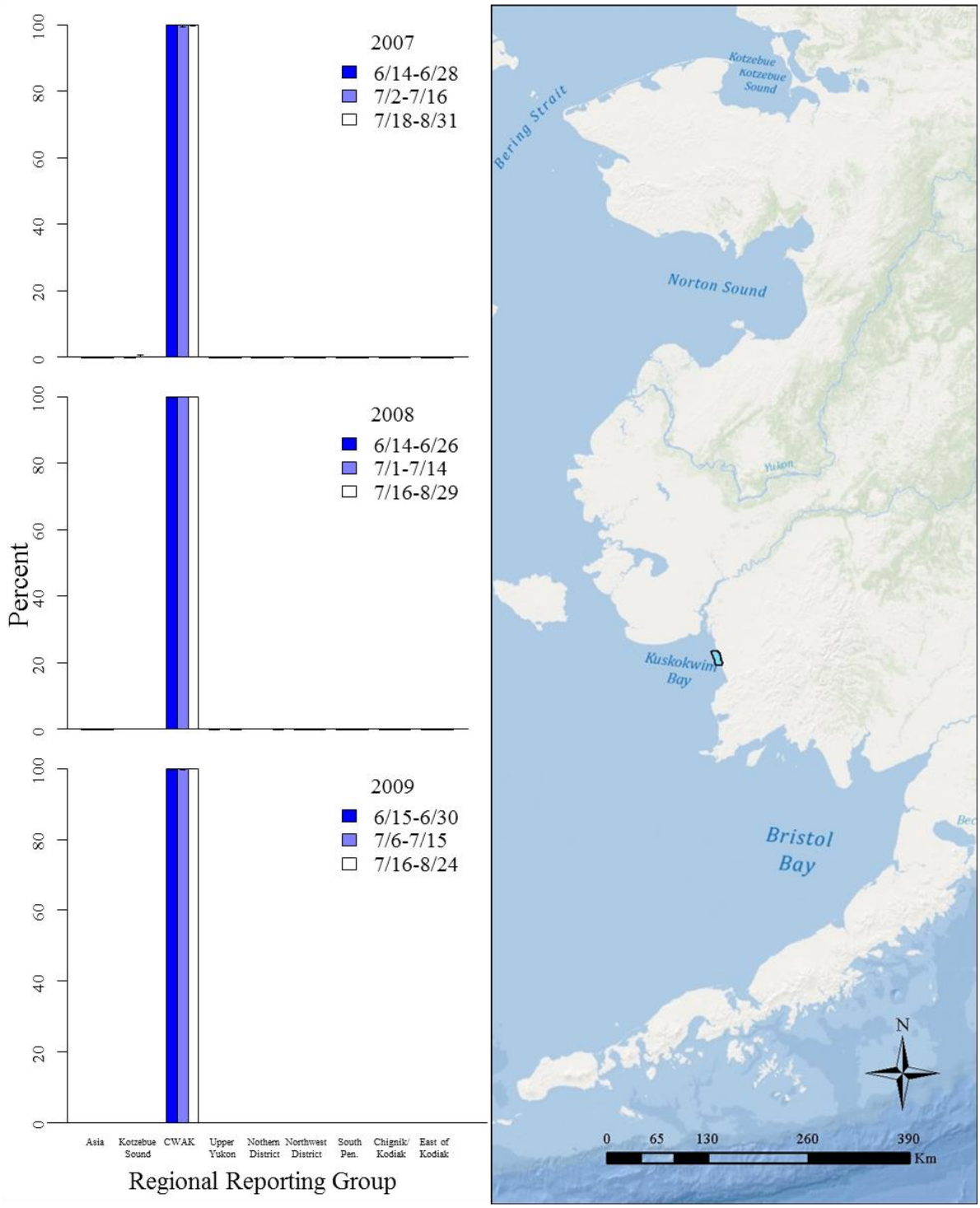

Figure 18.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from District 4 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

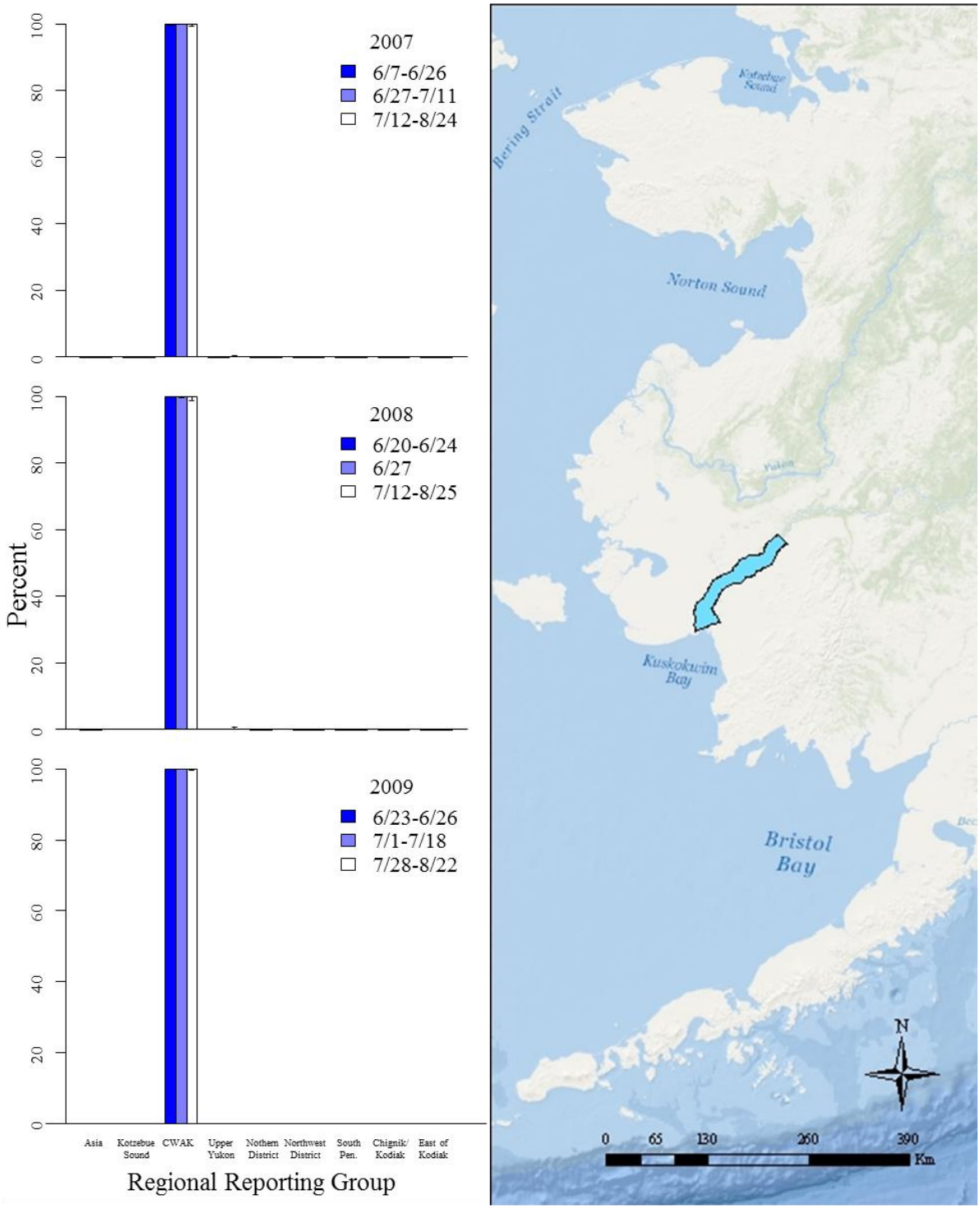

Figure 19.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from District 1 Commercial, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

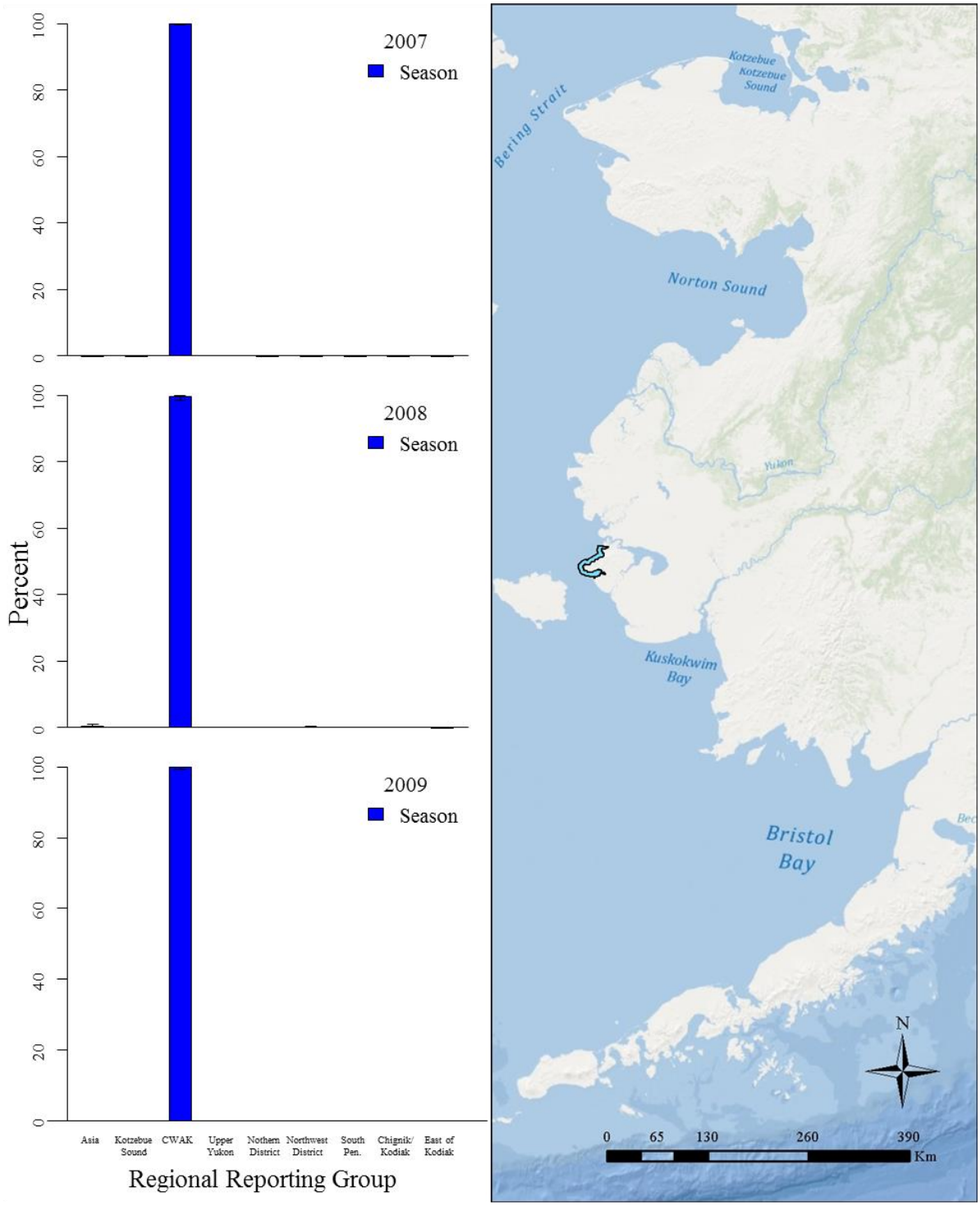

Figure 20.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Toksook Bay Subsistence, Kuskokwim Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

