Ayakulik River Chinook Salmon Creel Survey, Kodiak National Wildlife Refuge, Alaska, 1993 and 1994

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April 1996

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The correct citation for this report is

Booth, J A and M L Mc Cosh 1996 Ayakulik River chinook salmon creel survey, Kodiak National Wildlife Refuge, Alaska, 1993 and 1994 U S Fish and Wildlife Service, Kenai Fishery Resource Office, Alaska Fisheries Technical Report Number 37, Kenai, Alaska

ABSTRACT

A creel survey was conducted from 28 May through 10 July, 1993, and 26 May through 11 July, 1994, on the Ayakulik River within the Kodiak National Wildlife Refuge Exit interviews were conducted with all anglers and at either the confluence of the Ayakulik River and Bare Creek or the Alaska Department of Fish and Game (Department) weir site at the mouth of the Ayakulik River

In 1993, 427 anglers were interviewed 212 non-guided, 199 guided, and 16 subsistence In 1994, 476 anglers were interviewed 293 non-guided and 183 guided Anglers expended a total of 1,109 angler days in 1993 and harvested 808 chinook *Oncorhynchus tshawytscha*, 338 sockeye *O nerka*, and 18 coho *O kisutch* salmon, 9 Dolly Varden *Salvelinus malma*, 3 rainbow and 1 steelhead trout *O mykiss* In 1994, anglers expended a total of 1,533 angler days and harvested 739 chinook, 558 sockeye salmon, 5 Dolly Varden and 2 steelhead trout In addition, 2,871 and 2,733 chinook salmon were caught and released in 1993 and 1994, respectively

In 1993, angler activity included day use, overnight use, rafting, lodge clientele and subsistence Effort in angler days was predominately overnight use and rafting. Lodge clientele accounted for 22% of the total angler effort and were entirely guided anglers In 1994, angler activity included day use, overnight use, rafting and lodge clientele Effort in angler days was predominately rafting and overnight use Similar to 1993, lodge clientele accounted for 16% of the total angler effort and were all guided anglers

In 1993, the age composition and length distribution of fish sampled from the weir was significantly different across time Age 1 4 was the predominant age for females in the weir escapement during both early and late seasons

In 1994, the age composition of fish sampled from the weir escapement early in the season differed from fish sampled later in the season Females were primarily of age 1 4 fish both early and late in the season Length differed over time for males but not for females

Spawning escapement for chinook salmon in 1993 was 7,011 fish Age 1 4 and 1 2 were the most abundant age classes, followed by ages 1 5 and 1 3 In 1994, the spawning escapement was 8,399 Age 1 4 and 1 3 were the most abundant age classes in 1994

The sport harvest in 1993 consisted primarily of age 1 4 females, with age 1 2, 1 3, and 1 4 males prominent The age composition of the sport harvest was significantly different from the age composition of the escapement for late season males Length distributions were also significantly different between the harvest and escapement for early season females and late season males

In 1994, the sport harvest consisted primarily of age 1 4 females and age 1 3 and 1 4 males Age and length composition of the harvest did not differ from that of the escapement

Upon original examination of 1993 data there was concern that anglers were selecting female fish due to their longer lengths Repeating this survey in 1994 found this was not a consistent problem There was agreement between the creel survey and the Department postal survey harvest estimates but not angler days In the future, if creel survey sites are to be limited it is recommended that the weir site be maintained instead of the Bare Creek site The weir creel site interviews accounted for 50% of the fishery and if sites were chosen due to cost constraints it could be run simultaneously with personnel who are maintaining the weir

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INTRODUCTION

The Alaska National Interest Lands Conservation Act (ANILCA) mandates that salmon populations and their habitats be conserved within the Kodiak National Wildlife Refuge (Refuge) A creel survey was performed to validate the annual postal survey by the Alaska Department of Fish and Game (Department) and to determine age and sex composition of the chinook salmon *Oncorhynchus tshawytscha* sport harvest The U S Fish and Wildlife Service (Service) recognizes these objectives and the Refuge Fishery Management Plan identifies the characterization of the sport fishery as a priority item to meet conservation objectives for this population and to assist in the development of public use plans for the Refuge (U S Fish and Wildlife Service 1990)

Angling on the Ayakulik River has increased in recent years and may affect the chinook salmon spawning population Creel data collected during 1983 to 1992 by the Refuge and the Department on the chinook salmon sport fishery, show angler harvest has increased by more than 100% (Figure 1) During this same time period commercial harvest increased by over 220% in nearshore saltwater areas Historically, escapement goals have been attained and the sport harvest was less than 3% of the chinook salmon escapement More recent (1990-1992) escapement data indicate monitoring is necessary If returns continue to decline and sport and commercial harvest increase to levels which affect the chinook salmon stock conservation management, actions will be needed to ensure in-river escapement

The Ayakulik River chinook salmon run is one of two native chinook salmon runs on the Kodiak Archipelago (Alaska Department of Fish and Game 1977) The Karluk River on the west side of Kodiak Island has a comparable run of chinook salmon

Salmon escapement into the Ayakulik River has been monitored with a weir since 1929 The Bureau of Commercial Fisheries maintained a weir approximately 0 5 km from the stream terminus between 1929 and 1947 (Alaska Department of Fish and Game 1991) Average escapement of chinook salmon during this time period was approximately 3,100 fish (Simon et al 1962) From 1948 to 1968 the weir was relocated to the outlet of Red Lake by the Department to monitor sockeye salmon *O nerka* escapement In 1969, the Department moved the weir to the present location approximately 0 8 km from the stream terminus (Alaska Department of Fish and Game 1991) Department weir counts between 1970 and 1986 indicate an average of 6,400 chinook salmon entered the system, or approximately a 100% increase in escapement from the earlier weir counts Recently (1987-1992), escapements have been higher, averaging more than 14,000 fish However, a downward trend in escapement is currently evident and is approaching 1969-1986 levels (Figure 1)

Using historical data from the weir, the Department established escapement goals for Ayakulik River chinook salmon The Department determined that a minimum

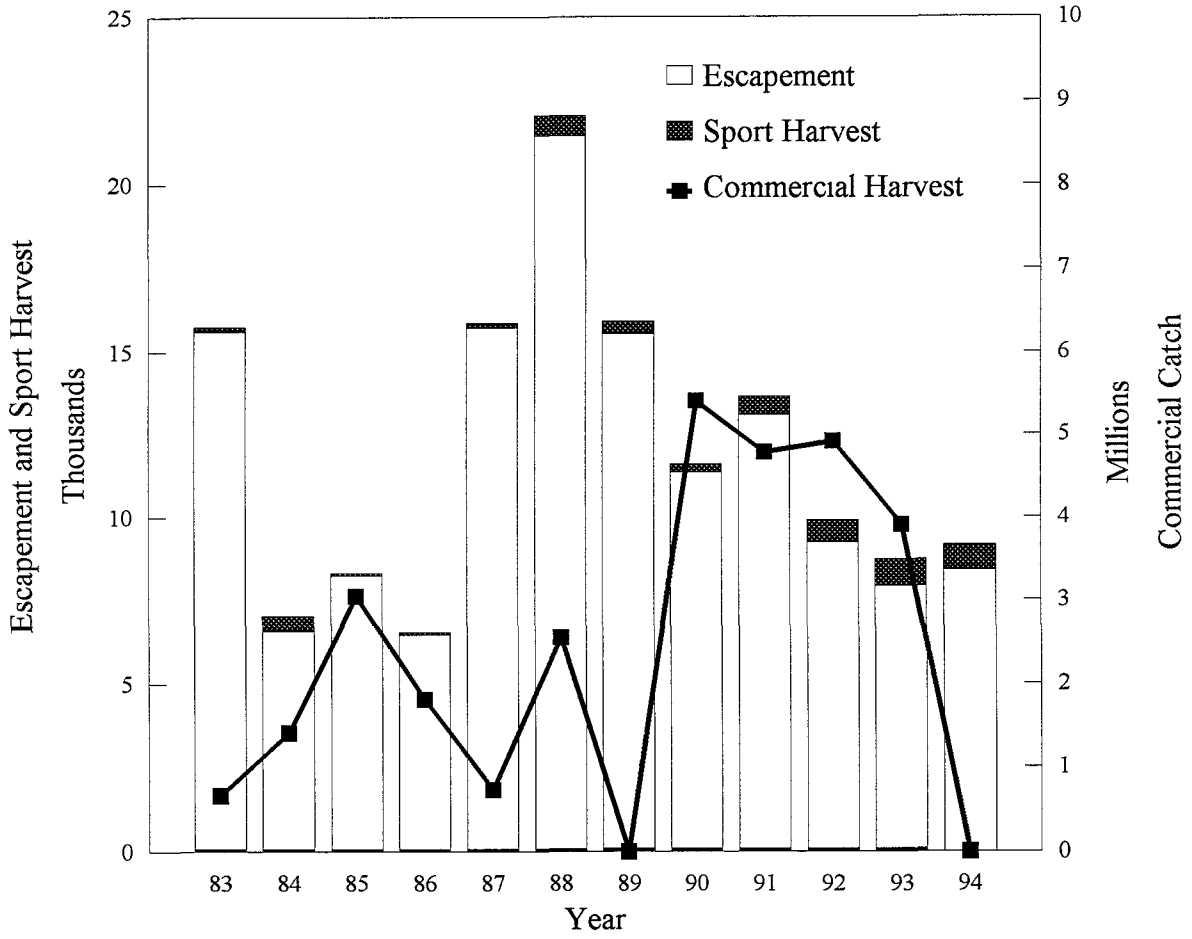

FIGURE 1 –Escapement and sport and commercial harvest of Ayakulik River chinook salmon, Kodiak, Alaska.

escapement goal of 6,500 chinook salmon is needed and 10,000 fish is desired (Schwarz 1992) A habitat survey conducted by the Refuge (Hander and Chatto 1989) determined that the number of chinook salmon needed to utilize the optimum spawning habitat available was 7,820 adult fish This number of fish is similar to historical escapement figures obtained at the weir and falls within the escapement goal set by the Department

The large escapements in 1987-1989 increased both guided and unguided sport anglers interest However, sport fishing effort and harvest have not decreased with the downward trend in escapement since 1990 Refuge creel survey and public use information collected on the Ayakulik River in 1986, 1987 and 1991, indicated an increased effort (107%), catch (452%) and harvest (235%) in the chinook salmon sport fishery during this time span (Table 1)

Additional information on sport fish harvest and effort for the Ayakulik River is based on estimates by the Department's statewide sport fish harvest postal survey (Mills 1992) Angler effort, catch and harvest for the Ayakulik River, estimated since 1991 indicate over 1,500 angler days of effort occurs each year

TABLE 1 —Effort, catch, and harvest of chinook salmon in the Ayakulik River sport fishery, Alaska[a]

Year	Angler Days	Escapement	Catch (Released)	Harvest (Retained)	Exploitation Rate[b]
1986	336	6,371	468	110	1 4
1987	557	15,636	1,274	157	1 0
1991	698	12,988	2,584	368	2 8
Average	530	11,665	1,442	212	1 7

[a] Kodiak National Wildlife Refuge data files
[b] Percentage of escapement harvested by sport fishery

Chinook salmon bound for the Ayakulik River are also harvested incidentally by commercial fisheries in the nearshore saltwater areas which target sockeye and pink *O gorbuscha* salmon Between 1985 and 1988 (no commercial harvest in 1989), the

average annual commercial harvest of chinook salmon was about 2,035 fish (Department data) More recently (1990-1992, 1994, 1995) the annual incidental harvest of chinook salmon off the mouth (Department statistical areas 256-20 and 256-10) of the Ayakulik River averaged 4,500 fish (Figure 2)

Working towards ANILCA goals of conserving salmon and their habitat, the Kenai Fishery Resource Office, in cooperation with the Refuge, conducted a creel survey of the Ayakulik River chinook salmon sport fishery in 1993 and 1994 to 1) determine the amount and type of angler effort expended, 2) determine the total catch and harvest of chinook salmon, 3) determine the age, sex, and length structure of the Ayakulik River chinook salmon population and sport harvest, 4) verify estimates of angler use and catch on the Ayakulik River produced by the annual postal survey conducted by the Department, and 5) to provide necessary in-season data needed to determine if in-river escapement goals are being met

STUDY AREA

The Ayakulik River is located on the southwest end of Kodiak Island approximately 120 km from the city of Kodiak (Figure 2) The 430 km^2 drainage is entirely within the Refuge, with the exception of a small 2 6 km^2 area near the mouth of the river Habitat and water quality for the Ayakulik River are at near pristine conditions The river provides spawning and rearing habitat for chinook, chum *O keta*, coho *O kisutch*, pink and sockeye salmon and rainbow/steelhead trout *O mykiss* and Dolly Varden char *Salvelinus malma* (U S Fish and Wildlife Service 1990)

Access to the river is by floatplane in the vicinity of Bare Creek and a tidewater lagoon at the mouth of the river (Figure 2) However, some parties access the lagoon by wheelplane during low tide (Squibb 1992) On limited occasions anglers access the Ayakulik River by small skiffs launched from larger boats anchored offshore Limited use has also been observed at the confluence of Red Lake with access by floatplane

