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Abundance and Run Timing of Adult Pacific Salmon in the East Fork Andreafsky River, Yukon Delta National Wildlife Refuge, Alaska, 2007

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Abstract

A resistance board weir was used to collect abundance, run timing, and biological data from salmon returning to the East Fork Andreafsky River, a tributary to the lower Yukon River, between June 19 and July 30, 2007. In 2007, an estimated 4,504 Chinook salmon *Oncorhynchus tshawytscha* migrated through the weir. Four age groups were identified from 689 Chinook salmon sampled, with age 1.2 (44%) dominating. The sex composition was 35% female. An estimated 69,642 summer chum salmon *O. keta* migrated through the weir. Four age groups were identified from 914 summer chum salmon sampled, with age 0.3 (71%) dominating. The sex composition was 47% female. An estimated 10,092 pink salmon *O. gorbuscha*, 141 sockeye salmon *O. nerka*, and 9 coho salmon *O. kisutch* migrated through the weir. Other species counted through the weir during 2007 included 2,559 whitefish (Coregoninae), and 49 northern pike *Esox lucius*.

Introduction

The Andreafsky River is one of several lower Yukon River tributaries on the Yukon Delta National Wildlife Refuge (Refuge). The Andreafsky River and its primary tributary, the East Fork Andreafsky River, provide important spawning and rearing habitat for Chinook *Oncorhynchus tshawytscha*, summer chum *O. keta*, coho *O. kisutch*, pink *O. gorbuscha*, and sockeye *O. nerka* salmon (USFWS 1991). The Andreafsky River supports one of the largest returns of Chinook salmon, has the second largest return of summer chum salmon (Bergstrom et al. 1998), and is believed to have the largest return of pink salmon in the Yukon River drainage (USFWS 1991). These Andreafsky River salmon stocks contribute to a large subsistence fishery in the lower Yukon River.

Escapement monitoring started on the East Fork Andreafsky River with aerial surveys in 1954, with sonar and tower count methods added from 1981 through 1988 (Appendix 1). The present weir project is one of the longest running escapement projects in the Yukon River drainage and provides accurate escapement and biological data dating back to 1994 for Chinook, summer chum, and pink salmon, and from 1995 to 2005 for coho salmon.

The Alaska National Interest Lands Conservation Act (ANILCA) mandates that salmon populations and their habitats be conserved within National Wildlife Refuge lands, international treaty obligations be fulfilled, and subsistence opportunities for local residents be maintained (USFWS 1991). Compliance with ANILCA mandates cannot be ensured without reliable data on salmon stocks originating from within Refuge boundaries. It is the mission of the U.S. Fish and Wildlife Service (USFWS) to conserve fish and wildlife populations, maintain habitats in

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their natural diversity, and provide the opportunity for continued subsistence use by local residents.

To assist in meeting ANILCA mandates, the USFWS has operated a weir on the East Fork Andreafsky River since 1994. Specific objectives of the 2007 project were to: (1) enumerate adult salmon escapement; (2) describe run timing of Chinook and summer chum salmon returns; (3) estimate age, sex, and length composition of adult Chinook and summer chum salmon populations; and (4) identify and count other fish species passing through the weir.

Poor salmon returns from 1998 – 2001 in the Yukon River resulted in harvest restrictions, complete fishery closures, and spawning escapements below management goals on many tributaries in the Yukon River drainage (Vania et al. 2002; Kruse 1998). However, Chinook and summer chum salmon runs have improved since 2001 with harvestable surpluses from 2002 – 2006 (JTC 2007). The need to collect accurate escapement estimates is required to maintain genetic diversity, determine exploitation rates, and spawner recruit relationships (Labelle 1994). Data on escapement counts, which are necessary for effective management, are lacking for many individual stocks in the Yukon River drainage. Individual salmon stocks that are returning in low numbers or having early and late run timing may be incidentally over-harvested in the subsistence, commercial, personal use, or sport fisheries. Federal and State fishery managers attempt to distribute salmon harvest over time to avoid over-harvesting an individual salmon stock (Mundy 1982).

Study Area

The Andreafsky River is located in the lower Yukon River drainage in western Alaska (Figure 1). The regional climate is subarctic with extreme temperatures reaching 28˚ C in summer and – 42˚C in winter at St. Mary's, Alaska (Leslie 1989). Mean July high and February low temperatures between 1976 and 2000 were 18˚ and – 22˚C, respectively. Average yearly precipitation is approximately 48 cm of rain and 172 cm of snow. The Andreafsky River ice breakup typically occurs in May or early June, and usually begins to freeze in late October (USFWS 1991). Maximum discharge is most often reached following breakup. Sporadic high discharge periods generated by heavy rains occur between late July and early September.

The Andreafsky River is one of the three largest Yukon River tributaries within Refuge boundaries (USFWS 1991) and drains a watershed of approximately 5,450 km^2. The main-stem and the East Fork Andreafsky River parallel each other in a southwesterly direction for more than 200 river-kilometers (rkm) and converge 7 rkm above its confluence with the Yukon River. The mouth of the Andreafsky River is approximately 160 rkm upstream from the mouth of the Yukon River. The East Fork and main-stem Andreafsky River flow through the Andreafsky Wilderness and the portions of each river within Refuge boundaries are designated as Wild and Scenic Rivers.

The East Fork Andreafsky River originates in the Nulato Hills at approximately 700 m elevation and drains an area of about 1,950 km^2 (USFWS 1991). The river cuts through alpine tundra at an average gradient of 7.6 m per km for 48 rkm. It then flows for 130 rkm through a forested river valley bordered by hills that rarely exceed 400 m elevation. Willow, spruce, alder, and birch dominate the riparian zone and much of the hillsides. This section drops at an average rate of 1.4 m/km and is characterized by glides and riffles with a gravel and rubble substrate. The river widens in the lowermost 38 rkm and the gradient changes to 0.14 m/km. The valley here is a wetland, interspersed with forest and tundra, and bordered by hills that are typically less than 230 m elevation. Aquatic vegetation grows in the slower flowing stream channels. Water level fluctuations on the Yukon River also affect the stage height in the lower sections of the East Fork and main-stem Andreafsky River.

Methods

Weir Operation

A modified resistance board weir (Tobin 1994; Tobin and Harper 1995; Zabkar and Harper 2003) spanning 105 m was installed in the East Fork Andreafsky River (62^{o} 07'N, 162^{o} 48.4'W) approximately 43 rkm upstream from the Yukon-Andreafsky River confluence and 26 air-km northeast of St. Mary's, Alaska (Figure 1). The weir site is located approximately 2.4 rkm downstream from the 1994 weir site described by Tobin and Harper (1995) and 2.1 rkm downstream from the 1981-1988 sonar and counting tower site described by Sandone (1989). Weir panel picket spacing (4.8 cm edge to edge) was designed to remain functional during higher water flow, but allowed some small pink salmon and resident fish to pass through the weir undetected. Beginning in 1995, weir operation was extended into September (fall season) to collect coho salmon data. In 2006 and 2007, available funding did not allow weir operation for the fall season.

A staff gauge was installed upstream of the weir to measure daily water levels. Staff gauge measurements were calibrated to correspond with the average water depth across the river channel at the upstream edge of the weir. Water temperatures were collected once daily between 0730 and 0830 hours and two automatic temperature loggers collected water temperatures throughout the season.

Two passage chutes were installed, one approximately 9 m from the left bank and the other approximately 7 m from the right bank A fish trap was installed on the left passage chute to facilitate efficient biological sampling during various river stage heights. The right passage chute was for use during extreme low water levels or when large numbers of fish, particulary pink salmon, began building up below the weir. It was not used in 2007 as water levels did not reach extremely low levels and 2007 was a relatively low pink salmon year. All fish, except whitefish (Coregoninae), were enumerated and identified to species as they passed through the live trap. Fish were counted 24 hours per day and the numbers were recorded hourly. The trap was kept closed during periods when fish were not being counted.

The weir was cleaned and its integrity visually checked daily. Cleaning consisted of raking debris from the upstream surface of the weir or walking across each panel to submerge it enough to allow the current to wash debris downstream. Repairs were made as necessary.

Biological Data

Adult salmon were identified and counted as they migrated through the weir live trap each day to determine run timing and escapement. A stratified random sampling design (Cochran 1977) was used to collect age, length, and sex ratio information for Chinook and summer chum salmon. Biological sampling commenced at the beginning of each week, and the weekly sampling goal was 160 Chinook and 160 summer chum salmon spread over a minimum four-day period. All target species within the trap were sampled to prevent bias. Non-target species were identified and counted but not sampled. Whitefish species were grouped together under the subfamily Coregoninae.

Fish sampling consisted of identifying salmon species, determining sex, measuring length, collecting scales, and then releasing the fish upstream of the weir. Secondary sex characteristics were used to determine sex. Length was measured from mid-eye to the fork of the caudal fin and rounded to the nearest 5 mm. Scales were removed from the preferred area (Koo 1962; Devries and Frie 1996). Three scales were collected from each Chinook salmon sampled, and one scale was collected from each summer chum salmon sampled. Scales were sent to the Alaska Department of Fish and Game (ADF&G) post season for age determination, and impressions were made on cellulose acetate cards using a heated scale press and examined with a microfiche reader (Zabkar and Harper 2003). Age was determined by an Alaska Department of Fish and Game (ADF&G) biologist and reported according to the European method (Koo 1962). Daily sex ratios were collected by visually sexing each fish when sampling for age and length. The daily escapement counts and sex ratios were reported daily to the USFWS Fairbanks Fish and Wildlife Field Office.