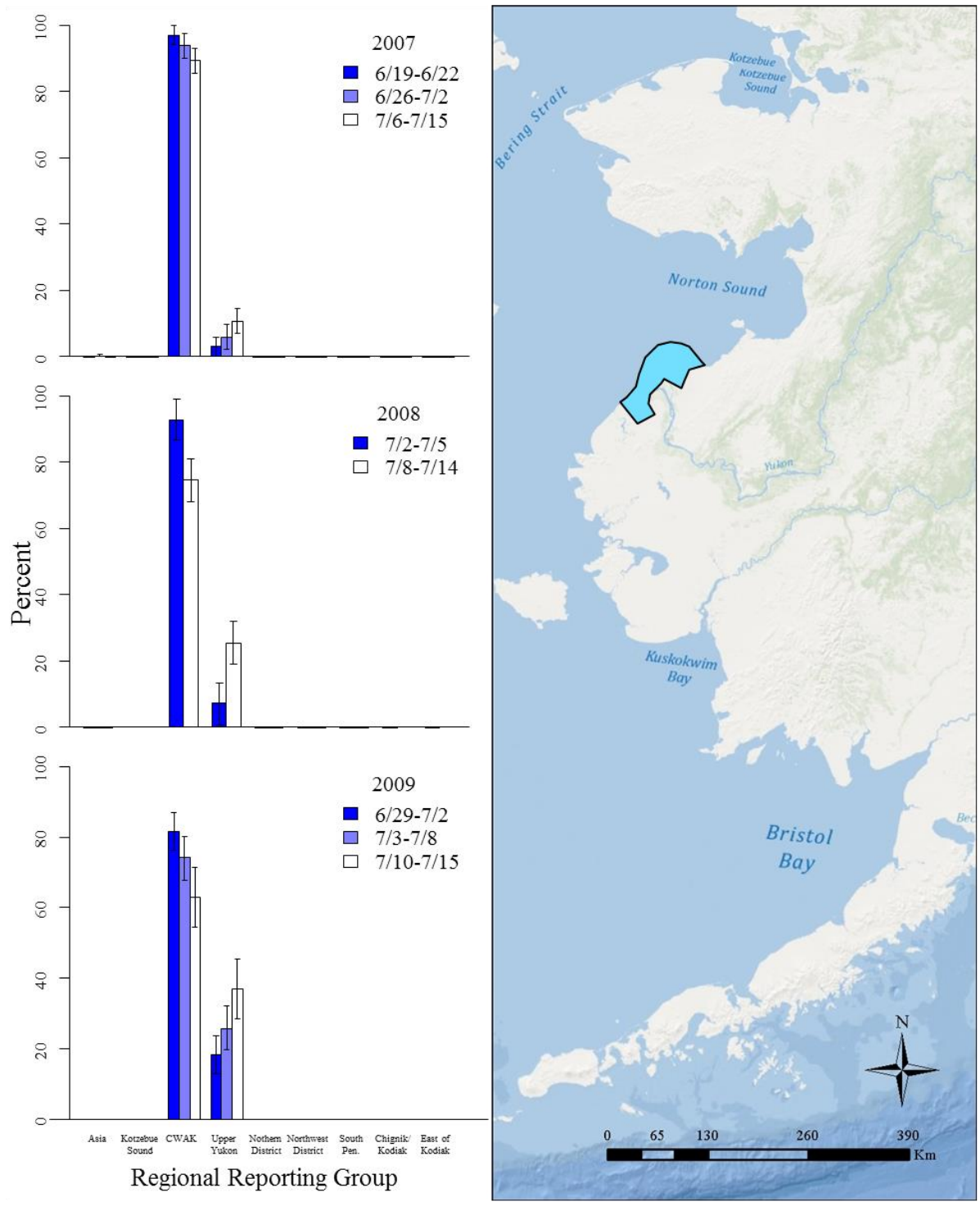

Figure 21.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from District 1 Commercial marine areas excluding Black River (summer), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

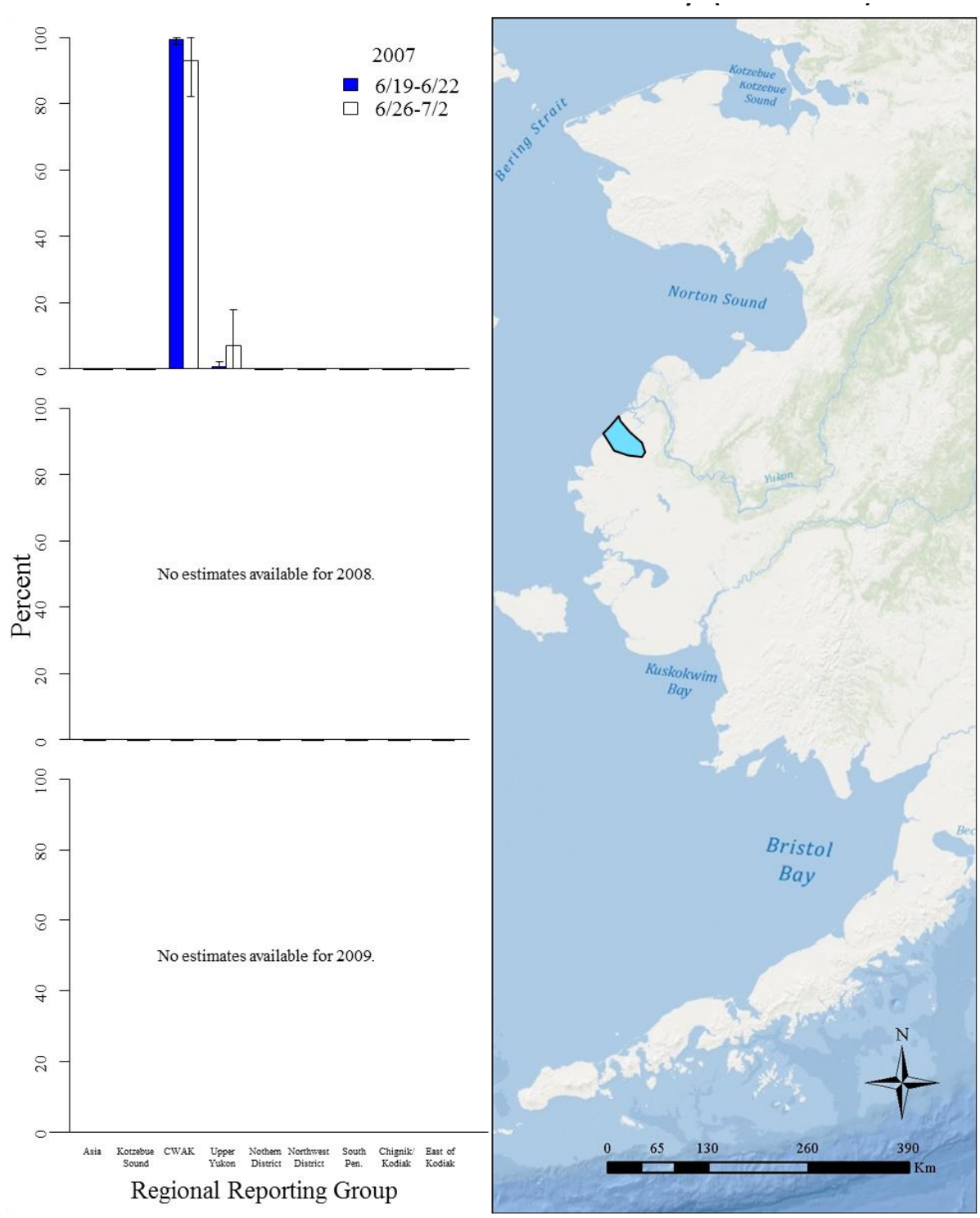

Figure 22.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from District 1 Commercial Black River only (summer), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

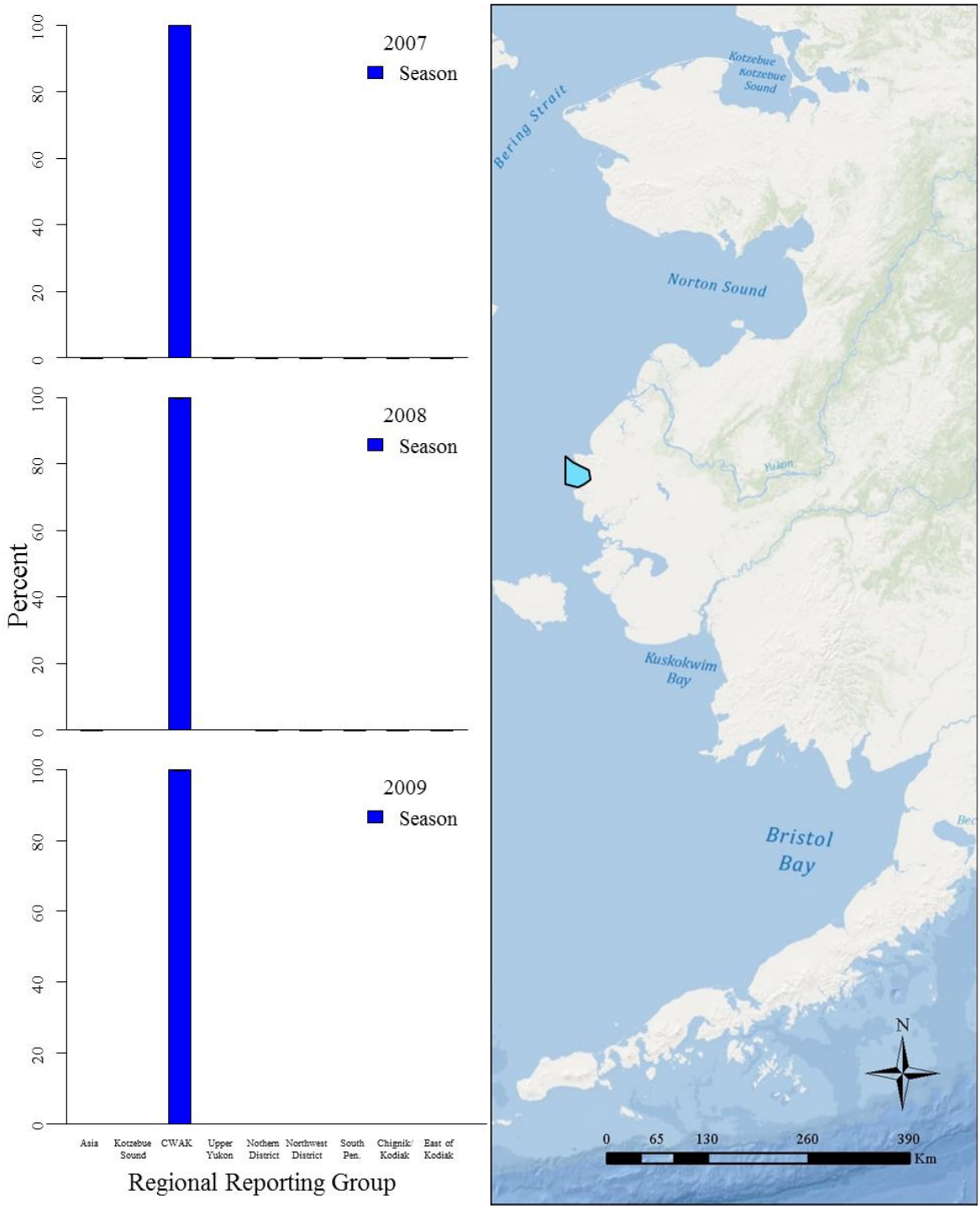

Figure 23.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Coastal District Subsistence (Hooper Bay summer), Yukon–Northern Area, Arctic–Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