Information in 1986 indicated the majority (>90%) of the sport fishing effort is concentrated near the confluence of Bare Creek (Jones and Selinger 1986) Rafters access the fishery near Bare Creek and fish downstream to the mouth where they are picked up in the lagoon or on the beach A lodge located at the mouth of the river, outside the Refuge boundary, conducts guided fishing trips in the lower portion of the river

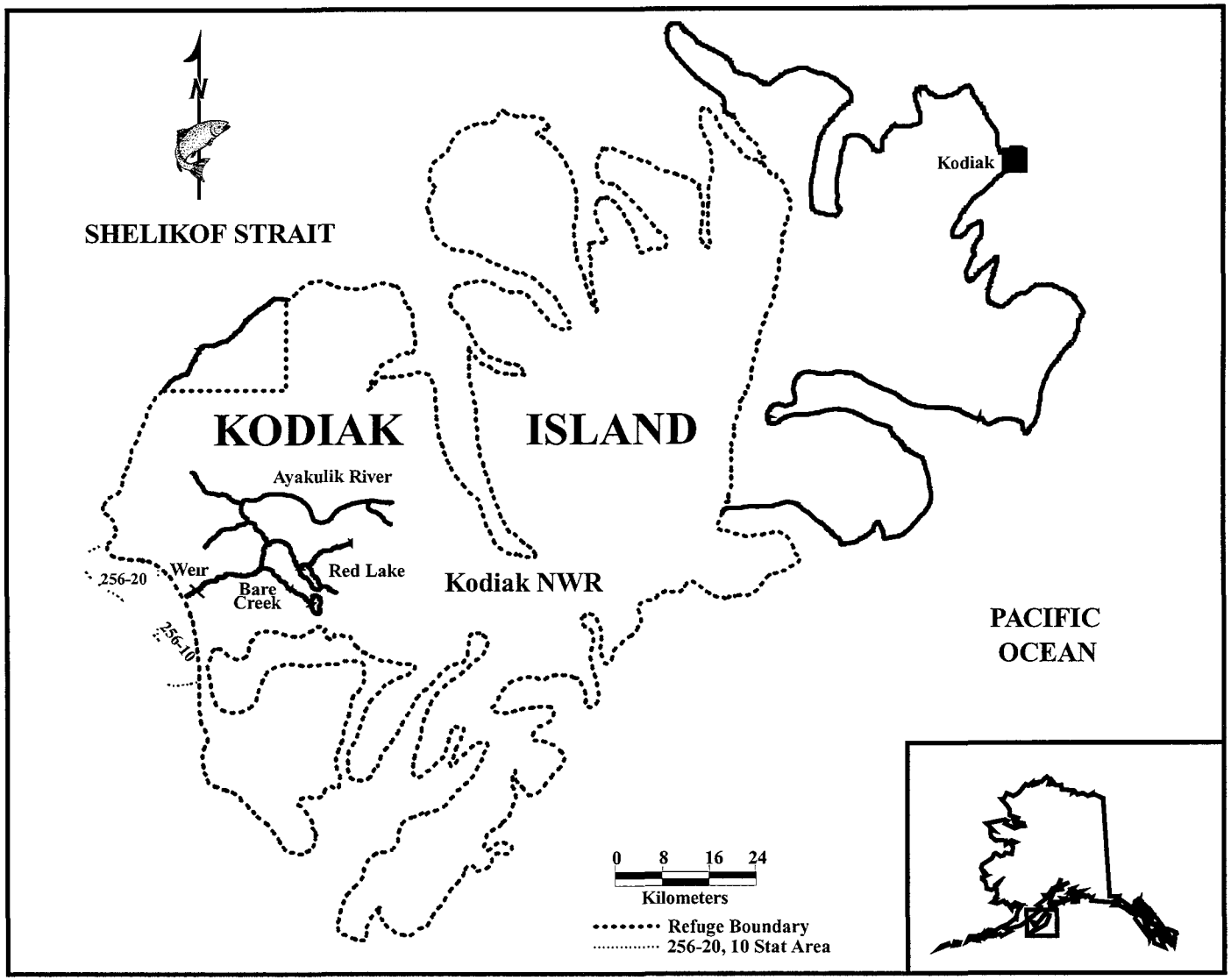

FIGURE 2.–Ayakulik River drainage, Kodiak National Wildlife Refuge, Alaska.

METHODS

Creel Survey

A creel survey of the chinook salmon sport fishery was conducted on the Ayakulik River from 28 May-10 July, in 1993 and 26 May-11 July, in 1994 The access point method was used as described by Hayne (1991) and is comparable to those conducted by the Refuge (Jones and Selinger 1986, Hander and Selinger 1987, Johnson 1991) Creel interviews continued past the July fourth holiday weekend and until over 90% of the run was passed through the weir

Fishing parties entering and exiting the system near the confluence of Bare Creek (rkm 19)(Figure 3) were interviewed An initial contact was used to assign each group a number, obtain information about the group and their plans, explain the creel survey procedure and answer any questions Each group was given a brief description of the study (Appendix 1) and a weather-proof data form (Appendix 2) with a notebook to record their daily fishing activities This information was returned to the creel clerk at the end of their trip Departing groups missed by the creel clerk were asked to leave the notebook with the air charter service or mail it to the Kenai Fishery Resource Office

A second creel site was located at the Department weir site (rkm 0 8) Anglers floating downstream as well as any anglers that entered and exited the system from downstream were interviewed

Information collected from all parties included group size, residence, guided or non-guided, use category, days fished, number of fish caught of each species and number of fish kept

Fishing effort was expressed as angler days with each angler visit equal to one angler day Anglers staying overnight on the river system were interviewed for the actual number of days fished to determine total angler days Data was summarized according to the area in which the exit interview was recorded

Angler residence was classified into 3 categories, Alaskan resident, resident living within the Kodiak Borough, and non-resident It was also determined if anglers were guided or non-guided and categorized into activity type that included day use, overnight camper, rafter, and lodge client

Biological Sampling

A weekly sample of the chinook salmon escapement was taken from the weir and the sport harvest for biological data by each creel clerk At least 60 fish were sampled

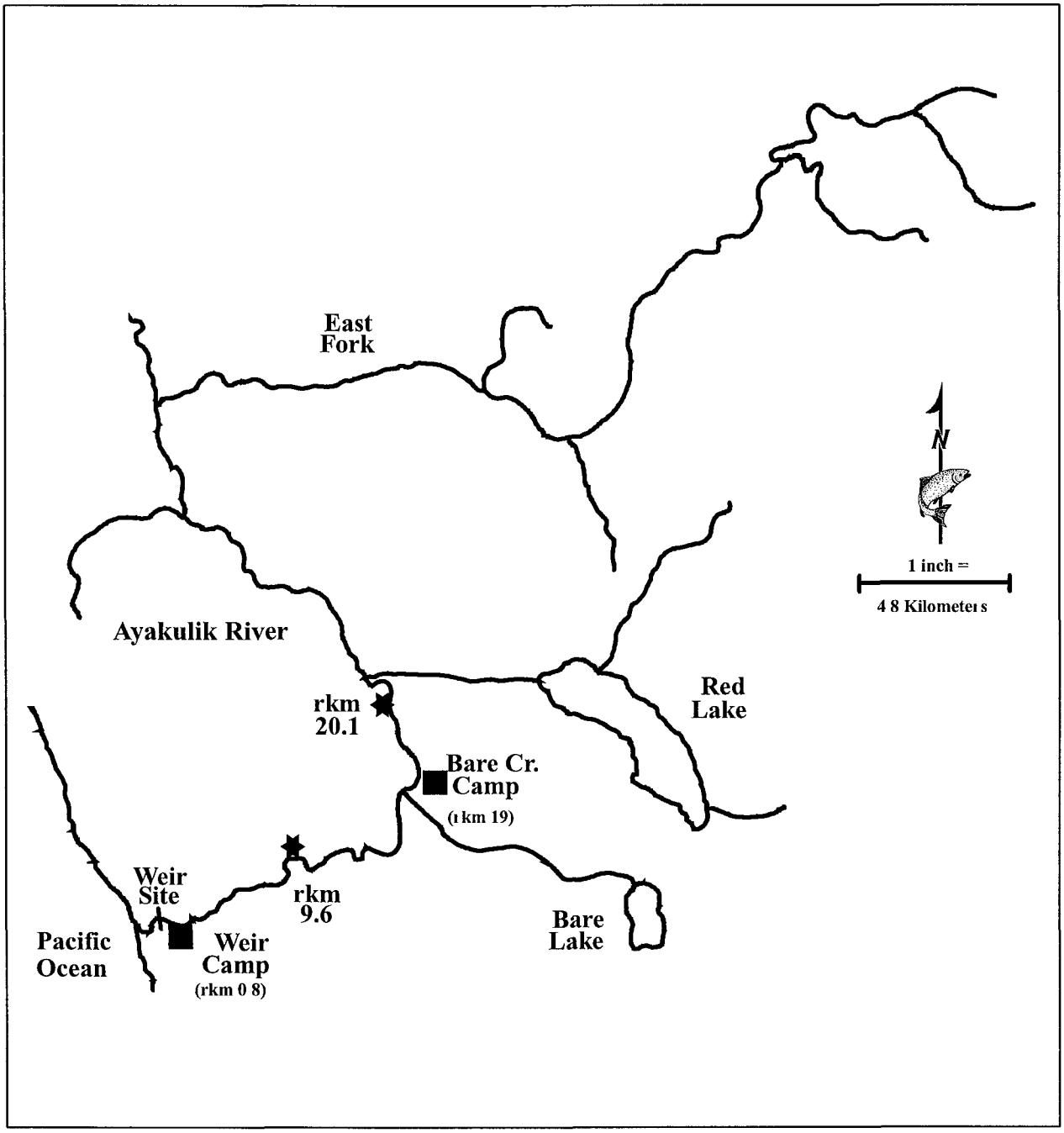

FIGURE 3 - Creel survey sites on the Ayakulik River, Kodiak National Wildlife Refuge, Alaska

from the weir escapement and 30 fish each from the sport fish harvest at Bare Creek and the weir Fish were measured for length, sexed, and scales were collected The mid-eye to fork length was measured to the nearest mm Scales were removed from the preferred area as described by Ambrose (1983) and recorded similar to Koo (1962) Impressions of scales were made on cellulose acetate cards, examined with a microfiche reader and analyzed by the Department Data obtained from the weir escapement were divided into early (15 May-20 June) and late run components (21 June-22 August) to determine any differences in age and length composition Length distribution over time was analyzed with a Kolmogrov-Smirnov goodness of fit test (Zar 1984) A Chi-square test was used to analyze age composition over time and for comparisons between age composition of the harvest to the age composition of the weir escapement

RESULTS

Creel Survey

Angler effort —In 1993, a total of 427 exit interviews were obtained 270 from Bare Creek and 157 from the weir (Table 2) Peak numbers of anglers occurred on the Ayakulik River the second and third week of June (Appendix 3 and 4)

Fifty-three percent of anglers interviewed at Bare Creek were guided/day use activity (Appendix 5) The remaining anglers at Bare Creek were non-guided anglers and were divided as follows overnight camping (29%), day use (13%) and subsistence (5%) Overnight campers accounted for the majority (63%) of the angler days expended at Bare Creek (Table 2) Anglers interviewed at Bare Creek were primarily non-resident anglers (62%) (Appendix 5)

Anglers interviewed at the weir in 1993 consisted of 36% guided and 64% non-guided anglers (Table 2) Of the guided anglers most were lodge clientele (86%) Non-guided anglers were rafters (58%), day use anglers (41%), and one camper Rafters (52%) and lodge clientele (41%) accounted for the majority of 589 angler days expended Fifty-seven percent of the anglers interviewed at the weir were non-residents and 43% were Alaskan residents of which about half (56%) resided within the Kodiak Borough (Appendix 5)

In 1994, a total of 476 exit interviews were obtained 273 from Bare Creek and 203 from the weir (Table 3) Peak numbers of anglers occurred on the Ayakulik River in mid-June (Appendix 3 and 4)

Fifty-eight percent of the anglers interviewed at Bare Creek in 1994 were guided of which 100% was day use activity (Table 3) The remaining non-guided anglers made up the following overnight campers (25%), day use (17%), and rafters Overnight

