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**Alaska Department of Fish and Game
Division of Commercial Fisheries
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Abundance, Age, Sex, and Size Statistics For Sockeye Salmon in Lower Cook Inlet, 1989

by

**Henry J. Yuen
Thomas R. Schroeder
Rance Morrison**

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ABSTRACT

The 1989 sockeye salmon (*Oncorhynchus nerka*) commercial catch in Lower Cook Inlet was sampled for age, sex, weight, and length. The number of areas opened to commercial fishing, especially for chum salmon, were reduced this year due to the presence of oil from the Exxon Valdez Oil spill. Only five sockeye fisheries that target primarily on discrete stocks were examined. A total of 163,271 sockeye and 11,305 chum (*O. nerka*) salmon were harvested in this management area. Another 55,500 sockeye and 126,800 chum salmon were estimated in the escapement. The dominant sockeye ages throughout Lower Cook Inlet were 1.2, 1.3, 2.2, and 2.3. Sex composition ranged from 58.58% females in the Eastern district to 56.91% males in the Kamishak district. Sockeye salmon harvested in the Outer and Eastern Districts tended to be larger, 549-567 mm and 2.36-2.93 kg, compared to 496-534 mm and 1.80-2.06 kg in the Southern and Kamishak Districts.

KEY WORDS: Age, length, Lower Cook Inlet, *Oncorhynchus*, salmon, sex, sockeye, weight

INTRODUCTION

The Lower Cook Inlet Management Area for salmon is comprised of all waters west of the longitude of Cape Fairfield in the Gulf of Alaska, north of the latitude of Cape Douglas in Shelikof Straits, and south of the latitude of Anchor Point in Cook Inlet. The area is divided into four management districts: Kamishak, Southern, Outer, and Eastern (Figure 1). Purse seine and set gill net are the only legal commercial gear types for salmon. Entry into the commercial fishery was limited in 1972. There were 65 seine and 23 set gill net permits fished during 1989.

Since 1961 catches of all five species of Pacific salmon (*Oncorhynchus*) have been documented in this area. In 1970 the Alaska Department of Fish and Game (ADF&G) began sampling the sockeye and chum salmon catch for age, sex, weight and length (AWL) data. AWL data through 1986 and for 1988 has been summarized by Schroeder (1984, 1985, 1986), Morrison (1987), and Yuen et al. (1989). There was no catch sampling program in 1987. Aerial and ground escapement surveys of pink salmon (*O. gorbuscha*) began in 1960. Chum salmon (*O. keta*) surveys began in 1964, and sockeye salmon (*O. nerka*) salmon surveys began in 1969. Annual escapement data are summarized in the Lower Cook Inlet Area Annual Finfish Management Reports (e.g., Schroeder and Morrison 1989).

Historically, fishing for a single species within a bay or drainage last between 3-6 weeks. The sockeye salmon fisheries generally begin in June and overlap the chum salmon fisheries which typically end in August. In 1989, however, many of the fisheries were either closed or not opened due to the presence of oil from the *Exxon Valdez* oil spill (Table 1). Commercial fishing for chinook salmon (*O. tshawytscha*) has begun as early as May, while fishing for coho salmon (*O. kisutch*) has extended into September. Current management strategy has established fishing districts which allow for management of discrete stocks. Commercial harvests are monitored so that predetermined escapement goals are met and the escapement is obtained from all segments of the run. In areas where interception fisheries have occurred historically, the fishery has been allowed to continue provided that the harvests are not detrimental to the individual contributing stocks.

The focus of the Lower Cook Inlet salmon catch-sampling program has been on collecting sockeye and chum salmon AWL data from the purse seine fisheries. With the exception of Halibut Cove, Tutka Bay, and Silver Beach, purse seine catches tend to be stock specific and normally account for about 97% of the total sockeye and chum catch from Lower Cook Inlet. During 1989 the chum salmon catches were down due to a combination of poor returns and fishery closures related to the *Exxon Valdez* oil spill. The only sizable chum fishery was in the Iniskin-Cottonwood area of the Kamishak District. However, this fishery was not sampled due to the small size of the fishery and a conflict in scheduling. Chinook salmon samples were also not collected because the total chinook salmon harvest was expected to be <1% of the total salmon catch. Similarly, the coho and pink salmon catch was not sampled because they were expected to exhibit no variation in their annual age compositions. There were also three small set net fisheries which were not sampled because they did not target on any specific stock.