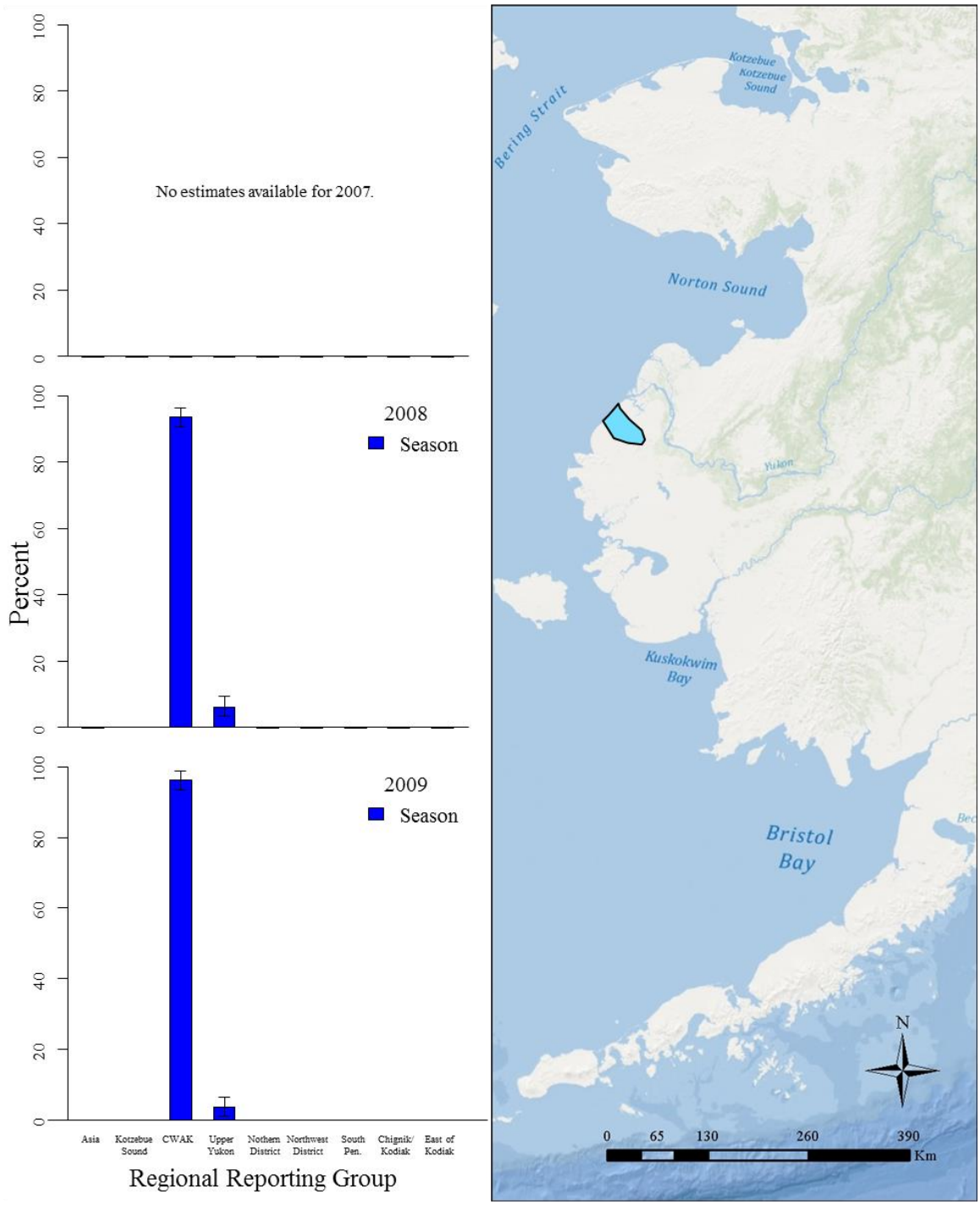

Figure 24.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from District 1 Black River Subsistence (Scammon Bay summer), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

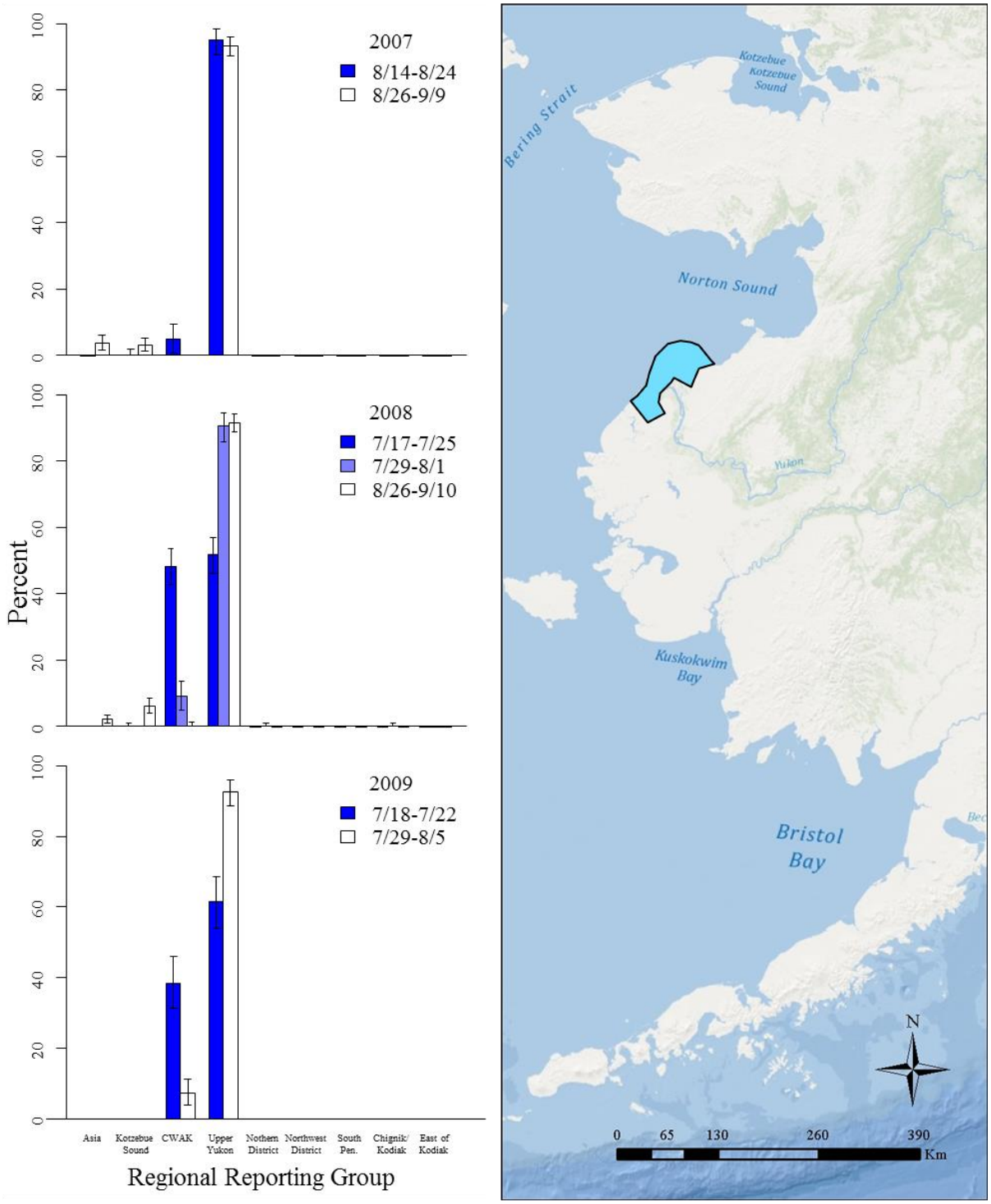

Figure 25.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from District 1 Commercial marine areas excluding Black River (fall), Yukon-Northern Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

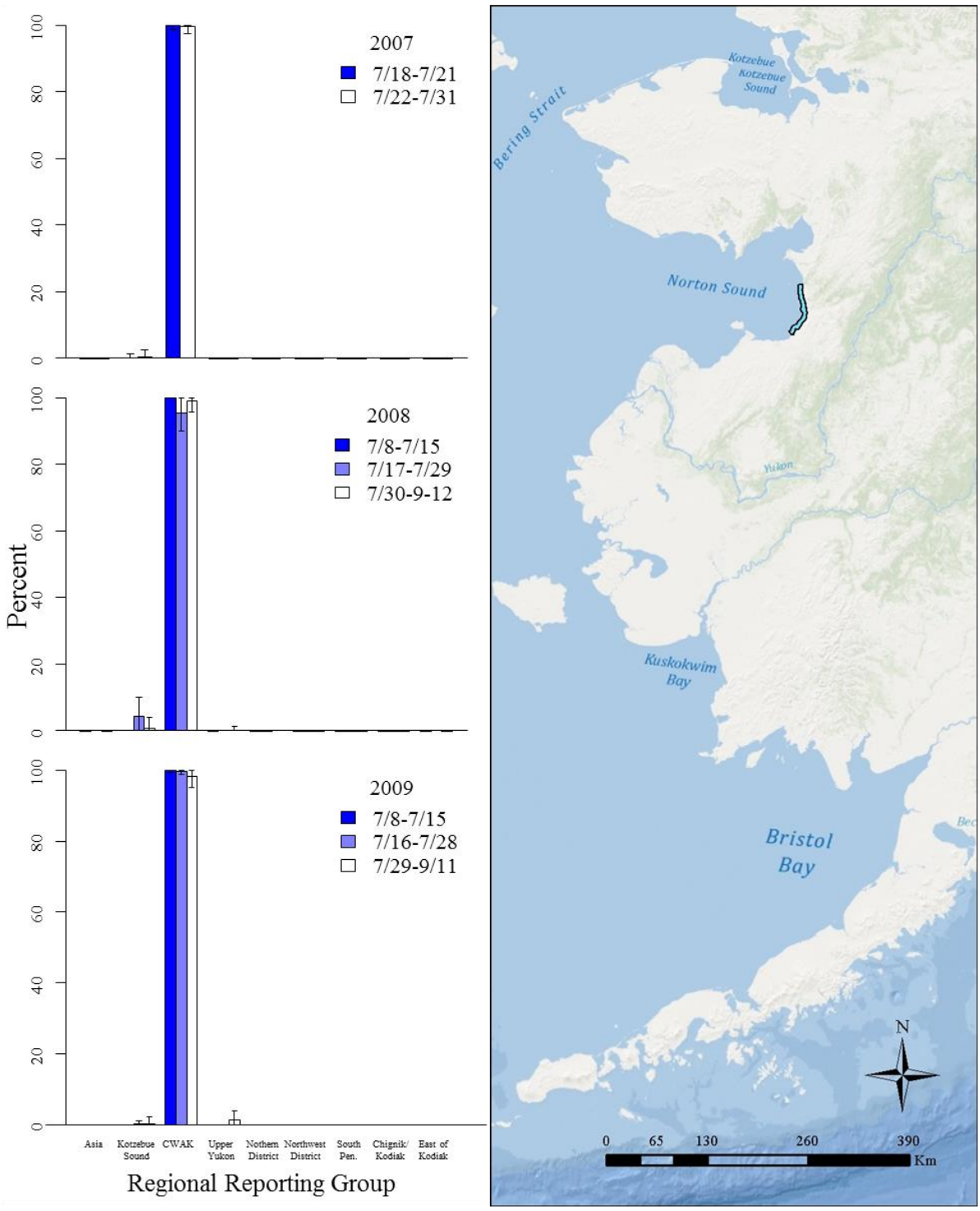

Figure 26.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Subdistrict 6 (Unalakleet) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

