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Alaska Department of Fish and Game
Commercial Fisheries Management
and Development Division
P.O. Box 25526
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Kuskokwim Management Area Salmon Catch and Escapement Statistics, 1988

by

Cindy J. Anderson

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ABSTRACT

Catch statistics, spawning escapement estimates, and age composition, sex, and length data for chinook (*Oncorhynchus tshawytscha*), sockeye (*O. nerka*), coho (*O. kisutch*), pink (*O. gorbuscha*), and chum salmon (*O. keta*) were compiled for the Kuskokwim area in 1988. Commercial gillnet fisheries harvested 2,335,254 salmon. The total was the largest catch ever recorded. Chum salmon catches were > 2.5 times the 1983–1987 average. With the exception of pink salmon, the largest catches of all other species were reported in District 1. Sockeye salmon catches were 24% greater than the 1983–1987 average and the second largest on record. The subsistence harvest was 6% greater than the 1983–1987 average and was composed of 56,695 chinook, 25,579 sockeye, 32,452 coho, 2 pink, and 118,181 chum salmon. The commercial chinook salmon harvest was composed primarily of age-1.3 fish (43%) and 60% of the chinook catch were males. Most sockeye salmon (72%) in the Kuskokwim area commercial and subsistence catches were age 1.3. The commercial coho salmon catch for all districts was composed primarily of age-2.1 fish (94%) and 5% of the catch were females. Age classes 0.3 (78%) and 0.4 (20%) predominated the chum salmon commercial catch and 51% of the total chum salmon catch were females. Chinook salmon escapement samples from the Kuskokwim River drainage were predominately age 1.3 (51%) and 37% of the samples were females. Sockeye salmon escapement samples were predominately age 1.3. Coho salmon age composition in the escapement was similar to the commercial catch (94%; age 2.1). Age composition of the chum salmon escapement was similar to the commercial catch: both were predominated by ages 0.4 and 0.3. Sex ratios ranged from 36% to 50% female.

KEY WORDS: Kuskokwim, chinook salmon, chum salmon, sockeye salmon, coho salmon, age classification, catch, escapement

INTRODUCTION

The Kuskokwim management area includes all waters of Alaska from the southernmost tip of Cape Newenham north to the Naskonat Peninsula, as well as the waters surrounding Nunivak and St. Matthew Islands. The management area is divided into four districts for commercial salmon fishing (Figure 1). Districts 1 and 2 are located within the Kuskokwim River. Kuskokwim Bay Districts 4 and 5 are located in the marine waters at the mouths of the Kanektok and Goodnews Rivers. The Kuskokwim River drainage supports major runs of chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and chum (*O. keta*) salmon. Major runs of these three species are likewise found in the Kanektok and Goodnews Rivers, which also support even-year runs of pink salmon (*O. gorbuscha*) and significant runs of sockeye salmon (*O. nerka*). Large runs of sockeye salmon in the Kuskokwim River drainage occasionally occur, but in an average year they are incidental to commercial catches of other species. Pink salmon are infrequent in the commercial catch in the Kuskokwim River drainage. The Kuskokwim River produces the largest annual runs of chinook, sockeye, coho, and chum salmon in the area, but the largest annual pink salmon runs are produced in the Kanektok drainage. These five species of salmon contribute to commercial and subsistence fisheries in the Kuskokwim management area.

Most commercial fishing takes place in Districts 1, 4, and 5, while most subsistence fishing occurs in District 1 within the lower 219 km (136 mi) of the Kuskokwim River. Set and drift gillnets with a maximum stretched-mesh size of 6 in (15.2 cm) are the only legal commercial fishing gear, though nearly all commercial fishing is done with drift gillnets. Subsistence fishing may be conducted using gillnets of any mesh size, fish wheels, beach seines and, in designated areas, spears. Subsistence fishermen commonly use set and drift gillnets throughout the Kuskokwim area, while fish wheels are used only in the upper Kuskokwim River. ADF&G (1989) provides a more detailed description of the Kuskokwim area salmon fisheries.

The Alaska Department of Fish and Game (ADF&G) conducts several projects to document information on commercial and subsistence harvests and spawning escapements. Specific objectives include: (1) documenting catches in each fishery; (2) sampling catches and selected spawning populations for age, sex, and size data; and (3) assessing the magnitude of spawning escapements using aerial and ground surveys, hydroacoustic counters, counting towers, and weirs.

For the years 1969 through 1981 Kuskokwim River salmon age, sex, and size data summaries were annually reported. Since 1982 these data have been reported by Huttunen (1984, 1985, 1986, 1987, and 1989) and Anderson (1991). This information has been used to regulate Kuskokwim area salmon fishery harvests and monitor the status of spawning stocks. The data for 1988 are documented in this report.

METHODS

Quantifying Catch and Escapement

Commercial catch data were compiled for each management district and were based on computer tabulations of individual harvest receipts (fish tickets) that, by law, document the sale of salmon from

fishermen to processors. Subsistence catch data were tabulated from personal interviews of subsistence fishermen in selected villages and from mail-in questionnaires or catch calendars. Methods used for subsistence harvest estimation have been described in ADF&G (1989).

Most escapement estimates were based on peak aerial surveys of selected major spawning areas. Aerial surveys were conducted during periods of probable peak abundance, and resulting indices were assumed to reflect annual variations in escapements. Because of the extensive spawning areas that exist in the Kuskokwim drainage, most systems were only surveyed once during the season. Additional escapement estimates were obtained through other methods. Chum salmon escapements to the Aniak River (Schneiderhan 1988a) were enumerated using hydroacoustic equipment. Chinook, chum, and sockeye salmon escapements to the Goodnews River were enumerated using a counting tower (Burkey 1989). Chinook, chum, sockeye, and coho salmon escapements to the Kogruklu River were enumerated using a weir (Schneiderhan 1988b).

Age, Sex, and Length Determination

Commercial catches of chinook, chum, coho, and sockeye salmon were sampled for age, sex, and length during the fishing season; pink salmon were not sampled. Escapement samples of chinook, chum, coho, and sockeye salmon were collected throughout the season using beach seines on the Goodnews River, the weir on the Kogruklu River, and from carcasses recovered from the spawning grounds.

Age was determined from annuli on the scales of sampled salmon. The scales were taken from each salmon's left side, approximately two rows above the lateral line in an area transected by a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963). The scales were then mounted on gum cards and permanent impressions made in cellulose acetate (Clutter and Whitesel 1956). Ages were reported in European notation, where the first digit refers to the freshwater age and does not include the year spent in the gravel and the second digit refers to the ocean age (Koo 1962). Sex was determined by examining external morphological features of salmon that had sufficiently developed secondary sexual characteristics. Gonads were examined whenever external characteristics were not sufficiently distinct. Lengths were measured from mid-eye to fork-of-tail. Average lengths by age and sex were calculated separately for each fishery and escapement sampled.

Age and sex composition was estimated for each fishery sampled using a stratified systematic sampling design (Cochran 1977). Time strata were of variable length depending on the number of samples collected. An attempt was made to sample a sufficient number of each salmon species within a strata to simultaneously estimate the true proportion of each major age class in the catch within 5 percentage points 90% of the time (Thompson 1987). Since the 1988 data were collected, sample size goals were revised to estimate the proportion in each age class within 10 percentage points 95% of the time (Thompson 1987). Some strata were changed to reflect decreased needs for accuracy and precision.

Age-composition estimates and associated variances were calculated with procedures outlined by Cochran (1977) for stratified sampling programs:

$$C_{tj} = C_t P_{tj},$$

$$V[C_{tj}] = (C_t)^2 \frac{P_{tj}(P_{tj}-1)}{N_{t-1}},$$

$$C_j = \sum_{t=1}^T C_{tj},$$

$$V[C_j] = \sum_{t=1}^T V[C_{tj}],$$

where: C_t = the number of salmon caught in sampling stratum t ,
 P_{tj} = the proportion of age j in stratum t ,
 N_t = the number of samples in stratum t ,
 C_{tj} = the estimated number of salmon of age j during stratum t ,
 T = the total number of strata, and
 C_j = the estimated number of fish of age j for the season T .

If sample sizes were insufficient to attain the desired levels of precision and accuracy within predetermined strata, sample strata were pooled until sample size requirements were met or all samples were included within a single stratum. The age, sex, and size composition of subsistence harvests in Districts 2, 4, and 5 and commercial harvests in District 2 were estimated using proportions calculated from samples obtained from the nearest commercial catch. I believed these samples would be representative of adjacent nonsampled areas because gear used to harvest salmon for subsistence purposes is frequently the same as that used for commercial fishing.

RESULTS AND DISCUSSION

Commercial and Subsistence Harvests

The Kuskokwim management area commercial catch totaled 2,335,254 salmon in 1988 (Table 1). The species composition was 74,602 chinook, 150,436 sockeye, 626,131 coho, 37,618 pink, and 1,446,467 chum salmon. The total catch was the largest ever recorded and twice the most recent 5-year average (1983-1987; ADF&G 1989). The chinook salmon harvest was approximately 6% more than the 1983-1987 average and the sockeye salmon catch, the second largest catch on record, was 24% greater than the 1983-1987 average. The coho salmon catch was 17% above the 5-year average, the pink salmon harvest was 24% above the most recent 5-even-year average (1978-1986), and the chum salmon harvest was more than 2.5 times the 1983-1987 average. The largest catches of all species, except pink salmon,

were reported from District 1. Commercial catches in District 2 were predominately chum and coho salmon, while in Districts 4 and 5 coho and sockeye salmon predominated.

A record 811 Kuskokwim area limited entry permit holders landed salmon in 1988 (Appendices A.1-A.4). The 1988 exvessel value of the catch, \$12,514,000, was twice the previous record value for this fishery.

Kuskokwim area subsistence harvests were estimated at 232,873 salmon (Table 1) and were composed of 56,695 chinook, 25,579 sockeye, 32,452 coho, 2 pink, and 118,181 chum salmon. The total subsistence harvest was 6% greater than the 1983-1987 average. However, subsistence catches of sockeye, pink, and chum salmon, historically pooled and classified as "small" salmon, were 6% less than the 1983-1987 average. The chinook salmon catch exceeded the 1983-1987 average by 4%.

Escapement Abundance

Minimum and optimum escapement objectives have been established by ADF&G for most major spawning populations of chinook, sockeye, coho, and chum salmon (Table 2; ADF&G 1989). Most escapement objectives have been based on historical aerial survey indices of abundance and are customarily reassessed as more information becomes available.

Chinook salmon spawn in tributaries throughout the Kuskokwim River drainage and the Kanektok and Goodnews Rivers of Kuskokwim Bay. Chinook escapement objectives have usually been based on aerial survey results; they include the Canyon Creek (200), Kwethluk (1,000), Kisaralik (1,000), Kasigluk (1,000), Tuluksak (400), Aniak (3,100), Holitna (2,000 by aerial survey, 10,000 by weir count), Pitka Fork Salmon (1,300), Kanektok (5,800), and Goodnews (1,600 by aerial survey, 3,500 by tower count) River systems (ADF&G 1989).

Aerial surveys of most major tributaries were completed in 1988 (Table 2). In Kuskokwim River tributaries the chinook salmon total escapement index from aerial and weir counts was 17,831. In the Kuskokwim River drainage chinook salmon escapement objectives were reached for the second time since 1981. Total chinook salmon escapement to the Kanektok and Goodnews River systems were estimated at 3,731 and 11,140, respectively. Escapement objectives were achieved in both drainages.

The Kuskokwim, Kanektok, and Goodnews River systems support major spawning populations of sockeye salmon. Escapement objectives have been established for the Holitna (1,000 by aerial survey, 2,000 by weir count), Kanektok (32,000), and Goodnews (20,000 by aerial survey, 40,000 by tower count) Rivers. In 1988 the Kogrukluk River weir passed 6,100 sockeye salmon, which is triple the index goal of 2,000. In 1988 the Goodnews River had sockeye salmon counts of 38,300 by aerial survey in combination with tower estimates. The Kanektok River had a count of 30,400 sockeye salmon by aerial survey. Aerial escapement index objectives in the Goodnews River were not met, and the Kanektok sockeye salmon aerial index was just 5% less than the objective. Aerial survey conditions for sockeye salmon were poor

in the Kuskokwim River drainage, but index counts were obtained for the Aniak (1,675), Chukowan (170), Eek (304), and Kwethluk (35) Rivers.