The objectives of the 1989 salmon catch sampling program were to (1) estimate the sockeye salmon age composition of the five fisheries listed in Table 1, (2) track changes in age composition over time within the 1989 fishing season, (3) provide this information to fishery managers inseason so they could respond to unexpected strength or weakness of a particular age group, and (4) obtain the estimates of age composition necessary for a preseason forecast of abundance.

METHODS

The Lower Cook Inlet salmon catch was previously reported separately for 16 purse seine fisheries, each represented by a discrete stock of sockeye or chum salmon. Each fishery's unique escapement goal was managed independently. Because of the Exxon Valdez oil spill, only six of the fisheries were opened this year, and five were sampled. Each fishery was considered a geographical sampling strata (Table 1; Figures 2, 3). In past reports the fisheries were often aggregated by management districts. A 1-week period was considered a temporal sampling strata.

The reduced number of salmon fisheries in Lower Cook Inlet in 1989 enabled dockside catch sampling. During a typical year samples had to be obtained on board a tender as the tenders frequently gathered the catch from several fisheries before returning to port. Nevertheless, the catch from China Poot Bay was sampled on board a tender in China Poot Bay to obtain samples from a single stock. The catch sampling crew on the tender interviewed the fishermen as they delivered their catch and before obtaining any samples. Whenever samples were collected from fish removed from a tender hold, the tender skipper was interviewed to ascertain that no fish from an earlier sampling period were present.

Each fish was measured from mid-eye to the fork of the tail with a digital measuring board to an accuracy of ± 1 mm. The fish were weighed with a hand held spring scale to the nearest 0.1 kg. Sex determined from external secondary sexual characteristics. One scale was collected from the preferred area of each salmon: approximately 3 rows above the lateral line and posterior of the dorsal fin, when possible. The scales were cleaned and mounted on a gum card, sculptured side up, from which an acetate impression was made. Images of scales were magnified 35x, and the number of annuli per scale were counted to determine age. The age designation used was the European system in which the first digit refers to the number of fresh water annuli, the second digit refers to the number of marine annuli, and the total age is the sum of the two digits plus one. For example, an age-1.2 fish is an 4-year-old fish that spent 2 years in fresh water (first winter spent in the gravel as an alevin) and 2 years at sea.

Sample sizes were set for each sampling strata to estimate age proportions, p_i , from a population of k age groups simultaneously within a specified distance, d , of their true population age proportions, π_i , 90% of the time $(1 - \alpha)$. That is,

$$\Pr \left\{ \prod_{i=1}^k | p_i - \pi_i | \leq d \right\} \geq 1 - \alpha,$$

where d and α , the confidence level, was chosen to be 0.05 and 0.10, respectively. Thompson (1987) calculated a maximum sample size of 403 for a worse-case scenario when three age groups were present in equal numbers, $d = 0.05$, and $\alpha = 0.10$. Any deviation in the number of age groups or unequal contributions by age group would require a smaller sample size. An *a priori* estimate of age composition, derived from the length frequency of about 200 males, was used to calculate a sample size n such that

$$\sum \alpha_i < \alpha \quad (\alpha = 0.10), \quad (1)$$

where:

$$\alpha_i = 2(1 - \Phi(z_i)), \quad (2)$$

$$\Phi(z_i) = \text{area under the standard normal distribution,} \\ \text{and } z_i = d \sqrt{n_i} / \sqrt{p_i(1-p_i)}. \quad (3)$$

The smallest n that satisfied equations (1)-(3) was rounded up to the nearest 40 fish (salmon scales are mounted on gum cards in groups of 40), increased by the observed unreadable rate, and rounded again up to the nearest 40 fish. This represented the total numbers of fish to process.

Sample size, n , for mean weight of each sex were determined from the methods described by Snedecor and Cochran (1967), i.e.,

$$n = 4 \sigma^2 / L^2,$$

where:

σ = population standard deviation,
and L = allowable error, i.e. 0.1 kg.

Samples sizes for mean weights ranged between 5 and 50 depending on σ . Most sample sizes were around 20 for a 200 fish sample, or 1 in 10 fish, of each sex.

Estimates of standard errors by age group were derived according to the procedures for stratified random sampling described by Snedecor and Cochran (1967).

$$SE = \sqrt{(\sum C_h^2 * s_h^2 / n_h)},$$

where:

C_h^2 = the salmon catch in the h th stratum, and
 s_h^2 = the sample variance in the h th stratum.

A chi-square test of a contingency table for age categories by location was used to test the hypothesis that both samples were from the same multinomial population. The null hypothesis was rejected at the $\alpha = 0.05$ or 95% level. Catch totals were obtained from harvest receipts (fish tickets) which document each sale by a licensed fishermen. Escapement estimates were derived from aerial and ground surveys.

