Alaska Fisheries Data Series Number 96-1

Abundance and Run Timing of Adult Salmon in the Gisasa River, Koyukuk National Wildlife Refuge, Alaska, 1995

Jeffery L. Melegari

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United States Department of the Interior
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Table of Contents

Page

List of Figures

List of Tables

List of Appendices

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Abstract. — From June 21 to August 3, 1995 a resistance board weir was operated on the Gisasa River, a tributary to the Koyukuk River in west central Alaska. This was the second year of weir operation at this site. A total of 136,886 summer chum salmon *Oncorhynchus keta* and 4,023 chinook salmon *O. Tschawytscha* were enumerated. The most abundant resident species were longnose sucker *Catostomus catostomus* (N=71) and northern pike *Esox lucius* (N=19). A total of 831 chum salmon and 403 chinook salmon were sampled for sex, length, and age from scale collections. Females comprised 46% of the chum salmon sampled. Average mid-eye to fork length (MEF) of chum salmon was 542 mm (N=386, SD=29) for females and 573 mm (N=445, SD=30) for males. Four age groups were identified for chum salmon, with 73% of the sample age 0.3 and 25% age 0.4. Females comprised 44% of the chinook salmon sampled. Average length was 852 mm MEF (N=178, SD=63) for females and 717 mm (N=225, SD=116) for males. Four age groups were identified for chinook salmon, with 52% of the sample age 1.4 and 30% age 1.3.

Introduction

Accurate salmon escapement data are critical to evaluating harvest management strategies, particularly in mixed stock fisheries. Chum salmon *Oncorhynchus keta* and chinook salmon *O. tschawytscha* stocks from the Gisasa River, located on the Koyukuk National Wildlife Refuge (Refuge), have been identified as important contributors to subsistence and commercial fisheries in the middle Yukon River drainage (USFWS 1993). Alaska National Interest Lands Conservation Act mandates that salmon populations within the Refuge be conserved in their natural diversity, international treaty obligations be fulfilled and subsistence opportunities for local residents be maintained.

Aerial survey escapement counts in the Yukon River drainage have been highly variable (Schultz et al. 1993), and are only an index of relative strength of a salmon run (Barton 1984). Summer chum salmon escapement counts from aerial surveys of the Gisasa River were highest from 1974 to 1976 averaging 33,423 (range = 21,342 - 56,904). Counts, for years when survey conditions were rated fair to good, from 1985 to 1993 averaged 7,805 (range = 1,581 - 13,232). Aerial survey counts of chinook salmon in the Gisasa River have been higher during recent years.

Counts, for years when survey conditions were rated fair to good, averaged 445 (range = 161 - 951) from 1974 - 1984 and 1112 (range = 731 - 1573) from 1985 - 1993 (Schultz et al. 1993; Alaska Department of Fish and Game, unpublished data).

A resistance board weir (Booth 1993; Tobin 1994) was installed and operated by the U.S. Fish and Wildlife Service on the lower Gisasa River from June 21 to August 3, 1995. This was the second year of weir operation at this site. Objectives of this study are to: (1) determine daily escapement and run timing of salmon into the Gisasa River; (2) determine sex and size composition of chinook and chum salmon in the Gisasa River; (3) evaluate the effectiveness of aerial surveys as a method for salmon escapement estimation in the Gisasa River; (4) determine presence and movement of resident fish in the Gisasa River. Additionally, the weir provides timely and accurate escapement data that augments in-season management decisions made by Alaska Department of Fish and Game (ADF&G).

Study Area

The Gisasa River is a tributary of the Koyukuk River located in west central interior Alaska (Figure 1). Climate of the region is continental subarctic with extreme seasonal variations of temperature. The town of Galena, approximately 64 km southeast of the mouth of the Gisasa River, has a mean annual temperature of 3.8° C. Extremes range from 32° C to -59° C. Rivers in the area generally begin to freeze during October and breakup occurs sometime in May (USFWS 1993).

The Gisasa River flows northeast 112 km from it's origin in the Nulato Hills to the Koyukuk River (65° 16'N latitude, 157° 40'W longitude, USGS. 1:63,360 series, Kateel River B-4 quadrangle). The lower third of the Gisasa River flows through the Refuge. Peak flows of area streams generally occur during snow melt and breakup, or during summer high precipitation events (USFWS 1993).

The weir site is approximately 4 km upriver from the mouth of the Gisasa River. This section of the river is straight and flow is generally laminar. The river channel slopes gradually from the stream banks and maximum depth is approximately 0.7 m. Substrate at the weir site consists primarily of medium sized gravel.

