Regional Information Report 5J20-01

Genetic Stock Composition Estimates for the Upper Cook Inlet Sockeye Salmon Commercial Fishery, 2019

by

Andrew W. Barclay

Update: The stock composition estimates were corrected in Appendix E1 on February 3, 2020.

January 2020

Alaska Department of Fish and Game **Division of Commercial Fisheries**

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

REGIONAL INFORMATION REPORT 5J20-01

GENETIC STOCK IDENTIFICATION OF UPPER COOK INLET SOCKEYE SALMON HARVEST, 2019

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INTRODUCTION

The Alaska Department of Fish and Game (ADF&G), Division of Commercial Fisheries, is responsible for managing the commercial fisheries in Upper Cook Inlet (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 (escapement) in a drainage (stock) and the number of their offspring that make it to reproductive adulthood (returns) in a 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).

ADF&G has used genetic mixed stock analysis (MSA) to estimate stock-specific harvests of sockeye salmon (*Oncorhynchus nerka*) in the Central and Northern district commercial fisheries of UCI since 2005. The MSA sampling design has remained relatively consistent since 2005; however, the number of samples and strata analyzed has declined over the years due to budget cuts and the redirecting of project funds to answer other fisheries questions. Regardless, the analyzed samples have represented over 90% of the catch since 2006. Spatiotemporal estimates for each fishing season are provided to area managers the spring following each season. Additionally, overall estimates from 2005 to 2016 were published in Barclay (2017) and estimates from 2015 to 2018 were published in Barclay (2019). However, only spatiotemporal estimates from 2005 to 2018 have been published in ADF&G reports.

Estimates for the 2019 season were originally planned for completion in spring of 2020 and were to be reported by fall of 2020. However, with the Board of Fisheries (BOF) Upper Cook Inlet Finfish meeting scheduled for February 2020, it was apparent that these estimates would need to be published in a timely manner to be available for members of the public and BOF to evaluate proposals. This report serves the purpose of making currently unpublished 2019 estimates publicly available.

Upper Cook Inlet MSA reports generally contain an overview of the management strategy and the highlights of each season to help the reader interpret the patterns of stock composition in the fishery harvests. Overview of the 2019 fishery is not included in this report but can be found in detail in the UCI fishery management report (Marston and Frothingham *in prep*).

This report includes stock composition and stock-specific harvest estimates for 2019 Central District set and drift gillnet fisheries and Northern District set gillnet fishery for the following 8 reporting groups: (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*). See Figure 1 for a map of these reporting groups.

METHODS

Methods for the 2019 season MSA generally follow those reported in the 2014 report (Barclay et al. 2018), except for (1) selection of mixture samples after laboratory analyses to reduce bias and (2) the program used to estimate stock compositions.

The objective during the selection of samples for laboratory analysis was to select samples to represent harvest in proportion to daily catch. Mixtures samples that are not selected in proportion to daily harvests can result in biased MSA estimates. However, an error during this selection procedure resulted in some mixtures where the samples either overrepresented or underrepresented the harvest for each day. To reduce bias in the MSA estimates, we randomly selected and excluded laboratory-analyzed samples from overrepresented days from qualifying mixtures before estimating stock composition estimates. We used the 10/10 criteria to identify qualifying mixtures (10/10 criteria is daily sample sizes for mixtures with over 10% of days where sample sizes were off by 10% or more).

Since the 2017 fishery analysis, a new *R*[1] package called *rubias* (Moran and Anderson 2019) has been used to estimate fishery stock compositions. The *rubias* package is a Bayesian approach to the conditional genetic stock identification model based upon computationally efficient C code implemented in *R*. It uses cross validation and simulation to quantify and correct for biases in reporting group estimates. For each mixture analysis, a single Markov Chain Monte Carlo chain with 25,000 iterations was run. The first 5,000 iterations of the chain were discarded to remove the influence of starting values. The prior parameters for each reporting group were defined to be equal (i.e., a flat prior). Within each reporting group, the population prior parameters were divided equally among the populations within that reporting group. Stock proportion estimates and the 90% credibility intervals for each mixture were calculated by taking the mean and 5% and 95% quantiles of the posterior distribution from the single chain output.

RESULTS

TISSUE SAMPLING

Field Sampling

Tissues suitable for genetic analysis were sampled from a total of 18,469 sockeye salmon from commercial catches throughout the UCI Central and Northern districts (Appendix A1).

Subsampling for Analysis

A total of 8 mixture samples (strata) were constructed for estimating stock compositions and stock-specific harvests of fishing area (area strata) harvests in 2019 (Table 1). Mixture sample sizes ranged from 379 to 381 fish.

Drift gillnet

For the Central District drift gillnet fishery, mixtures were constructed to represent both districtwide (excluding corridor-only; 2 mixtures) and corridor-only (1 mixture) harvests in 2019 (Table 1; Appendices A1 and B1). See Figure 2 for a map of Central District drift gillnet statistical area boundaries.

[1] The R project for statistical computing, Vienna, Austria. Available from https://www.R-project.org/.

Set gillnet

For the Upper Subdistrict (Central District) set gillnet fishery, 3 spatiotemporal mixtures were constructed for 2019 (Table 1; Appendices A1 and B1). In 2019, 2 fishing periods (July 13 and 21) were restricted to within a half-mile of the mean high tide mark in the Kasilof Section and within 600 feet of the mean high tide mark in the North K-Beach statistical area of the Kenai Section to minimize the harvest of Kenai River Chinook and sockeye salmon. Sufficient samples were collected to construct 2 mixtures to represent the combined July 13 and 21 harvests for the Kasilof Section (1 mixture) and North K-Beach statistical area (1 mixture). The Kasilof Section and North K-Beach statistical area were also restricted to fish within 600 feet of the mean high tide mark on August 2; however, insufficient samples were collected to represent those harvests individually, so a third mixture was constructed to represent August 2 harvests and unrestricted harvests for all other Upper Subdistrict fishing periods in 2019.

For the Western, Kustatan, and Kalgin Island subdistricts (Central District) set gillnet fisheries, a single mixture was constructed to represent the combined subdistricts harvest in 2019 (Table 1; Appendices A1 and B1).

For the Eastern and General subdistricts (Northern District) set gillnet fisheries, a single mixture was constructed to represent the combined subdistricts harvest in 2019 (Table 1; Appendices A1 and B1).

See Figure 3 for a map of set gillnet subdistrict boundaries.

Adjusting Qualifying Mixtures

The Upper Subdistrict (All sections), Western, Kustatan, and Kalgin Island subdistricts, and Eastern and General subdistricts mixtures had daily sample sizes selected for laboratory analyses that were not in proportion to the daily harvest. Daily sample sizes for the Upper Subdistrict (All Sections) and Western, Kustatan, and Kalgin Island subdistricts mixtures met the 10/10 criteria for adjusting mixture samples to reduce bias. After resampling in proportion to daily harvests, 347 samples remained in the Upper Subdistrict (All Sections) mixture and 298 samples remained in the Eastern and General subdistricts mixture.

STOCK COMPOSITION AND STOCK-SPECIFIC HARVEST ESTIMATES

Individual Strata

Stock composition and stock-specific harvest estimates for individual strata (mixtures) for each fishery can be found in 3 appendices:

1) Central District drift gillnet; Appendix C
2) Central District set gillnet, including Upper Subdistrict and Western, Kustatan, and Kalgin Island subdistricts; Appendix D
3) Northern District set gillnet, including Eastern and General subdistricts; Appendix E

Estimates by Area Strata

Annual stock-specific harvest estimates for area strata can be found in Table 2 and Figure 4.

All Strata Combined

Annual UCI stock-specific harvest estimates representing all analyzed strata from 2005–2019 can be found in Table 3 and Figure 5.

ALL STRATA 2005–2019

A summary of all strata analyzed since 2005, including where the estimates were reported, can be found in Appendix F1 and F2.

ACKNOWLEDGEMENTS

Producing the MSA estimates in this report required the efforts of a large number of dedicated people. The author acknowledges ADF&G Gene Conservation Laboratory members Heather Hoyt and staff for producing genetic data used in the MSA and Elizabeth Lee and Tyler Dann for reviewing this document. The author would like to thank the people with Soldotna commercial fishery sampling crews who collected the thousands of samples required for producing harvest-proportional samples of fish for MSA.

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TABLES AND FIGURES

Table 1.–Commercial fishery strata (mixtures) for estimating stock compositions and stock-specific harvests for 2019, including: mixture number, the fishery and fishing area represented, sampling dates, dates and harvest represented by each mixture, and number of fish genotyped and used in mixed stock analysis.

Mixture No.	Fishery	Area	Dates Sampled	Dates Represented	Harvest Represented	Number of Fish Genotyped	Number of Fish Used[a]
1	Central District drift	Districtwide (excluding corridor-only periods)	6/20–7/22	6/20–7/22	379,406	379	362
2			7/29–8/15	7/29–8/22	131,598	379	359
3	Central District drift	corridor-only periods	7/25 & 8/5	7/25–8/11	237,398	380	358
4	Central District set (East Cook Inlet)	Upper Subdistrict (All sections)[b]	6/27–8/3	6/27–8/3	741,865	380	347
5		Upper Subdistrict (Kasilof Section half-mile)[c]	7/13 & 7/21	7/13 & 7/21	31,111	379	368
6		Upper Subdistrict (Kenai Section, North K-Beach 600ft)[d]	7/13 & 7/21	7/13 & 7/21	11,303	380	367
7	Central District set (West Cook Inlet)	Western, Kustatan, & Kalgin Island subdistricts	6/17–8/8	6/10–8/15	109,694	379	298
8	Northern District set	Eastern & General subdistricts	7/4–8/15	6/27–8/22	72,977	381	363

[a] Samples missing genotypes for 20% or more loci and duplicate samples were removed prior to analysis. Additional samples were removed from mixtures 4 and 7 to better represent harvests.

