Alaska Fisheries Data Series Number 97-5

Abundance and Run Timing of Adult Salmon in the South Fork Koyukuk River, Kanuti National Wildlife Refuge, Alaska, 1996

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United States Department of the Interior
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Abstract. —A resistance board weir was installed on the South Fork Koyukuk River about 32 km above the confluence of the mainstem Koyukuk River and 2 km above Fish Creek. This was the first year of a multi-year salmon escapement study. The weir was in operation from July 2 through September 19; however, there was a 18 d hiatus between July 30 and August 16 and a 4 d break August 27-30 when the weir was inoperable due to high flows.

Summer chum escapement between July 2-29 was 37, 450 fish. The run peaked between July 20-26. The weekly sex ratio for the run ranged from 46 to 56 % female.

When counting was resumed on August 17, chum salmon passing through the weir were assumed to be the fall component of the run. A total of 21,651 chums were counted between August 17 and September 19. A peak in the run occurred during the 4 d period August 23-26 and accounted for almost 50% of the fall chum salmon run. The weekly sex ratio ranged from 48 to 53 % female.

Chum salmon were sampled weekly (N = 160 fish/week) for length, sex, and age information. Additionally, tissue samples from 100 fish were collected July 10-12 and September 10-12 for genetic stock identification (GSI) analysis; these samples were weighed, fecundity was estimated, and vertebrae were collected for ageing.

A total of 1,232 chinook salmon were counted between July 2 and September 6. Most of the run (67%) occurred during the 7 d period of July 3-9. The weekly sex ratio ranged from 24% female during the early part of the run to 64% female in late July as the run declined.

Introduction

Summer and fall chum *Oncorhynchus keta* and chinook salmon *O. tshawytscha* spawning in the South Fork Koyukuk River (South Fork) contribute to the subsistence and commercial fisheries occurring on the Yukon drainage. The summer chum salmon run enters the Yukon River in early June and continues through mid-July with a spawning distribution in the lower and middle reaches of the Yukon drainage. The fall chum salmon run is characterized by entering the river after mid-July with a spawning distribution in tributaries of the upper Yukon River (Minard 1996). Chinook salmon run timing is similar to that of summer run chum salmon. Recent declines of Yukon River salmon stocks, particularly summer chum salmon (Schultz et al. 1993), have led to harvest restrictions, complete fishery closures, and spawning escapements below management goals. In the mixed stock fishery of the Yukon River, overfishing of some salmon stocks may have contributed to the decline. Management of individual stocks does not occur and accurate escapement data are limited throughout the Yukon drainage. Escapement estimates are primarily from aerial surveys (Barton 1984; Appendix 1), which are highly variable and are only an index of relative strength of the runs.

Kanuti National Wildlife Refuge is located near the villages of Alatna, Allakaket, Bettles, Evansville, and Hughes. The resident of these villages depend on the refuge's fishery resources for subsistence. Continued subsistence use by local residents of fish and wildlife habitats and resources in National Wildlife Refuges, and the conservation of those resources is mandated in the Alaska National Interests Lands Conservation Act (1980). Accurate monitoring of salmon escapement and specific stock assessment projects are important components in refining fisheries management and also fulfill Congressional mandates. To that end, a resistance board fish weir (Tobin 1994) was installed on the South Fork Koyukuk River in 1996, the first year of a multi-year escapement study. The objectives of the study are to:

1. Determine escapement of salmon into South Fork Koyukuk River above the confluence of Fish Creek

2. Determine size, sex ratio, and age composition of chum and chinook salmon in South Fork Koyukuk River, and

3. Determine presence of larger size resident fish species in South Fork Koyukuk River.

Historical data on the fishery resources in the South Fork Koyukuk River are limited to aerial surveys, primarily of the summer chum and chinook run, conducted between 1969 and 1995 (Barton 1984; unpublished data, Alaska Department of Fish and Game; Appendix 1) and sonar enumeration of the fall chum run in 1990 (Troyer 1993).

Study area

The South Fork Koyukuk River originates in the Philip Smith Mountains and flows approximately 225 km southwesterly to the mainstem Koyukuk River. Major tributaries are the Jim River and Fish Creek. The weir site is 32 km above the confluence of the mainstem Koyukuk River and 2 km above Fish Creek (Figure 1). River flow throughout this reach consists of long runs and short riffle areas during early summer low water. Substrate is small gravel and sand.