Materials and Methods

Biological Data

All fish passing through the weir were counted and identified to species, except *Coregonus* and *Prosopium* spp, which were grouped together as whitefish. Daily counts began at 0001 hours and ended at midnight. Fish were released from the trap and counted at varying time intervals, corresponding to the intensity of migration. Chum and chinook salmon were sampled for scales, sexed using external characteristics and measured to the nearest 5 mm mid-eye to fork length (MEF). Scales were collected from the preferred area, two rows above the lateral line and on a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin,

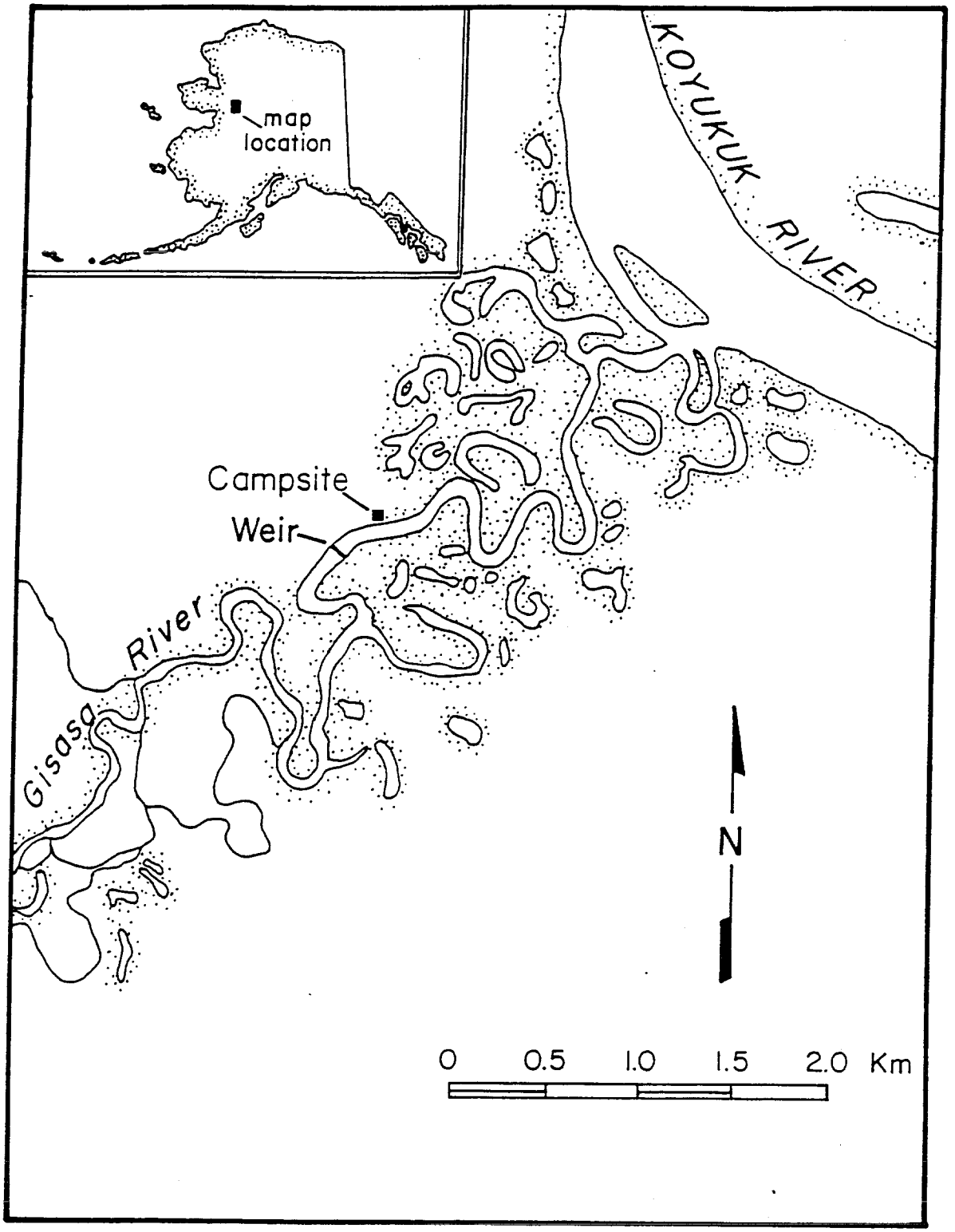

FIGURE 1.— Map of Gisasa River weir location, Koyukuk National Wildlife Refuge, Alaska.

according to ADF&G sampling protocol. One scale was taken from chum salmon and three scales were taken from chinook salmon. Scales were sent to ADF&G Commercial Fisheries Management and Development Division for processing, where acetate impressions of the scales were made and aged. All ages are reported using the European method (Jearld 1983). Sampling occurred weekly, and sample periods ranged from one to four days. The reported sample dates indicate the last day of sampling for that period. A students t-test ($P < 0.05$; Zar 1984) was used to compare mean lengths of males and females.

Weir Operation

Construction and installation of the weir is described by Melegari and Wiswar (1995). During operation the weir was visually inspected daily for holes and structural integrity. Fish carcasses and debris were cleaned from the weir as they accumulated, often several times a day. Cleaning usually involved walking on the weir panels until they were partially submerged and allowing the current to flush the debris off. Occasionally larger debris would have to be physically pushed off of the weir.

Results

Biological Data

Chum salmon (N=136,886) were the most abundant species counted through the weir, followed by chinook salmon (N=4,023). A few pink salmon *O. gorbuscha* (N=3) were also counted. Five resident species were enumerated. The most abundant were longnose sucker *Catostomus catostomus* (N=71) and northern pike *Esox lucius* (N=19). Other resident species included whitefish *Coregonus* and *Prosopium* spp (N=5), Arctic grayling *Thymallus arcticus* (N=2), and Dolly Varden *Salvalinus malma* (N=2).