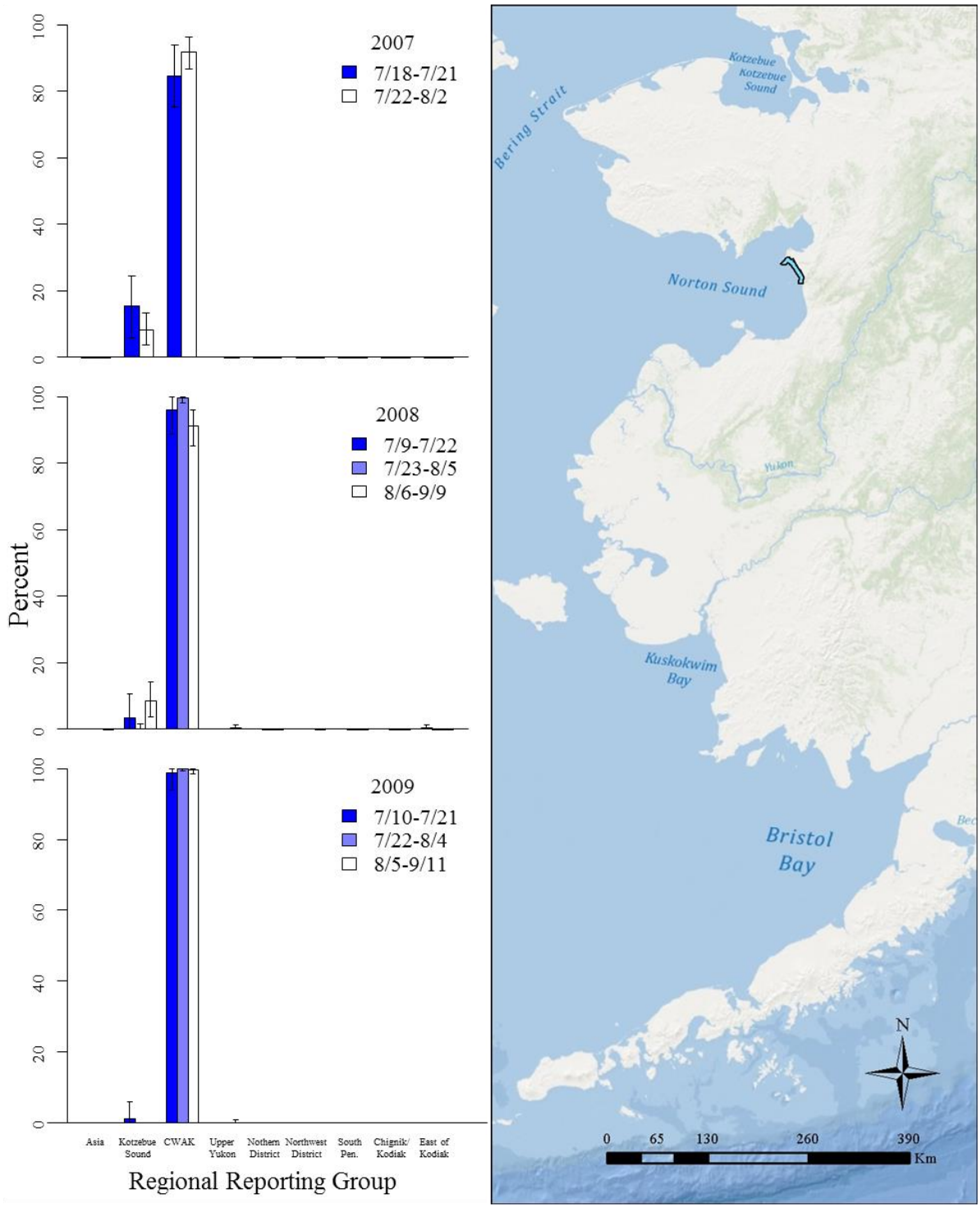

Figure 27.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Subdistrict 5 (Shaktoolik) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

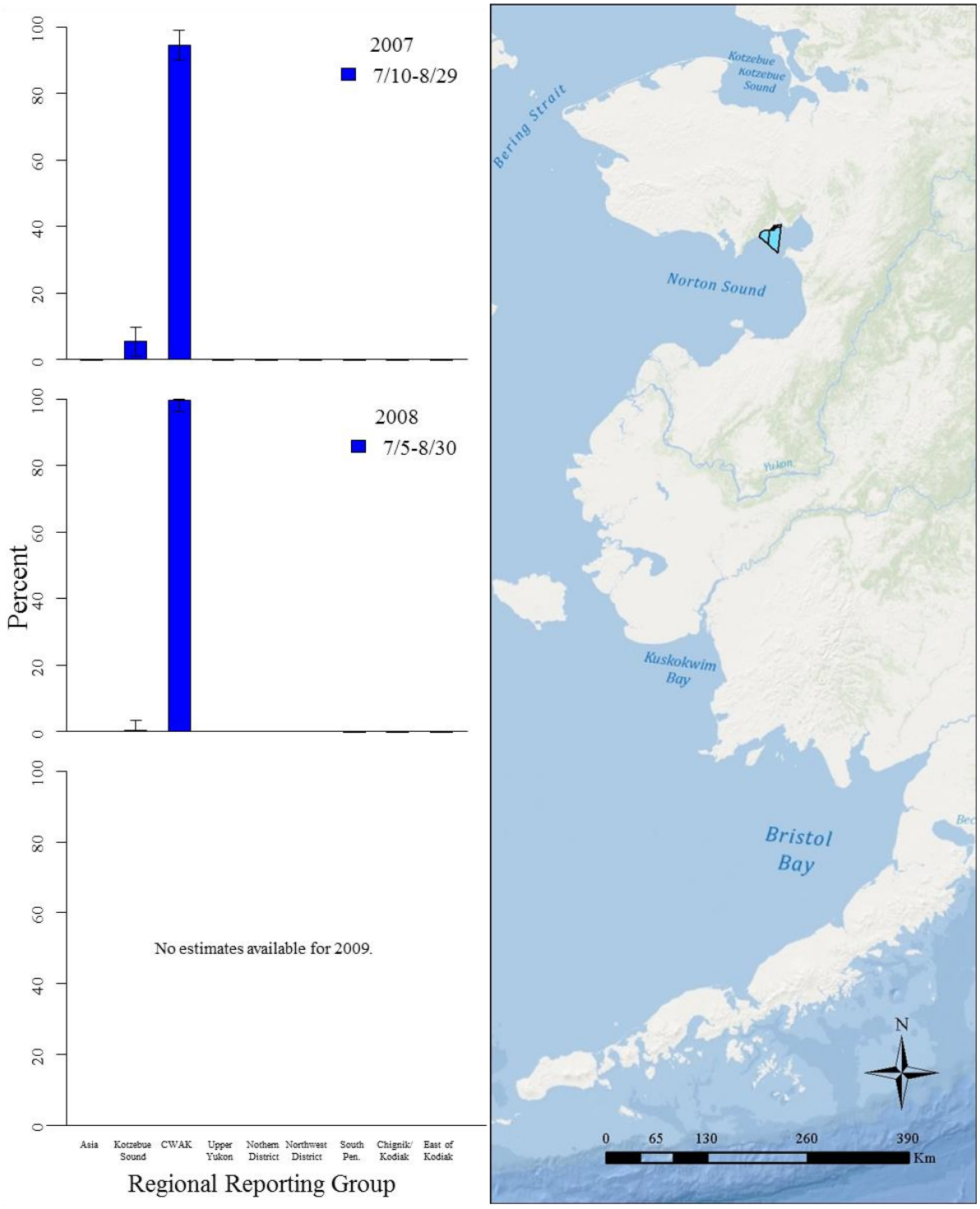

Figure 28.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Subdistrict 3 (Moses Point) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

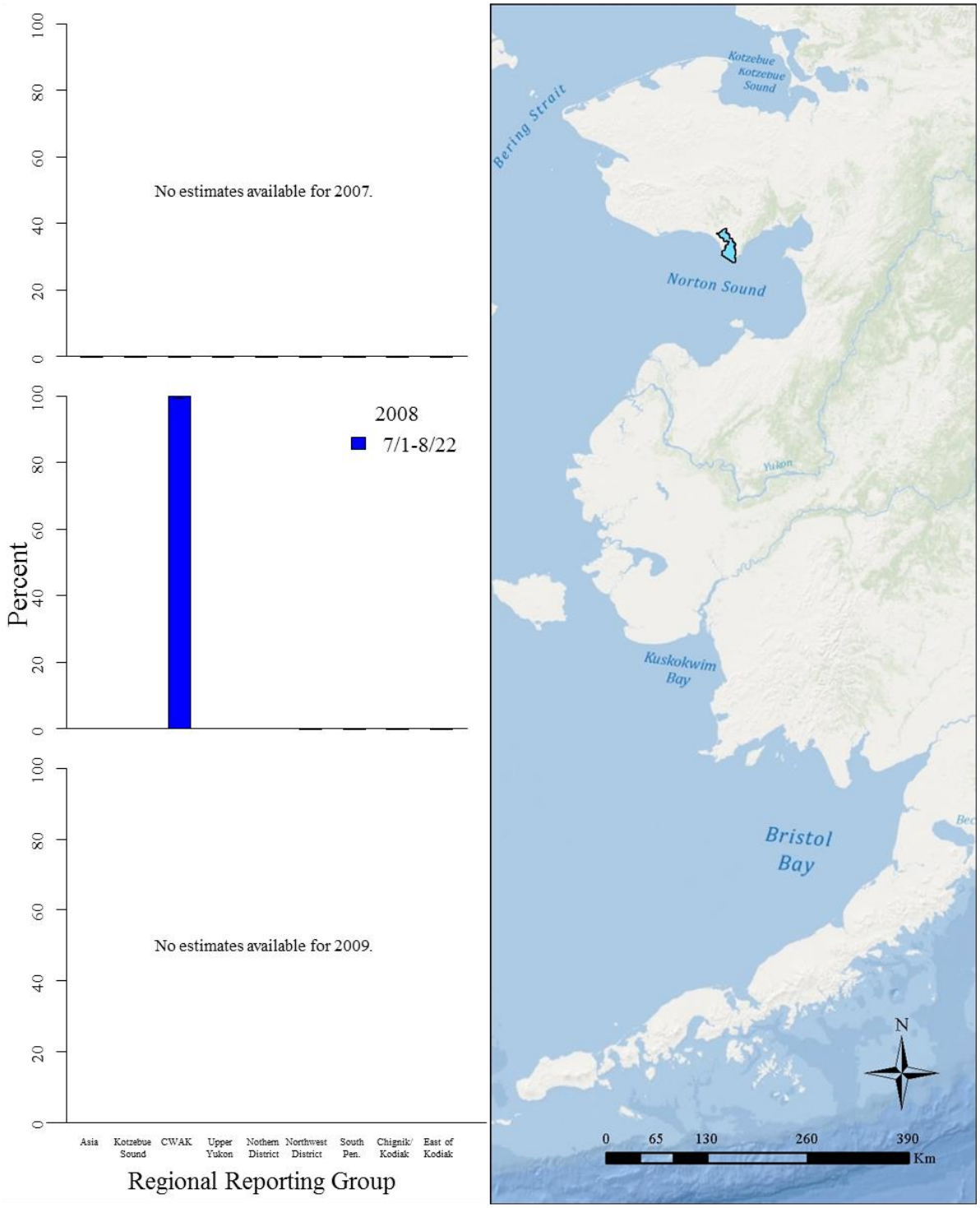

Figure 29.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Subdistrict 2 (Golovin) Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