[b] This mixture sample includes fish from August 2, when the Kasilof Section and North K-Beach (Kenai Section) fisheries were restricted to within 600 feet of the mean high tide mark and does not include fish from July 13 and 21.

[c] This mixture sample only includes fish from fisheries restricted to within a half-mile of the mean high tide mark.

[d] This mixture sample only includes fish from fisheries restricted to within 600 feet of the mean high tide mark.

Table 2.–Stock-specific harvest, 90% credibility intervals, and standard deviation (SD) calculated using a stratified estimator for combined strata in the Central District drift gillnet excluding corridor-only periods (2 temporal strata); drift gillnet corridor-only periods (1 temporal stratum); Upper Subdistrict set gillnet (3 spatiotemporal strata); Western, Kustatan, and Kalgin Island subdistricts set gillnet (1 temporal stratum); and Northern District set gillnet (1 temporal stratum) fisheries and based on genetic analysis of mixtures of sockeye salmon harvested in Upper Cook Inlet, 2019.

			90% CI		
Area strata	Reporting Group	Harvest	5%	95%	SD
Central District drift gillnet (excluding corridor-only periods)					
	Crescent	4,909	420	12,172	3,676
	West	64,770	46,424	88,149	12,754
	JCL	21,522	13,521	30,773	5,314
	SusYen	20,732	6,758	37,811	10,084
	Fish	857	0	4,435	1,596
	KTNE	14,028	6,196	23,535	5,466
	Kenai	362,708	338,566	385,720	14,334
	Kasilof	21,477	9,065	34,778	7,853
	Harvest represented	511,004			
	Harvest unrepresented	699			
	Total Harvest	511,703			
Central District drift gillnet (corridor-only periods)					
	Crescent	3,907	369	9,193	2,697
	West	16,312	9,059	24,992	4,813
	JCL	7,537	3,093	12,608	2,912
	SusYen	4,462	0	15,786	5,596
	Fish	289	0	1,769	715
	KTNE	3,332	834	7,143	2,023
	Kenai	201,177	187,874	212,577	7,433
	Kasilof	381	0	2,138	961
	Harvest represented	237,398			
	Harvest unrepresented	0			
	Total Harvest	237,398			

-continued-

Table 2.–Page 2 of 2.

Area strata	Reporting Group	Harvest	90% CI 5%	90% CI 95%	SD
Central District, Upper Subdistrict set gillnet					
	Crescent	3,584	5	18,116	6,813
	West	9,388	21	32,254	11,524
	JCL	2,081	1	7,725	2,844
	SusYen	3,643	1,554	9,187	2,948
	Fish	3,502	85	13,212	4,570
	KTNE	7,757	203	24,311	8,162
	Kenai	658,503	621,134	692,984	22,494
	Kasilof	95,821	65,573	129,898	19,652
	Harvest represented	784,279			
	Harvest unrepresented	0			
	Total Harvest	784,279			
Central District, Western, Kustatan, and Kalgin Island subdistricts set gillnet					
	Crescent	64,301	57,546	71,204	4,200
	West	25,925	19,203	32,977	4,184
	JCL	93	0	539	265
	SusYen	1,671	0	6,790	2,377
	Fish	90	0	503	253
	KTNE	95	0	505	312
	Kenai	16,979	11,009	23,106	3,659
	Kasilof	540	0	2,487	889
	Harvest represented	109,694			
	Harvest unrepresented	4,001			
	Total Harvest	113,695			
Northern District, Eastern and General subdistricts set gillnet					
	Crescent	202	0	1,216	476
	West	28,422	24,553	32,320	2,382
	JCL	5,746	3,847	7,828	1,221
	SusYen	8,811	5,645	12,272	2,021
	Fish	4,608	2,194	7,846	1,776
	KTNE	13,298	8,841	17,716	2,725
	Kenai	9,203	5,941	12,783	2,063
	Kasilof	2,688	782	4,716	1,187
	Harvest represented	72,977			
	Harvest unrepresented	243			
	Total Harvest	73,220			

Table 3.–Stock-specific harvest, 90% credibility intervals (CI), and standard deviation (SD) calculated using a stratified estimator for combined spatial and temporal strata in all represented fishing area strata based on genetic analysis of sockeye salmon harvested in the Upper Cook Inlet commercial fishery, 2005–2019. The numbers of fish that contribute to the unrepresented strata are also provided.

			90% CI		
Year	Reporting Group	Mean	5%	95%	SD
2005	*Crescent*	14,569	107.393412	29,869	8,821
	West	33,352	20,975	49,146	8,750
	JCL	27,178	17,392	38,970	6,613
	SusYen	27,748	15,479	43,405	8,693
	Fish	3,935	90.19403	9,413	2,952
	KTNE	14,820	6,907	25,800	5,914
	Kenai	2,936,487	2,873,151	2,999,297	38,564
	Kasilof	1,019,935	960,285	1,080,028	36,531
	Harvest represented	4,078,024			
	Harvest unrepresented	1,157,465			
	Total Harvest	5,235,489			
2006	*Crescent*	27,109	25,290	30,394	1,644
	West	53,574	45,690	62,233	5,053
	JCL	16,230	12,447	20,392	2,422
	SusYen	28,231	21,890	35,100	4,019
	Fish	333	8	1251	507
	KTNE	17,350	12,749	22,525	2,979
	Kenai	577,512	557,738	597,314	12,032
	Kasilof	1,324,611	1,304,965	1,344,149	11,928
	Harvest represented	2,044,951			
	Harvest unrepresented	143,252			
	Total Harvest	2,188,203			
2007[a]	*Crescent*	54,041	47,038	62,475	4,757
	West	152,145	128,233	177,461	14,971
	JCL	134,111	112,750	156,726	13,420
	SusYen	104,916	75,880	136,631	18,509
	Fish	8,200	3,943	14,174	3,189
	KTNE	75,059	56,784	95,117	11,663
	Kenai	1,921,009	1,870,874	1,970,414	30,280
	Kasilof	687,179	644,972	730,615	26,028
	Harvest represented	3,136,660			
	Harvest unrepresented	177,662			
	Total Harvest	3,314,322			

-continued-

Table 3.–Page 2 of 6.

Year	Reporting Group	Mean	90% CI 5%	90% CI 95%	SD
2008[b]	*Crescent*	25,708	19,187	33,709	4,432
	West	68,049	57,160	81,678	7,538
	JCL	85,191	71,952	99,293	8,302
	SusYen	50,569	36,661	66,366	9,107
	Fish	4,621	1,825	8,184	1,974
	KTNE	63,214	51,049	75,925	7,603
	Kenai	817,164	783,676	851,252	20,457
	Kasilof	1,120,753	1,087,203	1,154,515	20,276
	Harvest represented	2,235,268			
	Harvest unrepresented	142,378			
	Total Harvest	2,377,646			
2009	*Crescent*	59,630	54,264	68,063	4,259
	West	163,460	147,418	180,982	10,273
	JCL	45,224	35,597	55,723	6,156
	SusYen	57,296	42,919	73,061	9,166
	Fish	37,648	29,187	47,236	5,519
	KTNE	54,198	44,828	64,699	6,058
	Kenai	943,784	913,438	973,810	18,349
	Kasilof	670,243	644,903	695,821	15,588
	Harvest represented	2,031,483			
	Harvest unrepresented	9,797			
	Total Harvest	2,041,280			
2010[c]	*Crescent*	51,025	46,483	56,466	3,057
	West	204,880	187,051	223,389	11,027
	JCL	55,659	46,016	66,127	6,129
	SusYen	58,425	47,281	70,688	7,125
	Fish	93,905	81,945	106,752	7,548
	KTNE	78,996	67,471	91,598	7,360
	Kenai	1,821,553	1,791,995	1,850,794	17,872
	Kasilof	423,296	404,867	442,301	11,366
	Harvest represented	2,787,738			
	Harvest unrepresented	36,494			
	Total Harvest	2,824,232			

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Table 3.–Page 3 of 6.

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

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Table 3.–Page 4 of 6.

Year	Reporting Group	Mean	90% CI 5%	90% CI 95%	SD
2014	*Crescent*	32,555	30,045	35,226	1,809
	West	164,220	87,101	236,147	45,058
	JCL	56,109	32,826	82,212	15,068
	SusYen	67,659	34,078	124,917	27,974
	Fish	12,424	1,813	30,557	9,728
	KTNE	53,306	25,842	115,557	27,478
	Kenai	1,406,865	1,329,437	1,483,643	46,966
	Kasilof	327,136	277,631	379,368	31,014
	Harvest represented	2,120,276			
	Harvest unrepresented	223,106			
	Total Harvest	2,343,382			
2015[d]	*Crescent*	40,194	32,902	52,502	6,102
	West	130,819	100,289	178,524	23,551
	JCL	40,993	27,230	57,134	9,188
	SusYen	159,452	111,357	206,679	28,798
	Fish	17,283	8,015	29,737	6,704
	KTNE	36,978	22,092	55,376	10,295
	Kenai	1,658,415	1,593,069	1,723,423	39,618
	Kasilof	427,887	379,353	476,957	29,688
	Harvest represented	2,512,019			
	Harvest unrepresented	137,058			
	Total Harvest	2,649,077			
2016[d, e]	*Crescent*	32,300	26,298	39,348	4,796
	West	31,845	21,633	48,749	8,780
	JCL	47,927	34,022	63,921	9,140
	SusYen	76,635	42,669	122,867	25,155
	Fish	21,481	11,682	34,106	6,962
	KTNE	53,462	35,526	74,593	11,958
	Kenai	1,973,123	1,910,957	2,030,020	36,302
	Kasilof	146,521	108,136	187,852	24,211
	Harvest represented	2,383,292			
	Harvest unrepresented	13,493			
	Total Harvest	2,396,785			

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Table 3.–Page 5 of 6.

