Fishery Data Series No. 17-30

Genetic Stock Identification of Upper Cook Inlet Sockeye Salmon Harvest, 2012–2013

by

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

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

FISHERY DATA SERIES NO. 17-30

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by

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ABSTRACT

Mixed stock analysis based on genetic data has been used to estimate the stock compositions of sockeye salmon *Oncorhynchus nerka* harvested in commercial fisheries in Upper Cook Inlet (UCI), Alaska, since 2005. Here we report the genetic mixed stock analysis samples representing 99% of the 2012 and 2013 UCI commercial fishery harvests. Postseason analyses were performed using a previously reported baseline of 69 populations and 96 single nucleotide polymorphic markers, with the addition of 2 populations in the *West* reporting group (Harriet Creek and Packers Lake late run). Stock composition patterns in the commercial fishery were similar to previous years: eastern fisheries generally captured more Kenai and Kasilof rivers fish than western and northern fisheries; and gillnet fisheries closer to the Kenai or Kasilof river mouths harvested larger proportions of fish from those rivers. In 2012, however, the majority of Kasilof fish were harvested in the drift gillnet fisheries due to restrictions on the set gillnet fishery. Most stocks contributed similar proportions to the overall harvest in the UCI fishery compared to previously reported years, but Fish and Kasilof stocks were 38–86% below average and Susitna/Yentna River stocks were 19–77% above average. In 2013, 2 additional drift gillnet samples were analyzed to compare harvests in the Kenai and Kasilof expanded corridor (July 11) with the districtwide harvest (July 8). Kenai and Kasilof estimates were higher in the corridor sample than the districtwide sample, whereas estimates for the remaining reporting groups were generally lower, but these differences were not significant and could be attributed to the difference in sampling date. Estimates of stock-specific harvests for UCI commercial fisheries in 2012 and 2013 build upon previous years in refining understanding of productivity and the effect of management actions on the stock composition of commercial sockeye salmon harvests.

Key words Cook Inlet, sockeye salmon, *Oncorhynchus nerka*, genetic stock identification, mixed stock analysis, MSA, commercial fishery, single nucleotide polymorphism, SNP

INTRODUCTION

BACKGROUND

Sockeye salmon *Oncorhynchus nerka* are the most important species to the commercial fishery in the Upper Cook Inlet (UCI) Management Area, with an average annual exvessel value of $27 million over the previous 10 years (2006–2015; Shields and Dupuis 2017). The Alaska Department of Fish and Game (ADF&G), Division of Commercial Fisheries, is responsible for managing the commercial fisheries in UCI under the sustained yield principle. Application of the sustained yield principle requires an understanding of the relationship between the number of fish that spawn in a drainage (stock) and the number of their offspring that make it to reproductive adulthood (i.e., brood table). The number of offspring that return for each stock is calculated by adding the number of spawners in the drainage to the number of fish harvested before reaching the spawning grounds for each of the 5 major sockeye salmon-producing drainages in UCI: Crescent River, Susitna River, Fish Creek, Kenai River, and Kasilof River (Figure 1). The harvest estimate is especially important in UCI where sockeye salmon are harvested at rates from 47% to 73% in mixed-stock fisheries (Tobias and Willette 2013; Shields and Dupuis 2012, 2017). Most of this harvest occurs in the commercial fishery in various UCI districts, subdistricts, and sections (Figures 2–5) by both set and drift gillnet commercial fisheries (Shields and Dupuis 2017). An offshore test fishery provides inseason forecasts and postseason estimates of the total UCI sockeye salmon run and the sockeye salmon run to the Kenai River (Dupuis et al. 2016). The Kenai River late-run sockeye salmon management plan specifies 3 tiers for the inriver sockeye salmon escapement goal and changes in allowable commercial fishing time based upon the inseason Kenai sockeye salmon forecast derived from the offshore test fishery.

Estimating the stock composition of sockeye salmon harvests within the UCI fishery is a key component to developing accurate brood tables. Previous methods to assign harvest to stocks

within the UCI fishery (including a weighted age-composition model and early genetic methods) were less accurate and precise and are detailed in Barclay et al. (2010a). ADF&G has used mixed stock analysis (MSA) based upon genetic data since 2005 to estimate stock compositions of sockeye salmon collected in selected periods of the 2005–2011 Central and Northern district commercial fisheries (Barclay et al. 2010a, 2010b, 2013, 2014). Among the findings were that the greatest harvests of Kenai River fish occurred in the drift gillnet fishery and the greatest harvest of Kasilof River fish occurred in the set gillnet fishery. In the Kasilof Section harvest within a half mile of shore, the combined stock contribution of Kenai and Kasilof river fish was 97–98%. Fish from Knik and Turnagain arms contributed the most to harvests in the northern area of the General Subdistrict; Susitna River fish contributed very little. In the southern area of the General Subdistrict, western Cook Inlet and Susitna River fish had the biggest contributions to the harvest.

Interannual deviations in stock composition estimates were also observed. For example, above-average harvests of Crescent River, western Cook Inlet, and Fish Creek fish were observed in 2009 (Barclay et al. 2010b) compared to the previous 4 years (2005–2008; Barclay et al. 2010a). The most recent report of the 2011 commercial harvest includes the most detailed and precise estimates to date: analyzed strata represented 97% of the commercial harvest and the 90% credibility intervals for the most abundant stocks (Kenai and Kasilof rivers) captured in the largest fisheries (Central District drift gillnet and Upper Subdistrict set gillnet) were within 5% of the point estimate (Barclay et al. 2014).

In 2012, a new coastwide baseline was published for the Western Alaska Salmon Stock Identification Program (WASSIP; Dann et al. 2012). This baseline doubled the number of markers screened for sockeye salmon populations from Cape Suckling to the Seward Peninsula (see Habicht et al. 2007 for information on SNP baseline previous to WASSIP). This baseline also incorporated new baseline samples (from additional sampling years and populations) and implemented improved methods to detect and handle linked loci. Since the last baseline upgrade, additional test mixtures were also used to evaluate baseline performance for MSA in UCI. Taking advantage of these new data and methods, a new baseline was developed for MSA in UCI that contains 10,001 fish representing 69 populations screened for 96 SNP loci (Barclay and Habicht 2012). Populations were assigned into reporting groups (stocks) and tested for MSA performance. The following 8 reporting groups (Figure 1) met or exceeded the MSA performance metrics: (1) the largest producer of sockeye salmon on the west side of Cook Inlet (Crescent River; *Crescent*), (2) the remaining West Cook Inlet producers (*West*), (3) the lakes monitored by weirs in the Susitna/Yentna rivers (Judd/Chelatna/Larson lakes) with the addition of the Mama and Papa Bear Lakes and Talkeetna Sloughs population (*JCL*), (4) the remaining producers in the Susitna/Yentna rivers (*SusYen*), (5) the only major creek monitored with a weir in the Knik/Turnagain/Northeast Cook Inlet area (Fish Creek; *Fish*), (6) the remaining Knik/Turnagain/Northeast Cook Inlet producers (*KTNE*), (7) the composite of all populations within the Kenai River (*Kenai*), and (8) the composite of all populations within the Kasilof River (*Kasilof*). Hereafter, when the terms *Crescent*, *West*, *JCL*, *SusYen*, *Fish*, *KTNE*, *Kenai*, and *Kasilof* are used as nouns, they refer to reporting groups (stocks; see definitions).

Here we use the baseline reported in Barclay and Habicht (2012) with 2 additional populations in the West reporting group (Harriet Creek and Packers Lake late run) to analyze samples collected in 2012 and 2013 from time and area strata that represented over 99% of the UCI sockeye commercial catch in both years.

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.

Brood (year). All salmon in a stock spawned in a specific year.

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

District. Waters open to commercial salmon fishing. Commercial fishing districts, subdistricts and sections in Cook Inlet are defined in Alaska Administrative Code (5 AAC 21.200).

Escapement (or Spawning Abundance or Spawners). The annual estimated size of the spawning salmon stock; quality of escapement may be determined not only by numbers of spawners, but also factors such as sex ratio, age composition, temporal entry into the system, and spatial distribution with the salmon spawning habitat (from 5 AAC 39.222(f)).

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.

Hardy-Weinberg Equilibrium (H-W). The genotype frequencies that would be expected from given allele frequencies assuming random mating, no mutation (the alleles don't change), no migration or emigration (no exchange of alleles between populations), infinitely large population size, and no selective pressure for or against any traits.

Harvest. The number of salmon or weight of salmon taken from returning salmon prior to escapement as a result of fishing activities.

Harvest Rate. The fraction of returning salmon harvested.

Locus (plural, loci). A fixed position or region on a chromosome.

Linkage Disequilibrium. A state that exists in a population when alleles at different loci are not distributed independently in the population's gamete pool, often because the loci are physically linked.

Linked Markers. Markers showing linkage disequilibrium, or physical linkage on a chromosome.

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

Population. A locally interbreeding group that has little interbreeding with other spawning aggregations other than the natural background stray rate, is uniquely adapted to a spawning habitat, and has inherently unique attributes (Ricker 1958) that result in different productivity rates (Pearcy 1992; NRC 1996). This population definition is analogous to the spawning aggregations described by Baker et al. (1996) and the demes by NRC (1996).

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 management

needs and genetic distinction. See definition for *Salmon Stock* for breakdown of reporting groups (stocks) in Upper Cook Inlet.

Run. The total number of salmon of a stock surviving to adulthood and returning to the vicinity of the natal stream in any calendar year. The annual run is composed of both the harvest of adult salmon and the escapement in any calendar year. With the exception of pink salmon, 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)).

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

Salmon Stock. A locally interbreeding group of salmon (population) distinguished by a distinct combination of genetic, phenotypic, life history, and habitat characteristics or an aggregation of 2 or more interbreeding groups (populations) that occur within the same geographic area and is managed as a unit (from 5 AAC 39.222(f)). For purposes of this study, stocks in Upper Cook Inlet were delineated based on the major population or aggregation of populations for which ADF&G estimates escapement, or for a population or aggregation of populations occuring in a geographic area for which ADF&G does not estimate escapement. Upper Cook Inlet stocks are defined as: (1) the largest producer on the west side (Crescent River; *Crescent*), (2) the remaining West Cook Inlet producers (*West*), (3) the lakes with weirs in the Susitna/Yentna rivers (Judd/Chelatna/Larson lakes) and the Mama and Papa Bear Lakes and Talkeetna Sloughs population (*JCL*), (4) the remaining producers in the Susitna/Yentna rivers (*SusYen*), (5) the only major creek with a weir in the Knik/Turnagain/Northeast Cook Inlet area (Fish Creek; *Fish*), (6) the remaining Knik/Turnagain/Northeast Cook Inlet producers (*KTNE*), (7) the composite of all populations within the Kenai River (*Kenai*), and (8) the composite of all populations within the Kasilof River (*Kasilof*).

MANAGEMENT OF UPPER COOK INLET SOCKEYE SALMON

Management Strategy for 2012 and 2013

UCI commercial fisheries were managed to achieve salmon escapement goals. Salmon were commercially harvested in UCI using drift and set gillnets. Drift gillnet fisheries occurred in the Central District only, whereas set gillnet fisheries occur in both the Central and Northern districts on both eastern and western shores (Figure 2). During each season, regularly scheduled fishery openings occurred for 12 hours on Mondays and Thursdays beginning at 7:00 a.m. Additional fishing time was allowed via emergency orders depending on catches, escapements, and the projected run size of sockeye salmon. Each season generally began in late June and ran through early August for a total of about 14 regularly scheduled fishery openings.

To achieve escapement goals, drift and set gillnet fisheries were sometimes restricted to smaller portions of the district to reduce the harvest of specific salmon stocks (Table 1; Figures 2–5). These area restrictions varied throughout each season and across years. Drift gillnet fisheries were sometimes restricted to areas south of the northern or southern tip of Kalgin Island, or only the Kenai or Kasilof corridor along the eastside beaches, usually to reduce harvest of Susitna/Yentna rivers or Kenai River sockeye salmon. For a portion of the 2013 season, drift and set gillnet fisheries were restricted to the Kasilof River Special Harvest Area (KRSHA) near the mouth of the Kasilof River to minimize harvests of Kenai River sockeye salmon, but allow

harvest of Kasilof River sockeye salmon in excess of escapement needs (Barclay et al. 2010a; Figure 5). The Kenai, East Foreland, and Kasilof sections of the Upper Subdistrict were managed as separate units. Set gillnet fisheries were sometimes restricted to harvest within a half-mile of shore in the Kasilof Section and closed in the Kenai and East Foreland sections to reduce harvests of Kenai River fish. Descriptions of the management plans governing these fisheries and details of these restrictions for specific years can be found in the UCI Annual Management Reports (Shields and Dupuis 2013a, 2013b) and in reports to the Alaska Board of Fisheries. These area restrictions need to be considered when evaluating genetic stock composition estimates in this report because some of the variability in these estimates results from the areas where the fish were caught. All genetic stock composition estimates in this report are linked to information about these area restrictions (Tables 1 and 2).

Description of Fishery 2012–2013

Sockeye salmon runs in 2012 and 2013 differed from each other due to varying migration patterns and run strengths as well as management actions. Management also proceeded—in light of the 2011 Alaska Board of Fisheries modifications to the 3-tiered management system in the Kenai River—to reflect the new DIDSON[1]-based inriver goal for this system. The 3 tiers were delineated at (1) less than 2.3 million fish, (2) 2.3 to 4.6 million fish, and (3) over 4.6 million fish. For both years, the Kenai forecast was for a run of greater than 2.3 million sockeye salmon, so ADF&G started the season managing for an inriver Kenai sockeye salmon goal range of 1.0 to 1.2 million counted by DIDSON sonar, with 51 hours of additional fishing time allowed in the Upper Subdistrict set gillnet fishery. The low return of late-run Kenai River Chinook salmon uniquely affected fishery management in both years.

In 2012, the preseason forecast for the total UCI sockeye salmon run (6.2 million) was above average with an above-average Kenai (4,026,000) forecast, and below-average Kasilof (754,000) and Susitna (443,000) forecasts (Eggers and Carroll 2012). Inseason projections in late July indicated run timing was late, and the Kenai run was greater than 4.6 million, triggering a higher inriver goal range of 1,100,000 to 1,350,000 sockeye salmon. In addition, 84 hours of additional fishing time in the Upper Subdistrict set gillnet fishery were allowed with 1 closed period (window) each week. The Upper Subdistrict set gillnet fishery was closed on July 17, because all indices used to assess inriver abundance of Kenai River late-run Chinook salmon indicated that the run was below average and would fail to meet inseason management objectives. With the set gillnet fishery closed, the drift gillnet fishery became the primary management tool to control sockeye salmon escapement into the Kenai and Kasilof rivers. During the July 22–28 management week, the drift gillnet fleet fished in the full Central District during the regular period on July 23, but the drift fishery was restricted to Drift Gillnet Areas 1 and 2 during the regular period on July 26 to conserve northern-bound stocks of sockeye and coho salmon. During this same management week, the drift gillnet fleet was granted 61 hours of additional fishing time in the Expanded Kenai and Expanded Kasilof Sections (expanded corridor; Shields and Dupuis 2013a). At the end of the season, the Kasilof sockeye salmon escapement (374,523) was below the upper optimal escapement goal (390,000) and the Kenai escapement (1,581,555) exceeded the inriver goal range (1,100,000–1,350,000). Overall, the total sockeye salmon run

[1] Product and company names used in this publication are included for completeness but do not constitute an endorsement. The Alaska Department of Fish and Game does not endorse or recommend any specific company or their products.

(6.6 million) was 7% above the preseason forecast, and the run was 1 day early (Dupuis and Willette 2014).

In 2013, the preseason forecast for the total UCI sockeye salmon run (6.7 million) was above average with an above average Kenai (4,374,000) forecast, and below average Kasilof (903,000) and Susitna (363,000) forecasts (Eggers et al. 2013). On July 24, Division of Commercial Fisheries staff estimated the total Kenai River sockeye salmon run would range between 3.4 and 3.8 million fish, so fisheries management continued to follow the guidelines for run sizes between 2.3 and 4.6 million fish. The poor performance of the Kenai River late-run Chinook salmon run combined with the above average sockeye salmon run led to an atypical management strategy during late July. On July 23, the Upper Subdistrict set gillnet fishery was closed, because Kenai River late-run Chinook salmon escapement projections indicated the escapement goal would not be achieved. With the Upper Subdistrict set gillnet fishery closed, the department was forced to use the KRSHA and the drift gillnet fishery to control sockeye salmon escapement into the Kenai and Kasilof rivers. The KRSHA was opened for 186 hours between July 21 and August 3 to control Kasilof River sockeye salmon escapement and minimize harvests of Kenai River late-run Chinook salmon. All 6 regularly scheduled drift gillnet fishing periods from July 11 to 29 were restricted to reduce harvests of northern-bound sockeye and coho salmon. The drift gillnet fleet fished in the Expanded Kenai and Expanded Kasilof Corridors for 12 additional days between July 11 and 30 to reduce escapements of Kenai and Kasilof rivers sockeye salmon (Shields and Dupuis 2013b). At the end of the season, the Kasilof River sockeye salmon escapement (489,654) exceeded the upper optimal escapement goal (390,000), and the Kenai River escapement (1,359,893) exceeded the inriver goal range (1,000,000–1,200,000). Overall, the total sockeye salmon run (5.8 million) was 13% below the preseason forecast. In 2013, due to poor weather and mechanical difficulties, no estimate of run timing was made using the southern offshore test fishery, resulting in a lack of sampling during critical periods (Dupuis et al. 2015).

OBJECTIVES

(1) Collect sockeye salmon tissue samples for genetic analysis throughout the 2012 and 2013 fishing seasons from the UCI commercial drift and set gillnet fisheries.

(2) Subsample tissues in proportion to catch within spatial and temporal strata.

(3) Analyze selected tissues for 96 single nucleotide polymorphism markers.

(4) Estimate stock proportions of sockeye salmon for each stratum.

(5) Estimate stock-specific harvest of sockeye salmon for each stratum and for combined strata.

METHODS

TISSUE SAMPLING

Tissue Handling

Tissue samples for genetic analysis were collected from sockeye salmon caught in the commercial catch without regard to size, sex, or condition following the methods outlined in Barclay et al. (2010a). Briefly, an axillary process was excised from individual fish and placed in ethanol in either an individually labeled 2 ml plastic vial or a single well in a 48 deep-well plate. For data continuity, tissue samples were paired with age, sex, and length information collected

from each fish. These data were collated and archived by Division of Commercial Fisheries staff at ADF&G's office in Soldotna.