TABLE 2 —Summary of the Ayakulik River chinook salmon creel survey, Alaska, 1993

	N of parties	*N* of anglers	Angler Days	Chinook Salmon R	Chinook Salmon K	Sockeye Salmon R	Sockeye Salmon K	Dolly Varden R	Dolly Varden K	Rainbow Trout R	Rainbow Trout K	Steelhead Trout R	Steelhead Trout K	Coho Salmon R	Coho Salmon K	Pink Salmon R	Pink Salmon K
Bare Creek																	
Guided																	
Day-use	34	142	142	291	161	94	41	17	2	4	1	0	0	0	0	0	0
Non-Guided																	
Camper	24	77	327	573	136	120	133	33	3	8	0	94	1	0	0	0	0
Day-use	10	35	35	58	42	0	0	26	0	0	0	0	0	0	0	0	0
Subsist	10	16	16	0	36	0	0	0	0	0	0	0	0	0	0	0	0
Combined																	
Total	78	270	520	922	375	214	174	76	5	12	1	94	1	0	0	0	0
Weir																	
Guided																	
Lodge	6	49	239	1,102	309	137	83	27	0	12	0	37	0	11	18	0	0
Rafters	1	8	24	7	10	1	0	2	0	1	1	0	0	0	0	0	0
Non-Guided																	
Camper	1	1	4	24	3	78	8	0	0	0	0	2	0	0	0	0	0
Day-use	13	41	41	1	9	16	10	3	0	0	0	55	0	0	0	0	0
Rafters	18	58	281	811	102	168	63	45	4	14	1	89	0	0	0	6	0
Combined																	
Total	39	157	589	1,945	433	400	164	77	4	27	2	183	0	11	18	6	0
Ayakulik River (Bare Creek and weir combined)																	
Guided	41	199	405	1,400	480	232	124	46	2	17	2	37	0	11	18	0	0
Non-Guided	66	212	682	1,471	292	382	214	107	7	22	1	240	1	0	0	6	0
Subsistence	10	16	16	0	36	0	0	0	0	0	0	0	0	0	0	0	0
Total	117	427	1,109	2,871	808	614	338	153	9	39	3	277	1	11	18	6	0

[a]R=number of fish released, K=number of fish kept

TABLE 3 –Summary of the Ayakulik River chinook salmon creel survey, Alaska, 1994

	N of parties	*N* of anglers	Angler Days	Chinook Salmon R	Chinook Salmon K	Sockeye Salmon R	Sockeye Salmon K	Dolly Varden R	Dolly Varden K	Rainbow Trout R	Rainbow Trout K	Steelhead Trout R	Steelhead Trout K	Pink Salmon R	Pink Salmon K
						Bare Creek									
Guided															
Day-use	58	133	197	551	124	21	61	3	1	0	0	29	0	0	0
Non-Guided															
Camper	25	91	352	255	105	346	141	117	0	18	1	170	1	0	0
Day-use	16	46	46	29	33	1	5	1	0	0	0	3	0	0	0
Rafter	1	3	12	0	0	70	0	0	0	0	0	0	0	0	0
Subsist	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Combined															
Total	100	273	607	835	262	438	207	121	1	18	1	202	1	0	0
						Weir									
Guided															
Day Use	1	4	4	0	0	7	5	0	0	0	0	0	0	0	0
Lodge	6	46	242	863	242	16	151	3	0	0	0	61	0	2	0
Non-Guided															
Camper	1	2	9	1	5	1	4	0	0	0	0	0	0	0	0
Day-use	8	21	27	9	16	89	22	2	0	0	0	4	0	0	0
Rafters	27	130	644	1,025	214	653	169	50	4	2	1	112	1	1	0
Combined															
Total	43	203	926	1,898	477	766	351	55	4	2	1	177	1	3	0
						Ayakulik River (Bare Creek and weir combined)									
Guided	65	183	443	1,414	366	44	217	6	1	0	0	90	0	2	0
Non-Guided	78	293	1,090	1,319	373	1,160	341	170	4	20	2	289	0	1	0
Subsistence	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	143	476	1,533	2,733	739	1,204	558	176	5	20	2	379	2	3	0

[a] R=number of fish released, K=number of fish kept

campers accounted for 58% of 607 anglers days of effort expended at Baıe Creek Anglers interviewed at Bare Creek were primarily non-resident anglers (73%)(Appendix 5)

Anglers interviewed at the weir in 1994 were mostly unguided (75%)(Table 3) Guided anglers were primarily lodge clientele (92%) Non-guided anglers were predominately rafters (84%) The majority of angler effort reported at the weir came from rafters (70%) and lodge clientele (26%), out of a total of 926 angler days Fifty-nine percent of the anglers interviewed at the weir were non-residents and over half (52%) of Alaskan residents resided within the Kodiak Borough (Appendix 5)

Catch and harvest —Interviewed anglers harvested a total of 808 chinook salmon from the Ayakulik River in 1993 (Table 2) An additional 2,871 chinook salmon were caught and released Other species harvested included, 338 sockeye salmon, 18 coho salmon, 9 Dolly Varden, 3 rainbow trout and 1 steelhead trout Pink salmon were also captured but none were reported harvested

Overall, guided anglers in 1993 harvested 480 (60%) of the chinook salmon This is compared to non-guided harvests of 292 (36%) and subsistence anglers of 36 (4%) Anglers interviewed at the weir harvested 433 (54%) chinook salmon These anglers, who were mostly guided and rafting parties, also released 1,945 chinook salmon

Anglers interviewed at Baıe Creek harvested fewer fish and caught and released fewer fish than those at the weir A total of 375 (46%) chinook salmon were harvested Fifty-seven percent of the Bare Creek site harvest was by non-guided anglers Subsistence anglers reported harvesting 36 fish Sixty-eight percent of the anglers who released 922 chinook salmon at Bare Creek were non-guided

The majority (80%) of anglers harvested fewer than 3 chinook salmon during their fishing activities on the Ayakulik River (Table 4) Eight percent of the anglers harvested more than six chinook salmon, most of these anglers were guided lodge clientele.

In 1994, 739 chinook salmon were harvested by anglers interviewed at the Ayakulik River (Table 3) In addition, 2,733 chinook salmon were caught and released Other species harvested included, 558 sockeye salmon, 5 Dolly Varden, 2 steelhead and 2 rainbow trout Pink salmon were also captured but none were reported haıvested

Anglers interviewed at Bare Creek in 1994 reported haıvesting 262 chinook salmon In addition, 835 chinook salmon were caught and released at Bare Creek with the majority (66%) reported by guided anglers

Interviewed anglers at the weir site harvested 477 chinook salmon An additional 1,898 chinook salmon were caught and released

TABLE 4 —Age distribution of chinook salmon harvested at the Ayakulik River, Alaska, 1993 and 1994[a]

	Number of chinook salmon kept during trip								Total Anglers
	0	1	2	3	4	5	6	>6	
1993									
Guided anglers									
N	51	27	79	4	2	2	7	27	199
%	26	14	40	2	1	1	4	14	0
Unguided anglers									
N	83	55	50	25	4	3	3	5	228
%	36	24	22	11	2	1	1	2	0
Anglers at the weir									
N	47	23	29	17	5	2	7	27	157
%	30	15	18	11	3	1	4	17	0
Anglers at Bare Creek									
N	93	53	100	12	1	3	3	5	270
%	34	20	37	4	<1	1	1	2	0
All anglers									
N	140	76	129	29	6	5	10	32	427
%	33	18	30	7	1	1	2	8	0
1994									
Guided anglers									
N	66	44	23	15	9	1	10	15	183
%	36	24	13	8	5	1	5	8	38
Unguided anglers									
N	114	58	72	35	8	2	4	0	293
%	39	20	25	12	3	<1	1	0	62
Anglers at the weir									
N	50	43	40	27	11	3	14	15	203
%	25	21	20	13	5	2	7	7	0
Anglers at Bare Creek									
N	130	59	55	23	6	0	0	0	273
%	48	22	20	8	2	0	0	0	0
All anglers									
N	180	102	95	50	17	3	14	15	476
%	38	21	20	11	4	<1	3	3	0

[a] Numbers vary slightly from Department numbers due to final data entry

Biological Sampling

In 1993, the Department counted 7,819 chinook salmon upstream of the weir (Appendix 6) Chinook salmon were observed on the first day of operation, 23 May, with peak counts occurring 1 and 2 June By 10 June, over 50% of the escapement had been counted past the weir Ninety percent of the escapement had passed by 2 July and the last chinook salmon was observed on 22 August

Age composition was determined for 245 chinook salmon sampled at the weir in 1993 (Tables 5 and 6) The age composition of fish sampled early in the season (15 May-20 June) was significantly different from the age composition of fish sampled late in the season (21 June-22 August) for males ages 1 3, 1 4, and 1 5 (χ^2 = 14 215, df=2, P=0 001), but not for females (ages 1 4 and 1 5, χ^2 = 0 952, df=1, P=0 329) The length distribution of all fish sampled was significantly different across time (Kolmogrov-Smirnov test, D=0 3359, P=0 0001)

Age 1 4 was the predominant age for females in the weir escapement both early and late in the season in 1993 Ages 1 2 and 1 4 were the predominant ages for males early in the season, ages 1 2 and 1 3 late in the season (Tables 5 and 6)

Ages were determined for 260 chinook salmon from the sport harvest in 1993 (Table 7) The age composition of fish harvested by rafters and lodge clientele was not significantly different from the age composition of fish harvested by anglers at Bare Creek for either males or females (females ages 1 4 and 1 5 χ^2 = 0 155, df=1, P=0 693, males ages 1 3, 1 4 and 1 5 χ^2 = 0 713, df=2, P=0 700) Overall, the sport harvest consisted primarily of age 1 4 females and age 1 2, 1 3 and 1 4 males

The age composition of the sport harvest was significantly different from the age composition of the escapement sampled at the weir for late season males (χ^2 = 9 2, df=2, P=0 010) Length distributions were also significantly different between the harvest and weir escapement for early season females (D=0 3171, P=0 0003) and late season males (D=0 3336, P=0 0001)

Spawning escapement for chinook salmon in 1993 was 7,011 with age 1 4 and 1 2 the most abundant age classes, followed by ages 1 5 and 1 3 (Table 8) A total of 9,138 chinook salmon were counted upstream through the Department weir in 1994 (Table 8)(Appendix 6) Chinook salmon were observed on the first day of operation, 21 May, with a peak count occurring 9 June By 15 June, over 50% of the run had passed the weir Ninety percent of the run had passed through the weir by 1 July and the last chinook salmon was observed on 24 August

TABLE 5 —Age composition, escapement estimates by age, and mean length (MEFL) at age for chinook salmon at the Ayakulik River weir, Alaska, 15 May-20 June, 1993[a]

	Age						
	1 1	1 2	1 3	1 4	1 5	1 6	Total
Females							
Sample size	0	0	3	32	14	0	49
Percent			2 4	24 1	10 5		36 8
SE percent			1 29	3 71	2 66		4 18
Escapement	0	0	133	1,424	623	0	2,180
SE escapement				7 62	219 30	157 50	247 50
Mean length			772 0	818 6	841 6		822 5
SE mean length			20 07	10 28	14 66		8 23
Minimum length			732	670	723		670
Maximum length			795	942	950		950
Male							
Sample size	0	29	17	26	12	0	84
Percent		21 8	12 8	19 6	9 0		63 2
SE percent		3 58	2 90	3 44	2 48		4 18
Escapement	0	1,290	756	1,157	534		3,737
SE escapement		211 90	171 30	203 50	147 00		247 50
Mean length		548 4	686 1	824 2	884 8		701 7
SE mean length		12 37	23 28	13 77	22 27		16 80
Minimum length		449	523	660	745		449
Maximum length		803	858	957	956		957
All							
Sample size	0	29	20	58	26	0	133
Percent		21 8	15 0	43 6	19 5		100 0
SE percent		3 58	3 10	4 30	3 44		0 00
Escapement	0	1,290	890	2,580	1,157	0	5,917
SE escapement		211 90	183 40	254 40	203 50		
Mean length		548 4	699 0	821 1	858 5		746 4
SE mean length		12 37	21 07	8 33	12 96		12 15
Minimum length		449	523	660	723		449
Maximum length		803	858	957	956		957

[a] Data source Alaska Department of Fish and Game, Sport Fish Division, Kodiak, Alaska

TABLE 6 —Age composition, escapement estimates by age, and mean length (MEFL) at age for chinook salmon at the Ayakulik River weir, Alaska, 21 June-22 August, 1993[a]

	Age						
	1 1	1 2	1 3	1 4	1 5	1 6	Total
Females							
Sample size	0	0	0	17	4	0	21
Percent				15 8	3 6		18 7
SE Percent				3 39	1 75		3 69
Escapement	0	0	0	289	68	0	357
SE escapement				64 50	33 40	70 10	
Mean length				802 3	834 3		808 4
SE length				10 61	21 97		9 72
Minimum length				715	771		715
Maximum length				868	869		869
Male							
Sample size	3	49	27	10	2	0	91
Percent	2 7	43 7	24 1	8 9	1 8		81 3
SE percent	1 53	4 69	4 04	2 69	1 25		3 69
Escapement	51	832	459	170	34	0	1,545
SE escapement	29 0	89 2	76 9	51 2	23 8		70 1
Mean length	320 0	536 2	677 1	799 2	902 5		608 2
SE mean length	21 59	5 57	16 00	16 08	7 50		13 28
Minimum length	295	416	536	713	895		295
Maximum length	363	643	896	890	910		910
All							
Sample size	3	49	27	27	6	0	112
Percent	2 7	43 8	24 1	24 1	5 4		100 0
SE percent	1 53	4 69	4 04	4 04	2 13		0 00
Escapement	51	832	459	459	102	0	1,902
SE escapement	29 0	89 2	76 9	76 9	40 5		
Mean length	320 0	536 9	677 1	801 2	857 0		645 8
SE mean length	21 59	5 57	16 00	8 77		20 10	13 20
Minimum length	295	416	536	713	771		295
Maximum length	363	643	896	890	910		910