Year	Reporting Group	Mean	90% CI 5%	90% CI 95%	SD
2017	*Crescent*	55,339	38,898	76,144	11,316
	West	201,200	170,122	233,194	19,413
	JCL	37,489	25,064	51,691	8,089
	SusYen	148,646	113,353	187,813	23,061
	Fish	61,785	44,328	81,572	11,329
	KTNE	69,156	48,384	93,114	13,637
	Kenai	906,523	846,051	965,981	36,297
	Kasilof	332,623	290,424	376,533	26,991
	Harvest represented	1,812,761			
	Harvest unrepresented	36,089			
	Total Harvest	1,848,850			
2018	*Crescent*	36,321	30,811	43,325	4,092
	West	76,940	51,954	105,697	16,846
	JCL	52,596	39,648	66,503	8,124
	SusYen	50,558	29,949	76,528	14,507
	Fish	34,167	24,454	45,202	6,396
	KTNE	35,292	20,341	55,310	10,963
	Kenai	317,200	288,663	346,923	18,205
	Kasilof	204,000	181,477	225,759	13,676
	Harvest represented	807,072			
	Harvest unrepresented	10,724			
	Total Harvest	817,796			
2019	*Crescent*	76,903	64,972	93,932	9,061
	West	144,818	118,275	179,131	18,514
	JCL	36,979	26,925	48,568	6,760
	SusYen	39,319	21,087	60,689	12,199
	Fish	9,346	3,537	20,248	5,203
	KTNE	38,511	24,334	56,420	10,173
	Kenai	1,248,570	1,201,224	1,293,305	28,146
	Kasilof	120,908	87,445	157,705	21,177
	Harvest represented	1,715,352			
	Harvest unrepresented	4,943			
	Total Harvest	1,720,295			

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Note: 90% credibility intervals and standard deviations for harvest years prior to 2014 may differ from what was originally reported due a different rounding procedure used when summarizing the BAYES output for this report. The harvest numbers used in this table were pulled from the fish ticket database when these estimates were originally reported and, therefore, may not match current harvest numbers in the database.

[a] Estimates for 2007 differ from what was previously reported in Barclay et al. (2010a, 2010b, 2013, 2017, 2018) and Barclay (2017, 2019) due to an error in the Kasilof Section July 16–21, 2007, stock composition estimates was corrected for this report.

[b] Estimates for 2008 differ from what was previously reported in Barclay et al. (2010a, 2010b, 2013, 2017, 2018) and Barclay (2017, 2019) because of a correction made to the harvest represented for the Upper Subdistrict.

[c] Estimates for 2010 differ from what was previously reported in Barclay et al. (2013) because Western Subdistrict harvests were not included in that report because the BAYES chains for the Western Subdistrict mixture failed to converge due to a missing baseline population. Harvest for the Western Subdistrict is reported here for 2010 after the mixture was reanalyzed using the updated baseline.

[d] Estimates for 2015 and 2016 differ from what was reported in Barclay (2017) due to an error in the fish ticket database that put some districtwide harvests in the wrong statistical area; therefore, those harvests were not included in the represented harvest in that report. The stock-specific harvest estimates in this report have been recalculated using the correct harvest numbers.

[e] Estimates for 2016 differ from what was reported in Barclay (2019) due to a correction made to the harvest represented for the Central District drift gillnet (excluding corridor-only periods) fishery.

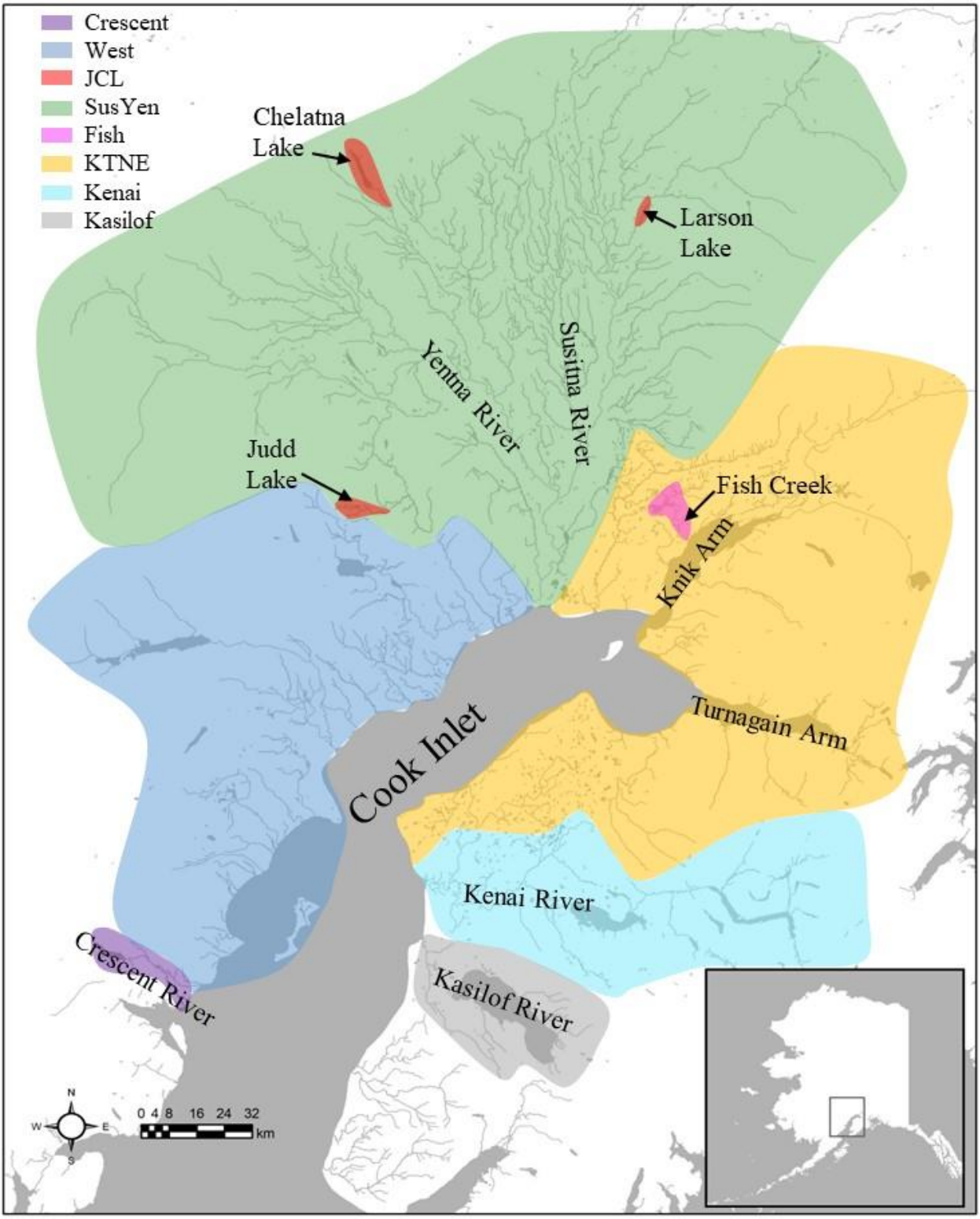

Figure 1.– Map of Cook Inlet showing reporting group areas for genetic mixed stock analysis of sockeye salmon harvest samples.

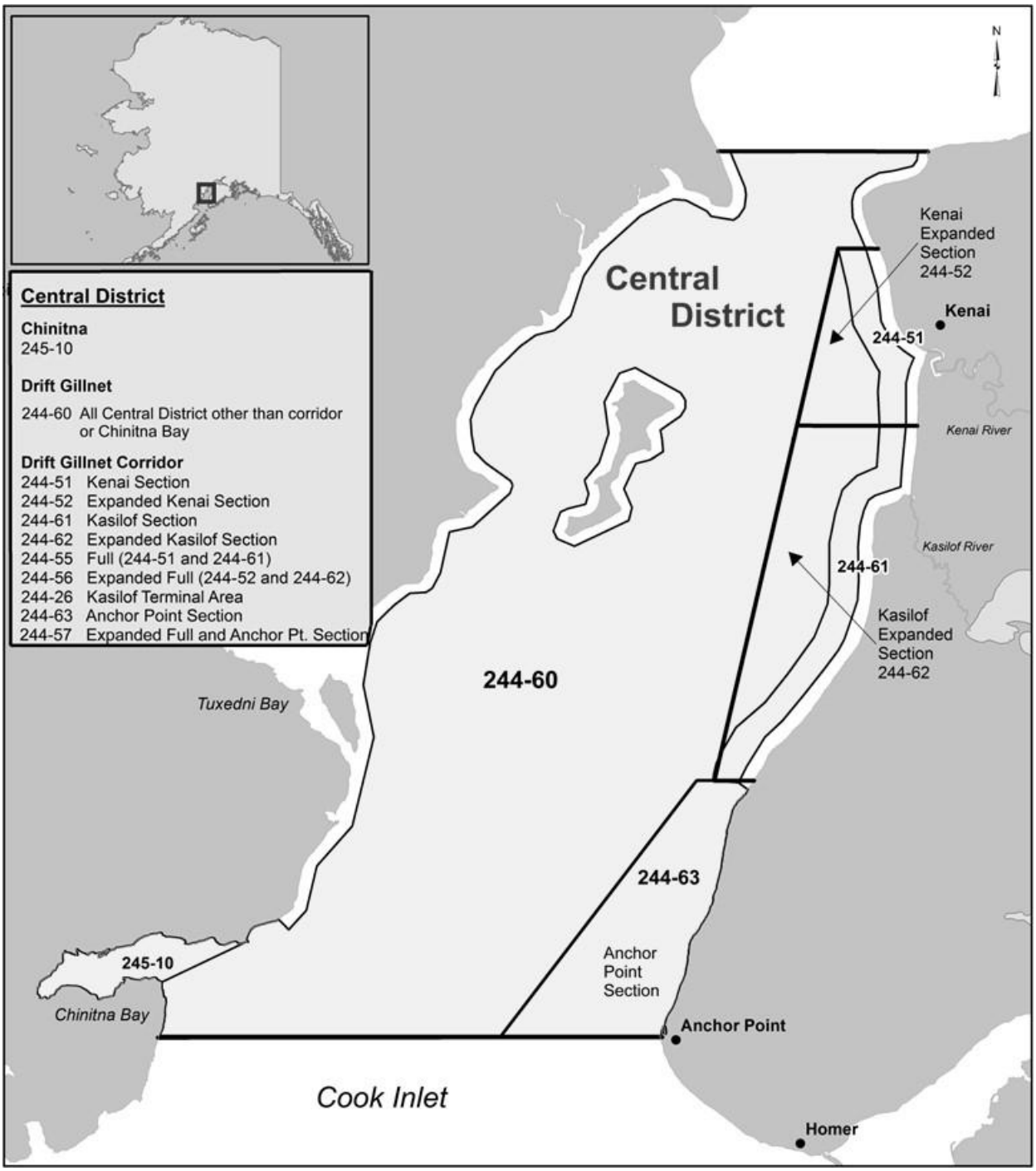

Figure 2.– Map of Upper Cook Inlet showing commercial fishing boundaries (statistical areas) within the Central district drift gillnet fishery, including the Kenai and Kasilof sections and expanded sections.