Data Analysis

Calculations for age and sex information were treated as a stratified random sample (Cochran 1977), with sampling weeks as the strata. Age 1.2 Chinook salmon were assumed to be males (Brady 1983; Bales 2007; Karpovich and DuBois 2007) regardless of their field determination. Each statistical week was defined as beginning on Sunday and ending the following Saturday. Incomplete weeks were combined with the week after the beginning of weir operation or with the week before the end of weir operation. Within a stratum, the proportion of the samples composed of a given sex or age, $\hat{p}_{ij}$, was calculated as

$$\hat{p}_{ij} = \frac{n_{ij}}{n_j},$$

where n_{ij} is the number of fish by sex i or age i sampled in week j, and n_j is the total number of fish sampled in week j. The variance of $\hat{p}_{ij}$ was calculated as

$$\hat{v}(\hat{p}_{ij}) = \frac{\hat{p}_{ij}(1-\hat{p}_{ij})}{n_j - 1}.$$

Sex and age compositions for the total run of Chinook and summer chum salmon of a given sex or age, $\hat{p}_i$ were calculated as

$$\hat{p}_i = \sum_{j-1} \hat{W}_j \hat{p}_{ij},$$

where the stratum weight $\hat{W}_j$ was calculated as

$$\hat{W}_j = \frac{N_j}{N},$$

and N_j equals the total number of fish of a given species passing through the weir during week *j*, and *N* is the total number of fish of a given species passing through the weir during the run. Variance, $\hat{v}(\hat{p}_i)$ of sex and age compositions for the run was calculated as

$$\hat{v}(\hat{p}_i) = \sum_{j-1} \hat{W}_j^2 \hat{v}(\hat{p}_{ij}).$$

Results and Discussion

Weir Operation

The weir was operational from June 19 through July 30, 2007. No high or low water events hindered the weir operation for 2007. The average river stage height during weir operations was 82 cm with a range between 73 and 91 cm (Figure 2). Water temperature during weir operations averaged 11°C and ranged between 9.5 and 17°C (Figure 2).

Picket spacing in the weir panels allowed smaller pink salmon and resident fish to pass unhindered through the weir, yet effectively blocked passage of other salmon and larger fish species (Zabkar and Harper 2003). Consequently, counts of pink salmon, whitefish, Arctic grayling (*Thymallus arcticus*), northern pike (*Esox lucius*), and Dolly Varden (*Salvelinus malma*) were incomplete.

Biological Data

An estimated 4,504 Chinook, 69,642 summer chum, nine coho, 10,092 pink, and 141 sockeye salmon migrated through the weir in 2007 (Table 1). Passage estimates for Chinook and summer chum salmon were conservative due to an unknown number of fish passing before and after the weir was operational. Non-salmon species recorded moving through the weir include 2,559 whitefish and 49 northern pike.

Preliminary ADF&G reports indicated the 2007 Chinook salmon run to be below average and summer chum salmon runs to be average (Hayes et al. 2007). However, the East Fork Andreafsky River weir recorded a near average Chinook salmon weir count but the summer chum salmon run was slightly below average (Figure 3). Substantial numbers of coho salmon in 1998 and all salmon species in 2001 were missed due to high water; therefore the counts for these years were not included in any annual comparative analyses.

Chinook Salmon

The 2007 Chinook salmon escapement estimate (4,504 fish) was near the 1994-2006 historical average of 4,506 fish (Figure 3; Appendix 2). Peak passage (1,742 fish) occurred during the stratum of July 1 through July 7 (Table 1; Figure 4). The 2007 run timing was near average. The first quartile passed on July 6 (yearly average July 5), the mid-point of the run at the weir was July 10 (yearly average July 10), and the third quartile passage date was July 14 (yearly average July 15) (Table 2).

Female Chinook salmon lengths ranged from 450 to 975 mm, and male Chinook salmon ranged from 400 to 975 mm (Table 3). A total of 689 Chinook salmon was sampled for age composition, with 58 (8%) classified as unreadable, principally because of scale regeneration. Also, two aged 1.2 Chinook salmon measuring 955 mm and 975 mm were considered incorrectly aged and not included in the age calculations. The age composition of sampled Chinook salmon included four age groups: age 1.2 (44%), age 1.3 (25%), age 1.4 (30%), and age 1.5 (<1%) (Table 4). Females composed an estimated 35% of the overall escapement (Table 4). The age distributions of female and male Chinook salmon were different with age 1.4 dominating at 72% for females, and age 1.2 dominating at 61% for males.

The 2007 ADF&G aerial survey conducted on the Andreafsky River estimated 976 Chinook salmon for the main stem, and 1,758 Chinook salmon for the east fork (Appendix 1). The main stem count was within the Sustainable Escapement Goal (SEG) of 640 to 1,600 Chinook salmon, and the east fork was above the SEG of 960-1,700 Chinook salmon (Hayes et al. 2007).

Summer Chum Salmon

The 2007 summer chum salmon escapement estimate of 69,642 fish was 92% of the 1994-2006 historical average of 75,978 fish (Figure 3; Appendix 3), and fell within the Biological Escapement Goal (BEG) of 65,000 to 130,000 fish (Appendix 1; JTC 2008). Peak passage (25,129 fish) occurred during the stratum of July 1 through July 7 (Table 1; Figure 4). The 2007 run timing was later then average. The first quartile passed on July 4 (yearly average July 1), the mid-point of the run at the weir was July 9 (yearly average July 5), and the third quartile passage date was July 17 (yearly average July 11) (Table 2).

Female summer chum salmon lengths ranged from 440 to 615 mm, and male summer chum salmon ranged from 455 to 650 mm (Table 3). A total of 914 summer chum salmon was sampled for age composition, with 109 (12%) classified as unreadable, principally because of scale regeneration. The age composition of sampled summer chum salmon included four age groups: age 0.2 (1%), age 0.3 (71%), age 0.4 (23%), and age 0.5 (5%) (Table 5). Females comprised an estimated 47% of the overall escapement (Table 5). The age distribution of female and male summer chum salmon were similar with age 0.3 dominating, 73% for females and 69% for males.

Coho Salmon

Coho salmon enumeration was discontinued after the 2005 season due to insufficient funding for continuing weir operations into August and September. Nine coho salmon passed through the weir prior to closure. The first coho salmon passed through the weir on July 25 (Appendix 4).

Pink Salmon

Pink salmon have strong returns to the East Fork Andreafsky River during even-numbered years and relatively weak returns during odd-numbered years (Appendix 5). The 2007 escapement through the weir was the second highest odd-year return (10,092 fish) and was 109% of the odd-year 1994-2006 historical average of 9,301 fish. Pink salmon counts on the Andreafsky River are a measure of relative year to year abundance due to small pink salmon being able to pass uncounted between the weir pickets. Additionally, the 2007 pink salmon escapement estimate is incomplete since weir operation ceased before the end of the run. Peak passage (4,433 fish) occurred during the stratum of July 22 to 30 (Table 1). The first quartile passed on July 16 at the weir, the mid-point run at the weir was July 20, while the third quartile passed on July 25 (Table 2).

Sockeye Salmon

The 2007 sockeye salmon escapement estimate of 141 fish was below the 1995-2005 historical average of 204 fish (Appendix 6). However, the 2007 sockeye salmon escapement estimate is incomplete since weir operation ceased before the end of the run. Large populations of sockeye salmon are absent in the Yukon River drainage (Bergstrom et al. 1995), but small populations have been identified in several Yukon River tributaries (Alt 1983; O'Brien 2006), including the Andreafsky River. Age, sex, and length data for sockeye salmon were collected in 2007 (n = 44 fish). Fin-clip samples for genetic analysis were also obtained. These data will be presented in a future report specific to Yukon River sockeye salmon populations.

Conclusion

The East Fork Andreafsky River weir has been an important tool for monitoring salmon stocks originating in the Refuge and assisting both ADF&G and USFWS in-season managers with management of Yukon River fisheries. This project continues to build a long-term database that is unique to the lower Yukon River drainage. Future weir operations will likely run through the end of the summer chum salmon run (approximately the first week of August).

Due to the complexity of the Yukon River mixed-stock salmon fishery and the difficulty in managing specific stocks, it is vital to continue collecting information from individual salmon populations, including stocks in the Andreafsky River drainage. If commercial interest in Yukon River coho salmon continues to grow, it is recommended that coho salmon enumeration be reinstated on the East Fork Andreafsky River to monitor the status of this stock. It is also recommended that investigations into spawning and rearing locations for sockeye salmon be conducted to assure long-term viability of this small unique population.

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Table 1. Escapement estimates, by stratum, recorded at the East Fork Andreafsky River weir, Alaska, 2007.

Stratum dates	Chinook salmon	Chum salmon	Coho salmon	Pink salmon	Sockeye salmon
Jun 19 - 30	20	5,406	0	5	1
Jul 1 - 7	1,742	25,129	0	821	44
Jul 8 - 14	1,649	18,929	0	1,494	32
Jul 15 - 21	427	12,372	0	3,339	21
Jul 22 - 30	666	7,806	9	4,433	43
Total	4,504	69,642	9	10,092	141

Table 2. Daily and total estimates of Chinook, summer chum, coho, pink, and sockeye salmon escapement through the East Fork Andreafsky River weir, Alaska, 2007. Run passage by quartile are shown in shaded boxes.

Date	Chinook salmon	Chum salmon	Coho salmon	Pink salmon	Sockeye salmon
19-Jun	0	0	0	0	0
20-Jun	0	0	0	0	0
21-Jun	0	0	0	0	0
22-Jun	0	2	0	0	0
23-Jun	0	0	0	0	0
24-Jun	0	29	0	0	0
25-Jun	7	1,166	0	0	0
26-Jun	2	348	0	0	0
27-Jun	0	70	0	0	1
28-Jun	0	362	0	0	0
29-Jun	4	1,644	0	3	0
30-Jun	7	1,785	0	2	0
1-Jul	134	3,581	0	5	6
2-Jul	197	3,463	0	38	8
3-Jul	75	2,694	0	36	2
4-Jul	277	4,834 25%	0	143	17
5-Jul	141	4,725	0	184	5
6-Jul	476 25%	3,852	0	251	0
7-Jul	442	1,980	0	164	6
8-Jul	157	1,919	0	125	6
9-Jul	299	4,559 50%	0	278	9
10-Jul	255 50%	6,021	0	461	6
11-Jul	86	1,455	0	112	2
12-Jul	653	2,362	0	315	6
13-Jul	103	1,219	0	74	2
14-Jul	96 75%	1,394	0	129	1
15-Jul	28	860	0	103	1
16-Jul	25	1,867	0	367 25%	2
17-Jul	34	3,294 75%	0	518	4
18-Jul	132	3,834	0	843	5
19-Jul	78	1,349	0	524	5
20-Jul	35	468	0	642 50%	3
21-Jul	95	700	0	342	1
22-Jul	249	1,895	0	1,040	4
23-Jul	59	1,417	0	393	4
24-Jul	63	1,208	0	306	4
25-Jul	102	1,784	3	1,231 75%	8
26-Jul	33	645	2	475	8
27-Jul	149	444	0	403	4
28-Jul	4	95	1	143	5
29-Jul	4	179	0	206	5
30-Jul	3	139	3	236	1
Total	4,504	69,642	**	**	**

[shaded box] indicates dates at which 25, 50, and 75 percent of the run had passed the weir.
** incomplete counts, weir removed

Table 3. Mid-eye to fork length (mm) at age of female and male Chinook and summer chum salmon sampled at East Fork Andreafsky River weir, Alaska, 2007.