[a] Data source Alaska Department of Fish and Game, Sport Fish Division, Kodiak, Alaska

TABLE 7 —Age composition, harvest, and mean length (MEFL) at age estimates for chinook salmon harvested in the Ayakulik River sport fishery, Alaska, 29 May-9 July, 1993[a]

	Age						
	1 1	1 2	1 3	1 4	1 5	1 6	Total
Females							
Sample size	0	0	8	87	28	0	123
Percent			3 1	33 5	10 8		47 3
SE percent			1 07	2 93	1 92		3 10
Harvest	0	0	25	268	86	0	378
SE harvest			8 6	23 4	15 4		24 8
Mean length			782 5	843 8	869 8		845 6
SE mean length			16 69	4 70	8 50		4 37
Minimum length			700	709	790		700
Maximum length			864	945	950		950
Male							
Sample size	2	45	32	42	13	3	137
Percent	0 8	17 3	12 3	16 2	5 0	1 2	52 7
SE percent	0 54	2 35	2 04	2 28	1 35	0 66	3 10
Harvest	6	138	98	129	40	9	422
SE harvest	4 3	18 8	16 3	18 3	10 8	5 3	24 8
Mean length	325 5	560 1	734 8	858 6	906 5	974 0	729 1
SE mean length	25 50	8 27	18 15	11 00	10 75	13 00	13 88
Minimum length	300	475	535	699	835	961	300
Maximum length	351	843	895	970	970	987	987
All							
Sample size	2	45	40	129	41	3	260
Percent	0 8	17 3	15 4	49 6	15 8	1 1	100 0
SE percent	0 54	2 35	2 24	3 10	2 26	0 66	0 00
Harvest	6	138	123	397	126	9	800
SE harvest	4 3	18 8	17 9	24 8	18 1	5 3	
Mean length	325 5	560 1	744 4	848 8	881 7	974 0	783 5
SE mean length	25 50	8 27	15 13	4 84	7 18	13 00	8 49
Minimum length	300	475	535	699	790	961	300
Maximum length	351	843	895	970	970	987	987

[a] Data Source Alaska Department of Fish and Game, Sport Fish Division, Kodiak, Alaska

TABLE 8 —Estimated spawning escapement for Ayakulik River chinook salmon, Alaska, 1993 and 1994[a]

	Age						
	1 1	1 2	1 3	1 4	1 5	1 6	Total
			1993				
Escapement at weir	51	2,122	1,349	3,039	1,259	0	7,819
SE	29 0	229 9	198 9		265 8	297 5	
Sport harvest above weir	6	140	124	401	127	9	808
SE	4 4	19 0	18 1	25 1	18 3	5 4	
Spawning escapement	45	1,982	1,225	2,638	1,132	0	7,011
SE	29 3	230 7	199 7	267 0		298 1	5 4
			1994				
Escapement at weir	988	974	2,239	4,767	170	0	9,138
SE	152	169	248	275	76	0	
Sport harvest	16	66	202	404	27	0	739
SE	4	9	14	15	6	0	
Spawning escapement	972	908	2,037	4,363	143	0	8,399
SE	152	169	248	276	77	0	

[a] Data source Alaska Department of Fish and Game, Sport Fish Division, Kodiak, Alaska

Age composition was determined for 258 chinook salmon sampled at the weir (Tables 9 and 10) The age composition of fish sampled early in the season was significantly different from the age composition of fish sampled late in the season (ages 1 1 through 1 5)(χ^2 = 37 0, df=4, P=0 001) Females were comprised primarily of age 1 4 fish early and late in the season and males were comprised mostly of age 1 3 and 1 4 fish early in the season and age 1 1, 1 2, 1 3 and 1 4 fish late in the season The length distribution of males sampled was significantly different across time (Kolmogorov-Smirnov test, D=0 339, P=0 0001) but not for females (D=0 229, P=0 162)

Ages were determined for 326 chinook salmon from the sport harvest (Table 11) The age composition of fish harvested by rafters and lodge clientele was not significantly different from the age composition of fish harvested by anglers at Bare Creek for either males or females (ages 1 2 through 1 4 only, χ^2 = 1 8, df=2, P=0 400) The sport harvest consisted primarily of age 1 4 females and age 1 3 and 1 4 males The age composition of the sport harvest did not differ from the age composition of the escapement sampled at the weir (ages 1 2 through 1 4 only, χ^2 = 1 8, df=2, P=0 400) Length distributions were also similar between the harvest and weir escapement (D=0 229, P=0 162)

The spawning escapement for chinook salmon in 1994 was 8,399 fish with age 1 4 (52%) and 1 3 (24%) the most abundant age classes, followed by ages 1 2 (11%) and 1 1 (12%) (Table 8)

TABLE 9 —Age composition, escapement estimates by age, and mean length (MEFL) at age for Ayakulik River, Alaska, chinook salmon at the weir, 21 May-20 June, 1994

	Age						
	1 1	1 2	1 3	1 4	1 5	1 6	Total
			1993				
Sample size	0	0	8	51	2	0	61
Percent	0	0	6 4	40 8	1 6	0	48 8
SE percent	0	0	2 20	4 30	1 10	0	4 40
Escapement	0	0	350	2,228	87	0	2,665
SE Escapement	0	0	118	237	61	0	241
Mean length		0	749	792	876		789[a]
SE mean length			11	6	3		5[a]
Minimum length			702	620	873		620[a]
Maximum length			805	856	878		878[a]
Male							
Sample size	3	9	23	29	0	0	64
Percent	2 4	7 2	18 4	23 2	0	0	51 2
SE percent	1 4	2 3	3 4	3 7	0	0	4 4
Escapement31	393	1,005	1,267	0	0	2,796	
SE escapement	74	125	187	204	0	0	241
Mean length	323	555	725	833	0	0	718[b]
SE mean length	17	12	9	10	0	0	15[b]
Minimum length	291	500	637	692	0	0	291[b]
Maximum length	348	611	813	914	0	0	926[b]
All							
Sample size	3	9	31	80	2	0	125
Percent	2 4	7 2	24 8	64 0	1 6	0	100 0
SE percent	1 4	2 3	3 8	4 2	1 1	0	0 0
Escapement	131	393	1,354	3,495	87	0	5,461
SE escapement	71	125	209	232	61	0	0
Mean length	323	555	732	807	876	0	751[c]
SE mean length	17	12	7	5	3	0	9[c]
Minimum length	291	500	637	620	873	0	291[c]
Maximum length	348	611	813	914	878	0	926[c]

[a] Includes 16 fish for which age was not estimated
[b] Includes 25 fish for which age was not estimated
[c] Includes 41 fish for which age was not estimated

TABLE 10 —Age composition, escapement estimates by age, and mean length (MEFL) at age for Ayakulik River, Alaska, chinook salmon at the weir 21 June-24 August, 1994

	Age						
	1 1	1 2	1 3	1 4	1 5	1 6	Total
Female							
Sample size	0	1	6	21	2	0	30
Percent	0	0 8	4 5	15 8	1 5	0	22 6
SE percent	0	0 7	1 8	3 1	2 0	0	3 6
Escapement	0	28	166	581	55	0	829
SE Escapement	0	27	65	114	38	0	131
Mean length		490	732	790	790		768[a]
SE mean length			11	10	24		11[a]
Minimum length		490	685	683	766		490[a]
Maximum length		490	762	863	814		863[a]
Male							
Sample size	31	20	26	25	1	0	103
Percent	23 3	15 0	19 5	18 8	0 8	0	77 4
SE percent	3 6	3 0	3 4	3 3	0 7	0	3 6
Escapement	857	553	719	691	28	0	2,848
SE escapement	132	112	124	122	27	0	131
Mean length	347	554	712	815	730	0	601[b]
SE mean length	5	13	9	12			16[b]
Minimum length	294	445	615	728	730	0	294[b]
Maximum length	432	661	774	910	730	0	910[b]
All							
Sample size	31	21	32	46	3	0	133
Percent	23 3	15 8	24 1	34 6	2 3	0	100 0
SE percent	3 6	3 1	3 6	4 0	1 3	0	0 0
Escapement	857	581	885	1,272	83	0	3,677
SE escapement	132	114	134	149	46	0	0
Mean length	347	551	715	803	770	0	636[c]
SE mean length	5	13	7	8	24	0	14[c]
Minimum length	294	445	615	683	730	0	294[c]
Maximum length	432	661	774	910	814	0	910[c]

[a] Includes 5 fish for which age was not estimated
[b] Includes 27 fish for which age was not estimated
[c] Includes 32 fish for which age was not estimated

TABLE 11 —Age composition, harvest, and mean length (MEFL) at age estimates for chinook salmon harvested in the Ayakulik River sport fishery, Alaska, 30 May-10 July, 1994

	Age								
	0 4	1 1	1 2	1 3	1 4	1 5	2 3	2 4	Total
Female									
Sample size	0	0	1	17	102	11	1	7	139
Percent			0 3	5 2	31 3	3 4	0 3	2 1	42 6
SE percent			0 2	0 9	1 9	0 7	0 2	0 6	2 0
Harvest	0	0	2	39	231	25	2	16	315
SE harvest			2	7	14	6	2	4	15
Mean length			835	758	823	856	834	831	817[a]
SE mean length				11	4	21		13	4[a]
Minimum length			835	666	706	710	834	792	666[a]
Maximum length			835	831	949	930	834	889	949[a]
Male									
Sample size	1	7	28	72	76	1	1	1	187
Percent	0 3	2 1	8 6	22 1	23 3	0 3	0 3	0 3	57 4
SE percent	0 2	0 6	1 2	1 7	1 8	0 2	0 2	0 2	2 0
Harvest	2	16	63	163	172	2	2	2	424
SE harvest	2	4	9	13	13	2	2	15	
Mean length	826	340	552	723	823	902	792	801	731[b]
SE mean length		10	11	8	7				9[b]
Minimum length	826	305	405	350	619	902	792	801	305[b]
Maximum length	826	368	678	860	940	902	792	801	990[b]
All									
Sample size	1	7	29	89	178	12	2	6	326
Percent 0 3	2 1	8 9	27 3	54 6	3 7	0 6	2 5	100 0	
SE percent	0 2	0 6	1 2	1 8	2 1	0 8	0 3	0 6	0 0
Harvest	2	16	66	202	404	27	5	18	739
SE Harvest	2	4	9	14	15	6	2	5	0
Mean length	826	340	561	729	823	860	813	827	769[c]
SE mean length		10	14	7	4	20	21	12	6[c]
Minimum length	826	305	405	350	619	710	792	792	305[c]
Maximum length	826	368	835	860	949	930	834	889	990[c]

[a] Includes 49 fish for which age was not estimated

[b] Includes 51 fish for which age was not estimated

[c] Includes 100 fish for which age was not estimated

**Disclaimer note 1993 Service data varies slightly from published Department of the same survey data due to data entry Both the Service and Department data are in agreement with regards to resultant trends and relative magnitude of harvest, catch and release numbers

DISCUSSION

Creel Survey

Angler effort, catch, and harvest on the Ayakulik River in 1993 and 1994 was the highest on record during the chinook salmon fishery when compared with earlier public use surveys (Jones and Selinger 1986, Hander and Selinger 1987, Johnson 1991)(Tables 12 and 13) From 1993 to 1994, total angler numbers and effort increased from an average of 110 anglers and 530 angler days to 450 anglers and 1,300 angler days, respectively The previous surveys conducted during the same time period and were similar in design to the 1993 and 1994 surveys with the exception of the additional creel site located at the weir Because this site is located at the lower take out point a more complete census of the fishery was possible This may partially account for the increase in angler effort, catch and harvest A comparison of only Bare Creek data with earlier surveys shows angler numbers have more than doubled Angler days for Bare Creek have only increased 15%

The harvest of chinook salmon in 1993 and 1994 was more than triple of what was recorded in earlier public use surveys conducted by the Refuge (Table 13) The number of chinook salmon caught and released also more than doubled during this time period Harvest, catch and release data for other species, during the chinook salmon fishery, exist for steelhead, rainbow trout, Dolly Varden, and sockeye salmon These numbers are similar among years surveyed with the exception of sockeye salmon Since the 1986 survey, the number of sockeye salmon caught has more than doubled and harvest has increased ten-fold

An analyses of the chinook salmon harvest may help managers choose the most effective regulations to address conservation concerns For example, if the bag limit on chinook salmon was reduced to one fish per day, approximately 50% of the anglers would have been affected and the harvest could have been reduced by as much as 80% each year (Table 4) During years of low escapement, a reduction in the bag limit may be an effective regulation to ensure adequate spawning escapement