RESULTS AND DISCUSSION

A total of 163,271 sockeye were harvested in Lower Cook Inlet in 1989. The sockeye escapement was estimated to be 55,500 from aerial and ground surveys. Catch samples were collected from stocks returning to Aialik Lake, Nuka Bay, China Poot Bay, Chenik Lake, and Mikfik Creek. The harvest of these stocks accounted 62% of the total sockeye salmon catch. The remaining sockeye salmon catch from other areas were not sampled as they did not represent any specific local stock. Ten sampling trips were made. The results from the five China Poot trips were pooled into two samples to obtain the desired sample size. After pooling, five of the seven samples (three single and two pooled samples) met or exceeded the 95% confidence level ($d = 0.05$). Another had confidence levels of at least 90% and the remaining sample had a confidence level of 88% ($d = 0.05$). Altogether there were 2,881 readable scales collected. Individual sample sizes and dates are summarized in Table 2.

Chum salmon runs were small this year. Furthermore, the number of chum salmon fisheries were reduced this year because of the presence of oil from the Exxon Valdez Oil spill. Consequently, the total chum harvest for all of Lower Cook Inlet was 11,305, the lowest on record.

Eastern District

In the Eastern District, only Aialik Lagoon was opened for sockeye salmon purse seining. The total sockeye harvest from Aialik Bay was 8,538 fish. With an escapement estimate of 6,500, the total run was approximately 15,038 salmon. Two catch samples were collected on 3 and 19 June. The earlier sample had only two age groups, 1.2 and 1.3, and had more females, 58.58%, than males. The second sample had six age groups with the main groups being 1.2, 1.3, 2.2, and 2.3. The proportion of males and females were about equal in the later sample. These fish from the Gulf of Alaska side of the Kenai Peninsula tend to be among the larger of the Lower Cook Inlet sockeye salmon. Their overall mean weight was 3.20 kg (Table 3).

Outer District

In the Outer District only Nuka Bay was opened for sockeye salmon purse seining. The total sockeye harvest from Nuka Bay was 10,284 fish. Most of these sockeye were bound for Delight Lake. The escapements to Delight and Desire Lakes were approximately 7,700 and 9,000 sockeye, respectively. Only one sample was collected from this fishery on 13 July; its three main age groups were 1.2, 1.3, and 2.3. The Nuka Bay sockeye salmon, also from the Gulf of Alaska side of the Kenai Peninsula, tend to be among the larger of the Lower Cook Inlet sockeye with a 1989 mean weight of 2.36 kg. Over 55% of the samples were female (Table 4).

Southern District

In the Southern District all of the traditional sockeye salmon purse seine areas were open. However, the China Poot Bay fishery was the only one that was not a mixed stock fishery. The sockeye run to China Poot Bay (Leisure Lake) supported the largest sockeye fishery in Lower Cook Inlet during 1989. This run resulted

from a lake stocking program. Because this lake does not provide access for returning sockeye salmon, all salmon were harvested in this terminal fishery. The total commercial sockeye harvest within China Poot Bay was 35,795 fish. Another 8,000 were caught in the sport and personal use fisheries. Other sockeye set gill net and purse seine fisheries within Kachemak Bay (i.e., Humpy Creek, Halibut Cove Lagoon, Halibut Cove, and Tutka Bay) reported additional sockeye catches totaling 36,154 fish. When this was added to the China Poot Bay catch, the total commercial sockeye harvest in the Southern District area was 79,949. A total of five sampling trips were made, with the data pooled into two sample periods. There were 946 readable scales collected. The 1.2 and 2.2 age groups dominated both sample periods. Mean weight decreased with time, from 2.22 kg to 1.65 kg, while the proportion of males increased from 56.16% to 60.93% (Table 5).

Kamishak District

Oil from the Exxon Valdez oil spill led to the eventual closure of the Kamishak District south of Bruin Bay on 9 June. However, on 2 July the Paint River special harvest area was extended north to include Chenik. This allowed a single boat chartered by the Cook Inlet Aquaculture Association to harvest the fish returning to Chenik Lake. Only a single boat was allowed to operate and the proceeds from the sale of the fish harvested were to fund construction and operation of the Paint River fish ladder project. A sample was collected from this harvest. The Paint River special harvest of Chenik sockeye totaled 38,905 fish. Escapement to Chenik lake was 12,000. Four age groups were predominant: 1.2, 1.3, 2.2, and 2.3. Mean weight was 2.06 kg, and there were slightly more males (51.73%) than females (Table 6).