Climate of the region is continental subarctic with extreme seasonal variations in temperature. Normal daily maximum temperatures are between 60 and 70° F May through August and about 47° F in September. Normal daily minimum temperatures are coldest in January and February at -20° to -18° F, respectively. Peak flows occur during breakup and high percipitation events during summer. Highest rainfall occurs in August. Snowfall has occurred during all months except June and July; heaviest snowfall is November through January (NOAA 1994).

Methods

All fish passing through the weir were identified to species and counted with the exception of *Coregonus* and *Prosopium* spp. which were grouped together as whitefish. The trap was generally opened at 0800 and closed at midnight. Fish were released fom the trap at varing time intervals corressonding to the intensity of the migration. Each picket of the weir was schedule 40 polyvinyl chloride (PVC) electrical conduit with a 2.5 cm inside diameter. The space between individual pickets was 3.2 cm.

Length, sex ratio, and age were determined from weekly samples of 160 chum and chinook salmon. Samples were taken over a 4 d period beginning on Monday of each week and consisted of the first 40 fish passing through the weir. Because chinook numbers decreased after the first week of July we were unable to collect the required samples for this species. Lengths from chum and chinook salmon were measured to the nearest 0.5 cm from the mid-eye to fork of the caudal fin (MEL). Scales were collected from the preferred area located on the left side of the fish and two rows above the lateral line on a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin. One scale was taken from chum salmon and three scales from chinook salmon. Scale ages were determined by Alaska Department of Fish and Game (ADFG), Commercial Fisheries Management and Development Division. All ages are reported using the European method (Jearld 1983).

The sampling procedure was modified July 10-12 and September 10-12 to incorporate the collection of 100 chum salmon for genetic stock identification. Sampling protocol was in accordance with guidelines of the genetics laboratory, USFWS, Anchorage. In addition to recording age/sex/length data (described above), chum salmon were weighed to the nearest 0.01 kg, vertebrae were collected and compared with scale age, and fecundity was estimated. Mean

lengths by age of males and females chum salmon were compared using a two-tailed t test at α=0.05 (Zar 1984).

Chum salmon age estimates from scales were considered unreliable because there was only 44% agreement in age between vertebrae and scales in the July sample (N = 93) and 79% in the September (N = 42). Where disagreement occurred, scale age were found to be generally one to two years less than vertebrae age and may be attributed to reabsorption. Therefore, only vertebrae ages are reported. Age structures for chinook salmon were not compared; scale ages are reported.

Fecundity was estimated by weighing > 25 g sample (Synder 1983) and counting the eggs in the sample of the skein and estimating total fecundity/female by the equation:

fecundity= weight of skeins/ weight of sample x number of eggs in sample.

It was anticipated that there could be difficulty in determining the end of the summer run of chum salmon and those fish comprising the beginning of the fall run in August. Determination was deferred in 1996 when high water precluded our ability to count fish through the weir for 18 days between July 30 and August 16. When counting was resumed on August 17, chum salmon passing through the weir were assumed to be the fall component of the run.

Results

Weir Operation

The weir was in operation from July 2 through September 19; however, there was a 18 d hiatus between July 30 and August 16 and a 4 d break August 27-30 when the weir was inoperable due to high flows that submerged the weir panels and trap.

Biological Data

Chum salmon were the most abundant fish species counted at the weir (Appendix 2). Summer chum escapement between July 2-29 was 37, 450 fish. The fall chum run totaled 21,651 fish counted between August 17 and September 19. Chinook salmon counted at the weir between July 2 and September 6 totaled 1,232 fish. Five resident fish species were counted. Whitefish *Coregonus* and *Prosopium* spp. were the most abundant species (N= 248) followed by Arctic grayling *Thymallus arcticus* (N= 49), northern pike *Esox lucius* (N= 10), longnose sucker *Catastomus catastomus* (N= 4), and sheefish *Stenodus leucichthys* (N= 1).

Summer run chum salmon.—The summer chum salmon run peaked between July 20-26 accounting for 41% of the total escapement (Figure 2; Appendix 2). The weekly sex ratio ranged from 46 to 56% female with the female proportion higher towards the end of the run (Table 1).