Kuskokwim area drainages support extensive and widely scattered spawning populations of coho salmon. Escapement objectives have been established for only the Kogrukluuk (25,000 by weir count), Kanektok (25,000 by aerial survey), and Goodnews (17,000 by aerial survey) Rivers. Escapement goals for coho salmon were not met on the Kogrukluuk River, where an estimated 12,800 coho salmon passed the weir in 1988. Aerial surveys during periods of peak coho salmon migration for most systems were prevented by inclement weather.

Tributaries throughout the Kuskokwim area support spawning populations of chum salmon. Escapement aerial survey objectives, usually based on aerial survey results, have been established for the Kwethluk (7,000), Kisarialik (8,000), Kasigluk (8,000), Tuluksak (5,000), Aniak (250,000 by sonar count), Holitna (49,000), Kogrukluuk (30,000 by weir count), Kanektok (30,500), and Goodnews (21,000 by aerial index, 15,000 by tower count) Rivers.

In 1988 most primary chum salmon spawning streams were surveyed, and most escapement objectives were achieved or surpassed. Escapement to the Aniak River was estimated at 401,000 chum salmon based on sonar; the weir on the Kogrukluuk River recorded a passage of 41,800 chum salmon. Based on tower counts in combination with aerial surveys, chum salmon escapement to the Goodnews River was 39,501, and based on a peak aerial survey chum salmon escapement to the Kanektok River drainage was 20,063.

Age, Sex, and Length Composition

Chinook Salmon

Commercial chinook salmon catches in Districts 1, 4, and 5, and the subsistence catch in Districts 1 and 2 combined, were sampled to estimate harvest age composition at the target levels of accuracy and precision. The 1988 chinook salmon harvest was primarily composed of 56,252 age-1.3 (43%) and age-1.2 (28%) fish (Table 3). Males were predominate in the catches (78,459) and composed 60% of the combined commercial and subsistence catch.

Samples from the District 4 commercial catch indicated a strong return of ages 1.3 (34%) and 1.4 (31%; i.e., the 1983 and 1982 brood years, respectively). District 1 and 2 commercial catches indicated a strong return of age 1.3 (48%). The District 5 commercial catch was predominately age-1.4 chinook salmon (43%). Males again predominated commercial catch samples and composed 53% of the District 5 catch and 60% of the combined catch from Districts 4 and 1 (Appendices C.1-C.4). Average lengths of commercially caught male chinook salmon by age group ranged from 534 mm for age 1.2 to 980 mm for age 1.6; the average lengths of females ranged from 534 mm for age 1.2 to 911 mm for age 1.5 (Table 4). Because external morphological sexual characteristics are poorly developed in young age classes just entering fresh water, there was some uncertainty in determining the sex of age-1.2 chinook salmon.

The chinook salmon escapement samples to the Kogrukluk River were similar to the commercial catch samples for District 1, and the Goodnews River escapement samples were similar to those in District 5. Chinook escapement samples from the Kogrukluk River weir were 51% age 1.3 and 62% were male (Table 5). Goodnews River chinook salmon were 57% age 1.4 and 57% male, though the sample size of 94 fish was well below the level desired. Average lengths of male chinook salmon in escapement samples ranged from 535 mm for age 1.2 to 953 mm for age 1.5; average lengths of females ranged from 798 mm for age 1.3 to 905 mm for age 1.5 (Table 6).

Sockeye Salmon

Commercial catches of sockeye salmon in Districts 1, 4, and 5 were sampled to estimate age and sex composition of the harvest. The 1988 sockeye salmon commercial and subsistence catches were primarily composed of age-1.3 (72%) and age-2.3 (14%) fish (Table 7). Most (77%) sockeye salmon spent only one winter in fresh water before migrating to sea. The commercial catch was 47% male.

District 1 and 4 commercial catch samples were primarily age-1.3 (74-82%) sockeye salmon from the 1983 brood year (Appendices D.1-D.4). The commercial catch from District 5 was 93% age 1.3. Sex composition of district catches ranged from 40% to 56% female. Average lengths of commercially caught male sockeye salmon by age group ranged from 539 mm for age 1.2 to 627 mm for age 1.4; average lengths of females ranged from 510 mm for age 1.2 to 600 mm for age 0.4 (Table 8).

Subsistence catches of sockeye salmon were estimated for Districts 1, 4, and 5 in 1988. Age and sex composition of subsistence catches were not sampled but were assumed to be the same as those estimated for commercial catch samples in those districts (Appendices D.5-D.7).

Sockeye salmon escapement samples were collected from the Goodnews and Kogrukluk Rivers in 1988 (Table 9). Kogrukluk River escapements were predominately age-1.3 (94%) sockeye salmon from the 1983 brood year. Goodnews River escapements were 83% age 1.3. Kogrukluk River samples were composed of 53% male sockeye salmon and Goodnews River samples were composed of 42% male sockeye salmon. Average lengths of male sockeye salmon in escapement samples from the Goodnews and Kogrukluk Rivers ranged from 563 mm for age 1.2 to 601 mm for age 1.3, while average lengths of females ranged from 509 mm for age 1.2 to 557 mm for age 1.4 (Table 10).

Coho Salmon

Commercial coho salmon catches were sampled in Districts 1, 4, and 5 to estimate the age and sex composition of the harvest. The Kuskokwim area harvest was composed of 602,018 (94%) age 2.1 and three other age groups (Table 11). The coho harvest was 51% male. Average lengths of commercially harvested male coho salmon by age group ranged from 563 mm for age 1.1 to 610 mm for age 3.1; average lengths of females ranged from 560 mm for age 1.1 to 655 mm for age 3.1 (Table 12).

Kuskokwim area coho salmon subsistence catches were much less than the commercial catch and were therefore not sampled. Age and sex compositions of subsistence catches were estimated using samples from adjacent commercial fishing areas (Appendices E.5-E.7).

The coho salmon escapement was sampled only from the Kogrukluk River in 1988. As found in the commercial catch samples, age-2.1 coho salmon predominated the escapement samples (94%; Table 13). The escapement was 46% female. Average lengths for male coho salmon in escapement samples ranged from 563 mm for age 1.1 to 581 mm for age 3.1; average lengths of females ranged from 563 mm for age 1.1 to 597 mm for age 3.1 (Table 14).

Chum Salmon

Chum salmon in Districts 1, 4, and 5 were sampled throughout the commercial fishing season in 1987. The age compositions of the commercial and subsistence catches for this area were estimated to be 78% age 0.3, 20% age 0.4, and 2% ages 0.5 and 0.2 (Table 15). Sex composition of the total catch was estimated to be 49% male. The commercial catch in District 1 primarily consisted of age-0.3 chum salmon (79%), District 4 was mostly age 0.3 (65%), and District 5 was mostly age 0.4 (75%; Appendix F.1-F.4). The proportion of age-0.3 chum salmon increased markedly through time in District 1 (Appendix F.1). Sex composition of commercial catches ranged from 44% to 62% female. Average lengths of male chum salmon in commercial catch samples ranged from 543 mm for age 0.2 to 631 mm for age 0.5; average lengths of females ranged from 529 mm for age 0.2 to 617 mm for age 0.5 (Table 16).

Subsistence catches of chum salmon were not sampled. The closest commercial fishing district samples were used to estimate age and sex composition of subsistence catches (Appendices F.5-F.7).

Chum salmon escapement samples were collected from the Kogrukluk and Goodnews Rivers to estimate age and sex composition. Age-0.3 chum salmon from the 1984 brood year predominated escapement samples from the Kogrukluk River. Chum salmon samples from the Goodnews River drainage were 68% age 0.4 and 29% age 0.3 (Table 17). Sex compositions of samples ranged from 36% to 50% female. Average lengths of male chum salmon in the escapement ranged from 579 mm for age 0.3 to 641 mm for age 0.5; average lengths of females ranged from 546 mm for age 0.3 to 582 mm for age 0.5 (Table 18).

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Table 1. Commercial and subsistence harvests of Kuskokwim area salmon in numbers of fish by fishery, district, and species, 1988.

COMMERCIAL HARVEST:						
District	Chinook	Sockeye	Coho	Pink	Chum	Total
1 ^a	53,860	90,273	510,829	10,831	1,364,533	2,030,326
2	1,906	2,261	15,879	20	19,692	39,758
4	13,872	21,543	68,591	21,258	29,183	154,438
5	4,964	36,368	30,832	5,509	33,059	110,732
Subtotal	74,602	150,436	626,131	37,618	1,446,467	2,335,254
SUBSISTENCE HARVEST:						
Area	Chinook	Sockeye	Coho	Pink	Chum	Total
Kuskokwim River ^b	53,877	23,657	28,357	2	117,009	222,902
Quinhagak	2,508	857	2,933	0	724	7,022
Goodnews Bay	310	1,065	1,162		941	3,478
Subtotal	56,695	25,579	32,426	2	118,181	232,873
Total	131,297	176,015	658,557	37,620	1,564,648	2,568,127

^a Includes salmon from ADF&G test fishing projects that were sold.

^b Includes salmon from one personal-use permit.

Table 2. Salmon escapement indices in Kuskokwim area spawning tributaries by species and method, 1988. ^a

Location	Date	Chinook	Sockeye	Coho	Pink	Chum
KUSKOKWIM RIVER:						
Aniak River	07/24/88	45	1,675	0	0	24,508
Aniak Sonar ^b	07/31/88					401,511
Bear Creek			— not surveyed —			
Cheeneetnuk River ^c	08/04/88	107	0		0	82
Chineekluk Creek	07/20/88	0	0		0	0
Chukowan River	07/23/88	1,120	170	0	0	940
Eek River	07/23/88	2,459	304	0	120	3,920
Middle Fork Eek River			— not surveyed —			
Holitna River			— not surveyed —			
Holokuk River ^c	07/20/88	57	0	0		500
Kisaralik River	08/02/88	840	0	0	0	1,010
Kogrukuk River	09/17/88	11,194	6,158	12,799		41,881
Kwethluk River	08/02/88	597	35	0	0	820
Oskawalik River	07/20/88	80	0	0	0	3,620
Salmon River	07/18/88	244	0	0	0	310
North Fork Salmon River ^g			— not surveyed —			
Middle Fork Salmon River ^g			— not surveyed —			
South Fork Salmon River ^g			— not surveyed —			
Tuluksak River	07/28/88	188	0	0	0	1,445
Kuskokwim River Total (aerial & weir sonar)		17,831	8,342	12,799	120	510,547
KUSKOKWIM BAY:						
Goodnews River ^h	07/15/88	1,024	3,175	0	0	5,814
Goodnews Tower ⁱ	07/30/88	5,419	38,319		11,019	39,501
Kanektok River ^j	07/21/88	11,140	30,440	0	870	20,063
Kuskokwim Bay Total (aerial survey)		12,164	33,615	0	870	25,877

^a All surveys were good to fair unless otherwise noted.

^b Adjusted sonar count.

^c Poor survey conditions.

^d Downstream from Ignatti Weir on the Holitna River.

^e Weir count.

^f Aniak River system.

^g Pitka Fork.

^h Middle Fork only.

ⁱ Entire drainage estimate based upon aerial survey counts in combination with tower estimates.

^j Peak aerial survey estimates.

Table 3. Total harvest of Kuskokwim area chinook salmon in numbers of fish by age, sex, and fishery, 1988.