Before the 9 June closure, the Mikfik Creek fishery harvested 7,011 sockeye salmon. The escapement was estimated to be 11,500 sockeye. One sample was collected on 6 June. The 1.3 age group dominated the sample. Mean weight was 1.80 kg, and there were more males (57%) than females (Table 7).

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Table 1. Daily catch of sockeye salmon in five Lower Cook Inlet fisheries, 1989.

Date	Aialik Bay	Nuka Bay	China Poot Bay	Chenik Lake	Mikfik Creek
Jun 5 Mon					450
6 Tue					5,517
7 Wed					1,044
26 Mon			94		
27 Tue			20		
28 Wed			167		
29 Thu			45		
30 Fri			22		
Jul 3 Mon	4,461		1,282	15,206	
4 Tue	641	62	640	2,804	
5 Wed	396		992		
6 Thu	618		2,077		
7 Fri	703		994	8,483	
8 Sat	235		133		
10 Mon	910	226	1,733	8,468	
11 Tue	365	502	3,569		
12 Wed	84		1,541		
13 Thu	80	3,516	1,941		
14 Fri		380	1,571		
15 Sat		250	482		
17 Mon	38	1,854	7,671		
18 Tue		1,192	2,136		
19 Wed	7	26	1,906		
20 Thu		772	960		
21 Fri		386	1,424	3,082	
24 Mon			2,557	862	
25 Tue			946		
26 Wed			483		
27 Thu			156		
28 Fri			102		
31 Mon			63		
Aug 1 Tue			88		
2 Wed					
3 Thu		190			
4 Fri		236			
7 Mon		208			
8 Tue		101			
10 Thu		78			
11 Fri		40			
14 Mon		92			
15 Tue		84			
17 Thu		71			
18 Fri		18			
Total	8,538	10,284	35,795	38,905	7,011

Table 2. Sample sizes of readable salmon scales and corresponding simultaneous confidence levels in Lower Cook Inlet, 1989.

Species	Fishery	Dates	Sample Size	Simultaneous Confidence Level	Fraction Unreadable Scales
Sockeye	Aialik	7/3	338	99	0.16
		7/19	394	95	0.17
	Nuka	7/13	331	88	0.21
	China Poot	7/5,10,11	406	99	0.11
		7/17,18	495	99	0.11
	Chenik	7/5	404	92	0.12
Mikfik	6/6	513	99	0.15	

Table 3. Age, sex, and size composition of sockeye salmon commercial catch from Aialik Bay, 1989.

	Age Group						Total
	1.1	1.2	0.4	1.3	2.2	2.3	
Sample Period 1: 3 - 7 July							
Males		71		2,414			2,485
Percent		1.18		40.23			41.42
Mean Length		500		589			587
Std. Error		17		2			2
Sample Size		4		136			140
Mean Weight				3.88			3.88
Std. Error				0.20			0.20
Sample Size				11			11
Females		71		3,444			3,515
Percent		1.18		57.40			58.58
Mean Length		496		562			560
Std. Error		16		2			2
Sample Size		4		194			198
Mean Weight				3.03			3.03
Std. Error				0.09			0.09
Sample Size				21			21
Both Sexes		142		5,858			6,000
Percent		2.37		97.63			100.00
Mean Length		498		573			571
Std. Error		12		1			1
Sample Size		8		330			338
Mean Weight				3.38			3.38
Std. Error				0.10			0.10
Sample Size				32			32
Sample Period 2: 8 - 19 July							
Males	30	929	15	1,189	289	594	3,046
Percent	0.50	15.48	0.25	19.82	4.82	9.90	50.77
Mean Length	767	528	561	602	539	607	576
Std. Error	4	3		3	5	5	2
Sample Size	2	61	1	78	19	39	200
Mean Weight	8.00	1.59		3.14	2.45	3.45	2.71
Std. Error		0.22		0.25		0.50	0.16
Sample Size	1	4		9	1	2	17
Females		1,005		1,218	411	320	2,954
Percent		16.75		20.30	6.85	5.33	49.23
Mean Length		509		581	526	579	548
Std. Error		2		3	4	6	2
Sample Size		66		80	27	21	194
Mean Weight		1.97		2.48	1.80	2.95	2.26
Std. Error		0.14		0.09	0.05		0.06
Sample Size		9		10	2	1	22
Both Sexes	30	1,934	15	2,407	700	914	6,000
Percent	0.50	32.23	0.25	40.12	11.67	15.23	100.00
Mean Length	767	518	561	591	532	597	562
Std. Error	4	2		2	3	4	1
Sample Size	2	127	1	158	46	60	394
Mean Weight	8.00	1.79		2.81	2.07	3.27	2.49
Std. Error		0.13		0.13	0.05	0.50	0.08
Sample Size	1	13		19	3	3	39