Male chums ranged from 505 to 680 mm MEL and weighed between 2.30 and 6.65 kg (Tables 2 and 3). Females ranged from 495 to 630 mm MEL and 2.00 to 4.40 kg. (Tables 2 and 3). Mean length of age 0.3 males was not significantly greater ($P > 0.10$) than age 0.3 females; but age 0.4 males were significantly larger ($P < 0.001$) than same-aged females. Mean weights of males were significantly greater ($P < 0.001$) than same-aged females. Age 0.4 was the predominant age group for both male and females sampled July 10-12 (Tables 4 and 5). Fecundity was estimated at 2,486 eggs/female (N= 37, SD = 436.9).

Fall run chum salmon.— A peak in the fall chum salmon migration occurred during the 4d period of August 23-26 and accounted for 46% of the run (Figure 2; Appendix 2). The weekly sex ratio ranged from 38 to 56% female (Table 1) but, unlike the summer run, the ratio did not show a consistent increase.

Males ranged from 485 to 680 mm MEL and weighed between 2.35 and 5.30 kg (Tables 2 and 3). Female chums ranged from 500 to 640 mm MEL and 1.85 to 5.50 kg (Tables 2 and 3). There was no significant difference ($P > 0.10$) in the mean lengths of age 0.3 and 0.4 males and same-age females; however, males were significantly heavier ($P < 0.05$) than there female counterparts. Age 0.4 for males and age 0.3 for females were the dominate groups sampled September 10-12 (Tables 4 and 5). Fecundity was estimated at 2,447 eggs/female (N= 40, SD = 586.5).

Size comparisons of summer and fall run chum salmon.— Results from length and weight comparisons between summer and fall runs of chum salmon were inconsistent. There was no significant difference in length between summer and fall run males ($P = 0.09$). Fall chum females were slightly smaller than summer run females ($P = 0.03$). Fall run male chums were heavier than summer males ($P < 0.001$). There was no significant difference ($P = 0.11$) in weight between summer and fall run females. Fecundity estimates between the summer and fall runs were not significantly different ($P = 0.74$).

Chinook salmon.—Chinook salmon were counted daily from July 2 through July 29; thereafter, their migration was sporadic (Figure 3; Appendix 2). The last chinook counted was on September 6. Most of the run (67%) occurred during the 7 d period of July 3-9. The weekly sex ratio for July 10-25 ranged from 24% female during the peak of the run to 64% female as the run trailed off (Table 6). Males ranged in length from 455 to 1060 mm MEL and females measured 640 to 1020 mm MEL (Tables 7). Four age classes were determined from scales (Table 8). The majority (80%) of males were age 1.3. Females were comprised predominately of ages 1.4 (57%) and 1.3 (28%).

Discussion

The migration of chum and chinook salmon in the South Fork began several days prior to the completion of installing the weir. Prior to weir installation, low numbers (<20 fish/d) were observed migrating past the weir site as early as June 28; although, the daily number of migrating fish was likely greater than the observed. The peak migration of summer chum salmon in the South Fork occurred about two weeks later than chum salmon in the Gisasa River (Melegari 1997) and Clear Creek (unpublished data, U.S. Fish and Wildlife Service). The Gisasa River and Clear Creek are located in the lower and middle Koyukuk drainage, respectively. The run timing of chinook salmon in the South Fork and Gisasa River (Melegari 1997) was similar; both runs peaked during the first week of July. The escapement of summer chum salmon was still relatively strong when counting ceased due to high river flows that submerged the weir panels and trap. Conversely, the chinook migration had essentially ended. An aerial survey conducted by ADFG on July 24 estimated 4,920 chum and 273 chinook salmon. Cumulative weir counts on July 24 for chum and chinook salmon were 6 and 4.4 times greater than the aerial surveys estimates.

The fall chum migration on the South Fork is the only fall run monitored in the Koyukuk drainage. Aerial survey estimates of the escapement were conducted in 1971, 1988, and 1989. The latter two surveys recorded 242 and 280 fish, respectively (Barton 1984; unpublished data, Alaska Department of Fish and Game). In 1990, a Bendix riverine sonar was used to count the fall chum escapement passing a site about 3 km below the present weir location. Over 19,000 chums were electronically counted moving upstream between August 2 and September 25 (Troyer 1993).

In 1990, the fall run peaked on August 13 which was 10 to 13 days earlier than the peak of August 23-26, 1996. Peak run timing of fall chum salmon is variable year to year. Daum et al. (1992) reports that in the Chandalar River the peak of the run varied by almost a month during the years 1986 to 1990. What appears to be a more reliable characteristic of the run is the median date. On the Chandalar River this varied by only ten days (Daum et al. 1992). However, on the South Fork in 1996, because of the number of days with missing counts, the median run time is difficult to characterize.