District	Fishery	Sample Size	Sex	Brood Year and Age Group					Total
				1984	1983	1982	1981	1980	
				1.2	1.3	1.4	1.5	1.6	
1	Commercial ^a	646	Female	1,751	11,005	5,920	2,835	0	21,511
			Male	13,507	11,757	3,335	750	0	32,349
			Total	15,258	25,763	9,255	3,585	0	53,860
2	Commercial ^a		Female	62	389	209	100	0	761
			Male	478	522	118	27	0	1,145
			Total	540	911	327	127	0	1,906
	Subsistence ^b		Female	1,751	11,009	5,921	2,836	0	21,517
			Male	13,511	14,762	3,336	751	0	32,360
			Total	15,262	25,771	9,258	3,586	0	53,877
4	Commercial ^c	592	Female	375	1,313	2,509	1,360	0	4,510
			Male	2,744	3,353	1,782	422	23	8,325
			Total	3,119	4,666	4,292	1,782	23	13,883
	Subsistence ^c		Female	68	237	453	246	0	1,004
			Male	496	606	322	76	4	1,504
			Total	563	843	775	322	4	2,508
5	Commercial ^d	475	Female	397	418	1,369	167	0	2,351
			Male	930	805	752	125	0	2,613
			Total	1,327	1,223	2,121	293	0	4,964
	Subsistence ^d		Female	25	26	85	10	0	147
			Male	58	50	47	8	0	163
			Total	83	76	132	18	0	310
TOTAL HARVEST			Female	4,429	24,397	16,466	7,554	0	51,801
			Male	31,724	31,855	9,692	2,159	27	78,459
			Total	36,153	56,252	26,158	9,713	27	130,260

^a Estimates based on District 1 commercial catch samples.

^b Entire Kuskokwim River subsistence harvest.

^c Estimates based on District 4 commercial catch samples.

^d Estimates based on District 5 commercial catch samples.

Table 4. Average length (in mm from mid-eye to fork-of-tail) by age and sex of Kuskokwim area chinook salmon commercial catch samples, 1988.

District	Sex		Brood Year and Age Group				
			1984	1983	1982	1981	1980
			1.2	1.3	1.4	1.5	1.6
1	Female	Mean Length	581	723	846	904	
		Standard Error	10.9	6.5	10.0	11.9	
		Sample Size	21	132	71	34	
	Male	Mean Length	547	693	785	903	
		Standard Error	4.8	5.5	21.0	43.5	
		Sample Size	162	177	40	9	
4	Female	Mean Length	619	738	868	911	
		Standard Error	30.4	10.8	6.1	8.4	
		Sample Size	16	56	107	58	
	Male	Mean Length	540	709	850	861	980
		Standard Error	5.5	6.8	12.3	26.3	0.0
		Sample Size	117	143	76	18	1
5	Female	Mean Length	534	705	864	906	
		Standard Error	7.0	15.7	5.8	13.0	
		Sample Size	38	39	129	16	
	Male	Mean Length	534	682	880	902	
		Standard Error	4.4	8.5	9.3	41.1	
		Sample Size	89	76	72	12	

Table 5. Age and sex composition of Kuskokwim area chinook salmon escapement samples, 1988.

River	Sample Size	Sex	Brood Year and Age Group				Total
			1984 1.2	1983 1.3	1982 1.4	1981 1.5	
Kogrukluk ^a	868	Female	0.0	8.8	20.9	7.7	37.3
		Male	9.0	42.5	10.3	0.9	62.7
		Total	9.0	51.3	31.1	8.6	100.0
Tuluksak ^b	12	Female	0.0	0.0	16.7	8.3	25.0
		Male	0.0	0.0	16.7	16.7	75.0
		Total	0.0	0.0	33.3	25.0	100.0
Goodnews ^c	94	Female	0.0	10.6	22.3	8.5	41.5
		Male	2.1	12.8	35.1	8.5	58.5
		Total	2.1	23.4	57.4	17.0	100.0

^a Samples collected at weir 7/6-7/27.

^b Samples collected on 7/12.

^c Samples collected on 9/8.

Table 6. Average length (in mm from mid-eye to fork-of-tail) by age and sex of Kuskokwim area chinook salmon escapement samples, 1988.

River	Sex		Brood Year and Age Group			
			1984 1.2	1983 1.3	1982 1.4	1981 1.5
Kogrukluk ^a	Female	Mean Length		818	867	905
		Standard Error		4.8	3.8	5.4
		Sample Size		76	181	67
	Male	Mean Length	561	724	828	880
		Standard Error	6.2	3.1	7.4	25.1
		Sample Size	78	369	89	8
Goodnews ^b	Female	Mean Length		798	877	898
		Standard Error		32.4	13.9	15.1
		Sample Size		10	21	8
	Male	Mean Length	535	772	920	953
		Standard Error	20.0	27.1	10.6	25.1
		Sample Size	2	12	33	8

^a Samples collected at weir on 7/6-7/27.

^b Samples collected from carcass survey 8/9.

Table 7. Total harvest of Kuskokwim area sockeye salmon in numbers of fish by age, sex, and fishery, 1988.

District	Fishery	Sample Size	Sex	Brood Year and Age Group									Total
				1984		1983			1982		1981		
				0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	2.4	
1	Commercial ^a	453	Female	0	598	0	39,457	598	0	1,594	8,569	199	51,015
			Male	199	598	0	26,903	598	0	399	10,362	199	39,258
			Total	199	1,196	0	66,360	1,196	0	1,993	18,931	399	90,273
2	Commercial ^a		Female	0	15	0	988	15	0	40	215	5	1,278
			Male	5	15	0	674	15	0	10	260	5	983
			Total	5	30	0	1,662	30	0	50	474	10	2,261
	Subsistence ^b		Female	0	157	0	10,340	157	0	418	2,246	52	13,369
			Male	52	157	0	7,050	157	0	104	2,716	52	10,288
			Total	52	313	0	17,390	313	0	522	4,961	104	23,657
4	Commercial ^c	748	Female	58	749	58	6,945	58	0	375	288	0	8,530
			Male	231	1,153	86	10,634	144	29	490	202	0	12,997
			Total	288	1,902	144	17,608	202	29	865	490	0	21,556
	Subsistence ^c		Female	0	112	0	328	0	0	0	0	0	439
			Male	0	216	0	411	0	0	0	0	0	628
			Total	0	328	0	739	0	0	0	0	0	1,067
5	Commercial ^d	546	Female	0	813	0	13,167	0	0	0	0	0	13,981
			Male	0	1,118	0	12,608	0	0	0	0	0	13,726
			Total	0	1,932	0	25,826	0	0	0	0	0	27,758
	Subsistence ^d		Female	0	28	0	453	0	0	0	0	0	481
			Male	0	38	0	434	0	0	0	0	0	472
			Total	0	66	0	887	0	0	0	0	0	955
TOTAL HARVEST			Female	58	2,472	58	71,678	828	0	2,427	11,318	256	102,840
			Male	487	3,295	86	58,714	914	29	1,003	13,540	256	78,324
			Total	545	5,767	144	130,392	1,742	29	3,430	24,858	512	181,164

^a Estimates based on District 1 commercial catch samples.

^b Entire Kuskokwim River subsistence harvest.

^c Estimates based on District 4 commercial catch samples.

^d Estimates based on District 5 commercial catch samples.

Table 8. Average length (in mm from mid-eye to fork-of-tail) by age and sex of Kuskokwim area sockeye salmon commercial catch samples, 1988.

District	Sex		Brood Year and Age Group						
			1984		1983			1982	
			0.3	1.2	0.4	1.3	2.2	1.4	2.3
1	Female	Mean Length		558		570	570	577	580
		Standard Error		13.1		1.6	15.2	9.3	3.9
		Sample Size		3		198	3	8	43
	Male	Mean Length		544		612	600	627	619
		Standard Error		44.0		2.4	22.1	5.0	3.7
		Sample Size		3		135	3	2	52
4	Female	Mean Length	562	519	600	568	495	583	564
		Standard Error	12.5	6.2	10.0	1.3	0.0	4.9	5.4
		Sample Size	2	26	2	241	2	13	10
	Male	Mean Length	599	539	641	597	552	620	584
		Standard Error	10.3	7.7	20.8	1.3	9.8	7.2	10.6
		Sample Size	8	40	3	369	5	17	7
5	Female	Mean Length		510	582	577		592	
		Standard Error		24.0	5.5	1.3		6.4	
		Sample Size		5	2	276		20	
	Male	Mean Length	584	552	626	611	546	621	
		Standard Error	5.3	8.3	0.0	1.3	19.6	8.3	
		Sample Size	5	21	1	377	3	21	

Table 9. Age and sex composition of Kuskokwim area sockeye salmon escapement samples, 1988.

River	Sample		Brood Year and Age Group								Total
			1984			1983			1982		
			0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	
Kogrukluk ^a	328	Female	0.0	0.0	0.0	0.0	44.8	0.0	1.8	0.6	47.3
		Male	0.0	1.8	0.0	0.0	50.0	0.0	0.3	0.6	52.7
		Total	0.0	1.8	0.0	0.0	94.8	0.0	2.1	1.2	100.0
Goodnews ^b	315	Female	1.3	6.3	0.3	0.0	47.9	0.0	1.3	0.6	58.0
		Male	1.3	3.8	0.0	0.3	34.9	0.6	1.0	0.0	42.7
		Total	2.6	10.2	0.3	0.3	83.2	0.6	2.3	0.6	100.0

^a Samples collected 7/6/88–7/27/88 at weir.

^b Samples collected by beach seine 7/1/88–7/28/88.

Table 10. Average length (in mm from mid-eye to fork-of-tail) by age and sex of Kuskokwim area sockeye salmon escapement samples, 1988.

River	Sex		Brood Year and Age Group				
			1984		1983	1982	
			0.3	1.2	1.3	1.4	2.3
Kogrukluk ^a	Female	Mean Length			540	555	527
		Standard Error			1.6	4.7	12.5
		Sample Size			147	6	2
	Male	Mean Length		582	588	570	590
		Standard Error		6.5	1.7	0.0	20.0
		Sample Size		6	164	1	2
Goodnews ^b	Female	Mean Length	555	563	564	557	552
		Standard Error	14.5	3.8	1.9	23.5	2.5
		Sample Size	4	10	151	4	2
	Male	Mean Length	598	563	601		
		Standard Error	6.9	14.1	2.7		
		Sample Size	4	12	110		

^a Samples collected at weir 7/6–7/27.

^b Samples collected by beach seine 7/1–7/27.

Table 11. Total harvest of Kuskokwim area coho salmon in numbers of fish by age, sex, and fishery, 1988.

District	Fishery	Sample Size	Sex	Brood Year and Age Group				Total
				1985	1984		1983	
				1.1	1.2	2.1	3.1	
1	Commercial ^a	1,427	Female	12,171		244,496	4,296	260,963
			Male	10,381		233,041	4,296	247,718
			Total	22,552		479,685	8,591	510,829
2	Commercial ^a		Female	378		7,600	134	8,112
			Male	323		7,244	134	7,700
			Total	701		14,911	267	15,879
	Subsistence ^b		Female	676		13,572	238	14,487
			Male	576		12,937	238	13,751
			Total	1,252		26,628	477	28,357
4	Commercial ^c	286	Female	555	0	13,684	0	14,239
			Male	2,219	185	35,875	370	38,649
			Total	2,774	185	49,559	370	52,888
	Subsistence ^c		Female	31	0	759	0	790
			Male	123	10	1,990	21	2,143
			Total	154	10	2,748	21	2,933
5	Commercial ^d	222	Female	308	0	12,230	103	12,641
			Male	719	0	17,471	0	18,191
			Total	1,028	0	29,701	103	30,832
	Subsistence ^d		Female	12	0	461	4	476
			Male	27	0	658	0	686
			Total	39	0	1,119	4	1,162
TOTAL HARVEST			Female	14,131	0	292,802	4,775	311,893
			Male	14,368	185	309,216	5,059	328,643
			Total	28,499	185	602,018	9,834	640,536

^a Estimates based on District 1 commercial catch samples.

^b Entire Kuskokwim River subsistence harvest.

^c Estimates based on District 4 commercial catch samples.

^d Estimates based on District 5 commercial catch samples.

Table 12. Average length (in mm from mid-eye to fork-of-tail) by age and sex of Kuskokwim area coho salmon commercial catch samples, 1988.

District	Sex		Brood Year and Age Group		
			1985	1984	1983
			1.1	2.1	3.1
1	Female	Mean Length	560	571	582
		Standard Error	4.8	1.0	5.1
		Sample Size	34	683	12
	Male	Mean Length	563	575	586
		Standard Error	6.5	1.2	10.4
		Sample Size	29	651	12
4	Female	Mean Length	578	585	
		Standard Error	18.6	3.3	
		Sample Size	3	74	
	Male	Mean Length	583	594	610
		Standard Error	15.4	2.5	4.5
		Sample Size	12	194	2
5	Female	Mean Length	562	602	655
		Standard Error	45.9	2.8	0.0
		Sample Size	3	119	1
	Male	Mean Length	593	602	
		Standard Error	9.8	3.2	
		Sample Size	7	170	

Table 13. Age and sex composition of Kogrukluk River coho salmon escapement samples, 1988.