Additional regulations that could be used to minimize the harvest and possibly reduce hooking mortality could include eliminating the use of bait and multiple hooks Generally, the use of artificial lures and single hooks reduces the mortality associated with catch-and-release fishing (Bendock, T and M Alexandersdottir 1990, Hooton 1987 and Lewynski and Bjornn 1987) A cursory look at angler terminal tackle found the use of salmon roe to be the most effective method of catching chinook salmon in the Ayakulik River With other factors constant, eliminating the use of bait may reduce the

TABLE 12 —Creel survey data from the chinook salmon sport fishery on the Ayakulik River, Alaska, 1986, 1987, 1991, 1993 and 1994

Year	Survey Period	Number Anglers	Residence		# Anglers		Angler Days	Total Use/days	
			AK	Non-AK	Guided	Non-Guided		Day	Overnight
1986	6/6-7/7[a]	99	38	61	39	60	336	55	281
1987	5/27-7/7[b]	113	47	55	20	93	557	38	519
1991	6/10-7/1[c]	119	65	54	26	93	698	63	635
Mean		110	50	57	28	82	530	52	478
1993	5/28-7/10								
	Bare Creek	270	96	174	142	128	520	182	338
	Weir	157	68	89	57	100	589	41	548
	Total	427	164	263	199	228	1,109	223	886
1994	5/26-7/11								
	Bare Creek	273	75	198	133	140	607	231	376
	Weir	203	84	119	50	153	926	28	898
	Total	476	159	317	183	293	1,533	259	1,274

[a] Jones and Selinger, 1986
[b] Hander and Selinger, 1987
[c] Johnson, 1991

TABLE 13 —Release (R) and harvest (K) in the Ayakulik River chinook salmon sport fishery, Alaska

Year	Chinook salmon R	Chinook salmon K	Sockeye salmon R	Sockeye salmon K	Steelhead trout R	Steelhead trout K	Dolly Varden R	Dolly Varden K	Rainbow trout R	Rainbow trout K
1986	468	110	343	37	292	1	118	1	31	0
1987	1274	157	120	40	271	3	104	6	20	0
1991	2584	368	95	60	61	2	40	1	6	0
Mean	1442	212	186	46	208	2	87	3	19	0
1993 Bare Creek										
	922	375	214	174	94	1	76	5	12	1
Weir										
	1945	433	400	164	183	0	77	4	27	2
Total	2871	808	614	338	277	1	153	9	39	3
1994 Bare Creek										
	835	262	438	207	202	1	121	1	18	1
Weir										
	1898	477	766	351	177	1	55	4	2	1
Total	2733	739	1204	558	379	2	176	5	20	2

number of chinook salmon mortalities due to catch-and-release fishing, and possibly the total harvest Mortality rates for catch-and-release can range from 4-7%, depending on bait, barbed hooks, etc (Hooton 1987) Avoidance behavior is possible from repeated hookings (Lewynski and Bjornn 1987)

High retention rates (>6) of chinook salmon by guided anglers is probably due to their access to cold storage facilities at lodges This access may also hold true when flying in for day use Creel data indicate primarily lodge clientele and guided day use would be affected if reductions were made in the bag limit of chinook salmon Though lodge clientele may simply extend their trips to obtain more fish

Additional information on sport fish harvest and effort for the Ayakulik River is based on estimates by the Department's statewide sport fish harvest postal survey (Mills 1992, 1993, 1994) This survey only recently separated out data exclusive to the Ayakulik River (Table 14) These estimates are based on the entire year and include angler effort for the chinook salmon fishery, steelhead and coho salmon Year round data may account for the greater number of angler days of effort determined by the postal survey when compared to our seasonal data

The postal survey reports four times the anglers and angler days (Tables 2, 3, and 14)(Howe et al 1995) than this study When comparing angler days to anglers the ratio is similar between reports Harvest results of this survey and the Department's postal survey for chinook salmon correlate well Yet, when comparing magnitude of catch and the ratios of release (catch-harvest) catch estimates in this study has lower numbers than the postal survey in 1993 and in 1994 this study has higher estimates Differences may be due to location of anglers, temporal timing of the interview, seasonal regulations, etc

Comparison between these two studies should be made over a longer period of time in order to determine the overall trend accuracy Harvest of chinook salmon from the Ayakulik River has resulted in exploitation rates (# harvested/# counted at weir) of the in-river escapement ranging from 0 8 to 10 3 The harvest of 808 chinook salmon in 1993 and 739 in 1994 resulted in the highest exploitation rates recorded for the Ayakulik River This exploitation rate is relatively low when compared to other chinook salmon fisheries within Alaska (Hammarstrom 1993, Coggins and Bingham 1993) However, if escapement trends continue to decline escapement goals may not be met with current harvest levels

Surveys conducted by the Refuge on the Ayakulik River identified chinook salmon spawning areas in the mainstem and the East Fork Ayakulik River Based on their migration timing and spawning distribution, chinook salmon were susceptible to sport harvest from June until early July These studies concluded that the chinook salmon run was not being adversely impacted with the current escapement trend and the estimated sport harvest However, this status could change if effort and harvest were to

TABLE 14 —Summary of the Ayakulik River sport fishing effort and harvest estimates from the Alaska Department of Fish and Game Postal Survey method, Alaska, 1991-1994

Year	N of Anglers	Angler Days	Chinook Salmon R	Chinook Salmon K	Sockeye Salmon R	Sockeye Salmon K	Dolly Varden R	Dolly Varden K	Rainbow Trout R	Rainbow Trout K	Steelhead Trout R	Steelhead Trout K	Coho Salmon R	Coho Salmon K	Pink Salmon R	Pink Salmon K	Chum Salmon R	Chum Salmon K
1991[a]	638	1,780	2,191	563	4,077	179	1,614	432	0	39	228	57	454	0	331	52	198	75
1992[a]	1,010	3,340	3,199	776	4,389	633	1,065	41	348	8	70	8	2,073	526	733	0	1,106	0
1993[a]	1,016	4,566	4,566	1,004	3,869	985	1,634	45	557	0	1,443	0	1,188	260	272	0	8	0
1994[b]	1,472	5,473	1,020	948	1,754	1,723	1,353	0	393	25	497	21	278	96	528	0	652	0

[a] Mills 1992, 1993, 1994
[b] Howe et al. 1995
R=Released, K=Kept

increase dramatically and it was recommended that the fishery be monitored biennially to detect any changes in effort (Chatto 1989)

Another concern with increased levels of angling activity on the Ayakulik River is the mortality rate associated with hook and release fishing An 8% mortality rate was associated with the hook and release of chinook salmon in the Kenai River (Bendock and Alexandersdottir 1990) If this mortality rate is taken into consideration, then approximately 200 additional fish may not have survived to spawn each year of our survey The mortality rate for Ayakulik River chinook salmon may be even higher as they are usually removed from the water prior to being unhooked and released This practice is likely more stressful than the Kenai River fishery where the fish were not removed from the water This mortality rate may need to be considered during years of low escapement and if the harvest trends in the sport fishery continue

Biological Sampling

The total weir escapement of 7,819 chinook salmon in 1993 and 9,118 in 1994 is within the historical escapement range for the Ayakulik River Salmon escapement has been monitored with a weir since 1929 The Bureau of Commercial Fisheries maintained a weir with an average escapement of chinook salmon between 1929 and 1947 of approximately 3,100 fish Department weir counts between 1970 and 1986 give an average of 6,400 chinook salmon entered the system, and more recently (1987 to 1992), escapements have been higher averaging more than 14,000 fish The largest recorded escapement of chinook salmon (21,370) occurred in 1988, since then a downward trend in escapement has been observed and is approaching historical levels As escapement levels approach historical levels, continued in-season monitoring of the harvest may be needed to ensure adequate spawning escapement

In 1993, the sex composition of the escapement was predominately male (68%) while the sex composition in the sport harvest was similar between males (53%) and females (47%) Also, the age composition of the sport harvest was significantly different from the age composition of the escapement sampled at the weir for late season males This indicates that anglers may have been selecting for larger fish which were predominately female If escapement trends continue to decline and the sex composition remains skewed towards a lower percentage of females in the in-river escapement, the tendency to retain females in the sport harvest may result in under utilization of the available spawning habitat In 1994, the sex ratio of chinook salmon sampled at the weir was similar to those sampled from the sport harvest

The Refuge creel surveys documented the harvest of chinook salmon ranged from 1 4% of the escapement in 1986 to 2 8% in 1991 Our survey showed that in 1993 and 1994 the exploitation rate of the in-river escapement increased to 10 3% and 8 1%,

respectively Although this rate of harvest is acceptable given the high escapement levels in 1987, 1988, and 1989, it may result in removal of too many adult spawners if escapement levels decline and the sport harvest continues to increase

Future monitoring may be constrained by budgetary limits This may not allow for a creel clerk station at both Bare Creek and the weir to monitor the sport harvest of chinook salmon in the Ayakulik River It may be possible to acquire an accurate in-season estimate by collecting information from only the anglers exiting the weir Data collected in 1993 and 1994 indicate at least 50% of the harvest was obtained by anglers exiting at the weir site Personnel already located at the weir could collect angler harvest data from rafters and lodge clientele while simultaneously monitoring escapement and sex composition of the run If harvest trends continue in a similar pattern and begin to affect the spawning stock, managers will need to implement conservation measures to ensure the continuation of Ayakulik River chinook salmon runs

ACKNOWLEDGMENTS

We express our appreciation to all those people who contributed to this project co-workers Brad Benter, John Crye and Anne Barrett, and Student Conservation Association Volunteers John Baker and Anne Bierzychudek

A special thanks to the entire staff of the Kodiak National Wildlife Refuge Tony Chatto, Ron Squibb, and Jacke Barnes deserve special mention for their help and assistance We also appreciate the support and effort of the Alaska Department of Fish and Game (Commercial and Sport Fish Divisions) especially that of Len Schwarz for his assistance with project development

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APPENDIX 1 —Description of the Ayakulik River, Alaska, chinook salmon creel survey

AYAKULIK RIVER ANGLERS
WE NEED YOUR FISHING INFO

Dear Angler

Congratulations! You are about to participate in one of the most unique fisheries on Kodiak Island Only one other river on the island supports a comparable number of chinook (king) salmon The Ayakulik Rivers scenic splendor, bountiful wildlife resources and outstanding recreational opportunities are second to none However, the pristine opportunities offered in the Ayakulik River drainage may currently be at risk In the interest of maintaining the recreational opportunities associated with the Ayakulik River, the U S Fish and Wildlife Service invites your participation in the following creel survey

On the reverse side you will find a form that will help you keep track of your fishing efforts over the course of your stay A creel survey clerk will contact you upon your arrival and on the subsequent departure from the river to obtain information on your fishing activities This survey will help us keep track of sport fishing effort and harvest which will in turn help us monitor the health of the chinook salmon fishery We realize that some effort will be required to keep track of your fishing activities but your input will allow us to more accurately describe and analyze the fishery Lack of your personal input may require us to make generalizations about the fishery, and possibly bias the results, which could lead to more conservative management practices in the future such as reduced bag limits, gear restrictions, and possibly time and/or area closures

With accurate and timely data the management of this resource will continue to offer recreational opportunities today and in the future If you are interested in a summary of the information collected during this survey and/or are interested in participating in future surveys and planning processes involving the Ayakulik River please provide your name and address on the survey form provided or give it to the creel survey clerk on your departure

Thank you for your time and consideration We hope you have an excellent adventure and good luck fishing!