During June 22, the first full day of operation, 131 chum salmon were counted through the weir. The daily count increased to a high of 11,207 on July 11 then decreased to 332 by August 3, the last day of operation (Figure 2; Appendix 1). Females comprised 46% of the total chum salmon sampled (N = 831). The percent of females in weekly samples ranged from 31% during the first sample period to 55% during the last sample period (Figure 3). Lengths of all chum salmon sampled ranged from 380 mm to 670 mm. Average length of all sampled females (542 mm, SD=29) was significantly less ($P<.001$) than males (573 mm, SD=30).

Ages were determined for 632 (76%) of the 831 chum scale samples collected, and four age groups were identified. For both sexes age 0.3 was most common (73% of the sample), followed by age 0.4 (25%). Age 0.3 fish were nearly evenly distributed between males and females, while 68% of the age 0.4 fish were males (Table 1). Additionally, samples taken during the earlier portion of the run contained a higher percentage of age 0.4 fish than samples taken later (Appendix 2). Average length of females in age groups 0.3 and 0.4 was significantly less ($P<.001$ for both age classes) than for males in corresponding age classes.

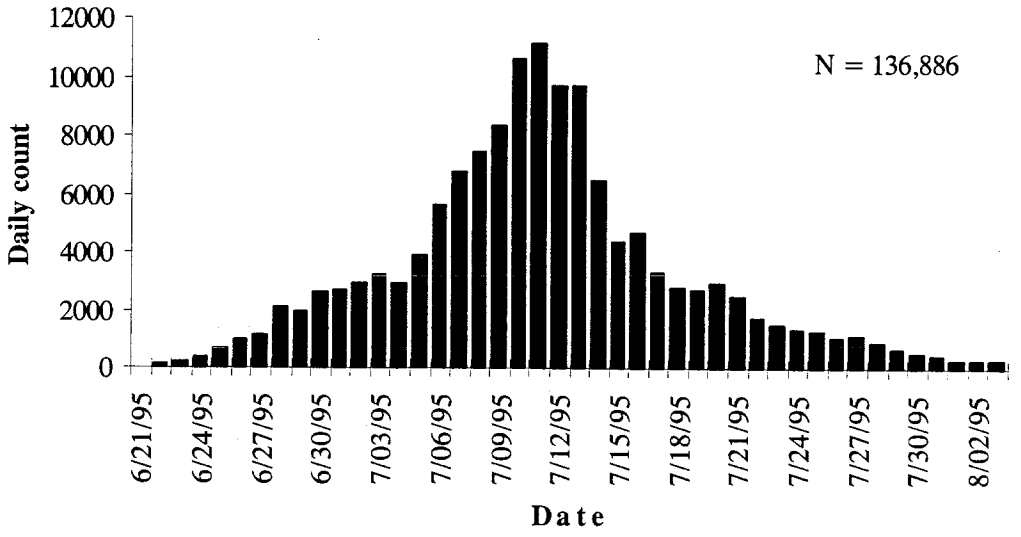

FIGURE 2. — Daily counts of chum salmon passing through Gisasa River weir, 1995. The count began at 1800 hours on 6/21.

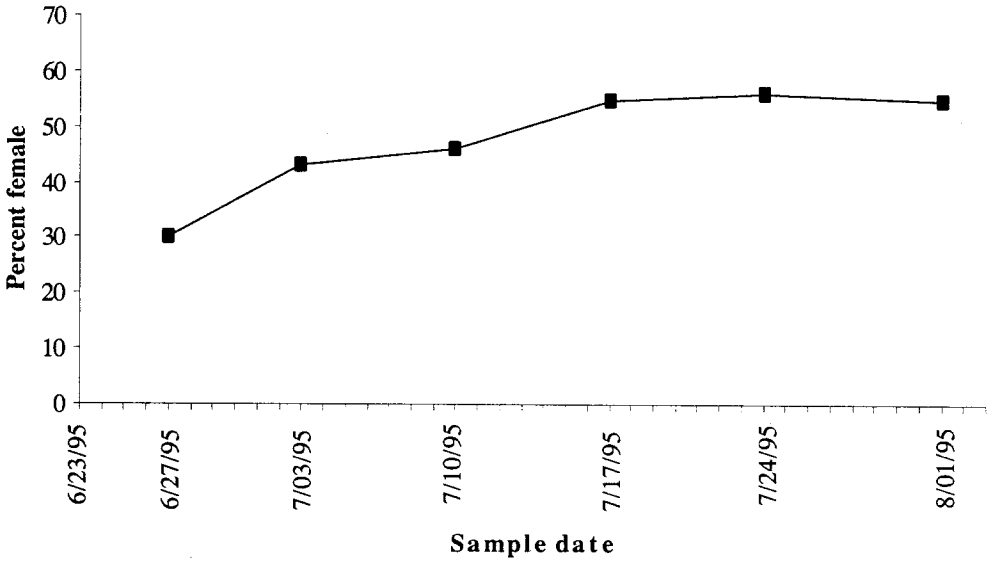

FIGURE 3. — Sex composition (percent female) of chum salmon samples from the Gisasa River weir, 1995. Sample size was 160 for all samples except on 8/01/95 where N=31.

TABLE 1. — Age, length, and sex composition of chum salmon sampled at Gisasa River weir, 1995.

