3A97-18

KOGRUKLUK RIVER WEIR SALMON ESCAPEMENT REPORT, 1995 - 1996

By

Thomas Cappiello
and
Charles Burkey, Jr.

Regional Information Report[1] No. 3A97-18

Alaska Department of Fish and Game
Commercial Fisheries Management and Development Division
Arctic-Yukon-Kuskokwim Region
333 Raspberry Road
Anchorage, Alaska 99518

March, 1997

[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports to this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Commercial Fisheries Management and Development Division.

AUTHORS

Thomas Cappiello is Assistant Area Management Biologist for the Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, P.O. Box 1467, Bethel, Alaska 99559-1467.

Charles Burkey, Jr. is Area Management Biologist for the Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, P.O. Box 1467, Bethel, Alaska 99559-1467

ACKNOWLEDGEMENTS

Special thanks to Marianne Profita, Gary Knuepfer, Chris Schmierbach, Joe Whittom, Joy and Alan Wintersteen, Donna Elliot, and J.R. Woods who operated the project during the 1995 and 1996 field seasons. Doug Molyneaux and Larry DuBois analyzed the age, sex, and length data. Thanks also to Doug Bue who helped with the critical and often difficult logistics support for the project. Jeff Bromaghin provided the rationale for sex, length and age sample objectives. Larry Buklis and Doug Molyneaux. reviewed a draft of this report.

OEO/ADA Statement

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

The Kogrukluk River weir is the oldest continuing salmon escapement assessment project in the Kuskokwim River drainage. Since 1976, the weir has been used to assess chinook, chum and sockeye salmon escapements; coho salmon assessment began in 1981. For periods when the weir is ineffective due to high water, daily total counts and, thus, total escapement, are estimated by using historical run-timing information. Minimum biological escapement goals (BEG's) have been established for chinook (10,000), chum (30,000) and coho salmon (25,000). This report covers the project operation during 1995 and 1996.

The BEG for chinook salmon was achieved in 1995 and 1996 with an estimated 20,630 and 14,199 fish, respectively. Females were 46% and 38% of the actual counts in the respective years. The midpoint of fish passage at the weir occurred on 10 July in 1995 and on 7 July in 1996. The estimated age composition of the 1995 chinook escapement was 19.1% age 1.2, 25.5% age 1.3, 55.1% age 1.4, 0.1% age 2.3, 0.2% age 1.5 and 0.1% age 2.4. In 1996, the age composition was 12.5% age 1.2, 54.7% age 1.3, 25.3% age 1.4, 0.40% age 2.3 and 7.2% age 1.5.

The estimated sockeye salmon escapement was 10,996 in 1995 and 15,385 in 1996. Females were 33% and 29% of the escapement in the respective years. The midpoint of fish passage at the weir occurred on 15 July in 1995, and on 13 July in 1996.

The BEG for chum salmon was achieved in 1995 and 1996 with an estimated 31,265 and 48,494 fish, respectively. Females were 19% and 17% of the actual counts in the respective years. The estimated age composition of the sockeye escapement in 1995 was the 1.4% age 0.2, 45.9% age 0.3, 51.8% age 0.4, and 0.8% age 0.5. In 1996, the age composition was 1.8% age 0.2, 67.8% age 0.3, 28.8% age 0.4 and 1.6% age 0.5. The midpoint of fish passage at the weir occurred on 14 July in 1995 and on 9 July in 1996.

The BEG for coho salmon was achieved in 1995 and 1996 with an estimated 27,861 and 50,555 fish, respectively. Females were 38% and 45% of the actual counts in the respective years. In 1995, the age composition of the coho escapement was 4.1% age 1.1, 88.5% age 2.1, and 7.0% age 3.1. In 1996, the age composition was 3.0% age 1.1, 94.9% age 2.1, and 2.1% age 3.1. The midpoint of fish passage at the weir occurred on 30 August in 1995 and on 25 August in 1996.

INTRODUCTION

The waters of the Kuskokwim River drainage produce six species of Pacific salmon *Oncorhynchus* spp. The species of commercial and subsistence importance in the region are chinook *O. tshawytscha*, chum *O. keta*, sockeye *O. nerka*, and coho salmon *O. kisutch*. Pink salmon *O. gorbuscha* are relatively few in number and of minor importance in the Kuskokwim area. Rainbow trout *O. mykis* occur only as resident forms and are caught in sport and subsistence fisheries. The Holitna River is a major salmon producing tributary of the Kuskokwim River. Recorded evidence of this has accumulated since 1961 (Schneiderhan 1983, Burkey 1994) when the earliest aerial survey of the Holitna River was documented. The apparent importance of the Holitna River as a salmon producer and the necessity to more closely monitor escapements of spawning salmon motivated the Alaska Department of Fish and Game (ADF&G) to establish a permanent salmon escapement monitoring project in the Holitna River drainage. A weir on the Kogrukluk River, a tributary of the Holitna River, is the result that endeavor.

Salmon escapements in the Kogrukluk River are a low percentage of the overall escapement in the Kuskokwim River drainage. However, compared with the few other escapement assessment projects in the Kuskokwim River drainage, relatively large numbers of chinook salmon pass the Kogrukluk River weir. The relative abundance of pink salmon is unknown in the Kogrukluk River because they are able to pass through the weir pickets but the numbers observed in any year are very low.

Salmon Fisheries

Subsistence and commercial fishermen who live along the Kuskokwim River place major cultural and economic importance on harvests of salmon. Commercial fisheries occur in two non-contiguous districts (Districts 1 and 2) in the Kuskokwim River stretching from the river mouth to Chuathbaluk (Figure 1). The 1985 - 1994 average commercial harvest for both districts is approximately 37,577 chinook, 476,637 chum, 83,786 sockeye, and 531,208 coho salmon (Burkey et al. *in prep.*). The 1985 - 1994 average subsistence harvest (estimated from surveys of residents from villages along the Kuskokwim River and Kuskokwim Bay) is approximately 68,895 chinook, 91,128 chum salmon, and 34,188 coho salmon (Burkey et al. *in prep.*).

The Kogrukluk River salmon weir is an integral tool for ADF&G salmon management and research programs. After 1983, commercial fisheries management shifted from a guideline harvest strategy to an escapement objective strategy. Although commercial fisheries harvests usually occur before many escapements can be fully assessed, postseason escapement assessments are useful for evaluating inseason management decisions.

In 1983, biological escapement goals (BEG's) for the Kogrukluk River were established for chinook, (10,000), chum (20,000), sockeye (2,000), and coho salmon (10,000). In 1985, BEG's were increased for chum (to 30,000) and coho salmon (to 25,000). These BEG's were based on average historical weir counts and represent a presumed minimum escapement level needed to maintain each salmon stock at past levels of abundance. The BEG for sockeye was eliminated in 1993 because sockeye are not actively managed in the Kuskokwim River and commercial harvests are incidental to other species. In most years, the sockeye salmon BEG was exceeded without direct management actions.

Study Site

The Kogrukluk River weir project is located in the remote upper reaches of the Holitna River drainage, a major tributary of the Kuskokwim River. The Holitna River forms at the confluence of the Kogrukluk and Chukowan Rivers about 1.5 km above the village of Kashegelok (Figure 2). The Kogrukluk River is formed by surface runoff from the north side of the plateau dividing the Tikchik Lakes and Nushagak River system from the Kuskokwim River system and from numerous streams which originate in the Shotgun Hills to the east. From a point about five miles from Nishlik Lake, the uppermost lake of the Tikchiks, the Kogrukluk River flows northerly for about 69 km before it joins the Chukowan River. Shotgun Creek, a major tributary, joins the Kogrukluk about 3 km upstream from the Chukowan confluence where the Holitna River begins.

Project History

The Kogrukluk River weir is the oldest continuing salmon escapement assessment project in the Kuskokwim area, and has been operated under a number of different names by various project leaders (Appendix A). The project began as a salmon counting tower in 1969. The tower was located about 2 km above the confluence of Shotgun Creek. Inadequacies of the tower site and the absence of a more suitable nearby tower site resulted in the changeover from a tower to a weir between 1976 and 1978. The weir was located downstream from the confluence of Shotgun Creek and about 2 km upstream of the confluence of the Chukowan River. Because the tower excluded Shotgun Creek, the tower and weir were operated from 1976 to 1978 to compare escapements between both projects. Only the 1978 operations provided an acceptable set of data from each project. Beginning in 1981, the weir operation period was extended to count coho salmon in addition to the other species.

Objectives

The objectives of the Kogrukluk River weir project are to:

1. Provide daily counts of the spawning escapement of chinook, sockeye, coho, and chum salmon by sex.

2. Describe the migratory timing of chinook, sockeye, coho and chum salmon spawning escapements.

3. Estimate the age, sex and length composition of the chinook, sockeye, coho and chum salmon spawning escapements.

4. Index gillnet fishing intensity by comparing the frequency of gillnet-marked salmon at the weir with prior years.

5. Estimate carcass wash out rate and timing by species.

6. Monitor variability in stream hydrological and meteorological conditions to provide information relating to potential environmental effects on salmon production.

METHODS

Weir Operation

The weir consists of pickets made of black iron pipe held in position by two angle iron stringers, 3 m in length. The stringers are perforated on one side to receive about 45 pickets (2 cm black iron pipe). The stringers are overlapped and braced by "A" shaped steel pipe support pods at each ten foot juncture to span the 70 m wide river. The triangular "A" pods are constructed of 3.8 cm black iron pipe (schedule 80) and Kee Klamps™. The trap is constructed of pickets and stringers to dimensions of 1.8 m wide, 3 m long, and 1.2 m deep. It has a funnel shaped entrance and is placed just upstream of an opening in the weir (Figure 3). All salmon except pink pass through the trap before proceeding upstream. Other details of weir construction may be found in *Ignatti Weir Construction Manual* (Baxter 1981).

Salmon Counts

Salmon are enumerated from an observation position on top of the trap. Two to four pickets are pulled out of the side of one upstream corner of the trap to allow salmon to pass. Visibility and definition are enhanced by yellow plywood panels placed on the stream bottom at the exit to the trap. Twelve data categories are tallied on counters mounted on a pedestal near the counting position. Categories were (1) male chinook, (2) female chinook, (3) male chum, (4) female chum, (5) male sockeye, (6) female sockeye, (7) gillnet-marked male chinook, (8) gillnet-marked female chinook, (9) gillnet-marked male chum, (10) gillnet-marked female chum, (11) gillnet-marked male sockeye, and (12) gillnet-marked female sockeye salmon. During the coho migration, the above data is maintained for the few remaining chinook, sockeye, and chum migrants; however, the primary objective is to count (1) male coho, (2) female coho, (3) gillnet-marked male coho, and (4) gillnet-marked female coho. Salmon carcasses which washed down the river and were stopped by the weir were counted by species during daily weir cleaning.

Between 0730 and 2400 hours, the weir trap is cleared of salmon once or more every 6 h. The trap exit is closed from 2400 to 0730 hours because few salmon migrate upstream during this time. At 0730 hours all salmon in the trap are allowed to proceed upstream and are counted.