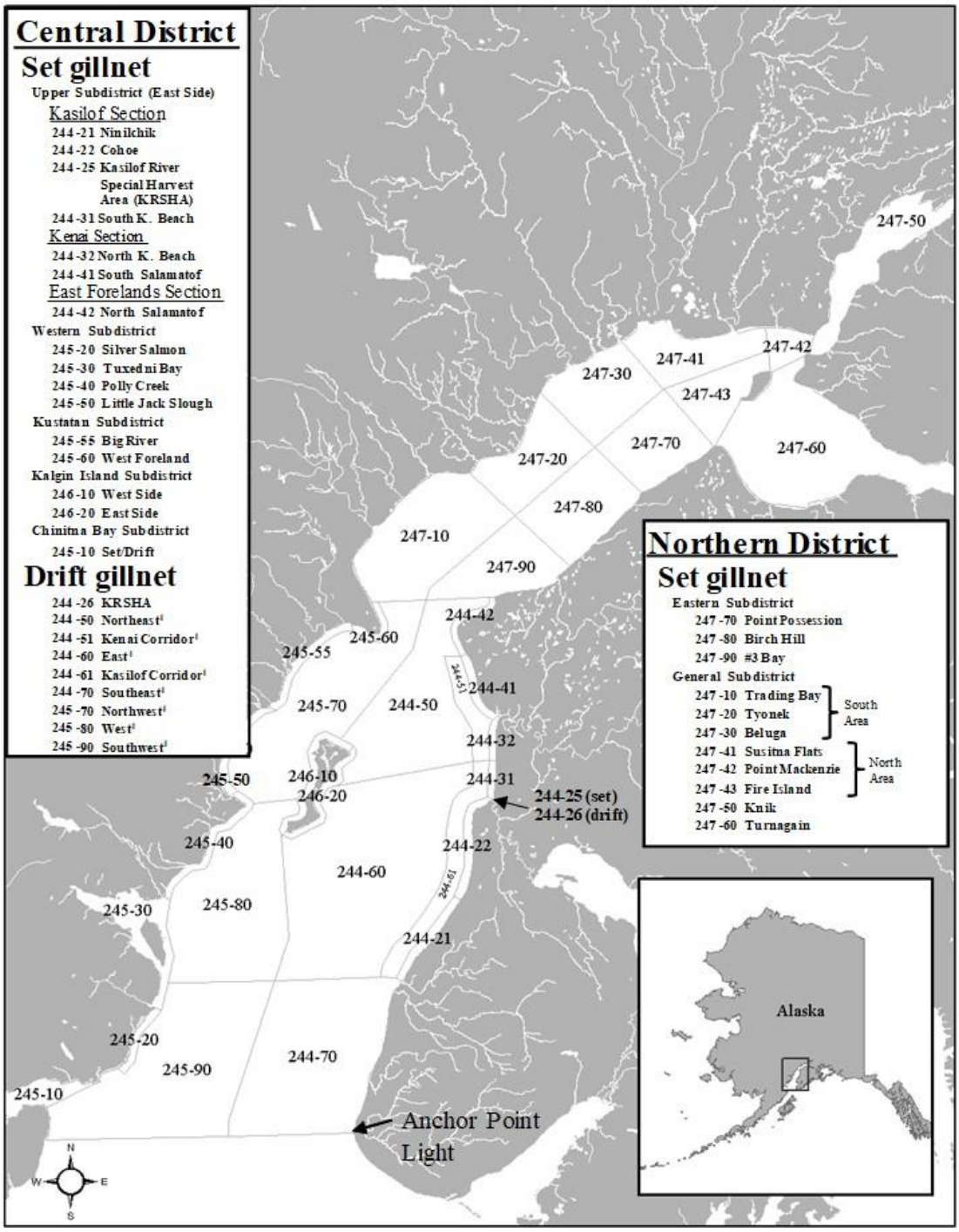

Figure 3.–Map of Upper Cook Inlet showing commercial fishing boundaries (statistical areas) for subdistricts and selected sections and subsections within the Northern and Central districts for both set and drift gillnet fisheries. See Figure 6 for a map of the Kasilof River Special Harvest Area (KRSHA).

Note: Districts, subdistricts, and sections are defined in Alaska Administrative Code (5 AAC 21.200).

[1] These stat areas are grouped into one stat area (244-60) in Figure 2 and Appendices A and B to represent all Central District drift gillnet areas excluding Chinitna Bay.

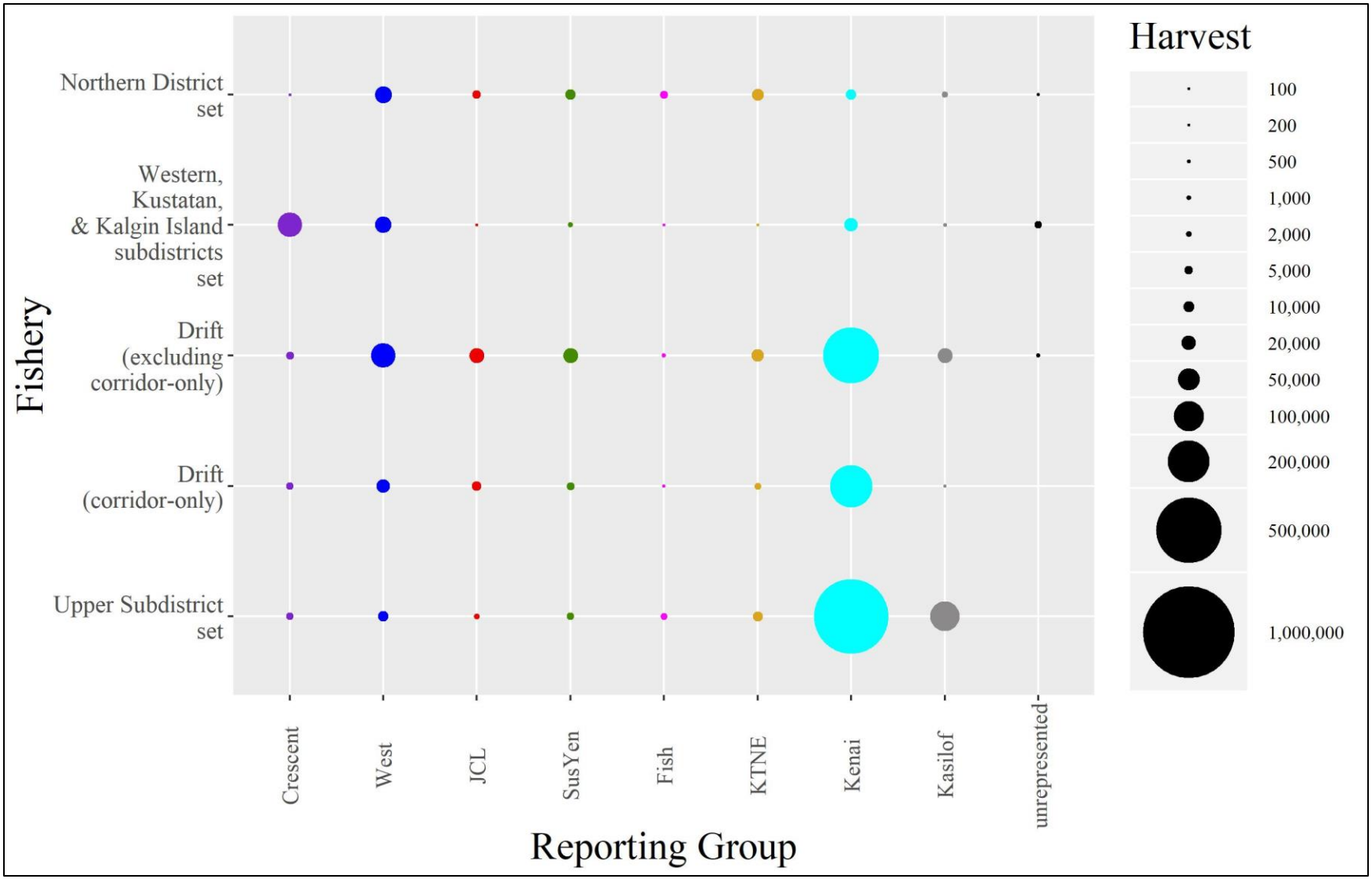

Figure 4.–Sockeye salmon harvest estimates and harvest not included in the analysis (unrepresented) by stock (reporting group), Upper Cook Inlet commercial fishery, 2019.

Key: Black circles indicate the portion of the total harvest from each fishery not represented in the analysis (unrepresented).