	Males					Females				
			Mid-eye to fork length (mm)					Mid-eye to fork length (mm)		
Age	N	%	Range	Mean	SD	N	%	Range	Mean	SD
0.2	1	0.2	550	550	-	5	0.8	505-550	533	15.7
0.3	228	36.1	490-640	569	27.4	233	36.9	380-610	542	29.9
0.4	109	17.2	485-670	587	30.7	51	8.1	475-600	550	24.6
0.5	5	0.8	570-595	581	8.6	0	0.0	-	-	-
Total	343	54.3	485-670	575	29.6	289	45.7	380-610	543	29.0

The first chinook salmon was counted on June 22. The daily count peaked on July 13 (N=468) and decreased to 17 by August 3 (Figure 4). A total of 403 chinook salmon were sampled and females accounted for 44% of the sample. The percent female for each sample period ranged from 28% - 55% (Figure 5). Lengths of chinook salmon ranged from 465 - 1050 mm. Average length of all sampled females (852 mm, SD=63) was significantly larger ($P<.001$) than for males (717 mm, SD=116).

Ages were determined for 346 (86%) of the 403 chinook scale samples collected, and four age groups were identified. Age groups 1.3 and 1.4 comprised 82% of the total sample. The majority (74%) of females were age 1.4, and 21% were age 1.3 (Table 2). Males were more evenly distributed between age groups 1.3 (37%), 1.4 (33%), and 1.2 (29%). Fish in age group 1.2 were predominantly male while those in age group 1.5 were predominantly female. Average lengths of females in age groups 1.3 and 1.4 were significantly larger ($P<.001$ for both age groups) than males in corresponding age groups.

Weir Operation

Installation of the weir was completed at 1800 hours on June 21, and operation continued through August 3, 1995. Spawning activity immediately upstream of the weir resulted in areas where gravel accumulated on the weir panels. During the early morning of July 25, rising water levels made it possible for fish to escape around one end of the weir. The problem was fixed by extending the rigid weir section. Few fish were actually observed swimming around the weir and the length of time fish were able to escape around the weir was less than four hours. No other aspects of weir operation were seriously affected by the high water.

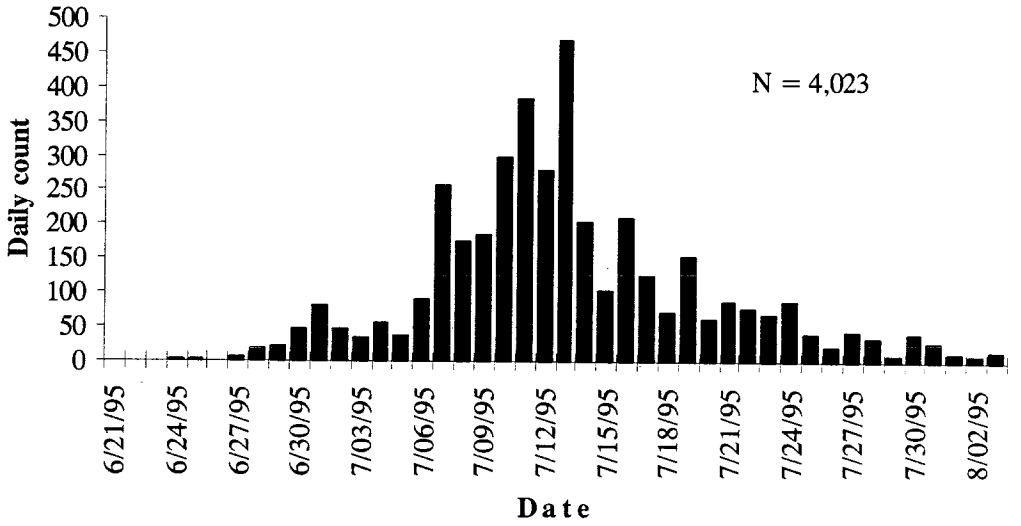

FIGURE 4. — Daily counts of chinook salmon passing through Gisasa River weir, 1995. The count began at 1800 hours on 6/21.