	Female					Male				
Age	N	Mean	Median	SE	Range	N	Mean	Median	SE	Range
					Chinook salmon					
1.2	0	0	0	0.0	-	263	524	520	2.8	400-650*
1.3	49	731	745	10.5	450-825	116	679	687.5	5.4	490-800
1.4	133	812	815	6.0	530-975	64	798	805	7.3	650-910
1.5	2	803	802.5	42.5	760-845	2	825	825	100.0	725-925
Total	184					445				
					Chum salmon					
0.2	4	506	508	4.3	495-515	7	562	565	14.0	500-605
0.3	264	515	513	1.9	440-615	304	546	545	1.8	455-635
0.4	72	528	530	3.5	465-610	106	566	565	3.7	470-650
0.5	16	538	535	6	490-580	32	583	583	6.2	505-640
Total	356					449				

* Two Chinook salmon aged 1.2 and measuring 955 mm and 975 mm were aged incorrectly, and not included in the calculations.

Table 4. Age and sex ratio estimates by stratum of Chinook salmon sampled at East Fork Andreafsky River weir, Alaska, 2007. Standard errors are in parentheses. Season totals are calculated from weighted weekly strata totals. Unknown age data are from unreadable scale samples and are listed for informational purposes. They were not included in age calculations.

					Brood year and age			
					2003	2002	2001	2000
Strata	Run size (N)	Sample size (n)	Unknown age	Percent female	1.2	1.3	1.4	1.5
June 19 - June 30	20	10	0	50% (16.7)	30% (15.3)	10% (10.0)	50% (16.7)	10% (10.0)
July 1 - July 7	1,742	194	23	27% (3.2)	57% (3.8)	22% (3.2)	21% (3.1)	0% (0.0)
July 8 - July 14	1,649	158	10	31% (3.7)	35% (3.9)	26% (3.6)	38% (4.0)	1% (0.7)
July 15 - July 21	427	160	12	31% (3.7)	44% (4.1)	26% (3.6)	29% (3.7)	1% (0.7)
July 22 - July 30	666	167	13	35% (3.7)	31% (3.7)	31% (3.7)	37% (3.9)	1% (0.6)
Total	4,504	689	58	35% (1.9)	44%(2.2)	25%(1.9)	30%(2.0)	<1%(0.3)
Female	1,350	213	29		0%(0.0)	28%(3.8)	72%(3.8)	<1%(0.3)
Male	3,154	476	29		61%(2.5)	24%(2.8)	14%(1.8)	<1%(0.4)

Table 5. Age and sex ratio estimates by stratum of summer chum salmon sampled at East Fork Andreafsky River weir, Alaska, 2007. Standard errors are in parentheses. Season totals are calculated from weighted weekly strata totals. Unknown age data are from unreadable scale samples and are listed for informational purposes. They were not included in age calculations.

					Brood year and age			
					2004	2003	2002	2001
Strata	Run size (N)	Sample size (n)	Unknown age	Percent female	0.2	0.3	0.4	0.5
June 19 - June 30	5,406	160	13	23% (3.3)	1% (0.7)	57% (4.1)	26% (3.6)	16% (3.1)
July 1 - July 7	25,129	200	22	46% (3.5)	1% (0.6)	69% (3.5)	26% (3.3)	4% (1.5)
July 8 - July 14	18,929	160	21	49% (4.0)	2% (1.2)	72% (3.8)	24% (3.6)	2% (1.2)
July 15 - July 21	12,372	160	26	54% (4.0)	2% (1.3)	75% (3.7)	18% (3.3)	4% (1.8)
July 22 - July 30	7,806	234	27	50% (3.3)	1% (0.8)	77% (2.9)	17% (2.6)	4% (1.3)
Total	69,642	914	109	47% (1.9)	1% (0.5)	71% (1.8)	23% (1.7)	5% (0.8)
Female	32,624	411	55		1% (0.4)	73% (2.7)	22% (2.5)	4% (1.2)
Male	37,018	503	54		2% (0.8)	69% (2.5)	24% (2.3)	5% (1.0)

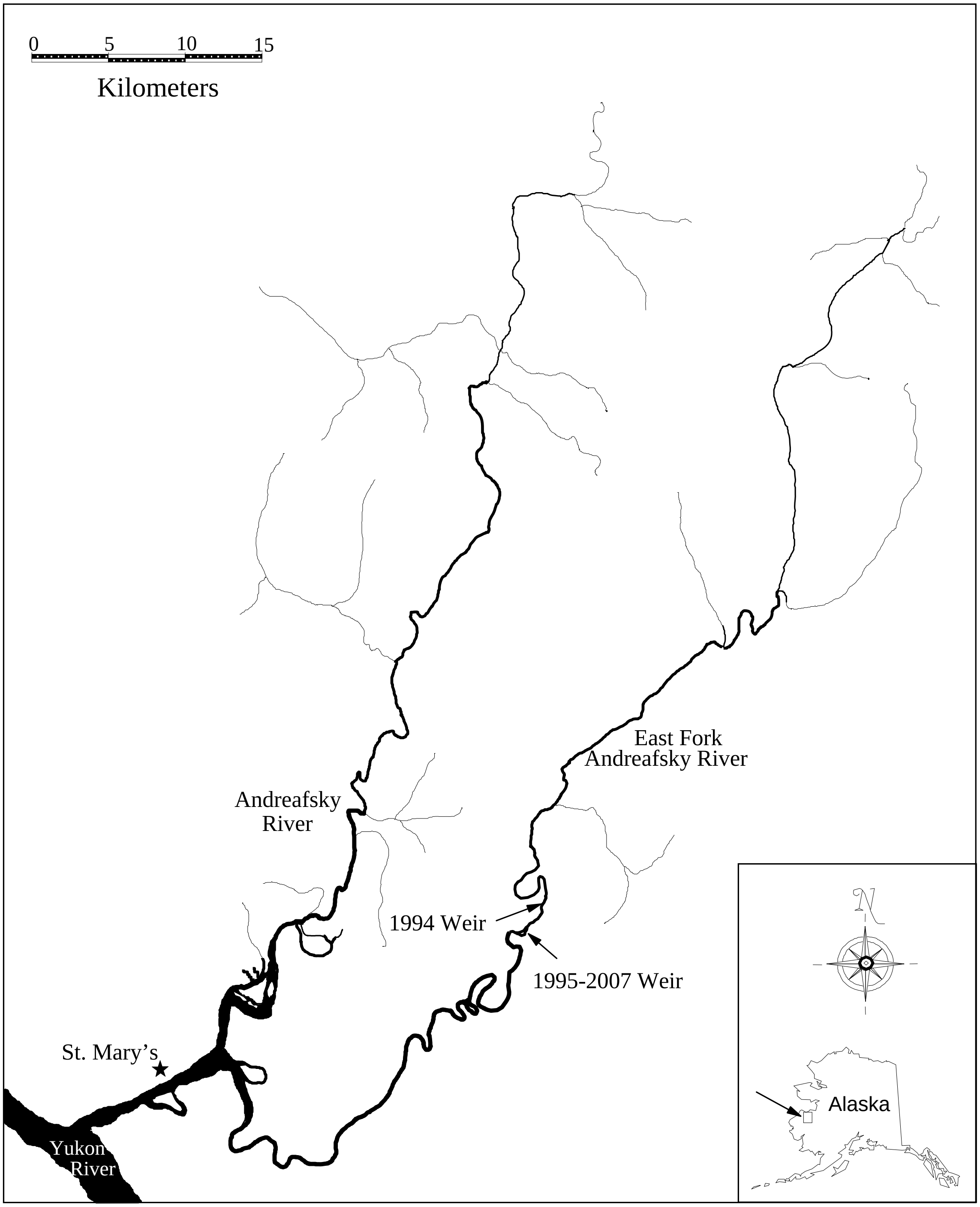

Figure 1. Weir locations in the East Fork Andreafsky River, Alaska, 1994-2007.

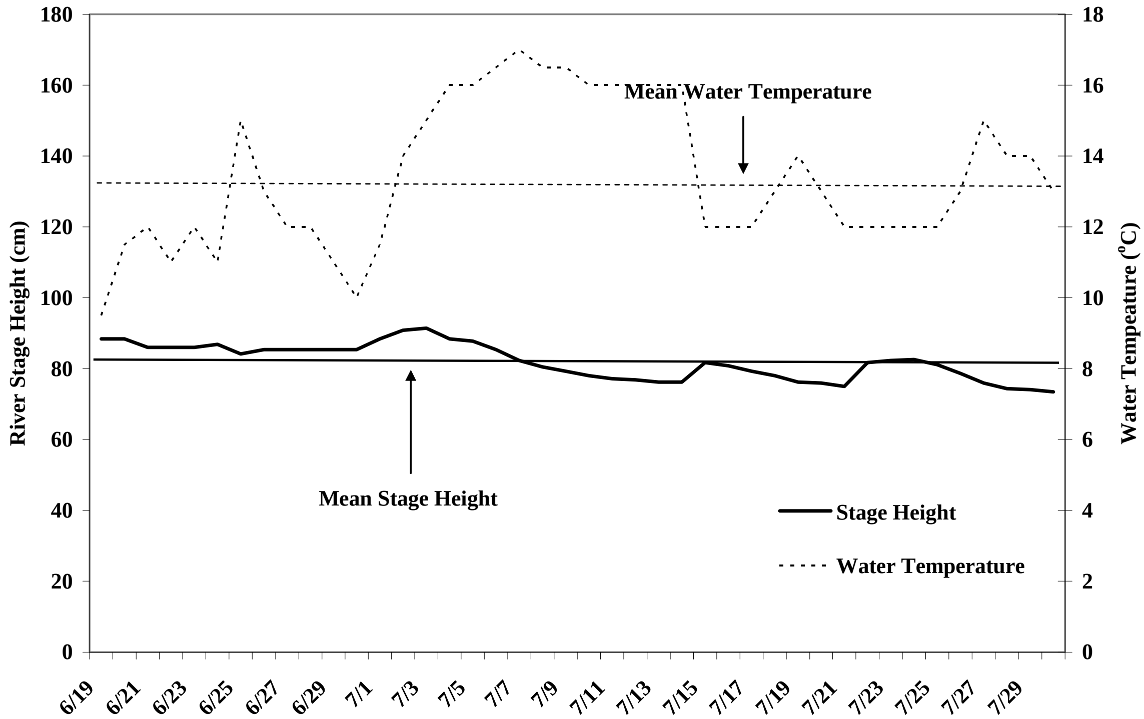

Figure 2. River stage heights and water temperatures at the East Fork Andreafsky River weir, 2007.