Commercial Drift and Set Gillnet Fisheries

Field sampling

Commercial fishery harvests in 2012 and 2013 were sampled using the same stratified, systematic sampling design used for the 2009–2011 harvests (Barclay et al. 2010b, 2013, 2014). Area strata were determined *a priori* using established fishery districts and subdistricts (Table 2). Temporal stratification was determined postseason to best represent the harvest, based on catch patterns in each fishery and the number of samples collected. Because samples could not be collected each day, samples collected on individual days were often used to represent harvests over several adjacent days (Table 2). In general, samples collected from a given area were only used to represent harvests within about 1 week of the sampling date. For each area, the first and last temporal strata were sometimes several days long (Table 2) because harvests were low and either building or tapering off during these periods (Shields and Dupuis 2013a, 2013b). Samples representing these strata were generally collected during peak harvests within each stratum, which typically occurred near the end of the first stratum or beginning of the last stratum. Drift and set gillnet harvests were oversampled in proportion to expected harvest to allow for composite samples to be constructed in proportion to actual harvest postseason. Sampling was conducted over 7 weeks in both years (Table 2).

2012 and 2013 drift gillnet sampling

In general, sampling methods followed those used for the 2010 harvest (Barclay et al. 2010b). Sampling was conducted in proportion to expected daily harvest, and samples were collected from as many boats as possible throughout the delivery period for each fishery opening at 1 or more processors located in the Kenai/Kasilof area and from Icicle Seafoods tenders. The proportion of the catch to sample from each boat was estimated based on the number of boats expected to deliver at each processor and their expected average catch estimated by the processor. Temporal strata were identified postseason, and composite random samples were constructed in proportion to the actual substratum (fishery/processor) harvests. Many different area restrictions were in effect during these harvest periods (Table 2).

2012 and 2013 set gillnet sampling

Two management areas, called the Kenai/East Foreland (Kenai/EF) and Kasilof sections, were sampled in the Upper Subdistrict set gillnet fishery. These 2 management areas were established in the 1990s to provide for separate management of sockeye salmon escapements into the Kenai and Kasilof rivers, if necessary. The Kenai/EF sections are composed of the North Kalifornsky (North K.) Beach and North and South Salamatof statistical areas, and the Kasilof section is composed of the Ninilchik, Cohoe, and South Kalifornsky (South K.) Beach statistical areas (Figure 2).

Sampling methods for the Upper, Western, and Kalgin subdistricts (Central District) and Eastern Subdistrict (Northern District) follow methods used for the 2009 harvest (Barclay et al. (2010b). Upper Subdistrict (Central District) set gillnet harvests were oversampled to allow composite random samples to be constructed postseason in proportion to actual harvest. We determined substratum sample sizes based on the largest proportion of catch observed in each substratum over the last 5 years. Genetic samples were randomly collected at buying stations near the beaches and at processors. Crews attempted to sample from all the buying stations twice during a

period, obtaining half their sample after the high tide and half after the low tide. Postseason, random samples (n = 400) were constructed for the Kasilof and Kenai/EF sections in proportion to the actual harvests in each subsection/period. Samples taken within the Upper Subdistrict set gillnet fishery were analyzed 2 ways. First, samples were partitioned by section (Kenai/EF and Kasilof) that would represent the total season harvest for each year. Second, the samples were partitioned by subsection (Cohoe/Ninilchik and South K. Beach, North K. Beach, and North/South Salamatof).

Western and Kalgin Island subdistrict harvests were sampled after each period, when possible. Samples were collected at Kenai Peninsula processors from tenders that deliver fish from these 2 subdistricts. Goals of 48 to 96 fish were set for each sampling period based on the timing of historical harvests, with the objective of sampling enough fish in each sampling period to construct a sample of 400 fish postseason (weighted by the actual harvest in each period) that would represent the total season harvest for each year.

Eastern Subdistrict (Northern District) harvests were delivered mainly to the Pacific Star processing plant in Nikiski. Genetic samples were taken from harvests each period when possible. Goals were set based on timing of historical harvests and observations of number of fish harvested on the sample period date.

In 2012, General Subdistrict (Northern District) samples were collected in Anchorage at the Ship Creek dock and from Copper River Seafood's processing plant where fish from statistical areas 247-41, 247-42, and 247-43 were usually delivered (Figure 2). Tender deliveries, historically made to Kenai Peninsula processors, representing statistical areas 247-10, 247-20, and 247-30 (Figure 2), were discontinued early in the season due to mechanical difficulties. As a result, sampling crews were not able to obtain samples from the southwestern statistical areas. In 2013, only 174 samples were collected from Snug Harbor in Kenai and Favco in Anchorage due to logistical reasons; these samples represented harvest from southwestern statistical areas (247-10, 247-20, and 247-30).

Drift gillnet subsampling for analysis

Composite samples were constructed from subsamples collected at 1 or more processors located in the Kenai/Kasilof area and from Icicle Seafoods tenders. Temporal strata were identified postseason, and composite random samples were constructed in proportion to the actual substratum (fishery/processor) harvests with a stratum goal of 400 fish. Fishery restrictions were incorporated into defining temporal strata. In 2012, enough samples were collected from the Expanded Kenai and Kasilof sections to construct a separate expanded corridor-only, harvest-proportional sample of 400 fish (Shields and Dupuis 2012).

In 2013, samples taken within the Central District drift gillnet fishery were analyzed in 2 ways. First, a single harvest-proportional sample (n = 400) was constructed to represent drift gillnet harvests (excluding corridor-only periods; June 20 to August 15). Enough samples were collected from the Expanded Kenai and Kasilof sections in 2013 to construct a separate harvest-proportional sample of 300 fish representing expanded corridor-only harvests from July 11 to July 30. An additional expanded corridor sample of 400 fish was constructed to compare the expanded corridor harvest on July 11 to the districtwide drift gillnet harvest on July 8 (genetic mixture sample, n = 400) This second analysis was conducted to provide for a more direct comparison of stock compositions between expanded corridor and districtwide harvests during a relative short time period. Some of the samples in these 2 mixtures were also included in the 2

harvest-proportional mixtures representing noncorridor and corridor-only drift gillnet harvests (Table 2).

Set gillnet subsampling for analysis

Samples taken in 2012 and 2013 within the Upper Subdistrict set gillnet fishery were analyzed 2 different ways. First, samples were partitioned by section (Kenai/EF and Kasilof) and time. Postseason, random samples (n = 400) were constructed for the Kasilof and Kenai/EF sections in proportion to the actual harvests in each subsection/period. Secondly, the samples were partitioned by subsection (Cohoe/Ninilchik and South K. Beach, North K. Beach, and North/South Salamatof).

For the Western, Kalgin Island, and Eastern subdistricts in 2012 and 2013, sockeye salmon were subsampled to construct a sample of 400 fish postseason (weighted by the actual harvest in each period) that would represent the majority of the season harvest (Western and Eastern subdistricts) or the total season harvest (Kalgin Island Subdistrict).

For the General Subdistrict in 2012, a sample of 250 was constructed to represent the northern area of the General Subdistrict from July 12 to August 6 (Table 2). In 2013, all 174 samples collected on July 4 and July 18 were used to represent the southern area of the General Subdistrict.

LABORATORY ANALYSIS

Assaying Genotypes

Genomic DNA was extracted following the methods of Barclay and Habicht (2012) using DNeasy 96 Tissue Kits by QIAGEN (Valencia, CA). All baseline and commercial fishery samples were screened for 96 sockeye salmon SNP markers (3 mitochondrial and 93 nuclear DNA) following the methods of Barclay and Habicht (2012).

Laboratory Failure Rates and Quality Control

Genotyping failure rate calculations and quality control measures follow those reported in Barclay et al. (2010a), where they report results for a representative set of baseline collections. Briefly, 8% of all individuals were re-extracted and genotyped from all collections. Here we report on the failure rates and quality control measures for the 2012 and 2013 commercial fishery samples.

STATISTICAL ANALYSIS

Data Retrieval and Quality Control

Methods for data retrieval and quality control are reported in Barclay et al. (2010a). In that report 2 quality control analyses were used. In the first analysis, referred to as the *80% rule*, a threshold of 80% scorable markers per individual was established and all individuals that did not meet this threshold were excluded from MSA. This rule was used to filter samples with poor quality DNA and missing data from analyses to decrease errors and reduce estimate variances. In the second analysis, individual sharing alleles at least 95% of loci were identified and the sample with the most missing genotypic data was removed. This rule is used to filter out duplicate fish samples. Both of these analyses were conducted for the 2012 and 2013 mixture individuals.

Mixed Stock Analysis

We estimated the stock composition of all commercial fishery mixtures using the same BAYES protocol as reported in Barclay and Habicht (2012) for the baseline evaluation tests, except for defining the informative Dirichlet priors and analysis of mixtures with nonconverging chains. Informative Dirichlet priors were defined using a similar *step-wise* prior protocol as reported in Barclay et al. (2010a) except, for the first time stratum within a fishery for each year, the prior parameters were the posterior means from the first period of the same fishery from the previous year (Barclay et al. 2010b; Table 3). For fisheries represented by only one stratum, the prior parameters were the average of the posterior means from all strata from the previous year of the same fishery. When estimates were not available from the previous year for a given fishery area, prior parameters were the posterior means from the most recent year where estimates were available for the same fishery area.

We assessed the within- and among-chain convergence of these estimates in BAYES using the Raftery-Lewis (within-chain) diagnostic and Gelman-Rubin (among-chain) shrink factor. These compare variation of estimates among iterations within a chain (Raftery and Lewis 1996) and within-chain variation to the total variation among chains (Gelman and Rubin 1992). If a shrink factor for any stock group estimate was greater than 1.2 and Raftery-Lewis estimate suggested a chain had not converged to stable estimates, we reanalyzed the mixture with 80,000-iteration chains following the same protocol (initial analysis used 40,000 iterations). If the chains still failed to converge, we did not report the estimates. Patterns in stock composition estimates across strata were considered significant only if the credibility intervals did not overlap with other estimates (Mukhopadhyay 2000).

Total Stock-Specific Harvest of Sampled Strata

Methods for applying stock composition estimates to catch to calculate total stock-specific harvest of sampled strata are the same as reported in Barclay et al. (2010a).

RESULTS

TISSUE SAMPLING

Commercial Drift and Set Gillnet Fisheries

Field sampling

Tissues suitable for genetic analysis were sampled from 11,250 sockeye salmon in 2012 and 13,514 sockeye salmon in 2013, all from commercial catches throughout the UCI Central and Northern districts (area strata). These fish represented 162 individual collections (Table 2).

Drift gillnet subsampling for analysis

A total of 6 composite random samples of 400 fish each were constructed representing over 99% of the drift gillnet fishery total season harvest in 2012 and 2 composite random samples of 400 fish each were constructed representing over 99% of the drift gillnet fishery total season harvest in 2013 (Table 2). Two additional mixtures of 400 fish were constructed to represent districtwide and expanded corridor-only harvest periods by selecting samples from July 8, 2013 (districtwide; n = 322), and July 11, 2013 (expanded corridor-only; n = 208), and combining them with samples selected for the total season harvest analysis from the same days (Tables 2 and 4). These mixtures, which were not in proportion to harvest, were constructed for a direct comparison of

stock composition estimates between a day of districtwide harvest and a day restricted to expanded corridor harvest.

Set gillnet subsampling for analysis

Composite random samples of 400 fish were constructed for both the Kenai/EF and Kasilof sections, representing the total Upper Subdistrict season harvest in 2012 and 2013 (Table 2). Partitioning of these samples by subsection resulted in samples sizes of 244 (Cohoe/Ninilchik), 154 (South K. Beach), 30 (North K. Beach), and 270 (North/South Salamatof) fish for 2012, and 305 (Cohoe/Ninilchik), 94 (South K. Beach), 100 (North K. Beach), and 296 (North/South Salamatof) fish for 2013 (Table 5). Due to the low sample size from the North K. Beach subsection in 2012 (30), North K. Beach was excluded from the 2012 subsection analysis.

Composite random samples of 400 fish were constructed for Kalgin Island, Western, and Eastern subdistricts set gillnet fisheries for each year representing 100% (Kalgin Island), 100% (Western), and 91% (Eastern) of the total season harvests in 2012, and 99% (Kalgin Island), 98% (Western), and 94% (Eastern) of the total season harvests in 2013 (Table 2).

For the General Subdistrict set gillnet fishery, a composite random sample of 250 fish was constructed representing 48% of General Subdistrict (north) season harvests in 2012 and a composite sample of 174 fish was constructed representing 78% of General Subdistrict (south) season harvests in 2013. Samples were not available to represent harvests in the General Subdistrict (south) in 2012 and the General Subdistrict (north) in 2013.

LABORATORY ANALYSIS

Laboratory Failure Rates and Quality Control

A total of 4,550 fish from the 2012 collections and 3,404 fish from the 2013 collections were genotyped. Failure rates among collections ranged from 0.49% to 1.81% for 2012 collections and from 1.08% to 2.79% for 2013 collections. Discrepancy rates were uniformly low and ranged from 0.00% to 0.45% for 2012 collections and from 0.06% to 1.35% for 2013 collections. Assuming equal error rates in the original and the quality control analyses, estimated error rates in the samples is half of the discrepancy rate (0.00–0.22% for 2012; 0.03–0.67% for 2013).

STATISTICAL ANALYSIS

Data Retrieval and Quality Control

Data retrieval and quality control results for the baseline collections are reported in Barclay and Habicht (2012). Based upon the 80% rule, and before stock composition estimates were calculated, 0.24% of individuals were removed from the 2012 collections and 0.70% of individuals were removed from the 2013 collections. Based on the criterion for detecting duplicate individuals, and before stock composition estimates were calculated, 13 fish were removed from the 2012 collections and 1 fish was removed from the 2013 collections.

Mixed Stock Analysis

A total of 7,954 fish were genotyped from the 162 collections captured in 2012 and 2013. This resulted in 12 mixtures for 2012 and 6 mixtures for 2013 for which stock composition and stock-specific harvest were estimated, and 2 additional mixtures of 400 from 2013 for which only stock composition was estimated (Tables 2 and 4). These mixtures had sample sizes ranging between

174 and 400 fish. In the reanalysis of the data by subsection for the Kenai/EF sections and Kasilof Section set gillnet fisheries (Central District, Upper Subdistrict), the 7 mixtures had sample sizes ranging between 94 and 305 fish. No mixture was analyzed for the 2012 N. K Beach subsection due to low sample size (n = 30).

Central District

Drift gillnet

For the 2012 Central District drift gillnet fishery (excluding corridor-only periods), we analyzed samples representing harvests from June 21 to August 6 (Table 2). We observed a pattern of increasing contribution of *Kenai* (range: 59.2–92.0%) and a decreasing contribution of *Kasilof* (range: 1.5–13.3%) across the 5 temporal strata (Figure 6; Appendix A1). The contribution of *West* had a similar pattern to *Kasilof* (range: 2.6–15.6%); however, it increased slightly in the last period (July 26–August 6; 3.8%). Throughout the season, contributions from the remaining reporting groups did not exceeded 4%.

For 2013, we analyzed a single mixture of samples representing the Central District drift gillnet fishery (excluding corridor-only periods) from June 20 to August 15 (Figure 6; Appendix A1). *Kenai* harvest was dominant (78.0%) with *West* (7.4%), *Kasilof* (6.0%), *JCL* (5.2%), *SusYen* (1.9%), and *KTNE* (1.0%) being the next largest contributors. The contributions of *Crescent* and *Fish* were less than 1%.

For the Central District drift gillnet fishery (expanded corridor-only periods), we analyzed samples representing harvest in 2012 from July 9 to July 31, and in 2013 from July 11 to July 30 (Table 2). Each period represented the entire harvest for the respective year for corridor-only periods. There were no periods in 2012 where the drift gillnet fishery was restricted to only the narrow corridor (Kenai and Kasilof sections). In both years, the *Kenai* harvest was dominant (2012, 88.1%; 2013, 77.2%; Figure 6; Appendix A2). In 2012, *Kasilof* (4.2%) was the next largest contributor with the remaining groups contributing less than 3% each. In 2013, similar contributions were observed for *SusYen* (5.3%), *JCL* (5.0%), *Kasilof* (4.9%), and *West* (4.4%), with the remaining groups contributed less than 3% each.

When comparing the point estimates for mixtures representing July 11 corridor-only and July 8 districtwide, we observed higher contributions of *Kenai* and *Kasilof* in the corridor-only sample and higher contributions of northern and western Cook Inlet stocks in the districtwide sample (Table 4). The contributions of *JCL* (8.3% vs. 6.2%) and *SusYen* (5.5% vs. 3.1%) had the biggest decrease from the districtwide to corridor-only with both stocks decreasing over 2.1%. The contributions of *Crescent* (1.3% vs. 0.0%) decreased by 1.3%, *KTNE* (2.0% vs. 0.3%) decreased by 1.7%, and *West* (4.5% vs. 4.1%) decreased by 0.4%. *Kenai* (71.8% vs. 76.8%) and *Kasilof* (6.4% vs. 8.6%) had the biggest increase from the districtwide to the corridor-only mixtures at 5.0% for *Kenai* and 2.2% for *Kasilof*. The contribution of *Fish* increased slightly from the districtwide (0.3%) to corridor-only (0.9%). All but 2 reporting groups (*Crescent* and *KTNE*) had overlapping credibility intervals between mixtures; therefore, differences between the point estimates for these groups are not significant (see MSA methods).

Set gillnet

For the Upper Subdistrict set gillnet fishery, Kasilof section, we analyzed samples representing the harvest in 2012 from July 3 to August 13, and in 2013 from June 27 to July 23 (Table 2; Appendix A3). In both years, *Kasilof* (57.1%, 2012; 40.6%, 2013) and *Kenai* (37.2%, 2012;

52.9%, 2013) dominated the harvest; estimates for the remaining reporting groups did not exceed 3.4%.

For the Upper Subdistrict set gillnet fishery, Kenai/EF sections, we analyzed samples representing harvest in 2012 from July 16 to August 13, and in 2013 from July 8 to July 23 (Table 2; Appendix A4). *Kenai* dominated the harvest in both years at 69.6% in 2012 and 72.4% in 2013. *Kasilof* was the next largest contributor in both years at 13.0% in 2012 and 11.0% in 2013. The combined contribution of Susitna and Yentna rivers stocks *JCL* and *SusYen* was similar for both years at 8.9% in 2012 and 9.6% in 2013. The contribution of *KTNE* was also similar between years at 5.6% in 2012 and 6.6% in 2013. The remaining reporting groups did not exceed 2.5% in either year.