-Continued-

Table 3. (page 2 of 3)

	Age Group						Total
	1.1	1.2	0.4	1.3	2.2	2.3	
All Periods Combined							
Males	30	1,000	15	3,603	289	594	5,531
Percent	0.25	8.33	0.13	30.03	2.41	4.95	46.09
Mean Length	767	526	561	593	539	607	581
Std. Error	4	3		2	5	5	1
Sample Size	2	65	1	214	19	39	340
Mean Weight	8.00	1.59		3.64	2.45	3.45	3.23
Std. Error		0.22		0.16		0.50	0.12
Sample Size	1	4		20	1	2	28
Females		1,076		4,662	411	320	6,469
Percent		8.97		38.85	3.43	2.67	53.91
Mean Length		508		567	526	579	555
Std. Error		3		1	4	6	1
Sample Size		70		274	27	21	392
Mean Weight		1.97		2.89	1.80	2.95	2.68
Std. Error		0.14		0.07	0.05		0.05
Sample Size		9		31	2	1	43
Both Sexes	30	2,076	15	8,265	700	914	12,000
Percent	0.25	17.30	0.13	68.88	5.83	7.62	100.00
Mean Length	767	516	561	578	532	597	567
Std. Error	4	2		1	3	4	1
Sample Size	2	135	1	488	46	60	732
Mean Weight	8.00	1.79		3.21	2.07	3.27	2.93
Std. Error		0.13		0.08	0.05	0.50	0.06
Sample Size	1	13		51	3	3	71

Table 4. Age, sex, and size composition of sockeye salmon commercial catch from Nuka Bay, 1989.

	Age Group						Total
	0.2	0.3	1.2	1.3	2.2	2.3	
Sample date:	13 July						
Males	21	21	952	1,756	63	317	3,130
Percent	0.30	0.30	13.60	25.09	0.90	4.53	44.71
Mean Length	530	617	518	579	543	594	561
Std. Error			4	3	13	8	2
Sample Size	1	1	45	83	3	15	148
Mean Weight	2.10		2.25	2.58			2.46
Std. Error			0.27	0.33			0.23
Sample Size	1		4	10			15
Females	21	21	1,184	1,862	190	592	3,870
Percent	0.30	0.30	16.91	26.60	2.71	8.46	55.29
Mean Length	512	502	504	557	511	565	539
Std. Error			3	2	9	5	2
Sample Size	1	1	56	88	9	28	183
Mean Weight			1.80	2.48		2.65	2.29
Std. Error			0.17	0.11		0.25	0.09
Sample Size			8	8		2	18
Both Sexes	42	42	2,136	3,618	253	909	7,000
Percent	0.60	0.60	30.51	51.69	3.61	12.99	100.00
Mean Length	521	560	510	568	519	575	549
Std. Error			3	2	7	4	1
Sample Size	2	2	101	171	12	43	331
Mean Weight	2.10		2.00	2.53		2.65	2.36
Std. Error			0.15	0.17		0.25	0.11
Sample Size	1		12	18		2	33

Table 5. Age, sex, and size composition of sockeye salmon commercial catch from China Poot Bay, 1989.