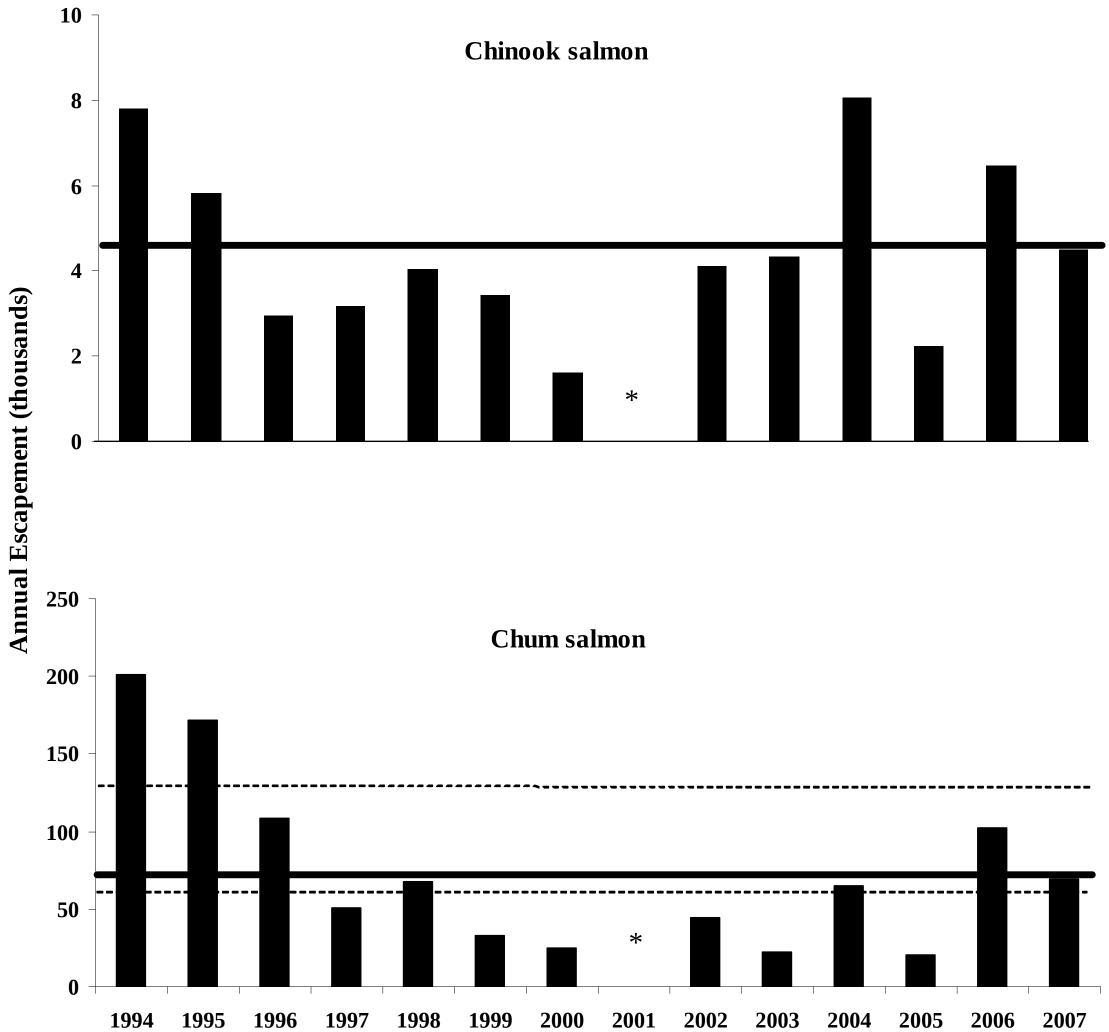

Figure 3. Annual escapement estimates of Chinook salmon and summer chum salmon migrating through the East Fork Andreafsky River weir, Alaska, 1994 to 2007. Historical average represented by the solid, horizontal line. The dotted lines in the summer chum salmon chart represent the maximum and minimum BEG. Asterisk denotes missing annual count.

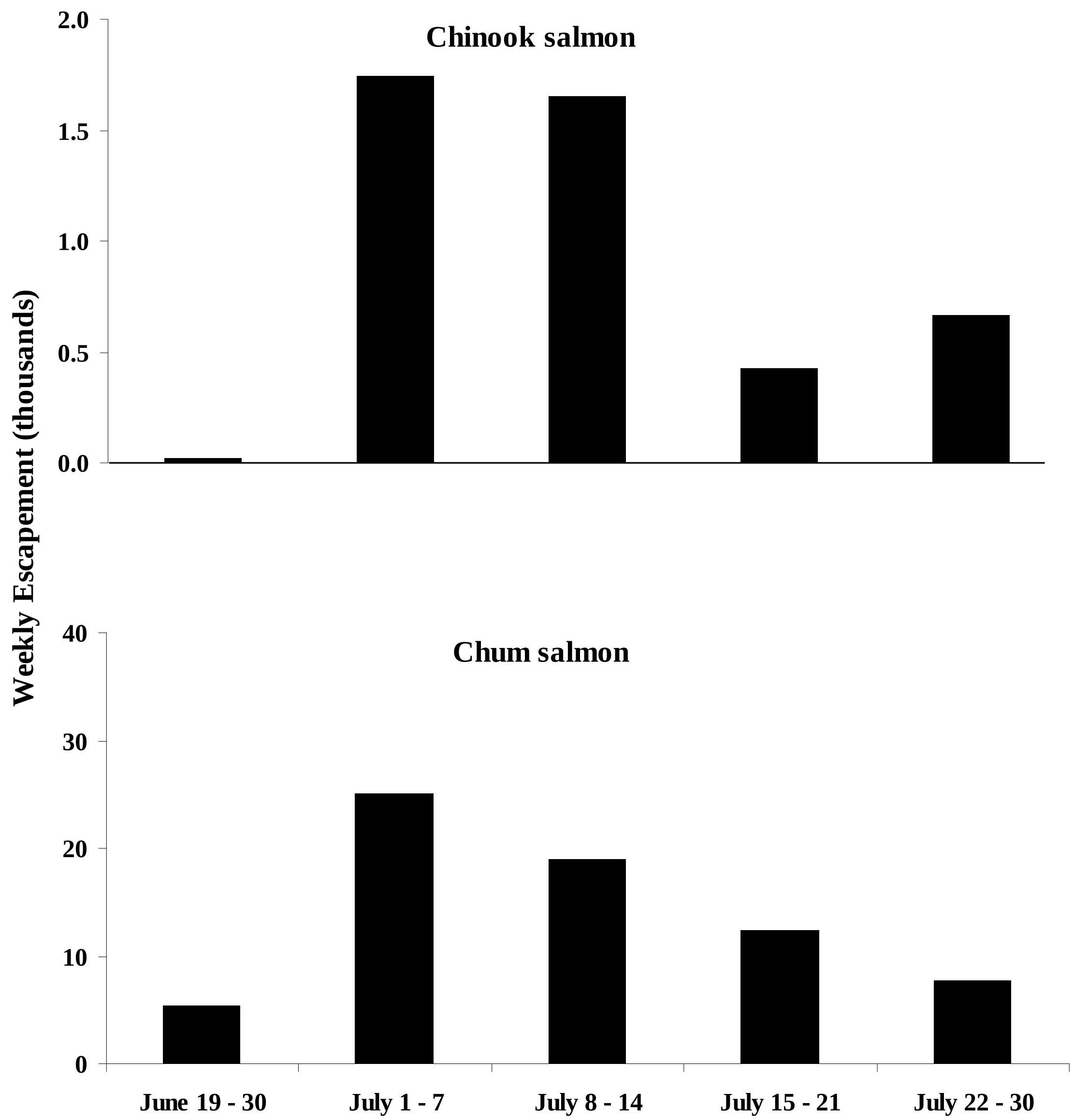

Figure 4.—Weekly Chinook salmon and summer chum salmon escapement estimates through the East Fork Andreafsky River weir, Alaska, June 19 to July 30, 2007.

Appendix 1. Historical Chinook, summer chum, and coho salmon escapement estimates recorded for the Andreafsky River, Alaska, 1954-2007. Data from JTC (Joint Technical Committee of the Yukon River of the US/Canada Panel)(2008 in progress).