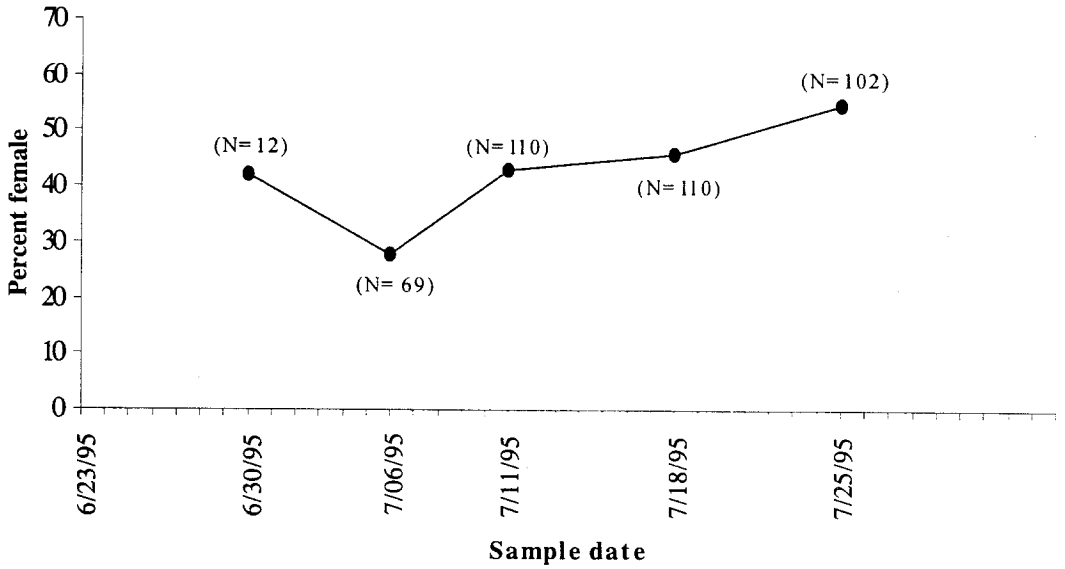

FIGURE 5. — Sex composition (percent female) of chinook salmon samples from Gisasa River weir, 1995.

TABLE 2. — Age, length, and sex composition of chinook salmon sampled at Gisasa River weir, 1995.

	Males					Females				
			Mid-eye to fork length (mm)					Mid-eye to fork length (mm)		
Age	N	%	Range	Mean	SD	N	%	Range	Mean	SD
1.2	54	15.6	465-745	572	59.0	1	0.3	570	570	-
1.3	70	20.2	530-910	742	75.4	34	9.8	645-905	821	54.9
1.4	62	17.9	580-1050	807	71.7	118	34.1	740-1000	865	47.4
1.5	1	0.3	810	810	-	6	1.7	795-940	895	46.4
Total	187	54.0	465-1050	714	118.0	159	46.0	570-1000	856	57.5

Discussion

Biological Data

Run timing for both chum and chinook salmon during 1995 appeared similar to 1994 (Figure 6). Peak migration of chum and chinook salmon for 1995 occurred during July 11 and July 13 respectively. The corresponding peaks for 1994 occurred on July 15 and July 16. However, during 1994 counts were incomplete due to delayed weir installation (Melegari and Wiswar 1995).

The 1995 weir count of chum salmon (N=136,886) was considerably higher than any recent aerial surveys (Table 3). Alaska Department of Fish and Game conducted an aerial survey during July 21, 1995, 10 days after the peak of migration. The cumulative weir count on that date (125,347) was 19.4 times greater than the aerial survey count of 6,458. The total weir count was 21.2 times greater than the aerial survey count. During 1994 the total weir count was 7.5 times greater than the corresponding aerial survey count. However, as stated, the weir count for 1994 was incomplete.

The average length of female chum salmon was significantly less than males. McBride et al. (1983) reported average lengths, from carcass samples of chum salmon on the Gisasa River, of 605 mm (N=9) for males and 540 mm (N=22) for females. Length differences between sexes of summer chum salmon have been noted on other tributaries in the Yukon River drainage (Table 4).

The 1995 weir count for chinook salmon (N=4,023) was also higher than past aerial survey counts (Table 3). The cumulative weir count on July 21 (3,525) was 8.8 times greater than the aerial survey count of 410. The total weir count was 9.8 times greater than the aerial survey count. During 1994 the total weir count was only slightly greater than the corresponding aerial survey (Melegari and Wiswar 1995).

Average length of female chinook salmon was significantly larger than males. McBride et al. (1983) reported average lengths of chinook salmon from Gisasa River escapement samples of 657 mm (N=21) for males and 830 mm (N=11) for females. Length differences between sexes of chinook salmon have been noted on other tributaries in the Yukon River (Table 5).