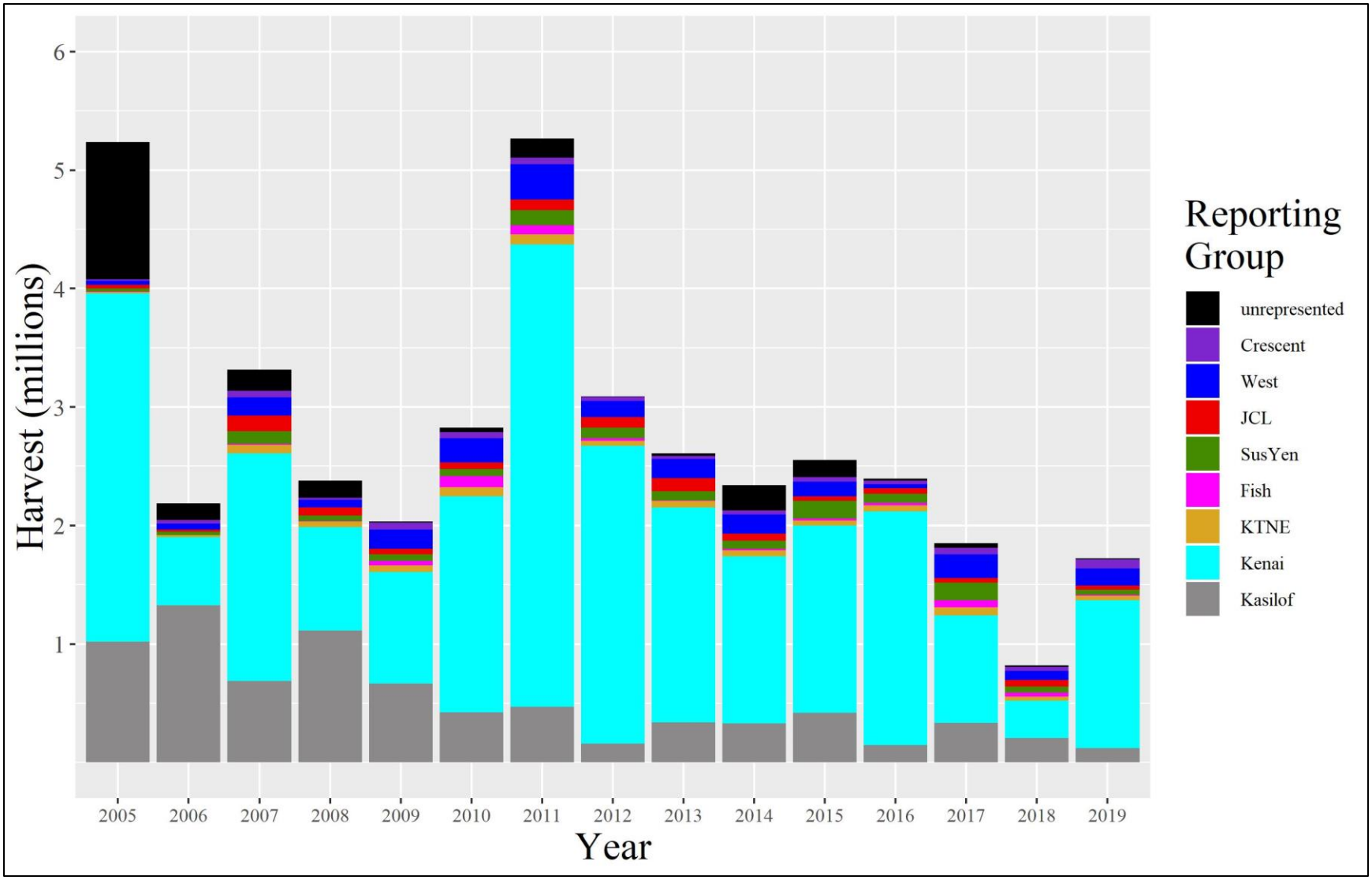

Figure 5.–Overall Cook Inlet commercial fishery stratified harvest estimates for sockeye salmon by stock for 2005–2019. Black bars indicate the portion of the total harvest from each year not represented in the analysis (unrepresented).

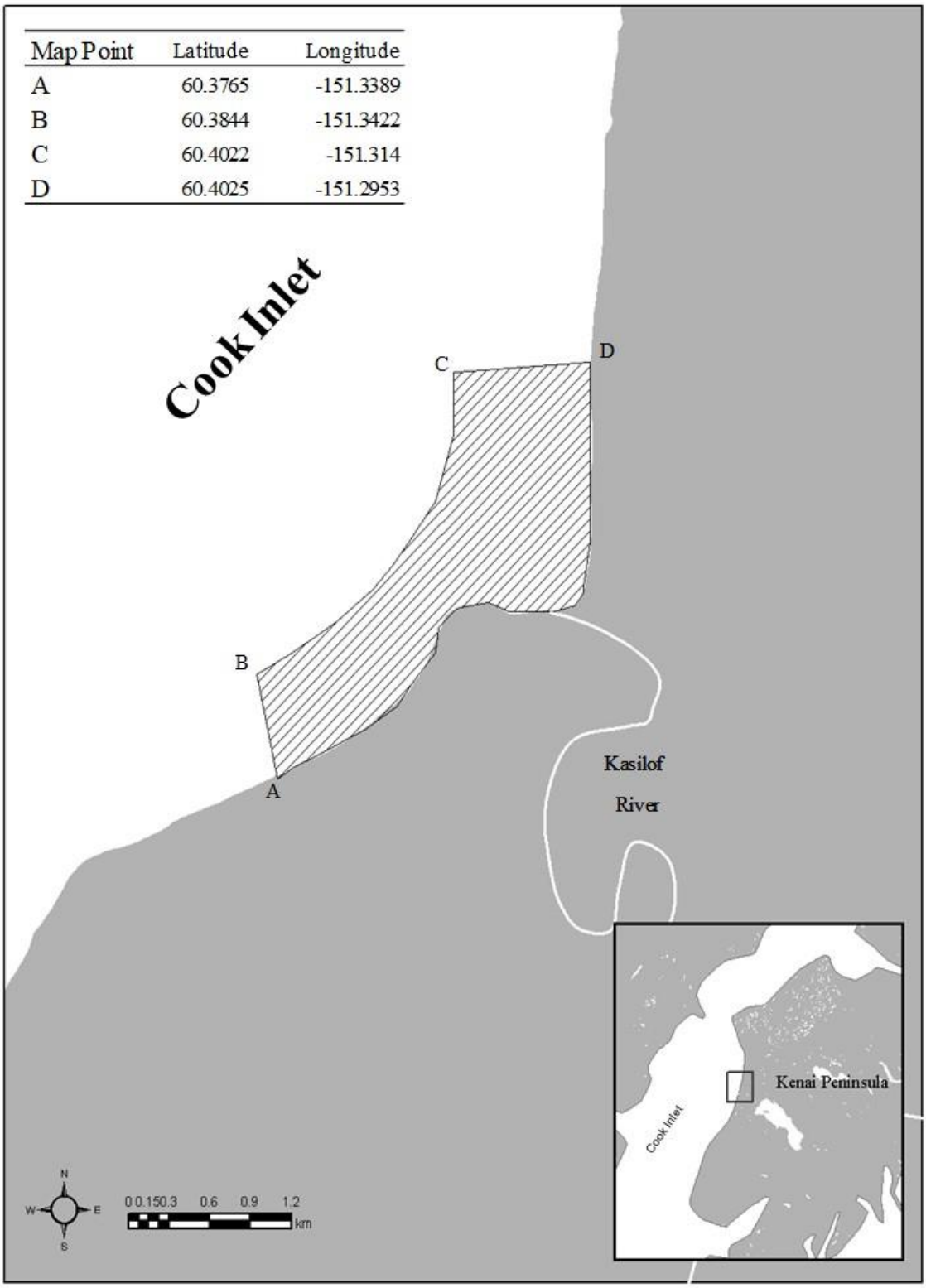

Figure 6.–Map of the mouth of the Kasilof River showing management fishing boundaries for the Kasilof River Special Harvest Area (Central District, Upper Subdistrict).

APPENDIX A: SAMPLE COLLECTION INFORMATION, 2019

Appendix A1.–Statistical area; sampling dates; numbers of fish sampled, genotyped, and used in MSA; and mixture dates and number for sockeye salmon harvested in the Upper Cook Inlet commercial fishery in 2019. Mixture numbers correspond to mixture numbers in Table 1. Maps of statistical areas can be found in Figures 2 and 3.