	East Fork Andreafsky River						Main-stem Andreafsky River		
	Aerial Index Estimates			Sonar, Tower, or Weir			Aerial Index Estimates		
Year	Chinook salmon	Chum salmon	Coho salmon	Chinook salmon	Chum salmon	Coho salmon	Chinook salmon	Chum salmon	Coho salmon
1954	*a*	*a*					2,000 *a*	7,000 *a*	
1955									
1956	336 *b*	15,356 *b*							
1957									
1958	50 *b*	3,500 *b*					150 *b*	30,000 *b*	
1959	150 *b*	4,000 *b*					300 *b*	7,000 *b*	
1960	1,020	10,530					1,220	6,016	
1961	1,003	8,110							
1962	675 *b*	18,040					762 *b*	19,530	
1963									
1964	867	8,863					705	12,810	
1965							355 *b*	14,670 *b*	
1966	361	25,619 *b*					303	18,145	
1967							276 *b*	14,495 *b*	
1968	380	17,600					383 *b*	74,600 *b*	
1969	231 *b*	119,000					374 *b*	159,500 *b*	
1970	665	84,090					574 *b*	91,710 *b*	
1971	1,904	98,095					1,682	71,745	
1972	798 *b*	41,460 *b*					582 *b*	25,573	
1973	825	10,149 *b*					788	51,835	
1974		3,215 *b*					285	33,578	
1975	993	223,485					301	235,954	
1976	818	105,347					643	118,420	
1977	2,008	112,722					1,499	63,120	
1978	2,487	127,050					1,062	57,321	
1979	1,180	66,471					1,134	43,391	
1980	958 *b*	36,823 *b*					1,500	115,457	
1981	2,146 *b*	81,555	1,657 *b*	5,343 *c*	147,312 *c*		231 *b*		
1982	1,274	7,501 *b*			180,078 *c*		851	7,267 *b*	
1983				2,720 *c*	110,608 *c*				
1984	1,573 *b*	95,200 *b*			70,125 *c*		1,993	238,565	
1985	1,617	66,146					2,248	52,750	
1986	1,954	83,931		1,530 *d*	167,614 *d*		3,158	99,373	
1987	1,608	6,687 *b*		2,011 *d*	45,221 *d*		3,281	35,535	
1988	1,020	43,056	1,913	1,339 *d*	68,937 *d*		1,448	45,432	830
1989	1,399	21,460 *b*					1,089		
1990	2,503	11,519 *b*					1,545	20,426 *b*	
1991	1,938	31,886					2,544	46,657	
1992	1,030 *b*	11,308 *b*					2,002 *b*	37,808 *b*	
1993	5,855	10,935 *b*					2,765	9,111 *b*	
1994	300 *b*			7,801	200,981 *f*		213 *b*		
1995	1,635			5,841	172,148	10,901	1,108		
1996				2,955	108,450	8,037	624		
1997	1,140			3,186	51,139	9,472	1,510		
1998	1,027			4,034	67,720	5,417 *e*	1,249 *b*		
1999				3,444	32,587	2,963	870 *b*		

Appendix 1. Continued.

	East Fork Andreafsky River						Main-stem Andreafsky River		
	Aerial Index Estimates			Sonar, Tower, or Weir			Aerial Index Estimates		
Year	Chinook salmon	Chum salmon	Coho salmon	Chinook salmon	Chum salmon	Coho salmon	Chinook salmon	Chum salmon	Coho salmon
2000	1,018			1,609	24,785	8,451	427		
2001	1,065			1,148 *f*	2,134 *f*	15,896 *e*	570		
2002	1,447			4,123	44,194	3,577	977		
2003	1,116 *b*			4,336	22,461	8,231	1,578 *b*		
2004	2,879			8,045	64,883	11,146	1,317		
2005	1,715			2,239	20,127	5,303	1,492		
2006	590 *b*			6,463	102,260	23 *g*	824		
2007	1,758			4,504	69,642	9 *g*	976		
SEG *h*	960 - 1,900						640 - 1,600		
BEG *i*					65,000 - 130,000				

a Counts for both forks were combined into Andreafsky River count.
b Incomplete survey and/or poor survey timing or conditions resulting in minimal or inaccurate count.
c Sonar count.
d Tower count.
e Incomplete count, missing data not estimated
f Weir installed too late for an accurate count
g Incomplete count, weir removed
h Sustainable Escapement Goals.
i Biological Escapement Goals.

Appendix 2. Historical daily Chinook salmon escapements recorded at the East Fork Andreafsky River weir 1994-2007. Data for 2001 were not used in calculations and are shown for informational purposes only.

Date	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
15-Jun				0										
16-Jun		0		0										
17-Jun		0		0		0								
18-Jun		0		0		0								
19-Jun		0	0	0		0			0	0				0
20-Jun		1	0	0		0			0	0				0
21-Jun		0	10	0		0			1	0				0
22-Jun		1	0	0		0			20	0				0
23-Jun		0	33	14	0	0			0	4	67			0
24-Jun		2	6	21	0	0			0	2	26			0
25-Jun		0	0	59	0	0			3	7	15			7
26-Jun		0	59	0	0	0			1	3	55	16		2
27-Jun		41	42	101	1	0			26	12	181	2		0
28-Jun		48	19	11	0	0			314	19	534	42	0	0
29-Jun	1	67	6	1	10	0			119	4	290	88	6	4
30-Jun	188	104	8	0	34	47	9		27	0	461	238	51	7
1-Jul	141	81	72	75	93	19	16		319	176	582	11	40	134
2-Jul	54	71	21	24	17	9	39		105	295	25	89	13	197
3-Jul	222	17	205	29	36	0	89		230	22	375	135	51	75
4-Jul	156	55	124	49	75	12	74		5	6	353	114	128	277
5-Jul	651	107	309	98	336	97	38		20	83	263	111	276	141
6-Jul	225	678	258	356	373	42	407		356	136	1,187	154	437	476
7-Jul	1,156	433	280	227	386	114	18		307	336	878	271	574	442
8-Jul	108	155	244	123	204	197	71		130	469	463	169	392	157
9-Jul	351	260	186	49	129	216	17		178	823	503	46	86	299
10-Jul	375	250	111	64	167	256	30		191	48	368	7	165	255
11-Jul	288	382	72	69	255	507	57		264	107	122	15	449	86
12-Jul	581	1,022	52	88	138	214	35		166	345	315	9	1,108	653
13-Jul	779	697	100	15	62	331	55		191	311	106	58	201	103
14-Jul	433	375	96	16	61	97	18		158	340	105	108	67	96
15-Jul	352	292	62	124	91	22	90	169	140	2	53	49	117	28
16-Jul	389	97	95	274	197	33	76	87	210	7	58	55	262	25
17-Jul	144	46	110	91	263	75	62	41	119	25	54	30	714	34
18-Jul	285	38	55	25	184	63	48	196	94	235	29	14	371	132
19-Jul	161	25	42	70	240	65	34	71	75	158	40	22	264	78
20-Jul	53	37	69	264	67	302	22	107	50	28	57	17	164	35
21-Jul	66	74	51	148	129	55	12	175	29	10	40	50	161	95
22-Jul	62	33	26	35	117	67	21	66	12	2	13	51	166	249
23-Jul	209	24	2	103	57	15	6	15	32	23	17	15	117	59
24-Jul	149	7	4	57	66	54	11	5	16	58	12	22	48	63
25-Jul	25	78	6	0	12	24	10	17	7	31	19	46	25	102
26-Jul	51	21	3	11	8	5	9	7	3	4	5	4	8	33
27-Jul	92	12	6	3	8	34	7	17	6	22	14	4	2	149
28-Jul	20	15	16	29	11	6	3	10	3	108	23	4		4
29-Jul	10	9	13	58	23	159	57	41	4	28	19	0		4
30-Jul	13	5	7	144	31	80	4	16	2	4	7	4		3
31-Jul	10	1	10	2	17	59	20	11	46	0	15	3		
1-Aug	1	8	4	8	20	38	12	8	55	2	13	2		
2-Aug		2	2	4	4	18	4	12	48	5	4	2		
3-Aug		13	2	128	11	42	24	4	10	1	3	8		
4-Aug		5	5	2	1	11	19	8	3	1	6	4		

Appendix 2. Continued.

Date	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
5-Aug		6	6	1	7	5	14	6	3	4	5	8		
6-Aug		6	2	0	9	2	9	1	4	0	10	4		
7-Aug		19	7	1	10	1	4	11	4	1	8	3		
8-Aug		20	3	2	3	4	7	0	0	3	6	2		
9-Aug		25	2	2	5	0	10	4	0	1	13	9		
10-Aug		25	5	1	7	1	3	2	0	0	39	35		
11-Aug		7	2	1	1	2	8	1	4	1	17	14		
12-Aug		4	3	7	8	5	4	1	0	1	23	2		
13-Aug		11	0	14	7	3	1	10	1	2	21	2		
14-Aug		2	0	18	1	9	3	0	1	3	19	5		
15-Aug		2	0	26	0	2	6	11	0	3	17	7		
16-Aug		3	3	2	12	4	2	8	0	2	16	3		
17-Aug		3	0	4	9	7	1	2	3	1	14	1		
18-Aug		3	2	3	5	3	2	2	0	1	10	3		
19-Aug		2	2	3	2	0	2	2	1	2	9	3		
20-Aug		1	3	2	2	6	3	1	0	2	6	2		
21-Aug		2	3	1	2	0	1	0	0	0	8	2		
22-Aug		0	0	4	1	1	1	1	5	0	5	0		
23-Aug		1	2	2	1	0	0	0	0	0	1	5		
24-Aug		1	0	1	1	0	1	1	1	2	3	0		
25-Aug		0	0	4	1	0	0	0	0	2	1	1		
26-Aug		0	1	0	1	1	2	0	0	1	0	3		
27-Aug		0	0	0	0	1	0	0	0	0	1	3		
28-Aug		3	0	1	0	0	0	0	0	0	0	7		
29-Aug		1	2	2	0	0	0	0	0	0	0	6		
30-Aug		0	1	3	1	0	0	0	1	0	4	5		
31-Aug		0	2	1	1	0	0	0	0	0	2	2		
1-Sep		1	0	0	0	0	0	0	0	0	2	3		
2-Sep		0	0	0	0	1	1	0	0	0	0	3		
3-Sep		0	0	4	0	0	0	0	0	0	0	2		
4-Sep		0	0	0	0	0	0	0	0	0	1	3		
5-Sep		1	0	1	0	1	0	0	0	0	1	1		
6-Sep		0	1	1	0	0	0	0	0	0	2	0		
7-Sep		0	0	0	1	0	0	0	0	0	0	0		
8-Sep		3	0	2	0	0	0	0	0	0	1	1		
9-Sep		0	0	1	1	0	0	0	0	1	1	0		
10-Sep		0	0	0	0	0	0	0	0	0	0	0		
11-Sep		0	0	0	1	0	0	0	0	0	2	0		
12-Sep		0	0	2	0		0	0	0	0	0			
13-Sep			0	0	0		0	0	0	0	0			
14-Sep			0				0	0	0	0	0			
15-Sep			0				0	1		1	0			
16-Sep			0				0				0			
17-Sep			0				0				1			
18-Sep							0				0			
19-Sep							0				1			
20-Sep							0							
21-Sep							0							
22-Sep							0							
23-Sep							0							
Total	7,801	5,841	2,955	3,186	4,034	3,444	1,609	**	4,123	4,336	8,045	2,239	6,463	4,504

= estimated escapement counts
= adjusted escapement counts
** = incomplete count, missing data not estimated

Appendix 3. Historical daily summer chum salmon estimates recorded at the East Fork Andreafsky River weir 1994-2007. Data for 2001 were not used in calculations and are shown for informational purposes only.