The sex ratio of chum salmon generally changes over the course of the run with males predominating early in spawning rivers (Salo 1991). This tendency in summer chums was observed in the Koyukuk drainage where in the South Fork in 1996 and Gisasa River in 1994-96 (Melegari and Wiswar 1995; Melegari 1996, 1997) the percent female composition increased as the run progressed. However, the change in sex ratio during the fall run in the South Fork in 1996 was not as pronounced.

In the South Fork, comparisons between the summer and fall run chum salmon were consistent with that reported from the fisheries in the lower mainstem Yukon River where fall chums are larger (Buklis and Barton 1984). However, mean weight for both summer and fall chum females in the South Fork were less than the weight range for Yukon mainstem mixed-stock fishery. In the lower Yukon, weights reported were 2.7 to 3.2 kg for summer chum and 3.2 to 4.1 kg for fall

chum (Buklis and Barton 1984). The sampling methods employed to capture chum salmon in the lower Yukon are not clear and it is possible that there may have been a bias towards reporting larger size fish.

Numbers of resident fish species counted at the weir were relatively low. Spacing of the weir pickets would allow smaller size fish to move upstream without being counted at the trap; therefore, resident fish counts are conservative. There was no evidence of a pulse in the numbers to imply migration of larger size resident fish.

Acknowledgments

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TABLE 1.—Sex ratio of summer and fall run chum salmon sampled at the South Fork Koyukuk River weir, Alaska, 1996.

Time period	N	Percent female
	Summer run	
July 10-13	160	46
July 18-21	160	53
July 23-26	160	56
	Fall run	
August 20-22	160	48
August 26	40	38
September 1	40	53
September 5-8	140	56
September 10-12	100	47
September 15-19	200	49

TABLE 2.—Lengths of chum salmon sampled at the South Fork Koyukuk River weir, Alaska, 1996.

Summer run				Fall run			
	Mid-eye to fork length (mm)				Mid-eye to fork length (mm)		
N	Mean	SD	Range	N	Mean	SD	Range
			Males				
233	593.7	28.0	505-680	365	589.6	31.2	485-680
			Females				
247	569.7	25.3	495-630	335	564.9	26.7	500-640

TABLE 3.—Weights of chum salmon sampled at the South Fork Koyukuk River weir, Alaska, 1996.

Summer run				Fall run			
	Weight (kg)				Weight (kg)		
N	Mean	SD	Range	N	Mean	SD	Range
			Males				
59	3.41	0.66	2.30-6.55	53	3.88	0.63	2.35-5.30
			Females				
41	2.66	0.43	2.00-4.40	47	2.85	0.65	1.85-5.50

TABLE 4.—Length and weight at age of male chum salmon sampled at the South Fork Koyukuk River weir, Alaska, 1996. Age determined from vertebrae.

		Mid-eye to fork length (mm)			Weight (kg)		
Age	N	Mean	SD	Range	Mean	SD	Range
				Summer run			
0.3	12	568.3	25.1	530-605	2.94	0.37	2.30-3.45
0.4	38	600.3	24.0	550-650	3.39	0.41	2.60-4.25
0.5	9	618.3	20.5	590-655	4.12	1.12	2.90-6.65
				Fall run			
0.3	7	586.4	48.8	525-655	3.65	0.66	2.35-4.40
0.4	17	595.3	30.4	555-640	4.12	0.53	3.10-4.75
0.5	3	600.0	30.4	565-620	4.11	0.37	3.75-4.50
0.6	1	605			3.55		

TABLE 5.—Length and weight at age of female chum salmon sampled at the South Fork Koyukuk River weir, Alaska, 1996. Age determined from vertebrae.

		Mid-eye to fork length (mm)				Weight (kg)		
Age	N	Mean	SD	Range	N	Mean	SD	Range
				Summer run				
0.3	9	551.7	19.2	520-575	9	2.34	0.24	2.00-2.65
0.4	25	575.0	21.3	535-620	25	2.68	0.33	22.1-3.20
0.5	7	580.7	22.8	545-605	7	3.00	0.65	2.50-4.40
				Fall run				
0.3	12	583.3	26.9	530-625	12	2.70	0.37	2.20-3.25
0.4	7	586.4	25.9	550-630	6	2.84	0.51	1.85-3.30
0.5	2	567.5	31.8	545-590	2	3.80	0.57	3.40-4.20

TABLE 6.—Sex ratio of chinook salmon sampled at the South Fork Koyukuk River weir, Alaska, 1996.