Please Return To: Creel Survey Clerk or
U.S. Fish and Wildlife Service
Kenai Fishery Resource Office
P.O. Box 1670, Kenai, AK 99611

Party #_____ Surveyors Initials_____

Office Phone: (907) 262-9863

NAME _____

ADDRESS (Optional) _____

RESIDENCE: (Circle One) AK Resident (Kodiak Borough) AK Resident City:_____ Non-Resident State:_____

DATE _____ TIME _____

LOCATION _____

ANGLERS IN PARTY _____ NON-ANGLERS _____

AIR CARRIER _____

GUIDED: Y/N (Name) _____

START OF TRIP _____ END OF TRIP _____

Use Category: _____ (Circle One)
Day Use/Camper
Raft-Camper/Lodge
Other _____

Date	Location	Days Fished Refuge/Off Refuge	# Of Fish Caught & Released								# Of Fish Caught and Kept							
			KS	RS	SS	PS	DV	RB	SH	Other	KS	RS	SS	PS	DV	RB	SH	Other

	At Bear Creek	While Rafting	Comments:
1. How many other groups did you see per day? (average)			
2. How many groups would you accept seeing per day before your experience is compromised?			
3. How many other camps did you see or hear from your camp at night? (average)			
4. How many groups could you accept seeing or hearing from your camp before your experience is compromised?			
5. How many aircraft did you party hear per day? (Average)			
6. Max. number of aircraft you would accept per day & still want to come back?			
7. Did you have any undesireable encounters with bears?	Y/N		
8. Would you support limits on the number of people using the area that you visited?	Y/N/Maybe		

KS=King Salmon; RS=Red Salmon; SS=Silver Salmon; PS=Pink Salmon
DV=Dolly Varden; RB=Rainbow Trout; SH=Steelhead

APPENDIX 3.—Daily catch (C) and harvest (K) by guided and unguided anglers interviewed at the Ayakulik River at Bare Creek, 1993 and 1994

Guided/ Unguided	Date	N[a]	Effort (days)	Chinook salmon		Sockeye salmon		Coho salmon		Pink salmon		Steel-head		Rainbow trout		Dolly Varden	
				C[b]	K	C	K	C	K	C	K	C	K	C	K	C	K
								1993									
G	930603	3	3	10	6	3	3	0	0	0	0	0	0	2	0	0	0
G	930604	3	3	12	6	5	5	0	0	0	0	0	0	0	0	0	0
G	930605	3	3	9	6	4	4	0	0	0	0	0	0	0	0	0	0
G	930606	3	3	9	6	0	0	0	0	0	0	0	0	0	0	0	0
G	930607	3	3	26	1	1	0	0	0	0	0	0	0	0	0	0	0
G	930608	6	6	20	12	4	4	0	0	0	0	0	0	0	0	0	0
G	930609	6	6	18	12	3	3	0	0	0	0	0	0	0	0	0	0
G	930610	6	6	19	12	6	6	0	0	0	0	0	0	0	0	0	0
G	930611	11	11	21	17	0	0	0	0	0	0	0	0	0	0	0	0
G	930614	6	6	14	1	40	0	0	0	0	0	0	0	1	0	0	0
G	930615	10	10	44	17	3	3	0	0	0	0	0	0	1	0	2	0
G	930616	8	8	29	12	5	5	0	0	0	0	0	0	0	0	0	0
G	930617	8	8	22	13	0	0	0	0	0	0	0	0	0	0	0	0
G	930618	6	6	20	12	0	0	0	0	0	0	0	0	0	0	0	0
G	930620	5	5	14	6	0	0	0	0	0	0	0	0	0	0	0	0
G	930621	2	2	10	2	0	0	0	0	0	0	0	0	0	0	0	0
G	930622	9	9	7	0	21	3	0	0	0	0	0	0	0	0	0	0
G	930623	10	10	11	7	29	4	0	0	0	0	0	0	1	1	3	2
G	930627	4	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0
G	930628	3	3	8	1	0	0	0	0	0	0	0	0	0	0	0	0
G	930630	7	7	21	2	0	0	0	0	0	0	0	0	0	0	4	0
G	930704	3	3	9	2	11	1	0	0	0	0	0	0	0	0	1	0
G	930705	3	3	35	4	0	0	0	0	0	0	0	0	0	0	8	0
G	930706	3	3	28	0	0	0	0	0	0	0	0	0	0	0	1	0
G	930707	5	5	15	2	0	0	0	0	0	0	0	0	0	0	0	0
G	930709	6	6	17	1	0	0	0	0	0	0	0	0	0	0	0	0
		142	142	452	161	135	41	0	0	0	0	0	0	5	1	19	2
U	930528	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	930529	3	9	2	2	0	0	0	0	0	0	0	0	0	0	0	0
U	930531	4	16	3	3	5	5	0	0	0	0	5	1	0	0	0	0
U	930606	3	9	86	7	2	2	0	0	0	0	3	0	1	0	3	0
U	930607	9	56	83	12	11	3	0	0	0	0	45	0	3	0	7	0
U	930609	4	5	10	10	0	0	0	0	0	0	0	0	0	0	0	0
U	930610	7	19	22	10	1	0	0	0	0	0	0	0	2	0	1	0
U	930611	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0
U	930612	4	4	16	4	0	0	0	0	0	0	0	0	0	0	0	0
U	930613	8	21	19	9	24	15	0	0	0	0	0	0	0	0	0	0

APPENDIX 3 —(Continued)

Guided/ Unguided	Date	N[a]	Effort (days)	Chinook salmon		Sockeye salmon		Coho salmon		Pink salmon		Steel-head		Rainbow trout		Dolly Varden	
				C[b]	K	C	K	C	K	C	K	C	K	C	K	C	K
U	930614	6	21	14	11	8	6	0	0	0	0	0	0	0	0	0	0
U	930615	11	11	7	7	0	0	0	0	0	0	0	0	0	0	1	0
U	930617	11	48	80	25	20	5	0	0	0	0	1	0	0	0	0	0
U	930618	5	30	98	14	2	0	0	0	0	0	0	0	2	0	15	1
U	930619	13	35	110	34	29	4	0	0	0	0	0	0	0	0	4	0
U	930620	14	51	235	31	141	90	0	0	0	0	0	0	0	0	3	0
U	930624	2	10	11	3	4	1	0	0	0	0	0	0	0	0	0	0
U	930625	6	13	17	4	2	2	0	0	0	0	0	0	0	0	2	2
U	930626	4	4	8	8	0	0	0	0	0	0	0	0	0	0	20	0
U	930628	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
U	930704	2	2	5	5	0	0	0	0	0	0	0	0	0	0	0	0
U	930705	4	4	10	7	0	0	0	0	0	0	0	0	0	0	1	0
U	930707	3	3	6	6	0	0	0	0	0	0	0	0	0	0	0	0
U	930709	1	3	1	1	3	1	0	0	0	0	0	0	0	0	0	0
		128	378	850	214	253	133	0	0	0	0	94	1	8	0	59	3
	Total	270	520	1,302	375	388	174	0	0	0	0	94	1	12	1	81	5
									1994								
G	940605	5	5	5	2	0	0	0	0	0	0	4	0	0	0	0	0
G	940606	3	3	6	1	0	0	0	0	0	0	0	0	0	0	0	0
G	940607	3	2	1	1	0	0	0	0	0	0	1	0	0	0	0	0
G	940608	3	3	10	1	0	0	0	0	0	0	0	0	0	0	0	0
G	940611	2	2	2	2	0	0	0	0	0	0	0	0	0	0	1	1
G	940613	4	4	1	1	7	4	0	0	0	0	0	0	0	0	0	0
G	940616	21	21	44	25	6	5	0	0	0	0	21	0	0	0	0	0
G	940617	2	2	4	4	0	0	0	0	0	0	0	0	0	0	0	0
G	940622	50	50	156	17	18	13	0	0	0	0	3	0	0	0	0	0
G	940623	6	12	33	18	0	0	0	0	0	0	0	0	0	0	0	0
G	940627	9	17	119	17	18	8	0	0	0	0	0	0	0	0	0	0
G	940628	4	12	32	4	30	30	0	0	0	0	0	0	0	0	0	0
G	940630	6	16	98	2	0	0	0	0	0	0	0	0	0	0	0	0
G	940708	4	13	105	8	0	0	0	0	0	0	0	0	0	0	3	0
G	940710	11	35	78	21	3	1	0	0	0	0	0	0	0	0	0	0
U	940530	9	22	3	2	0	0	0	0	0	0	36	0	0	0	1	0
U	940602	6	30	3	0	0	0	0	0	0	0	73	0	12	0	102	0
U	940603	3	6	5	2	2	0	0	0	0	0	4	0	0	0	0	0
U	940604	15	30	9	9	2	2	0	0	0	0	33	0	4	0	4	0
U	940608	4	4	0	0	2	2	0	0	0	0	0	0	0	0	0	0

APPENDIX 3 —(Continued).

Guided/ Unguided	Date	N[a]	Effort (days)	Chinook salmon		Sockeye salmon		Coho salmon		Pink salmon		Steel-head		Rainbow trout		Dolly Varden	
				C[b]	K	C	K	C	K	C	K	C	K	C	K	C	K
U	940610	4	20	13	6	10	2	0	0	0	0	4	0	0	0	6	0
U	940611	9	33	16	16	113	35	0	0	0	0	0	0	0	0	0	0
U	940612	5	39	143	13	30	21	0	0	0	0	33	0	0	0	0	0
U	940613	11	11	21	9	3	3	0	0	0	0	0	0	0	0	0	0
U	940614	6	14	6	6	8	1	0	0	0	0	0	0	0	0	0	0
U	940615	10	40	50	20	261	37	0	0	0	0	0	2	1	0	0	0
U	940616	9	24	11	3	14	11	0	0	0	0	0	0	0	0	0	0
U	940617	6	24	36	6	16	16	0	0	0	0	0	0	1	0	0	0
U	940618	5	11	13	10	0	0	0	0	0	0	0	0	0	0	0	0
U	940619	6	18	10	4	29	13	0	0	0	0	0	0	1	0	1	0
U	940621	9	36	21	1	73	3	0	0	0	0	0	0	1	1	2	0
U	940622	6	31	26	15	0	0	0	0	0	0	0	0	0	0	0	0
U	940623	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	940704	4	4	16	10	0	0	0	0	0	0	0	0	0	0	0	0
U	940705	3	3	14	6	0	0	0	0	0	0	0	0	0	0	0	0
U	940708	9	9	6	0	0	0	0	0	0	0	0	0	0	0	2	0

[a] Number of anglers interviewed
[b] C=catch, K=harvest

APPENDIX 4 —Daily catch (C) and harvest (K) by guided and unguided anglers interviewed at the Ayakulik River weir, 1993 and 1994

Guided/ Unguided	Date	N[a]	Effort (days)	Chinook salmon		Sockeye salmon		Coho salmon		Pink salmon		Steel-head		Rainbow trout		Dolly Varden	
				C[b]	K	C	K	C	K	C	K	C	K	C	K	C	K
									1993								
G	930610	7	39	128	38	93	53	0	0	0	0	31	0	0	0	2	0
G	930612	4	8	6	6	47	15	0	0	0	0	0	0	0	0	0	0
G	930613	4	12	10	10	44	11	0	0	0	0	0	0	0	0	0	0
G	930619	10	54	507	87	32	4	0	0	0	0	5	0	3	0	7	0
G	930625	7	42	182	41	4	0	0	0	0	0	0	0	7	0	1	0
G	930628	8	24	17	10	1	0	0	0	0	0	1	0	1	1	2	0
G	930701	8	40	350	68	0	0	0	0	0	0	0	0	0	0	0	0
G	930703	5	24	169	34	0	0	5	0	0	0	0	0	3	0	17	0
G	930707	4	20	59	25	0	0	24	18	0	0	0	0	0	0	0	0
		57	263	1,428	319	221	83	29	18	0	0	37	0	14	1	29	0
U	930529	15	15	0	0	1	1	0	0	0	0	0	0	0	0	0	0
U	930530	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0
U	930531	5	5	1	1	2	2	0	0	0	0	0	0	0	0	0	0
U	930601	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0
U	930603	9	21	89	8	19	8	0	0	0	0	60	0	0	0	0	0
U	930604	5	5	3	1	2	0	0	0	0	0	33	0	0	0	3	0
U	930607	1	3	8	4	0	0	0	0	0	0	0	0	0	0	0	0
U	930609	4	12	107	3	0	0	0	0	0	0	20	0	0	0	0	0
U	930612	1	4	27	3	86	8	0	0	0	0	2	0	0	0	0	0
U	930613	6	16	169	15	40	10	0	0	0	0	0	0	0	0	2	1
U	930614	4	12	52	5	2	1	0	0	0	0	15	0	0	0	0	0
U	930615	8	41	95	15	22	5	0	0	0	0	6	0	4	0	7	0
U	930616	15	51	184	9	40	8	0	0	0	0	9	0	0	0	0	0
U	930617	3	12	77	10	3	0	0	0	0	0	0	0	0	0	7	0
U	930621	7	39	62	18	43	0	0	0	0	0	0	0	4	0	16	1
U	930625	9	68	43	15	64	38	0	0	0	0	0	0	1	0	7	2
U	930702	2	16	27	1	19	0	0	0	6	0	1	0	6	1	10	0
		100	326	950	114	343	81	0	0	6	0	146	0	15	1	52	4
	Total	157	589	2,378	433	564	164	29	18	6	0	183	0	29	2	77	4
									1994								
G	940609	8	48	47	35	69	68	0	0	0	0	58	0	0	0	3	0
G	940611	4	4	0	0	12	5	0	0	0	0	0	0	0	0	0	0
G	940612	9	27	46	22	44	33	0	0	0	0	0	0	0	0	0	0

APPENDIX 4 —(Continued)