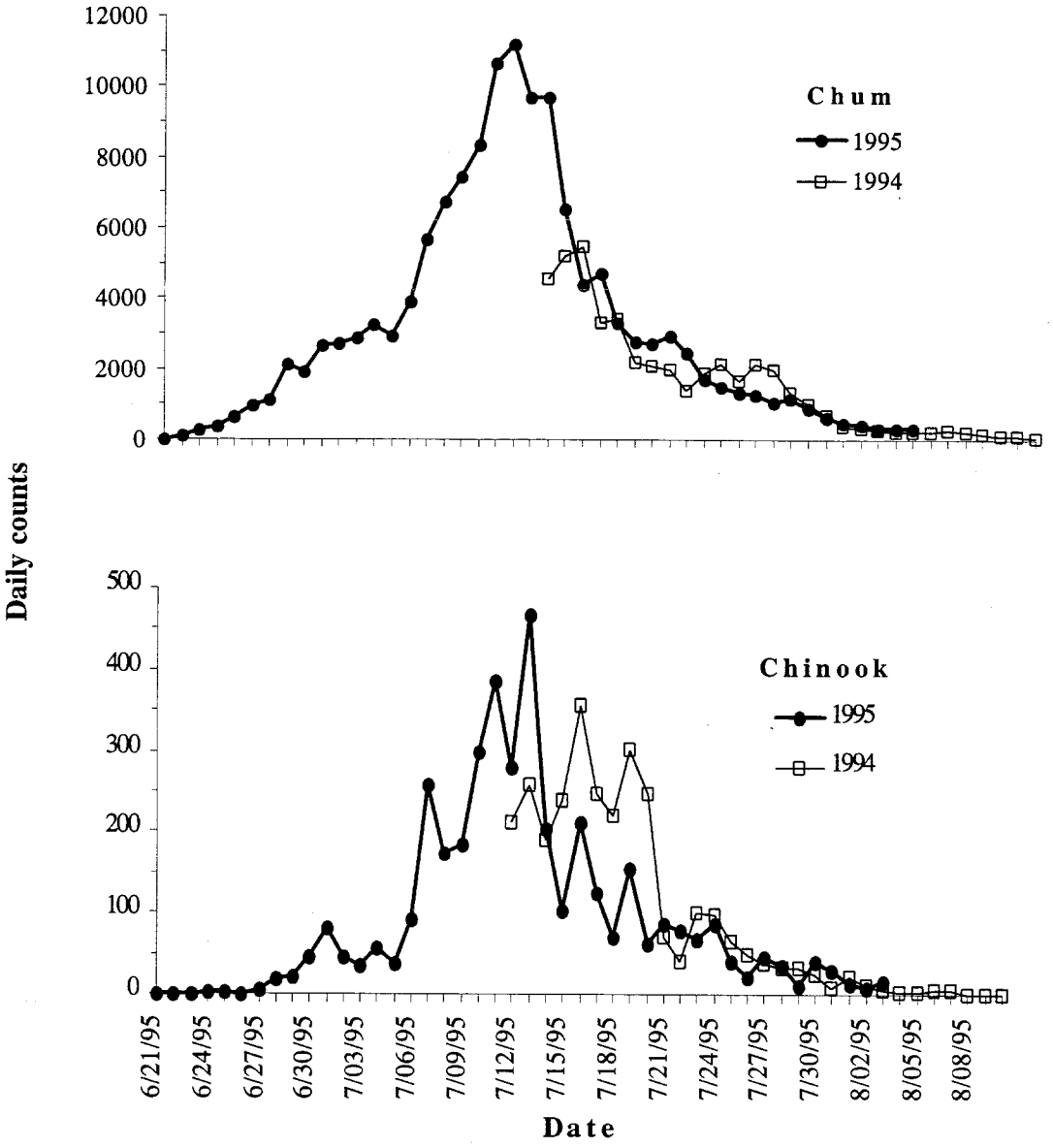

FIGURE 6. — Run timing of chum and chinook salmon from the Gisasa River during 1994 and 1995.

TABLE 3.— Escapement counts from aerial surveys of the Gisasa River, 1974-1995. (Schultz et al. 1993; Alaska Department of Fish and Game, unpublished data).

	Escapement counts	
Year	Chum	Chinook
1974	22,022	161
1975	56,904	385
1976	21,342	332
1977	2,204[a]	255
1978	9,280[a]	45[a]
1979	10,962	484
1980	10,388	951
1981	-	-
1982	334[a]	421
1983	2,356[a]	572
1984	-	-
1985	13,232	735
1986	12,114	1,346
1987	2,123	731
1988	9,284	797
1989	-	-
1990	450[a]	884[a]
1991	7,003	1,690
1992	9,300	910
1993[b]	1,581	1,573
1994[b]	6,827	2,775
1995[b]	6,458	410

[a] Inaccurate counts due to incomplete surveys or poor survey timing or conditions.

[b] 1993 - 1995, unpublished data, Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Anchorage Alaska.

Weir Operation

The use of resistance board weirs in Alaska is relatively new (Tobin 1994). Resistance board weirs are less likely to be damaged or washed-out by high flows and debris than conventional rigid weir designs. When compared to sonar enumeration, resistance board weirs provide more accurate identification of species, eliminate the need for test fisheries, do not require expensive electronics equipment, and require less time spent interpreting data after field work is completed.

Table 4. — Average lengths of male and female summer chum salmon from various Yukon River tributaries.

		Average length (mm)		
Location	Year	Male	Female	Source
Andreafsky River	1982	581	534	McBride et al. 1983
Andreafsky River	1994	557	516	Tobin and Harper 1995
Anvik River	1982	592	545	McBride et al. 1983
Chena River	1982	579	555	McBride et al. 1983
Clear Creek	1995	582	549	[a] TCC data files

[a] Tanana Chiefs Conference Inc. preliminary data from 1995 counting tower operation.

Table 5. — Average lengths of male and female chinook salmon from various Yukon River tributaries.

		Average length (mm)		
Location	Year	Male	Female	Source
Andreafsky River	1982	643	741	McBride et al. 1983
Andreafsky River	1994	707	823	Tobin and Harper 1995
Anvik River	1982	631	829	McBride et al. 1983
Chena River	1990	693	862	Evenson 1990

Aerial surveys are less costly than sonar or weirs, however the data provided are highly variable and are of limited use. Daum et al. (1992) reported expansion factors for aerial surveys to sonar counts of fall chum salmon that ranged from 2.70 to 6.17 on the Chandalar River from 1988 to 1990. Aerial survey conditions for all three years were rated fair to good. Additionally, population estimates from mark and recovery studies of chinook salmon from 1986 to 1990 on the Chena River were 1.7 to 4.9 times greater than the corresponding aerial surveys (Schultz et al. 1993). Much of the variability of aerial surveys is due to uncontrollable factors such as weather, variable run timing, and changing river conditions. Comparatively, the effects of these factors on the performance of a resistance board weir are minimal.