		Brood Year and Age Group			Total	
		1985	1984	1983		
		1.1	2.1	3.1		
Sampling Dates: 8/18-9/17						
Sample Size: 589						
	Female	Percent of Sample	1.4	44.1	0.7	46.2
	Male	Percent of Sample	3.7	49.2	0.5	53.5
	Total	Percent of Sample	5.1	93.7	1.2	100.0

Table 14. Average length (in mm from mid-eye to fork-of-tail) by age and sex of Kuskokwim area coho salmon escapement samples, 1988.

		Brood Year and Age Group			
		1985	1984	1983	
River	Sex	1.1	2.1	3.1	
Kogrukluk ^a	Female	Mean Length	563	567	597
		Standard Error	7.1	1.4	5.2
		Sample Size	8	260	4
	Male	Mean Length	563	568	581
		Standard Error	8.7	2.0	7.2
		Sample Size	22	290	3

^a Samples collected at weir 8/17-9/17.

Table 15. Total harvest of Kuskokwim area chum salmon in numbers of fish by age, sex, and fishery, 1988.

District	Fishery	Sample Size	Sex	Brood Year and Age Group				Total
				1985	1984	1983	1982	
				0.2	0.3	0.4	0.5	
1	Commercial ^a	2,404	Female	6,244	568,745	112,387	6,244	693,619
			Male	5,676	514,822	144,173	6,244	670,914
			Total	11,920	1,083,566	256,559	12,487	1,364,533
2	Commercial ^a		Female	90	8,208	1,622	90	10,010
			Male	82	7,430	2,081	90	9,682
			Total	172	15,637	3,702	180	19,692
	Subsistence ^b		Female	535	48,770	9,637	535	59,478
			Male	487	44,146	12,363	535	57,531
			Total	1,022	92,916	22,000	1,071	117,009
4	Commercial ^c	593	Female	197	9,954	4,336	246	3,764
			Male	148	9,067	4,927	345	4,793
			Total	345	19,020	9,264	591	29,220
	Subsistence ^c		Female	5	247	107	6	365
			Male	4	225	122	9	359
			Total	9	471	471	15	724
5	Commercial ^d	430	Female	70	4,511	13,463	141	18,186
			Male	211	3,101	11,208	352	14,873
			Total	282	7,613	24,671	493	33,059
	Subsistence ^d		Female	2	128	383	4	518
			Male	6	88	319	10	423
			Total	8	217	702	14	941
TOTAL HARVEST			Female	7,143	640,563	141,935	7,266	796,907
			Male	6,614	578,879	175,193	7,585	768,271
			Total	13,757	1,219,442	317,128	14,851	1,565,178

^a Estimates based on District 1 commercial catch samples.

^b Entire Kuskokwim River subsistence harvest.

^c Estimates based on District 4 commercial catch samples.

^d Estimates based on District 5 commercial catch samples.

Table 16. Average length (in mm from mid-eye to fork-of-tail) by age and sex of Kuskokwim area chum salmon commercial catch samples, 1988.

District	Sex		Brood Year and Age Group			
			1985 0.2	1984 0.3	1983 0.4	1982 0.5
1	Female	Mean Length	529	560	577	577
		Standard Error	7.3	0.7	1.8	6.5
		Sample Size	11	1,002	198	11
	Male	Mean Length	564	584	597	601
		Standard Error	10.5	0.9	2.0	10.6
		Sample Size	10	907	254	11
4	Female	Mean Length	548	567	586	583
		Standard Error	13.2	1.5	2.6	18.7
		Sample Size	4	202	88	5
	Male	Mean Length	543	589	610	600
		Standard Error	6.0	2.1	3.4	10.9
		Sample Size	3	184	100	7
5	Female	Mean Length	545	573	591	617
		Standard Error	0.0	2.9	1.7	20.0
		Sample Size	1	64	191	2
	Male	Mean Length	550	610	623	631
		Standard Error	10.0	4.3	2.5	8.3
		Sample Size	3	44	159	5

Table 17. Age and sex composition of Kuskokwim River chum salmon escapement samples, 1988.

River	Sample Size	Sex	Brood Year and Age Group				Total
			1985	1984	1983	1982	
			0.2	0.3	0.4	0.5	
Kogruklu ^a	621	Female	0.0	26.2	9.2	0.2	35.6
		Male	0.0	43.0	19.6	1.8	64.4
		Total	0.0	69.2	28.8	1.9	100.0
Goodnews ^b	422	Female	0.0	16.4	32.5	0.9	49.8
		Male	0.7	12.6	35.1	1.2	49.5
		Total	0.7	28.9	68.2	2.1	100.0

^a Samples collected at weir 7/6–7/31.

^b Samples collected by beach seine from 6/30 to 7/15.

Table 18. Length (in mm from mid-eye to fork-of-tail) by age and sex of Kuskokwim area chum salmon escapement samples, 1988.

River	Sex		Brood Year and Age Group		
			1984	1983	1982
			0.3	0.4	0.5
Kogruklu ^a	Female	Mean Length	546	562	580
		Standard Error	1.8	3.4	
		Sample Size	163	57	1
	Male	Mean Length	579	591	597
		Standard Error	1.4	2.5	6.6
		Sample Size	267	122	11
Goodnews ^b	Female	Mean Length	564	577	582
		Standard Error	3.0	2.0	10.1
		Sample Size	68	134	4
	Male	Mean Length	601	623	641
		Standard Error	4.2	2.6	38.0
		Sample Size	52	147	5

^a Samples collected at weir from 7/6 to 7/31.

^b Samples collected by beach seine 6/30–7/15.

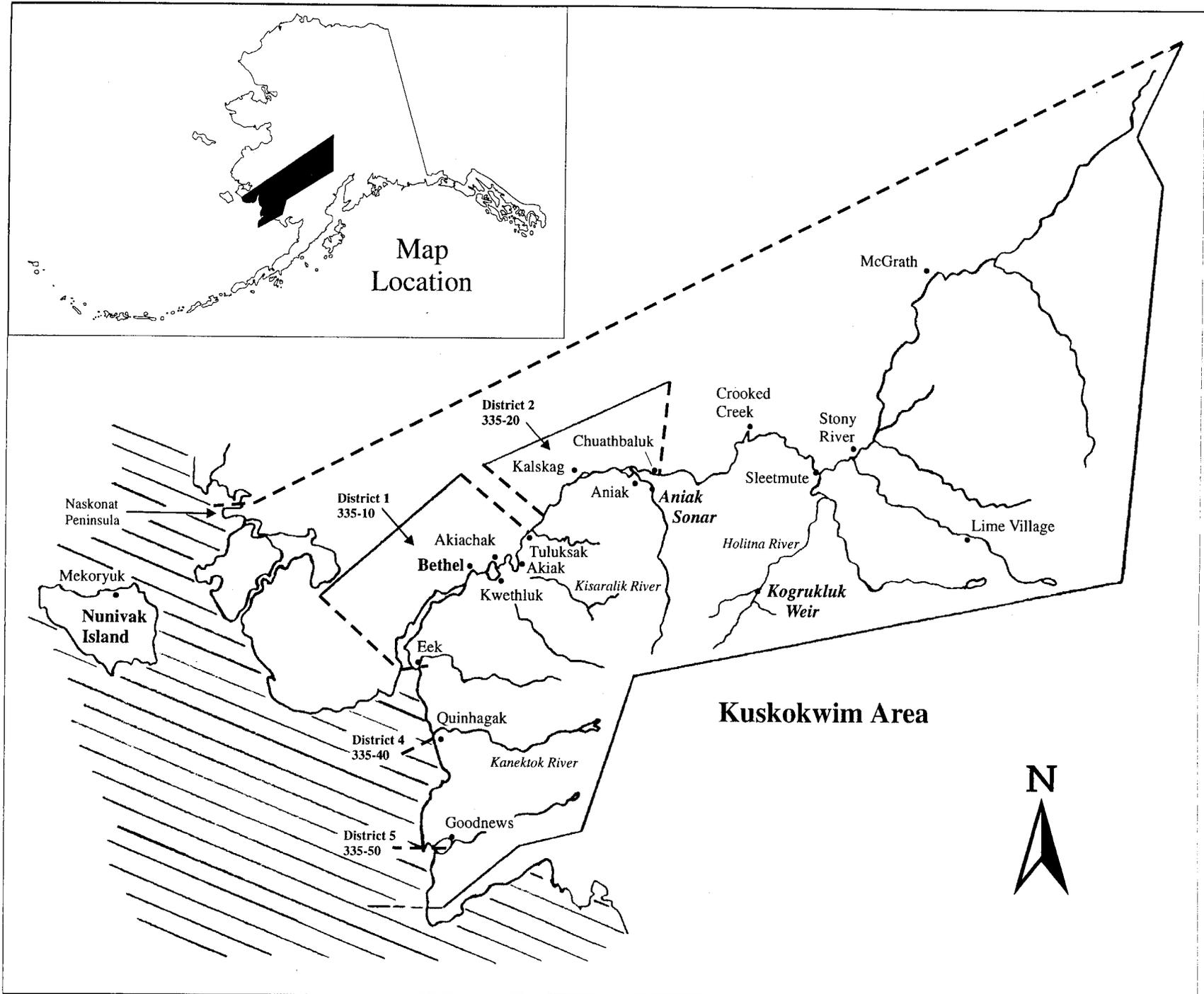


Figure 1. Map of the Kuskokwim area showing commercial fishing district boundaries.

APPENDIX

Appendix A
Commercial Catch by District

Appendix A.1. Lower Kuskokwim River, District 1, commercial harvest by species and fishing effort by period, 1988.

Period	Hours	Permits ^a	Commercial Catch				
			Chinook	Sockeye	Coho	Pink	Chum
June 16	8	602	12,640	7,408	0	0	72,219
June 20	6	612	11,708	14,502	0	0	113,628
June 24	6	644	9,710	19,894	0	3	119,808
June 28	6	609	5,350	17,628	0	4	154,027
July 2	6	580	3,531	15,102	0	28	187,916
July 5	6	579	2,340	7,284	9	18	163,971
July 8	6	604	1,891	3,623	1	49	138,772
July 11	6	598	1,628	2,467	24	123	137,450
July 14	6	597	1,751	822	141	402	116,930
July 18	6	567	1,107	396	502	503	57,749
July 21	6	539	621	164	1,278	1,022	39,643
July 25	6	494	329	109	6,323	1,488	24,893
July 28	6	552	333	760	20,970	1,572	16,028
August 1	6	594	201	32	33,954	1,869	6,967
August 4	6	639	206	105	76,576	1,235	5,152
August 8	6	640	114	92	76,345	835	2,890
August 10	6	596	73	9	53,874	517	1,376
August 12	6	624	115	11	84,700	469	1,422
August 15	6	613	76	14	59,724	215	663
August 18	6	620	37	8	37,415	175	230
August 20	6	577	29	5	24,046	84	121
August 27	6	532	14	8	22,683	109	93
August 31	6	408	6	10	9,852	85	34
Unknown ^b		2	50	510	2,412	26	2,551
SEASON TOTAL	140	746	53,860	90,273	510,829	10,831	1,364,533

^a Number of fishermen making at least one delivery.

^b ADF&G test fishery catch.

Appendix A.2. Kuskokwim District 2 commercial catch of salmon by species and period, 1988.

Period	Hours	Permits ^a	Commercial Catch				
			Chinook	Sockeye	Coho	Pink	Chum
June 24	6	13	669	1,041	0	0	4,232
June 28	6	17	746	639	0	0	6,087
July 2	6	19	468	579	0	0	8,155
August 8	6	14	6	0	1,465	3	308
August 10	6	16	10	0	1,823	6	312
August 12	6	20	3	2	5,216	5	244
August 15	6	21	1	0	2,317	4	144
August 18	6	15	2	0	1,485	1	116
August 20	6	17	1	0	1,573	1	94
SEASON TOTAL	54	29	1,906	2,261	15,879	20	19,692

^a Number of fishermen making at least one delivery.

Appendix A.3. Kuskokwim District 4 commercial harvest of salmon by species and period, 1988.