For the Upper Subdistrict set gillnet fishery, by subsection, we observed a pattern of generally increasing contributions of *Kenai* from south to north for both years (Table 5; Figure 7). However, in 2012, the percentage of *Kenai* was smaller and the percentage of *Kasilof* was larger in the South K. Beach subsection than in the Cohoe/Ninilchik subsection. In both years, larger proportions of *Kenai* fish were harvested in subsections bordering the Kenai River mouth (North K. Beach and North/South Salamatof). In the subsections that border the Kasilof River, however, more *Kasilof* fish were harvested in the South K. Beach subsection, and more *Kenai* fish were captured in the Cohoe/Ninilchik subsection. The most southerly (Cohoe/Ninilchik) and northerly (North/South Salamatof) subsections contained higher contributions of non-*Kenai* and non-*Kasilof* fish in 2013; however, in 2012, the South K. Beach section had a slightly higher contribution of non-*Kenai* and non-*Kasilof* fish (5.7%) than the most southerly subsection (Cohoe/Ninilchik). In 2012, we observed a 4.2% combined contribution of all other groups in the most southern subsections, and a 19.3% combined contribution in the most northern subsections. In 2013, we observed a 7.9% combined contribution of all other groups in the most southern subsections, and a 22.7% combined contribution of all other groups in the most northern subsections.

For the Kalgin Island Subdistrict set gillnet fishery, we analyzed samples representing harvests in 2012 from June 1 to August 16, and in 2013 from June 3 to August 19 (Table 2; Appendix A5). For both years, *Kenai* and *West* were the dominant reporting groups; however, in 2012 their contributions were more similar to each other (50.2%, *Kenai*; 42.3%, *West*) than in 2013 (15.5%, *Kenai*; 63.9% *West*). In 2012, the next largest contributors were *Kasilof* (5.0%), *Crescent* (1.1%) and *SusYen* (1.1%). In 2013, the next largest contributors were *Kasilof* (9.8%) and *Crescent* (9.8%). The combined contribution of all other reporting groups did not exceed 1% in both years.

For the Western Subdistrict set gillnet fishery, we analyzed samples representing harvest in 2012 from June 18 to August 20, and in 2013 from June 17 to August 1 (Table 2; Appendix A6). In both years, the majority of the contributions were from *Crescent* and *West*, with *Kenai* and *Kasilof* having significant contributions in 2013. In 2012, the contributions were 72.5% for *Crescent*, 25.3% for *West*, and 1.9% for *Kenai*, with each of the remaining groups contributing less than 1%. In 2013, the contributions were 44.4% for *Crescent*, 31.8% for *West*, 14.0% for *Kenai*, and 9.7% for *Kasilof*, with each of the remaining groups contributing less than 1%.

Northern District

Set gillnet

For the Eastern Subdistrict set gillnet fishery, we analyzed samples representing harvest in 2012 from July 2 to August 13, and in 2013 from June 24 to August 22 (Table 2; Appendix A7). In

both years, northern and western stocks *West, JCL, SusYen, Fish,* and *KTNE* made up the largest component of the harvest with a combined contribution of 59.5% in 2012 and 85.4% in 2013. *Kenai* (33.7%) and *Kasilof* (6.8%) were a larger component of the harvest in 2012, and were a smaller component of the harvest in 2013 (*Kenai,* 12.7%; *Kasilof,* 1.9%). *Crescent* contributed less than 1% to the harvest in both years.

For the General Subdistrict set gillnet fishery, we analyzed samples representing the harvest from the northern harvest area in 2012 from July 12 to August 16, and we analyzed samples representing the harvest from the southern harvest area in 2013 from July 4 to August 18 (Table 2; Appendix A8). In 2012, *KTNE* (38.9%), *Fish* (36.2%), and *SusYen* (12.0%) made up the largest portion of the harvest, with *West* (6.2%) and *JCL* (5.2%) as the next largest contributors. The combined contribution of *Kenai, Kasilof,* and *Crescent* was less than 2%. In 2013, *West* (54.0%), *JCL* (25.2%) and *SusYen* (19.4%) were the largest contributors, followed by *KTNE* (1.3%), and the combined contribution of all remaining reporting groups was less than 1%.

Total Stock-Specific Harvest of Sampled Strata

As expected, the stratified estimates for combined temporal strata within years produced the same point estimates of harvest as the summed individual time strata in 2012 and 2013, but with narrower credibility intervals (Tables 6 and 7). The relative error, as measured by credibility intervals, was smaller for stocks with large harvest estimates (see *Kenai* and *Kasilof*, 2012 and 2013) and greater for small harvest estimates (*Fish* and *Crescent*, 2012 and 2013; Table 7).

Central District

Drift gillnet (excluding corridor-only periods)

Over 99% of the Central District drift gillnet harvest (excluding corridor-only periods) was represented by MSA samples in both 2012 and 2013 (Tables 2 and 6). In 2012, for the represented strata, harvest was greatest for *Kenai* (1,926,357 fish), followed by the combined harvest of Susitna and Yentna rivers stocks (*SusYen* and *JCL*, 142,250 fish), *Kasilof* (106,619 fish), the combined harvest of western stocks (*Crescent* and *West*, 100,455 fish). The combined harvest of *Fish* and *KTNE* made up the remainder of the harvest (46,532 fish). In 2013, harvest was also greatest for *Kenai* (1,024,597 fish), followed by the combined harvest of western stocks (*Crescent* and *West*, 103,845 fish), the combined harvest of Susitna and Yentna rivers stocks (*SusYen* and *JCL*, 93,449 fish), and *Kasilof* (78,499 fish). The combined harvest of *Fish* and *KTNE* made up the remainder of the harvest (13,485 fish).

Drift gillnet (corridor-only periods)

In 2012 and 2013, roughly 20% of the Central District drift gillnet harvest was from corridor-only periods (Table 2 and 6). In 2012, over 100% of corridor-only harvest was represented by MSA samples, and in 2013 over 96% was represented by MSA samples. In both 2012 and 2013, *Kenai* was the dominant stock, with a harvest of 498,368 fish in 2012 and 256,932 fish in 2013 (Table 6). The next largest harvest was of Susitna and Yentna rivers stocks (*SusYen* and *JCL*) at 27,969 fish (2012) and 34,295 fish (2013), followed by *Kasilof* at 23,735 fish (2012) and 16,460 fish (2013), and the combined harvest of western stocks (*West* and *Crescent*) at 11,014 fish (2012) and 14,557 fish (2013). The combined harvest of *Fish* and *KTNE* made up the remainder of the harvest with 4,842 (2012) and 10,768) fish (2013).

Upper Subdistrict set gillnet

All of the Upper Subdistrict set gillnet (Central District) harvest was represented by MSA samples (Tables 2 and 6). In 2012 and 2013, harvests were greatest for *Kenai* with 56,472 fish in 2012 and 522,735 fish in 2013, and *Kasilof* with 25,060 fish in 2012 and 233,650 fish in 2013 (Table 6). The combined harvest of the Susitna and Yentna rivers stocks (*SusYen* and *JCL*) was the next largest at 6,218 fish in 2012 and 54,502 fish in 2013, followed by the combined harvest *Fish* and *KTNE* at 5,537 fish in 2012 and 29,630 fish in 2013. The combined harvest of western stocks (*West* and *Crescent*) made up the remainder of the harvest at 1,346 fish in 2012 and 8,944 fish in 2013.

Western and Kalgin Island subdistricts set gillnet

All of the Western and Kalgin Island subdistricts set gillnet harvest was represented by MSA samples in 2012, and in 2013 over 99% were represented by MSA samples (Tables 2 and 6). In the represented strata, the combined harvest of western stocks (*Crescent* and *West*) was greatest at 56,223 fish in 2012 and 53,767 fish in 2013 (Table 6). The next largest harvest was for *Kenai* at 29,269 fish in 2012 and 10,712 fish in 2013, followed by *Kasilof* at 2,942 fish in 2012 and 7,032 fish in 2013. The combined harvest of all northern stocks, (*SusYen*, *JCL*, *Fish*, and *KTNE*) made up the remainder of the harvest with 806 fish in 2012 and 446 fish in 2013.

Northern District

Eastern and General subdistricts set gillnet

Over 69% of the Eastern and General subdistricts set gillnet harvest was represented by MSA samples in 2012 and over 76% of harvest was represented in 2013 (Tables 2 and 6). In represented strata, northern stocks (*JCL*, *SusYen*, *Fish*, and *KTNE*) accounted for 7,221 fish in 2012 and 9,529 fish in 2013 (Table 6). In 2012 the combined harvest of *Kenai* and *Kasilof* was next largest at 3,689 fish, followed by the combined harvest of western stocks (*Crescent* and *West*) at 1,281 fish. In 2013, the combined harvest of western stocks (*Crescent* and *West*) was the next largest at 6,868 fish, followed by the combined harvest of *Kenai* and *Kasilof* at 1,520 fish.

All strata combined

In both 2012 and 2013, over 99% of total commercial harvest was represented by MSA samples (Table 7; Figure 8). In the represented strata for both years, harvest estimates were greatest for *Kenai* at 2,513,544 fish in 2012 and 1,816,297 fish in 2013, followed by *Kasilof* at 158,968 fish in 2012 and 335,839 fish in 2013. The combined harvest of northern stocks (*JCL*, *SusYen*, *Fish*, and *KTNE*) was the next largest at 241,376 fish in 2012 and 246,105 fish in 2013. The combined harvest of western stocks (*Crescent* and *West*) made up the remainder of the harvest at 170,318 fish in 2012 and 187,982 fish in 2013.

DISCUSSION

This report used genetic data from a previously reported sockeye salmon baseline (Barclay and Habicht 2012) and samples collected during selected periods of the Central and Northern Cook Inlet district commercial fisheries in 2012 and 2013 to estimate the stock composition of the harvests. Here we report on the evaluation of results from harvest sampling for 2012 and 2013 looking at temporal and spatial distributions of stocks in the harvests.

PATTERNS IN FISHERY STOCK COMPOSITIONS AND HARVESTS

Temporal Patterns in the Central District Drift Gillnet Fishery

As in past years, the distribution of stock-specific harvests across fisheries varied (Barclay et al. 2010a, 2010b, 2013, 2014). In 2012 and 2013, the largest harvests of *Kenai* sockeye salmon occurred in the drift gillnet fishery (Table 6). In 2012, the largest harvests of *Kasilof* sockeye salmon occurred in the drift gillnet fishery, most likely due to the severe restrictions on the set gillnet fishery that summer (Shields and Dupuis 2013a). In 2013, the largest harvests of *Kasilof* fish were in the set gillnet fishery, with the majority of *Kasilof* fish harvested in the Kasilof Section (Table 6; Appendix A3). In both years, the largest harvests of Susitna and Yentna river (*SusYen* and *JCL*) sockeye salmon occurred in the drift gillnet fishery (excluding corridor-only periods; Table 6). Management actions and interannual differences in run strengths appear to explain differing patterns in stock specific harvests across space and time between the 2 years.

Temporal patterns within the Central District drift gillnet fishery in 2012 were similar to those observed in previous years, including an increase in the contribution of *Kenai* and a corresponding decrease of *Kasilof* sockeye salmon in drift gillnet fishery harvests (excluding corridor-only periods) during the season (Appendix A1). The estimated peak harvest date of July 19–21 for *Kenai* sockeye salmon was similar to 2011 but slightly later than observations in 2009 and 2010, when peak harvests of *Kenai* sockeye salmon were July 13–16 (2009) and July 12 (2010). This corresponds to the postseason analysis of run timing for the total UCI run being 2 to 9 days late (Dupuis and Willette 2014). In 2013, no temporal analyses were performed; *Kenai* (78%) was the dominant stock for the entire season's harvest, followed by *West* (7.4%), *Kasilof* (6.0%) and the Susitna and Yentna rivers sockeye salmon stocks (7.1% combined). No estimate of run timing relative to historic means was made in 2013 due to poor weather and mechanical difficulties resulting in a lack of test fishery sampling during critical periods (Dupuis et al. 2015).

Spatial Patterns in the Central District Drift Gillnet Fishery

In 2013, a districtwide fishery on July 8 and an expanded corridor fishery on July 11 were sampled to compare stock compositions between these 2 areas. *Kenai* and *Kasilof* sockeye salmon comprised a higher proportion of the harvest in the expanded corridor fishery (85.4%) than in the districtwide fishery (78.1%), but the stock proportions of *Kenai* and *Kasilof* between the 2 areas were not significantly different based on overlapping 90% credibility intervals (Table 4). Since the expanded corridor was established in part to reduce harvests of Susitna River sockeye salmon, it is noteworthy that the *JCL* and *SusYen* stocks made up 13.8% of the districtwide harvest and 9.3% of the expanded corridor harvest (Table 4); however, these stock proportions were not statistically significantly different.

Patterns in the Central District Set Gillnet Fisheries

Unlike analyses from 2006 to 2011, no temporal analyses were performed in set gillnet fisheries in 2012 or 2013 in order to redirect funding toward the analyses of pre-2006 collections (see last section in the Discussion). For all these fisheries, we analyzed sets of fish that represented the catch over the entire year. As a result, we can only compare spatial patterns across these fisheries with previous years.

In 2012 and 2013, the Upper Subdistrict (Central District) set gillnet fishery harvested predominantly *Kasilof* fish in the Kasilof Section and *Kenai* fish in the Kenai/EF sections.

Consistent with previous findings, (Barclay et al. 2010b, 2013, 2014), most of the catch of the Upper Subdistrict were composed of either *Kenai* or *Kasilof* fish (Figure 6; Appendices A3 and A4).

We observed higher contributions of non-*Kenai* and non-*Kasilof* stocks in subsections farthest from the Kenai and Kasilof rivers mouths, which was consistent with previous years (Barclay et al. 2010b, 2013, 2014). However, in 2012 South K. Beach had a large portion of *West* (4.6%) fish, and in 2013 South K. Beach had a larger portion of *Kenai* than *Kasilof* fish—which has not occurred in any previous year of genetic stock identification analysis by subsection. The occurrence of non-*Kasilof* sockeye salmon in this area is likely affected by the occurrence of strong onshore winds and the timing of fishery openings (Shields and Dupuis 2013a).

This report does not provide stock composition estimates separately in either 2012 or 2013 for both the northern and southern areas of the General Subdistrict set gillnet fishery, so a comparison to patterns between these area of the General Subdistrict set gillnet fishery cannot be made between each years (Northern District; Figure 2; Appendix A8). However, comparisons can be made with estimates from the 2009 and 2010 harvests where both areas of the General Subdistrict were represented in each year (Barclay et al. 2010b, 2013). Stock composition estimates from the northern area in 2012 and the southern area in 2013 are congruent with the patterns observed 2009 and 2010, where *KTNE* and *Fish* were the largest contributors to the harvest in the northern area and *West*, *JCL*, and *SusYen* were the largest contributors to the harvest in the southern area.

In 2012, we observed below average harvest in *Crescent*, *Fish*, *KTNE*, and *Kasilof* when comparing overall harvest in the UCI fishery with the 7 previous years (Table 7; Figure 8). Of these stocks with below average harvest, *Fish* and *Kasilof* were well below their respective 7-year averages, and *Kasilof* was the smallest of all prior years. The lower harvest of *Kasilof* fish corresponds with the unusually heavy restrictions placed on the Upper Subdistrict set gillnet fishery due to the low abundance of Kenai River Chinook salmon, and the lower than average harvest of *Fish* is consistent with smaller escapement of sockeye salmon to Fish Creek in 2012 (Shields and Dupuis 2013a). In stocks with above average harvest, the *JCL* was well above average by 27,673 fish, *SusYen* by 24,730 fish, and *Kenai* by 659,660 fish. *Kenai* had its second largest harvest since 2005, which corresponds with reported record returns to the Kenai River in 2012 (Shields and Dupuis 2013a.) *JCL* and *SusYen* had the third largest harvest in the past 7 years, larger than harvests from 2008 to 2010.

In 2013, we observed both above and below average harvests when comparing overall harvest in the UCI fishery with the 8 previous years (Table 7; Figure 8). In stocks with below average harvest, *Fish* and *Kasilof* harvests remained well below their 8-year average. The estimated harvest of *Kasilof* was the smallest of all prior years except 2012, corresponding with continuing constraints on the set gillnet fishery (Shields and Dupuis 2013b). In stocks with above average harvest, the Susitna and Yentna rivers (*JCL*, *SusYen*) were well above average.

RELATIVE ERRORS ACROSS STOCKS

As expected, relative errors of stock-specific harvest estimates in mixtures were generally smaller for stocks with large contributions and were larger for stocks with low contributions (Tables 6 and 7). For example, a stock composition estimate of 4% with a credibility interval of ±2% represents a relative error of ±50%, whereas a stock composition estimate of 80% with the same credibility interval represents a relative error of ±2.5%. This affected estimates for the

northern stocks (*JCL, SusYen, Fish, KTNE*) and one western stock (*Crescent*) that generally had small contributions to UCI fishery mixtures.

As reported in Barclay et al. (2010a), relative errors of stock-specific harvest estimates were generally greater for individual fishery estimates (Table 6) and lower for pooled annual totals (Table 7). For example, the relative error of *Kenai* harvest estimates for individual fisheries was 2% in 2012 and 23% in 2013 (Table 6), and the relative error for total harvest was 2% in 2012 and 3% in 2013 (Table 7). Similar patterns can be seen when examining the relative errors of harvest estimates for other stocks. In 2012 and 2013, relative error rates in the total commercial harvest were comparable to previous years for most stocks, except in cases where the mean harvest of a particular stock was unusually low.

ACCOUNTING FOR UNSAMPLED AND UNREPRESENTED STRATA

Despite efforts to sample all strata, a small number of strata were not sampled due to logistical reasons or because the strata represented small harvests. The strata not sampled in 2012 and 2013 due to logistical reasons represented extremely small harvests: less than 1% of the total harvest (Table 6). This is in contrast to the unsampled strata from 2005 to 2008 where the unsampled fractions of the total harvest were 23% (2005), 10% (2006), 5% (2007), and 6% (2008; Barclay et al. 2010a). It is similar to the unsampled fraction from 2009, which was less than 1% of the harvest (Barclay et al. 2010b), and lower than the unsampled fractions in 2010 (1%) and 2011 (3%). Beginning in 2009, unsampled strata became synonymous with the term *unrepresented harvest in analysis*.