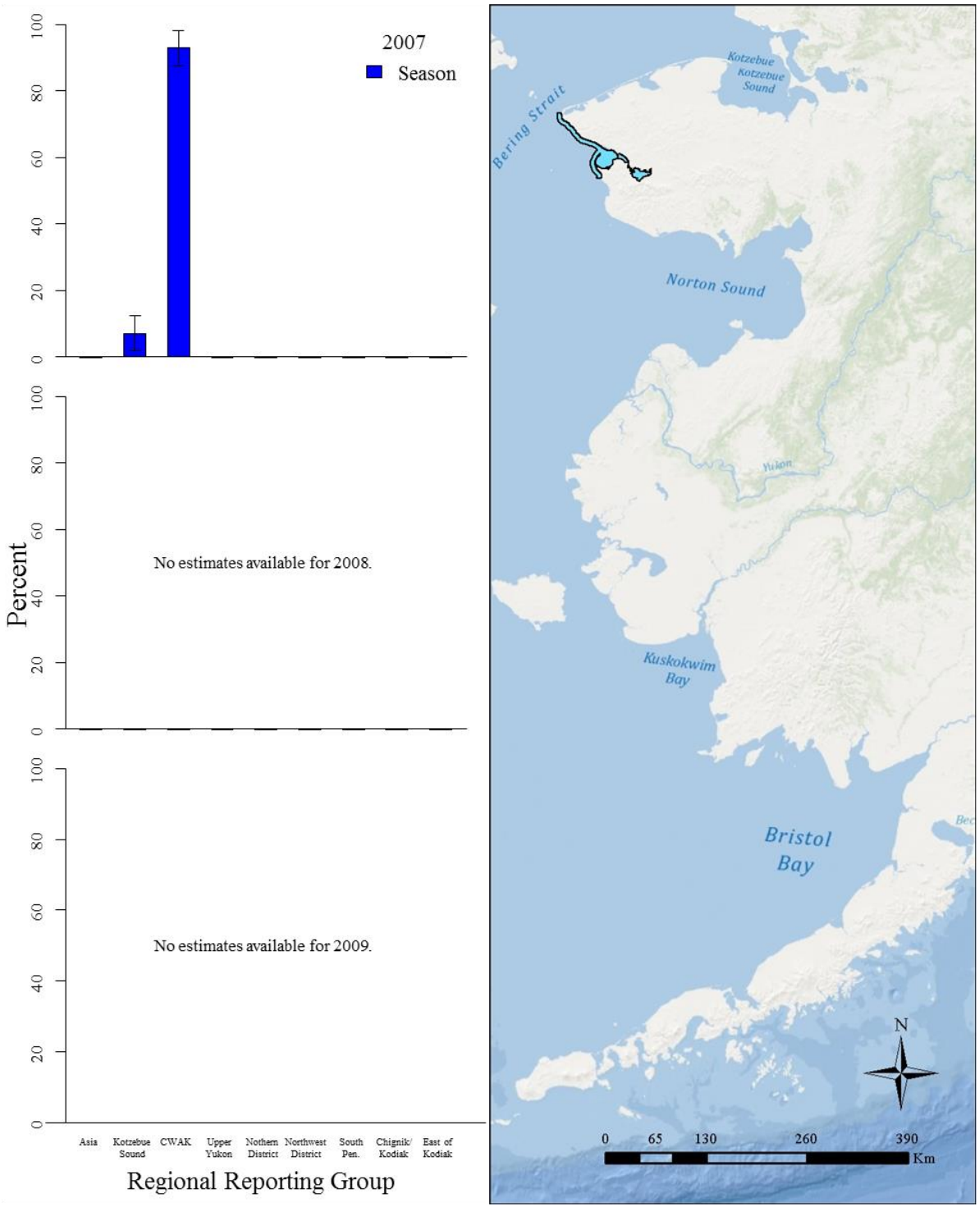

Figure 30.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Port Clarence District Commercial, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

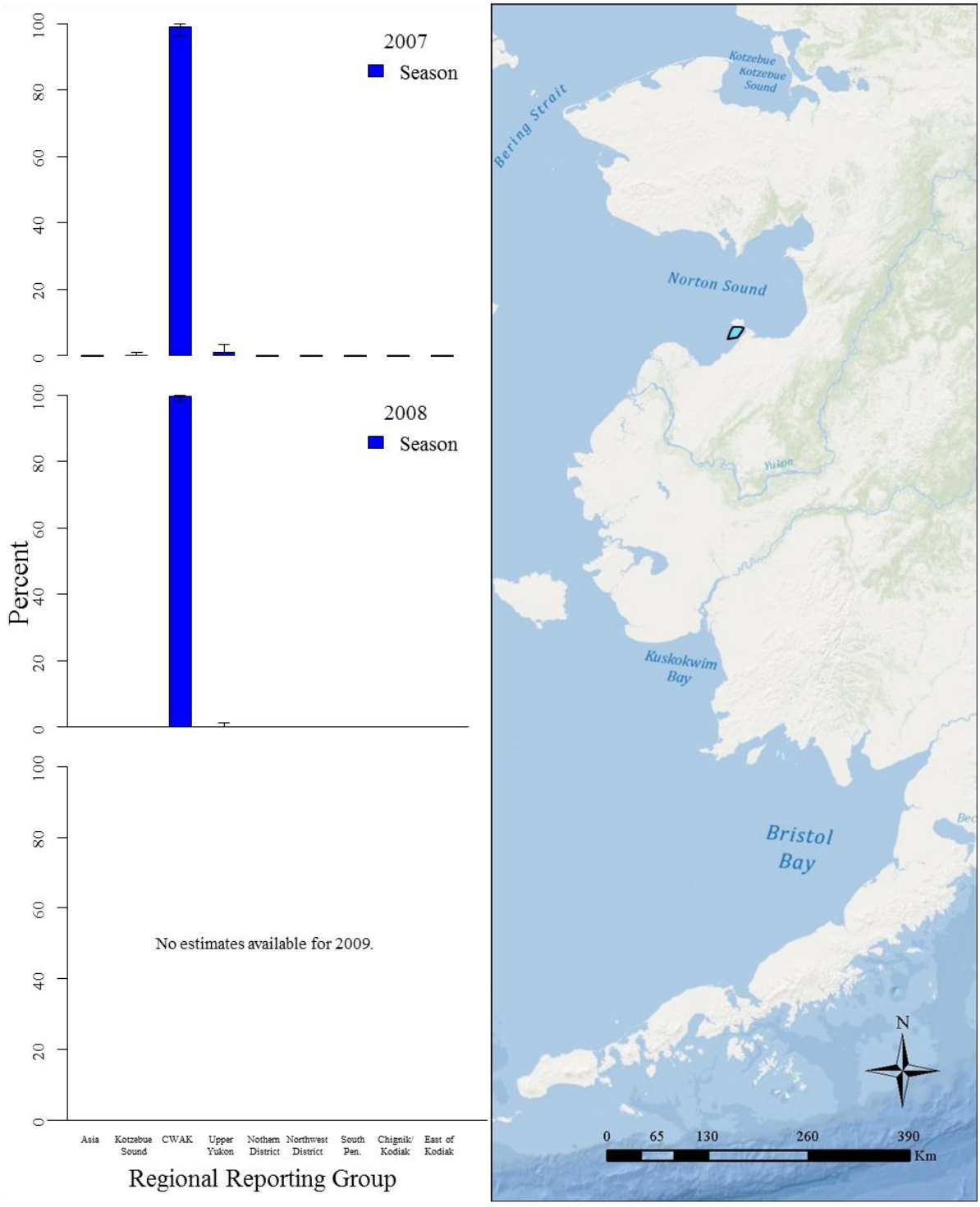

Figure 31.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Stebbins area subsistence, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

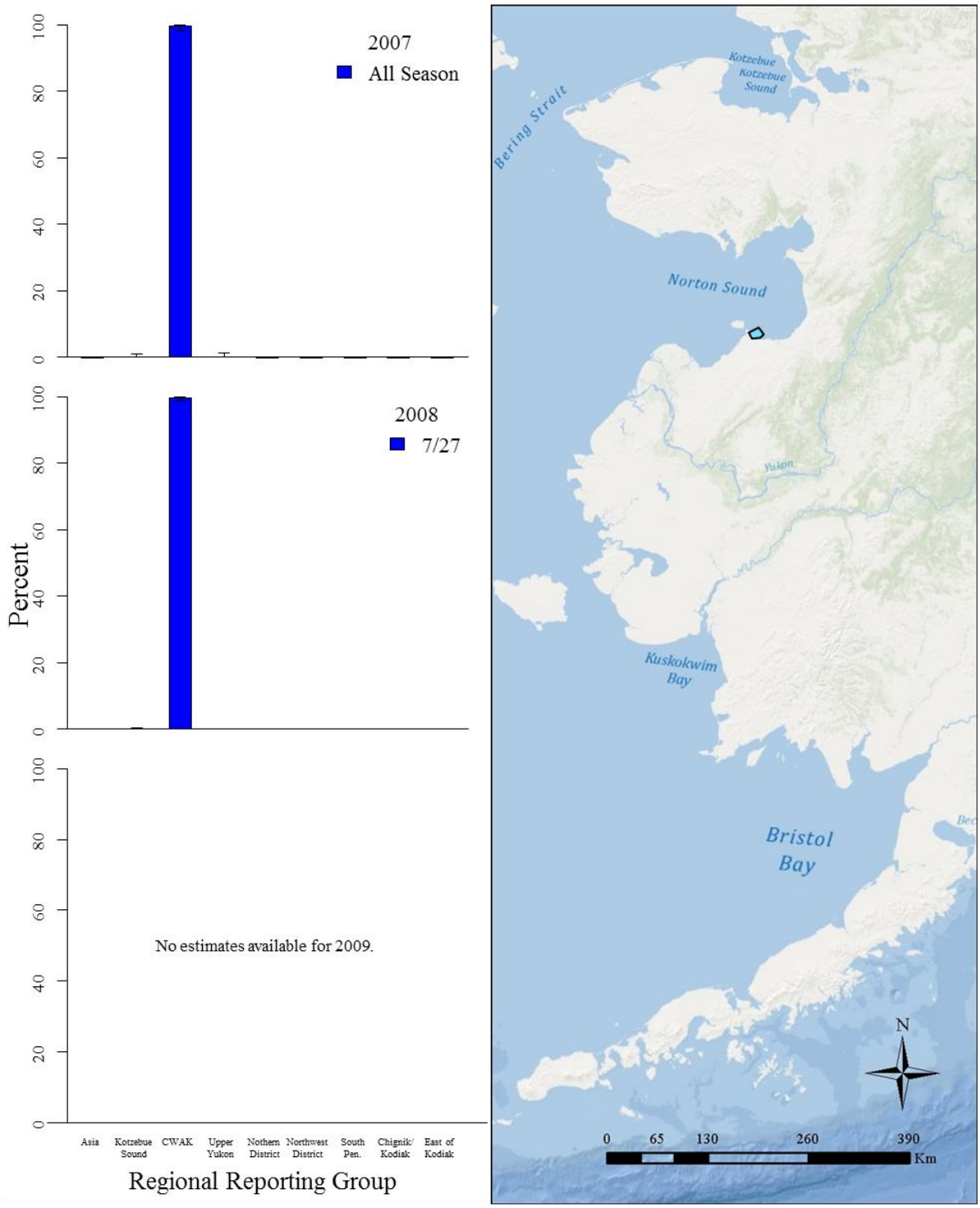

Figure 32.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from St. Michael area subsistence, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