		Number of Fish			Mixture	
Statistical Area(s)	Sample Date	Sampled	Genotyped	Used	Dates	Number
Central District drift gillnet						
244-60	6/20/2019	63	2	2	6/20–7/22	1
244-60	6/24/2019	192	2	2	6/20–7/22	1
244-60	6/27/2019	384	2	2	6/20–7/22	1
244-60	7/1/2019	452	8	8	6/20–7/22	1
244-60	7/4/2019	445	12	10	6/20–7/22	1
244-60	7/8/2019	528	30	30	6/20–7/22	1
244-60	7/11/2019	480	45	42	6/20–7/22	1
244-60	7/15/2019	480	65	62	6/20–7/22	1
244-60	7/18/2019	480	114	111	6/20–7/22	1
244-60	7/22/2019	480	99	93	6/20–7/22	1
244-60	7/29/2019	480	211	202	7/29–8/22	2
244-60	8/1/2019	288	120	111	7/29–8/22	2
244-60	8/8/2019	192	32	31	7/29–8/22	2
244-60	8/12/2019	192	12	11	7/29–8/22	2
244-60	8/15/2019	96	4	4	7/29–8/22	2
244-57	7/25/2019	480	212	210	7/25–8/11	3
244-57	8/5/2019	192	168	148	7/25–8/11	3
Central District-Upper Subdistrict set gillnet						
244-21 & 22	6/27/2019	192	10	10	6/27–8/3	4
244-31	6/27/2019	91	2	2	6/27–8/3	4
244-21 & 22	7/1/2019	96	12	7	6/27–8/3	4
244-31	7/1/2019	48	3	2	6/27–8/3	4
244-21 & 22	7/4/2019	192	5	5	6/27–8/3	4
244-31	7/4/2019	168	2	2	6/27–8/3	4
244-21 & 22	7/8/2019	240	9	9	6/27–8/3	4
244-31	7/8/2019	144	3	3	6/27–8/3	4
244-32	7/8/2019	72	2	2	6/27–8/3	4
244-41	7/8/2019	144	2	2	6/27–8/3	4
244-42	7/8/2019	144	1	1	6/27–8/3	4
244-21 & 22	7/11/2019	240	7	7	6/27–8/3	4
244-31	7/11/2019	137	2	2	6/27–8/3	4
244-32	7/11/2019	144	3	3	6/27–8/3	4
244-41	7/11/2019	144	7	7	6/27–8/3	4
244-42	7/11/2019	144	3	3	6/27–8/3	4

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		Number of Fish			Mixture	
Statistical Area(s)	Sample Date	Sampled	Genotyped	Used	Dates	Number
Central District-Upper Subdistrict set gillnet (*continued*)						
244-21 & 22	7/15/2019	240	6	5	6/27–8/3	4
244-31	7/15/2019	192	2	2	6/27–8/3	4
244-32	7/15/2019	144	4	3	6/27–8/3	4
244-41	7/15/2019	192	6	6	6/27–8/3	4
244-42	7/15/2019	192	3	2	6/27–8/3	4
244-21 & 22	7/18/2019	240	7	6	6/27–8/3	4
244-31	7/18/2019	192	3	3	6/27–8/3	4
244-32	7/18/2019	144	5	4	6/27–8/3	4
244-41	7/18/2019	192	10	9	6/27–8/3	4
244-42	7/18/2019	192	4	4	6/27–8/3	4
244-21 & 22	7/22/2019	192	4	4	6/27–8/3	4
244-31	7/22/2019	192	1	1	6/27–8/3	4
244-32	7/22/2019	96	4	3	6/27–8/3	4
244-41	7/22/2019	192	17	16	6/27–8/3	4
244-42	7/22/2019	192	6	6	6/27–8/3	4
244-21 & 22	7/25/2019	192	9	8	6/27–8/3	4
244-31	7/25/2019	144	4	4	6/27–8/3	4
244-32	7/25/2019	120	7	6	6/27–8/3	4
244-41	7/25/2019	144	24	22	6/27–8/3	4
244-42	7/25/2019	144	8	8	6/27–8/3	4
244-21 & 22	7/28/2019	192	18	17	6/27–8/3	4
244-31	7/28/2019	96	5	4	6/27–8/3	4
244-21 & 22	7/29/2019	192	11	10	6/27–8/3	4
244-31	7/29/2019	144	3	2	6/27–8/3	4
244-32	7/29/2019	96	13	13	6/27–8/3	4
244-41	7/29/2019	144	21	20	6/27–8/3	4
244-42	7/29/2019	144	9	9	6/27–8/3	4
244-21 & 22	8/1/2019	192	25	24	6/27–8/3	4
244-31	8/1/2019	96	4	2	6/27–8/3	4
244-32	8/1/2019	48	9	8	6/27–8/3	4
244-41	8/1/2019	144	32	30	6/27–8/3	4
244-42	8/1/2019	144	20	18	6/27–8/3	4
244-31	8/3/2019	48	1	1	6/27–8/3	4
244-21 & 22	7/13/2019	192	119	112	7/13 & 21	5
244-21 & 22	7/21/2019	192	142	49	7/13 & 21	5
244-31	7/13/2019	192	50	140	7/13 & 21	5
244-31	7/21/2019	192	67	67	7/13 & 21	5
244-32	7/13/2019	384	107	105	7/13 & 21	6
244-32	7/21/2019	400	272	262	7/13 & 21	6

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		Number of Fish			Mixture	
Statistical Area(s)	Sample Date	Sampled	Genotyped	Used	Dates	Number
Central District-Western, Kustatan, and Kalgin Island subdistricts set gillnet						
245-30	6/17/2019	48	4	4	6/10–8/15	7
246-10	6/17/2019	48	10	8	6/10–8/15	7
245-30 & 50	6/20/2019	48	3	2	6/10–8/15	7
246-10	6/21/2019	48	2	2	6/10–8/15	7
245-30 & 50	6/24/2019	48	4	3	6/10–8/15	7
246-10	6/24/2019	48	1	1	6/10–8/15	7
245-30 & 50	6/27/2019	24	5	4	6/10–8/15	7
246-10 & 20	6/27/2019	48	3	3	6/10–8/15	7
245-30 & 50	7/1/2019	48	7	6	6/10–8/15	7
246-10 & 20	7/1/2019	24	4	4	6/10–8/15	7
245-30 & 50	7/4/2019	48	11	9	6/10–8/15	7
246-10 & 20	7/4/2019	48	5	5	6/10–8/15	7
245-30 & 50	7/8/2019	48	12	10	6/10–8/15	7
246-10 & 20	7/8/2019	48	16	13	6/10–8/15	7
245-30 & 50	7/11/2019	48	28	12	6/10–8/15	7
246-10 & 20	7/11/2019	48	6	6	6/10–8/15	7
245-30	7/15/2019	48	25	22	6/10–8/15	7
246-10 & 20	7/15/2019	48	31	27	6/10–8/15	7
245-30 & 50	7/18/2019	48	20	8	6/10–8/15	7
245-30 & 50	7/22/2019	48	26	23	6/10–8/15	7
246-10 & 20	7/22/2019	48	13	11	6/10–8/15	7
245-30 & 50	7/25/2019	48	30	16	6/10–8/15	7
246-10 & 20	7/25/2019	48	5	5	6/10–8/15	7
245-30 & 50	7/29/2019	24	24	22	6/10–8/15	7
246-10 & 20	7/29/2019	48	10	9	6/10–8/15	7
245-30 & 50	8/1/2019	24	10	6	6/10–8/15	7
246-10 & 20	8/1/2019	24	8	7	6/10–8/15	7
245-30 & 50	8/5/2019	24	14	12	6/10–8/15	7
246-10 & 20	8/5/2019	23	14	12	6/10–8/15	7
245-30 & 50	8/8/2019	24	8	7	6/10–8/15	7
246-10 & 20	8/8/2019	24	22	19	6/10–8/15	7

-continued-

Statistical Area(s)	Sample Date	Number of Fish			Mixture	
		Sampled	Genotyped	Used	Dates	Number
Northern District-Eastern and General subdistricts set gillnet						
247-70, 80, & 90	7/4/2019	130	13	12	6/27–8/22	8
247-70, 80, & 90	7/8/2019	96	10	9	6/27–8/22	8
247-70, 80, & 90	7/11/2019	144	13	13	6/27–8/22	8
247-70, 80, & 90	7/15/2019	144	11	11	6/27–8/22	8
247-70, 80, & 90	7/18/2019	131	14	13	6/27–8/22	8
247-70, 80, & 90	7/22/2019	96	17	14	6/27–8/22	8
247-70, 80, & 90	7/25/2019	96	32	31	6/27–8/22	8
247-70, 80, & 90	7/29/2019	48	14	13	6/27–8/22	8
247-70, 80, & 90	8/1/2019	48	10	10	6/27–8/22	8
247-70, 80, & 90	8/5/2019	48	16	14	6/27–8/22	8
247-70, 80, & 90	8/8/2019	24	6	6	6/27–8/22	8
247-70, 80, & 90	8/12/2019	72	4	4	6/27–8/22	8
247-70, 80, & 90	8/15/2019	8	8	8	6/27–8/22	8
247-41, 42, & 43	7/8/2019	29	2	2	6/27–8/22	8
247-41, 42, & 43	7/11/2019	24	3	3	6/27–8/22	8
247-41, 42, & 43	7/15/2019	72	8	7	6/27–8/22	8
247-41, 42, & 43	7/18/2019	48	8	7	6/27–8/22	8
247-41, 42, & 43	7/22/2019	48	8	8	6/27–8/22	8
247-41, 42, & 43	7/25/2019	48	5	5	6/27–8/22	8
247-41, 42, & 43	7/29/2019	24	10	10	6/27–8/22	8
247-41, 42, & 43	8/1/2019	24	4	4	6/27–8/22	8
247-41, 42, & 43	8/8/2019	48	4	4	6/27–8/22	8
247-41, 42, & 43	8/12/2019	24	2	2	6/27–8/22	8
247-41, 42, & 43	8/15/2019	24	1	1	6/27–8/22	8
247-10, 20, & 30	7/4/2019	48	7	6	6/27–8/22	8
247-10, 20, & 30	7/8/2019	48	9	9	6/27–8/22	8
247-10, 20, & 30	7/11/2019	96	12	12	6/27–8/22	8
247-10, 20, & 30	7/15/2019	72	14	13	6/27–8/22	8
247-10, 20, & 30	7/18/2019	48	16	15	6/27–8/22	8
247-10, 20, & 30	7/22/2019	48	22	22	6/27–8/22	8
247-10, 20, & 30	7/25/2019	48	18	18	6/27–8/22	8
247-10, 20, & 30	7/29/2019	48	20	20	6/27–8/22	8
247-10, 20, & 30	8/1/2019	48	8	8	6/27–8/22	8
247-10, 20, & 30	8/5/2019	48	13	12	6/27–8/22	8
247-10, 20, & 30	8/8/2019	48	9	8	6/27–8/22	8
247-10, 20, & 30	8/12/2019	48	4	3	6/27–8/22	8
247-10, 20, & 30	8/15/2019	48	6	6	6/27–8/22	8

[a] These samples were only collected from Western and Kalgin Island subdistrict harvests but were used to represent harvests from Kustatan Subdistrict.