	Age Group						Total
	1.1	1.2	2.1	1.3	2.2	2.3	
Sample Period 1: 5 - 14 July							
Males	83	7,706		621	870	166	9,446
Percent	0.49	45.81		3.69	5.17	0.99	56.16
Mean Length	377	490		566	512	559	497
Std. Error	3	2		9	4	16	1
Sample Size	2	186		15	21	4	228
Mean Weight		2.03		4.90			2.24
Std. Error		0.09					0.09
Sample Size		15		1			16
Females		5,718		704	829	124	7,375
Percent		33.99		4.19	4.93	0.74	43.84
Mean Length		488		566	510	568	499
Std. Error		2		6	5	17	2
Sample Size		138		17	20	3	178
Mean Weight		2.10			2.75		2.18
Std. Error		0.04					0.03
Sample Size		4			1		5
Both Sexes	83	13,424		1,325	1,699	290	16,821
Percent	0.49	79.81		7.88	10.10	1.72	100.00
Mean Length	377	489		566	511	563	498
Std. Error	3	1		5	3	12	1
Sample Size	2	324		32	41	7	406
Mean Weight		2.06		4.90	2.75		2.22
Std. Error		0.06					0.05
Sample Size		19		1	1		21
Sample Period 2: 15 - 18 July							
Males	70	8,889	35	703	1,722	141	11,560
Percent	0.37	46.85	0.18	3.71	9.08	0.74	60.93
Mean Length	353	487	407	555	514	558	495
Std. Error	15	1		4	3	8	1
Sample Size	2	253	1	20	49	4	329
Mean Weight	0.50	1.66		2.50	2.00		1.76
Std. Error		0.08			0.10		0.06
Sample Size	1	7		1	2		11
Females		6,360		211	738	105	7,414
Percent		33.52		1.11	3.89	0.55	39.07
Mean Length		487		563	524	556	494
Std. Error		1		8	5	9	1
Sample Size		181		6	21	3	211
Mean Weight		1.45					1.45
Std. Error		0.09					0.09
Sample Size		4					4
Both Sexes	70	15,249	35	914	2,460	246	18,974
Percent	0.37	80.37	0.18	4.82	12.97	1.30	100.00
Mean Length	353	487	407	557	517	557	495
Std. Error	15	1		4	2	6	1
Sample Size	2	434	1	26	70	7	540
Mean Weight	0.50	1.57		2.50	2.00		1.65
Std. Error		0.06			0.10		0.05
Sample Size	1	11		1	2		15

-Continued-

Table 5. (page 2 of 3)

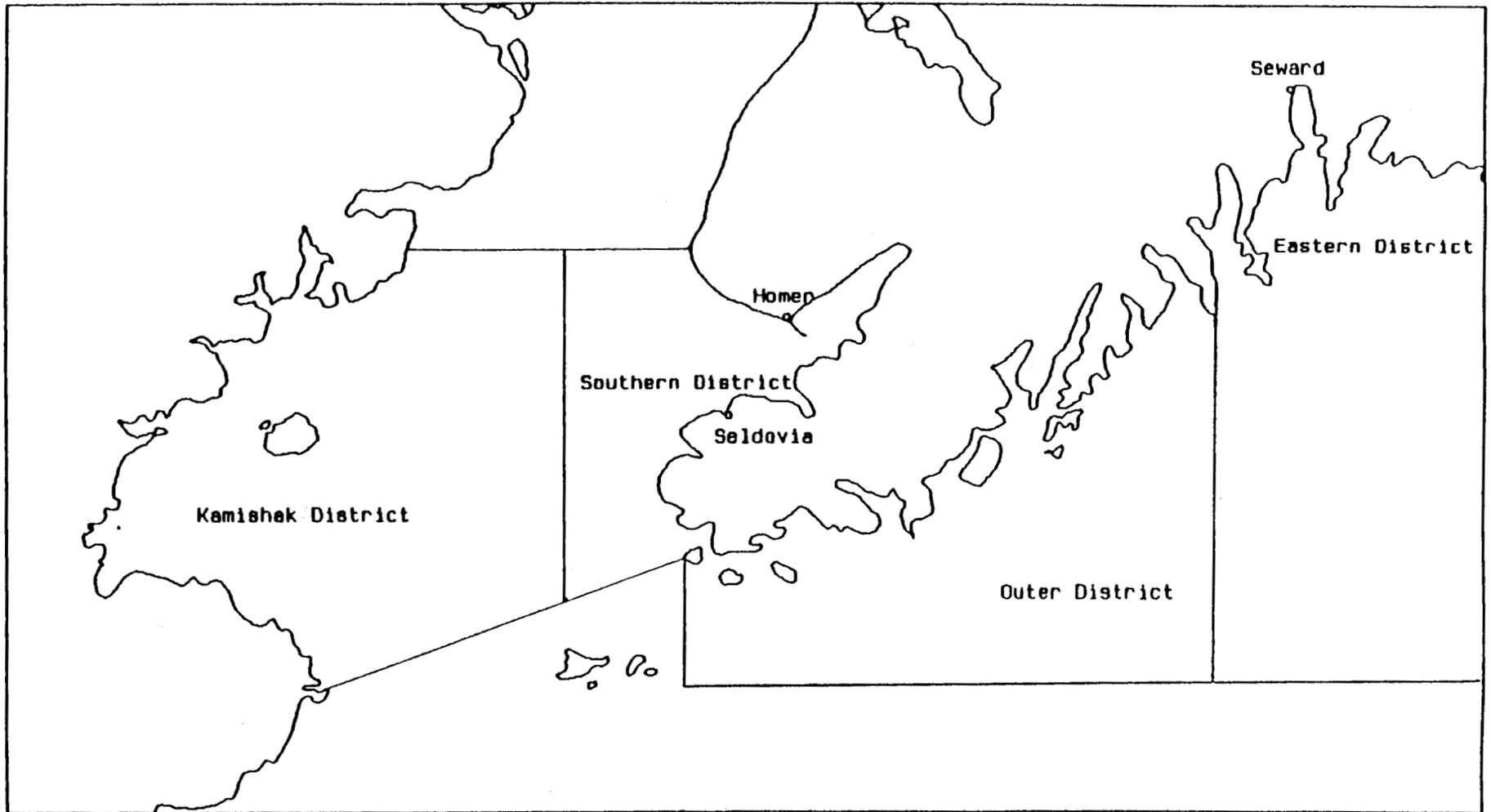
	Age Group						Total
	1.1	1.2	2.1	1.3	2.2	2.3	
All Periods Combined							
Males	153	16,595	35	1,324	2,592	307	21,006
Percent	0.43	46.36	0.10	3.70	7.24	0.86	58.68
Mean Length	366	489	407	560	513	558	496
Std. Error	7	1		5	2	9	1
Sample Size	4	439	1	35	70	8	557
Mean Weight	0.50	1.83		3.63	2.00		1.96
Std. Error		0.06			0.10		0.05
Sample Size	1	22		2	2		27
Females		12,078		915	1,567	229	14,789
Percent		33.74		2.56	4.38	0.64	41.32
Mean Length		488		565	517	562	497
Std. Error		1		5	4	10	1
Sample Size		319		23	41	6	389
Mean Weight		1.76			2.75		1.82
Std. Error		0.05					0.05
Sample Size		8			1		9
Both Sexes	153	28,673	35	2,239	4,159	536	35,795
Percent	0.43	80.10	0.10	6.26	11.62	1.50	100.00
Mean Length	366	488	407	562	514	560	496
Std. Error	7	1		3	2	7	1
Sample Size	4	758	1	58	111	14	946
Mean Weight	0.50	1.80		3.63	2.24		1.91
Std. Error		0.04			0.10		0.04
Sample Size	1	30		2	3		36