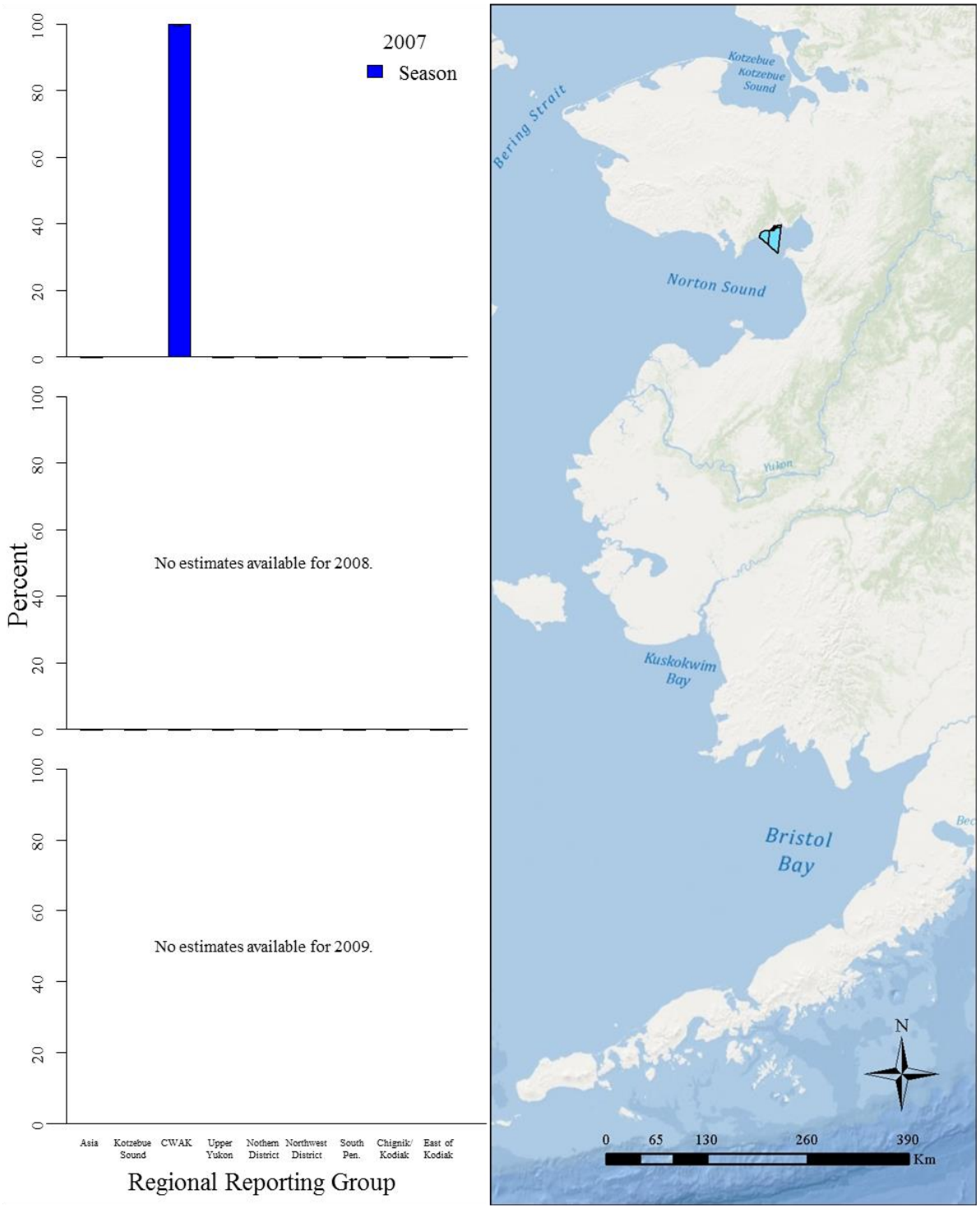

Figure 33.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Subdistrict 3 (Moses Point) subsistence, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region, (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

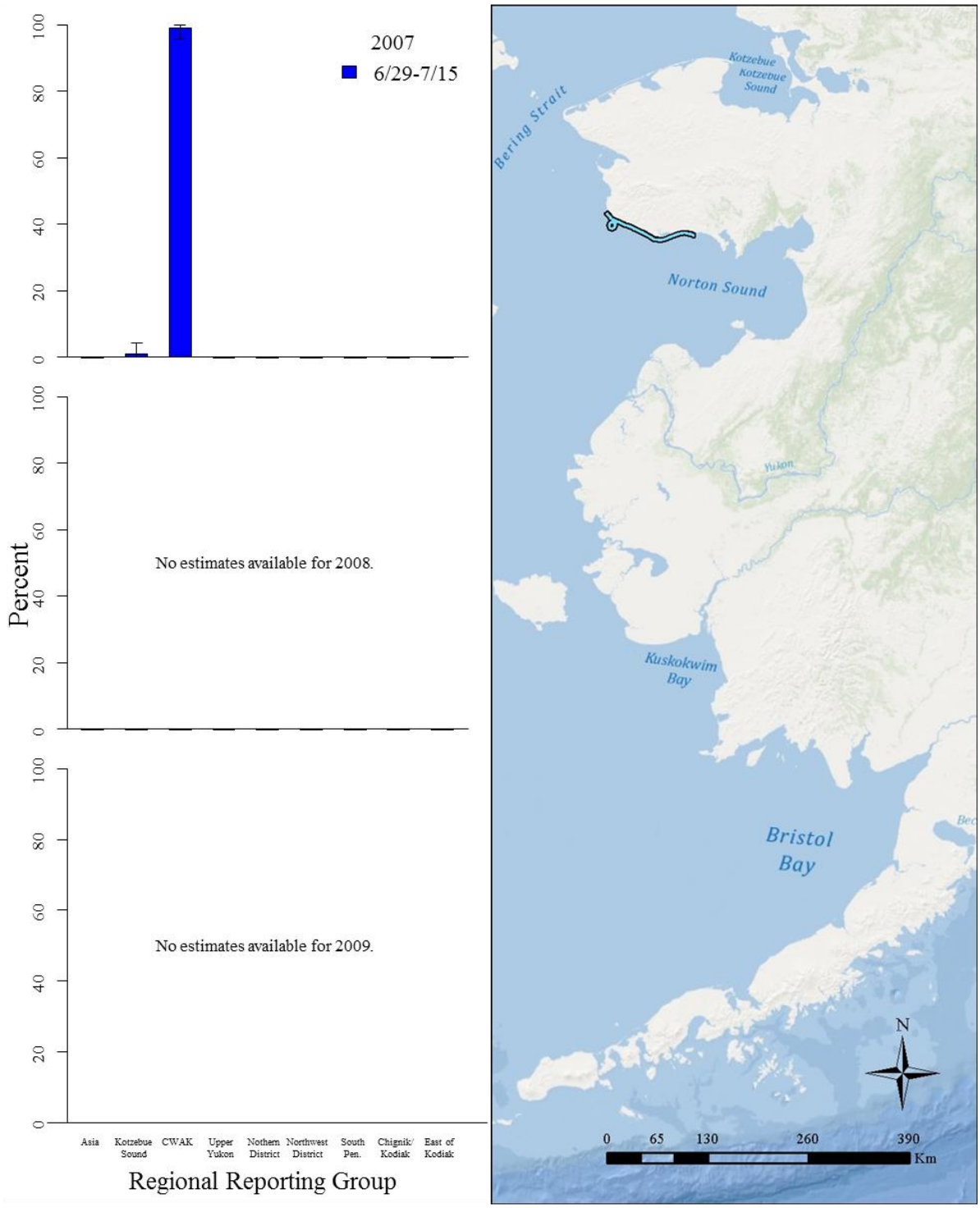

Figure 34.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Nome area subsistence, Norton Sound District, Norton Sound-Port Clarence Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

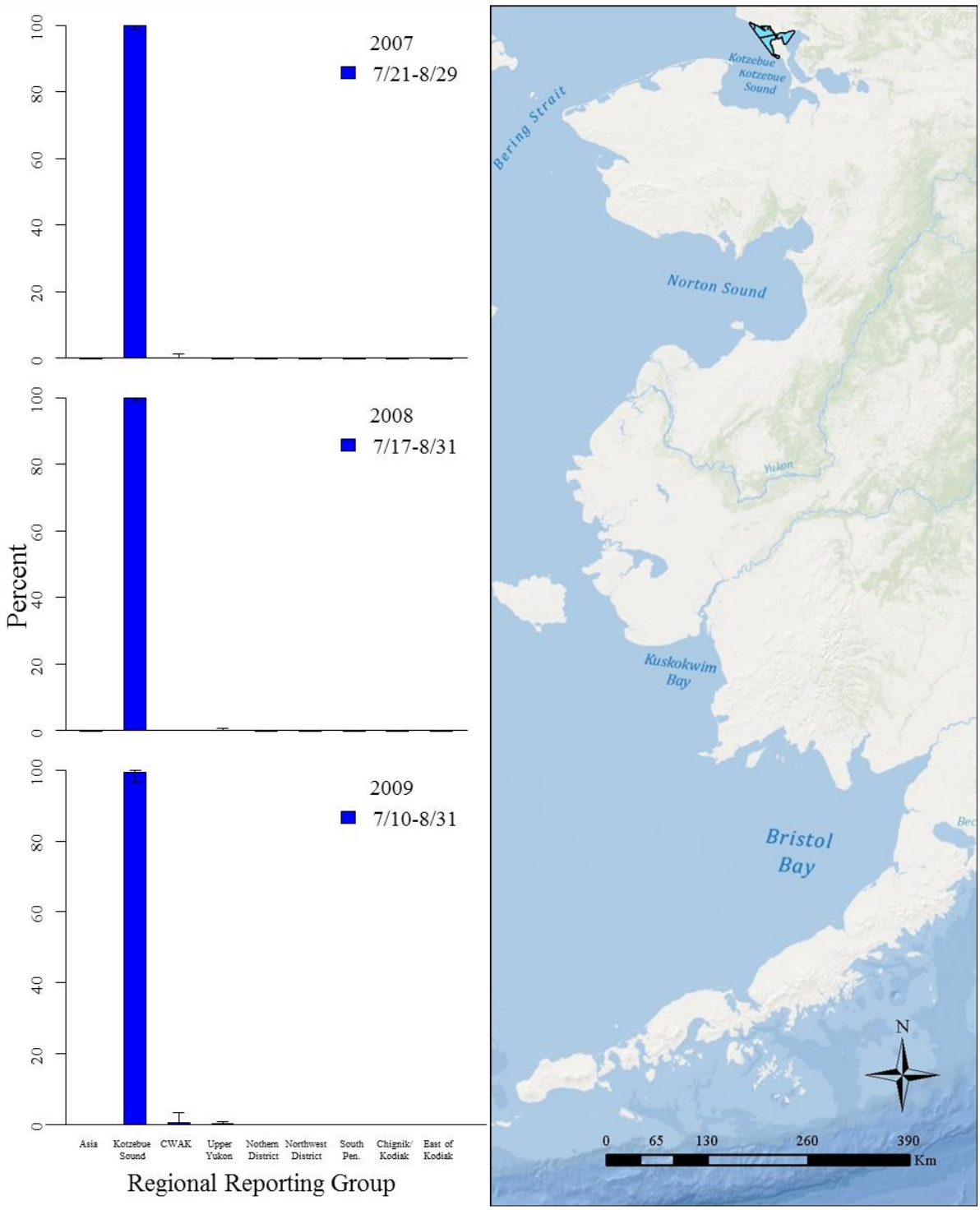

Figure 35.–Mean regional stock composition estimates (bars) and 90% credibility intervals (whiskers) by temporal stratum within years for chum salmon sampled from Kotzebue District Commercial, Kotzebue Area, Arctic-Yukon-Kuskokwim Region (map) in 2007–2009 for the Western Alaska Salmon Stock Identification Program.