Period	Hours	Permits ^a	Commercial Catch				
			Chinook	Sockeye	Coho	Pink	Chum
June 13-14	12	202	1,716	151	0	0	1,092
June 16-17	12	94	1,179	277	0	0	847
June 20-21	12	88	803	367	0	2	746
June 28	12	69	4,089	2,413	0	0	5,449
July 2	12	98	1,891	3,121	0	0	4,337
July 5	12	62	967	2,295	0	5	3,303
July 8	12	71	918	2,453	0	38	3,672
July 11	12	66	621	3,369	0	67	2,940
July 14	12	64	596	3,465	0	159	1,748
July 18	12	73	202	1,454	1	760	1,310
July 21	12	79	162	769	15	1,709	1,380
July 25	12	61	135	393	519	2,865	813
July 27	12	49	93	253	273	1,972	320
July 29	12	55	104	212	565	2,943	353
August 1	12	69	54	129	1,315	2,231	246
August 3	12	72	74	81	2,793	1,809	247
August 5	12	60	40	46	4,517	1,133	98
August 8	12	67	59	94	2,991	1,597	106
August 10	12	57	19	10	5,298	278	43
August 12	12	73	45	64	3,033	1,168	47
August 15	12	77	36	31	15,733	594	53
August 17	12	107	24	18	2,775	415	15
August 19	12	75	14	13	4,373	257	15
August 22	12	86	11	6	4,502	329	13
August 24	12	84	5	16	8,673	389	7
August 26	12	86	17	14	4,825	242	8
August 29	12	70	4	6	2,701	118	3
August 31	12	56	3	11	1,524	99	3
September 2	12	40	0	4	558	50	0
September 5	12	34	2	16	1,012	58	5
September 7	12	29	0	5	609	23	1
September 9	12	0			No Commercial Fishing — No Buyers		
SEASON TOTAL	384	288	13,883	21,556	52,888	21,310	29,220

^a Number of fishermen who made at least one delivery.

Appendix A.4. Kuskokwim District 5 commercial harvest of salmon by species and period, 1988.

Period	Hours	Permits ^a	Commercial Catch					
			Chinook	Sockeye	Coho	Pink	Chum	
June 16	12	22	251	696	0	0	1,091	
June 20	12	32	404	1,989	0	0	3,501	
June 23	12	68	1,639	2,701	0	1	7,833	
June 28	12	48	1,307	2,932	0	5	8,369	
July 2	12	42	234	2,657	0	16	3,434	
July 5	12	36	467	3,328	0	44	3,193	
July 8	12	47	147	3,600	0	4	1,894	
July 11	12	54	124	2,851	0	35	1,525	
July 14	12	48	89	3,173	0	110	1,019	
July 18	12	48	71	3,049	0	172	649	
July 25	12	39	30	1,534	24	440	227	
July 29	12	35	32	1,312	91	530	72	
August 1	12	33	27	811	171	683	55	
August 3	12	23	13	578	192	471	33	
August 5	12	25	12	527	752	517	63	
August 8	12	30	19	926	1,343	531	23	
August 10	12	31	10	659	1,340	240	20	
August 12	12	34	7	564	1,766	339	9	
August 15	12	32	5	398	2,338	177	4	
August 17	12	35	16	498	3,237	133	7	
August 19	12	36	10	360	4,180	73	6	
August 22	12	41	10	353	4,520	175	5	
August 24	12	52	17	244	3,467	237	5	
August 26	12	52	8	204	2,868	255	7	
August 29	12	61	4	155	1,675	112	3	
August 31	12	52	6	88	1,125	80	5	
September 2	12	39	2	57	792	49	4	
September 5	12	28	2	61	525	46	2	
September 7	12	24	1	63	426	34	1	
September 9	12	0		No Commercial Fishing — No Buyers				
SEASON TOTAL	360	125	4,964	36,368	30,832	5,509	33,059	

^a Number of fishermen making at least one delivery.

Appendix B
Estimated Escapement by Location

Appendix B.1. Kogrukluk River weir daily and cumulative salmon escapement counts by species, 1988. ^a

Date	Chinook	Cumulative		Sockeye	Cumulative		Coho	Cumulative		Chum	Cumulative	
	Count	Count	Percent	Count	Count	Percent	Count	Count	Percent	Count	Count	Percent
July 5	349	349	4.6	75	75	1.8	0	0	0.0	1,845	1,845	6.5
July 6	465	814	10.6	150	225	5.3	0	0	0.0	1,380	3,225	11.4
July 7	696	1,510	19.7	283	508	12.0	0	0	0.0	1,694	4,919	17.4
July 8	583	2,093	27.3	476	984	23.2	0	0	0.0	1,959	6,878	24.4
July 9	571	2,664	34.8	505	1,489	35.0	0	0	0.0	2,751	9,629	34.1
July 10	684	3,348	43.7	419	1,908	45.0	0	0	0.0	2,151	11,780	41.7
July 11	704	4,052	52.9	507	2,415	57.0	0	0	0.0	2,638	14,418	51.1
July 12	658	4,710	61.4	365	2,780	65.6	0	0	0.0	2,635	17,053	60.4
July 13	492	5,202	67.9	239	3,019	71.2	0	0	0.0	1,960	19,013	67.3
July 14	595	5,797	75.6	273	3,292	77.6	0	0	0.0	2,078	21,091	74.7
July 15	450	6,247	81.5	276	3,568	84.2	0	0	0.0	1,772	22,863	81.0
July 16	311	6,558	85.6	179	3,747	88.4	0	0	0.0	977	23,860	84.5
July 17	150	6,708	87.5	109	3,856	90.9	0	0	0.0	727	24,587	87.1
July 18	103	6,811	88.9	83	3,939	92.9	0	0	0.0	410	24,997	88.5
July 19	124	6,935	90.5	46	3,985	94.0	0	0	0.0	459	25,456	90.1
July 20	47	6,982	91.1	37	4,022	94.9	1	1	0.0	335	25,791	91.3
July 21	107	7,089	92.5	40	4,062	95.8	0	1	0.0	344	26,135	92.5
July 22	108	7,197	93.9	29	4,091	96.5	0	1	0.0	230	26,365	93.4
July 23	84	7,281	95.0	33	4,124	97.3	0	1	0.0	193	26,558	94.0
July 24	56	7,337	95.7	28	4,152	97.9	1	2	0.0	228	26,786	94.9
July 25	46	7,383	96.3	9	4,161	98.1	0	2	0.0	95	26,881	95.2
July 26	38	7,421	96.8	9	4,170	98.3	0	2	0.0	124	27,005	95.6
July 27	27	7,448	97.2	4	4,174	98.4	0	2	0.0	103	27,108	96.0
July 28	16	7,464	97.4	10	4,184	98.7	0	2	0.0	119	27,227	96.4
July 29	27	7,491	97.7	6	4,190	98.8	0	2	0.0	97	27,324	96.8
July 30	31	7,522	98.1	9	4,199	99.0	0	2	0.0	147	27,471	97.3
July 31	23	7,545	98.4	12	4,211	99.3	0	2	0.0	134	27,605	97.8
August 1	-	7,545	98.4	-	4,211	99.3	-	2	0.0	-	27,605	97.8
August 2	-	7,545	98.4	-	4,211	99.3	-	2	0.0	-	27,605	97.8
August 3	4	7,549	98.5	1	4,212	99.3	0	2	0.0	71	27,676	98.0

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Appendix B.1. (Page 2 of 3).

Date	Chinook	Cumulative		Sockeye	Cumulative		Coho	Cumulative		Chum	Cumulative	
	Count	Count	Percent	Count	Count	Percent	Count	Count	Percent	Count	Count	Percent
August 4	12	7,561	98.6	3	4,215	99.4	0	2	0.0	72	27,748	98.3
August 5	6	7,567	98.7	3	4,218	99.5	0	2	0.0	61	27,809	98.5
August 6	7	7,574	98.8	2	4,220	99.5	4	6	0.0	62	27,871	98.7
August 7	6	7,580	98.9	1	4,221	99.6	6	12	0.1	53	27,924	98.9
August 8	10	7,590	99.0	0	4,221	99.6	11	23	0.0	45	27,969	99.0
August 9	3	7,593	99.1	1	4,222	99.6	15	38	0.3	47	28,016	99.2
August 10	1	7,594	99.1	3	4,225	99.6	25	63	0.5	35	28,051	99.3
August 11	5	7,599	99.1	1	4,226	99.6	38	101	0.9	37	28,088	99.5
August 12	10	7,609	99.3	1	4,227	99.7	80	181	1.5	18	28,106	99.5
August 13	2	7,611	99.3	1	4,228	99.7	86	267	2.3	16	28,122	99.6
August 14	3	7,614	99.3	1	4,229	99.7	46	313	2.7	7	28,129	99.6
August 15	2	7,616	99.4	0	4,229	99.7	25	338	2.9	13	28,142	99.7
August 16	3	7,619	99.4	0	4,229	99.7	105	443	3.8	20	28,162	99.7
August 17	5	7,624	99.5	0	4,229	99.7	157	600	5.1	20	28,182	99.8
August 18	4	7,628	99.5	2	4,231	99.8	258	858	7.3	5	28,197	99.9
August 19	3	7,631	99.6	1	4,232	99.8	202	1,060	9.0	12	28,209	99.9
August 20	3	7,634	99.6	0	4,232	99.8	290	1,350	11.5	12	28,221	99.9
August 21	3	7,637	99.6	1	4,233	99.8	352	1,702	14.5	7	28,228	100.0
August 22	3	7,640	99.7	1	4,234	99.9	383	2,085	17.8	5	28,233	100.0
August 23	2	7,642	99.7	0	4,234	99.9	323	2,408	20.5	9	28,242	100.0
August 24	0	7,642	99.7	0	4,234	99.9	389	2,797	23.9	1	28,243	100.0
August 25	1	7,643	99.7	0	4,234	99.9	258	3,055	26.1	0	28,243	100.0
August 26	1	7,644	99.7	0	4,234	99.9	898	3,953	33.7	0	28,243	100.0
August 27	1	7,645	99.7	1	4,235	99.9	378	4,331	36.9	1	28,244	100.0
August 28	4	7,649	99.8	0	4,235	99.9	618	4,949	42.2	0	28,244	100.0
August 29	1	7,650	99.8	0	4,235	99.9	553	5,502	46.9	1	28,245	100.0
August 30	1	7,651	99.8	0	4,235	99.9	770	6,272	53.5	0	28,245	100.0
August 31	1	7,652	99.8	0	4,235	99.9	494	6,766	57.7	0	28,245	100.0
September 1	1	7,653	99.8	1	4,236	99.9	330	7,096	60.5	0	28,245	100.0
September 2	1	7,654	99.9	1	4,237	99.9	369	7,465	63.7	0	28,245	100.0
September 3	0	7,654	99.9	1	4,238	100.0	238	7,703	65.7	1	28,246	100.0
September 4	1	7,655	99.9	0	4,238	100.0	237	7,940	67.7	0	28,246	100.0
September 5	1	7,656	99.9	0	4,238	100.0	171	8,111	69.2	0	28,246	100.0
September 6	1	7,657	99.9	1	4,239	100.0	170	8,281	70.6	0	28,246	100.0

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Appendix B.1. (Page 3 of 3).

Date	Chinook	Cumulative		Sockeye	Cumulative		Coho	Cumulative		Chum	Cumulative	
	Count	Count	Percent	Count	Count	Percent	Count	Count	Percent	Count	Count	Percent
September 7	0	7,657	99.9	0	4,239	100.0	153	8,434	72.0	0	28,246	100.0
September 8	3	7,660	99.9	0	4,239	100.0	445	8,879	75.7	0	28,246	100.0
September 9	0	7,660	99.9	0	4,239	100.0	179	9,058	77.3	0	28,246	100.0
September 10	0	7,660	99.9	0	4,239	100.0	434	9,492	81.0	0	28,246	100.0
September 11	0	7,660	99.9	0	4,239	100.0	966	10,458	89.2	0	28,246	100.0
September 12	0	7,660	99.9	0	4,239	100.0	436	10,894	92.9	0	28,246	100.0
September 13	3	7,663	100.0	1	4,240	100.0	257	11,151	95.1	0	28,246	100.0
September 14	2	7,665	100.0	0	4,240	100.0	152	11,303	96.4	0	28,246	100.0
September 15	0	7,665	100.0	0	4,240	100.0	112	11,415	97.4	0	28,246	100.0
September 16	0	7,665	100.0	0	4,240	100.0	121	11,536	98.4	0	28,246	100.0
September 17	0	7,665	100.0	0	4,240	100.0	186	11,722	100.0	0	28,246	100.0
TOTAL		7,665			4,240			11,722			28,246	

^a The weir was not operated on 1 and 2 August. Numbers in table are actual counts. Missing counts were estimated from historical proportion data for total estimated escapement at 11,194 chinook, 6,158 sockeye, 12,799 coho, and 41,881 chum salmon.