Table 6. Age, sex, and size composition of sockeye salmon commercial catch from Chenik Lake, 1989.

	Age Group					Total
	1.2	2.1	1.3	2.2	2.3	
Sample date:	5 July					
Males	4,430		8,860	4,333	2,504	20,127
Percent	11.39		22.77	11.14	6.44	51.73
Mean Length	518		568	535	571	550
Std. Error	2		3	3	4	1
Sample Size	46		92	45	26	209
Mean Weight	2.05		2.50	2.18	2.30	2.31
Std. Error			0.13	0.09		0.06
Sample Size	1		9	4	1	15
Females	5,971	96	6,644	4,526	1,541	18,778
Percent	15.35	0.25	17.08	11.63	3.96	48.27
Mean Length	494	324	542	505	543	517
Std. Error	3		2	3	5	1
Sample Size	62	1	69	47	16	195
Mean Weight	1.53		2.03	1.75	1.90	1.79
Std. Error	0.09		0.12	0.11		0.06
Sample Size	4		6	4	1	15
Both Sexes	10,401	96	15,504	8,859	4,045	38,905
Percent	26.73	0.25	39.85	22.77	10.40	100.00
Mean Length	505	324	557	520	560	534
Std. Error	2		2	2	3	1
Sample Size	108	1	161	92	42	404
Mean Weight	1.75		2.30	1.96	2.15	2.06
Std. Error	0.09		0.09	0.07		0.04
Sample Size	5		15	8	2	30

Table 7. Age, sex, and size composition of sockeye salmon commercial catch from Mikfik Creek, 1989.