Guided/ Unguided	Date	N[a]	Effort (days)	Chinook salmon		Sockeye salmon		Coho salmon		Pink salmon		Steel-head		Rainbow trout		Dolly Varden	
				C[b]	K	C	K	C	K	C	K	C	K	C	K	C	K
G	940618	7	39	138	59	47	43	0	0	0	0	1	0	0	0	0	0
G	940625	8	44	132	46	4	4	0	0	1	0	1	0	0	0	0	0
G	940630	7	42	492	46	3	3	0	0	0	0	0	0	0	0	0	0
G	940706	7	42	250	34	0	0	0	0	1	0	1	0	0	0	0	0
U	940531	5	5	0	0	4	3	0	0	0	0	0	0	0	0	0	0
U	940602	4	4	1	1	54	12	0	0	0	0	3	0	0	0	0	0
U	940603	4	4	1	1	47	2	0	0	0	0	0	0	0	0	0	0
U	940605	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	940608	4	20	25	5	61	23	0	0	0	0	4	0	1	0	8	3
U	940609	4	20	114		0	0	0	0	0	0	34	0	0	0	0	0
U	940611	13	49	177	21	166	29	0	0	0	0	26	0	0	0	14	0
U	940612	7	14	65	18	20	7	0	0	0	0	4	0	0	0	2	0
U	940614	11	44	105	29	30	6	0	0	0	0	8	0	0	0	4	0
U	940615	15	72	158	26	24	16	0	0	0	0	5	0	1	0	10	1
U	940617	6	42	16	8	14	7	0	0	0	0	0	0	0	0	0	0
U	940618	15	87	129	22	59	18	0	0	0	0	1	0	0	0	5	0
U	940619	18	81	64	14	19	8	0	0	0	0	2	1	1	1	2	0
U	940621	2	8	6	5	5	4	0	0	1	0	0	0	0	0	0	0
U	940622	16	112	75	23	79	9	0	0	0	0	0	0	0	0	0	0
U	940623	8	48	17	8	104	47	0	0	0	0	0	0	0	0	2	0
U	940624	2	6	6	2	0	0	0	0	0	0	1	0	0	0	0	0
U	940625	3	12	119	11	0	0	0	0	0	0	0	0	0	0	0	0
U	940629	5	5	8	4	1	1	0	0	0	0	0	0	0	0	0	0
U	940630	2	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0
U	940702	4	24	118	24	4	0	0	0	0	0	8	0	0	0	0	0
U	940710	4	29	66	13	255	11	0	0	0	0	21	0	0	0	0	0

[a] Number of anglers interviewed
[b] C=catch, K=harvest

APPENDIX 5 —Total harvest(K) and catch (C) by all anglers interviewed on the Ayakulik River, 1993 and 1994

Location	N[a]	Effort (days)	Chinook salmon		Sockeye salmon		Coho salmon		Pink salmon		Steel-head		Rainbow trout		Dolly Varden	
			C[b]	K	C	K	C	K	C	K	C	K	C	K	C	K
1993																
Weir																
Guided	57	263	1,428	319	221	83	29	18	0	0	37	0	14	1	29	0
Unguided	100	326	950	114	343	81	0	0	6	0	146	0	15	1	52	4
Local	38	67	192	29	132	20	0	0	0	0	38	0	9	2	14	0
Other AK	30	131	337	61	147	43	0	0	0	0	17	0	1	0	13	0
Nonres	89	391	1,849	343	285	101	29	18	6	0	128	0	19	0	54	4
Total	157	589	2,378	433	564	164	29	18	6	0	183	0	29	2	81	4
Bare Creek																
Guided	142	142	452	161	135	41	0	0	0	0	0	0	5	1	19	2
Unguided	112	362	814	178	253	133	0	0	0	0	95	1	8	0	62	3
Subsistence	16	16	36	36	0	0	0	0	0	0	0	0	0	0	0	0
Local	66	132	292	91	38	13	0	0	0	0	20	0	4	0	32	2
Other AK	30	81	144	49	25	13	0	0	0	0	46	1	0	0	16	0
Nonres.	174	307	866	235	325	148	0	0	0	0	29	0	9	1	33	3
Totals	270	520	1,302	375	388	174	0	0	0	0	95	1	13	1	81	5
Both Sites																
Guided	199	405	1,880	480	356	124	29	18	0	0	37	0	19	2	48	2
Unguided	212	682	1,763	292	596	214	0	0	6	0	241	1	23	1	114	7
Subsistence	16	16	36	36	0	0	0	0	0	0	0	0	0	0	0	0
Local	87	191	474	115	170	33	0	0	0	0	58	0	13	2	46	2
Other AK	57	209	478	107	172	56	0	0	0	0	63	0	1	0	29	0
Nonres	263	698	2,715	578	610	249	29	18	6	0	157	0	28	1	87	7
Total	427	1,109	3,679	808	952	338	29	18	6	0	278	1	42	3	162	9
1994																
Weir/Lodge																
Guided	50	246	1,105	242	119	156	0	0	0	0	61	0	0	0	3	0
Unguided (rafters)	153	680	1,270	235	938	195	0	0	0	0	120	3	0	0	56	4

APPENDIX 5 —(Continued)

Location	N[a]	Effort (days)	Chinook salmon		Sockeye salmon		Coho salmon		Pink salmon		Steel-head		Rainbow trout		Dolly Varden	
			C[b]	K	C	K	C	K	C	K	C	K	C	K	C	K
Local	43	196	407	63	220	57	0	0	0	0	49	0	0	0	9	0
Other AK	39	175	183	50	162	55	0	0	0	0	12	0	0	0	21	3
NonRes	119	551	1,782	361	733	237	0	0	0	0	117	3	0	0	29	1
Unknown	2	4	3	3	2	2	0	0	0	0	0	0	0	0	0	0
Total	203	926	2,375	477	1,118	351	0	0	0	0	178	3	0	0	59	4
Bare Creek																
Guided	133	197	675	124	82	61	0	0	0	0	29	0	0	0	4	1
Unguided	140	410	422	138	563	146	0	0	0	0	19	2	0	0	118	0
Local	49	88	58	27	8	4	0	0	0	0	110	0	0	0	105	0
Other AK	24	69	54	19	121	29	0	0	0	0	44	0	0	0	2	0
NonRes	198	443	977	216	512	172	0	0	0	0	68	1	0	0	15	1
Unknown	2	7	8	0	4	4	0	0	0	0	0	0	0	0	0	1
Total	273	607	1,097	262	645	207	0	0	0	0	233	2	0	0	122	2
Both Sites																
Guided	183	443	1,780	366	261	217	0	0	0	0	90	0	0	0	7	1
Unguided	293	1,090	1,692	373	1,501	341	0	0	0	0	313	5	0	0	174	4
Local	92	284	465	90	228	61	0	0	0	0	114	0	0	0	114	0
Other AK	63	249	237	69	233	82	0	0	0	0	56	1	0	0	23	3
Non Res.	317	994	2,759	577	1,295	409	0	0	0	0	185	4	0	0	44	2
Unknown	4	11	11	3	6	6	0	0	0	0	0	0	0	0	0	1
Total	476	1,533	3,472	739	1,762	558	0	0	0	0	411	5	0	0	181	6

[a] Number of anglers interviewed
[b] C=total catch, K=harvest

APPENDIX 6 —Daily and cumulative escapement counts through the weir, Ayakulik River, Alaska, 1993 and 1994[a]

	Sockeye		Chinook		Coho		Pink		Chum	
Date	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum
					1993					
May										
23	10	10	21	21	0	0	0	0	0	0
24	2	12	7	28	0	0	0	0	0	0
25	2	14	9	37	0	0	0	0	0	0
26	1	15	7	44	0	0	0	0	0	0
27	225	240	59	103	0	0	0	0	0	0
28	948	1,188	136	241	0	0	0	0	0	0
29	1,879	3,067	85	326	0	0	0	0	0	0
30	3,291	6,358	44	370	0	0	0	0	0	0
31	6,368	12,726	451	821	0	0	0	0	0	0
June										
1	7,074	19,800	1,106	1,927	0	0	0	0	0	0
2	9,971	29,771	1,191	3,118	0	0	0	0	0	0
3	2,693	32,464	107	3,225	0	0	0	0	0	0
4	4,366	36,830	127	3,352	0	0	0	0	0	0
5	2,950	39,760	233	3,585	0	0	0	0	0	0
6	75	39,885	38	3,623	0	0	0	0	0	0
7	926	40,781	63	3,686	0	0	0	0	0	0
8	26	40,807	22	3,708	0	0	0	0	0	0
9	15,784	56,591	153	3,861	0	0	0	0	0	0
10	27,131	83,722	293	4,154	0	0	0	0	0	0
11	16,853	100,575	383	4,537	0	0	0	0	0	0
12	15,916	116,491	270	4,807	0	0	0	0	0	0
13	9,505	125,996	234	5,041	0	0	0	0	0	0
14	740	126,736	119	5,160	0	0	0	0	0	0
15	1,626	128,362	95	5,225	0	0	0	0	0	0
16	2,691	131,053	182	5,437	0	0	0	0	0	0
17	836	131,879	116	5,553	0	0	0	0	0	0
18	2,126	134,005	111	5,664	0	0	0	0	0	0
19	3,704	137,709	170	5,834	0	0	0	0	0	0
20	720	138,429	83	5,917	0	0	0	0	0	0
21	747	139,176	19	5,936	0	0	0	0	0	0
22	1,356	140,532	105	6,041	0	0	0	0	0	0
23	671	141,203	34	6,075	0	0	0	0	0	0
24	308	141,511	43	6,118	0	0	0	0	0	0
25	12,252	153,763	372	6,490	0	0	0	0	0	0
26	2,793	156,556	242	6,732	0	0	0	0	0	0
27	430	156,986	46	6,778	0	0	0	0	0	0
28	1,312	158,298	94	6,872	0	0	0	0	0	0
29	42	158,340	36	6,908	0	0	0	0	0	0
30	298	158,635	39	6,947	0	0	3	3	0	0

APPENDIX 6–(Continued)

	Sockeye		Chinook		Coho		Pink		Chum	
Date	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum
July										
1	0	158,635	13	6,960	0	0	1	4	1	1
2	846	159 481	226	7,186	0	0	28	32	1	2
3	657	160,138	48	7,234	0	0	61	93	0	2
4	684	160,822	32	7,226	0	0	17	110	0	2
5	548	161,370	22	7,288	0	0	5	115	0	2
6	1,707	163,077	80	7,368	0	0	12	127	2	4
7	1,839	164,916	40	7,408	0	0	6	133	0	4
8	1,829	166,745	30	7,438	0	0	7	140	0	4
9	2,156	168,901	33	7,471	0	0	5	145	0	4
10	6,657	175,558	59	7,530	0	0	47	192	4	8
11	3,352	178,910	17	7,547	0	0	18	210	0	8
12	2,517	181,427	26	7,573	0	0	34	244	0	8
13	2,680	184,107	14	7,587	0	0	43	287	0	8
14	2,915	187,022	28	7,615	0	0	38	325	0	8
15	8,679	195,701	34	7,649	0	0	112	437	4	12
16	4,080	199,781	10	7,659	0	0	138	575	0	12
17	3,361	203,142	23	7,682	0	0	72	647	0	12
18	7,821	210,963	22	7,704	0	0	119	766	0	12
19	4	210,967	0	7,704	0	0	1	767	0	12
20	127	211,094	2	7,706	0	0	6	773	0	12
21	172	211,266	2	7,708	0	0	7	780	0	12
22	39	211,295	5	7,713	0	0	12	792	0	12
23	18	211,313	3	7,716	0	0	2	794	0	12
24	2,971	214,284	33	7,749	0	0	147	941	1	13
25	519	214,803	0	7,749	0	0	60	1,001	0	13
26	2,319	217,122	8	7,757	0	0	116	1,117	0	13
27	9,857	226,979	1	7,758	0	0	462	2,579	2	15
28	9,058	236,027	13	7,771	0	0	498	2,077	1	16
29	332	236,359	7	7,778	0	0	34	2,111	0	16
30	381	236,740	3	7,781	0	0	37	2,148	1	17
31	2,288	239,028	0	7,781	0	0	250	2,398	0	17
August										
1	6,547	245,575	7	7,788	0	0	1,085	3,483	0	17
2	586	246,161	0	7,788	0	0	93	3,576	1	18
3	2,133	248,294	1	7,789	0	0	202	3,778	5	23
4	6,741	255,035	6	7,795	0	0	903	4,681	1	24
5	862	255,897	0	7,795	0	0	92	4,773	0	24
6	366	256,263	1	7,796	0	0	382	5,155	0	24
7	2,214	258,477	1	7,797	0	0	887	6,042	0	24
8	395	258,872	1	7,798	0	0	64	6,106	0	24
9	917	259,789	1	7,799	0	0	305	6,411	0	24
10	12,005	271,794	9	7,808	0	0	2,192	8,603	2	26

APPENDIX 6 —(Continued)