Appendix B.2. Goodnews River tower daily and cumulative chinook, sockeye, and chum salmon escapement counts, 1988. ^a

Date	Daily Chinook			Daily Sockeye			Daily Chum		
	Count	Count	Percent	Count	Count	Percent	Count	Count	Percent
June 23	50	50	1.8	358	358	2.3	0	0	0.0
June 24	22	72	2.7	269	627	4.0	18	18	0.1
June 25	109	181	6.7	695	1,322	8.4	178	196	0.9
June 26	155	336	12.4	783	2,105	13.3	225	421	2.0
June 27	200	536	19.8	870	2,975	18.8	271	692	3.3
June 28	56	592	21.8	703	3,678	23.3	223	915	4.4
June 29	49	641	23.6	746	4,424	28.0	317	1,232	5.9
June 30	176	817	30.1	818	5,242	33.2	961	2,193	10.5
July 1	251	1,068	39.4	983	6,225	39.4	1,281	3,474	16.7
July 2	102	1,170	43.1	556	6,781	42.9	291	3,765	18.1
July 3	93	1,263	46.6	609	7,390	46.8	246	4,011	19.3
July 4	89	1,352	49.9	635	8,025	50.8	224	4,235	20.4
July 5	84	1,436	52.9	661	8,686	55.0	201	4,436	21.3
July 6	68	1,504	55.5	959	9,645	61.0	654	5,090	24.5
July 7	95	1,599	59.0	609	10,254	64.9	1,149	6,239	30.0
July 8	70	1,669	61.5	698	10,952	69.3	935	7,174	34.5
July 9	126	1,795	66.2	652	11,604	73.4	1,785	8,959	43.1
July 10	120	1,915	70.6	586	12,190	77.2	1,353	10,312	49.6
July 11	114	2,029	74.8	519	12,709	80.4	921	11,233	54.0
July 12	81	2,110	77.8	537	13,246	83.8	1,536	12,769	61.4
July 13	59	2,169	80.0	365	13,611	86.2	634	13,403	64.4
July 14	24	2,193	80.9	459	14,070	89.1	912	14,315	68.8
July 15	48	2,241	82.6	246	14,316	90.6	984	15,399	73.6
July 16	65	2,306	85.0	269	14,585	92.3	805	16,104	77.4
July 17	49	2,355	86.8	210	14,795	93.6	573	16,677	80.2
July 18	33	2,388	88.1	151	14,946	94.6	341	17,018	81.8
July 19	30	2,418	89.2	157	15,103	95.6	384	17,402	83.7
July 20	21	2,439	89.9	111	15,214	96.3	282	17,684	85.0
July 21	11	2,450	90.3	101	15,315	96.9	300	17,984	86.5
July 22	67	2,517	92.8	137	15,452	97.8	834	18,818	90.5
July 23	45	2,562	94.5	123	15,575	98.6	267	19,085	91.8
July 24	41	2,603	96.0	80	15,655	99.1	236	19,321	92.9
July 25	37	2,640	97.3	36	15,691	99.3	205	19,526	93.9
July 26	14	2,654	97.9	31	15,722	99.5	154	19,680	94.6
July 27	3	2,657	98.0	24	15,746	99.7	232	19,912	95.7
July 28	17	2,674	98.6	17	15,763	99.8	328	20,240	97.3
July 29	17	2,691	99.9	13	15,776	99.9	343	20,583	99.0
July 30	21	2,712	100.0	23	15,799	100.0	216	20,799	100.0
TOTAL		2,712			15,799			20,799	

^a Expanded 20-minute counts, including interpolations for missing data.

Appendix B.3. Goodnews River tower daily and cumulative coho and pink salmon escapement counts, 1988.^a

Date	Coho Count	Cumulative		Pink Count	Cumulative	
		Count	Percent		Count	Percent
July 1	0	0	0	13	13	0.2
July 2	0	0	0	23	36	0.5
July 3	0	0	0	23	59	0.9
July 4	0	0	0	23	82	1.2
July 5	0	0	0	23	105	1.5
July 6	0	0	0	13	118	1.7
July 7	0	0	0	32	150	2.2
July 8	0	0	0	23	173	2.6
July 9	0	0	0	96	269	4.0
July 10	0	0	0	102	371	5.5
July 11	0	0	0	108	479	7.1
July 12	0	0	0	234	713	10.5
July 13	0	0	0	321	1,034	15.2
July 14	0	0	0	450	1,484	21.9
July 15	0	0	0	330	1,814	26.8
July 16	0	0	0	399	2,213	32.6
July 17	0	0	0	425	2,638	38.9
July 18	0	0	0	451	3,089	45.6
July 19	0	0	0	163	3,252	48.0
July 20	0	0	0	279	3,531	52.1
July 21	0	0	0	304	3,835	56.6
July 22	0	0	0	688	4,523	66.7
July 23	0	0	0	438	4,961	73.2
July 24	0	0	0	283	5,244	77.3
July 25	0	0	0	127	5,371	79.2
July 26	0	0	0	186	5,557	81.9
July 27	3	3	50	302	5,859	86.4
July 28	0	3	50	390	6,249	92.2
July 29	3	6	100	348	6,597	97.3
July 30	0	6	100	184	6,781	100.0
TOTAL	6			6,781		

^a Expanded 20-minute counts, including interpolations for missing data.

Appendix B.4. Aniak River sonar daily and cumulative chum salmon escapement estimates, 1988. ^a

Date	Daily	Cumulative	
	Sonar Estimate ^b	Count	Percent
June 23	851	851	0.4
June 24	1,495	2,346	1.0
June 25	2,333	4,679	2.0
June 26	4,796	9,475	4.0
June 27	4,113	13,588	5.7
June 28	3,751	17,339	7.2
June 29	2,689	20,028	8.4
June 30	4,055	24,083	10.1
July 1	9,600	33,683	14.1
July 2	5,910	39,593	16.5
July 3	8,264	47,857	20.0
July 4	9,300	57,157	23.9
July 5	11,139	68,296	28.5
July 6	6,091	74,387	31.1
July 7	4,422	78,809	32.9
July 8	7,698	86,507	36.1
July 9	10,200	96,707	40.4
July 10	9,134	105,841	44.2
July 11	7,453	113,294	47.3
July 12	7,726	121,020	50.6
July 13	7,115	128,135	53.5
July 14	7,720	135,855	56.8
July 15	9,924	145,779	60.9
July 16	8,064	153,843	64.3
July 17	10,774	164,617	68.8
July 18	9,220	173,837	72.6
July 19	6,739	180,576	75.5
July 20	6,508	187,084	78.2
July 21	4,980	192,064	80.3
July 22	6,980	199,044	83.2
July 23	6,034	205,078	85.7
July 24	7,083	212,161	88.7
July 25	5,417	217,578	90.9
July 26	3,213	220,791	92.3
July 27	5,110	225,901	94.4
July 28	4,089	229,990	96.1
July 29	2,864	232,854	97.3
July 30	3,960	236,814	99.0
July 31	2,493	239,307	100.0
TOTAL	239,307 ^c		

^a All sonar counts are assumed to be chum salmon.

^b Raw counts expanded for times and areas not ensonified.

^c Estimated count for the period of data collection; total estimated escapement based on historic daily proportion data is 401,511.

Appendix C
Chinook Salmon

Appendix C.1. Kuskokwim District 1 commercial chinook salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1984	1983	1982	1981	
		1.2	1.3	1.4	1.5	
Stratum Dates:	6/16–8/31					
Sampling Dates:	6/16–7/5					
Sample Size:	646					
Female	Percent of Sample	3.3	20.4	11.0	5.3	39.9
	Number in Catch	1,751	11,005	5,920	2,835	21,511
Male	Percent of Sample	25.1	27.4	6.2	1.4	60.1
	Number in Catch	13,507	14,757	3,335	750	32,349
Total ^a	Percent of Sample	28.3	47.8	17.2	6.7	100.0
	Number in Catch	15,258	25,763	9,255	3,585	53,860
	Standard Error	956	1,059	800	529	

^a Based on Kuskokwim District 1 commercial gillnet samples.

Appendix C.2. Kuskokwim District 2 commercial chinook salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1984	1983	1982	1981	
		1.2	1.3	1.4	1.5	
Stratum Dates:	6/16–8/31					
Female	Percent of Sample	3.3	20.4	11.0	5.3	39.9
	Number in Catch	62	389	209	100	761
Male	Percent of Sample	25.1	27.4	6.2	1.4	60.1
	Number in Catch	478	522	118	27	1,145
Total ^a	Percent of Sample	28.3	47.8	17.2	6.7	100.0
	Number in Catch	540	912	328	127	1,906
	Standard Error	34	37	28	19	

^a Based on Kuskokwim District 1 commercial gillnet samples.

Appendix C.3. Kuskokwim District 4 commercial chinook salmon catch, age, and sex composition by sample period, 1988.

		Brood Year and Age Group					Total
		1984	1983	1982	1981	1980	
		1.2	1.3	1.4	1.5	1.6	
Stratum Dates:	6/14–9/7						
Sampling Dates:	6/14–7/27						
Sample Size:	592						
Female	Percent of Sample	2.7	9.5	18.1	9.8	0.0	40.0
	Number in Catch	375	1,313	2,509	1,360	0	5,558
Male	Percent of Sample	19.8	24.2	12.8	3.0	0.2	60.0
	Number in Catch	2,744	3,353	1,782	422	23	8,325
Total ^a	Percent of Sample	22.5	33.6	30.9	12.8	0.2	100.0
	Number in Catch	3,119	4,667	4,292	1,782	23	13,883
	Standard Error	238	270	264	191	23	

^a Based on Kuskokwim District 4 commercial gillnet samples.

Appendix C.4. Kuskokwim District 5 commercial chinook salmon catch, age, and sex composition by sample period, 1988.

		Brood Year and Age Group				Total
		1984	1983	1982	1981	
		1.2	1.3	1.4	1.5	
Stratum Dates:	6/19–9/7					
Sampling Dates:	6/20–7/11					
Sample Size:	475					
Female	Percent of Sample	8.0	8.4	27.6	3.4	47.4
	Number in Catch	397	418	1,369	167	2,351
Male	Percent of Sample	18.7	16.2	15.2	2.5	52.6
	Number in Catch	930	805	752	125	2,613
Total ^a	Percent of Sample	26.7	24.6	42.7	5.9	100.0
	Number in Catch	1,327	1,223	2,121	293	4,964
	Standard Error	101	98	113	54	

^a Based on Kuskokwim District 5 commercial gillnet samples.

Appendix C.5. Kuskokwim River subsistence chinook salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1984	1983	1982	1981	
		1.2	1.3	1.4	1.5	
Stratum Dates: 6/16-8/31						
Female	Percent of Sample	3.3	20.4	11.0	5.3	39.9
	Number in Catch	1,751	11,009	5,921	2,836	21,517
Male	Percent of Sample	25.1	27.4	6.2	1.4	60.1
	Number in Catch	13,511	14,762	3,336	751	32,360
Total ^a	Percent of Sample	28.3	47.8	17.2	6.7	100.0
	Number in Catch	15,262	25,771	9,258	3,586	53,877
	Standard Error	956	1,060	800	529	

^a Based on Kuskokwim District 1 commercial gillnet samples.