Escapement Estimation / Migration-Timing Database

Every year the Kogrukluk River weir has experienced one or more periods of ineffective operation due to high water levels. Schneiderhan (1989) used a methodology for estimating daily counts and, hence, total escapement. After the 1988 field season, he subjectively expanded the historic salmon counts to produce a migration-timing database with as many years represented as possible. The migration-timing database then consisted of nine years of data for chinook, sockeye, and chum salmon (1976, 1978, 1979, 1981, 1982, 1984, 1985, 1986, and 1988) and eight years of data for coho salmon (1981-1988). The salmon migrations in each year were characterized as early, normal, or late depending on the relationships of the various mean dates to the grand mean date for each species. Early-, normal- and late-run models were used in subsequent years to estimate missing or partial daily counts and total escapement. Since 1988, the migration-timing database has been updated annually and consists of daily and daily cumulative proportions of actual and estimated weir counts of each species for all years with "adequate" operational duration. Years with actual counts less than 50% of total estimated escapement were considered inadequate and omitted from the database. In 1991, the methodology for establishing run-timing models was altered. For each salmon species mentioned above, the historic daily proportions were ranked across years for each day that had either an actual or estimated count. Run-timing models were then based on the 25th (late-run model), 50th (normal-run model), and 75th (early-run model) percentiles of the ranked daily proportions. This modeling method uses historical

information and attempts to incorporate both the relative timing of the midpoint of the run and the rate at which the run develops (i.e., number of days between quartiles). Before an appropriate model was chosen, each model was used to estimate missing total counts. The sum of the model daily proportions for days with actual counts was assumed to be the proportion of the total escapement that was actually counted. Estimates of missing counts were then calculated by multiplying the actual cumulative count by the ratio of the daily model proportion to the total proportion assumed to be actually counted. The final step was a subjective choice of the model. This was accomplished by comparing midpoints of the model and the reconstructed run, and by comparing the daily estimates to surrounding actual counts. The model chosen is based on a visual "best-fit" of the actual data. No attempt was made to partition the estimated daily counts by sex.

Age, Sex and Length

Beginning in 1992, the age, sex and length (ASL) sampling plan was altered to accommodate a "pulse" sampling strategy. The goal of pulse sampling is to collect the samples from each stratum in as short a time as possible and from as many strata as possible. Sample size goals for each time stratum were 210 chinook, 200 chum, and 170 coho salmon. These sample sizes, based on the requirements for multinomial distributions described by Bromaghin (1993), are needed to estimate the true age composition for a given time interval within 10% of the true value ($d = 0.10$) 95% of the time ($\alpha = 0.05$). After the sample size for a species has been reached for a particular stratum another species is sampled. In 1995, five strata of chinook salmon were collected in July and August, seven strata of chum salmon were collected during July, and four strata of coho salmon were collected during August and September. In 1996, three strata of chinook salmon and six strata of chum salmon were collected during July, and five strata of coho salmon were collected during August and September.

Scales, sex and length were taken from salmon that were dipped from the trap while it was closed. Length was measured from mid eye to fork of tail to the nearest 5 mm and sex was determined by inspection of external characteristics. After being sampled, salmon were released on the upstream side of the weir.. Scales were taken from the preferred area (INPFC 1963) and mounted on gum cards. Gum cards were pressed in acetate using methods described by Clutter and Whitesel (1956). Scale impressions were viewed through a microfiche reader and age was determined by visual identification of annuli. Ages were recorded on mark-sense forms which also contained the sex and length data. Completed mark-sense forms were processed through an OPSCAN machine to produce ASCII computer files. These files were then summarized using various custom computer programs. Age, sex, and length compositions of each stratum were weighted by fish passage to provide estimates for the entire escapement.

Meteorological and Hydrological Factors

Water temperature was measured to the nearest 1 °C with a pocket thermometer. Precipitation for the prior 24 hour period was measured to the nearest 1 mm using a standard precipitation gauge (10 to 1 ratio). The amount of cloud cover and wind speed and direction were estimated by the observer. Water level was measured to the nearest 5 mm from a meter stick set at an arbitrary point in the river. The time when the measurements were taken was recorded. Generally, measurements were taken in the morning and evening or at noon.

RESULTS

Weir Operation

1995

The weir was installed and "fish tight" at 1700 hours on 2 July and had to be pulled out for the season at 1630 hours on 6 September due to high water. During this operational period the weir was ineffective due to high water levels from 10 through 15 August and from 2000 hours on 1 September to 1400 hours on 2 September. Due to holes in the weir, daily fish counts may not have been complete on 12 and 27 July, and on 18 and 19 August.

1996

The weir was installed and "fish tight" on 29 June and pulled out on 15 September. During this operational period, the weir was ineffective due to high water levels from 31 July through 1 August and from 11 through 15 August. There were several days when daily fish counts may not have been complete because of holes or missing pickets, however, these holes were fixed promptly.

Chinook Salmon

1995– The actual count of chinook salmon was 10,189 males and 8,687 females (Table 1). A normal-run model (Table 2) was used to estimate counts for days the weir was ineffective except for 1 and 2 September when counts were extrapolated from partial day counts. The estimated portion was 1,774 fish which represents 8.6% of the total escapement estimate of 20,630 fish, which was 106% above the BEG minimum. The midpoint of the run occurred on 10 July, and the overall pattern of fish passage closely followed the historical average (Figure 4). A total of 1,070 female chinook salmon (12.7% of all females counted) were observed with gillnet marks (Table 3). A total of 1,455 carcasses were counted (Table 4). The midpoint of carcass washout occurred on 4 August; 25 days after the upstream migration midpoint.

1996– The actual count of chinook salmon was 8,360 males and 5,406 females (Table 5). An early-run model (Table 2) was used to estimate counts for days the weir was ineffective except for 1 and 2 August when counts were linearly interpolated. The estimated portion was 465 fish or 3.7% of the total escapement estimate of 14,199 fish, which was about 42% above the BEG minimum. The midpoint of the run occurred on 7 July, seven days earlier than normal, and daily fish counts were highest during the first half of the run (Figure 5). A total of 237 female (4.4% of all females counted) and 255 male (2.7% of all males counted) chinook salmon were observed with gillnet marks (Table 6). A total of 1,138 carcasses were counted (Table 7). The midpoint of carcass washout occurred on 5 August; 29 days after the upstream migration midpoint.

Sockeye Salmon

1995– The actual count of sockeye salmon was 7,119 males and 3,463 females (Table 1). A normal-run model (Table 2) was used to estimate counts for days the weir was ineffective. The estimated portion was 415 fish or 3.8% of the total escapement estimate of 10,996 fish. The midpoint of the run occurred on 15 July, and the overall pattern of fish passage closely followed the normal-run model except that daily counts were higher than average on most days (Figure 6). A total of 158 female sockeye salmon (4.6% of all females counted) were observed with gillnet marks (Table 3). A total of 453 carcasses were counted (Table 4). The midpoint carcass washout occurred on 18 August; 34 days after the upstream migration midpoint.

1996– The actual count of sockeye salmon was 10,673 males and 4,421 females (Table 5). A normal-run model (Table 2) was used to estimate counts for days the weir was ineffective except for 1 and 2 August when counts were linearly interpolated. Total counts were also estimated for 8 days prior to weir installation. The estimated portion was 164 fish or 1.1% of the total

escapement estimate of 15,385 fish. The midpoint of the run occurred on 13 July, 2 days earlier than normal and daily fish passage was higher than average during most the run, particularly during the first three quarters of the run (Figure 7). A total of 65 female (1.5% of all females counted) and 110 male (1.0% of all males counted) sockeye salmon were observed with gillnet marks (Table 6). A total of 795 carcasses were counted (Table 7). The midpoint occurred on 19 August; 37 days after the upstream migration midpoint.

Chum Salmon

1995– The actual count of chum salmon was 23,550 males and 5,465 females (Table 1). A normal-run model (Table 2) was used to estimate total counts for days the weir was ineffective. The estimated portion was 2,886 fish or 9.2% of the total escapement estimate of 31,265 fish, which was 4% above the BEG minimum. The midpoint of the run occurred on 14 July, and the overall pattern of fish passage closely followed the normal-run model and historical average daily passage (Figure 8). A total of 282 female chum salmon (5.2% of all females counted) were observed with gillnet marks (Table 3). A total of 9,056 carcasses were counted (Table 4). The midpoint of carcass washout occurred on 27 July; 13 days after the upstream migration midpoint.

1996– The actual count of chum salmon was 39,196 males and 7,920 females (Table 5). An early-run model (Table 2) was used to estimate counts for days the weir was ineffective except for 1 and 2 August when counts were linearly interpolated. The estimated portion was 1,378 fish or 2.8% of the total escapement estimate of 48,494 fish, which was 62% above the BEG minimum. The midpoint of the run occurred on 9 July, four days earlier than normal. Daily fish passage was higher than average during most of the run, particularly during the second quartile (Figure 9). A total of 255 female (3.2% of all females counted) and 351 male (<1.0% of all males counted) chum salmon were observed with gillnet marks (Table 6). A total of 9,874 carcasses were counted. The midpoint of carcass washout occurred on 25 July; 16 days after the upstream migration midpoint.

Coho Salmon

1995– The actual count of coho salmon was 11,763 males and 7,161 females (Table 1). An early-run model (Table 8) was used to estimate counts for days the weir was ineffective. The estimated portion was 10,369 fish or 37% of the total escapement estimate of 27,861 fish, which was 10% above the BEG minimum. The midpoint of the run occurred on 30 August, and the overall pattern of fish passage closely followed the normal-run model except that daily counts were higher than average especially during the peak (Figure 10). A total of 313 female coho salmon (4.4% of all females counted) were observed with gillnet marks (Table 3). Four carcasses were counted, however, the weir was pulled out well before many coho salmon died (Table 4).

1996– The actual count of coho salmon was 25,741 males and 21,278 females (Table 5). A normal-run model (Table 8) shifted 10 d ahead, rather than an early-run model, was used to estimate counts for days the weir was ineffective except for 1 and 2 August when counts were linearly interpolated. The coho migration was the earliest on record (with respect to the midpoint), therefore, the normal-run model was shifted ahead 10 d in an attempt to "match" the unusual run. The estimated portion was 3,544 fish or 7.0% of the total escapement estimate of 50,555 fish, which was double the BEG minimum. The "tail end" of the run was not estimated in this case. The midpoint of the run occurred on 25 August, and daily fish passage was much higher than average during most the run (Figure 11). A total of 653 female (3.0% of all females counted) and 981 male (3.8% of all males counted) coho salmon were observed with gillnet marks (Table 6). A total of 37 carcasses were counted, but the weir was pulled out before many coho salmon died (Table 7).

Age, Sex and Length

Chinook Salmon

1995– ASL data was obtained from 533 live specimens in five temporal strata. The estimated age composition of the escapement was 19.1% age 1.2, 25.5% age 1.3, 55.1% age 1.4, 0.1% age 2.3, 0.2% age 1.5, and 0.1% age 2.4 (Table 9). The weighted mean lengths of females ages 1.2, 1.3, 1.4, and 1.5, were 619 mm, 783 mm, 880 mm, and 947 mm (Table 10). The weighted mean lengths of males ages 1.2, 1.3, 1.4, 2.3, and 2.4 were 598 mm, 727 mm, 855 mm, 875 mm, and 775 mm. The female composition estimated from the ASL samples was 42.9%.

1996– ASL data was obtained from 482 live specimens in three temporal strata. The estimated age composition of the escapement was 12.5% age 1.2, 54.7% age 1.3, 25.3% age 1.4, 0.4% age 2.3, and 7.2% age 1.5 (Table 11). The weighted mean lengths of females ages 1.3, 1.4, and 1.5, were 781 mm, 851 mm, and 910 mm. (Table 12). The weighted mean lengths of males were 583 mm, 716 mm, 814 mm, 777 mm, and 938 mm for ages 1.2, 1.3, 1.4, 2.3, and 1.5. The female composition estimated from the ASL samples was 24.4%.