APPENDIX B: UPPER COOK INLET COMMERCIAL SOCKEYE SALMON HARVEST BY STATISTICAL AREA AND DATE, 2019

Appendix B1.–Commercial sockeye salmon harvest by area and date in Upper Cook Inlet, 2019. Harvest numbers were pulled from fish ticket database on November 24, 2019.

Key: Represented harvest is shaded in dark gray if sampled and light gray if unsampled. The harvest represented for each genetic mixed stock analysis stratum (mixture; Table 1) is indicated with black outlines. The harvest represented for strata where the fishery was restricted to within 600 feet or a half-mile of the mean high tide mark are indicated by bold numbers.

Central District drift gillnet

	Statistical Area		
Date	244-57	244-60	245-10
6/20/2019		1,961	
6/24/2019		2,182	
6/27/2019		2,491	
7/1/2019		7,962	
7/4/2019		12,017	
7/8/2019		30,397	
7/11/2019		45,344	
7/15/2019		64,412	
7/18/2019		114,240	
7/22/2019		98,400	
7/25/2019	87,200		
7/28/2019	45,338		
7/29/2019		73,029	
7/31/2019	33,789		
8/1/2019		41,444	
8/2/2019	7,489		
8/3/2019	8,274		
8/5/2019	23,553		
8/6/2019	17,149		
8/7/2019	10,095		
8/8/2019		11,600	
8/9/2019	2,732		
8/10/2019	1,511		
8/11/2019	268		
8/12/2019		4,238	
8/15/2019		864	
8/16/2019			614
8/19/2019		292	
8/20/2019			24
8/22/2019		131	
8/23/2019			16
8/26/2019		26	
8/29/2019		15	
9/5/2019		2	
9/9/2019		2	

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Central District-Upper Subdistrict set gillnet

	Statistical Area					
Date	244-21	244-22	244-31	244-32	244-41	244-42
6/27/2019	6,811	3,260	1,896			
6/29/2019	6,720	3,459	2,012			
7/1/2019	8,904	5,382	3,576			
7/4/2019	5,519	5,176	4,216			
7/8/2019	10,107	8,718	5,867	4,128	4,114	2,352
7/11/2019	7,714	6,212	4,668	6,539	14,373	6,334
7/13/2019	**5,227**	**4,507**	**4,112**	**3,227**		
7/15/2019	5,383	6,571	4,708	7,329	12,254	5,043
7/18/2019	5,481	8,011	5,563	8,938	19,751	7,758
7/21/2019	**6,085**	**5,656**	**5,524**	**8,076**		
7/22/2019	4,214	4,055	2,418	7,266	34,390	12,084
7/25/2019	8,532	8,928	8,699	13,125	47,460	16,731
7/28/2019	17,734	17,378	9,289	14,133	22,625	9,872
7/29/2019	13,064	8,774	5,280	12,666	20,067	8,433
7/31/2019	14,234	9,608	5,064	8,746	36,729	18,308
8/1/2019	7,165	7,136	2,554	5,551	14,923	13,050
8/2/2019	2,099	1,052	653	1,331		
8/3/2019	5,747	3,297	1,381	2,163	11,339	7,671

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Central District-West Side set gillnet

	Statistical Area						
Date	245-10	245-30	245-50	245-55	245-60	246-10	246-20
6/3/2019				181		1,057	
6/5/2019				230		598	
6/7/2019				267		1,053	
6/10/2019				295		1,022	
6/12/2019				117		633	
6/14/2019				196		655	
6/17/2019		458		234		694	
6/19/2019				107		284	
6/20/2019		531	70				
6/21/2019				113		422	
6/24/2019		936	249			333	
6/27/2019		1,361	125		101	532	392
7/1/2019		2,059	115			782	617
7/4/2019		3,362	83			1,342	363
7/8/2019		3,408	408			4,330	750
7/11/2019		4,120	364			1,260	780
7/13/2019		4,491					
7/15/2019		3,521				3,185	2,449
7/18/2019		2,163	703	97		3,368	1,002
7/20/2019		3,506					
7/22/2019		3,802	711	126	239	2,947	1,138
7/25/2019		4,611	1,108		177	830	933
7/27/2019		3,565					
7/29/2019		3,131	932		277	1,952	1,327
8/1/2019		1,782	419			1,787	771
8/3/2019		993					
8/5/2019		2,421	469		545	3,907	632
8/8/2019		1,051	328		138	1,257	791
8/10/2019						517	423
8/12/2019	10	388	171		43	566	920
8/15/2019	6	257	170			1,108	1,546
8/19/2019			47		1	34	296
8/22/2019							219
9/5/2019							2

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Northern District set gillnet

	Statistical Area								
Date	247-10	247-20	247-30	247-41	247-42	247-43	247-70	247-80	247-90
6/27/2019	43	199	60		9	5	225	188	244
7/1/2019	216	355	91		15	19	471	244	405
7/4/2019	82	241	110		41	6	294	105	276
7/8/2019	42	1,122	482	112	114	49	569	736	590
7/11/2019	70	2,005	212	140	272	154	388	1,585	616
7/15/2019	88	1,663	896	561	826	156	931	1,125	62
7/18/2019	93	2,220	818	709	581	287	1,251	1,004	341
7/22/2019	53	2,423	1,694	729	341	424	1,262	1,251	710
7/25/2019	383	2,378	743	418	336	279	2,250	2,719	1,244
7/29/2019	101	2,475	1,174	698	531	617	987	875	879
8/1/2019	9	1,166	369	167	455	129	257	562	1,106
8/5/2019	13	2,042	433	150	260	87	559	1,051	1,467
8/8/2019	375	956	319	63	161	96	322	354	498
8/12/2019	206	514		152	105	102	176	215	390
8/15/2019	211	503			26	17	157	282	522
8/19/2019	163	169		10	23	43	35	57	176
8/22/2019	73	56					99	140	141
8/26/2019	57	3					16	30	51
8/29/2019	18	1					7	3	33
9/2/2019									1
9/5/2019		2					6	4	9
9/9/2019								2	

APPENDIX C: CENTRAL DISTRICT DRIFT GILLNET STOCK COMPOSTION AND STOCK-SPECIFIC HARVEST BY DATE, 2019

Appendix C1.–Central District drift gillnet fishery, 2019: Temporal stratum stock composition (%) and stock-specific harvest estimates, including the final number of samples used in the genetic analysis (*n*), mean, 90% credibility interval (CI), and standard deviation (SD).

Excluding corridor-only periods

Dates: 6/20–7/22	Stock Composition (*n* = 362)				Harvest = 379,406			
		90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	0.7	0.0	2.4	0.8	2,573	0	8,928	3,176
West	14.2	9.4	20.2	3.3	53,757	35,795	76,593	12,433
JCL	5.0	2.9	7.4	1.4	19,075	11,173	28,240	5,199
SusYen	3.0	0.0	7.3	2.6	11,337	0	27,717	9,696
Fish	0.2	0.0	1.2	0.4	789	0	4,426	1,588
KTNE	3.1	1.3	5.4	1.3	11,604	4,926	20,540	4,757
Kenai	68.7	62.9	74.6	3.5	260,825	238,760	282,913	13,433
Kasilof	5.1	1.9	8.6	2.0	19,447	7,326	32,453	7,636
Dates: 7/29–8/22	Stock Composition (*n* = 359)				Harvest = 131,598			
		90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	1.8	0.0	4.4	1.4	2,337	0	5,787	1,896
West	8.4	5.4	11.6	1.9	11,013	7,147	15,258	2,483
JCL	1.9	0.6	3.5	0.9	2,448	817	4,642	1,184
SusYen	7.1	3.4	11.3	2.4	9,395	4,535	14,893	3,159
Fish	0.1	0.0	0.3	0.1	67	0	391	180
KTNE	1.8	0.0	5.9	2.0	2,424	0	7,700	2,673
Kenai	77.4	71.6	82.9	3.5	101,883	94,202	109,148	4,541
Kasilof	1.5	0.0	4.3	1.4	2,031	0	5,609	1,882

Corridor-only periods

Dates: 7/25–8/11	Stock Composition (*n* = 358)				Harvest = 237,398			
		90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	1.6	0.2	3.9	1.1	3,907	369	9,193	2,697
West	6.9	3.8	10.5	2.0	16,312	9,059	24,992	4,813
JCL	3.2	1.3	5.3	1.2	7,537	3,093	12,608	2,912
SusYen	1.9	0.0	6.6	2.4	4,462	0	15,786	5,596
Fish	0.1	0.0	0.7	0.3	289	0	1,769	715
KTNE	1.4	0.4	3.0	0.9	3,332	834	7,143	2,023
Kenai	84.7	79.1	89.5	3.1	201,177	187,874	212,577	7,433
Kasilof	0.2	0.0	0.9	0.4	381	0	2,138	961

Note: The 90% credibility intervals of harvest estimates may not include the point estimate for the very low harvest estimates.
Note: Stock composition and harvest estimates may not sum to 100% due to rounding errors.

APPENDIX D: CENTRAL DISTRICT SET GILLNET STOCK COMPOSTION AND STOCK-SPECIFIC HARVEST BY DATE, 2019

Appendix D1.–Upper Subdistrict set gillnet (Central District), 2019: Stock composition (%) and stock-specific harvest estimates, including the final number of samples used in the genetic analysis (*n*), mean, 90% credibility interval (CI), and standard deviation (SD).