Time period	N	Percent female
July 10-14	85	24
July 15-21	53	34
July 22-25	14	64

TABLE 7.—Lengths of chinook salmon sampled at the South Fork Koyukuk River weir, Alaska, 1996.

Males				Females			
	Mid-eye to fork length (mm)				Mid-eye to fork length (mm)		
N	Mean	SD	Range	N	Mean	SD	Range
105	698.5	99.6	455-1060	47	846.6	69.7	640-1020

TABLE 8.—Length at age of male and female chinook salmon sampled at the South Fork Koyukuk River weir, Alaska, 1996.

	Males				Females			
		Mid-eye to fork length (mm)				Mid-eye to fork length (mm)		
Age	N	Mean	SD	Range	N	Mean	SD	Range
1.2	11	553.6	39.6	500-605	1	640		
1.3	75	697.5	56.0	460-820	12	790.4	33.5	720-825
1.4	8	871.9	127.1	705-1005	25	867.6	46.6	790-1005
1.5	0				6	901.7	98.5	780-1020

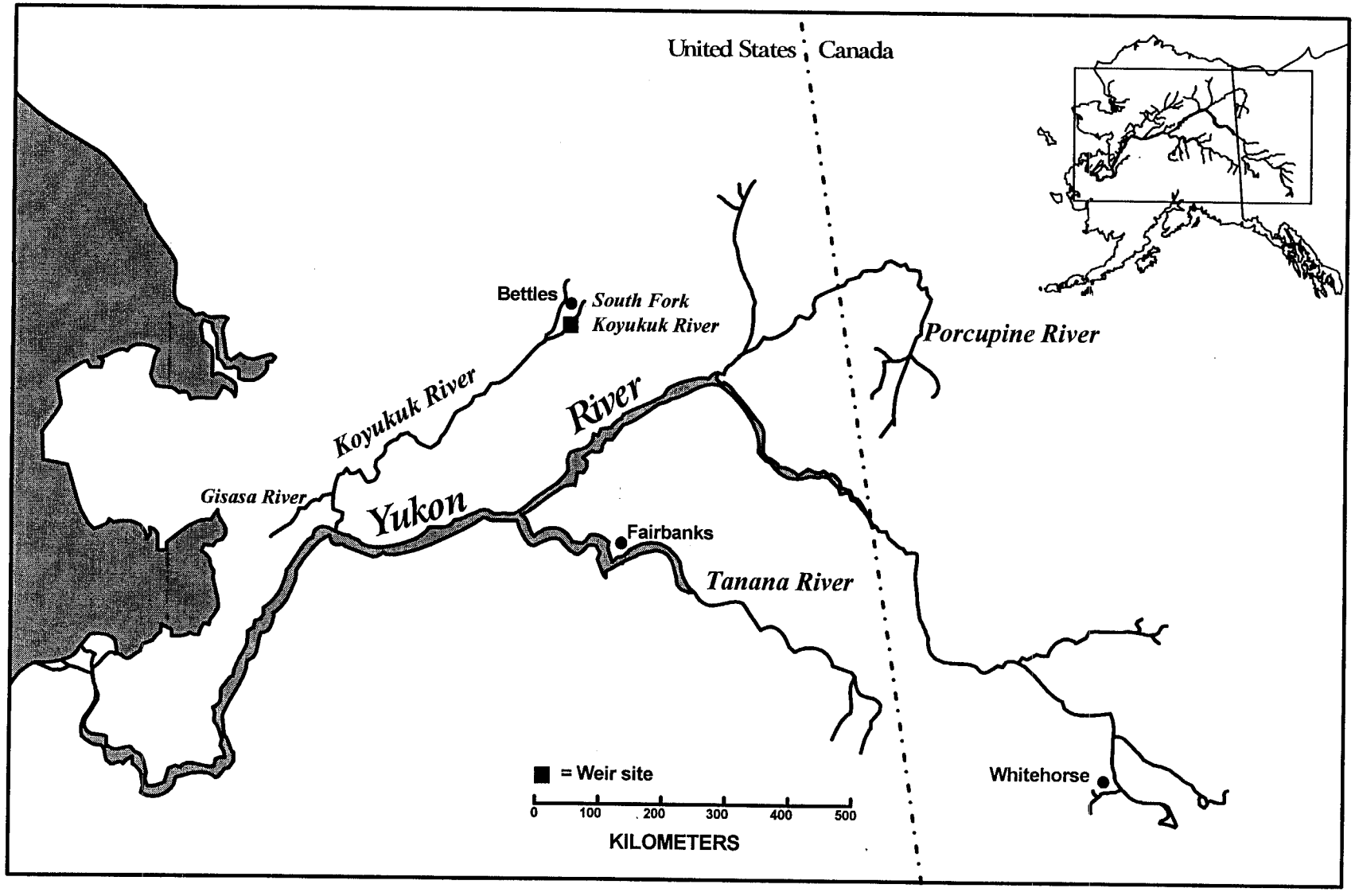

FIGURE 1.—Location of South Fork Koyukuk River weir.

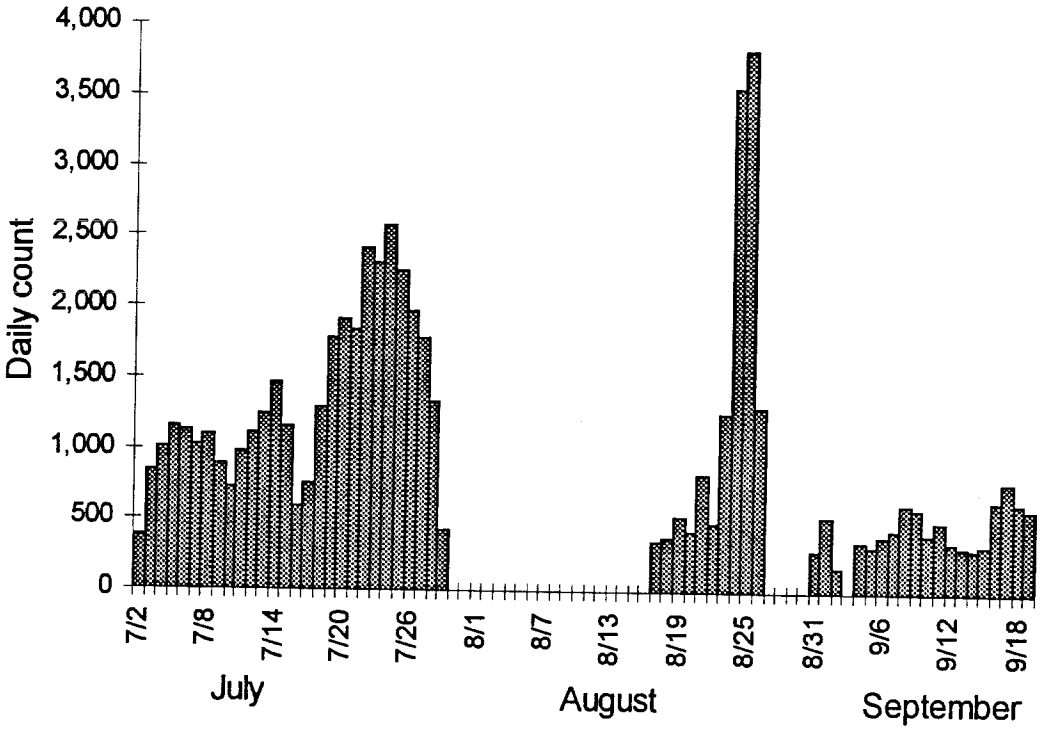

FIGURE 2.—Daily counts of chum salmon at the South Fork Koyukuk River weir, 1996.