The weir performed well and was effective in allowing accurate counts of migrating salmon. Picket spacing of the trap and the weir panels was adequate to prevent adult chum and chinook salmon from passing between the pickets. However, smaller pink salmon and resident species may have passed through the weir undetected. High water levels can temporarily submerge weir panels (Booth 1993; Tobin 1994), resulting in the need to estimate escapement over the submerged panels. While a high water event did occur on the Gisasa River during weir operation, the magnitude was not great enough to submerge any weir panels. Minor damage (a few broken pickets) did occur as a result of increased debris load during the high water. Additionally the water rose high enough to allow fish to escape around the end of one of the rigid weir sections. The number of fish that escaped around the weir is assumed to be insignificant due to the shortness of the event (less than four hours) and observations made at the time. This problem can be avoided in the future by extending the rigid weir section farther up the bank.

Acknowledgments

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Appendix 1. — Daily, cumulative, and total counts of fish passing through Gisasa River weir, 1995.

Date	Chum		Chinook		Pink	Longnose sucker	N. Pike	Whitefish spp.	Arctic grayling	Dolly Varden
	Daily Count	Cumulative Count	Daily Count	Cumulative Count	Daily Count	Daily Count	Daily Count	Daily Count	Daily Count	Daily Count
6/21/95	3	3	0	0	0	3	1	0	0	0
6/22/95	131	134	1	1	0	7	0	0	0	0
6/23/95	254	388	0	1	0	4	0	0	0	0
6/24/95	382	770	2	3	0	3	0	0	0	0
6/25/95	653	1423	4	7	0	8	0	0	1	0
6/26/95	955	2378	1	8	0	3	0	0	0	0
6/27/95	1123	3501	5	13	0	2	0	0	0	0
6/28/95	2117	5618	19	32	0	6	0	0	0	0
6/29/95	1950	7568	23	55	0	4	1	0	0	0
6/30/95	2678	10246	46	101	0	2	0	0	0	0
7/01/95	2747	12993	82	183	0	5	0	1	1	0
7/02/95	2911	15904	46	229	0	7	1	0	0	0
7/03/95	3253	19157	35	264	0	6	1	0	0	1
7/04/95	2967	22124	57	321	0	1	0	0	0	0
7/05/95	3908	26032	39	360	0	0	0	0	0	0
7/06/95	5663	31695	92	452	0	1	1	1	0	0
7/07/95	6765	38460	258	710	0	0	0	0	0	0
7/08/95	7439	45899	175	885	0	0	0	0	0	0
7/09/95	8347	54246	184	1069	0	1	1	0	0	0
7/10/95	10664	64910	300	1369	0	1	1	0	0	0
7/11/95	11207	76117	385	1754	0	0	0	0	0	0
7/12/95	9710	85827	281	2035	0	1	2	0	0	1
7/13/95	9699	95526	468	2503	0	0	3	0	0	0
7/14/95	6519	102045	205	2708	0	1	0	0	0	0
7/15/95	4396	106441	104	2812	1	0	0	0	0	0
7/16/95	4690	111131	211	3023	0	0	0	0	0	0
7/17/95	3344	114475	126	3149	0	0	1	0	0	0
7/18/95	2761	117236	72	3221	0	0	0	0	0	0
7/19/95	2706	119942	155	3376	0	0	0	0	0	0
7/20/95	2944	122886	62	3438	0	2	1	0	0	0
7/21/95	2461	125347	87	3525	1	0	0	0	0	0
7/22/95	1709	127056	79	3604	0	1	0	0	0	0
7/23/95	1524	128580	68	3672	0	0	0	0	0	0
7/24/95	1343	129923	87	3759	0	0	0	0	0	0
7/25/95	1280	131203	42	3801	0	0	0	1	0	0
7/26/95	1073	132276	21	3822	0	1	2	0	0	0
7/27/95	1158	133434	45	3867	0	0	1	0	0	0
7/28/95	896	134330	35	3902	0	1	0	0	0	0
7/29/95	656	134986	11	3913	1	0	0	0	0	0
7/30/95	500	135486	42	3955	0	0	0	0	0	0
7/31/95	439	135925	29	3984	0	0	0	0	0	0
8/01/95	299	136224	14	3998	0	0	0	1	0	0
8/02/95	330	136554	8	4006	0	0	2	1	0	0
8/03/95	332	136886	17	4023	0	0	0	0	0	0
Total	136886		4023		3	71	19	5	2	2

Appendix 2. — Age and sex composition of weekly samples of chum salmon from Gisasa River weir, 1995 (table from Alaska Department of Fish and Game, Commercial Fisheries Management and Development division).