APPENDIX

Appendix A1.–Summary of sample sizes by fishery area, district, year, temporal stratum, and period. Sample size summaries include number of fish selected for analysis, the number actually genotyped, number of fish removed due to greater than 20% missing loci, number removed that were not actually chum salmon (alternate species), number removed because they were part of a duplicated pair (duplicate), and the final sample size used to generate stock composition estimates.

					Number of fish					
							Fish Removed			
Area	District	Year	Temporal stratum	Period	Selected	Genotyped	Missing loci	Alternate species	Duplicate	Final
Chignik	Eastern District	2007	1	6/25–7/05	208	205	5	0	1	199
Chignik	Eastern District	2009	1	7/01–7/31	167	166	19	0	0	147
Chignik	Central District	2007	1	6/15–7/31	400	395	14	0	1	380
Chignik	Central District	2008	1	6/24–7/31	400	400	3	0	0	397
Chignik	Central District	2009	1	6/20–7/31	401	401	37	0	2	362
Chignik	Western and Perryville districts	2007	1	7/09–7/31	400	476	7	0	0	469
Chignik	Western and Perryville districts	2008	1	6/24–7/31	400	400	5	0	0	395
Chignik	Western and Perryville districts	2009	1	6/22–7/31	400	402	18	0	0	384
SEDM post-June	SEDM	2008	1	7/03–7/31	400	400	3	0	1	396
SEDM post-June	SEDM	2009	1	7/01–7/31	400	400	7	0	0	393
South Peninsula June	Shumagin Islands Section	2007	1	6/07–6/10	400	400	1	0	0	399
South Peninsula June	Shumagin Islands Section	2007	2	6/12–6/15	400	400	1	0	0	399
South Peninsula June	Shumagin Islands Section	2007	3	6/17–6/20	400	400	0	0	0	400
South Peninsula June	Shumagin Islands Section	2007	4	6/22–6/25	400	415	2	0	2	411
South Peninsula June	Shumagin Islands Section	2007	5	6/27–6/29	400	400	3	0	0	397
South Peninsula June	Shumagin Islands Section	2008	2	6/14–6/15	400	400	1	0	1	398
South Peninsula June	Shumagin Islands Section	2008	3	6/17–6/20	400	400	4	0	0	396
South Peninsula June	Shumagin Islands Section	2008	4	6/22–6/25	400	400	10	0	0	390
South Peninsula June	Shumagin Islands Section	2008	5	6/27–6/29	400	468	10	0	1	457
South Peninsula June	Shumagin Islands Section	2009	1	6/07–6/10	400	400	0	0	0	400
South Peninsula June	Shumagin Islands Section	2009	2	6/12–6/15	400	400	8	0	0	392

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					Number of fish					
							Fish Removed			
Area	District	Year	Temporal stratum	Period	Selected	Genotyped	Missing loci	Alternate species	Duplicate	Final
South Peninsula June	Shumagin Islands Section	2009	3	6/17–6/20	400	400	3	0	0	397
South Peninsula June	Shumagin Islands Section	2009	4	6/22–6/25	400	400	1	0	2	397
South Peninsula June	Shumagin Islands Section	2009	5	6/27–6/29	400	400	2	0	0	398
South Peninsula June	Ikatan area	2007	1	6/07–6/10	400	400	2	0	0	398
South Peninsula June	Ikatan area	2007	2	6/12–6/15	400	400	6	0	0	394
South Peninsula June	Ikatan area	2007	3	6/17–6/20	400	400	10	0	0	390
South Peninsula June	Ikatan area	2007	4	6/22–6/25	400	400	12	0	0	388
South Peninsula June	Ikatan area	2007	5	6/27–6/29	400	400	8	0	0	392
South Peninsula June	Ikatan area	2008	2	6/12–6/15	400	398	15	0	1	382
South Peninsula June	Ikatan area	2008	3	6/17–6/20	400	400	3	0	1	396
South Peninsula June	Ikatan area	2008	4	6/22–6/25	200	199	0	0	0	199
South Peninsula June	Ikatan area	2008	5	6/27–6/29	400	400	23	0	0	377
South Peninsula June	Ikatan area	2009	1	6/07–6/10	129	129	1	0	0	128
South Peninsula June	Ikatan area	2009	2	6/12–6/15	386	377	2	0	1	374
South Peninsula June	Ikatan area	2009	3	6/17–6/20	400	399	3	0	0	396
South Peninsula June	Ikatan area	2009	4	6/22–6/25	400	399	3	0	0	396
South Peninsula June	Ikatan area	2009	5	6/27–6/29	400	400	2	0	0	398
South Peninsula June	Unimak District	2007	1	6/07–6/10	400	400	3	0	0	397
South Peninsula June	Unimak District	2007	2	6/12–6/15	400	400	2	0	0	398
South Peninsula June	Unimak District	2007	3	6/17–6/20	400	400	6	0	0	394
South Peninsula June	Unimak District	2007	4	6/22–6/25	400	480	4	0	0	476
South Peninsula June	Unimak District	2007	5	6/27–6/27	400	400	3	0	0	397
South Peninsula June	Unimak District	2008	1	6/07–6/10	400	400	15	0	0	385
South Peninsula June	Unimak District	2008	2	6/12–6/15	400	401	16	0	0	385
South Peninsula June	Unimak District	2008	3	6/17–6/20	400	400	7	0	0	393

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					Number of fish					
							Fish Removed			
Area	District	Year	Temporal stratum	Period	Selected	Genotyped	Missing loci	Alternate species	Duplicate	Final
South Peninsula June	Unimak District	2008	4	6/22–6/25	400	400	7	0	0	393
South Peninsula June	Unimak District	2008	5	6/27–6/29	400	391	9	0	0	382
South Peninsula June	Unimak District	2009	1	6/07–6/10	400	400	3	0	0	397
South Peninsula June	Unimak District	2009	2	6/12–6/15	400	401	4	0	0	397
South Peninsula June	Unimak District	2009	3	6/17–6/20	400	397	1	0	0	396
South Peninsula June	Unimak District	2009	4	6/22–6/25	400	400	0	0	0	400
South Peninsula June	Unimak District	2009	5	6/27–6/29	400	400	6	0	0	394
South Peninsula post-June	Shumagin Islands Section	2007	1	7/06–7/12	400	400	2	0	0	398
South Peninsula post-June	Shumagin Islands Section	2007	2	7/15–7/21	400	383	1	0	0	382
South Peninsula post-June	Shumagin Islands Section	2007	3	7/23–7/31	400	400	3	0	0	397
South Peninsula post-June	Shumagin Islands Section	2008	1	7/06–7/12	400	400	5	0	0	395
South Peninsula post-June	Shumagin Islands Section	2008	2	7/14–7/22	400	400	2	0	1	397
South Peninsula post-June	Shumagin Islands Section	2008	3	7/23–8/05	400	399	18	0	0	381
South Peninsula post-June	Shumagin Islands Section	2009	1	7/03–7/09	333	331	0	0	0	331
South Peninsula post-June	Shumagin Islands Section	2009	2	7/11–7/20	400	400	3	0	0	397
South Peninsula post-June	Shumagin Islands Section	2009	3	7/21–7/31	401	401	3	0	0	398
South Peninsula post-June	Dolgoi Island area	2007	1	7/06–7/31	400	451	8	0	0	443
South Peninsula post-June	Dolgoi Island area	2008	1	7/06–7/31	400	426	4	0	0	422
South Peninsula post-June	Dolgoi Island area	2009	1	7/06–7/31	400	400	48	0	0	352
South Peninsula post-June	Ikatan area	2007	1	7/06–7/31	300	300	4	0	0	296
South Peninsula post-June	Ikatan area	2008	1	7/06–7/31	400	466	23	0	0	443
South Peninsula post-June	Ikatan area	2009	1	7/06–7/31	400	399	8	0	1	390
North Peninsula	Bear River Section	2007	1	6/11–7/31	313	312	2	0	0	310
North Peninsula	Bear River Section	2009	1	6/08–7/28	400	394	16	0	0	378
North Peninsula	Three Hills and Ilnik sections	2007	1	6/20–7/31	400	396	10	0	1	385

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					Number of fish					
							Fish Removed			
Area	District	Year	Temporal stratum	Period	Selected	Genotyped	Missing loci	Alternate species	Duplicate	Final
North Peninsula	Three Hills and Ilnik sections	2009	1	6/27–7/28	185	185	14	0	0	171
Bristol Bay	Eastside districts	2007	1	6/12–6/26	389	386	3	0	88	295
Bristol Bay	Eastside districts	2007	2	6/27–6/29	400	266	2	0	4	260
Bristol Bay	Eastside districts	2007	3	6/30–7/05	400	400	8	0	54	338
Bristol Bay	Eastside districts	2007	4	7/06–7/15	400	400	10	0	65	325
Bristol Bay	Eastside districts	2007	5	7/16–8/31	400	409	20	0	25	364
Bristol Bay	Eastside districts	2008	1	6/09–6/26	400	451	7	0	0	444
Bristol Bay	Eastside districts	2008	2	6/27–7/01	400	349	5	0	0	344
Bristol Bay	Eastside districts	2008	3	7/02–7/10	400	400	6	0	0	394
Bristol Bay	Eastside districts	2008	4	7/11–7/17	400	400	9	0	1	390
Bristol Bay	Eastside districts	2008	5	7/18–8/21	400	400	9	0	0	391
Bristol Bay	Eastside districts	2009	1	6/15–6/25	400	400	13	0	1	386
Bristol Bay	Eastside districts	2009	2	6/26–6/30	400	387	38	0	0	349
Bristol Bay	Eastside districts	2009	3	7/01–7/06	401	401	23	0	2	376
Bristol Bay	Eastside districts	2009	4	7/07–7/11	400	400	18	0	7	375
Bristol Bay	Eastside districts	2009	5	7/12–8/31	400	390	32	0	0	358
Bristol Bay	Nushagak District	2007	1	6/11–6/27	640	638	31	0	0	607
Bristol Bay	Nushagak District	2007	2	6/28–7/07	630	627	27	0	0	600
Bristol Bay	Nushagak District	2007	3	7/08–7/12	419	415	6	0	0	409
Bristol Bay	Nushagak District	2007	4	7/13–7/17	453	448	20	0	0	428
Bristol Bay	Nushagak District	2007	5	7/18–8/12	543	542	35	0	1	506
Bristol Bay	Nushagak District	2008	1	6/09–6/29	640	600	8	0	1	591
Bristol Bay	Nushagak District	2008	2	6/30–7/05	640	640	13	0	2	625
Bristol Bay	Nushagak District	2008	3	7/06–7/11	640	640	26	0	9	605
Bristol Bay	Nushagak District	2008	4	7/12–7/15	640	628	20	0	28	580