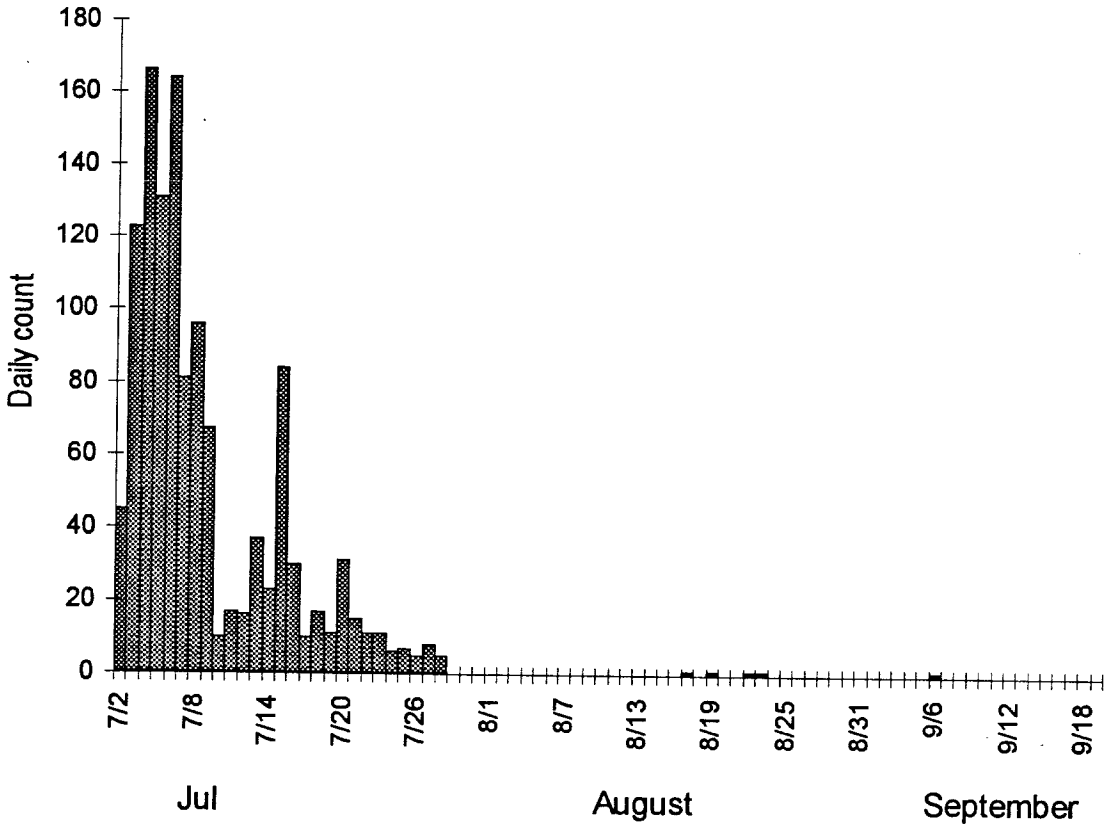

FIGURE 3.—Daily counts of chinook salmon at the South Fork Koyukuk River weir, 1996.

Appendix 1.—Aerial salmon escapement counts in the South Fork Koyukuk River including Jim River, excluding Fish Creek (source: Barton 1984; Alaska Department of Fish and Game, unpublished data).

Year	Escapement counts		
	Summer chum	Fall chum	Chinook
1969	29		33
1971	6,950	652	230
1974	57		14
1975	15,209		181
1976	4,817		189
1977	1,412		83
1978	3,421		154
1980	33		49
1981			
1982	2		20
1983	726		312
1984	315		108
1985	942		535
1986	2,445		794
1987	436		236
1988	462	242	157
1989	728	280	419
1990	233		288
1991	308		630
1992	349		591
1993	124		421
1994	324		528
1995	439		358
1996	4,920		268

APPENDIX 2.—Daily and cumulative (salmon spp. only) counts of fish passing through the South Fork Koyukuk River weir, 1996. (Cum = cumulative).