Chum Salmon

1995– ASL data was obtained from 848 live specimens in seven temporal strata. The estimated age composition of the escapement was 1.4% age 0.2, 45.9% age 0.3, 51.8% age 0.4, and 0.8%

age 0.5 (Table 13). The weighted mean lengths of males age 0.2, 0.3, 0.4, and 0.5 were 552 mm, 569 mm, 599 mm, and 593 mm (Table 14). The weighted mean lengths of females age 0.2, 0.3, 04 were 518 mm, 567 mm, and 574 mm. The female composition estimated from the ASL samples was 13.3%.

1996– ASL data was obtained from 827 live specimens in six temporal strata. The estimated age composition of the escapement was 1.8% age 0.2, 67.8% age 0.3, 28.8% age 0.4, and 1.6% age 0.5 (Table 15). The weighted mean lengths of females age 0.2, 0.3, 0.4 and 0.5 were 580 mm, 581 mm, and 590 mm (Table 16). The weighted mean lengths of males age 0.2, 0.3, 0.4, 0.5 were 588 mm, 605 mm, 622 mm, and 614 mm. The female composition estimated from the ASL samples was 15.4%.

Coho Salmon

1995– ASL data was obtained from 363 live specimens in four temporal strata. The estimated age composition of the escapement was 4.1% age 1.1, 88.5% age 2.1, and 7.0% age 3.1 (Table 17). The weighted mean lengths of males ages 1.1, 2.1, and 3.1 were 559 mm, 554 mm, and 558 mm. The weighted mean lengths of females age 1.1, 2.1, and 3.1 were 580 mm, 561 mm, and 548 mm (Table 18). The composition of females estimated from the ASL samples was 39.1%.

1996– ASL data was obtained from 639 live specimens in five temporal strata. The estimated age composition of the escapement was 3.0% age 1.1, 94.9% age 2.1, 2.1% age 3.1 and one specimen age 2.2 (Table 19). The weighted mean lengths of males age 1.1, 2.1, and 3.1 were 587 mm, 596 mm, and 571 mm. The weighted mean lengths of females age 1.1, 2.1, and 3.1 were 591 mm, 594 mm, and 575 mm (Table 20). The composition of females estimated from the ASL samples was 37%.

Meteorological and Hydrological Factors

During both the 1995 and 1996 weir operation periods, there were no observed meteorological and hydrological conditions that could negatively influence salmon production. Late season rains in 1995 kept water temperature relatively warm and water levels high (Figure 12) which caused an earlier than desired termination of weir operation. Water level in 1996 was relatively moderate and stable (Figure 13).

DISCUSSION

Annual Escapements

Chinook Salmon

Due to conservation and subsistence concerns, chinook salmon have not been targeted in the Kuskokwim River commercial fishery since 1987. Since then, minimum chinook salmon escapement objectives at the Kogrukluk River weir have been achieved in all years except 1988, 1991, and 1992 (Appendix B). As of 1996, the historical average chinook escapement was 10,533 fish. The 1995 escapement estimate (20,630) was the highest on record. A strong chinook run, late start of the commercial fishery and shorter openings were likely factors contributing to high chinook salmon escapements at the Kogrukluk River weir and in other escapement indices in the Kuskokwim River drainage (Burkey et al. *in prep.*). The 1996 escapement estimate was the fourth largest recorded. The higher than average escapement in 1996 could be at least partially attributed to an early run timing and shorter than normal commercial fishery openings with relatively few fishers participating. Commercial harvests of chinook salmon in 1995 and 1996 were well below the most recent 10 year average.

Sockeye Salmon

Historically, sockeye salmon have not been important in the Kuskokwim River subsistence or commercial economies. Annual escapements at the Kogrukluk River weir have been highly variable ranging from 1,670 in 1978 to 29,358 in 1993 (Appendix B). The escapement estimates for 1995 and 1996 were approximately 18% and 65% above the historical average of 9,298.

Chum Salmon

In 1995, information from the Kuskokwim River sonar project at Bethel indicated chum salmon harvest may have exceeded the available drainagewide surplus; however, the Kogrukluk River BEG was reached. In 1996, the minimum escapement objective was exceeded by 62%. Poor market conditions for chum salmon and lack of processing capability, which caused a reduction in fishing time and low participation, were probable reasons the escapement goal minimum was achieved.

Coho Salmon

Run timing and escapement information on coho salmon is difficult to obtain and incomplete because their migration coincides with months having the most precipitation. Consequently, few escapement estimates are based on actual counts of greater than 80% of what is presumed to be the entire run (the Kogrukluk River weir has never operated for the entire coho salmon migration). The 1995 season was no exception with the estimated portion 37% of the approximated total escapement. The return of coho to the weir in 1996 was the earliest and largest recorded. The Kuskokwim River commercial coho catch was also the largest recorded (Burkey et al. *in prep.*) implying a very large total run size of coho salmon.

Gillnet-Marked Salmon

The number of salmon with gillnet marks is collected primarily to index the relative intensity of the commercial and subsistence fisheries. After gillnets were restricted to 6 inch (15 cm) maximum stretch mesh in 1985, there was a slight increase (nonstatistical comparison = NSC) in the mean percentage of gillnet-marked female chinook salmon observed passing the weir (Burkey 1995; Appendix C). Since 1993, however, the percentage of gillnet-marked female chinook salmon has been relatively low, with 1996 having the lowest percentage on record. Annual changes in frequency of gillnet-marked salmon could be caused by several confounding factors such as mean length at age, age composition, run timing, the amount of commercial effort directed at the particular stock, and variability in the skill of observers at the weir. Therefore, changes or apparent trends in the percentage of gillnet-marked salmon at the weir are likely poor indicators of the effectiveness of regulatory changes, such as mesh size and duration and frequency of fishery openers. An exception would be in rather extreme cases such as in 1996. Because of the lack of fishing effort during the majority of the chinook run, exploitation was likely to be very low which may help explain the extreme low percentage of gillnet-marked fish observed at the weir. In previous years, limited attempts to analyze counts of gillnet-marked fish were inconclusive (Schneiderhan 1989).

Age, Sex, and Length

Age compositions of escapements can sometimes be useful for developing stock-recruitment models which can be used to project run size. Unfortunately this is neither possible for any one spawning stock nor the entire Kuskokwim River drainage because stock specific exploitation and

total run size, for most years, is unknown. Age composition information, however, can help predict the relative magnitude of future runs. Strong or weak returns from the younger returning adults may be indicative of the survival of those cohorts, hence, strength of spawner returns from those cohorts in following years. Such interpretations should be made with caution for several reasons: (1) there is a tendency for the age compositions to shift towards younger fish as the run progresses, (2) disparate removal of age classes in the commercial and subsistence fisheries may occur, (3) the thoroughness of the sampling regimen, and (4) seemingly high percentages of one age class could also be caused by low percentages of another.

Chinook Salmon

Most chinook salmon return to the Kuskokwim River as 4, 5, and 6 year old fish (age classes 1.2, 1.3 and 1.4). For the Kogrukluk River, the historical (years 1984 through 1995) mean composition for both sexes combined is 17.8% age 1.2, 42.1% age 1.3, and 37.1% age1.4 (Molyneaux and DuBois 1996). Females are typically older and fewer in number, historically composing 0.3% of age 1.2, 6.9% of age 1.3, 23.7% of age 1.4, and 69% of age 1.5.

The age composition in 1995 had a higher (NSC) percentage of age 1.2 (19%) and 1.4 (55%) and lower percentage of age 1.3 fish (26%) than the historical average. The overall age composition in 1996 had a higher than average (NSC) percent of age 1.3 (55%) and 1.5 (7%, mostly females) fish and lower percentage of age 1.4 (25%) and 1.2 (13%).

The 1995 estimated percent females from the ASL samples (43%) and the weir counts (46%) were similar, suggesting adequate ASL sampling over time. These percentages were well above the 1979 - 1994 average of 31%. In 1996, however, there was a disagreement between the percent females from the ASL samples (24%) and the weir counts (38%). This discrepancy, most severe in the first and third strata, could have three possible causes: (1) by chance or trap selectivity, females were under represented or males over represented in the weir trap when the crew sampled, (2) observer error in identifying sex as fish passed at the weir, or (3) inadequate number of strata and sample sizes for characterizing the run.

Chum Salmon

Most chum salmon return as 4, and 5 year olds (age classes 0.3 and 0.4). For the Kogrukluk River, the historical (years 1971 through 1995, excluding 1974,1975, 1977, 1978, 1979, and 1988) mean percent of age 0.3 is 47.8% and of age 0.4 is 50.2% (Molyneaux and DuBois 1996). In 1995, the proportion of 0.3 (45.9%) and 0.4 (51.8%) age classes was near the historical average. The 1995 proportions of the 0.2 (1.4%) and 0.5 (0.8%) age classes were different (NSC) from the historical averages of 0.4% and 1.6%. Low sample sizes, however, can cause high variability of these percentages. Age compositions of male and female chum salmon are usually

similar proportionally but fewer females than males are observed at the Kogrukluk River weir.

The paucity of female chum salmon has been a concern, especially in 1995 and 1996 when females were only 18.8% and 16.8% of the actual total count, well below the historical mean of 31%. Observer error can be ruled out because of the close agreement between the actual weir counts and ASL samples. Although the female percentages tend to be low at the Kogrukluk River weir, 1995 and 1996 are the fourth and second lowest on record. The lowest ever recorded was 9.6% in 1980. For reasons not understood, the proportion of females at the weir may not be a good representation of the entire Holitna River drainage, but other areas of the drainage have not been sampled. Commercial catches and other escapement assessment projects in the Kuskokwim River drainage do not have such low percentages of females (Molyneaux and DuBois 1996).

Coho Salmon

Most coho salmon return to the Kuskokwim River as 4 year old fish (age class 2.1). For the Kogrukluk River, the historical (years 1991 through 1995) mean age composition is 3.3% age 1.1, 89.8% age 2.1, and 6.7% age 3.1. Age compositions of male and female coho salmon are usually similar but fewer females than males pass the Kogrukluk River weir. The 1995 age composition was similar to the historical average. The 1996 age composition had a higher than average percent of age 2.1 fish (95%) and lower than average percent of age 3.1 (2.1%). With such a large run size a strong age class and, possibly, a concomitant lower than average percent of the other age classes could be expected.

The 1995 estimated percent females from the ASL samples (39%) was close to the historical mean (40%) but did not agree well with the percent females from actual counts (46%). The 1996 percent females from the ASL samples (37%) also did not agree well with the percent females from actual counts (45%). This discrepancy in sex composition between the ASL samples and actual counts could be caused by the same reasons as discussed for chinook salmon.

LITERATURE CITED

Baxter, R. 1981. Ignatti weir construction manual. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region Kuskokwim Escapement Report 28, Anchorage.

Bromaghin, J.F. 1993. Sample size determination for interval estimation of multinomial probabilities. The American Statistician 47 (3): 203 - 206.

Burkey, C.E. Jr. 1995. Kogrukluk River weir salmon escapement report, 1991 - 1994. Regional Information Report No. 3A95-24. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Anchorage.

Burkey, C.E. Jr., and five other authors. *In prep*. Annual management report for the subsistence and commercial fisheries of the Kuskokwim Area 1995. Regional Information Report Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Anchorage.