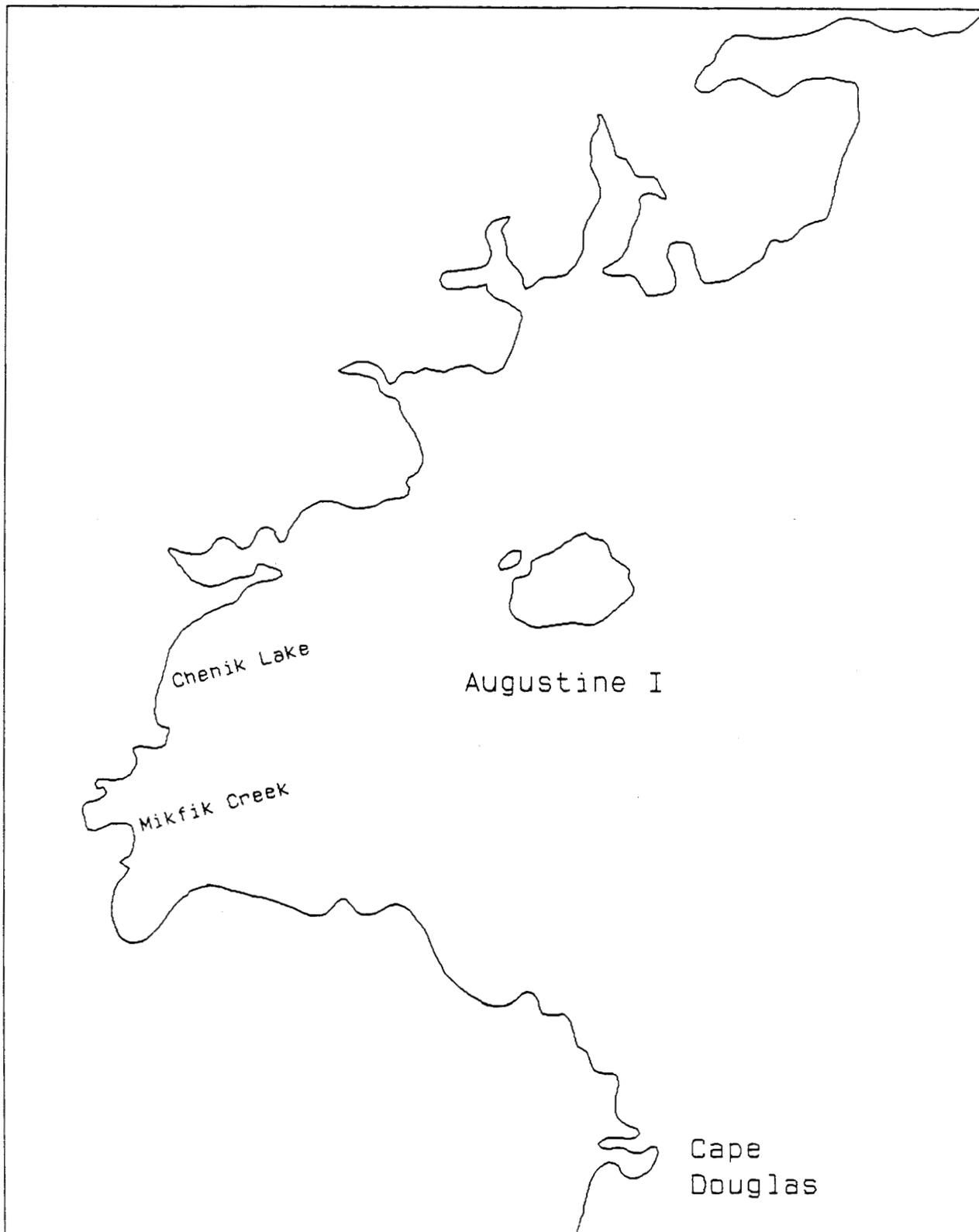
	Age Group				Total
	1.2	1.3	2.2	2.3	
Sample date:	6 June				
Males	355	2,933	382	314	3,984
Percent	5.07	41.90	5.46	4.49	56.91
Mean Length	475	533	493	535	524
Std. Error	8	1	6	5	1
Sample Size	26	215	28	23	292
Mean Weight	0.90	2.06	1.37	1.87	1.88
Std. Error		0.07	0.23	0.09	0.06
Sample Size	1	25	2	3	31
Females	368	2,129	355	164	3,016
Percent	5.26	30.41	5.07	2.34	43.09
Mean Length	471	531	480	525	517
Std. Error	6	2	5	4	2
Sample Size	27	156	26	12	221
Mean Weight	1.33	1.78	1.58		1.70
Std. Error	0.33	0.09	0.08		0.08
Sample Size	2	17	2		21
Both Sexes	723	5,062	737	478	7,000
Percent	10.33	72.31	10.53	6.83	100.00
Mean Length	473	532	487	531	521
Std. Error	5	1	4	3	1
Sample Size	53	371	54	35	513
Mean Weight	1.12	1.94	1.47	1.87	1.80
Std. Error	0.33	0.05	0.13	0.09	0.05
Sample Size	3	42	4	3	52



1. Kamishak, Southern, Outer, and Eastern Districts of Lower Cook Inlet Management Area



2. Salmon catch sampling sites in the Southern, Outer, and Eastern Districts, 1989



3. Salmon catch sampling sites in the Kamishak District, 1989

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