Unlike previous years, most of the unrepresented harvest in 2012 was for set gillnet fisheries conducted in the Northern District, Eastern and General subdistricts, with the small remainder from the corridor section of the Central District drift gillnet fishery (Tables 2 and 6). In 2013, harvest from the Central District drift gillnet fishery and the KRSHA set gillnet fishery made up the largest portion unrepresented harvest (Table 2). It is beyond the scope of this report to extrapolate the stock compositions of harvest in sampled strata to harvest in unsampled strata.

APPLICATION OF DATA TO BROOD TABLE REFINEMENT: GOING BACK IN TIME

Stock composition estimates from MSA are improving our understanding of stock productivity as more accurate data are incorporated into brood tables. However, constructing brood tables and estimating stock productivity using these data requires (1) estimating stock composition by age class, (2) estimating stock composition of unsampled harvests, and (3) recognizing that the relative errors of stock composition estimates are correlated with stock size—introducing uncertainty into spawner-recruit analyses for small stocks. Fair et al. (2010) constructed brood tables for the review of Kenai and Kasilof rivers sockeye salmon escapement goals in 2011 using the weighted age composition model beginning with brood year 1969 and MSA estimates of stock-specific harvests from 2006 to 2009. A comparison of MSA and weighted age composition estimates (2006–2009) indicated that historical stock composition estimates and brood tables could not be readily adjusted using contemporary MSA data, and that MSA data for years prior to 2006 would be useful for refining brood tables (Mark Willette, 2010, unpublished data).

In 2014, ADF&G recognized the need for harvest stock composition information predating the initiation of the 2006 Cook Inlet genetic MSA program in order to reconstruct runs to better estimate escapement goals. In order to accomplish this new objective, funding for temporal

analyses of the Central District drift fishery in 2013 and all other fisheries in 2012 and 2013 were redirected to analyses of archived scales, and the legislature allocated additional funds to conduct genetic analyses of the archived scales collected between 1986 and 2005. Adequate funding was retained to estimate annual stock composition in every fishery in 2012 and 2013. Archived scale analyses will be used to develop a run reconstruction model (Cunningham et al. 2012). These results will better estimate stock composition of historical harvests and adjust brood tables. This effort is on track to be completed in 2018.

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TABLES AND FIGURES

Table 1.–Description of fishery restrictions and coordinates (decimal degrees, WGS1984) to corresponding map points and lines in Figures 2–5.

Restriction	Area Common Name	Figure No.	Description (Common Name)	Map Point	Map Line	Latitude	Longitude
1	N/A	N/A	No restrictions				
2	Kasilof (Narrow) Corridor	3	Statistical Area 244-61				
3	Kasilof Expanded Corridor		Statistical Area 244-62				
4	Kenai (Narrow) Corridor	3	Statistical Area 244-51				
5	Kenai Expanded Corridor		Statistical Area 244-52				
6	Area 1	4	Northern boundary (Latitude of the southern point of Kalgin Island)		a	60.3405	
			Southern boundary (Latitude of the Anchor Point light)		b	59.7698	
7	Area 2	4	Southwest point	1		60.3405	–151.9138
			Northwest point	2		60.6847	–151.6500
			Northeast point	3		60.6847	–151.4000
			Eastern midpoint (Blanchard Line corridor boundary)	4		60.4517	–151.4283
			Southeast point	5		60.3405	–151.4758
8	N/A	N/A	Miscellaneous areas representing small catches including; drift Areas 3 and 4 and Chinitna Bay. See Shields (2010).				
9	N/A	N/A	Within 1/2 mile of shore				
10	N/A	2	One set gillnet no more than 35 fathoms in length		c	60.2871	
11	N/A	N/A	Statistical Areas 247-41,42,43				
12	N/A	2	Statistical Areas 247-10,20,30				
13	N/A	2	Fishing with set gillnets in the portion of the Western Subdistrict (Central District) south of the latitude of Redoubt Point (add reference?).				
14	N/A		Two set gillnets no more than 35 fathoms in length				
15	Kasilof River Special Harvest Area	5	Southeast point (inside south beach)	8		60.3765	–151.3389
			Southwest point (outside south end)	9		60.3844	–151.3422
			Northwest point (outside north end)	10		60.4022	–151.3140
			Northeast point (inside north beach)	11		60.4025	–151.2953

Table 2.–Details for sockeye salmon commercial fishery openings in Upper Cook Inlet with corresponding information for tissue sampling for genetic analysis in 2012 and 2013.

Area Strata	Restrictions[a] / Subsection[b]	Date(s) sampled	Harvest on sample date	Represented date(s)	Harvest represented	Mixture date(s)	Sample Size	
							Analyzed	Collected
Central District drift gillnet (excluding corridor-only periods)								
	2012							
	1	6/25	4,512	6/21,6/25	5,129		16	96
	1	6/28	14,817	6/28	14,817	6/21–7/5	53	192
	1	7/2	40,515	7/2	40,515		146	384
	1,2	7/5	51,466	7/5	51,466		185	480
	2,4,6	7/12	135,122	7/12	135,122		84	480
	2,4,6	7/14	211,100	7/14	211,100	7/12–7/16	131	240
	6	7/16	297,083	7/16	297,083		185	480
	1,3,5,6	7/19	614,386	7/19,7/21	1,067,669	7/19,7/21	400	720
	1,3,5	7/23	366,497	7/23	366,497	7/23	400	480
	6,7	7/26	114,519	7/26	114,519	7/26,7/30,	350	480
	1,3,5,6,7	7/30	16,374	7/30,8/2,8/6	18,296	8/2,8/6	50	240
	2			7/3	160		-	-
	1			8/9	268		-	-
	1			8/13	25		-	-
	8			8/16	20		-	-
	8			8/20	12		-	-
	8			8/23	6		-	-
	8			8/30	1		-	-
				Total Harvest	2,322,705			
	2013							
	1	6/20	3,590	6/20	3,590		1	48
	1	6/24	5,828	6/24	5,828		2	144
	1	6/27	13,915	6/27	13,915		5	240
	1	7/1	39,591	7/1	39,591		10	384
	1	7/4	111,293	7/4	111,293		34	480
	1	7/8	253,434	7/8	253,434		78[c]	480
	2,3,4,5,6	7/15	432,662	7/15	432,662		134	528
	3,5,6	7/18	210,531	7/18	210,531	6/20–8/15	63	528
	6	7/22	133,050	7/22	133,050		40	480
	3,5,6	7/25	85,719	7/25	85,719		26	480
	3,5,6	7/29	18,228	7/29	18,228		6	624
	1	8/1	5,482	8/1	5,482		1	474
	1	8/5	190	8/5	190		0	7
	1	8/8	177	8/8	177		0	35
	1	8/12	168	8/12,8/15	185		0	48
	8			8/19	13		-	-
	8			8/22	20		-	-
				Total Harvest	1,313,908			

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Table 2.–Page 2 of 8.

Area Strata	Restrictions[a] / Subsection[b]	Date(s) sampled	Harvest on sample date	Represented date(s)	Harvest represented	Mixture date(s)	Sample Size	
							Analyzed	Collected
Central District drift gillnet (corridor-only)								
	2012							
	3,5	7/9	3,519	7/9	3,519		6	304
	3,5	7/20	143,901	7/17–7/20	366,855		240	240
	3,5	7/22	19,609	7/22	19,609	7/9–7/31	37	144
	3,5	7/25	69,348	7/24,7/25,7/27, 7/28,7/31	175,944		117	240
				Total Harvest	565,927			
	2013							
	2			6/30	1,216		-	-
	2			7/6	11,418		-	-
	3,5	7/11	51,263	7/11,7/13,7/17	207,633		192[d]	480
	3,5	7/19	28,184	7/19,7/20, 7/21,7/23	100,569		94	96
	3,5	7/28	3,078	7/24,7/26, 7/27,7/28	23,789	7/11–7/30	11	79
	3,5	7/30	1,106	7/30	1,021		3	8
				Total Harvest	345,646			

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Table 2.–Page 3 of 8.

Area Strata	Restrictions[a] / Subsection[b]	Date(s) sampled	Harvest on sample date	Represented date(s)	Harvest represented	Mixture date(s)	Sample Size	
							Analyzed	Collected
Kasilof Section set gillnet (Central District, Upper Subdistrict)								
	2012							
	1a	7/3	5,848	7/3	5,848		81	192
	1b	7/3	2,609	7/3	2,609		36	96
	1a	7/5	3,955	7/5	3,955		55	96
	1b	7/5	985	7/5	985		14	96
	1a	7/16	4,648	7/16	4,648		64	240
	1b	7/16	6,518	7/16	6,518	7/3–8/13	90	192
	1a	8/6	1,710	8/6	1,710		24	192
	1b	8/6	456	8/6	456		6	96
	1a	8/9	822	8/9	822		11	192
	1b	8/9	278	8/9	278		4	79
	1a	8/13	518	8/12–8/13	767		10	96
	1b	8/13	170	8/12–8/13	372		5	33
				Total Harvest	28,968			
	2013							
	1a	6/27	32,910	6/27	32,910		28	192
	1b	6/27	15,450	6/27	15,450		13	96
	1a	7/1	10,414	6/30,7/1	32,356		27	192
	1b	7/1	1,659	6/30,7/1	6,434		5	96
	1a	7/4	25,248	7/4	25,248		20	192
	1b	7/4	2,674	7/4	2,674		2	96
	1a	7/8	27,889	7/6,7/8	48,348		41	192
	1b	7/8	2,358	7/6,7/8	3,720	6/27–7/23	3	144
	1a	7/11	30,321	7/10,7/11	73,156		61	240
	1b	7/11	2,360	7/10,7/11	11,360		9	144
	1a	7/15	65,126	7/15	65,126		56	240
	1b	7/15	51,707	7/15	51,707		40	192
	1a	7/18	48,886	7/18,7/20	72,169		67	288
	1b	7/18	14,649	7/18,7/20	22,945		20	240
	1a	7/23	7,739	7/23	7,739		6	288
	1b	7/23	2,436	7/23	2,436		2	192
				Total Harvest	473,778			

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Table 2.–Page 4 of 8.

Area Strata	Restrictions[a] / Subsection[b]	Date(s) sampled	Harvest on sample date	Represented date(s)	Harvest represented	Mixture date(s)	Sample Size	
							Analyzed	Collected
Kasilof River Special Harvest Area - Drift								
	2013							
	15			7/17	1,265		-	-
	15			7/21	194		-	-
	15			7/22	159		-	-
	15			7/23	62		-	-
	15			7/24	391		-	-
	15			7/26	516		-	-
	15			7/27	96		-	-
	15			7/28	193		-	-
	15			7/30	85		-	-
	15			8/1	17		-	-
	15			8/2	17		-	-
				Total Harvest	2,995			
Kenai Section set gillnet (Central District, Upper Subdistrict)								
	2012							
	1c	7/16	5,285	7/16	5,285		24	144
	1d	7/16	50,190	7/16	50,190		229	240
	1c	8/6	781	8/6	781		4	96
	1d	8/6	6,172	8/6	6,172	7/16–8/13	28	192
	1c	8/9	261	8/9	261		1	96
	1d	8/9	1,774	8/9	1,774		8	144
	1c	8/13	137	8/12–8/13	200		1	19
	1d	8/13	972	8/12–8/13	1,003		5	144
				Total Harvest	65,666			
	2013							
	1c	7/8	1,717	7/8	1,717		2	48
	1d	7/8	3,049	7/8	3,049		3	288
	1c	7/11	1,426	7/11	1,426		2	96
	1d	7/11	6,378	7/11	6,378		7	240
	1c	7/15	68,258	7/15	68,258	7/8–7/23	75	144
	1d	7/15	160,357	7/15	160,357		175	240
	1c	7/18	13,699	7/18	13,699		15	192
	1d	7/18	73,477	7/18	73,477		78	300
	1c	7/23	1,132	7/20,7/23	8,284		9	192
	1d	7/23	11,060	7/20,7/23	39,038		34	300
				Total Harvest	375,683			

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Table 2.–Page 5 of 8.

Area Strata	Restrictions[a] / Subsection[b]	Date(s) sampled	Harvest on sample date	Represented date(s)	Harvest represented	Mixture date(s)	Sample Size	
							Analyzed	Collected
Kalgin Island Subdistrict set gillnet (Central District)								
	2012							
	1	6/4	642	6/1–6/4	3,315		23	48
	1	6/6	680	6/6–6/8	2,046		14	48
	1	6/13	665	6/11–6/13	1,783		13	45
	1	6/18	775	6/15–6/18	1,338		9	48
	1	6/20	243	6/20–6/22	997		7	48
	1	6/25	1,540	6/25	1,540		11	48
	1	6/28	1,131	6/28	1,131		8	48
	1	7/2	938	7/2–7/5	949	6/1–8/16	7	48
	1	7/16	2,777	7/09–7/16	5,107		36	96
	1	7/23	11,288	7/19–7/23	30,421		139	139
	1	7/26	3,376	7/26	3,376		96	96
	1	7/30	2,117	7/30	2,117		17	96
	1	8/2	936	8/2	936		7	48
	1	8/6	1,053	8/6	1,053		7	48
	1	8/9	321	8/9	321		2	48
	1	8/13	375	8/13–8/16	640		4	48
				Total Harvest	57,070			
	2013							
	1	6/5	2,088	6/3,6/5	2,899		28	96
	1	6/10	2,115	6/7,6/10	3,863		36	48
	1	6/12	1,706	6/12	1,706		16	48
	1	6/17	1,300	6/14,6/17	1,889		18	48
	1	6/19	700	6/19	700		7	48
	1	6/21	445	6/21	445		4	48
	1	6/24	943	6/24	943		9	48
	1	6/27	1,214	6/27	1,214	6/3–8/19	12	48
	1	7/1	1,734	7/1	1,734		16	48
	1	7/4	1,034	7/4	1,034		10	48
	1	7/8	1,815	7/8	1,815		26	48
	1	7/11	725	7/11,7/15	6,055		48	48
	1	8/1	1,034	7/18,7/22,7/25, 7/29,8/1	15,562		145	192
	1	8/5	979	8/5,8/8	2,038		19	96
	1	8/12	452	8/12,8/15,8/19	655		6	96
	1			8/26	33		-	-
				Total Harvest	42,585			

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Table 2.–Page 6 of 8.

Area Strata	Restrictions[a] / Subsection[b]	Date(s) sampled	Harvest on sample date	Represented date(s)	Harvest represented	Mixture date(s)	Sample Size	
							Analyzed	Collected
Western Subdistrict set gillnet (Central District)								
	2012							
	1	6/25	1,822	6/18–6/25	3,391		42	48
	1,13	6/28	1,410	6/28–7/3	3,736		46	48
	13	7/9	882	7/4–7/9	7,088		88	144
	13	7/12	2,855	7/12–7/14	5,345		66	96
	13	7/16	522	7/16–7/18	2,374		30	96
	13	7/19	1,262	7/19–7/20	1,649	6/18–8/20	21	96
	13	7/22	115	7/21–7/22	1,430		18	96
	13	7/26	5,618	7/26	5,618		70	96
	1,13	7/30	488	7/30–8/2	1,070		13	96
	1	8/6	197	8/6	197		2	96
	1	8/9	128	8/9	128		2	48
	1	8/13	79	8/13–8/20	144		2	48
				Total Harvest	32,170			
	2013							
	1	6/20	1,423	6/17,6/20	2,258		35	48
	1	6/24	1,331	6/24	1,331		21	48
	1	6/27	1,543	6/27,7/1,7/4	4,205		40	48
	1,13	7/8	1,337	7/6,7/8,7/11, 7/13	6,887	6/17–8/1	72	96
	1,13	7/18	2,213	7/15,7/18	6,452		123	144
	1,13	7/22	2,811	7/20,7/22	3,395		53	144
	1,13	7/25	1,061	7/25,7/27, 7/29,8/1	4,877		56	96
	1,13			8/3	84		-	-
	1			8/5	375		-	-
	1			8/8	83		-	-
	1			8/12	50		-	-
				Total Harvest	29,997			

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Table 2.–Page 7 of 8.

Area Strata	Restrictions[a] / Subsection[b]	Date(s) sampled	Harvest on sample date	Represented date(s)	Harvest represented	Mixture date(s)	Sample Size Analyzed	Sample Size Collected
Eastern Subdistrict set gillnet (Northern District)								
	2012							
				5/28–6/18	839		-	-
	1	7/2	504	7/2	504		22	79
	1	7/9	242	7/5–7/9	261		13	48
	1	7/12	144	7/12	144		6	96
	1	7/16	2,427	7/16	2,427		108	144
	1	7/19	593	7/19	593		26	144
	10	7/23	1,557	7/23	1,557	7/02–8/13	69	144
	10	7/26	2,188	7/26	2,188		96	96
	10	7/30	574	7/30	574		27	96
	10	8/2	245	8/2	245		11	48
	1	8/9	204	8/6–8/9	423		19	48
	1	8/13	75	8/13	75		3	48
				Total Harvest	9,830			
	2013							
	1			6/3	86		-	-
	1			6/10	337		-	-
	1			6/17	196		-	-
	1	7/1	655	6/24,6/27,7/1	1,252		48	48
	1	7/4	1,530	7/4	1,530		47	48
	1	7/8	236	7/8	236		31	48
	1	7/11	974	7/11	974		30	87
	1	7/15	2,021	7/15	2,021		81	144
	1	7/18	2,020	7/18	2,020		66	144
	10	7/22	273	7/22	273	6/24–8/22	10	128
	10	7/25	305	7/25	305		10	96
	10	7/29	658	7/29	658		28	48
	10	8/1	355	8/1	355		17	48
	10	8/5	297	8/5	297		13	48
	1	8/8	155	8/8	155		7	48
	1	8/12	88	8/12	88		3	48
	1	8/15	118	8/15,8/19,8/22	227		9	18
	1			8/26	20		-	-
	1			9/2	5		-	-
	1			9/5	1		-	-
	1			9/9	1		-	-
				Total Harvest	11,037			

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Table 2.–Page 8 of 8.