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					Number of fish					
							Fish Removed			
Area	District	Year	Temporal stratum	Period	Selected	Genotyped	Missing loci	Alternate species	Duplicate	Final
Bristol Bay	Nushagak District	2008	5	7/16–8/15	530	518	20	0	0	498
Bristol Bay	Nushagak District	2009	1	6/07–6/27	640	641	11	0	5	625
Bristol Bay	Nushagak District	2009	2	6/28–7/02	640	639	24	0	0	615
Bristol Bay	Nushagak District	2009	3	7/03–7/04	640	638	9	0	2	627
Bristol Bay	Nushagak District	2009	4	7/05–7/09	640	637	9	0	1	627
Bristol Bay	Nushagak District	2009	5	7/10–8/18	640	640	1	0	0	639
Bristol Bay	Togiak District	2007	1	6/18–6/28	400	400	9	0	0	391
Bristol Bay	Togiak District	2007	2	7/02–7/09	400	401	99	0	0	302
Bristol Bay	Togiak District	2007	3	7/10–7/15	400	400	16	0	0	384
Bristol Bay	Togiak District	2007	4	7/16–7/20	400	401	7	0	0	394
Bristol Bay	Togiak District	2007	5	7/21–8/04	400	402	18	0	0	384
Bristol Bay	Togiak District	2008	1	6/18–6/27	400	400	2	0	1	397
Bristol Bay	Togiak District	2008	2	6/30–7/04	400	400	3	0	0	397
Bristol Bay	Togiak District	2008	3	7/05–7/11	400	401	1	0	1	399
Bristol Bay	Togiak District	2008	4	7/12–7/16	400	400	11	0	3	386
Bristol Bay	Togiak District	2008	5	7/17–8/06	400	401	5	0	2	394
Bristol Bay	Togiak District	2009	1	6/22–6/30	400	400	5	0	0	395
Bristol Bay	Togiak District	2009	2	7/01–7/02	400	399	5	0	0	394
Bristol Bay	Togiak District	2009	3	7/03–7/07	250	246	3	0	0	243
Bristol Bay	Togiak District	2009	4	7/08–7/11	400	400	24	0	0	376
Bristol Bay	Togiak District	2009	5	7/13–8/27	400	389	3	0	0	386
Kuskokwim Area	District 5 Commercial	2007	1	6/19–7/04	261	252	1	0	1	250
Kuskokwim Area	District 5 Commercial	2007	2	7/06–7/16	194	193	8	0	0	185
Kuskokwim Area	District 5 Commercial	2007	3	7/18–8/31	337	335	17	0	1	317
Kuskokwim Area	District 5 Commercial	2009	1	6/22–6/30	400	401	3	0	0	398

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					Number of fish					
							Fish Removed			
Area	District	Year	Temporal stratum	Period	Selected	Genotyped	Missing loci	Alternate species	Duplicate	Final
Kuskokwim Area	District 5 Commercial	2009	2	7/06–7/17	400	400	2	0	0	398
Kuskokwim Area	District 4 Commercial	2007	1	6/14–6/28	400	397	3	0	0	394
Kuskokwim Area	District 4 Commercial	2007	2	7/02–7/16	400	407	7	0	0	400
Kuskokwim Area	District 4 Commercial	2007	3	7/18–8/31	400	400	0	0	0	400
Kuskokwim Area	District 4 Commercial	2008	1	6/14–6/26	400	401	10	0	0	391
Kuskokwim Area	District 4 Commercial	2008	2	7/01–7/14	400	400	5	0	0	395
Kuskokwim Area	District 4 Commercial	2008	3	7/16–8/29	400	400	7	0	2	391
Kuskokwim Area	District 4 Commercial	2009	1	6/15–6/30	400	399	6	0	0	393
Kuskokwim Area	District 4 Commercial	2009	2	7/06–7/15	402	403	3	0	0	400
Kuskokwim Area	District 4 Commercial	2009	3	7/16–8/24	400	400	4	0	0	396
Kuskokwim Area	District 1 Commercial	2007	1	6/07–6/26	400	400	12	0	0	388
Kuskokwim Area	District 1 Commercial	2007	2	6/27–7/11	400	400	2	0	1	397
Kuskokwim Area	District 1 Commercial	2007	3	7/12–8/24	363	362	5	0	0	357
Kuskokwim Area	District 1 Commercial	2008	1	6/20–6/24	400	401	3	0	0	398
Kuskokwim Area	District 1 Commercial	2008	2	6/27–6/27	400	381	4	0	0	377
Kuskokwim Area	District 1 Commercial	2008	3	7/12–8/25	365	365	67	0	1	297
Kuskokwim Area	District 1 Commercial	2009	1	6/23–6/26	400	401	7	1	0	393
Kuskokwim Area	District 1 Commercial	2009	2	7/01–7/18	401	400	4	0	1	395
Kuskokwim Area	District 1 Commercial	2009	3	7/28–8/22	400	400	4	0	0	396
Kuskokwim Area	Toksook Bay Subsistence	2007	1	6/06–6/10	375	314	2	0	0	312
Kuskokwim Area	Toksook Bay Subsistence	2008	1	6/20–6/24	400	401	6	0	1	394
Kuskokwim Area	Toksook Bay Subsistence	2009	1	6/13–7/20	115	114	4	0	0	110
Yukon River Summer Run	District 1 marine Black River Commercial	2007	1	6/19–6/22	400	399	6	0	0	393
Yukon River Summer Run	District 1 marine Black River Commercial	2007	2	6/26–7/02	400	398	13	0	0	385
Yukon River Summer Run	District 1 marine Black River Commercial	2007	3	7/06–7/15	400	400	3	0	4	393

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					Number of fish					
							Fish Removed			
Area	District	Year	Temporal stratum	Period	Selected	Genotyped	Missing loci	Alternate species	Duplicate	Final
Yukon River Summer Run	District 1 marine Black River Commercial	2008	2	7/02–7/05	400	390	2	0	1	387
Yukon River Summer Run	District 1 marine Black River Commercial	2008	3	7/08–7/14	400	395	5	0	0	390
Yukon River Summer Run	District 1 marine Black River Commercial	2009	1	6/29–7/02	351	345	2	1	0	342
Yukon River Summer Run	District 1 marine Black River Commercial	2009	2	7/03–7/08	300	300	4	0	0	296
Yukon River Summer Run	District 1 marine Black River Commercial	2009	3	7/10–7/15	300	296	1	0	0	295
Yukon River Summer Run	District 1 Black River only Commercial	2007	1	6/19–6/22	400	400	3	0	0	397
Yukon River Summer Run	District 1 Black River only Commercial	2007	2	6/26–7/02	120	119	1	0	2	116
Yukon River Summer Run	Coastal District Hooper Bay Subsistence	2007	1	6/14–6/26	347	324	9	1	0	314
Yukon River Summer Run	Coastal District Hooper Bay Subsistence	2008	1	6/11–6/29	400	399	20	0	2	377
Yukon River Summer Run	Coastal District Hooper Bay Subsistence	2009	1	6/14–7/01	391	390	17	0	10	363
Yukon River Summer Run	District 1 Scammon Bay Black River Subsistence	2008	1	6/14–7/06	400	396	11	0	2	383
Yukon River Summer Run	District 1 Scammon Bay Black River Subsistence	2009	1	6/21–6/25	400	400	1	0	2	397
Yukon River Fall Run	District 1 marine Black River Commercial	2007	2	8/14–8/24	400	148	5	0	0	143
Yukon River Fall Run	District 1 marine Black River Commercial	2007	3	8/26–9/09	400	221	1	0	0	220
Yukon River Fall Run	District 1 marine Black River Commercial	2008	1	7/17–7/25	400	399	13	0	0	386
Yukon River Fall Run	District 1 marine Black River Commercial	2008	2	7/29–8/01	300	297	12	0	0	285
Yukon River Fall Run	District 1 marine Black River Commercial	2008	3	8/26–9/10	400	399	4	0	1	394
Yukon River Fall Run	District 1 marine Black River Commercial	2009	1	7/18–7/22	308	304	1	0	0	303
Yukon River Fall Run	District 1 marine Black River Commercial	2009	2	7/29–8/05	302	302	23	0	1	278
Norton Sound	Subdistrict 6 Unalakleet Commercial	2007	1	7/18–7/21	400	396	0	0	0	396
Norton Sound	Subdistrict 6 Unalakleet Commercial	2007	2	7/22–7/31	400	400	2	0	0	398
Norton Sound	Subdistrict 6 Unalakleet Commercial	2008	1	7/08–7/15	350	349	5	0	0	344
Norton Sound	Subdistrict 6 Unalakleet Commercial	2008	2	7/17–7/29	400	400	1	0	0	399
Norton Sound	Subdistrict 6 Unalakleet Commercial	2008	3	7/30–9/12	273	264	1	0	0	263
Norton Sound	Subdistrict 6 Unalakleet Commercial	2009	1	7/08–7/15	300	300	0	0	0	300

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					Number of fish					
							Fish Removed			
Area	District	Year	Temporal stratum	Period	Selected	Genotyped	Missing loci	Alternate species	Duplicate	Final
Norton Sound	Subdistrict 6 Unalakleet Commercial	2009	2	7/16–7/28	400	398	1	0	1	396
Norton Sound	Subdistrict 6 Unalakleet Commercial	2009	3	7/29–9/11	301	301	1	0	0	300
Norton Sound	Subdistrict 5 Shaktoolik Commercial	2007	1	7/18–7/21	200	200	0	0	0	200
Norton Sound	Subdistrict 5 Shaktoolik Commercial	2007	2	7/22–8/02	400	400	1	0	0	399
Norton Sound	Subdistrict 5 Shaktoolik Commercial	2008	1	7/09–7/22	276	200	0	0	0	200
Norton Sound	Subdistrict 5 Shaktoolik Commercial	2008	2	7/23–8/05	350	350	5	0	1	344
Norton Sound	Subdistrict 5 Shaktoolik Commercial	2008	3	8/06–9/09	400	400	7	0	0	393
Norton Sound	Subdistrict 5 Shaktoolik Commercial	2009	1	7/10–7/21	150	150	5	0	0	145
Norton Sound	Subdistrict 5 Shaktoolik Commercial	2009	2	7/22–8/04	151	151	6	0	1	144
Norton Sound	Subdistrict 5 Shaktoolik Commercial	2009	3	8/05–9/11	107	106	0	0	0	106
Norton Sound	Subdistrict 3 Moses Point Commercial	2007	1	7/10–8/29	400	400	4	0	3	393
Norton Sound	Subdistrict 3 Moses Point Commercial	2008	1	7/05–8/30	198	198	1	0	0	197
Norton Sound	Subdistrict 2 Golovin Commercial	2008	1	7/01–8/22	215	214	0	0	0	214
Norton Sound	Stebbins area Subsistence	2007	1	6/26–7/03	400	400	17	0	3	380
Norton Sound	Stebbins area Subsistence	2008	1	7/08–7/24	107	107	12	0	0	95
Norton Sound	St. Michael area Subsistence	2007	1	1/01–12/31	289	287	9	0	4	274
Norton Sound	St. Michael area Subsistence	2008	1	7/27–7/27	170	168	7	0	1	160
Norton Sound	Subdistrict 3 Moses Point Subsistence	2007	1	6/25–7/11	128	127	0	0	1	126
Norton Sound	Nome area Subsistence	2007	1	6/29–7/15	176	176	3	0	7	166
Norton Sound	Port Clarence District Subsistence	2007	1	1/01–12/31	365	364	2	0	1	361
Kotzebue	Kotzebue Area Commercial	2007	1	7/17–8/31	401	403	0	0	0	403
Kotzebue	Kotzebue Area Commercial	2008	1	7/21–8/29	400	402	0	0	1	401
Kotzebue	Kotzebue Area Commercial	2009	1	7/10–8/31	400	398	1	0	1	396
				Total	74,277	73,669	1632	3	378	71,656