Appendix C.6. Kuskokwim District 4 subsistence chinook salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group					Total
		1984	1983	1982	1981	1980	
		1.2	1.3	1.4	1.5	1.6	
Stratum Dates: 6/13-9/7							
Female	Percent of Sample	2.7	9.5	18.1	9.8	0.0	40.0
	Number in Catch	68	237	453	246	0	1,004
Male	Percent of Sample	19.8	24.2	12.8	3.0	0.2	60.0
	Number in Catch	496	606	322	76	4	1,504
Total ^a	Percent of Sample	22.5	33.6	30.9	12.8	0.2	100.0
	Number in Catch	563	843	775	322	4	2,508
	Standard Error	43	49	48	35	4	

^a Based on Kuskokwim District 4 commercial gillnet samples.

Appendix C.7. Kuskokwim District 5 subsistence chinook salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1984	1983	1982	1981	
		1.2	1.3	1.4	1.5	
Stratum Dates: 6/16-9/7						
Female	Percent of Sample	8.0	8.4	27.6	3.4	47.4
	Number in Catch	25	26	85	10	147
Male	Percent of Sample	18.7	16.2	15.2	2.5	52.6
	Number in Catch	58	50	47	8	163
Total ^a	Percent of Sample	26.7	24.6	42.7	5.9	100.0
	Number in Catch	83	76	132	18	310
	Standard Error	6	6	7	3	

^a Based on Kuskokwim District 5 commercial gillnet samples.

Appendix D
Sockeye Salmon

Appendix D.1. Kuskokwim District 1 commercial sockeye salmon catch, age, and sex composition by sample period, 1988.

		Brood Year and Age Group							Total
		1984		1983		1982		1981	
		0.3	1.2	1.3	2.2	1.4	2.3	2.4	
Stratum Dates: 6/16-8/31									
Sampling Dates: 6/16-7/5									
Sample Size: 453									
Female	Percent of Sample	0.0	0.7	43.7	0.7	1.8	9.5	0.2	56.5
	Number in Catch	0	598	39,457	598	1,594	8,569	199	51,015
Male	Percent of Sample	0.2	0.7	29.8	0.7	0.4	11.5	0.2	43.5
	Number in Catch	199	598	26,903	598	399	10,362	199	39,258
Total ^a	Percent of Sample	0.2	1.3	73.5	1.3	2.2	21.0	0.4	100.0
	Number in Catch	199	1,196	66,360	1,196	1,993	18,931	399	90,273
	Standard Error	199	485	1,874	485	624	1,729	282	

^a Based on District 1 commercial gillnet samples.

Appendix D.2. Kuskokwim District 2 commercial sockeye salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group							Total
		1984		1983		1982		1981	
		0.3	1.2	1.3	2.2	1.4	2.3	2.4	
Stratum Dates: 6/24-8/20									
Female	Percent of Sample	0.0	0.7	43.7	0.7	1.8	9.5	0.2	56.5
	Number in Catch	0	15	988	15	40	215	5	1,278
Male	Percent of Sample	0.2	0.7	29.8	0.7	0.4	11.5	0.2	43.5
	Number in Catch	5	15	674	15	10	260	5	983
Total ^a	Percent of Sample	0.2	1.3	73.5	1.3	2.2	21.0	0.4	100.0
	Number in Catch	5	30	1,662	30	50	474	10	2,261
	Standard Error	5	12	47	12	16	43	7	

^a Based on District 1 commercial gillnet samples.

Appendix D.3. Kuskokwim District 4 commercial sockeye salmon escapement, age, and sex composition, 1988.

		Brood Year and Age Group									Total
		1985	1984		1983			1982			
		0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	
Stratum Dates:		6/13-9/7									
Sampling Dates:		6/14-8/1									
Sample Size:		748									
Female	Percent of Sample	0.0	0.3	3.5	0.3	32.2	0.3	0.0	1.7	1.3	39.6
	Number in Catch	0	58	749	58	6,945	58	0	375	288	8,530
Male	Percent of Sample	0.1	1.1	5.3	0.4	49.3	0.7	0.1	2.3	0.9	60.3
	Number in Catch	29	231	1,153	86	10,634	144	29	490	202	12,997
Total ^a	Percent of Sample	0.1	1.3	8.8	0.7	81.7	0.9	0.1	4.0	2.3	100.0
	Number in Catch	29	288	1,902	144	17,608	202	29	865	490	21,556
	Standard Error	29	91	224	64	305	76	29	155	118	

^a Based on District 4 commercial gillnet samples.

Appendix D.4. Kuskokwim District 5 commercial sockeye salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group									Total
		1985	1984		1983			1982		1981	
		0.2	0.3	1.2	0.4	1.3	2.2	1.4	2.3	2.4	
Stratum Dates:		6/16-9/7									
Sampling Dates:		6/16-8/8									
Sample Size:		738									
Female	Percent of Sample	0.0	0.0	0.7	0.3	37.5	0.0	2.7	0.1	0.0	41.3
	Number in Catch	0	0	246	99	13,650	0	986	49	0	15,030
Male	Percent of Sample	0.1	0.7	2.8	0.1	51.4	0.4	2.8	0.1	0.1	58.7
	Number in Catch	49	246	1,035	49	18,677	148	1,035	49	49	21,338
Total ^a	Percent of Sample	0.1	0.7	3.5	0.4	88.9	0.4	5.6	0.3	0.1	100.0
	Number in Catch	49	246	1,281	148	32,327	148	2,020	99	49	36,368
	Standard Error	49	110	247	85	421	85	307	70	49	

^a Based on District 5 commercial gillnet samples.

Appendix D.5. Kuskokwim District 1 subsistence sockeye salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group							Total
		1984		1983		1982		1981	
		0.3	1.2	1.3	2.2	1.4	2.3	2.4	
Stratum Dates: 6/16-8/31									
Female	Percent of Sample	0.0	0.7	43.7	0.7	1.8	9.5	0.2	56.5
	Number in Catch	0	157	10,340	157	418	2,246	52	13,369
Male	Percent of Sample	0.2	0.7	29.8	0.7	0.4	11.5	0.2	43.5
	Number in Catch	52	157	7,050	157	104	2,716	52	10,288
Total ^a	Percent of Sample	0.2	1.3	73.5	1.3	2.2	21.0	0.4	100.0
	Number in Catch	52	213	17,390	313	522	4,961	104	23,657
	Standard Error	52	127	491	127	163	453	74	

^a Based on District 1 commercial gillnet samples.

Appendix D.6. Kuskokwim District 4 subsistence sockeye salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group									Total
		1985	1984		1983			1982			
		0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	
Stratum Dates: 6/16–8/7											
Female	Percent of Sample	0.0	0.3	3.5	0.3	32.2	0.3	0.0	1.7	1.3	39.6
	Number in Catch	0	2	30	2	276	2	0	15	11	339
Male	Percent of Sample	0.1	1.1	5.3	0.4	49.3	0.7	0.1	2.3	0.9	60.3
	Number in Catch	1	9	46	3	423	6	1	19	8	517
Total ^a	Percent of Sample	0.1	1.3	8.8	0.7	81.7	0.9	0.1	4.0	2.3	100.0
	Number in Catch	1	11	76	6	700	8	1	34	19	857
	Standard Error	1	4	9	3	12	3		1	6	5

^a Based on District 4 commercial gillnet samples.

Appendix D.7. Kuskokwim District 5 subsistence sockeye salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group									Total
		1985	1984		1983			1982		1981	
		0.2	0.3	1.2	0.4	1.3	2.2	1.4	2.3	2.4	
Stratum Dates: 6/16–9/7											
Female	Percent of Sample	0.0	0.0	0.7	0.3	37.5	0.0	2.7	0.1	0.0	41.3
	Number in Catch	0	0	7	3	400	0	29	1	0	440
Male	Percent of Sample	0.1	0.7	2.8	0.1	51.4	0.4	2.8	0.1	0.1	58.7
	Number in Catch	1	7	30	1	547	4	30	1	1	625
Total ^a	Percent of Sample	0.1	0.7	3.5	0.4	88.9	0.4	5.6	0.3	0.1	100.0
	Number in Catch	1	7	38	4	947	4	59	3	1	1,065
	Standard Error	1	3	7	2	12	3	9	2	1	

^a Based on District 5 commercial gillnet samples.

Appendix E
Coho Salmon

Appendix E.1. Kuskokwim District 1 commercial coho salmon catch, age, and sex composition by sample period, 1988.

		Brood Year and Age Group			Total
		1985	1984	1983	
		1.1	2.1	3.1	
Sampling Dates:	7/25-7/28; Periods 7-13				
Sample Size:	221				
Female	Percent of Sample	0.9	46.2	0.5	47.5
	Number in Catch	265	13,495	132	13,892
Male	Percent of Sample	3.6	48.9	0.0	52.5
	Number in Catch	1,058	14,289	0	15,347
Total	Percent of Sample	4.5	95.0	0.5	100.0
	Number in Catch	1,323	27,784	132	29,239
	Standard Error	410	429	132	
Stratum Dates:	8/1-8/4; Periods 14 & 15				
Sampling Dates:	8/1-8/4				
Sample Size:	244				
Female	Percent of Sample	1.6	45.9	0.8	48.4
	Number in Catch	1,812	50,735	906	53,453
Male	Percent of Sample	2.0	48.4	1.2	51.6
	Number in Catch	2,265	53,453	1,359	57,077
Total	Percent of Sample	3.7	94.3	2.0	100.0
	Number in Catch	4,077	104,188	2,265	110,530
	Standard Error	1,336	1,649	1,005	
Stratum Dates:	8/8-8/10; Periods 16 & 17				
Sampling Dates:	8/8-8/10				
Sample Size:	238				
Female	Percent of Sample	2.5	46.2	0.8	49.6
	Number in Catch	3,283	60,185	1,095	64,562
Male	Percent of Sample	1.7	47.9	0.8	50.4
	Number in Catch	2,189	62,374	1,094	65,657
Total	Percent of Sample	4.2	94.1	1.7	100.0
	Number in Catch	5,471	122,559	2,189	130,219
	Standard Error	1,697	1,990	1,087	

- continued -

		Brood Year and Age Group			
		1985	1984	1983	
		1.1	2.1	3.1	Total
Stratum Dates:	8/12-8/18; Periods 18-20				
Sampling Dates:	8/15, 8/18				
Sample Size:	240				
Female	Percent of Sample	3.8	48.3	0.0	52.1
	Number in Catch	6,819	87,889	0	94,708
Male	Percent of Sample	1.7	45.4	0.8	47.9
	Number in Catch	3,031	82,585	1,515	87,131
Total	Percent of Sample	5.4	93.8	0.8	100.0
	Number in Catch	9,850	170,474	1,515	181,839
	Standard Error	2,662	2,847	1,069	
Stratum Dates:	8/20-8/31; Periods 21-23				
Sampling Dates:	8/27, 8/31				
Sample Size:	484				
Female	Percent of Sample	2.7	50.2	1.4	54.3
	Number in Catch	1,585	29,618	853	32,056
Male	Percent of Sample	1.7	41.7	1.0	44.4
	Number in Catch	975	24,621	609	26,206
Total	Percent of Sample	4.3	93.2	2.5	100.0
	Number in Catch	2,560	54,971	1,463	58,993
	Standard Error	547	677	417	
Stratum Dates:	7/5-8/31				
Sampling Dates:	7/25-8/31				
Sample Size:	1,427				
Female	Percent of Sample	2.4	47.9	0.8	51.1
	Number in Catch	12,171	244,496	4,296	260,963
Male	Percent of Sample	2.0	45.6	0.8	48.5
	Number in Catch	10,381	233,041	4,296	247,718
Total	Percent of Sample	4.4	93.9	1.7	100.0
	Number in Catch	22,552	479,685	8,591	510,829
	Standard Error	2,779	3,237	1,740	

Appendix E.2. Kuskokwim District 2 commercial coho salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group			Total
		1985	1984	1983	
		1.1	2.1	3.1	
Stratum Dates:	6/24–8/20				
Female	Percent of Sample	2.4	47.9	0.8	51.1
	Number in Catch	378	7,600	134	8,112
Male	Percent of Sample	2.0	45.6	0.8	48.5
	Number in Catch	323	7,244	134	7,700
Total ^a	Percent of Sample	4.4	93.9	1.7	100.0
	Number in Catch	701	14,911	267	15,879
	Standard Error	86	101	54	

^a Based on Kuskokwim District 1 commercial gillnet samples.