	Sockeye		Chinook		Coho		Pink		Chum	
Date	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum
11	667	272,461	0	7,808	0	0	381	8,984	0	26
12	45	272,506	1	7,809	2	2	32	9,016	1	27
13	1,929	274,435	0	7,809	1	3	564	9,580	1	28
14	243	274,678	0	7,809	2	5	380	9,960	2	30
15	953	275,631	4	7,813	3	8	431	10,391	1	31
16	2,510	278,141	4	7,817	8	16	615	11,006	0	31
17	726	278,867	1	7,818	14	30	388	11,394	1	32
18	222	279,089	0	7,818	1	31	156	11,550	0	32
19	252	279,341	0	7,818	7	38	233	11,783	0	32
20	252	279,593	0	7,818	7	45	233	12,016	0	32
21	251	279,844	0	7,818	6	51	234	12,250	0	32
22	419	280,263	1	7,819	14	65	149	12,399	0	32
23	452	280,715	0	7,819	289	354	1,061	13,460	0	32
24	207	280,922	0	7,819	148	502	1,835	15,295	2	34
25	2,516	283,438	0	7,819	421	923	7,915	23,210	1	35
26	1,883	285,321	0	7,819	429	1,352	4,023	27,233	1	36
27	315	285,636	0	7,819	147	1,499	933	28,166	0	36
28	424	286,060	0	7,819	381	1,880	980	29,146	0	36
29	110	286,170	0	7,819	274	2,154	451	29,597	0	36
30	0	286,170	0	7,819	0	2,154	0	29,597	0	36
31	0	286,170	0	7,819	0	2,154	0	29,597	0	36
September										
1	0	286,170	0	7,819	0	2,154	0	29,597	0	36
2	0	286,170	0	7,819	0	2,154	0	29,597	0	36
3	0	286,170	0	7,819	0	2,154	0	29,597	0	36
4	0	286,170	0	7,819	0	2,154	0	29,597	0	36
5	0	286,170	0	7,819	0	2,154	0	29,597	0	36
6	0	286,170	0	7,819	0	2,154	0	29,597	0	36
7	0	286,170	0	7,819	0	2,154	0	29,597	0	36
8	0	286,170	0	7,819	0	2,154	0	29,597	0	36
9	0	286,170	0	7,819	0	2,154	0	29,597	0	36
10	0	286,170	0	7,819	0	2,154	0	29,597	0	36
11	0	286,170	0	7,819	0	2,154	0	29,597	0	36
12	0	286,170	0	7,819	0	2,154	0	29,597	0	36
13	0	286,170	0	7,819	0	2,154	0	29,597	0	36
14	0	286,170	0	7,819	0	2,154	0	29,597	0	36
15	0	286,170	0	7,819	0	2,154	0	29,597	0	36
16	0	286,170	0	7,819	0	2,154	0	29,597	0	36
17	0	286,170	0	7,819	0	2,154	0	29,597	0	36
18	0	286,170	0	7,819	0	2,154	0	29,597	0	36
19	0	286,170	0	7,819	0	2,154	0	29,597	0	36
20	0	286,170	0	7,819	0	2,154	0	29,597	0	36

APPENDIX 6 —(Continued)

	Sockeye		Chinook		Coho		Pink		Chum	
Date	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum
21	0	286,170	0	7,819	0	2,154	0	29,597	0	36
22	0	286,170	0	7,819	0	2,154	0	29,597	0	36
23	0	286,170	0	7,819	0	2,154	0	29,597	0	36
24	0	286,170	0	7,819	0	2,154	0	29,597	0	36
25	0	286,170	0	7,819	0	2,154	0	29,597	0	36
26	0	286,170	0	7,819	0	2,154	0	29,597	0	36
27	0	286,170	0	7,819	0	2,154	0	29,597	0	36
28	0	286,170	0	7,819	0	2,154	0	29,597	0	36
29	0	286,170	0	7,819	0	2,154	0	29,597	0	36
30	0	286,170	0	7,819	0	2,154	0	29,597	0	36
					1994					
May										
21	0	0	4	4	0	0	0	0	0	0
22	0	0	11	15	0	0	0	0	0	0
23	0	0	24	39	0	0	0	0	0	0
24	0	0	24	63	0	0	0	0	0	0
25	73	73	25	88	0	0	0	0	0	0
26	18	91	12	100	0	0	0	0	0	0
27	105	196	29	129	0	0	0	0	0	0
28	25	221	29	158	0	0	0	0	0	0
29	135	356	46	204	0	0	0	0	0	0
30	4	360	6	210	0	0	0	0	0	0
31	1,072	1,432	55	265	0	0	0	0	0	0
June										
1	240	1,672	29	294	0	0	0	0	0	0
2	114	1,786	34	328	0	0	0	0	0	0
3	1,608	3,394	240	568	0	0	0	0	0	0
4	138	3,532	126	694	0	0	0	0	0	0
5	2,129	5,661	610	1,304	0	0	0	0	0	0
6	663	6,324	261	1,565	0	0	0	0	0	0
7	1,193	7,517	71	1,636	0	0	0	0	0	0
8	3,551	11,068	224	1,860	0	0	0	0	0	0
9	12,324	23,392	871	2,731	0	0	0	0	0	0
10	3,027	26,419	526	3,257	0	0	0	0	0	0
11	7,009	33,428	384	3,641	0	0	0	0	0	0
12	3,874	37,302	156	3,797	0	0	0	0	0	0
13	10,487	47,789	496	4,293	0	0	0	0	0	0
14	456	48,245	28	4,321	0	0	0	0	0	0
15	3,568	51,813	223	4,544	0	0	0	0	0	0
16	1,702	53,515	281	4,825	0	0	0	0	0	0
17	3,315	56,830	108	4,933	0	0	0	0	0	0
18	8,608	65,438	222	5,155	0	0	0	0	0	0
19	14,061	79,499	192	5,347	0	0	0	0	0	0

APPENDIX 6 —(Continued)

	Sockeye		Chinook		Coho		Pink		Chum	
Date	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum
20	13,888	93,387	114	5,461	0	0	0	0	0	0
21	2,472	95,859	75	5,536	0	0	1	1	0	0
22	1,971	97,830	235	5,771	0	0	0	1	0	0
23	4,092	101,922	160	5,931	0	0	0	1	0	0
24	4,205	106,127	259	6,100	0	0	1	2	0	0
25	9,529	115,656	599	6,789	0	0	0	2	0	0
26	6,582	122,238	440	7,229	0	0	0	2	0	0
27	12,885	135,123	495	7,724	0	0	1	3	0	0
28	14,231	149,354	182	7,906	0	0	1	4	0	0
29	2,020	151,374	84	7,990	0	0	0	4	0	0
30	4,511	155,885	103	8,093	0	0	0	4	1	1
July										
1	6,338	162,223	168	8,261	0	0	1	5	1	2
2	8,593	170,816	182	8,443	0	0	5	10	1	3
3	3,236	174,052	79	8,522	0	0	9	19	0	3
4	6,639	180,691	97	8,619	0	0	8	27	0	3
5	4,604	185,295	42	8,661	0	0	8	35	0	3
6	1,365	186,660	30	8,691	0	0	6	41	0	3
7	3,406	190,066	49	8,740	0	0	6	47	0	3
8	7,637	197,703	66	8,806	0	0	70	117	2	5
9	6,192	203,895	26	8,832	0	0	33	150	0	5
10	7,607	211,502	41	8,873	0	0	44	194	1	6
11	7,912	219,414	69	8,942	0	0	79	273	0	6
12	4,934	224,348	31	8,973	0	0	59	332	0	6
13	3,588	227,936	17	8,990	0	0	71	403	0	6
14	3,121	231,057	18	9,008	0	0	82	485	0	6
15	10,754	241,811	17	9,025	0	0	172	657	0	6
16	3,674	245,485	11	9,036	0	0	44	701	0	6
17	7,301	252,786	18	9,054	0	0	104	805	0	6
18	6,249	259,035	15	9,069	0	0	277	1,082	0	6
19	2,547	261,582	13	9,082	0	0	162	1,244	0	6
20	169	261,751	6	9,088	0	0	31	1,275	1	7
21	5,433	267,814	6	9,094	0	0	551	1,826	0	7
22	5,433	272,617	5	9,099	0	0	551	2,377	0	7
23	5,434	278,051	5	9,104	0	0	550	2,927	0	7
24	3,022	281,073	1	9,105	0	0	418	3,345	0	7
25	10,654	291,727	3	9,108	0	0	1,406	4,751	0	7
26	6,198	297,925	3	9,111	0	0	1,672	6,423	1	8
27	9,483	307,408	0	9,111	0	0	3,878	10,301	0	8
28	2,305	309,713	2	9,113	0	0	3,187	13,488	0	8
29	1,955	311,668	2	9,115	0	0	3,764	17,252	1	9
30	1,678	313,346	1	9,116	0	0	3,212	20,464	0	9
31	3,315	316,661	2	9,118	0	0	10,434	30,898	0	9

APPENDIX 6 –(Continued)

	Sockeye		Chinook		Coho		Pink		Chum	
Date	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum
August										
1	2,037	318,698	0	9,118	0	0	7,946	38,844	2	11
2	2,630	321,328	2	9,120	1	1	8,213	47,057	5	16
3	2,060	323,388	5	9,125	2	3	9,709	56,766	4	20
4	5,475	328,863	2	9,127	11	14	23,554	80,320	9	29
5	3,687	332,550	0	9,127	12	26	17,397	97,717	8	37
6	3,618	335,168	0	9,127	10	36	10,012	107,729	1	38
7	3,605	338,773	0	9,127	32	68	5,299	113,028	1	39
8	2,117	340,890	0	9,127	47	115	10,882	123,910	3	42
9	697	341,587	0	9,127	49	164	4,451	128,361	1	43
10	1,927	343,514	0	9,127	157	321	5,378	133,739	7	50
11	1,126	344,640	1	9,128	118	439	3,537	137,276	2	52
12	3,401	348,041	1	9,129	113	552	7,459	144,735	5	57
13	2,596	350,637	2	9,131	149	701	5,655	150,390	6	63
14	2,522	353,159	2	9,133	198	899	4,550	154,940	3	66
15	7,464	360,623	2	9,135	147	1,046	5,306	160,246	1	67
16	3,469	364,092	2	9,137	119	1,165	2,670	162,916	7	74
17	2,829	366,921	0	9,137	192	1,357	1,673	164,589	2	76
18	3,210	370,131	0	9,137	389	1,746	2,586	167,175	5	81
19	2,685	372,816	0	9,137	511	2,257	4,781	171,956	3	84
20	1,484	374 300	0	9,137	627	2,884	3,716	175,672	5	89
21	1,119	375,419	0	9,137	640	3,524	4,230	179,902	3	92
22	629	376,048	0	9,137	349	3,873	1,052	180,954	0	92
23	662	376,710	0	9,137	472	4,345	1,101	182,055	1	93
24	191	376,901	1	9,138	236	4,581	532	182,587	1	94
25	648	377,549	0	9,138	528	5,109	1,840	184,427	4	98
26	586	378,135	0	9,138	336	5,445	2,992	187,419	1	99
27	448	378,583	0	9,138	2,173	7,618	2,197	189,616	1	100
28	448	379,031	0	9,138	2,173	9,791	2,197	191,813	1	101
29	83	379,114	0	9,138	2,412	12,203	432	192,245	0	101
30	343	379,457	0	9,138	6,584	18,787	571	192,816	0	101
31	217	379,674	0	9,138	4,196	22,983	494	193,310	2	103
September										
1	96	379,770	0	9,138	3,708	26,691	439	193,749	0	103
2	85	379,855	0	9,138	2,553	29,244	401	194,150	0	103
3	89	379,944	0	9,138	1,688	30,932	379	194,529	0	103
4	70	380,014	0	9,138	1,157	32,089	338	194,867	0	103
5	27	380,041	0	9,138	469	32,558	182	195,049	0	103
6	70	380,111	0	9,138	500	33,058	200	195,249	0	103
7	70	380,181	0	9,138	600	33,658	200	195,449	0	103
8	0	380,181	0	9,138	0	33,658	0	195,449	0	103
9	0	380,181	0	9,138	0	33,658	0	195,449	0	103
10	0	380,181	0	9,138	0	33,658	0	195,449	0	103
11	0	380,181	0	9,138	0	33,658	0	195,449	0	103

APPENDIX 6 —(Continued)

	Sockeye		Chinook		Coho		Pink		Chum	
Date	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum	Daily	Accum
12	0	380,181	0	9,138	0	33,658	0	195,449	0	103
13	0	380,181	0	9,138	0	33,658	0	195,449	0	103
14	0	380,181	0	9,138	0	33,658	0	195,449	0	103
15	0	380,181	0	9,138	0	33,658	0	195,449	0	103
16	0	380,181	0	9,138	0	33,658	0	195,449	0	103
17	0	380,181	0	9,138	0	33,658	0	195,449	0	103
18	0	380,181	0	9,138	0	33,658	0	195,449	0	103
19	0	380,181	0	9,138	0	33,658	0	195,449	0	103
20	0	380,181	0	9,138	0	33,658	0	195,449	0	103
21	0	380,181	0	9,138	0	33,658	0	195,449	0	103
22	0	380,181	0	9,138	0	33,658	0	195,449	0	103
23	0	380,181	0	9,138	0	33,658	0	195,449	0	103
24	0	380,181	0	9,138	0	33,658	0	195,449	0	103
25	0	380,181	0	9,138	0	33,658	0	195,449	0	103
26	0	380,181	0	9,138	0	33,658	0	195,449	0	103
27	0	380,181	0	9,138	0	33,658	0	195,449	0	103
28	0	380,181	0	9,138	0	33,658	0	195,449	0	103
29	0	380,181	0	9,138	0	33,658	0	195,449	0	103
30	0	380,181	0	9,138	0	33,658	0	195,449	0	103

[a] Data Source: Alaska Department of Fish and Game, Commercial Fish Division, Kodiak, Alaska