Burkey, C.E. Jr., editor. 1994. Kuskokwim Area salmon escapement observation catalog, 1984-1994. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Anchorage.

Clutter, R., and L. Whitesel. 1956. Collection and interpretation of sockeye salmon scales. Bulletin of the International North Pacific Fisheries Commission 9.

INFPC (International North Pacific Fisheries Commission). 1963. Annual Report, 1961. Vancouver, British Columbia.

Molyneaux, D. and L. DuBois. 1996. Salmon age, sex, and length, catalog for the Kuskokwim area, 1971-1995. Regional Information Report No. 3A96-31. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Anchorage.

Schneiderhan, D.J. 1989. Kogrukluk weir salmon escapement study, 1988. Regional Information Report No. 3A89-09. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Schneiderhan, D.J., editor. 1983. Kuskokwim stream catalog, 1954-1983. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Table 1. Daily counts of salmon by sex for the Kogrukluk River weir, 1995. Daily total counts with decimals are estimates based on run-timing models developed from historical data, unless noted otherwise.

	Chinook Salmon			Sockeye Salmon			Chum Salmon			Coho Salmon		
Date	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
6/19			2.1			0.0			3.1			
6/20			2.1			0.0			0.0			
6/21			2.1			0.3			3.1			
6/22			6.2			0.6			9.4			
6/23			16.5			1.3			9.4			
6/24			22.7			4.2			15.6			
6/25			43.3			6.4			31.3			
6/26			51.6			6.9			43.8			
6/27			97.0			12.1			62.5			
6/28			136.2			17.2			25.0			
6/29			208.4			43.6			125.1			
6/30			206.3			62.3			181.3			
7/1			416.7			81.3			328.3			
7/2 [a]	11	11	515.8	0	1	147.5	56	25	525.3	0	0	0
7/3	214	99	313	15	16	31	770	143	913	0	0	0
7/4	1,287	737	2,024	163	73	236	1,284	299	1,583	0	0	0
7/5	861	601	1,462	196	187	383	1,640	410	2,050	0	0	0
7/6	1,013	766	1,779	333	204	537	640	494	1,134	0	0	0
7/7	771	535	1,306	299	159	458	1,680	469	2,149	0	0	0
7/8	630	503	1,133	251	179	430	1,134	265	1,399	0	0	0
7/9	363	316	679	305	196	501	572	194	766	0	0	0
7/10	1,029	797	1,826	451	257	708	916	280	1,196	0	0	0
7/11	472	325	797	566	240	806	843	303	1,146	0	0	0
7/12	896	818	1,714	217	120	337	402	153	1,338.5	0	0	0
7/13	379	385	764	272	123	395	1,234	297	1,531	0	0	0
7/14	217	157	375	130	82	212	951	200	1,151	0	0	0
7/15	114	132	246	246	116	362	743	124	867	0	0	0
7/16	363	411	774	441	180	621	861	146	1,007	0	0	0
7/17	346	343	689	458	236	694	1,494	276	1,770	0	0	0
7/18	163	210	373	249	120	369	870	153	1,023	0	0	0
7/19	263	212	475	351	143	494	995	193	1,188	1	1	2
7/20	130	144	274	175	88	263	470	83	553	1	0	1
7/21	117	149	266	343	150	493	874	149	1,023	0	0	0
7/22	145	217	362	312	160	472	781	152	933	1	0	1
7/23	70	81	151	184	74	258	889	126	1,015	1	0	1
7/24	44	90	134	154	62	216	639	88	727	1	0	1
7/25	74	146	220	164	68	232	451	91	542	2	0	2
7/26	50	109	159	102	35	137	292	42	334	1	0	1
7/27	48	87	135	207	51	258	252	54	306	0	0	0
7/28	22	45	67	67	25	92	225	24	249	2	0	2
7/29	11	56	67	95	8	103	261	24	285	0	0	0
7/30	11	65	76	113	38	151	284	45	329	0	1	1
7/31	6	21	27	42	14	56	202	14	216	0	0	0
8/1	5	19	24	36	6	42	158	13	171	1	0	1
8/2	8	17	25	55	15	70	175	31	206	1	0	1
8/3	9	38	47	36	18	54	173	36	209	1	1	2
8/4	5	16	21	31	7	38	88	16	104	1	1	2
8/5	6	5	11	16	3	19	54	5	59	0	1	1
8/6	3	7	10	9	0	9	37	5	42	0	0	0
8/7	2	2	4	6	2	8	42	5	47	0	1	1
8/8	10	5	15	13	4	17	38	6	44	1	1	2
8/9	5	5	10	10	0	10	27	10	37	7	0	7
8/10 [b]			10.3			6.1	26	6	32			67.9
8/11 [b]			10.3			4.3			40.6			74.3
8/12 [b]			14.4			6.6			53.2			140.3
8/13 [b]			6.2			2.8			46.9			194.4
8/14 [b]			4.1			11.6			28.1			162.0
8/15 [b]			2.1			0.0			15.6			220.8
8/16	1	0	1	0	0	0	3	2	5	35	18	241.6
8/17	3	0	3	1	0	1	1	1	2	49	31	80

— continued —

Table 1. (page 2 of 2)

Date	Chinook Salmon			Sockeye Salmon			Chum Salmon			Coho Salmon		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
8/18	1	1	2	0	1	1	3	0	3	200	127	327
8/19	0	0	0	0	2	2	4	3	7	354	167	521
8/20	1	1	2	1	0	1	3	0	3	462	207	669
8/21	2	1	3	1	0	1	0	1	1	556	299	855
8/22	1	0	1	1	0	1	3	0	3	557	261	818
8/23	1	0	1	0	0	0	0	0	0	642	289	931
8/24	0	0	1	0	0	0	4	2	6	583	319	902
8/25	0	0	0	0	0	0	0	0	0	680	322	1,002
8/26	0	0	0	0	0	0	0	2	2	705	411	1,116
8/27	3	0	3	0	0	0	1	0	1	848	350	1,198
8/28	1	1	2	0	0	0	0	1	1	1,178	784	1,962
8/29	1	0	1	0	0	0	1	1	2	766	497	1,263
8/30	0	0	0	0	0	0	0	0	0	1,066	719	1,785
8/31	0	0	0	1	0	1	0	1	1	683	483	1,166
9/1 [c]	1	0	1	0	0	0	1	0	1	562	358	1,104.0 [c]
9/2 [c]	0	1	1	0	0	0	0	0	0	263	196	1,101.6 [c]
9/3	0	0	0	0	0	0	1	2	3	405	344	749
9/4	0	0	0	0	0	0	0	0	0	469	434	903
9/5	0	0	0	1	0	1	2	0	2	357	273	630
9/6 [d]	0	0	0	0	0	0	0	0	0	321	265	586
9/7												894.7
9/8												904.4
9/9												976.8
9/10												699.7
9/11												250.7
9/12												782.4
9/13												526.9
9/14												363.9
9/15												160.9
9/16												195.8
9/17												240.7
9/18												274.6
9/19												100.1
9/20												214.1
9/21												255.4
9/22												35.8
9/23												72.7
9/24												22.2
9/25												29.7
9/26												1.4
9/27												3.3
9/28												6.1
9/29												3.9
9/30												3.9
10/1												5.5
10/2												8.3
10/3												14.4
10/4												14.4
Total	10,189	8,687	20,630	7,119	3,463	10,996	23,550	5,465	31,265	11,763	7,161	27,861

[a] Weir was installed 1700 hours.

[b] Weir was ineffective due to high water.

[c] Pickets were pulled at 2000 hours and replaced at 1400 hours on 2 Sept.; estimates extrapolated from partial day counts.

Table 2. Run-timing models (cumulative proportion) used in 1995 and 1996 to calculate missing total daily counts of salmon for the Kogrukluk River weir.

	1995			1996		
Date	Chinook (early)	Sockeye (normal)	Chum (normal)	Chinook (early)	Sockeye (normal)	Chum (early)
6/18	0.0000		0.0000			0.0000
6/19	0.0001		0.0001	0.0000		0.0001
6/20	0.0002		0.0001	0.0001		0.0002
6/21	0.0003	0.0000	0.0002	0.0002	0.0000	0.0004
6/22	0.0006	0.0001	0.0005	0.0003	0.0001	0.0009
6/23	0.0014	0.0002	0.0008	0.0006	0.0002	0.0016
6/24	0.0025	0.0006	0.0013	0.0014	0.0006	0.0023
6/25	0.0046	0.0012	0.0023	0.0025	0.0012	0.0033
6/26	0.0071	0.0018	0.0037	0.0046	0.0018	0.0058
6/27	0.0118	0.0029	0.0057	0.0071	0.0029	0.0091
6/28	0.0184	0.0044	0.0065	0.0118	0.0044	0.0138
6/29	0.0285	0.0084	0.0105	0.0184	0.0084	0.0226
6/30	0.0385	0.0141	0.0163	0.0285	0.0141	0.0359
7/1	0.0587	0.0215	0.0268	0.0385	0.0215	0.0579
7/2	0.0837	0.0349	0.0436	0.0587	0.0349	0.0819
7/3	0.1347	0.0505	0.0651	0.0837	0.0505	0.1114
7/4	0.1631	0.0670	0.0967	0.1347	0.0670	0.1452
7/5	0.2091	0.0851	0.1173	0.1631	0.0851	0.1966
7/6	0.2424	0.1126	0.1549	0.2091	0.1126	0.2450
7/7	0.2918	0.1417	0.2100	0.2424	0.1417	0.2743
7/8	0.3522	0.1863	0.2713	0.2918	0.1863	0.3242
7/9	0.4109	0.2368	0.3264	0.3522	0.2368	0.3743
7/10	0.4660	0.2943	0.3669	0.4109	0.2943	0.4371
7/11	0.5255	0.3503	0.4416	0.4660	0.3503	0.4849
7/12	0.6183	0.4056	0.4927	0.5255	0.4056	0.5365
7/13	0.6409	0.4653	0.5352	0.6183	0.4653	0.5784
7/14	0.6801	0.5251	0.5723	0.6409	0.5251	0.6321
7/15	0.7650	0.5860	0.6225	0.6801	0.5860	0.6886
7/16	0.8169	0.6402	0.6709	0.7650	0.6402	0.7363
7/17	0.8426	0.6885	0.7077	0.8169	0.6885	0.7647
7/18	0.8776	0.7297	0.7496	0.8426	0.7297	0.8032
7/19	0.8889	0.7602	0.7735	0.8776	0.7602	0.8147
7/20	0.9084	0.7899	0.8013	0.8889	0.7899	0.8322
7/21	0.9271	0.8221	0.8333	0.9084	0.8221	0.8727
7/22	0.9346	0.8470	0.8557	0.9271	0.8470	0.8895
7/23	0.9441	0.8671	0.8693	0.9346	0.8671	0.9063
7/24	0.9502	0.8887	0.8777	0.9441	0.8887	0.9227
7/25	0.9568	0.9067	0.8953	0.9502	0.9067	0.9309
7/26	0.9655	0.9197	0.9053	0.9568	0.9197	0.9399
7/27	0.9730	0.9321	0.9159	0.9655	0.9321	0.9498
7/28	0.9754	0.9457	0.9286	0.9730	0.9457	0.9579
7/29	0.9801	0.9573	0.9402	0.9754	0.9573	0.9653
7/30	0.9830	0.9666	0.9494	0.9801	0.9666	0.9717
7/31	0.9855	0.9739	0.9562	0.9830	0.9739	0.9787
8/1	0.9873	0.9800	0.9611	0.9855	0.9800	0.9847
8/2	0.9898	0.9850	0.9670	0.9873	0.9850	0.9888
8/3	0.9925	0.9884	0.9726	0.9898	0.9884	0.9917
8/4	0.9935	0.9909	0.9785	0.9925	0.9909	0.9935
8/5	0.9947	0.9925	0.9824	0.9935	0.9925	0.9943
8/6	0.9956	0.9943	0.9845	0.9947	0.9943	0.9951
8/7	0.9962	0.9955	0.9873	0.9956	0.9955	0.9958
8/8	0.9971	0.9965	0.9891	0.9962	0.9965	0.9966
8/9	0.9977	0.9971	0.9908	0.9971	0.9971	0.9977
8/10	0.9982	0.9977	0.9926	0.9977	0.9977	0.9981
8/11	0.9987	0.9981	0.9939	0.9982	0.9981	0.9984
8/12	0.9994	0.9987	0.9956	0.9987	0.9987	0.9988
8/13	0.9997	0.9989	0.9971	0.9994	0.9989	0.9994
8/14	0.9999	1.0000	0.9980	0.9997	1.0000	0.9995
8/15	1.0000	1.0000	0.9985	0.9999		0.9995
8/16	0.9990	1.0000	0.9989	1.0000		0.9996
8/17	0.9992	1.0000	0.9993			0.9997
8/18	0.9994	1.0000	0.9995			0.9998
8/19	0.9995	1.0000	0.9996			0.9999
8/20	0.9996	1.0000	0.9997			1.0000
8/21	0.9996	1.0000	0.9998			
8/22	0.9997		0.9998			
8/23	0.9998		0.9999			
8/24	0.9999		0.9999			
8/25	1.0000		0.9999			
8/26			1.0000			