Appendix E.3. Kuskokwim District 4 commercial coho salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1985	1984		1983	
		1.1	1.2	2.1	3.1	
Stratum Dates:	6/13–9/7					
Sampling Dates:	8/1–8/17					
Sample Size:	286					
Female	Percent of Sample	1.0	0.0	25.9	0.0	26.9
	Number in Catch	555	0	13,684	0	14,239
Male	Percent of Sample	4.2	0.3	67.8	0.7	73.1
	Number in Catch	2,219	185	35,875	370	38,649
Total ^a	Percent of Sample	5.2	0.3	93.7	0.7	100.0
	Number in Catch	2,774	185	49,559	370	52,888
	Standard Error	698	185	761	261	

^a Based on Kuskokwim District 4 commercial gillnet samples.

Appendix E.4. Kuskokwim District 5 commercial coho salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group			Total
		1985	1984	1983	
		1.1	2.1	3.1	
Stratum Dates:	6/16–9/7				
Sampling Dates:	8/5–8/24				
Sample Size:	300				
Female	Percent of Sample	1.0	39.7	0.3	41.0
	Number in Catch	308	12,230	103	12,641
Male	Percent of Sample	2.3	56.7	0.0	59.0
	Number in Catch	719	17,471	0	18,191
Total ^a	Percent of Sample	3.3	96.3	0.3	100.0
	Number in Catch	1,028	29,701	103	30,832
	Standard Error	320	335	103	

^a Based on Kuskokwim District 5 commercial gillnet samples.

Appendix E.5. Kuskokwim District 1 subsistence coho salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group			Total
		1985	1984	1983	
		1.1	2.1	3.1	
Stratum Dates:	6/16–8/31				
Female	Percent of Sample	2.4	47.9	0.8	51.1
	Number in Catch	676	13,572	238	14,487
Male	Percent of Sample	2.0	45.6	0.8	48.5
	Number in Catch	576	12,937	238	13,751
Total ^a	Percent of Sample	4.4	93.9	1.7	100.0
	Number in Catch	1,252	26,628	477	28,357
	Standard Error	154	180	97	

^a Based on Kuskokwim District 1 commercial gillnet samples.

Appendix E.6. Kuskokwim District 4 subsistence coho salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1985	1984		1983	
		1.1	1.2	2.1	3.1	
Stratum Dates:	6/13-9/7					
Female	Percent of Sample	1.0	0.0	25.9	0.0	26.9
	Number in Catch	31	0	759	0	790
Male	Percent of Sample	4.2	0.3	67.8	0.7	73.1
	Number in Catch	123	10	1,990	21	2,143
Total ^a	Percent of Sample	5.2	0.3	93.7	0.7	100.0
	Number in Catch	154	10	2,748	21	2,993
	Standard Error	39	10	42	14	

^a Based on Kuskokwim District 4 commercial gillnet samples.

Appendix E.7. Kuskokwim District 5 subsistence coho salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group			Total
		1985	1984	1983	
		1.1	2.1	3.1	
Stratum Dates:	6/16-9/7				
Female	Percent of Sample	1.0	39.7	0.3	41.0
	Number in Catch	12	461	4	476
Male	Percent of Sample	2.3	56.7	0.0	59.0
	Number in Catch	27	658	0	686
Total ^a	Percent of Sample	3.3	96.3	0.3	100.0
	Number in Catch	39	1,119	4	1,162
	Standard Error	12	13	4	

^a Based on Kuskokwim District 5 commercial gillnet samples.

Appendix F
Chum Salmon

Appendix F.1. Kuskokwim District 1 commercial chum salmon catch, age, and sex composition by sample period, 1988.

		Brood Year and Age Group				
		1985	1984	1983	1982	
		0.2	0.3	0.4	0.5	Total
Stratum Dates:	6/16-6/20; Periods 1 & 2					
Sampling Dates:	6/16-6/20					
Sample Size:	387					
Female	Percent of Sample	0.0	28.4	19.6	1.6	49.6
	Number in Catch	0	52,825	36,497	2,881	92,203
Male	Percent of Sample	0.0	27.4	21.7	1.3	50.4
	Number in Catch	0	50,904	40,339	2,401	93,644
Total	Percent of Sample	0.0	55.8	41.3	2.8	100.0
	Number in Catch	0	103,729	76,836	5,282	185,847
	Standard Error	0	4,698	4,658	1,572	
Stratum Dates:	6/24-6/28; Periods 3 & 4					
Sampling Dates:	6/24-6/28					
Sample Size:	416					
Female	Percent of Sample	0.0	32.7	11.1	0.7	44.5
	Number in Catch	0	89,523	30,280	1,975	121,778
Male	Percent of Sample	0.5	38.5	15.9	0.7	55.5
	Number in Catch	1,317	105,321	43,445	1,975	152,057
Total	Percent of Sample	0.5	71.2	26.9	1.4	100.0
	Number in Catch	1,317	194,844	73,725	3,950	273,835
	Standard Error	930	6,090	5,962	1,603	
Stratum Dates:	7/2-7/5; Periods 5 & 6					
Sampling Dates:	7/2-7/5					
Sample Size:	370					
Female	Percent of Sample	0.3	38.1	6.5	0.0	44.9
	Number in Catch	951	134,097	22,825	0	157,874
Male	Percent of Sample	0.5	45.7	8.6	0.3	55.1
	Number in Catch	1,902	160,727	30,433	951	194,013
Total	Percent of Sample	0.8	83.8	15.1	0.3	100.0
	Number in Catch	2,853	294,824	53,259	951	351,887
	Standard Error	1,643	6,752	6,565	951	
Stratum Dates:	7/8-7/11; Periods 7 & 8					
Sampling Dates:	7/8-7/11					
Sample Size:	372					
Female	Percent of Sample	0.3	46.0	3.2	0.0	49.5
	Number in Catch	743	126,973	8,910	0	136,626
Male	Percent of Sample	0.5	44.4	5.6	0.0	50.5
	Number in Catch	1,485	122,518	15,593	0	139,596
Total	Percent of Sample	0.8	90.3	8.9	0.0	100.0
	Number in Catch	2,228	249,491	24,504	0	276,222
	Standard Error	1,283	4,240	4,077	0	

- continued -

		Brood Year and Age Group				Total
		1985	1984	1983	1982	
		0.2	0.3	0.4	0.5	
Stratum Dates:	7/14-7/18; Periods 9 & 10					
Sampling Dates:	7/14-7/18					
Sample Size:	409					
Female	Percent of Sample	1.5	55.5	4.9	0.5	62.3
	Number in Catch	2,563	96,949	8,542	854	108,907
Male	Percent of Sample	0.7	30.3	6.6	0.0	37.7
	Number in Catch	1,281	52,959	11,531	0	65,772
Total	Percent of Sample	2.2	85.8	11.5	0.5	100.0
	Number in Catch	3,844	149,908	20,073	854	174,679
	Standard Error	1,269	3,017	2,758	603	
Stratum Dates:	7/21-8/31; Periods 11-23					
Sampling Dates:	7/21, 7/25, 7/28					
Sample Size:	450					
Female	Percent of Sample	0.7	48.2	4.4	0.0	53.3
	Number in Catch	680	49,217	4,536	0	54,434
Male	Percent of Sample	0.2	40.7	5.3	0.4	46.7
	Number in Catch	227	41,506	5,443	454	47,629
Total	Percent of Sample	0.9	88.9	9.8	0.4	100.0
	Number in Catch	907	90,723	9,979	454	102,063
	Standard Error	452	1,514	1,431	320	
Stratum Dates:	6/16-8/31					
Sampling Dates:	6/16-7/28					
Sample Size:	2,404					
Female	Percent of Sample	0.5	41.7	8.2	0.5	50.8
	Number in Catch	6,244	568,745	112,387	6,244	693,619
Male	Percent of Sample	0.4	37.7	10.6	0.5	49.2
	Number in Catch	5,676	514,822	144,173	6,244	670,914
Total	Percent of Sample	0.9	79.4	18.8	0.9	100.0
	Number in Catch	11,920	1,083,566	256,559	12,487	1,364,533
	Standard Error	2,590	11,256	10,876	2,651	

Appendix F.2. Kuskokwim District 2 commercial chum salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1985	1984	1983	1982	
		0.2	0.3	0.4	0.5	
Stratum Dates: 6/24–8/24						
Female	Percent of Sample	0.5	41.7	8.2	0.5	50.8
	Number in Catch	90	8,208	1,622	90	10,010
Male	Percent of Sample	0.4	37.7	10.6	0.5	49.2
	Number in Catch	82	7,430	2,081	90	9,682
Total ^a	Percent of Sample	0.9	79.4	18.8	0.9	100.0
	Number in Catch	172	15,637	3,702	180	19,692
	Standard Error	37	162	157	38	

^a Based on Kuskokwim District 1 commercial gillnet samples.

Appendix F.3. Kuskokwim District 4 commercial chum salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1985	1984	1983	1982	
		0.2	0.3	0.4	0.5	
Stratum Dates:						
Female	Percent of Sample	0.7	34.1	14.8	0.8	50.4
	Number in Catch	197	9,954	4,336	246	14,733
Male	Percent of Sample	0.5	31.0	16.9	1.2	49.6
	Number in Catch	148	9,067	4,927	345	14,487
Total ^a	Percent of Sample	1.2	65.1	31.7	2.0	100.0
	Number in Catch	345	19,020	9,264	591	29,220
	Standard Error	130	572	559	169	

^a Based on Kuskokwim District 4 commercial gillnet samples.

Appendix F.4. Kuskokwim District 5 commercial chum salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1985	1984	1983	1982	
		0.2	0.3	0.4	0.5	
Stratum Dates:		6/16–9/9				
Sampling Dates:		6/16–7/11				
Sample Size:		469				
Female	Percent of Sample	0.2	13.6	40.7	0.4	55.0
	Number in Catch	70	4,511	13,463	141	18,186
Male	Percent of Sample	0.6	9.4	33.9	1.1	45.0
	Number in Catch	211	3,101	11,208	352	14,873
Total ^a	Percent of Sample	0.9	23.0	74.6	1.5	100.0
	Number in Catch	282	7,613	24,671	493	33,059
	Standard Error	141	643	665	185	

^a Based on Kuskokwim District 5 commercial gillnet samples.

Appendix F.5. Kuskokwim District 1 subsistence chum salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1985	1984	1983	1982	
		0.2	0.3	0.4	0.5	
Stratum Dates:		6/16–8/31				
Female	Percent of Sample	0.5	41.7	8.2	0.5	50.8
	Number in Catch	535	48,770	9,637	535	59,478
Male	Percent of Sample	0.4	37.7	10.6	0.5	49.2
	Number in Catch	487	44,146	12,363	535	57,531
Total ^a	Percent of Sample	0.9	79.4	18.8	0.9	100.0
	Number in Catch	1,022	92,916	22,000	1,071	117,009
	Standard Error	222	965	933	227	

^a Based on Kuskokwim District 1 commercial gillnet samples.

Appendix F.6. Kuskokwim District 4 subsistence chum salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1985	1984	1983	1982	
		0.2	0.3	0.4	0.5	
Stratum Dates: 6/13–9/7						
Female	Percent of Sample	0.7	34.1	14.8	0.8	50.4
	Number in Catch	5	247	107	6	365
Male	Percent of Sample	0.5	31.0	16.9	1.2	49.6
	Number in Catch	4	225	122	9	359
Total ^a	Percent of Sample	1.2	65.1	31.7	2.0	100.0
	Number in Catch	9	471	230	15	724
	Standard Error	3	14	14	4	

^a Based on Kuskokwim District 4 commercial gillnet samples.

Appendix F.7. Kuskokwim District 5 subsistence chum salmon catch, age, and sex composition, 1988.

		Brood Year and Age Group				Total
		1985	1984	1983	1982	
		0.2	0.3	0.4	0.5	
Stratum Dates: 6/16–9/9						
Female	Percent of Sample	0.2	13.6	40.7	0.4	55.0
	Number in Catch	2	128	383	4	518
Male	Percent of Sample	0.6	9.4	33.9	1.1	45.0
	Number in Catch	6	88	319	10	423
Total ^a	Percent of Sample	0.9	23.0	74.6	1.5	100.0
	Number in Catch	8	217	702	14	941
	Standard Error	4	18	19	5	

^a Based on Kuskokwim District 5 commercial gillnet samples.

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