Date	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2,005	2006	2007
15-Jun				0										
16-Jun		52		1										
17-Jun		332		4		0								
18-Jun		191		71		0								
19-Jun		423	62	539		0			0	0				0
20-Jun		2,198	424	981		0			0	0				0
21-Jun		861	3,315	192		0			117	2				0
22-Jun		1,170	1,036	53		0			1,782	87				2
23-Jun		228	11,195	3,141	13	1			0	564	3,045			0
24-Jun		1,951	798	1,620	18	1			6	182	1,062			29
25-Jun		364	303	1,422	264	0			522	484	985			1166
26-Jun		504	7,306	208	175	7			694	183	2,467	256		348
27-Jun		12,620	3,435	1,691	535	8			2,448	396	4,638	9		70
28-Jun		11,201	1,463	1,196	65	0			6,754	546	8,461	424	1,272	362
29-Jun	609	9,256	2,335	61	3,153	331			1,765	219	3,807	473	2,822	1644
30-Jun	19,254	10,938	314	80	4,585	4,459	837		836	271	7,081	432	14,912	1785
1-Jul	12,435	8,654	9,164	1,537	4,003	765	1,725		4,403	928	1,590	239	10,229	3581
2-Jul	2,840	5,553	3,326	619	652	459	1,460		2,467	339	153	1,081	2,395	3463
3-Jul	4,973	2,710	8,973	756	1,687	24	1,750		2,291	713	5,689	1,063	7,291	2694
4-Jul	13,321	10,678	10,018	1,264	3,561	3,000	2,070		28	175	3,940	1,238	14,018	4834
5-Jul	12,552	10,026	7,355	831	7,996	4,605	2,300		347	484	2,011	993	9,389	4725
6-Jul	4,043	23,584	3,351	3,428	6,030	1,185	3,717		4,423	1,051	1,791	1,218	7,738	3852
7-Jul	27,527	8,514	3,124	2,980	4,696	1,619	72		2,254	1,376	2,474	1,839	4,225	1980
8-Jul	5,251	732	4,771	2,440	3,088	1,569	1,548		845	2,476	2,096	1,270	3,614	1919
9-Jul	3,883	4,808	3,500	1,799	845	1,754	942		2,265	2,025	1,990	1,112	2,351	4559
10-Jul	12,416	6,473	2,303	3,195	1,003	2,135	727		1,732	244	2,069	1,370	3,478	6021
11-Jul	6,896	6,072	1,275	1,792	4,003	1,897	855		1,221	412	1,609	195	2,631	1455
12-Jul	8,424	3,973	1,497	1,738	4,401	501	477		1,099	1,762	1,815	197	1,609	2362
13-Jul	14,628	4,552	1,680	1,062	829	710	911		1,055	586	1,071	1,458	725	1219
14-Jul	11,611	2,990	1,038	1,302	1,248	1,223	352		544	254	896	1,242	330	1394
15-Jul	8,275	2,874	935	3,222	2,160	412	638	196	1,014	33	605	557	1,127	860
16-Jul	4,690	3,449	1,280	2,441	2,747	507	551	133	581	123	569	449	1,441	1867
17-Jul	4,886	2,739	774	1,150	3,038	547	464	95	420	445	465	196	2,564	3294
18-Jul	4,532	1,495	852	715	1,580	494	377	229	492	1,078	326	246	1,637	3834
19-Jul	2,977	651	1,848	624	1,365	666	290	102	392	708	217	141	1,294	1349
20-Jul	1,091	1,150	1,721	1,220	370	816	206	74	192	681	276	523	924	468
21-Jul	1,351	807	1,116	800	335	242	424	228	153	283	142	493	944	700
22-Jul	2,228	591	605	668	304	240	280	72	61	47	59	182	921	1895
23-Jul	1,320	742	246	405	248	201	116	29	201	306	77	167	715	1417
24-Jul	868	290	291	313	200	173	84	32	98	222	116	54	548	1208
25-Jul	1,349	1,214	196	121	220	131	159	155	26	348	171	80	452	1784
26-Jul	1,977	521	365	339	166	73	130	116	22	218	85	28	334	645
27-Jul	2,196	605	278	400	130	132	64	110	60	220	69	32	330	444
28-Jul	841	265	738	219	202	92	43	88	123	389	73	100		95
29-Jul	564	211	334	234	145	245	173	78	17	220	52	112		179
30-Jul	524	248	272	131	115	242	70	37	36	61	37	74		139
31-Jul	410	94	260	86	140	200	172	10	119	80	34	79		
1-Aug	239	160	93	134	191	158	89	24	81	104	17	50		
2-Aug		81	158	81	91	118	125	40	33	111	21	25		
3-Aug		147	91	182	76	124	109	28	36	40	28	23		
4-Aug		59	192	48	56	117	83	17	40	91	22	5		

Appendix 3. Continued.

Date	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
5-Aug		77	132	101	73	45	57	13	3	182	25	24		
6-Aug		115	215	77	71	17	31	2	7	52	31	30		
7-Aug		76	163	29	104	11	5	7	13	85	33	14		
8-Aug		78	54	31	77	16	12	7	5	44	16	19		
9-Aug		70	110	44	34	10	10	7	5	21	36	9		
10-Aug		61	137	17	57	32	13	4	13	21	26	8		
11-Aug		35	63	14	39	14	10	4	11	27	34	18		
12-Aug		60	65	65	77	29	9	3	2	40	26	10		
13-Aug		73	26	36	100	16	22	15	0	21	30	3		
14-Aug		62	35	33	58	6	13	9	0	52	35	7		
15-Aug		49	59	31	34	10	4	9	1	43	39	9		
16-Aug		95	80	46	32	13	4	11	6	35	44	8		
17-Aug		64	35	37	27	10	5	6	1	27	48	5		
18-Aug		83	33	58	21	6	13	6	2	19	18	11		
19-Aug		41	110	43	16	3	5	10	0	32	7	0		
20-Aug		45	33	95	15	3	3	7	2	22	12	1		
21-Aug		47	64	54	13	19	0	7	0	21	5	3		
22-Aug		43	27	37	12	2	1	3	2	10	4	2		
23-Aug		35	37	31	10	6	2	10	3	12	3	25		
24-Aug		35	26	41	9	5	4	5	3	11	14	4		
25-Aug		56	103	41	8	5	6	4	3	24	5	6		
26-Aug		53	35	18	6	2	19	2	1	13	2	3		
27-Aug		57	26	20	5	9	17	3	0	11	2	3		
28-Aug		31	39	38	3	7	13	3	1	5	10	20		
29-Aug		53	78	57	2	5	10	1	0	14	8	22		
30-Aug		34	66	73	4	11	9	4	0	6	19	24		
31-Aug		63	31	21	11	13	2	11	0	2	20	12		
1-Sep		48	38	14	8	18	6	10	0	1	22	7		
2-Sep		75	40	13	4	19	5	9	0	1	14	10		
3-Sep		36	49	53	5	15	4	8	0	5	5	28		
4-Sep		25	48	28	8	5	2	7	0	0	5	9		
5-Sep		30	37	38	1	4	1	6	0	0	16	4		
6-Sep		50	29	31	8	4	1	6	0	2	8	13		
7-Sep		60	50	51	6	3	1	5	1	4	11	7		
8-Sep		96	39	28	4	2	0	4	0	2	12	6		
9-Sep		42	32	22	3	2	0	3	0	3	4	3		
10-Sep		42	32	24	9	3	9	2	2	1	3	8		
11-Sep		37	24	48	10	4	3	0	1	0	6	7		
12-Sep		15	16	42	3		5	1	8	16	2			
13-Sep			18	23	4		1	1	2	3	6			
14-Sep			39				2	3	1	1	3			
15-Sep			33				5	3		3	3			
16-Sep			38				18				2			
17-Sep							3				5			
18-Sep							6				0			
19-Sep							4				3			
20-Sep							8							
21-Sep							10							
22-Sep							1							
23-Sep							1							
Total	200,981	172,148	108,450	51,139	67,720	32,587	24,785	**	44,194	22,461	64,883	20,127	102,260	69,642

= estimated escapement counts
= adjusted escapement counts
** = incomplete count, missing data not estimated

Appendix 4. Historical daily coho salmon estimates recorded at the East Fork Andreafsky River weir, 1995-2007. Data for 1998 and 2001 were not used in calculations and are shown for informational purposes only.