Area Strata	Restrictions[a] / Subsection[b]	Date(s) sampled	Harvest on sample date	Represented date(s)	Harvest represented	Mixture date(s)	Sample Size Analyzed	Sample Size Collected
General Subdistrict (North) set gillnet (Northern District)								
	2012							
	1,11			05/28–7/09	110		-	-
	1,11	7/12	91	7/12	91		7	11
	1,11	7/19	545	7/16–7/19	1,120		50	50
	10,11	7/23	909	7/23	909	7/12–8/06	109	115
	10,11	7/26	665	7/26	665		52	165
	10,11	7/30	210	7/30–8/06	415		32	35
				Total Harvest	3,310			
	2013							
	1,10,11			6/03–8/26	2,743		-	-
				Total Harvest	2,743			
General Subdistrict (South) set gillnet (Northern District)								
	2012							
	1,10,12,14			05/28–8/13	4,433		-	-
				Total Harvest	4,433			
	2013							
	1			6/3–7/1	912		-	-
	1	7/8	415	7/4,7/8	1,867	7/4–7/18	31	31
	1	7/15	2,109	7/11,7/15,7/18	5,660		143	143
	1,10,12,14			7/22–8/26	1,204		-	-
				Total Harvest	9,643			

Note: Corresponding restrictions to the fisheries and substrata are provided when applicable. Harvest numbers are given for all strata, including those that were not analyzed for stock composition.

[a] For description of restrictions see Table 1 and Figures 2–4.

[b] a) Cohoe/Ninilchik; b) South K. Beach; c) North K. Beach; d) North and South Salamatof.

[c] Number of samples analyzed for the harvest proportional mixture representing drift gillnet, excluding expanded corridor-only harvest 6/20–8/15. An additional 322 drift gillnet (excluding corridor-only) samples were analyzed from 7/8 to construct a mixture of 400 samples for a direct comparison of districtwide stock composition estimates with estimates from an expanded drift gillnet corridor-only mixture from 7/11.

[d] Number of samples analyzed for the harvest proportional mixture representing drift gillnet expanded corridor-only harvest 7/11–7/30. An additional 208 drift gillnet (expanded corridor-only) samples were analyzed from 7/11 to construct a mixture of 400 samples for a direct comparison of stock composition estimates with estimates from an expanded drift gillnet excluding districtwide mixture from 7/8.

Table 3.–Predetermined priors based on the best available information for the first stratum within each Upper Cook Inlet district, subdistrict, section and subsection in 2012 and 2013. See text for methods used for determining priors.

Gillnet fishery	Date	Reporting Group							
		Crescent	West	JCL	SusYen	Fish	KTNE	Kenai	Kasilof
	2012								
Central District drift (no corridor-only)	June 20–July 5, 2012	0.03	0.13	0.03	0.06	0.04	0.05	0.31	0.35
Central District drift (corridor-only)	July 9–31, 2012	0.00	0.06	0.05	0.02	0.02	0.02	0.78	0.06
Kasilof Section set	July 3–August 13, 2012	0.00	0.01	0.01	0.01	0.01	0.01	0.68	0.29
Kenai/EF sections set	July 16–August 13, 2012	0.00	0.00	0.01	0.00	0.01	0.02	0.94	0.02
Kalgin Island Subdistrict set	June 1–August 16, 2012	0.00	0.45	0.01	0.01	0.00	0.01	0.46	0.06
Western Subdistrict set	June 18–August 20, 2012	0.78	0.21	0.00	0.00	0.00	0.00	0.01	0.00
Eastern Subdistrict set	July 2–August 13, 2012	0.00	0.08	0.05	0.02	0.15	0.36	0.32	0.01
General Subdistrict set	July 12–August 6, 2012	0.00	0.01	0.01	0.02	0.74	0.22	0.00	0.00
Cohoe/Ninilchik Subsection set	July 3–August 13, 2012	0.00	0.02	0.01	0.01	0.01	0.02	0.58	0.35
South K. Beach Subsection set	July 3–August 13, 2012	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.60
North K. Beach Subsection set	July 16–August 13, 2012	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.12
North/South Salamatof Subsection set	July 16–August 13, 2012	0.00	0.01	0.01	0.01	0.01	0.02	0.93	0.01

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Table 3.–Page 2 of 2.

Gillnet fishery	Date	Reporting Group							
		Crescent	West	JCL	SusYen	Fish	KTNE	Kenai	Kasilof
		2013							
Central District drift (no corridor-only)	June 20–August 1, 2013	0.00	0.04	0.03	0.03	0.01	0.01	0.83	0.05
Central District drift (no corridor-only)	July 8, 2013[a]	0.00	0.10	0.02	0.04	0.07	0.05	0.61	0.11
Central District drift (corridor-only)	July 11–30, 2013	0.00	0.06	0.05	0.02	0.02	0.02	0.78	0.06
Central District drift (corridor-only)	July 11, 2013[a]	0.00	0.06	0.05	0.02	0.02	0.02	0.78	0.06
Kasilof Section set	June 27–July 23, 2013	0.00	0.03	0.01	0.01	0.00	0.01	0.37	0.57
Kenai/EF sections set	July 8–23, 2013	0.00	0.01	0.02	0.06	0.02	0.06	0.70	0.13
Kalgin Island Subdistrict set	June 3–August 19, 2013	0.01	0.42	0.00	0.01	0.00	0.00	0.50	0.05
Western Subdistrict set	June 17–August 1, 2013	0.72	0.25	0.00	0.00	0.00	0.00	0.02	0.00
Eastern Subdistrict set	June 24–August 22, 2013	0.00	0.12	0.08	0.05	0.08	0.27	0.34	0.07
General Subdistrict set	July 4–18, 2013	0.00	0.61	0.19	0.14	0.04	0.00	0.02	0.00
Cohoe/Ninilchik Subsection set	June 27–July 23, 2013	0.00	0.00	0.01	0.01	0.00	0.03	0.46	0.50
South K. Beach Subsection set	June 27–July 23, 2013	0.00	0.05	0.00	0.00	0.00	0.01	0.26	0.69
North K. Beach Subsection set	July 8–July 23, 2013	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.73
North/South Salamatof Subsection set	July 8–July 23, 2013	0.00	0.00	0.03	0.07	0.03	0.06	0.75	0.06

Note: All priors for subsequent strata are based upon the posterior distribution (i.e., stock composition estimates) of preceding strata from the same district, subdistrict, section, subsection, or test fishery. See *Methods* for details. Priors for a given stratum may not sum to 1 due to rounding error.

[a] Mixtures representing harvests on July 8, 2013 (no corridor-only), and July 11, 2013 (corridor-only) were constructed to provide a direct comparison of stock composition estimates between single-day districtwide and expanded corridor-only harvests.

Table 4.–Stock composition estimates (%) including mean, 90% credibility interval (CI), the final number of samples used in the analysis (*n*), and standard deviation (SD), for sockeye salmon harvested in the Central District drift gillnet fishery (districtwide) on July 8, 2013 and sockeye salmon harvested in the Central District drift gillnet fishery (corridor-only) on July 11, 2013.

	Central District drift gillnet fishery (districtwide)				Central District drift gillnet fishery (corridor-only)			
		(7/8; *n* = 396)				(7/11; *n* = 397)		
		90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	1.3	0.5	2.4	0.6	0.0	0.0	0.0	0.1
West	4.5	2.8	6.4	1.1	4.1	2.3	6.3	1.2
JCL	8.3	6.1	10.7	1.4	6.2	4.3	8.3	1.2
SusYen	5.5	3.5	7.9	1.3	3.1	1.6	5.0	1.0
Fish	0.3	0.0	0.8	0.3	0.9	0.2	1.8	0.5
KTNE	2.0	0.9	3.3	0.7	0.3	0.0	1.1	0.4
Kenai	71.8	67.7	75.7	2.4	76.8	72.9	80.5	2.3
Kasilof	6.4	4.3	8.7	1.4	8.6	6.3	11.2	1.5

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

Table 5.–Reporting group stock composition estimates (%) including mean, 90% credibility intervals (CI), standard deviation (SD), and the final number of samples used in the analysis (*n*) for sockeye salmon harvested in the Kenai/EF sections and Kasilof Section set gillnet fisheries (Central District, Upper Subdistrict) analyzed by subsection in 2012 and 2013.

2012	Coho/Ninilchik (7/3–8/13; *n* = 244)				South K. Beach (7/3–8/13; *n* = 154)				North K. Beach[a] (7/16–8/13; *n* = 30)				North/South Salamatof (7/16–8/13; *n* = 270)			
		90% CI				90% CI				90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	-	-	-	0.0	0.0	0.0	0.1
West	0.1	0.0	0.6	0.3	4.6	2.0	8.1	1.9	-	-	-	-	0.4	0.0	1.5	0.5
JCL	0.8	0.1	1.9	0.6	0.0	0.0	0.0	0.1	-	-	-	-	2.7	1.2	4.6	1.0
SusYen	0.6	0.0	2.5	0.9	0.0	0.0	0.1	0.3	-	-	-	-	7.2	4.5	10.2	1.7
Fish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	-	-	-	2.7	1.2	4.5	1.0
KTNE	2.7	0.9	4.8	1.2	1.1	0.1	2.8	0.9	-	-	-	-	6.4	3.9	9.3	1.7
Kenai	45.6	40.2	51.1	3.3	25.6	19.7	31.9	3.7	-	-	-	-	75.0	70.3	79.5	2.8
Kasilof	50.2	44.7	55.6	3.3	68.6	62.2	74.8	3.8	-	-	-	-	5.7	3.4	8.4	1.5

2013	Coho/Ninilchik (6/27–7/23; *n* = 305)				South K. Beach (6/27–7/23; *n* = 94)				North K. Beach (7/8–7/23; *n* = 100)				North/South Salamatof (7/8–7/23; *n* = 296)			
		90% CI				90% CI				90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	0.8	0.0	2.1	0.7	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
West	1.9	0.0	3.9	1.2	0.5	0.0	2.5	0.9	0.0	0.0	0.0	0.1	0.4	0.0	1.1	0.4
JCL	1.9	0.8	3.4	0.8	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	5.7	3.6	8.1	1.4
SusYen	2.4	1.0	4.4	1.1	1.0	0.0	3.8	1.4	0.1	0.0	0.2	0.3	7.1	4.3	10.2	1.8
Fish	0.4	0.0	1.1	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.7	0.1	1.6	0.5
KTNE	0.5	0.0	1.5	0.5	1.0	0.0	3.1	1.1	0.0	0.0	0.0	0.1	8.9	6.3	11.9	1.7
Kenai	53.0	48.0	58.1	3.1	52.1	43.1	61.0	5.4	56.0	47.6	64.3	5.1	77.3	72.9	81.4	2.6
Kasilof	39.1	34.3	44.0	3.0	45.3	36.6	54.2	5.4	43.9	35.6	52.3	5.1	0.0	0.0	0.3	0.2

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

[a] Sample size was not large enough for North K. Beach analysis in 2012.

Table 6.–Stock-specific harvest, standard deviation (SD), and 90% credibility intervals (CI) calculated using a stratified estimator (see text) for combined temporal strata in the Central (4 area strata) and Northern (1 area stratum) districts and based on genetic analysis of sockeye salmon harvested in the Upper Cook Inlet in 2012–2013.

Area strata	Reporting Group	Harvest	90% CI 5%	90% CI 95%	SD	Relative Error
Central District drift gillnet (excluding corridor-only periods)						
2012						
	Crescent	7,171	2,616	13,552	3,410	76%
	West	93,284	72,949	116,456	13,305	23%
	JCL	67,327	46,587	90,861	13,531	33%
	SusYen	74,923	55,675	96,567	12,484	27%
	Fish	13,257	5,801	23,486	5,516	67%
	KTNE	33,275	20,835	48,468	8,493	42%
	Kenai	1,926,357	1,882,304	1,968,775	26,330	2%
	Kasilof	106,619	83,964	131,959	14,606	23%
	Harvest represented	2,322,213				
	Harvest unanalyzed	492				
	Total harvest	2,322,705				
2013[a]						
	Crescent	6,942	1,055	16,631	5,012	112%
	West	96,903	69,952	127,307	17,490	30%
	JCL	68,611	45,997	94,700	14,780	35%
	SusYen	24,838	10,068	43,877	10,437	68%
	Fish	36	0	12	368	16%
	KTNE	13,450	3,282	27,593	7,614	90%
	Kenai	1,024,597	976,076	1,070,563	28,746	5%
	Kasilof	78,499	52,154	108,185	17,132	36%
	Harvest represented	1,313,875				
	Harvest unanalyzed	3,028				
	Total harvest	1,316,903				
Central District drift gillnet (corridor-only periods)						
2012[a]						
	Crescent	21	0	7	204	18%
	West	10,993	5,046	18,710	4,239	62%
	JCL	15,599	5,705	20,665	4,603	60%
	SusYen	12,370	6,708	27,094	6,276	65%
	Fish	3,331	615	7,801	2,300	108%
	KTNE	1,511	80	4,476	1,489	145%
	Kenai	498,368	480,781	514,474	10,233	3%
	Kasilof	23,735	14,303	34,825	6,282	43%
	Harvest represented	565,927				
	Harvest unanalyzed	0				
	Total harvest	565,927				

-continued-

Table 6.–Page 2 of 4.

Area strata	Reporting Group	Harvest	90% CI 5%	90% CI 95%	SD	Relative Error
Central District drift gillnet (corridor-only periods) continued						
2013[a]						
	Crescent	14	0	5	139	18%
	West	14,543	7,859	22,667	4,545	51%
	JCL	16,787	10,098	24,744	4,483	44%
	SusYen	17,508	9,871	26,604	5,122	48%
	Fish	2,232	370	5,322	1,590	111%
	KTNE	8,536	3,366	14,852	3,527	67%
	Kenai	256,932	242,216	270,809	8,700	6%
	Kasilof	16,460	9,813	24,315	4,443	44%
	Harvest represented	333,012				
	Harvest unanalyzed	12,634				
	Total harvest	345,646				
Central District, Upper Subdistrict set gillnet						
2012						
	Crescent	11	0	22	76	105%
	West	1,335	522	2,473	610	73%
	JCL	4,469	2,793	6,372	1,094	40%
	SusYen	1,749	862	2,884	625	58%
	Fish	1,569	728	2,648	594	61%
	KTNE	3,968	2,426	5,766	1,023	42%
	Kenai	56,472	53,159	59,713	2,000	6%
	Kasilof	25,060	22,597	27,657	1,539	10%
	Harvest represented	94,634				
	Harvest unanalyzed	0				
	Total harvest	94,634				
2013						
	Crescent	765	0	4,830	1,810	316%
	West	8,179	1,327	15,547	4,230	87%
	JCL	22,910	15,560	31,398	4,832	35%
	SusYen	31,593	21,407	43,155	6,632	34%
	Fish	1,567	40	4,547	1,507	144%
	KTNE	28,063	19,666	37,500	5,439	32%
	Kenai	522,735	496,912	548,560	15,667	5%
	Kasilof	233,650	211,054	256,790	13,914	10%
	Harvest represented	849,461				
	Harvest unanalyzed	0				
	Total harvest	849,461				

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Table 6.–Page 3 of 4.

Area strata	Reporting Group	Harvest	90% CI 5%	90% CI 95%	SD	Relative Error
Central District, Western and Kalgin Island subdistricts set gillnet						
2012						
	Crescent	23,939	22,547	25,319	841	6%
	West	32,283	29,592	35,004	1,648	8%
	JCL	609	96	1,343	388	102%
	SusYen	188	8	539	177	141%
	Fish	3	0	8	22	122%
	KTNE	7	0	14	49	106%
	Kenai	29,269	26,799	31,737	1,501	8%
	Kasilof	2,942	1,939	4,110	663	37%
	Harvest represented	89,240				
	Harvest unanalyzed	0				
	Total harvest	89,240				
2013						
	Crescent	17,220	15,526	18,963	1,046	10%
	West	36,548	34,371	38,701	1,316	6%
	JCL	113	6	334	111	145%
	SusYen	239	17	640	203	131%
	Fish	2	0	4	14	121%
	KTNE	93	0	315	111	170%
	Kenai	10,712	9,149	12,361	976	15%
	Kasilof	7,032	5,765	8,394	801	19%
	Harvest represented	71,957				
	Harvest unanalyzed	625				
	Total harvest	72,582				
Northern District, Eastern and General subdistricts set gillnet						
2012						
	Crescent	0	0	1	3	120%
	West	1,280	992	1,593	183	23%
	JCL	823	609	1,067	140	28%
	SusYen	898	683	1,130	136	25%
	Fish	1,869	1,608	2,146	163	14%
	KTNE	3,632	3,231	4,043	246	11%
	Kenai	3,078	2,708	3,459	228	12%
	Kasilof	611	426	818	120	32%
	Harvest represented	12,191				
	Harvest unanalyzed	5,382				
	Total harvest	17,573				

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Table 6.–Page 4 of 4.

Area strata	Reporting Group	Harvest	90% CI 5%	90% CI 95%	SD	Relative Error
Northern District, Eastern and General subdistricts set gillnet continued						
2013						
	Crescent	1	0	3	9	117%
	West	6,867	6,203	7,538	407	10%
	JCL	2,333	1,892	2,795	274	19%
	SusYen	2,159	1,688	2,660	295	23%
	Fish	655	432	905	144	36%
	KTNE	4,382	3,861	4,923	324	12%
	Kenai	1,322	1,024	1,645	189	23%
	Kasilof	198	89	340	78	63%
	Harvest represented	17,918				
	Harvest unanalyzed	5,505				
	Total harvest	23,423				

Note: Stock-specific harvest numbers may not sum to the total harvest due to rounding error.

[a] Indicates where strata were represented by a single mixture, and therefore no stratified estimator was used to calculate overall stock specific harvest.

Table 7.–Stock-specific harvest, standard deviation (SD), and 90% credibility intervals (CI) calculated using a stratified estimator (see text) for combined temporal strata in all fishing area strata and based on genetic analysis of sockeye salmon harvested in the Upper Cook Inlet, 2005–2013.

			90% CI			
Year	Reporting Group	Mean	5%	95%	SD	Relative Error
2005	*Crescent*	14,569	64	30,065	8,876	103%
	West	33,352	21,097	48,742	8,588	41%
	JCL	27,178	17,361	38,890	6,600	40%
	SusYen	27,748	15,231	43,673	8,854	51%
	Fish	3,935	108	9,440	2,910	119%
	KTNE	14,820	6,866	26,026	5,975	65%
	Kenai	2,936,487	2,872,816	2,999,501	38,418	2%
	Kasilof	1,019,935	960,699	1,079,433	36,141	6%
	Harvest represented	4,078,024				
	Harvest unanalyzed[a]	1,157,465				
	Total harvest	5,235,489				
2006	*Crescent*	27,109	25,279	30,476	1,673	10%
	West	53,574	45,402	62,677	5,264	16%
	JCL	16,230	12,415	20,434	2,445	25%
	SusYen	28,231	21,944	35,250	4,075	24%
	Fish	333	7	1,248	503	186%
	KTNE	17,350	12,645	22,526	3,010	28%
	Kenai	577,512	558,050	597,296	11,902	3%
	Kasilof	1,324,611	1,305,342	1,343,687	11,635	1%
	Harvest represented	2,044,950				
	Harvest unanalyzed[a]	143,252				
	Total harvest	2,188,202				
2007	*Crescent*	54,001	46,973	62,559	4,772	14%
	West	153,205	129,922	178,433	14,739	16%
	JCL	134,100	112,161	157,216	13,723	17%
	SusYen	104,842	74,128	137,684	19,335	30%
	Fish	8,199	3,955	14,181	3,192	62%
	KTNE	74,235	55,825	94,015	11,628	26%
	Kenai	1,920,986	1,870,844	1,970,492	30,389	3%
	Kasilof	687,091	645,072	730,015	25,806	6%
	Harvest represented	3,136,659				
	Harvest unanalyzed[a]	177,662				
	Total harvest	3,314,321				

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Table 7.–Page 2 of 3.