Table 3. Daily counts of gillnet-marked female salmon for the Kogrukluk River weir, 1995.

Date	Chinook	Sockeye	Coho	Chum
7/2	1	0	0	0
7/3	21	0	0	8
7/4	76	2	0	6
7/5	42	4	0	3
7/6	49	3	0	5
7/7	42	2	0	12
7/8	46	2	0	9
7/9	31	10	0	4
7/10	109	9	0	21
7/11	33	6	0	11
7/12	75	3	0	4
7/13	43	5	0	6
7/14	38	2	0	10
7/15	19	6	0	8
7/16	53	7	0	9
7/17	62	9	0	21
7/18	30	5	0	15
7/19	57	2	0	10
7/20	26	4	0	8
7/21	31	11	0	15
7/22	34	12	0	14
7/23	28	7	0	13
7/24	16	8	0	9
7/25	18	1	0	8
7/26	26	10	0	6
7/27	15	5	0	5
7/28	10	3	0	9
7/29	5	5	0	1
7/30	9	6	0	6
7/31	6	1	0	7
8/1	7	2	0	3
8/2	4	3	0	2
8/3	4	1	0	4
8/4	1	2	0	6
8/5	0	0	0	1
8/6	0	0	0	0
8/7	0	0	0	0
8/8	0	0	1	2
8/9	1	0	0	1
8/10				
8/11				
8/12				
8/13				
8/14				
8/15				
8/16	0	0	1	0
8/17	0	0	0	0
8/18	0	0	0	0
8/19	0	0	9	0
8/20	0	0	5	0
8/21	0	0	10	0
8/22	0	0	11	0
8/23	0	0	10	0
8/24	0	0	14	0
8/25	0	0	14	0
8/26	0	0	17	0
8/27	0	0	22	0
8/28	2	0	18	0
8/29	0	0	15	0
8/30	0	0	37	0
8/31	0	0	36	0
9/1	0	0	21	0
9/2	0	0	6	0
9/3	0	0	20	0
9/4	0	0	28	0
9/5	0	0	18	0
Total	1,070	158	313	282
% of All Females	12.3	4.6	4.4	5.2

Table 4. Daily salmon carcass counts for the Kogrukluk River weir, 1995 and 1996.

	Chinook		Sockeye		Chum		Coho	
Date	1995	1996	1995	1996	1995	1996	1995	1996
6/29		0		0		0		0
6/30		0		0		0		0
7/1		0		0		3		0
7/2		0		0		5		0
7/3	0	1	0	0	2	3	0	0
7/4	0	0	0	0	2	7	0	0
7/5	0	0	0	0	5	7	0	0
7/6	0	0	0	0	0	24	0	0
7/7	0	0	0	0	4	19	0	0
7/8	0	0	0	1	6	20	0	0
7/9	0	0	0	0	17	29	0	0
7/10	0	0	1	0	9	26	0	0
7/11	0	0	0	0	23	31	0	0
7/12	0	1	0	0	46	75	0	0
7/13	1	0	0	0	69	87	0	0
7/14	1	0	0	1	122	239	0	0
7/15	0	0	1	0	108	165	0	0
7/16	4	0	0	0	286	209	0	0
7/17	0	1	0	0	330	198	0	0
7/18	1	2	1	0	317	344	0	0
7/19	0	2	0	0	364	368	0	0
7/20	4	0	0	0	502	427	0	0
7/21	1	5	0	0	238	428	0	0
7/22	5	4	0	0	345	567	0	0
7/23	3	16	0	0	457	586	0	0
7/24	11	7	0	1	306	681	0	0
7/25	24	32	1	1	441	893	0	0
7/26	29	28	1	0	457	745	0	0
7/27	41	41	1	0	507	586	0	0
7/28	45	65	1	2	480	619	0	0
7/29	50	119	3	1	386	745	0	0
7/30	80	107	6	0	591	651	0	0
7/31	61		4		422		0	
8/1	57		3		311		0	
8/2	103	0	8	0	543	0	0	0
8/3	120	40	12	0	277	70	0	0
8/4	122	91	17	8	186	133	0	2
8/5	168	80	22	6	252	120	0	0
8/6	140	103	15	13	162	152	0	0
8/7	145	77	10	15	155	115	0	0

- continued -

Table 4. (page 2 of 2)

	Chinook		Sockeye		Chum		Coho	
Date	1995	1996	1995	1996	1995	1996	1995	1996
8/8	101	85	28	30	125	136	0	0
8/9	93	60	30	25	96	87	0	0
8/10		78		35		127		0
8/11								
8/12								
8/13								
8/14								
8/15		0		0		0		0
8/16		37		41		16		0
8/17	11	13	43	83	8	17	0	1
8/18	13	12	32	61	10	28	0	1
8/19	2	8	52	72	12	18	0	1
8/20	5	3	26	41	18	13	2	0
8/21	2	3	34	41	5	12	0	0
8/22	3	1	18	48	10	8	0	0
8/23	1	1	15	41	7	9	0	0
8/24	0	1	16	40	4	4	0	0
8/25	0	0	12	34	9	1	0	0
8/26	3	2	12	28	5	3	0	0
8/27	3	0	0	18	8	2	0	0
8/28	2	1	3	20	2	1	1	0
8/29	0	0	8	20	6	3	0	0
8/30	0	0	5	18	1	3	0	0
8/31	0	1	1	9	0	3	1	0
9/1		0		16		1		0
9/2		1		0		0		0
9/3	0	2	8	1	2	1	0	0
9/4	0	1	3	2	0	2	0	0
9/5		0		4		0		0
9/6		0		2		0		0
9/7		2		4		0		0
9/8		1		4		0		1
9/9		1		2		1		2
9/10		1		1		0		3
9/11		0		3		0		6
9/12		0		1		1		8
9/13		0		1		0		4
9/14		1		0		0		4
9/15		0		0		0		4
Total	3,450	3,134	2,448	2,791	11,051	11,870	1,999	2,033

Table 5. Daily counts of salmon by sex for the Kogrukluk River weir, 1996. Daily total counts with decimals are estimates based on run-timing models developed from historical data, unless noted otherwise.

	Chinook Salmon				Sockeye Salmon			Chum Salmon			Coho Salmon		
Date	Male	Female	Jack	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
6/19										4.9			
6/20				1.5						0.0			
6/21				1.5						9.7			
6/22				4.4			0.8			24.3			
6/23				11.6			1.9			34.1			
6/24				16.0			5.9			34.1			
6/25				30.5			8.9			48.6			
6/26				36.3			9.6			121.6			
6/27				68.2			16.8			160.5			
6/28				95.7			24.0			228.6			
6/29 [a]	17	13	7	146.5	1	0	60.9	84	17	428.1	0	0	0
6/30	42	38	19	80	10	0	10	146	59	205	0	0	0
7/1	163	101	19	264	52	23	75	910	224	1,134	0	0	0
7/2	666	332	53	998	226	31	257	2,710	345	3,055	0	0	0
7/3	547	284	43	831	304	81	385	2,622	212	2,834	0	0	0
7/4	261	136	49	397	196	47	243	1,970	242	2,212	0	0	0
7/5	1,020	444	167	1,464	339	113	452	3,229	308	3,537	0	0	0
7/6	1,083	605	166	1,688	447	89	536	2,482	386	2,868	0	0	0
7/7	1,151	637	177	1,788	632	174	806	2,300	386	2,686	0	0	0
7/8	521	359	75	880	510	136	646	3,344	355	3,699	0	0	0
7/9	355	328	65	683	664	441	1,105	770	507	1,277	0	0	0
7/10 [b]	280	272	42	552	602	343	945	2,134	336	2,470	0	0	0
7/11	171	168	18	339	557	397	954	1,324	187	1,511	0	0	0
7/12	264	154	21	418	599	309	908	1,457	297	1,754	0	0	0
7/13	429	286	41	715	1,055	484	1,539	2,509	555	3,064	0	0	0
7/14	291	224	21	515	780	342	1,122	1,514	540	2,054	0	0	0
7/15	156	128	3	282	508	313	821	1,004	362	1,366	0	0	0
7/16	112	69	6	181	268	190	458	955	436	1,391	0	0	0
7/17	134	103	27	237	249	119	368	1,050	551	1,601	0	0	0
7/18	131	96	14	227	220	79	299	751	282	1,033	0	0	0
7/19	130	130	20	260	272	113	385	673	191	864	0	0	0
7/20	37	51	4	88	160	49	209	488	140	628	1	0	1
7/21	80	100	15	180	269	101	370	901	238	1,139	2	0	2
7/22	51	47	8	98	195	73	268	493	76	569	1	2	3
7/23	33	23	3	56	180	53	233	666	148	814	0	0	0
7/24	37	40	6	77	199	52	251	435	48	483	1	1	2
7/25	42	57	10	99	248	60	308	232	33	265	3	3	6
7/26	14	17	4	31	56	11	67	163	19	182	3	0	3
7/27	15	10	4	25	102	15	117	101	16	117	0	3	3
7/28	12	15	0	27	80	19	99	313	42	355	4	11	15
7/29 [c]	24	28	7	52	204	32	236	514	83	597	13	12	25
7/30	45	54	16	99	201	43	244	346	69	415	47	36	83
7/31 [d]	4	15	1	19	69	12	81	150	40	190	13	13	26
8/1 [e]				16.0 [h]			71			170.0 [h]			54.0 [h]
8/2 [f]	0	0	0	12.0 [h]	3	1	61	0	0	151.0 [h]	3	5	82.0 [h]
8/3	3	6	1	9	34	17	51	103	28	131	64	46	110

– continued –

Table 5. (page 2 of 2)