Date	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2,005	2006	2007
15-Jun			0										
16-Jun	0		0										
17-Jun	0		0		0								
18-Jun	0		0		0								
19-Jun	0	0	0		0			0	0				0
20-Jun	0	0	0		0			0	0				0
21-Jun	0	0	0		0			0	0				0
22-Jun	0	0	0		0			0	0				0
23-Jun	0	0	0	0	0			0	0	0			0
24-Jun	0	0	0	0	0			0	0	0			0
25-Jun	0	0	0	0	0			0	0	0			0
26-Jun	0	0	0	0	0			0	0	0	0		0
27-Jun	0	0	0	0	0			0	0	0	0		0
28-Jun	0	0	0	0	0			0	0	0	0	0	0
29-Jun	0	0	0	0	0			0	0	0	0	0	0
30-Jun	0	0	0	0	0	0		0	0	0	0	0	0
1-Jul	0	0	0	0	0	0		0	0	0	0	0	0
2-Jul	0	0	0	0	0	0		0	0	0	0	0	0
3-Jul	0	0	0	0	0	0		0	0	0	0	0	0
4-Jul	0	0	0	0	0	0		0	0	0	0	0	0
5-Jul	0	0	0	0	0	0		0	0	0	0	0	0
6-Jul	0	0	0	0	0	0		0	0	0	0	0	0
7-Jul	0	0	0	0	0	0		0	0	0	0	0	0
8-Jul	0	0	0	0	0	0		0	1	0	0	0	0
9-Jul	0	0	0	0	0	0		0	0	0	0	0	0
10-Jul	0	0	0	0	0	0		0	0	0	0	0	0
11-Jul	0	0	0	0	0	0		0	0	0	0	0	0
12-Jul	0	0	0	0	0	0		0	0	0	0	0	0
13-Jul	0	0	0	0	0	0		0	0	0	0	0	0
14-Jul	0	0	0	0	0	0		0	0	0	0	0	0
15-Jul	0	0	0	0	0	0	0	0	2	0	0	0	0
16-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
17-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
19-Jul	0	0	0	0	0	0	0	0	0	1	0	0	0
20-Jul	0	0	0	0	0	0	0	0	1	0	0	0	0
21-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
22-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0
23-Jul	0	11	0	0	0	0	0	0	0	0	0	2	0
24-Jul	0	2	0	0	0	0	0	0	2	0	0	5	0
25-Jul	0	1	0	0	0	0	0	0	0	0	0	7	3
26-Jul	0	4	0	0	0	0	0	0	0	0	0	4	2
27-Jul	0	0	0	0	0	0	0	0	0	0	0	5	0
28-Jul	0	3	0	1	0	0	0	0	0	2	0	0	1
29-Jul	0	3	0	0	0	0	0	0	0	0	0		0
30-Jul	0	9	0	1	0	1	0	0	1	1	0		3
31-Jul	0	25	0	0	0	1	0	0	2	2	0		
1-Aug	0	1	0	0	0	7	0	0	0	1	1		
2-Aug	0	7	0	1	0	9	0	0	1	4	0		
3-Aug	1	4	0	5	0	18	0	0	1	0	0		
4-Aug	0	15	0	8	9	16	0	1	1	0	1		

Appendix 4. Continued.

Date	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
5-Aug	0	20	0	8	4	14	0	0	2	8	0		
6-Aug	0	10	0	5	4	13	0	0	4	10	0		
7-Aug	1	26	1	16	0	12	0	0	28	14	1		
8-Aug	1	20	0	9	0	35	0	0	25	16	4		
9-Aug	3	26	0	5	1	79	0	0	27	98	2		
10-Aug	8	138	0	8	2	125	0	1	5	62	2		
11-Aug	12	105	0	3	2	89	0	0	9	115	0		
12-Aug	5	50	10	4	5	51	0	0	19	86	0		
13-Aug	3	16	47	111	1	211	0	0	40	78	0		
14-Aug	3	11	35	71	1	137	1	0	194	71	4		
15-Aug	9	19	6	9	0	64	22	0	146	63	9		
16-Aug	5	276	8	61	5	34	33	0	98	56	37		
17-Aug	11	92	7		2	23	5	0	50	48	6		
18-Aug	24	179	12		0	137	5	0	2	163	173		
19-Aug	41	1,052	13	8	0	108	51	1	7	384	24		
20-Aug	24	100	50		1	333	532	0	21	170	4		
21-Aug	95	149	414		42	303	270	0	11	185	2		
22-Aug	246	9	222		48	59	312	3	3	150	2		
23-Aug	305	32	22		0	10	343	6	24	80	21		
24-Aug	414	12	16		26	44	583	3	263	185	101		
25-Aug	245	1,539	577		8	533	217	7	1,744	243	19		
26-Aug	692	449	150		4	1,401	857	0	634	453	102		
27-Aug	1,436	5	10		4	1,643	382	0	288	17	128		
28-Aug	368	1	24		3	279	403	2	197	4	1,084		
29-Aug	938	179	2,335	371	0	626	103	0	243	38	475		
30-Aug	335	1,489	2,714	618	2	278	1,078	0	552	178	647		
31-Aug	265	374	122	568	1	192	2,264	0	729	490	218		
1-Sep	444	374	73	336	411	358	1,576	0	172	505	23		
2-Sep	863	147	53	17	162	238		14	107	897	23		
3-Sep	14	100	421	80	1,255	162		29	9	234	476		
4-Sep	29	250	355	490	704	160		43	646	167	483		
5-Sep	6	337	219	228	122	39		640	275	609	77		
6-Sep	21	78	514	591	40	46		738	14	1,550	128		
7-Sep	164	84	435	12	0	52		413	42	1,011	207		
8-Sep	2,403	24	169	0	14	48		345	459	578	80		
9-Sep	854	16	223	94	19	55		103	268	337	194		
10-Sep	391	1	52	555	41	94	85	237	9	535	343		
11-Sep	127	0	83	1,104	20	31	30	117	211	259	202		
12-Sep	95	0	64	6		79	20	726	231	13			
13-Sep		0	16	13		30	43	113	399	57			
14-Sep		0				22	21	35	8	37			
15-Sep		3				16	16		4	201			
16-Sep		160				28				240			
17-Sep						19				241			
18-Sep						3				42			
19-Sep						5				157			
20-Sep						5							
21-Sep						34							
22-Sep						32							
23-Sep						10							
Total	10,901	8,037	9,472	**	2,963	8,451	**	3,577	8,231	11,146	5,303	*	*

= estimated escapement count
= partial day's count adjusted to 24 hours
** = incomplete count, missing data not estimated
* = incomplete count, weir removed

Appendix 5. Historical daily pink salmon escapement estimates recorded at the East Fork Andreafsky River weir, 1994-2007. Data for 2001 were not used in calculations and are shown for informational purposes only.

Date	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
15-Jun				0										
16-Jun		0		0										
17-Jun		0		0		0								
18-Jun		0		0		0								
19-Jun		0	12	0		0			0	0				0
20-Jun		0	4	0		0			0	0				0
21-Jun		0	40	0		0			52	0				0
22-Jun		0	42	0		0			462	0				0
23-Jun		0	157	0	0	0			0	0	19			0
24-Jun		0	67	0	0	0			22	0	15			0
25-Jun		0	24	0	8	0			148	3	24			0
26-Jun		0	153	0	3	0			338	0	102	0		0
27-Jun		1	218	1	22	0			431	6	189	2		0
28-Jun		0	80	0	2	0			7,808	4	341	10	43	0
29-Jun	8	2	78	0	112	0			5,076	3	374	27	54	3
30-Jun	451	3	41	0	258	0	18		1,509	0	1,671	97	314	2
1-Jul	409	13	184	2	750	0	5		6,192	16	1,049	15	281	5
2-Jul	194	4	107	0	65	0	383		3,345	12	140	89	134	38
3-Jul	305	4	347	0	704	0	52		6,876	13	1,186	453	326	36
4-Jul	780	5	1,254	1	1,008	0	224		257	13	2,327	652	1,431	143
5-Jul	1,027	9	6,678	0	3,595	0	162		1,626	16	5,175	985	1,325	184
6-Jul	772	98	4,676	2	4,136	2	1,228		13,433	24	4,203	2,334	3,092	251
7-Jul	4,026	77	3,834	0	4,292	2	354		10,268	94	17,994	3,071	8,096	164
8-Jul	1,736	4	7,472	1	2,968	1	972		4,815	172	13,079	2,443	13,219	125
9-Jul	4,263	18	8,905	2	1,382	2	1,680		8,765	259	16,044	1,692	7,941	278
10-Jul	4,744	33	10,290	1	1,169	10	897		12,942	16	22,171	1,266	11,605	461
11-Jul	3,313	23	5,822	2	9,872	20	7,849		10,764	43	15,664	1,453	13,327	112
12-Jul	8,447	100	4,662	4	21,285	17	2,726		9,207	185	15,661	385	14,844	315
13-Jul	13,568	109	9,484	6	11,399	18	7,044		9,161	173	15,313	2,865	7,204	74
14-Jul	24,842	94	11,760	1	5,846	7	1,468		7,819	189	25,780	5,106	1,117	129
15-Jul	22,460	81	9,754	35	21,785	2	966	10	6,958	28	16,578	2,489	2,858	103
16-Jul	20,612	64	13,476	31	11,087	2	1,206	4	8,224	13	22,322	1,992	2,816	367
17-Jul	27,053	60	12,222	13	23,930	4	1,446	5	6,724	96	16,143	678	8,969	518
18-Jul	18,277	31	12,682	5	31,639	4	1,686	26	8,701	702	14,713	945	17,205	843
19-Jul	20,792	15	14,282	6	27,014	14	1,926	15	6,058	459	15,635	450	18,690	524
20-Jul	23,511	30	17,477	4	7,204	69	2,170	47	1,983	288	28,631	1,140	18,357	642
21-Jul	10,872	40	18,780	4	4,672	38	2,549	61	1,239	98	19,851	1,852	13,319	342
22-Jul	8,975	48	13,018	4	2,460	41	1,143	19	564	18	12,446	814	16,186	1,040
23-Jul	17,692	77	4,744	5	3,512	25	454	18	1,060	107	9,880	723	11,435	393
24-Jul	15,120	25	3,778	2	7,181	23	609	38	1,092	107	9,973	256	9,612	306
25-Jul	3,566	216	2,473	0	5,278	22	1,055	124	385	124	12,352	158	6,890	1,231
26-Jul	10,225	88	3,365	6	3,496	11	335	53	429	43	12,184	425	4,746	475
27-Jul	13,821	37	3,768	13	1,186	24	731	68	232	47	10,978	307	5,299	403
28-Jul	15,302	20	5,036	9	1,496	11	612	94	305	130	9,686	889		143
29-Jul	9,736	14	1,035	20	1,134	26	415	56	49	140	7,911	744		206
30-Jul	6,159	29	205	26	982	13	202	22	62	29	5,421	687		236
31-Jul	2,476	11	706	2	1,315	10	244	10	232	65	4,258	341		
1-Aug	996	22	169	7	962	8	145	17	131	69	2,669	430		
2-Aug		23	107	2	474	5	129	19	61	54	2,342	140		
3-Aug		44	127	8	440	48	81	17	73	33	1,206	79		
4-Aug		20	300	3	303	60	65	12	34	34	843	55		

Appendix 5. Continued.