Year	Reporting Group	Mean	90% CI 5%	90% CI 95%	SD	Relative Error
2008	*Crescent*	20,145	16,499	24,243	2,359	19%
	West	63,717	54,582	73,860	5,880	15%
	JCL	66,315	55,472	77,926	6,848	17%
	SusYen	47,092	34,396	61,204	8,162	28%
	Fish	3,516	1,471	6,181	1,490	67%
	KTNE	47,826	39,180	57,511	5,582	19%
	Kenai	875,430	842,868	908,403	19,876	4%
	Kasilof	1,111,226	1,079,760	1,142,403	19,076	3%
	Harvest represented	2,235,267				
	Harvest unanalyzed[a]	142,378				
	Total harvest	2,377,645				
2009	*Crescent*	59,630	54,305	67,836	4,182	11%
	West	163,460	147,142	181,011	10,286	10%
	JCL	45,224	35,567	55,619	6,127	22%
	SusYen	57,296	42,976	72,923	9,153	26%
	Fish	37,648	29,186	47,195	5,514	24%
	KTNE	54,198	44,734	64,676	6,080	18%
	Kenai	943,784	913,625	974,061	18,379	3%
	Kasilof	670,243	645,021	695,614	15,395	4%
	Harvest represented	2,031,483				
	Harvest unanalyzed[a]	9,797				
	Total harvest	2,041,280				
2010	*Crescent*	51,025	46,488	56,471	3,061	10%
	West	204,880	187,225	223,412	10,994	9%
	JCL	55,659	46,040	66,191	6,145	18%
	SusYen	58,425	47,185	70,616	7,162	20%
	Fish	93,905	81,844	106,611	7,564	13%
	KTNE	78,996	67,408	91,554	7,339	15%
	Kenai	1,821,553	1,791,885	1,850,751	17,926	2%
	Kasilof	423,296	404,928	442,293	11,346	4%
	Harvest represented	2,787,738				
	Harvest unanalyzed[a]	36,494				
	Total harvest	2,824,232				

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Table 7.–Page 3 of 3.

Year	Reporting Group	Mean	90% CI 5%	90% CI 95%	SD	Relative Error
2011[b]	*Crescent*	63,232	58,364	70,028	3,629	9%
	West	295,953	263,201	330,645	20,471	11%
	JCL	92,480	72,759	114,705	12,768	23%
	SusYen	125,039	98,621	154,410	16,997	22%
	Fish	80,172	62,469	100,096	11,490	23%
	KTNE	83,572	64,428	105,570	12,555	25%
	Kenai	3,901,433	3,842,526	3,958,817	35,450	1%
	Kasilof	470,319	437,456	505,024	20,539	7%
	Harvest represented	5,112,200				
	Harvest unanalyzed[a]	161,399				
	Total harvest	5,273,599				
2012	*Crescent*	31,142	26,325	37,615	3,517	18%
	West	139,175	117,443	163,628	14,072	17%
	JCL	90,128	69,548	113,076	13,279	24%
	SusYen	88,826	65,832	114,506	14,858	27%
	Fish	20,029	11,630	31,003	5,997	48%
	KTNE	42,393	29,588	58,010	8,711	34%
	Kenai	2,513,544	2,466,204	2,559,099	28,280	2%
	Kasilof	158,968	133,983	186,339	15,951	16%
	Harvest represented	3,084,205				
	Harvest unanalyzed[a]	5,874				
	Total harvest	3,090,079				
2013	*Crescent*	24,942	18,225	35,382	5,454	34%
	West	163,040	134,237	194,974	18,557	19%
	JCL	110,754	85,767	138,712	16,135	24%
	SusYen	76,336	55,991	99,733	13,353	29%
	Fish	4,492	1,671	8,693	2,224	78%
	KTNE	54,522	39,589	72,198	9,970	30%
	Kenai	1,816,297	1,759,722	1,871,163	33,862	3%
	Kasilof	335,839	299,715	374,057	22,589	11%
	Harvest represented	2,586,223				
	Harvest unanalyzed[a]	21,792				
	Total harvest	2,608,015				

Note: Stock-specific harvest numbers may not sum to the total harvest represented due to rounding error.

[a] Excludes unrepresented harvest from Kustatan (2005, 2,666 fish; 2006, 3,896 fish; 2007, 2,453 fish; 2008, 1,852 fish; 2009, 4,495 fish; 2010, 2,553 fish; 2011, 3,841 fish; 2012, 3,821 fish; and 2013, 3,121 fish) and Chinitna (2005, 13 fish; 2006, 108 fish; 2007, 4 fish; 2008, 4 fish; 2009, 18 fish; 2012, 1 fish; and 2013, 4 fish) subdistricts (Shields 2006, 2007a, 2007b, 2009, 2010a, 2010b; Shields and Dupuis 2012, 2013a, 2013b).

[b] The stock-specific harvest numbers for 2011 differ from those reported in Barclay et al. 2014 due to an editing oversight, but have been corrected in this report.

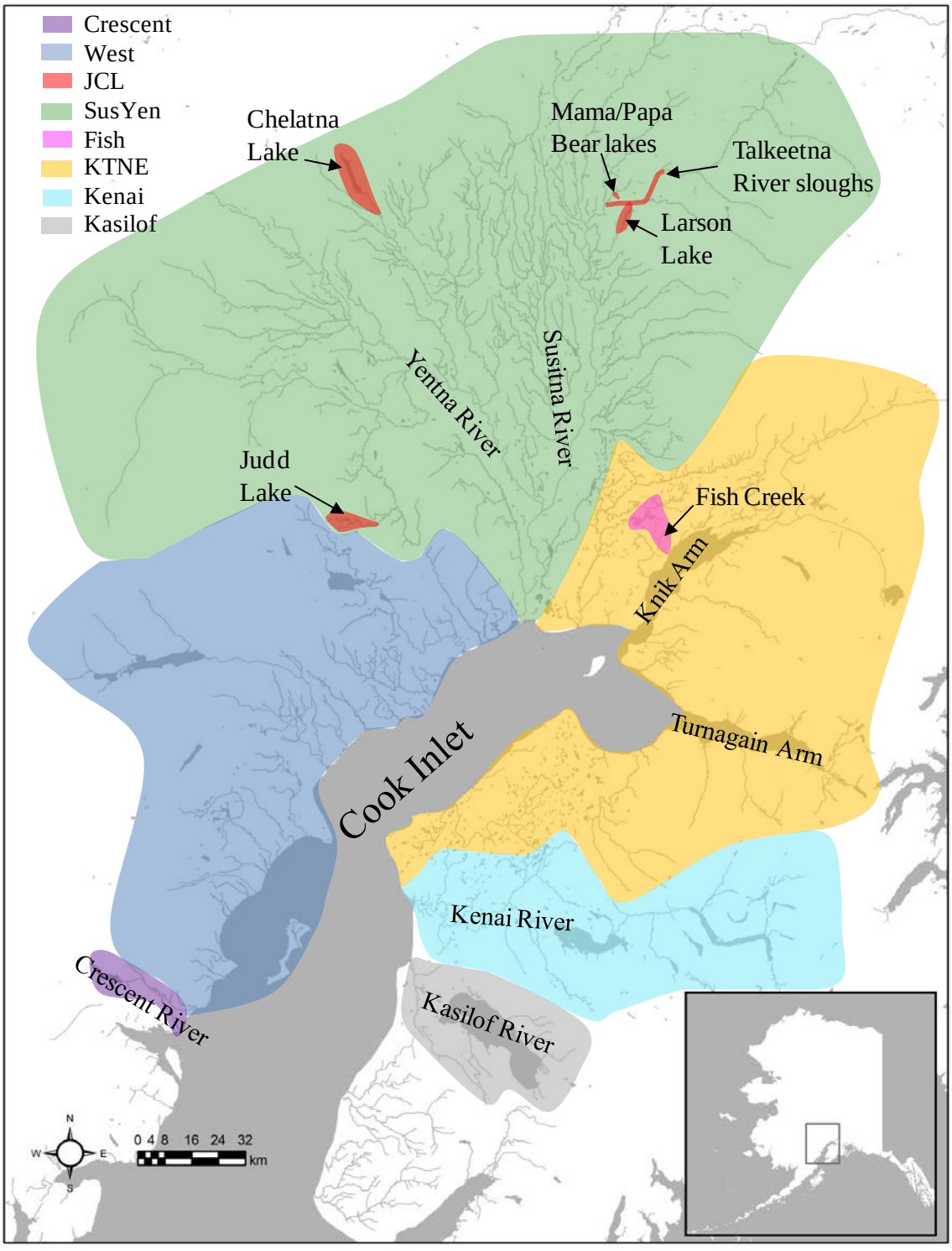

Figure 1.–Map of Upper Cook Inlet showing reporting group areas for mixed stock analysis for sockeye salmon using genetic markers.

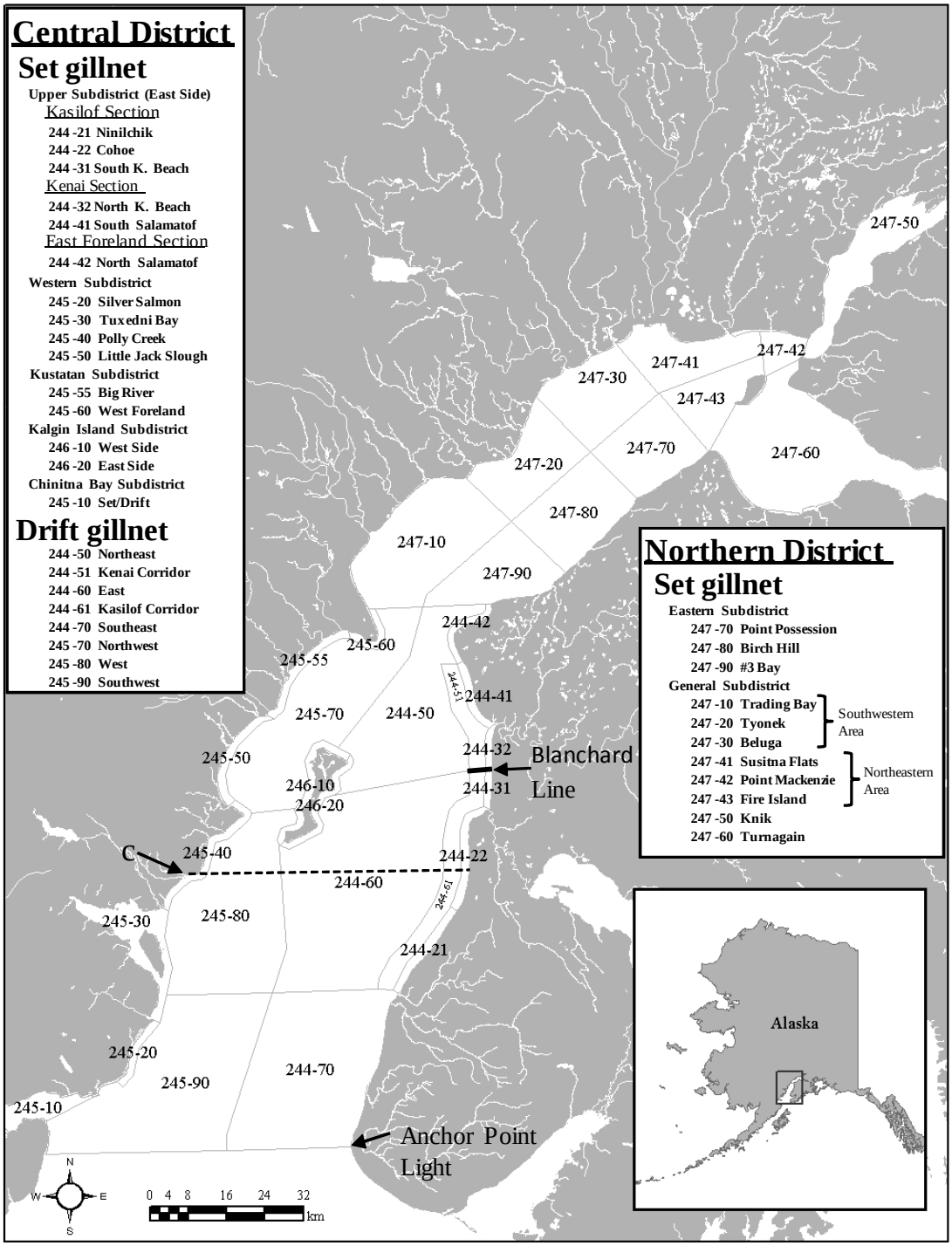

Figure 2.–Map of Upper Cook Inlet showing commercial fishing boundaries (statistical areas) for subdistricts and selected sections and subsections within the Northern and Central districts for both set and drift gillnet fisheries (see Table 1 for description of lines labeled with letters).

Note: Districts, subdistricts, and sections are defined in Alaska Administrative Code (5 AAC 21.200). For the purposes of this report, the statistical areas in Upper Subdistrict (Central District) are referred to as subsections.

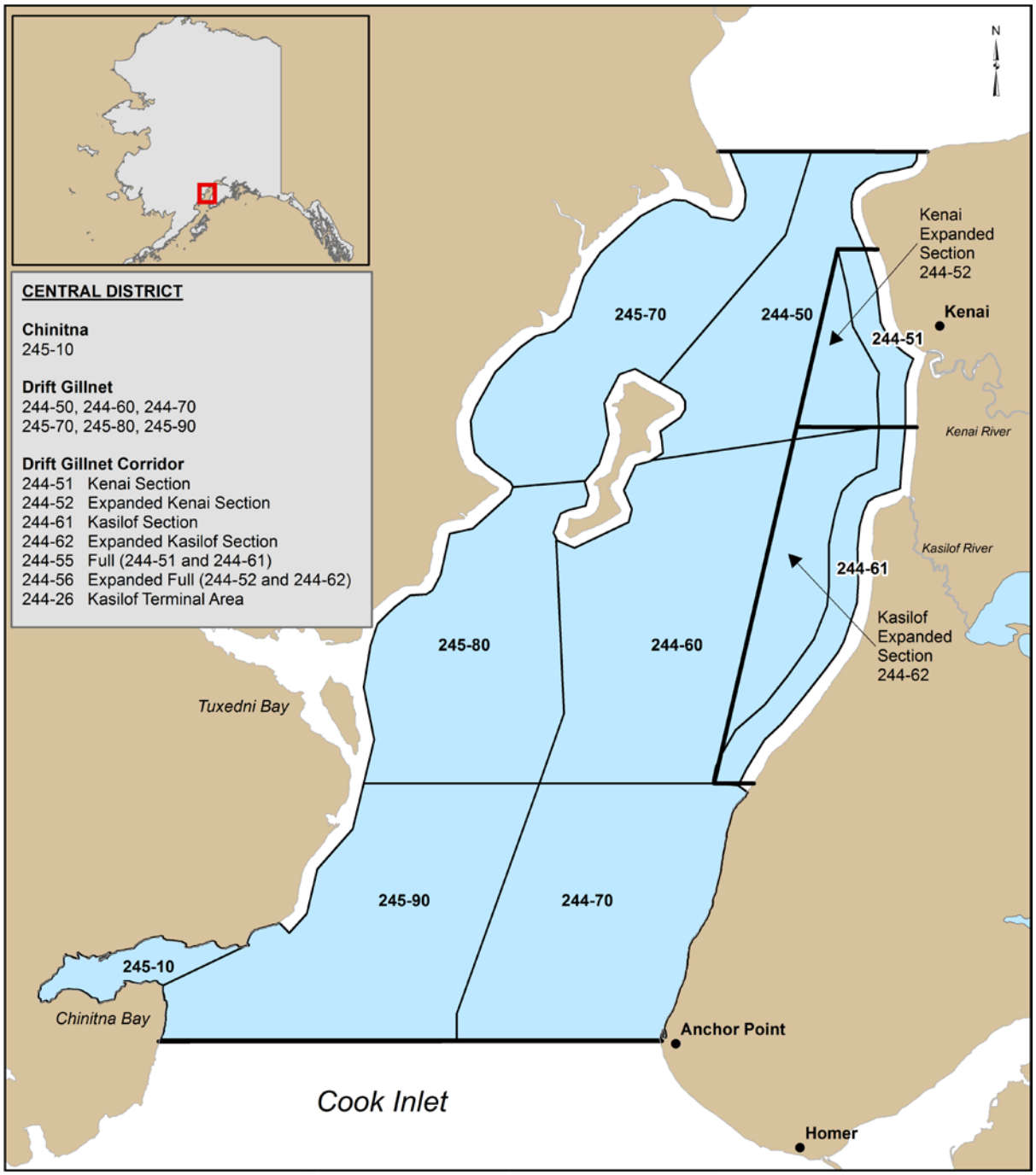

Figure 3.–Map of Upper Cook Inlet showing commercial fishing boundaries (statistical areas) within the Central District drift gillnet fishery, including expanded sections (see Table 1 and text).

Note: Districts, subdistricts, and sections are defined in Alaska Administrative Code (5 AAC 21.200). For the purposes of this report, the statistical areas in Upper Subdistrict (Central District) are referred to as subsections.