Date	Chinook Salmon				Sockeye Salmon			Chum Salmon			Coho Salmon		
	Male	Female	Jack	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
8/4	4	3	0	7	27	5	32	80	19	99	21	20	41
8/5	1	1	0	2	26	12	38	54	4	53	25	11	36
8/6	3	3	1	6	36	11	47	60	22	82	123	92	215
8/7	3	5	0	8	21	10	31	39	12	51	95	56	151
8/8	8	2	2	10	15	8	23	41	9	50	81	59	140
8/9	2	0	1	2	7	2	9	16	8	24	154	91	245
8/10	10	4	3	14	24	7	31	29	31	60	355	251	606
8/11 [g]				7.3			6.1			14.6			613.4
8/12 [g]				10.2			9.2			19.5			900.5
8/13 [g]				4.4			3.9			29.2			868.9
8/14 [g]				2.9			16.2			4.9			1,025.5
8/15	5	0	3	5	5	2	7	8	8	16	573	550	1,123
8/16	0	1	0	1	1	0	1	3	2	5	680	704	1,384
8/17	0	0	1	0	2	0	2	1	1	2	838	635	1,473
8/18	0	1	0	1	5	0	5	3	2	5	580	527	1,107
8/19	0	0	0	0	0	0	0	2	4	6	581	454	1,035
8/20	1	2	0	3	1	0	1	2	2	4	1,205	937	2,142
8/21	1	1	0	2	0	0	0	3	5	8	1,509	1,001	2,510
8/22	1	2	0	3	2	0	2	3	2	5	1,411	1,136	2,547
8/23	0	4	0	4	2	2	4	1	5	6	1,489	1,176	2,665
8/24	0	1	0	1	1	0	1	0	1	1	1,382	1,036	2,418
8/25	0	0	0	0	1	0	1	1	6	7	1,528	1,199	2,727
8/26	0	2	0	2	2	0	2	1	2	3	1,370	976	2,346
8/27	0	1	0	1	0	0	0	1	1	2	1,168	785	1,953
8/28	0	1	0	1	0	0	0	0	1	1	1,382	1,048	2,430
8/29	0	1	0	1	0	0	0	0	2	2	777	598	1,375
8/30	0	0	0	0	0	0	0	0	1	1	1,157	899	2,056
8/31	0	0	0	0	0	0	0	0	1	1	1,138	960	2,098
9/1	0	0	0	0	2	0	2	1	1	2	1,114	890	2,004
9/2	0	1	0	1	0	0	0	0	2	2	1,035	913	1,948
9/3	0	0	0	0	1	0	1	1	0	1	779	713	1,492
9/4	0	0	0	0	0	0	0	0	0	0	504	486	990
9/5	0	0	0	0	0	0	0	0	0	0	418	472	890
9/6	0	0	0	0	1	0	1	0	0	0	439	468	907
9/7	0	0	0	0	0	0	0	2	0	2	478	557	1,035
9/8	0	0	0	0	0	0	0	0	1	1	364	411	775
9/9	0	0	0	0	0	0	0	0	1	1	198	319	517
9/10	0	0	0	0	0	0	0	0	3	3	229	231	460
9/11	0	0	0	0	0	0	0	1	0	1	152	193	345
9/12	0	0	0	0	0	0	0	0	2	2	107	123	230
9/13	0	0	0	0	0	0	0	0	1	1	55	73	128
9/14	0	0	0	0	0	0	0	0	0	0	52	64	116
9/15	0	0	0	0	0	0	0	0	0	0	40	32	72
Total	8,360	5,406	1,143	14,199	10,673	4,421	15,385	39,196	7,920	48,494	25,741	21,278	50,555

[a] Weir installed at 2000 hours, total counts estimated.

[b] One picket accidentally left out from 2230 to 2330 hours.

[c] Hole in weir from 2200 to 2330 hours.

[d] Removed five sections of weir at 2215 hours.

[e] No counts made - high water.

[f] Re-installed weir sections at 2015 hours.

[g] Weir not operated.

[h] Total counts are estimated by linear interpolation.

Table 6. Daily counts by sex of gillnet-marked salmon for the Kogrukluk River weir, 1996.

	Chinook Salmon			Sockeye Salmon			Chum Salmon			Coho Salmon		
Date	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
29-Jun	0	0	0	0	0	0	1	1	2	0	0	0
30-Jun	2	2	4	0	0	0	7	2	9	0	0	0
1-Jul	7	9	16	3	0	3	29	13	42	0	0	0
2-Jul	27	36	63	8	8	16	67	80	147	0	0	0
3-Jul	6	42	48	0	9	9	7	87	94	0	0	0
4-Jul	4	2	6	7	0	7	1	0	1	0	0	0
5-Jul	14	16	30	17	5	22	17	5	22	0	0	0
6-Jul	27	22	49	12	6	18	48	20	68	0	0	0
7-Jul	42	19	61	8	4	12	16	12	28	0	0	0
8-Jul	9	6	15	2	0	2	10	5	15	0	0	0
9-Jul	5	2	7	8	11	19	38	7	45	0	0	0
10-Jul	5	4	9	7	3	10	12	2	14	0	0	0
11-Jul	2	0	2	2	6	8	8	1	9	0	0	0
12-Jul	7	4	11	6	0	6	12	2	14	0	0	0
13-Jul	8	9	17	11	1	12	11	1	12	0	0	0
14-Jul	18	8	26	3	3	6	12	4	16	0	0	0
15-Jul	9	5	14	2	0	2	2	0	2	0	0	0
16-Jul	9	3	12	2	1	3	3	3	6	0	0	0
17-Jul	5	8	13	0	1	1	4	0	4	0	0	0
18-Jul	4	5	9	1	0	1	0	1	1	0	0	0
19-Jul	15	5	20	3	2	5	3	0	3	0	0	0
20-Jul	2	8	10	0	2	2	6	0	6	0	0	0
21-Jul	10	3	13	0	0	0	2	1	3	0	0	0
22-Jul	2	6	8	0	0	0	3	0	3	0	0	0
23-Jul	3	2	5	3	0	3	2	1	3	0	0	0
24-Jul	3	3	6	0	0	0	6	0	6	0	0	0
25-Jul	3	2	5	2	3	5	1	0	1	0	0	0
26-Jul	1	0	1	0	0	0	1	0	1	0	0	0
27-Jul	1	0	1	2	0	2	2	0	2	0	0	0
28-Jul	1	1	2	0	0	0	5	0	5	0	0	0
29-Jul	2	1	3	0	0	0	1	0	1	0	0	0
30-Jul	1	2	3	1	0	1	3	0	3	0	0	0
31-Jul	0	1	1	0	0	0	2	0	2	0	0	0
1-Aug												
2-Aug	0	0	0	0	0	0	0	0	0	0	0	0
3-Aug	0	0	0	0	0	0	1	0	1	0	0	0
4-Aug	1	0	1	0	0	0	1	0	1	0	0	0
5-Aug	0	0	0	0	0	0	1	0	1	0	0	0
6-Aug	0	0	0	0	0	0	1	0	1	0	0	0
7-Aug	0	1	1	0	0	0	0	0	0	0	0	0
8-Aug	0	0	0	0	0	0	0	0	0	0	0	0
9-Aug	0	0	0	0	0	0	0	0	0	0	0	0
10-Aug	0	0	0	0	0	0	0	0	0	0	1	1
11-Aug												
12-Aug												
13-Aug												
14-Aug												
15-Aug	0	0	0	0	0	0	0	0	0	9	7	16
16-Aug	0	0	0	0	0	0	0	0	0	9	7	16
17-Aug	0	0	0	0	0	0	1	1	2	15	5	20
18-Aug	0	0	0	0	0	0	0	1	1	4	5	9
19-Aug	0	0	0	0	0	0	1	0	1	12	9	21
20-Aug	0	0	0	0	0	0	0	1	1	19	21	40
21-Aug	0	0	0	0	0	0	0	1	1	28	23	51
22-Aug	0	0	0	0	0	0	0	0	0	29	24	53
23-Aug	0	0	0	0	0	0	1	0	1	46	27	73
24-Aug	0	0	0	0	0	0	0	1	1	34	22	56
25-Aug	0	0	0	0	0	0	0	1	1	44	27	71

- continued -

Table 6. (page 2 of 2)

	Chinook Salmon			Sockeye Salmon			Chum Salmon			Coho Salmon		
Date	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
26-Aug	0	0	0	0	0	0	0	0	0	37	26	63
27-Aug	0	0	0	0	0	0	0	0	0	28	28	56
28-Aug	0	0	0	0	0	0	0	0	0	44	32	76
29-Aug	0	0	0	0	0	0	0	0	0	33	29	62
30-Aug	0	0	0	0	0	0	0	0	0	40	29	69
31-Aug	0	0	0	0	0	0	0	0	0	45	28	73
1-Sep	0	0	0	0	0	0	0	0	0	69	26	95
2-Sep	0	0	0	0	0	0	2	0	2	72	35	107
3-Sep	0	0	0	0	0	0	0	0	0	45	35	80
4-Sep	0	0	0	0	0	0	0	0	0	35	26	61
5-Sep	0	0	0	0	0	0	0	0	0	55	18	73
6-Sep	0	0	0	0	0	0	0	0	0	37	30	67
7-Sep	0	0	0	0	0	0	0	0	0	52	22	74
8-Sep	0	0	0	0	0	0	0	0	0	40	25	65
9-Sep	0	0	0	0	0	0	0	1	1	26	23	49
10-Sep	0	0	0	0	0	0	0	0	0	18	15	33
11-Sep	0	0	0	0	0	0	0	0	0	24	18	42
12-Sep	0	0	0	0	0	0	0	0	0	11	11	22
13-Sep	0	0	0	0	0	0	0	0	0	7	13	20
14-Sep	0	0	0	0	0	0	0	0	0	7	2	9
15-Sep	0	0	0	0	0	0	0	0	0	7	4	11
Total	255	237	492	110	65	175	351	255	606	981	653	1,634
Percent	2.7	4.4	3.6	1.0	1.5	1.2	0.9	3.2	1.3	3.8	3.1	3.5

Table 7. Run-timing models (cumulative proportion) used in 1995 and 1996 to calculate missing or partial daily counts of coho salmon for the Kogrukluk River weir.