All sections (excluding July 13 and 21 periods)

Dates: 6/27–8/3	Stock Composition (*n* = 347)				Harvest = 741,865			
		90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	0.5	0.0	2.4	0.9	3,382	0	18,062	6,800
West	1.2	0.0	4.3	1.6	8,870	0	31,963	11,515
JCL	0.3	0.0	1.0	0.4	2,024	0	7,675	2,845
SusYen	0.1	0.0	0.8	0.4	1,008	0	6,150	2,846
Fish	0.4	0.0	1.8	0.6	3,200	0	13,003	4,564
KTNE	1.0	0.0	3.2	1.1	7,300	0	23,728	8,156
Kenai	85.7	80.6	90.2	3.0	635,475	597,751	669,382	22,509
Kasilof	10.9	6.8	15.5	2.7	80,607	50,449	114,738	19,678

Kasilof Section half-mile[a]

Dates: 7/13 & 7/21	Stock Composition (*n* = 368)				Harvest = 31,111			
		90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	0.4	0.0	1.8	0.7	121	0	574	206
West	1.3	0.0	5.9	2.0	390	0	1,845	620
JCL	0.1	0.0	0.8	0.3	43	0	243	102
SusYen	8.3	4.5	12.6	2.5	2,598	1,390	3,930	771
Fish	0.9	0.1	2.3	0.7	283	16	703	218
KTNE	0.8	0.0	3.1	1.1	247	0	958	331
Kenai	60.9	54.7	67.0	3.8	18,942	17,023	20,830	1,169
Kasilof	27.3	21.9	32.6	3.3	8,487	6,806	10,134	1,015

Kenai Section, North K-Beach 600ft[b]

Dates: 7/13 & 7/21	Stock Composition (*n* = 367)				Harvest = 11,303			
		90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	0.7	0.0	2.9	1.0	80	0	326	112
West	1.1	0.0	5.5	1.9	129	0	627	215
JCL	0.1	0.0	0.7	0.3	14	0	79	32
SusYen	0.3	0.0	1.6	0.6	37	0	181	70
Fish	0.2	0.0	0.9	0.4	19	0	107	40
KTNE	1.9	0.0	4.6	1.5	210	0	524	175
Kenai	36.2	30.9	41.4	3.2	4,086	3,496	4,685	361
Kasilof	59.5	54.3	64.5	3.2	6,727	6,136	7,295	359

Note: The 90% credibility intervals of harvest estimates may not include the point estimate for the very low harvest estimates.

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

[a] This mixture represents fishing periods restricted to within half-mile of the mean high tide mark

[b] This mixture represents fishing periods restricted to within 600 feet of the mean high tide mark.

Appendix D2.–Western, Kustatan, and Kalgin Island subdistricts (Central District) set gillnet, 2019: Stock composition (%) and stock-specific harvest estimates, including the final number of samples used in the genetic analysis (*n*), mean, 90% credibility interval (CI), and standard deviation (SD).

Dates: 6/10–8/15	Stock Composition (*n* = 298)				Harvest = 109,694			
		90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	58.6	52.5	64.9	3.8	64,301	57,546	71,204	4,200
West	23.6	17.5	30.1	3.8	25,925	19,203	32,977	4,184
JCL	0.1	0.0	0.5	0.2	93	0	539	265
SusYen	1.5	0.0	6.2	2.2	1,671	0	6,790	2,377
Fish	0.1	0.0	0.5	0.2	90	0	503	253
KTNE	0.1	0.0	0.5	0.3	95	0	505	312
Kenai	15.5	10.0	21.1	3.3	16,979	11,009	23,106	3,659
Kasilof	0.5	0.0	2.3	0.8	540	0	2,487	889

Note: The 90% credibility intervals of harvest estimates may not include the point estimate for the very low harvest estimates.
Note: Stock composition and harvest estimates may not sum to 100% due to rounding errors.

APPENDIX E: NORTHERN DISTRICT SET GILLNET STOCK COMPOSTION AND STOCK-SPECIFIC HARVEST BY DATE, 2019

Appendix E1.–Eastern and General subdistricts (Northern District) set gillnet fisheries, 2019: stock composition (%) and stock-specific harvest estimates, including the final number of samples used in the genetic analysis (*n*), mean, 90% credibility interval (CI), and standard deviation (SD).

Dates: 6/27–8/22	Stock Composition (*n* = 363)				Harvest = 72,977			
		90% CI				90% CI		
Reporting Group	Mean	5%	95%	SD	Mean	5%	95%	SD
Crescent	0.3	0.0	1.7	0.7	202	0	1,216	476
West	38.9	33.6	44.3	3.3	28,422	24,553	32,320	2,382
JCL	7.9	5.3	10.7	1.7	5,746	3,847	7,828	1,221
SusYen	12.1	7.7	16.8	2.8	8,811	5,645	12,272	2,021
Fish	6.3	3.0	10.8	2.4	4,608	2,194	7,846	1,776
KTNE	18.2	12.1	24.3	3.7	13,298	8,841	17,716	2,725
Kenai	12.6	8.1	17.5	2.8	9,203	5,941	12,783	2,063
Kasilof	3.7	1.1	6.5	1.6	2,688	782	4,716	1,187

Note: The 90% credibility intervals of harvest estimates may not include the point estimate for the very low harvest estimates.
Note: Stock composition and harvest estimates may not sum to 100% due to rounding errors.

APPENDIX F: UPPER COOK INLET COMMERCIAL AND OFFSHORE TEST FISHERIES GENETIC MIXED-STOCK ANALYSIS STRATA, 2005–2019

Appendix F1.–Temporal strata analyzed in genetic mixed stock analysis of the Upper Cook Inlet commercial drift and set gillnet fisheries and Offshore Test fishery in 2005–2019, including: fishery, area name, statistical areas, year reported, and restriction (R) for each stratum.

Key: Gray boxes indicate which years were reported for a given stratum; "h" indicates that stock proportions and stock-specific harvests were reported, and "p" indicates that only stock proportions were reported.

			Year															
Fishery	Area	Stat. Area(s)	2005[a]	2006[a]	2007[a]	2008[a]	2009[b]	2010[c]	2011[d]	2012[e]	2013[e]	2014[f]	2015[g]	2016[g]	2017[g]	2018[g]	2019[h]	R[i]
Central District drift	Districtwide[j]	244-60	h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	
	Corridor	244-55		h														
		244-56							h	h								
		244-57															h	
		244-56, 57									h	h	h	h	h			
Upper Subdistrict set/drift	Kasilof River Special Harvest Area	244-26		h														
		244-25, 26		h		h										h		
		244-25		h														
Upper Subdistrict set	Kasilof Section	244-21, 22, 31	h	h	h	h	h	h	h	h	h	h						
		244-21, 22, 31		h			h										h	0.5 mi
		244-21, 22, 31											p					1.5 mi
		244-21, 22, 31											p			h		600 ft
		244-21, 22	p	p	p	p	p	p	p	p	p							
		244-31	p	p	p	p	p	p	p	p	p							
	Kenai/East Foreland sections	244-32, 41, 42	h	h	h	h	h	h	h	h	h	h						
		244-32	p	p	p	p	p	p	p	p	p							
		244-32														h	h	600 ft
		244-41, 42	p	p	p	p	p	p	p	p	p							
	Subdistrictwide	244-21, 22, 31, 32, 41, 42											h	h	h	h	h	

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Fishery	Area	Stat. Area(s)	Year															R[i]
			2005[a]	2006[a]	2007[a]	2008[a]	2009[b]	2010[c]	2011[d]	2012[e]	2013[e]	2014[f]	2015[g]	2016[g]	2017[g]	2018[g]	2019[h]	
Kalgin Island Subdistrict set	Subdistrictwide	246-10, 20		h	h	h	h	h	h	h	h	h						
Western Subdistrict	Subdistrictwide[j]	245-20, 30 40, 50		h	h	h	h	h	h	h	h							
Western/ Kustatan subdistricts	Subdistrictwide[j]	245-20, 30 40, 50, 55, 60										h						
Western/ Kustatan/ Kalgin Island subdistricts	Subdistrictwide[j]	245-20, 30 40, 55, 60; 246-10, 20											h	h	h	h	h	
Eastern Subdistrict set	Subdistrictwide	247-70, 80, 90		h	h	h	h	h	h	h	h	h						
General Subdistrict set	Subdistrictwide	247-10, 20, 30, 41, 42, 43				h			h			h						
	Southwest	247-10, 20, 30					h	h			h							
	Northwest	247-41, 42, 43					h	h		h								
Eastern/ General Subdistricts set	Subdistrictwide	247-10, 20, 30, 41, 42, 43,70, 80, 90											h	h	h	h	h	

[a] 2005–2008 estimates reported in Barclay et al. (2010a; FMS 10-01).

[b] 2009 estimates reported in Barclay et al. (2010b; FDS 10-93).

[c] 2010 estimates reported in Barclay et al. (2013; FDS 13-56).

[d] 2011 estimates reported in Barclay et al. (2014; FDS 14-43).

[e] 2012 and 2013 estimates reported in Barclay et al. (2017; FDS 17-30).

[f] 2014 estimates reported in Barclay et al. (2018; FDS 18-08).

[g] 2015–2018 estimates reported in Barclay (2019; RIR 5J19-02).

[h] 2019 estimates reported in this report.

[i] Distance from the mean high tide mark in which the fishery was restricted.

[j] Central District drift and west Cook Inlet strata do not include Chinitna Bay (245-10, Appendix B1).

Appendix F2.–Strata analyzed in genetic mixed stock analysis of the Upper Cook Inlet Offshore Test fishery, 2005–2019: test fishery and years reported for each fishery. Both temporal and spatial strata were analyzed each year.

Test Fishery	Year														
	2005	2006[a]	2007[a]	2008[a]	2009[b]	2010[c]	2011[d]	2012[e]	2013[e]	2014[f]	2015	2016	2017	2018	2019
Southern transect															
Northern transect(s)															

[a] 2005–2008 estimates reported in Barclay et al. (2010a; FMS 10-01).

[b] 2009 estimates reported in Barclay et al. (2010b; FDS 10-93).

[c] 2010 estimates reported in Barclay et al. (2013; FDS 13-56).

[d] 2011 estimates reported in Barclay et al. (2014; FDS 14-43).

[e] 2012 and 2013 estimates reported in Barclay et al. (2017; FDS 17-30).

[f] 2014 estimates reported in Barclay et al. (2018; FDS 18-08).