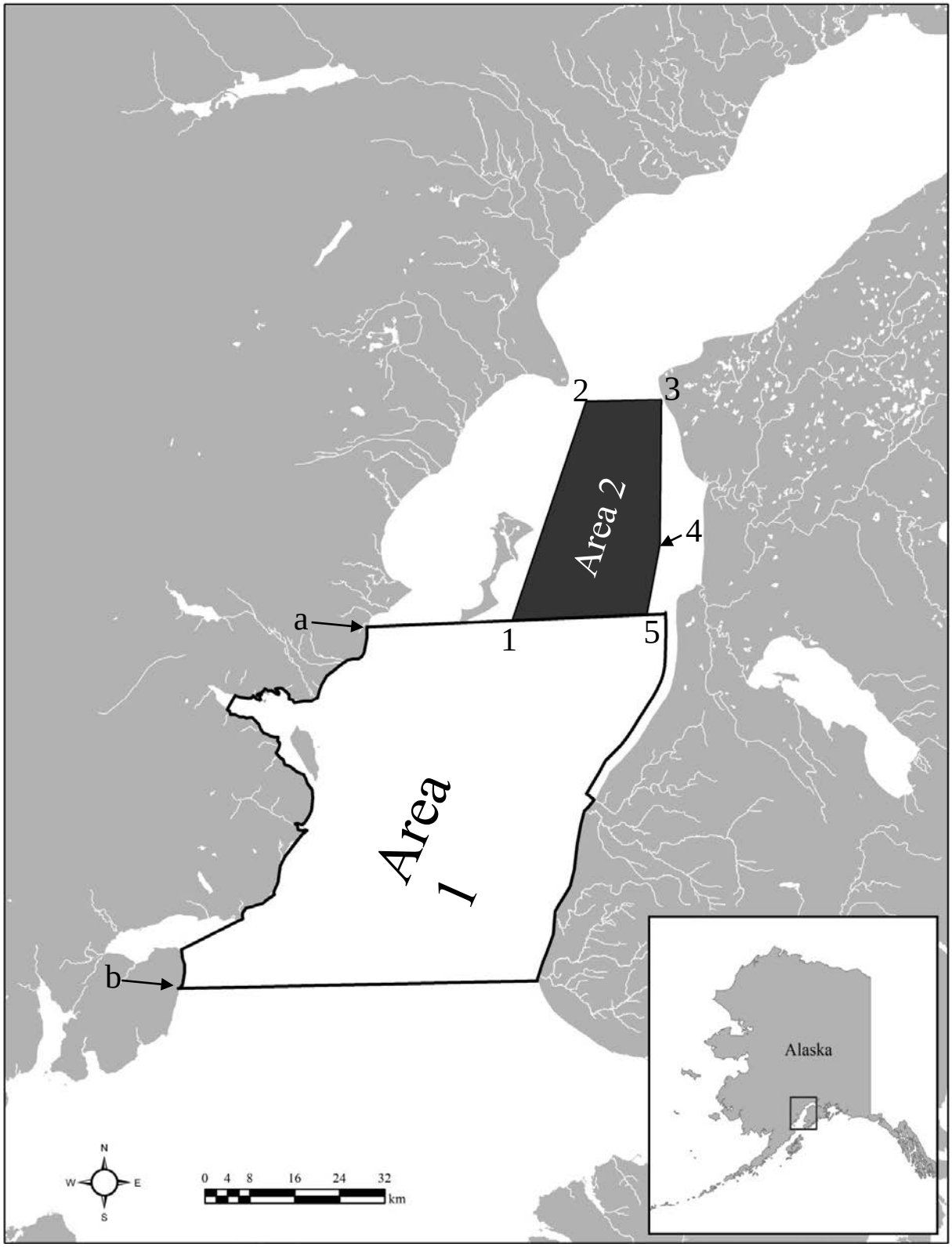

Figure 4.–Map of Upper Cook Inlet showing management fishing boundaries for the Central District drift gillnet fishery (see Table 1 for description of points [numbers] and lines [letters]).

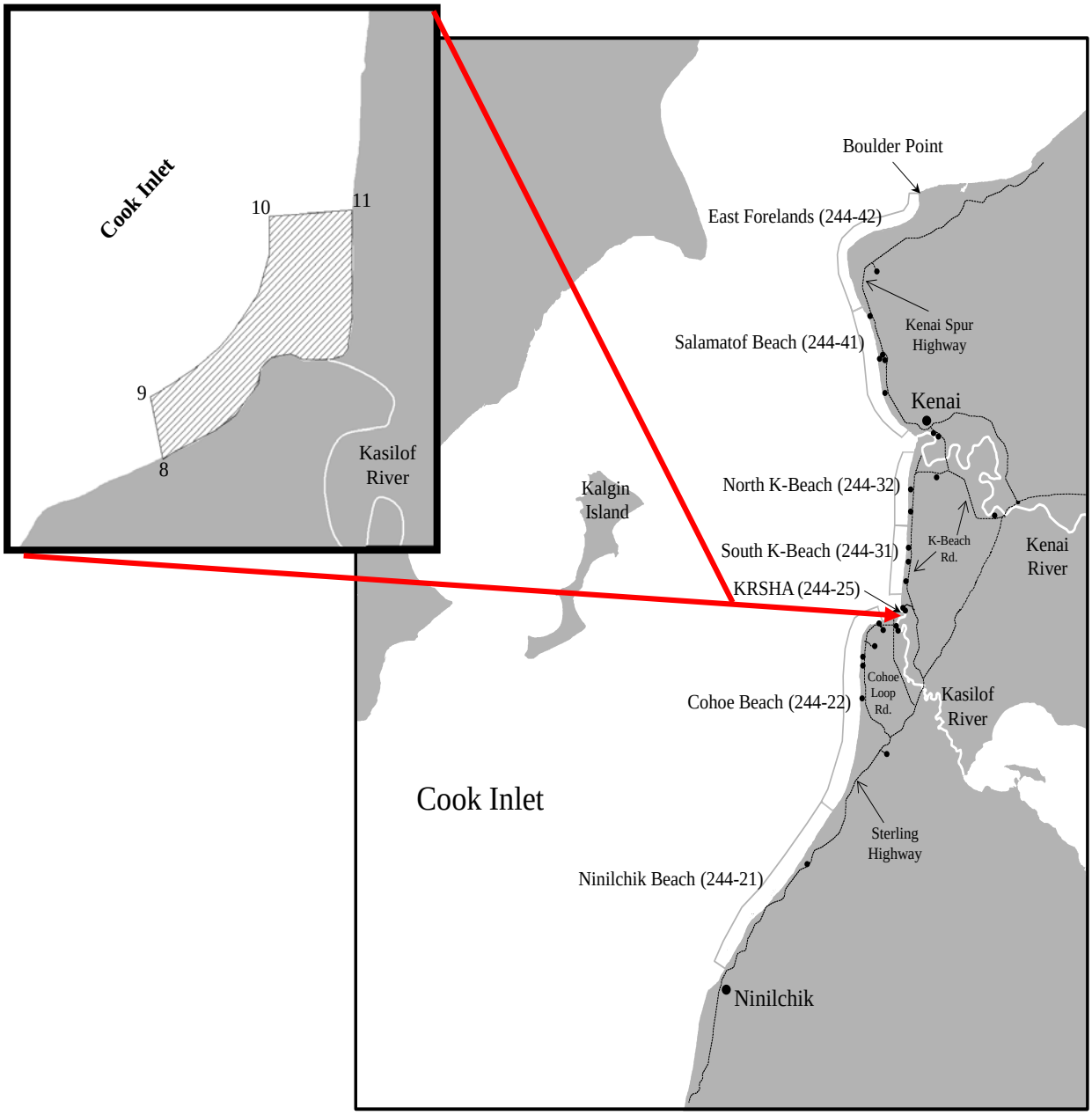

Figure 5.–Map of the mouth of the Kasilof River showing management fishing boundaries for the Kasilof River Special Harvest Area (Central District, Upper Subdistrict; see Table 1 for description of points).

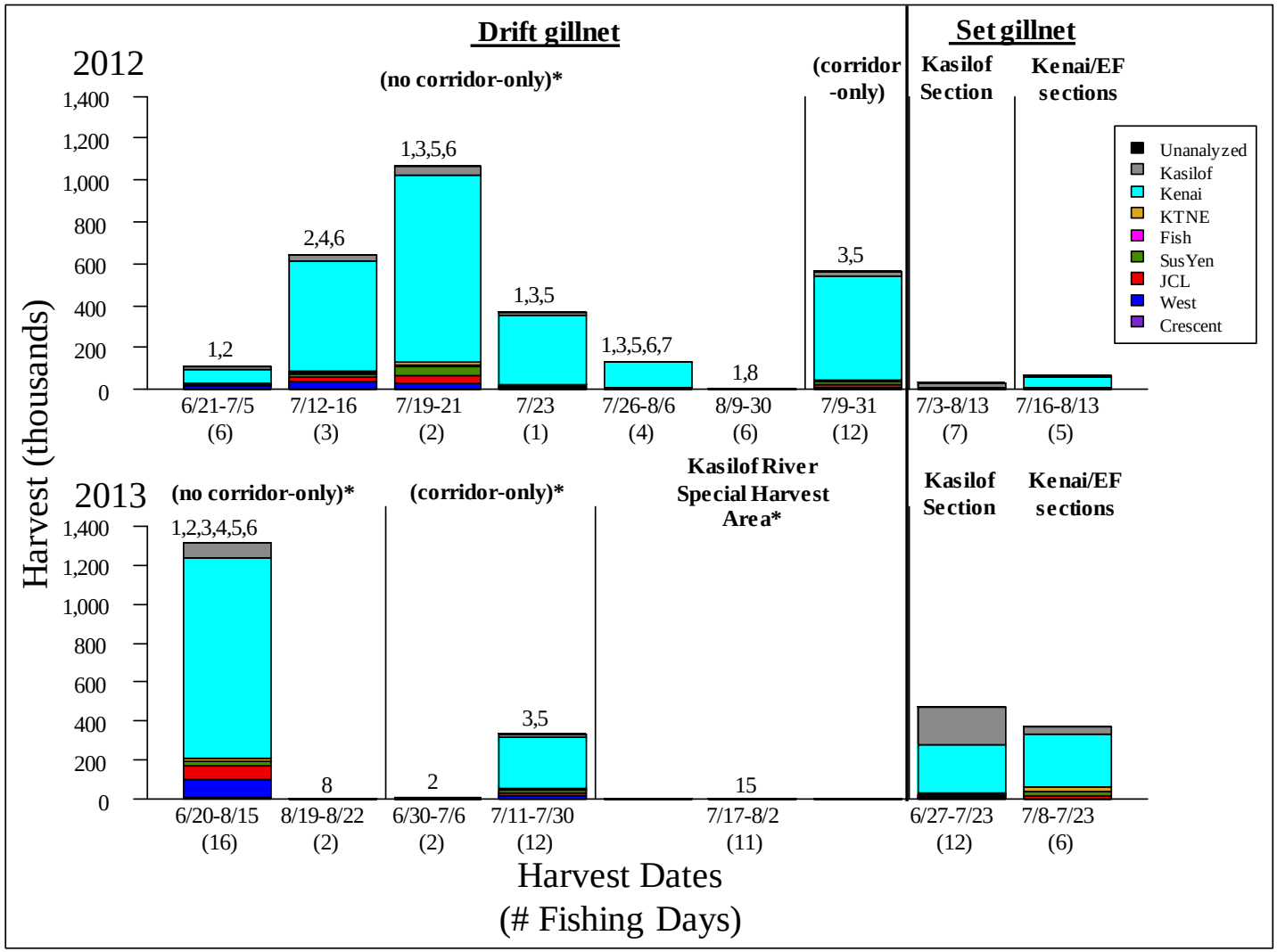

Figure 6.–Stock-specific harvest estimates for the Central District drift gillnet fishery (including corridor-only periods), Kasilof Section set gillnet fishery (Central District, Upper Subdistrict), and Kenai/East Foreland sections set gillnet fishery (Central District, Upper Subdistrict) in 2012 and 2013 for specified date ranges (number of days). Numbers above the bars indicate the fishery restrictions during temporal strata (see Tables 1 and 2). Strata containing unrepresented harvests are indicated with an asterisk.

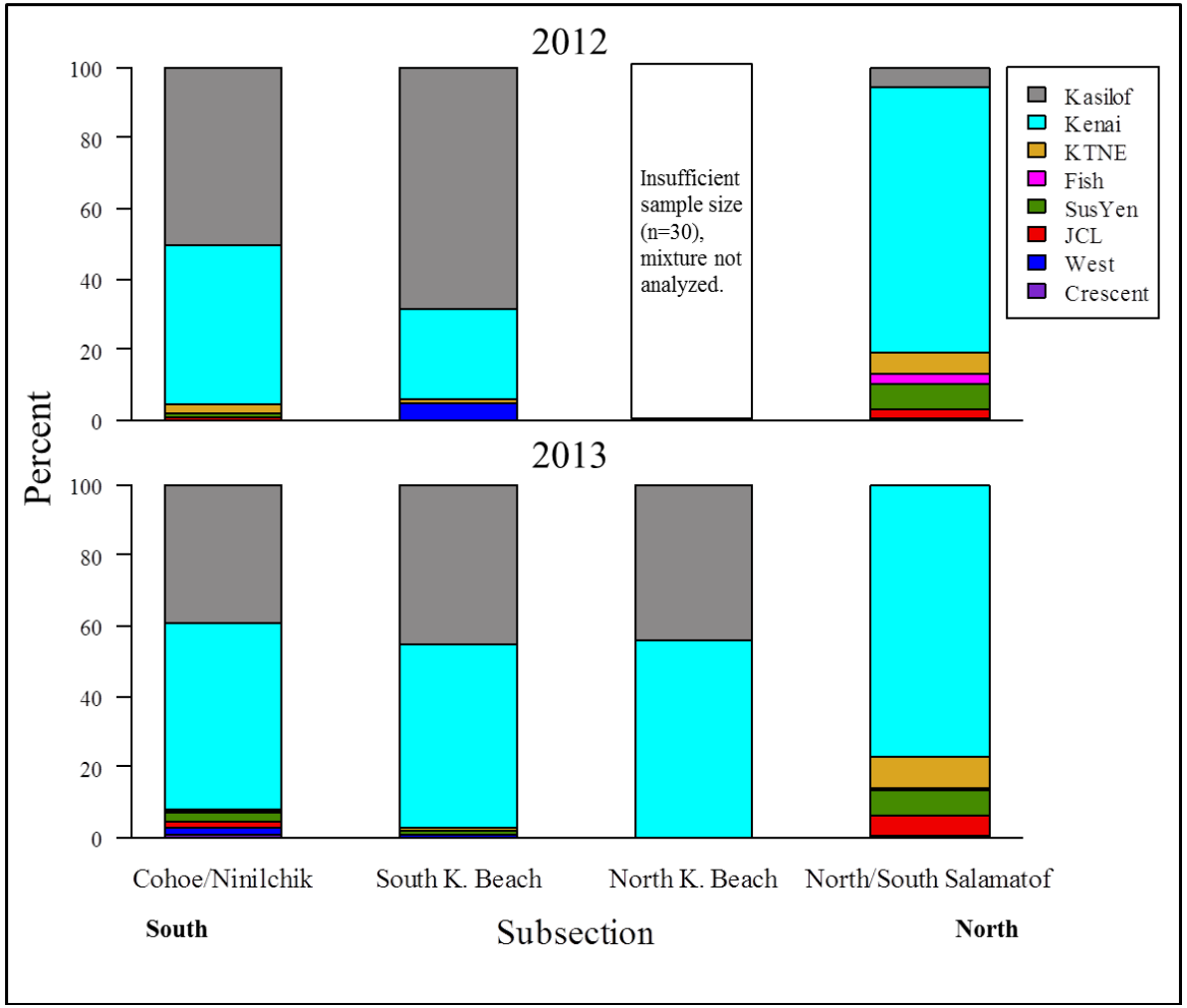

Figure 7.–Stock composition estimates by subsection for the Kasilof and Kenai/East Foreland sections set gillnet fisheries (Central District, Upper Subdistrict) in 2012 and 2013.

Note: There are 2 subsections for each section and they are displayed from south to north.

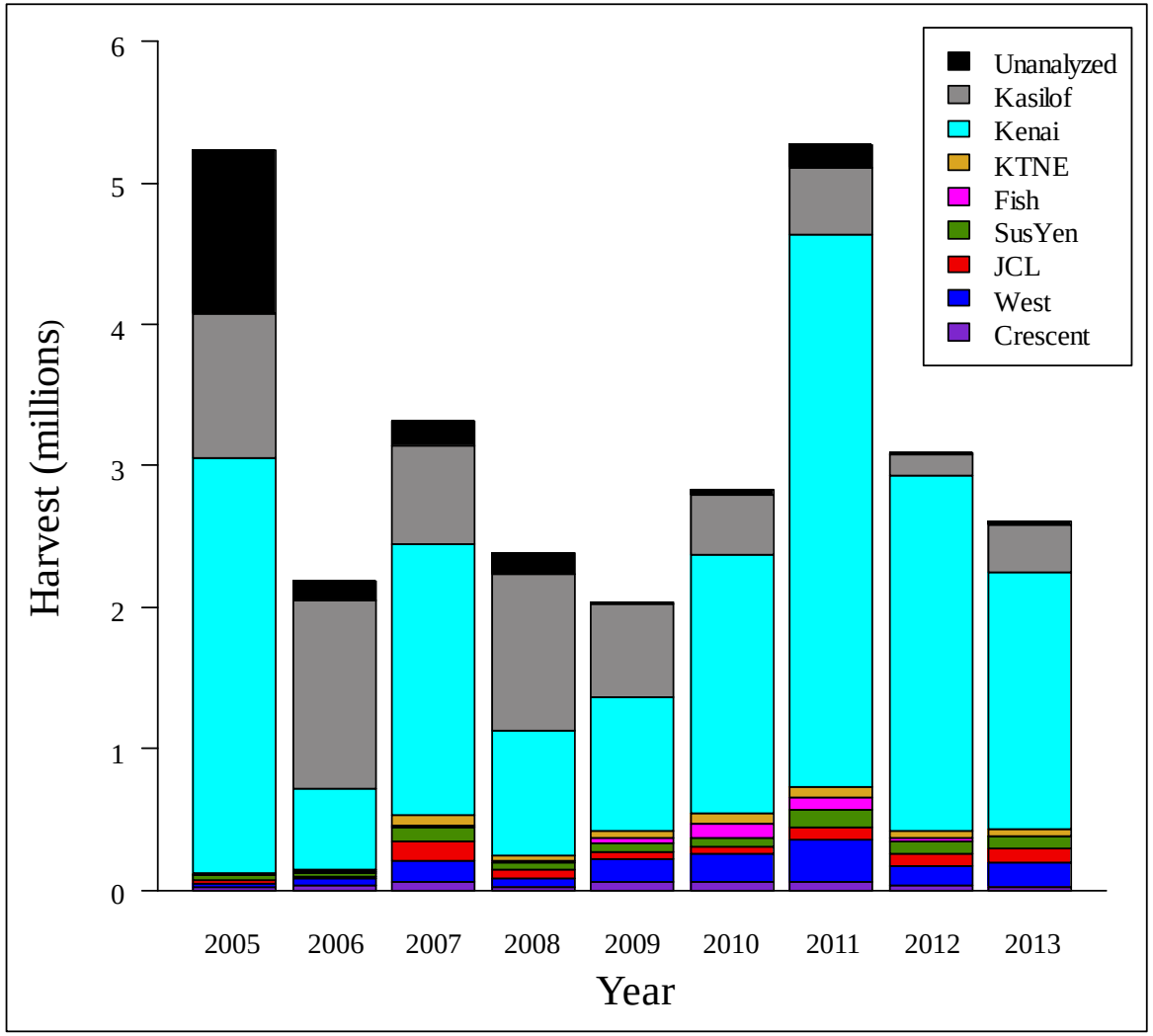

Figure 8.–Overall stock-specific harvest estimates calculated using a stratified estimator for all strata for in the Upper Cook Inlet sockeye salmon fishery, 2005–2013.