Date	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
5-Aug		17	237	3	127	28	49	5	11	35	890	91		
6-Aug		22	61	1	73	14	33	10	13	17	729	114		
7-Aug		37	109	1	104	13	17	10	7	20	789	41		
8-Aug		20	61	5	140	19	17	0	4	9	513	68		
9-Aug		29	55	1	68	7	35	3	5	8	439	39		
10-Aug		46	77	4	36	16	15	6	9	9	384	17		
11-Aug		18	44	7	40	15	11	10	2	6	205	23		
12-Aug		11	51	6	43	17	8	3	4	10	152	10		
13-Aug		12	25	4	52	8	14	8	1	14	140	3		
14-Aug		32	16	3	40	5	11	6	4	21	128	11		
15-Aug		20	7	0	11	3	9	2	1	16	116	10		
16-Aug		19	25	3	18	17	2	1	0	11	104	12		
17-Aug		17	8	5	0	1	1	1	1	6	96	5		
18-Aug		6	17	4	0	6	1	1	0	1	34	3		
19-Aug		7	40	2	2	0	3	6	0	14	35	1		
20-Aug		4	4	4	0	1	3	1	0	18	17	0		
21-Aug		7	2	1	0	1	1	0	1	10	17	3		
22-Aug		6	3	2	0	3	2	1	1	8	7	0		
23-Aug		4	8	2	0	2	1	3	2	12	5	0		
24-Aug		8	7	8	0	7	4	1	3	13	6	2		
25-Aug		3	16	10	0	1	5	0	1	10	7	2		
26-Aug		5	28	3	0	4	0	1	0	9	12	1		
27-Aug		9	1	1	0	1	0	0	0	2	4	2		
28-Aug		0	1	9	0	6	2	0	0	4	4	7		
29-Aug		7	1	15	2	6	1	0	0	3	5	3		
30-Aug		5	6	16	1	2	9	3	1	1	11	1		
31-Aug		0	4	1	2	3	2	0	0	0	18	2		
1-Sep		0	7	1	2	1	1	0	1	10	13	3		
2-Sep		2	4	0	0	1	0	0	1	2	35	2		
3-Sep		1	7	20	4	8	0	0	0	6	6	1		
4-Sep		0	1	13	5	2	0	0	0	8	11	0		
5-Sep		1	3	5	0	4	0	0	2	5	34	2		
6-Sep		1	0	2	2	2	0	0	0	4	47	0		
7-Sep		1	1	3	3	3	0	0	0	8	30	1		
8-Sep		1	0	3	0	0	0	0	0	12	24	0		
9-Sep		0	1	5	2	0	0	0	1	7	22	2		
10-Sep		1	0	4	2	0	1	0	0	5	13	3		
11-Sep		0	0	12	1	3	0	0	1	6	6	6		
12-Sep		1	0	6	2		0	0	2	4	4			
13-Sep			3	6	0		0	2	0	7	1			
14-Sep			0				1	0	0	3	3			
15-Sep			0				1	1		4	3			
16-Sep			1				0				3			
17-Sep							0				2			
18-Sep							0				3			
19-Sep							0				0			
20-Sep							0							
21-Sep							0							
22-Sep							0							
23-Sep							0							
Total	316,530	1,972	214,837	429	227,208	769	43,491	**	165,991	4,303	399,670	39,030	*	*

(yellow box) = estimated escapement count
(gray box) = partial day's count adjusted to 24 hours
** = incomplete count, missing data not estimated.
* = incomplete count, weir removed

Appendix 6. Historical daily sockeye salmon estimates recorded at the East Fork Andreafsky River weir, 1994-2007. Data for 2001 were not used in calculations and are shown for informational purposes only.

Date	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
15-Jun				0										
16-Jun		0		0										
17-Jun		0		0		0								
18-Jun		0		0		0				0				
19-Jun		0	0	0		0			0	0				0
20-Jun		0	0	0		0			0	0				0
21-Jun		0	0	0		0			0	0				0
22-Jun		0	0	0		0			0	0				0
23-Jun		0	0	0	0	0			0	0	0			0
24-Jun		0	0	0	0	0			0	0	0			0
25-Jun		0	0	0	0	0			0	0	0			0
26-Jun		0	0	0	0	0			0	0	0	0		0
27-Jun		0	0	0	0	0			0	0	1	0		1
28-Jun		0	0	0	0	0			0	0	2	0	0	0
29-Jun	0	0	0	1	3	1			0	1	5	0	0	0
30-Jun	0	0	0	0	0	0	0		0	0	2	1	0	0
1-Jul	0	2	0	1	0	0	0		0	0	0	1	0	6
2-Jul	0	0	6	0	0	0	0		0	0	3	0	0	8
3-Jul	0	1	9	0	0	0	0		0	0	5	0	9	2
4-Jul	0	0	16	0	0	1	0		0	1	3	0	50	17
5-Jul	0	1	6	0	0	8	0		0	4	9	0	15	5
6-Jul	0	4	1	0	0	1	0		1	4	7	0	27	0
7-Jul	2	0	7	1	0	2	0		0	4	22	0	16	6
8-Jul	1	0	0	0	3	6	0		0	2	18	0	12	6
9-Jul	0	0	10	0	0	2	0		0	2	14	0	13	9
10-Jul	0	1	6	1	0	0	0		0	13	15	0	12	6
11-Jul	1	1	6	0	4	7	1		0	14	18	0	16	2
12-Jul	0	0	8	0	8	0	0		1	4	16	1	20	6
13-Jul	0	0	7	0	3	0	0		0	4	19	0	4	2
14-Jul	0	0	9	2	0	0	1		0	1	10	15	3	1
15-Jul	1	0	4	1	10	0	0	0	0	8	3	0	7	1
16-Jul	2	0	5	2	7	1	0	0	3	13	6	1	5	2
17-Jul	0	0	4	1	5	5	0	0	1	23	9	0	18	4
18-Jul	2	3	8	1	13	2	0	1	2	0	7	0	21	5
19-Jul	0	0	7	0	17	0	0	0	3	9	12	0	26	5
20-Jul	3	1	6	1	3	2	0	0	1	3	12	0	21	3
21-Jul	2	2	3	0	1	0	0	0	1	1	7	2	32	1
22-Jul	0	0	4	2	6	0	0	4	1	8	2	0	12	4
23-Jul	0	0	4	1	3	0	0	1	2	11	7	0	31	4
24-Jul	1	0	1	0	1	0	0	2	4	11	10	5	19	4
25-Jul	1	8	1	0	9	1	0	1	0	2	16	5	15	8
26-Jul	1	2	3	0	0	0	0	0	0	15	9	2	13	8
27-Jul	5	1	3	0	0	0	0	2	1	25	16	5	9	4
28-Jul	4	0	2	3	6	0	0	0	2	19	6	4		5
29-Jul	3	1	0	3	5	0	0	0	0	9	5	7		5
30-Jul	2	3	0	2	5	1	1	0	0	18	6	1		1
31-Jul	0	0	5	0	4	1	1	0	4	7	7	1		
1-Aug	2	4	1	3	5	0	0	0	3	16	8	0		
2-Aug		0	1	2	1	0	0	0	3	4	9	0		
3-Aug		3	1	1	6	0	1	1	0	11	3	0		
4-Aug		0	4	0	4	1	1	0	0	40	7	0		

Appendix 6. Continued.

Date	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
5-Aug		0	1	0	3	0	1	0	0	5	2	2		
6-Aug		0	4	0	2	2	0	0	1	11	8	4		
7-Aug		1	3	0	5	0	0	0	0	9	9	0		
8-Aug		1	1	0	2	0	2	0	0	4	8	8		
9-Aug		0	5	0	2	0	1	0	1	2	6	1		
10-Aug		0	3	0	1	0	0	0	1	6	3	1		
11-Aug		0	2	0	4	1	1	0	0	6	5	2		
12-Aug		0	0	0	2	1	0	0	2	3	5	1		
13-Aug		3	0	2	12	1	0	1	0	12	4	3		
14-Aug		3	1	0	2	0	0	0	0	8	3	3		
15-Aug		3	1	0	1	0	0	0	0	7	2	0		
16-Aug		5	5	0	3	0	0	0	0	6	1	4		
17-Aug		5	0	0	2	0	1	0	0	5	0	0		
18-Aug		1	1	1	1	0	1	0	0	8	6	13		
19-Aug		1	5	2	0	2	1	0	0	8	4	0		
20-Aug		3	1	5	0	3	0	1	0	17	5	0		
21-Aug		1	3	5	0	2	0	0	0	0	6	1		
22-Aug		13	1	1	0	0	0	0	0	6	3	0		
23-Aug		9	0	1	0	1	0	0	0	11	0	0		
24-Aug		4	3	1	0	0	2	0	1	10	5	7		
25-Aug		0	16	8	0	0	3	0	0	5	15	1		
26-Aug		1	6	2	0	2	0	0	1	1	4	2		
27-Aug		0	2	1	0	0	11	0	0	6	2	0		
28-Aug		4	2	2	0	2	3	0	0	6	2	15		
29-Aug		1	4	5	0	0	4	0	1	4	2	5		
30-Aug		1	5	6	3	2	3	1	0	2	4	5		
31-Aug		2	0	0	0	0	5	0	0	2	1	1		
1-Sep		3	2	0	1	4	13	0	0	2	6	2		
2-Sep		0	1	4	1	2	5	0	0	1	6	2		
3-Sep		0	3	2	0	9	2	0	0	1	2	8		
4-Sep		2	3	1	0	13	2	0	0	5	5	1		
5-Sep		0	3	1	0	15	0	0	0	4	15	3		
6-Sep		3	2	2	0	2	0	0	0	0	6	3		
7-Sep		1	1	3	0	0	0	0	1	0	1	0		
8-Sep		2	0	1	1	1	0	0	0	1	2	0		
9-Sep		0	0	4	6	2	1	0	1	0	4	0		
10-Sep		1	0	4	0	0	2	0	0	0	1	2		
11-Sep		1	0	2	2	4	0	0	0	1	1	0		
12-Sep		0	0	3	0		0	0	0	0	1			
13-Sep			0	2	0		2	0	0	1	0			
14-Sep			0				1	0	0	1	0			
15-Sep			0				0			0	0			
16-Sep			0				0				1			
17-Sep							1				3			
18-Sep							0				2			
19-Sep							0				1			
20-Sep							1							
21-Sep							3							
22-Sep							1							
23-Sep							0							
Total	**	113	248	100	188	113	79	**	43	494	508	151	*	*

= estimated escapement counts
* * = incomplete count, missing data not estimated.
* = incomplete count, weir removed