Date	1995 (early)	1996 (10 d early)
7/20	0.0000	0.0000
7/21	0.0000	0.0000
7/22	0.0000	0.0001
7/23	0.0000	0.0001
7/24	0.0000	0.0002
7/25	0.0001	0.0006
7/26	0.0001	0.0010
7/27	0.0001	0.0012
7/28	0.0001	0.0021
7/29	0.0002	0.0043
7/30	0.0004	0.0061
7/31	0.0008	0.0080
8/1	0.0010	0.0133
8/2	0.0016	0.0164
8/3	0.0021	0.0183
8/4	0.0028	0.0283
8/5	0.0037	0.0355
8/6	0.0047	0.0418
8/7	0.0061	0.0493
8/8	0.0080	0.0636
8/9	0.0102	0.0778
8/10	0.0126	0.0861
8/11	0.0153	0.0981
8/12	0.0204	0.1158
8/13	0.0274	0.1328
8/14	0.0332	0.1529
8/15	0.0412	0.1671
8/16	0.0499	0.1847
8/17	0.0598	0.2124
8/18	0.0773	0.2259
8/19	0.0981	0.2407
8/20	0.1188	0.2643
8/21	0.1386	0.3119
8/22	0.1578	0.3278
8/23	0.1867	0.3687
8/24	0.2254	0.4170
8/25	0.2686	0.4462
8/26	0.3203	0.5079
8/27	0.3825	0.5421
8/28	0.4246	0.5714
8/29	0.4645	0.6050
8/30	0.4948	0.6710
8/31	0.5257	0.7049
9/1	0.5633	0.7164
9/2	0.6004	0.7373
9/3	0.6453	0.7989
9/4	0.6741	0.8138
9/5	0.7160	0.8301
9/6	0.7452	0.8613
9/7	0.7774	0.8921
9/8	0.8100	0.9133
9/9	0.8453	0.9306
9/10	0.8705	0.9426
9/11	0.8795	0.9630
9/12	0.9077	0.9732
9/13	0.9267	0.9832
9/14	0.9399	0.9873
9/15	0.9457	0.9913
9/16	0.9527	
9/17	0.9614	
9/18	0.9713	
9/19	0.9749	
9/20	0.9826	
9/21	0.9918	
9/22	0.9931	
9/23	0.9957	
9/24	0.9965	
9/25	0.9976	
9/26	0.9977	
9/27	0.9978	
9/28	0.9980	
9/29	0.9981	
9/30	0.9983	
10/1	0.9985	
10/2	0.9988	
10/3	0.9993	
10/4	0.9998	

Table 8. Percent age composition by sex and time stratum of chinook salmon sampled at the Kogrukluk River weir, 1995.

Sample Dates	Sample		Age Class						
(Stratum Dates)	Size	Sex	1.2	1.3	1.4	2.3	1.5	2.4	All
7/6 - 8	151	M	23.2	19.9	19.9	0.0	0.0	0.0	62.9
(7/2 - 9)		F	2.0	7.3	27.8	0.0	0.0	0.0	37.1
		Subtotal	25.2	27.2	47.7	0.0	0.0	0.0	100.0
7/12 - 14	138	M	16.7	18.8	21.7	0.0	0.0	0.0	57.2
(7/10 - 16)		F	0.0	5.8	37.0	0.0	0.0	0.0	42.8
		Subtotal	16.7	24.6	58.7	0.0	0.0	0.0	100.0
7/18 - 20	146	M	11.0	14.4	22.6	0.0	0.0	0.0	47.9
(7/17 - 22)		F	0.7	10.3	40.4	0.0	0.7	0.0	52.1
		Subtotal	11.6	24.7	63.0	0.0	0.7	0.0	100.0
7/25 - 26	72	M	6.9	13.9	16.7	1.4	0.0	0.0	38.9
(7/23 - 29)		F	0.0	5.6	54.2	0.0	1.4	0.0	61.1
		Subtotal	6.9	19.5	70.8	1.4	1.4	0.0	100.0
8/1, 3, 5, 9	26	M	7.7	19.2	11.5	0.0	0.0	3.8	42.3
(7/30 - 9/2)		F	0.0	3.8	53.8	0.0	0.0	0.0	57.7
		Subtotal	7.7	23.1	65.4	0.0	0.0	3.8	100.0
Season [a]	533	M	18.1	18.3	20.6	0.1	0.0	0.1	57.1
		F	1.0	7.2	34.5	0.0	0.2	0.0	42.9
		Total	19.1	25.5	55.1	0.1	0.2	0.1	100.0

[a] Season summaries are weighted by fish passage during each stratum.

Table 9. Mean length (mm) by age, sex, and stratum of chinook salmon sampled at the Kogrukluk River weir, 1995.

Sample Dates (Stratum Dates)	Sex		Age Class 1.2	1.3	1.4	2.3	1.5	2.4
7/6 - 8 (7/2 - 9)	M	Mean Length	609	712	857			
		Std. Error	10	15	19			
		Range	510- 740	580- 875	690- 1010			
		Sample Size	35	30	30	0	0	0
	F	Mean Length	625	791	871			
		Std. Error	8	21	8			
		Range	610- 635	705- 885	710- 985			
		Sample Size	3	11	38	0	0	0
7/12 - 14 (7/10 - 16)	M	Mean Length	576	733	871			
		Std. Error	8	10	17			
		Range	515- 660	605- 840	725- 1035			
		Sample Size	23	26	30	0	0	0
	F	Mean Length		760	889			
		Std. Error		20	8			
		Range		690- 840	750- 985			
		Sample Size	0	8	51	0	0	0
7/18 - 20 (7/17 - 22)	M	Mean Length	602	756	822			
		Std. Error	12	18	17			
		Range	515- 680	625- 900	550- 1020			
		Sample Size	16	21	33	0	0	0
	F	Mean Length	570	785	881		905	
		Std. Error	0	13	7		0	
		Range	570- 570	720- 885	740- 1000		905- 905	
		Sample Size	1	15	59	0	1	0
7/25 - 26 (7/23 - 29)	M	Mean Length	587	754	865	875		
		Std. Error	14	13	25	0		
		Range	555- 630	660- 815	745- 1050	875- 875		
		Sample Size	5	10	12	1	0	0
	F	Mean Length		795	889		1020	
		Std. Error		15	8		0	
		Range		760- 825	770- 965		1020- 1020	
		Sample Size	0	4	39	0	1	0
8/1, 3, 5, 9 (7/30 - 9/2)	M	Mean Length	518	756	810			775
		Std. Error	18	26	23			0
		Range	500- 535	680- 845	765- 840			775- 775
		Sample Size	2	5	3	0	0	10
	F	Mean Length		840	866			
		Std. Error		0	10			
		Range		840- 840	795- 935			
		Sample Size	0	1	14	0	0	0
Season [a]	M	Mean Length	598	727	855	875		775
		Range	500- 740	580- 900	550- 1050	875- 875		775- 775
		Sample Size	81	92	108	1	0	1
	F	Mean Length	619	783	880		947	
		Range	570- 635	690- 885	710- 1000		905- 1020	
		Sample Size	4	39	201	0	2	0

[a] Season summaries are weighted by fish passage during each stratum.

Table 10. Percent age composition by sex and time stratum of chinook salmon sampled at the Kogrukluk River weir, 1996.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 1.2	1.3	1.4	2.3	1.5	All
7/3 -6	157	M	15.9	52.9	10.2	0.6	0.6	80.3
(6/20 - 7/8)		F	0.0	5.1	9.6	0.0	5.1	19.7
		Subtotal	15.9	58.0	19.7	0.6	5.7	100.0
7/12- 13	163	M	9.2	49.7	12.9	0.0	2.5	74.2
(7/9 - 14)		F	0.0	3.7	16.6	0.0	5.5	25.8
		Subtotal	9.2	53.4	29.5	0.0	8.0	100.0
7/16 - 19	162	M	3.7	35.8	17.9	0.0	1.2	58.6
(7/15 - 9/2)		F	0.0	7.4	23.5	0.0	10.5	41.4
		Subtotal	3.7	43.2	41.4	0.0	11.7	100.0
Season [a]	482	M	12.5	49.5	12.0	0.4	1.1	75.6
		F	0.0	5.1	13.3	0.0	6.0	24.4
		Total	12.5	54.7	25.3	0.4	7.2	100.0

[a] Season summaries are weighted by fish passage during each stratum.

Table 11. Mean length (mm) by age, sex, and stratum of chinook salmon sampled at the Kogrukluk River weir, 1996.

Sample Dates (Stratum Dates)	Sex		Age Class 1.2	1.3	1.4	2.3	1.5
7/3 -6	M	Mean Length	589	707	809	777	958
(6/20 - 7/8)		Std. Error	10	6	22	0	0
		Range	503- 757	572- 854	702- 1011	777- 777	958- 958
		Sample Size	25	83	16	1	1
	F	Mean Length		759	844		907
		Std. Error		18	23		57
		Range		685- 847	700- 992		574- 1072
		Sample Size	0	8	15	0	8
7/12- 13	M	Mean Length	560	737	819		921
(7/9 - 14)		Std. Error	14	5	16		29
		Range	440- 648	662- 931	724- 983		857- 996
		Sample Size	15	81	21	0	4
	F	Mean Length		798	851		904
		Std. Error		19	15		19
		Range		710- 834	512- 940		825- 978
		Sample Size		6	27	0	9
7/16 - 19	M	Mean Length	572	729	818		949
(7/15 - 9/2)		Std. Error	28	8	11		60
		Range	461- 674	613- 842	660- 915		889- 1009
		Sample Size	6	58	29	0	2
	F	Mean Length		829	864		921
		Std. Error		13	8		13
		Range		705- 879	782- 983		830- 1009
		Sample Size	0	12	38	0	17
Season [a]	M	Mean Length	583	716	814	777	938
		Range	440- 757	572- 931	660- 1011	777- 777	857- 1009
		Sample Size	46	222	66	1	7
	F	Mean Length		781	851		910
		Range		685- 879	512- 992		574- 1072
		Sample Size	0	26	80	0	34

[a] Season summaries are weighted by fish passage during each stratum.

Table 12. Percent age composition by sex and time stratum of chum salmon sampled at the Kogrukluk River weir, 1995.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 0.2	0.3	0.4	0.5	All
7/4 - 5	140	M	0.0	27.9	50.7	2.1	80.7
(7/2 - 6)		F	0.0	8.6	10.7	0.0	19.3
		Subtotal	0.0	36.5	61.4	2.1	100.0
7/9 - 10	126	M	0.8	29.4	61.1	0.0	91.3
(7/7 - 13)		F	0.0	1.6	7.1	0.0	8.7
		Subtotal	0.8	31.0	68.2	0.0	100.0
7/16 - 17	137	M	2.2	45.3	37.2	0.0	84.7
(7/14 - 18)		F	0.0	9.5	5.8	0.0	15.3
		Subtotal	2.2	54.8	43.0	0.0	100.0
7/20 - 21	131	M	0.0	52.7	33.6	2.3	88.6
(7/19 - 24)		F	0.0	7.6	3.8	0.0	11.4
		Subtotal	0.0	60.3	37.4	2.3	100.0
7/27 - 28	128	M	3.9	56.3	28.1	0.0	88.3
(7/25 - 31)		F	0.8	6.3	4.7	0.0	11.8
		Subtotal	4.7	62.5	32.8	0.0	100.0
8/2 - 3	110	M	5.5	48.2	28.2	0.0	81.9
(8/1 - 5)		F	1.8	14.5	1.8	0.0	18.1
		Subtotal	7.3	62.7	30.0	0.0	100.0
8/6, 8, 10	76	M	7.9	42.1	21.1	0.0	71.1
(8/6 - 9/3)		F	7.9	15.8	5.3	0.0	28.9
		Subtotal	15.8	57.9	26.3	0.0	100.0
Season [a]	848	M	1.2	39.4	45.3	0.8	86.7
		F	0.2	6.5	6.6	0.0	13.3
		Total	1.4	45.9	51.8	0.8	100.0

[a] Season summaries are weighted by fish passage during each stratum.