	Chum salmon		Chinook salmon		Whitefish spp.	Northern pike	Arctic grayling	Longnose sucker	Sheefish
Date	Daily	Cum	Daily	Cum	Daily	Daily	Daily	Daily	Daily
Jul 2	392	392	45	45	8	0	0	0	0
Jul 3	843	1,235	123	168	23	0	0	0	0
Jul 4	1,003	2,238	166	334	13	0	0	2	0
Jul 5	1,161	3,399	131	465	26	0	0	0	0
Jul 6	1,131	4,530	164	629	19	1	0	0	0
Jul 7	1,018	5,548	81	710	13	1	0	0	0
Jul 8	1,100	6,648	96	806	13	0	0	0	0
Jul 9	893	7,541	67	873	15	0	1	0	0
Jul 10	729	8,270	10	883	6	2	0	0	0
Jul 11	983	9,253	17	900	3	0	0	0	0
Jul 12	1,115	10,368	16	916	5	2	1	0	0
Jul 13	1,246	11,614	37	953	1	0	0	0	0
Jul 14	1,471	13,085	23	976	1	0	0	0	0
Jul 15	1,156	14,241	84	1,060	0	2	0	0	0
Jul 16	592	14,833	30	1,090	1	0	0	0	0
Jul 17	753	15,586	10	1,100	7	0	0	0	0
Jul 18	1,282	16,868	17	1,117	17	0	0	2	0
Jul 19	1,775	18,643	11	1,128	0	0	0	0	0
Jul 20	1,907	20,550	31	1,159	5	0	0	0	0
Jul 21	1,840	22,390	15	1,174	0	0	0	0	0
Jul 22	2,418	24,808	11	1,185	0	0	0	0	0
Jul 23	2,312	27,120	11	1,196	0	0	0	0	0
Jul 24	2,574	29,694	6	1,202	2	0	1	0	0
Jul 25	2,245	31,939	7	1,209	2	0	0	0	0
Jul 26	1,970	33,909	5	1,214	0	0	0	0	0
Jul 27	1,772	35,681	8	1,222	1	0	0	0	0
Jul 28	1,337	37,018	5	1,227	3	1	0	0	0
Jul 29	432	37,450	0	1,227	4	0	0	0	0
Jul 30	High flow event; no daily counts at weir until August 17. Weir panels and trap submerged.								
Jul 31									
Aug 1									
Aug 2									
Aug 3									
Aug 4									
Aug 5									

APPENDIX 2. — Continued.

Date	Chum salmon Daily	Chum salmon Cum	Chinook salmon Daily	Chinook salmon Cum	Whitefish spp. Daily	Northern pike Daily	Arctic grayling Daily	Longnose sucker Daily	Sheefish Daily
Aug 6	High flow event; no daily counts at weir until August 17. Weir panels and trap submerged.								
Aug 7									
Aug 8									
Aug 9									
Aug 10									
Aug 11									
Aug 12									
Aug 13									
Aug 14									
Aug 15									
Aug 16									
Aug 17	358	358	1	1,228	1	0	0	0	0
Aug 18	392	750	0	1,228	0	0	0	0	0
Aug 19	530	1,280	1	1,229	3	0	0	0	0
Aug 20	433	1,713	0	1,229	3	0	0	0	0
Aug 21	833	2,546	0	1,229	2	0	0	0	0
Aug 22	490	3,036	1	1,230	13	0	0	0	0
Aug 23	1,265	4,301	1	1,231	3	0	12	0	0
Aug 24	3,549	7,850	0	1,231	0	0	10	0	0
Aug 25	3,825	11,675	0	1,231	0	0	2	0	0
Aug 26	1,302	12,977	0	1,231	0	0	1	0	0
Aug 27	High flow event; no daily counts until August 31. Weir panels and trap submerged.								
Aug 28									
Aug 29									
Aug 30									
Aug 31	302	13,279	0	1,231	3	0	2	0	0
Sep 1	539	13,818	0	1,231	1	0	0	0	0
Sep 2	175	13,993	0	1,231	3	0	0	0	0
Sep 3	High flow event; no daily counts. Weir panels and trap submerged.								
Sep 4	350	14,343	0	1,231	1	0	0	0	0
Sep 5	333	14,676	0	1,231	1	0	0	0	0
Sep 6	405	15,081	1	1,232	0	0	1	0	0

APPENDIX 2. — Continued.

Date	Chum salmon		Chinook salmon		Whitefish spp.	Northern pike	Arctic grayling	Longnose sucker	Sheefish
	Daily	Cum	Daily	Cum	Daily	Daily	Daily	Daily	Daily
Sep 7	445	15,526	0	1,232	0	0	0	0	0
Sep 8	617	16,143	0	1,232	1	0	1	0	0
Sep 9	590	16,733	0	1,232	1	0	0	0	0
Sep 10	420	17,153	0	1,232	1	0	0	0	0
Sep 11	502	17,655	0	1,232	3	0	0	0	0
Sep 12	350	18,005	0	1,232	1	0	2	0	0
Sep 13	329	18,334	0	1,232	1	0	4	0	0
Sep 14	316	18,650	0	1,232	0	0	1	0	0
Sep 15	347	18,997	0	1,232	2	0	0	0	0
Sep 16	649	19,646	0	1,232	2	0	2	0	0
Sep 17	781	20,427	0	1,232	4	0	1	0	0
Sep 18	631	21,058	0	1,232	6	1	5	0	0
Sep 19	593	21,651	0	1,232	4	0	2	0	1
Total	59,101		1,232		248	10	49	4	1