		Brood Year and Age Group				
		1992	1991	1990	1989	
		0.2	0.3	0.4	0.5	Total
Stratum Dates:	6/27 - 6/27			Stratum 1		
Sampling Dates:	6/27 - 6/27					
Female	Sample Size	0	29	10	0	39
	Percent of Sample	0.0	21.2	7.3	0.0	28.5
Male	Sample Size	0	56	38	4	98
	Percent of Sample	0.0	40.9	27.7	2.9	71.5
Total	Sample Size	0	85	48	4	137
	Percent of Sample	0.0	62.0	35.0	2.9	100.0
	Standard Error	0.0	4.2	4.1	1.4	
Stratum Dates:	7/03 - 7/03			Stratum 2		
Sampling Dates:	7/03 - 7/03					
Female	Sample Size	0	40	15	0	55
	Percent of Sample	0.0	30.3	11.4	0.0	41.7
Male	Sample Size	0	48	28	1	77
	Percent of Sample	0.0	36.4	21.2	0.8	58.3
Total	Sample Size	0	88	43	1	132
	Percent of Sample	0.0	66.7	32.6	0.8	100.0
	Standard Error	0.0	4.1	4.1	0.8	
Stratum Dates:	7/10 - 7/10			Stratum 3		
Sampling Dates:	7/10 - 7/10					
Female	Sample Size	1	49	14	0	64
	Percent of Sample	0.7	35.3	10.1	0.0	46.0
Male	Sample Size	1	47	27	0	75
	Percent of Sample	0.7	33.8	19.4	0.0	54.0
Total	Sample Size	2	96	41	0	139
	Percent of Sample	1.4	69.1	29.5	0.0	100.0
	Standard Error	1.0	3.9	3.9	0.0	
Stratum Dates:	7/17 - 7/17			Stratum 4		
Sampling Dates:	7/17 - 7/17					
Female	Sample Size	3	60	7	0	70
	Percent of Sample	2.5	49.6	5.8	0.0	57.9
Male	Sample Size	0	40	11	0	51
	Percent of Sample	0.0	33.1	9.1	0.0	42.1
Total	Sample Size	3	100	18	0	121
	Percent of Sample	2.5	82.6	14.9	0.0	100.0
	Standard Error	1.4	3.5	3.2	0.0	

-Continued-

Appendix 2. — (Continued).

		Brood Year and Age Group				
		1992	1991	1990	1989	
		0.2	0.3	0.4	0.5	Total
Stratum Dates:	7/24 - 8/01			Stratum 5		
Sampling Dates:	7/24, 8/01					
Female	Sample Size	1	55	5	0	61
	Percent of Sample	1.0	53.4	4.9	0.0	59.2
Male	Sample Size	0	37	5	0	42
	Percent of Sample	0.0	35.9	4.9	0.0	40.8
Total	Sample Size	1	92	10	0	103
	Percent of Sample	1.0	89.3	9.7	0.0	100.0
	Standard Error	1.0	3.1	2.9	0.0	
Stratum Dates:	6/27 - 8/01			Total All Strata		
Sampling Dates:						
Female	Sample Size	5	233	51	0	289
	Percent of Sample	0.8	36.9	8.1	0.0	45.7
Male	Sample Size	1	228	109	5	343
	Percent of Sample	0.2	36.1	17.2	0.8	54.3
Total	Sample Size	6	461	160	5	632
	Percent of Sample	0.9	72.9	25.3	0.8	100.0
	Standard Error	0.4	1.8	1.7	0.4	

Appendix 3. — Age and sex composition of samples of chinook salmon from Gisasa River weir, 1995 (table from Alaska Department of Fish and Game, Commercial Fisheries Management and Development division).

		Brood Year and Age Group				
		1991	1990	1989	1988	
		1.2	1.3	1.4	1.5	Total
Stratum Dates:	6/29 - 7/11			Stratum 1		
Sampling Dates:	6/29 - 6/30, 7/03 - 7/06, 7/10 - 7/11					
Female	Sample Size	1	13	38	3	55
	Percent of Sample	0.7	9.2	26.8	2.1	38.7
Male	Sample Size	24	44	18	1	87
	Percent of Sample	16.9	31.0	12.7	0.7	61.3
Total	Sample Size	25	57	56	4	142
	Percent of Sample	17.6	40.1	39.4	2.8	100.0
	Standard Error	3.2	4.1	4.1	1.4	
Stratum Dates:	7/11 - 7/23			Stratum 2		
Sampling Dates:	7/11, 7/15 - 7/18, 7/22 - 7/23					
Female	Sample Size	0	17	56	3	76
	Percent of Sample	0.0	11.0	36.1	1.9	49.0
Male	Sample Size	24	22	33	0	79
	Percent of Sample	15.5	14.2	21.3	0.0	51.0
Total	Sample Size	24	39	89	3	155
	Percent of Sample	15.5	25.2	57.4	1.9	100.0
	Standard Error	2.9	3.5	4.0	1.1	
Stratum Dates:	7/24 - 8/01			Stratum 3		
Sampling Dates:	7/24 - 7/25, 8/01					
Female	Sample Size	0	4	24	0	28
	Percent of Sample	0.0	8.2	49.0	0.0	57.1
Male	Sample Size	6	4	11	0	21
	Percent of Sample	12.2	8.2	22.4	0.0	42.9
Total	Sample Size	6	8	35	0	49
	Percent of Sample	12.2	16.3	71.4	0.0	100.0
	Standaid Error	4.7	5.3	6.5	0.0	
Stratum Dates:	6/29 - 8/01			Total All Strata		
Sampling Dates:						
Female	Sample Size	1	34	118	6	159
	Percent of Sample	0.3	9.8	34.1	1.7	46.0
Male	Sample Size	54	70	62	1	187
	Percent of Sample	15.6	20.2	17.9	0.3	54.0
Total	Sample Size	55	104	180	7	346
	Percent of Sample	15.9	30.1	52.0	2.0	100.0
	Standard Error	2.0	2.5	2.7	0.8	