APPENDIX A

Appendix A1.–Stock composition (%) and stock-specific harvest estimates, including mean, 90% credibility interval (CI), the final number of samples used in the analysis (*n*), and standard deviation (SD), for sockeye salmon harvested in the Central District drift gillnet fishery (excluding corridor-only periods) in 2012 and 2013.

2012

Dates: 6/21–7/5	Stock Composition (*n* = 399)				Harvest = 111,927		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	1.1	0.4	2.3	0.6	1,283	419	2,521
West	15.6	12.4	19.0	2.0	17,469	13,928	21,244
JCL	2.7	1.5	4.2	0.8	3,022	1,661	4,701
SusYen	4.0	2.3	6.0	1.1	4,482	2,630	6,688
Fish	1.0	0.4	2.0	0.5	1,154	398	2,221
KTNE	3.1	1.5	5.1	1.1	3,426	1,625	5,696
Kenai	59.2	54.8	63.5	2.6	66,240	61,352	71,064
Kasilof	13.3	10.4	16.4	1.8	14,849	11,584	18,360

Dates: 7/12–7/16	Stock Composition (*n* = 398)				Harvest = 643,305		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.8	0.2	1.8	0.5	5,320	1,179	11,397
West	5.0	3.2	7.0	1.2	32,040	20,765	45,035
JCL	3.0	1.7	4.5	0.9	19,151	10,750	29,257
SusYen	3.1	1.7	4.8	1.0	19,951	10,730	31,185
Fish	0.5	0.1	1.2	0.4	3,121	404	7,563
KTNE	1.5	0.6	2.7	0.7	9,581	3,816	17,421
Kenai	81.4	78.0	84.6	2.0	523,610	501,465	544,508
Kasilof	4.7	3.1	6.7	1.1	30,531	19,649	43,246

Dates: 7/19–7/21	Stock Composition (*n* = 398)				Harvest = 1,067,669		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.0	32	0	11
West	2.7	1.4	4.5	0.9	29,127	14,724	47,579
JCL	3.8	2.4	5.6	1.0	40,949	25,113	59,731
SusYen	3.5	1.9	5.4	1.1	37,211	20,241	57,415
Fish	0.8	0.2	1.6	0.5	8,140	1,952	17,435
KTNE	1.7	0.7	2.9	0.7	17,856	7,850	31,020
Kenai	83.1	79.6	86.3	2.0	887,227	850,378	921,837
Kasilof	4.4	2.7	6.4	1.1	47,127	29,155	68,243

-continued-

2012 (continued)

Dates: 7/23	Stock Composition (n = 400)				Harvest = 366,497		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.1	0.0	0.6	0.2	531	0	2,342
West	2.6	1.2	4.4	1.0	9,537	4,422	16,120
JCL	2.7	1.4	4.2	0.8	9,778	5,291	15,266
SusYen	1.5	0.3	3.2	0.9	5,577	1,025	11,695
Fish	0.2	0.0	0.7	0.3	838	0	2,681
KTNE	0.3	0.0	0.8	0.3	957	41	2,880
Kenai	89.3	86.3	91.9	1.7	327,101	316,269	336,977
Kasilof	3.3	1.9	5.1	1.0	12,177	6,892	18,564

Dates: 7/26–8/6	Stock Composition (n = 399)				Harvest = 132,815		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.0	4	0	1
West	3.8	2.4	5.6	1.0	5,110	3,130	7,468
JCL	1.5	0.7	2.7	0.6	2,022	886	3,526
SusYen	0.1	0.0	0.5	0.2	107	0	659
Fish	0.0	0.0	0.0	0.0	4	0	1
KTNE	1.1	0.4	2.1	0.5	1,455	500	2,798
Kenai	92.0	89.5	94.2	1.4	122,178	118,863	125,148
Kasilof	1.5	0.5	2.8	0.7	1,936	649	3,669

2013

Dates: 6/20–8/15	Stock Composition (n = 400)				Harvest = 1,313,875		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.5	0.1	1.3	0.4	6,942	1,055	16,631
West	7.4	5.3	9.7	1.3	96,903	69,952	127,307
JCL	5.2	3.5	7.2	1.1	68,611	45,997	94,700
SusYen	1.9	0.8	3.3	0.8	24,838	10,068	43,877
Fish	0.0	0.0	0.0	0.0	36	0	12
KTNE	1.0	0.2	2.1	0.6	13,450	3,282	27,593
Kenai	78.0	74.3	81.5	2.2	1,024,597	976,076	1,070,563
Kasilof	6.0	4.0	8.2	1.3	78,499	52,154	108,185

Note: The 90% credibility intervals may not include the point estimate for very low stock-specific harvest estimates because fewer than 5% of iterations had values above zero. Stock composition estimates may not sum to 100% due to rounding error.

Appendix A2.–Stock composition (%) and stock-specific harvest estimates, including mean, 90% credibility interval (CI), the final number of samples used in the analysis (*n*), and standard deviation (SD), for sockeye salmon harvested in the Central District drift gillnet fishery (corridor-only periods) in 2012 and 2013.

2012							
Dates: 7/9–7/31	Stock Composition (*n* = 382)				Harvest =565,927		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.0	21	0	7
West	1.9	0.9	3.3	0.7	10,993	5,046	18,710
JCL	2.2	1.0	3.7	0.8	12,370	5,705	20,665
SusYen	2.8	1.2	4.8	1.1	15,599	6,708	27,094
Fish	0.6	0.1	1.4	0.4	3,331	615	7,801
KTNE	0.3	0.0	0.8	0.3	1,511	80	4,476
Kenai	88.1	85.0	90.9	1.8	498,368	480,781	514,474
Kasilof	4.2	2.5	6.2	1.1	23,735	14,303	34,825
2013							
Dates: 7/11–7/30	Stock Composition (*n* = 299)				Harvest = 333,012		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.0	14	0	5
West	4.4	2.4	6.8	1.4	14,543	7,859	22,667
JCL	5.0	3.0	7.4	1.3	16,787	10,098	24,744
SusYen	5.3	3.0	8.0	1.5	17,508	9,871	26,604
Fish	0.7	0.1	1.6	0.5	2,232	370	5,322
KTNE	2.6	1.0	4.5	1.1	8,536	3,366	14,852
Kenai	77.2	72.7	81.3	2.6	256,932	242,216	270,809
Kasilof	4.9	2.9	7.3	1.3	16,460	9,813	24,315

Note: The 90% credibility intervals of harvest estimates may not include the point estimate for the very low extrapolated harvest numbers because fewer than 5% of iterations had values above zero. Stock composition and harvest estimates may not sum to 100% due to rounding error.

Appendix A3.–Stock composition (%) and stock-specific harvest estimates, including mean, 90% credibility interval (CI), the final number of samples used in the analysis (*n*), and standard deviation (SD), for sockeye salmon harvested in the Kasilof Section set gillnet fishery (Central District, Upper Subdistrict) in 2012 and 2013.

2012							
Dates: 7/3–8/13	Stock Composition (*n* = 398)				Harvest = 28,968		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.0	1	0	0
West	3.4	1.3	5.7	1.4	971	385	1,662
JCL	0.5	0.1	1.2	0.4	148	27	348
SusYen	0.8	0.0	2.3	0.8	227	0	673
Fish	0.0	0.0	0.0	0.0	1	0	0
KTNE	1.1	0.2	2.5	0.7	311	50	717
Kenai	37.2	32.9	41.4	2.6	10,763	9,538	12,001
Kasilof	57.1	52.9	61.4	2.6	16,547	15,316	17,776
2013							
Dates: 6/27–7/23	Stock Composition (*n* = 399)				Harvest = 473,778		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.2	0.0	1.0	0.4	755	0	4,718
West	1.5	0.1	3.0	0.9	7,204	307	14,330
JCL	1.5	0.6	2.6	0.6	7,009	2,963	12,353
SusYen	2.4	1.1	4.0	0.9	11,254	5,050	18,956
Fish	0.3	0.0	0.9	0.3	1,374	18	4,141
KTNE	0.7	0.1	1.7	0.5	3,295	368	7,904
Kenai	52.9	48.5	57.3	2.7	250,747	229,691	271,701
Kasilof	40.6	36.3	44.9	2.6	192,141	171,918	212,667

Note: The 90% credibility intervals may not include the point estimate for very low stock-specific harvest estimates because fewer than 5% of iterations had values above zero. Stock composition estimates may not sum to 100% due to rounding error.

Appendix A4.–Stock composition (%) and stock-specific harvest estimates, including mean, 90% credibility interval (CI), the final number of samples used in the analysis (*n*), and standard deviation (SD), for sockeye salmon harvested in the Kenai/East Foreland sections set gillnet fishery (Central District, Upper Subdistrict) in 2012 and 2013.

2012							
Dates: 7/16–8/13	Stock Composition (*n* = 300)				Harvest = 65,666		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.1	10	0	7
West	0.6	0.0	2.0	0.7	364	0	1,339
JCL	2.4	1.1	4.1	0.9	1,602	735	2,722
SusYen	6.5	4.0	9.3	1.6	4,242	2,604	6,101
Fish	2.4	1.1	4.0	0.9	1,568	727	2,651
KTNE	5.6	3.3	8.3	1.5	3,657	2,151	5,430
Kenai	69.6	64.9	74.2	2.8	45,710	42,602	48,717
Kasilof	13.0	9.7	16.5	2.0	8,513	6,399	10,816
2013							
Dates: 7/8–7/23	Stock Composition (*n* = 396)				Harvest =375,683		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.0	10	0	4
West	0.3	0.0	0.8	0.3	975	0	3,066
JCL	4.2	2.7	6.1	1.0	15,901	10,101	22,744
SusYen	5.4	3.4	7.8	1.4	20,339	12,624	29,205
Fish	0.1	0.0	0.3	0.2	194	0	1,312
KTNE	6.6	4.6	8.8	1.3	24,768	17,263	33,228
Kenai	72.4	68.4	76.3	2.4	271,988	256,971	286,559
Kasilof	11.0	8.4	13.9	1.7	41,509	31,639	52,280

Note: The 90% credibility intervals may not include the point estimate for very low stock-specific harvest estimates because fewer than 5% of iterations had values above zero. Stock composition estimates may not sum to 100% due to rounding error.

Appendix A5.–Stock composition (%) and stock-specific harvest estimates, including mean, 90% credibility interval (CI), the final number of samples used in the analysis (*n*), and standard deviation (SD), for sockeye salmon harvested in the Kalgin Island Subdistrict set gillnet fishery (Central District) in 2012 and 2013.

2012							
Dates: 6/1–8/16	Stock Composition (*n* = 399)				Harvest = 57,070		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	1.1	0.2	2.3	0.6	619	127	1,296
West	42.3	38.1	46.6	2.6	24,151	21,750	26,593
JCL	0.3	0.0	0.9	0.3	187	8	537
SusYen	1.1	0.2	2.4	0.7	607	95	1,343
Fish	0.0	0.0	0.0	0.0	2	0	1
KTNE	0.0	0.0	0.0	0.1	6	0	3
Kenai	50.2	45.9	54.5	2.6	28,642	26,194	31,089
Kasilof	5.0	3.3	7.0	1.2	2,856	1,859	4,013
2013							
Dates: 6/3–8/19	Stock Composition (*n* = 393)				Harvest =42,552		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	9.8	7.2	12.7	1.7	4,176	3,068	5,393
West	63.9	59.6	68.1	2.6	27,203	25,371	28,992
JCL	0.3	0.0	0.8	0.3	109	6	326
SusYen	0.4	0.0	1.2	0.4	188	12	521
Fish	0.0	0.0	0.0	0.0	1	0	0
KTNE	0.2	0.0	0.7	0.3	91	0	310
Kenai	15.5	12.5	18.8	1.9	6,597	5,305	7,985
Kasilof	9.8	7.4	12.5	1.6	4,186	3,154	5,322

Note: The 90% credibility intervals may not include the point estimate for very low stock-specific harvest estimates because fewer than 5% of iterations had values above zero. Stock composition estimates may not sum to 100% due to rounding error.

Appendix A6.–Stock composition (%) and stock-specific harvest estimates, including mean, 90% credibility interval (CI), the final number of samples used in the analysis (*n*), and standard deviation (SD), for sockeye salmon harvested in the Western Subdistrict set gillnet fishery (Northern District) in 2012 and 2013.

2012							
Dates: 6/18–8/20	Stock Composition (*n* = 397)				Harvest = 32,170		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	72.5	68.5	76.3	2.4	23,320	22,048	24,541
West	25.3	21.6	29.2	2.3	8,132	6,943	9,378
JCL	0.0	0.0	0.0	0.0	1	0	0
SusYen	0.0	0.0	0.0	0.0	2	0	1
Fish	0.0	0.0	0.0	0.0	1	0	1
KTNE	0.0	0.0	0.0	0.0	1	0	0
Kenai	1.9	0.8	3.4	0.8	626	260	1,107
Kasilof	0.3	0.0	0.8	0.3	87	0	267
2013							
Dates: 6/17–8/1	Stock Composition (*n* = 398)				Harvest =29,405		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	44.4	40.1	48.7	2.6	13,043	11,787	14,312
West	31.8	27.7	35.9	2.5	9,345	8,156	10,570
JCL	0.0	0.0	0.0	0.1	4	0	13
SusYen	0.2	0.0	1.0	0.4	51	0	308
Fish	0.0	0.0	0.0	0.0	1	0	0
KTNE	0.0	0.0	0.0	0.0	1	0	0
Kenai	14.0	11.1	17.1	1.8	4,114	3,257	5,039
Kasilof	9.7	7.3	12.3	1.5	2,846	2,141	3,619

Note: The 90% credibility intervals may not include the point estimate for very low stock-specific harvest estimates because fewer than 5% of iterations had values above zero. Stock composition estimates may not sum to 100% due to rounding error.

Appendix A7.–Stock composition (%) and stock-specific harvest estimates, including mean, 90% credibility interval (CI), the final number of samples used in the analysis (*n*), and standard deviation (SD), for sockeye salmon harvested in the Eastern Subdistrict set gillnet fishery (Northern District) in 2012 and 2013.

2012							
Dates: 7/2–8/13	Stock Composition (*n* = 399)				Harvest = 8,991		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.0	0	0	0
West	12.0	9.0	15.3	1.9	1,083	810	1,379
JCL	8.1	5.9	10.6	1.4	731	530	952
SusYen	4.9	2.9	7.3	1.3	437	257	653
Fish	7.9	5.7	10.3	1.4	711	515	928
KTNE	26.6	22.6	30.7	2.5	2,387	2,029	2,758
Kenai	33.7	29.6	37.9	2.5	3,031	2,665	3,408
Kasilof	6.8	4.7	9.1	1.3	611	427	818
2013							
Dates: 6/24–8/22	Stock Composition (*n* = 389)				Harvest =10,391		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.0	0	0	0
West	27.0	22.7	31.4	2.6	2,802	2,359	3,261
JCL	4.2	2.6	6.0	1.1	434	270	627
SusYen	6.7	4.5	9.3	1.5	701	463	971
Fish	6.3	4.1	8.7	1.4	653	431	903
KTNE	41.2	36.4	46.1	2.9	4,282	3,784	4,789
Kenai	12.7	9.8	15.8	1.8	1,322	1,023	1,645
Kasilof	1.9	0.9	3.3	0.7	198	88	338

Note: The 90% credibility intervals may not include the point estimate for very low stock-specific harvest estimates because fewer than 5% of iterations had values above zero. Stock composition estimates may not sum to 100% due to rounding error.

Appendix A8.–Stock composition (%) and stock-specific harvest estimates, including mean, 90% credibility interval (CI), the final number of samples used in the analysis (*n*), and standard deviation (SD), for sockeye salmon harvested in the northern area (2012) and southern area (2013) within the General Subdistrict set gillnet fishery (Northern District; Figure 2).

2012 (northern area only)							
Dates: 7/12–8/6	Stock Composition (*n* = 250)				Harvest = 3,200		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.1	0	0	0
West	6.2	3.4	9.3	1.8	198	110	298
JCL	5.2	3.1	7.8	1.4	167	98	249
SusYen	12.0	8.6	15.9	2.2	385	275	508
Fish	36.2	30.9	41.5	3.2	1,158	989	1,330
KTNE	38.9	33.4	44.5	3.4	1,245	1,070	1,425
Kenai	1.5	0.1	3.2	0.9	47	4	102
Kasilof	0.0	0.0	0.0	0.0	0	0	0
2013 (southern area only)							
Dates: 7/4–8/18	Stock Composition (*n* = 389)				Harvest = 7,527		
		90% CI				90% CI	
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%
Crescent	0.0	0.0	0.0	0.1	1	0	0
West	54.0	47.5	60.5	4.0	4,065	3,574	4,555
JCL	25.2	19.9	30.9	3.3	1,899	1,496	2,324
SusYen	19.4	14.1	25.1	3.4	1,459	1,058	1,888
Fish	0.0	0.0	0.1	0.1	2	0	7
KTNE	1.3	0.0	4.2	1.4	100	0	317
Kenai	0.0	0.0	0.0	0.1	1	0	1
Kasilof	0.0	0.0	0.0	0.1	0	0	0

Note: The 90% credibility intervals may not include the point estimate for very low stock-specific harvest estimates because fewer than 5% of iterations had values above zero. Stock composition estimates may not sum to 100% due to rounding error.