Table 13. Mean length (mm) by age, sex, and stratum of chum salmon sampled at the Kogrukluk River weir, 1995.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
7/4 - 5	M	Mean Length		591	604	613
(7/2 - 6)		Std. Error		8	3	7
		Range		360- 695	535- 685	600- 625
		Sample Size	0	39	71	3
	F	Mean Length		569	568	
		Std. Error		6	10	
		Range		530- 600	450- 605	
		Sample Size	0	12	15	0
7/9 - 10	M	Mean Length	585	590	601	
(7/7 - 13)		Std. Error	0	5	3	
		Range	585- 585	535- 650	515- 675	
		Sample Size	1	37	77	0
	F	Mean Length		558	591	
		Std. Error		23	7	
		Range		535- 580	545- 610	
		Sample Size	0	2	9	0
7/16 - 17	M	Mean Length	560	520	597	
(7/14 - 18)		Std. Error	28	5	4	
		Range	525- 615	500- 680	525- 650	
		Sample Size	3	62	51	0
	F	Mean Length		580	572	
		Std. Error		7	9	
		Range		535- 610	545- 600	
		Sample Size	0	13	7	0
7/20 - 21	M	Mean Length		581	597	573
(7/19 - 24)		Std. Error		4	6	23
		Range		530- 650	525- 680	550- 620
		Sample Size	0	69	44	3
	F	Mean Length		562	555	
		Std. Error		9	12	
		Range		520- 620	520- 580	
		Sample Size	0	10	5	0
7/27 - 28	M	Mean Length	524	577	586	
(7/25 - 31)		Std. Error	11	3	4	
		Range	490- 550	525- 660	535- 645	
		Sample Size	5	72	36	
	F	Mean Length	525	560	572	0

- continued -

Table 13. (page 2 of 2)

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
		Std. Error	0	6	11	
		Range	525- 525	525- 575	545- 610	
		Sample Size	1	8	6	0
8/2 - 3	M	Mean Length	540	570	572	
(8/1 - 5)		Std. Error	6	3	6	
		Range	525- 565	510- 625	490- 640	
		Sample Size	6	53	31	0
	F	Mean Length	513	559	555	
		Std. Error	3	7	20	
		Range	510- 515	490- 605	535- 575	
		Sample Size	2	16	2	0
8/6, 8, 10	M	Mean Length	538	575	586	
(8/6 - 9/3)		Std. Error	6	4	9	
		Range	520- 560	525- 615	525- 650	
		Sample Size	6	32	16	0
	F	Mean Length	515	526	533	
		Std. Error	13	7	3	
		Range	470- 565	480- 565	525- 540	
		Sample Size	6	12	4	0
Season [a]	M	Mean Length	552	569	599	593
		Range	490- 615	360- 695	490- 685	550- 620
		Sample size	21	364	326	6
	F	Mean Length	518	567	574	
		Range	470- 565	480- 620	450- 610	
		Sample size	9	73	48	0

[a] Season summaries are weighted by fish passage during each stratum.

Table 14. Percent age composition by sex and time stratum of chum salmon sampled at the Kogrukluk River weir, 1996.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 0.2	0.3	0.4	0.5	All
7/2	136	M	0.7	44.1	40.4	2.9	88.2
(6/19 - 7/5)		F	2.2	7.4	2.2	0.0	11.8
		Subtotal	2.9	51.5	42.6	2.9	100.0
7/8- 9	122	M	1.6	57.4	23.8	2.5	85.2
(7/6-7/11)		F	0.0	10.7	4.1	0.0	14.8
		Subtotal	1.6	68.0	27.9	2.5	100.0
7/13 - 14	151	M	0.0	60.9	17.9	0.0	78.8
(7/12 - 17)		F	0.7	14.6	6.0	0.0	21.2
		Subtotal	0.7	75.5	23.8	0.0	100.0
7/21 - 22	149	M	1.3	69.1	14.1	0.0	84.6
(7/18 - 24)		F	0.0	12.1	3.4	0.0	15.4
		Subtotal	1.3	81.2	17.4	0.0	100.0
7/26, 28 - 29	149	M	1.3	77.9	6.7	0.0	85.9
(7/25 - 31)		F	0.7	12.1	1.3	0.0	14.1
		Subtotal	2.0	89.9	8.1	0.0	100.0
8/3 - 7	120	M	1.7	75.0	7.5	0.8	85.0
(8/1 - 9/13)		F	0.0	12.5	1.7	0.8	15.0
		Subtotal	1.7	87.5	9.2	1.7	100.0
Season [a]	827	M	1.0	57.0	25.0	1.6	84.6
		F	0.8	10.9	3.7	0.0	15.4
		Total	1.8	67.8	28.8	1.6	100.0

[a] Season summaries are weighted by fish passage during each stratum.

Table 15. Mean length (mm) by age, sex, and stratum of chum salmon sampled at the Kogrukluk River weir, 1996.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
7/2	M	Mean Length	565	613	623	628
(6/19 - 7/5)		Std. Error	0	4	3	14
		Range	565- 565	565- 674	570- 665	589- 650
		Sample Size	1	60	55	4
	F	Mean Length	576	584	569	
		Std. Error	15	9	23	
		Range	556- 605	535- 625	532- 610	
		Sample Size	3	10	3	0
7/8- 9	M	Mean Length	609	607	630	598
(7/6-7/11)		Std. Error	45	3	6	3
		Range	564- 654	555- 683	575- 692	595- 605
		Sample Size	2	69	29	3
	F	Mean Length		591	596	
		Std. Error		5	9	
		Range		568- 630	575- 625	
		Sample Size		13	5	0
7/13 - 14	M	Mean Length		604	614	
(7/12 - 17)		Std. Error		3	5	
		Range		524- 694	565- 683	
		Sample Size		92	27	0
	F	Mean Length	590	573	600	
		Std. Error	0	4	11	
		Range	590- 590	545- 600	553- 637	
		Sample Size	1	21	9	0
7/21 - 22	M	Mean Length	560	598	606	
(7/18 - 24)		Std. Error	2	2	4	
		Range	558- 561	518- 643	556- 644	
		Sample Size	2	102	21	0
	F	Mean Length		581	578	
		Std. Error		9	10	
		Range		498- 638	547- 595	
		Sample Size		18	5	0
7/26, 28 - 29	M	Mean Length	563	592	607	
(7/25 - 31)		Std. Error	21	3	8	
		Range	542- 583	523- 674	564- 650	
		Sample Size	2	116	10	0
	F	Mean Length	606	568	570	
		Std. Error	0	5	2	
		Range	606- 606	537- 603	568- 571	
		Sample Size	1	17	2	0
8/3 - 7	M	Mean Length	591	585	595	580
(8/1 - 9/13)		Std. Error	10	3	7	0
		Range	581- 600	527- 656	562- 631	580- 580
		Sample Size	2	89	9	1
	F	Mean Length		567	545	566
		Std. Error		6	16	0
		Range		500- 610	529- 560	566- 566
		Sample Size		15	2	1
Season [a]	M	Mean Length	588	605	622	614
		Range	542- 654	518- 694	556- 692	580- 650
		Sample size	9	528	151	8
	F	Mean Length	580	581	590	566
		Range	556- 606	498- 638	529- 637	566- 566
		Sample size	5	94	26	1

[a] Season summaries are weighted by fish passage during each stratum.

Table 16. Percent age composition by sex and time stratum of coho salmon sampled at the Kogrukluk River weir, 1995.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 1.1	2.1	3.1	All
8/17- 18	95	M	8.4	55.8	1.1	65.3
(7/19 - 8/19)		F	5.3	25.3	4.2	34.7
		Subtotal	13.7	81.1	5.3	100.0
8/22- 23	103	M	1.9	63.1	5.8	70.9
(8/20- 26)		F	0.0	29.1	0.0	29.1
		Subtotal	1.9	92.2	5.8	100.0
8/30- 31	101	M	3.9	47.6	3.9	56.3
(8/27 - 9/2)		F	1.0	37.9	4.9	43.7
		Subtotal	4.9	85.4	8.7	100.0
9/5- 6	64	M	1.6	48.4	1.6	51.6
(9/3- 6)		F	1.6	43.8	3.1	48.4
		Subtotal	3.1	92.2	4.7	100.0
Season [a]	363	M	3.1	53.3	4.0	60.9
		F	1.0	35.2	2.9	39.1
		Total	4.1	88.5	7.0	100.0

[a] Season summaries are weighted by fish passage during each stratum.

Table 17. Mean length (mm) by age, sex, and stratum of coho salmon sampled at the Kogrukluk River weir, 1995.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/17- 18	M	Mean Length	545	554	585
(7/19 - 8/19)		Std. Error	7	6	0
		Range	520- 575	435- 625	585- 585
		Sample Size	8	53	1
	F	Mean Length	552	565	573
		Std. Error	19	6	19
		Range	490- 585	495- 620	540- 625
		Sample size	5	24	4
8/22- 23	M	Mean Length	560	545	564
(8/20- 26)		Std. Error	20	4	12
		Range	540- 580	465- 595	515- 600
		Sample Size	2	65	6
	F	Mean Length		561	
		Std. Error		5	
		Range		500- 610	
		Sample Size	0	30	0
8/30- 31	M	Mean Length	565	558	555
(8/27 - 9/2)		Std. Error	16	5	18
		Range	535- 600	495- 620	510- 595
		Sample Size	4	49	4
	F	Mean Length	600	557	545
		Std. Error	0	3	24
		Range	600- 600	510- 585	450- 580
		Sample Size	1	39	5
9/5- 6	M	Mean Length	535	568	530
(9/3- 6)		Std. Error	0	6	0
		Range	535- 535	520- 630	530- 530
		Sample Size	1	31	1
	F	Mean Length		570	553
		Std. Error		6	18
		Range		470- 640	535- 570
		Sample Size		28	2
Season [a]	M	Mean Length	559	554	558
		Range	520- 600	435- 630	510- 600
		Sample Size	15	198	12
	F	Mean Length	580	561	548
		Range	490- 600	470- 640	450- 625
		Sample Size	6	121	11

[a] Season summaries are weighted by fish passage during each stratum.

Table 18. Percent age composition by sex and time stratum of coho salmon sampled at the Kogrukluk River weir, 1996.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 1.1	2.1	3.1	All
8/3 - 8	38	M	0.0	86.8	0.0	86.8
(7/20 - 8/12)		F	0.0	13.2	0.0	13.2
		Subtotal	0.0	100.0	0.0	100.0
8/17 - 19	160	M	3.1	60.0	1.9	65.0
(8/13 - 23)		F	0.6	33.8	0.6	35.0
		Subtotal	3.8	93.8	2.5	100.0
8/27 - 28	148	M	2.7	58.1	0.7	61.5
(8/24 - 9/2)		F	0.7	37.2	0.7	38.5
		Subtotal	3.4	95.3	1.4	100.0
9/7 - 8	150	M	1.3	48.7	2.0	52.0
(9/3 - 10)		F	0.0	46.0	2.0	48.0
		Subtotal	1.3	94.7	4.0	100.0
9/13 - 16	143	M	2.1	53.1	0.7	56.6
(9/11 - 15)		F	0.7	37.8	4.9	43.4
		Subtotal	2.8	90.9	5.6	100.0
Season [a]	639	M	2.5	59.3	1.2	63.0
		F	0.5	35.6	0.9	37.0
		Total	3.0	94.9	2.1	100.0

[a] Season summaries are weighted by fish passage during each stratum.

Table 19. Mean length (mm) by age, sex, and stratum of coho salmon sampled at the Kogrukluk River weir, 1996.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	2.2	3.1
8/3 - 8 (7/20 - 8/12)	M	Mean Length		596		
		Std. Error		6		
		Range		530- 670		
		Sample Size	0	33	0	0
	F	Mean Length		578		
		Std. Error		14		
		Range		535- 620		
		Sample Size	0	5	0	0
8/17 - 19 (8/13 - 23)	M	Mean Length	580	590		549
		Std. Error	16	3		21
		Range	540- 625	495- 655		507- 575
		Sample Size	5	96	0	3
	F	Mean Length	585	590		570
		Std. Error	0	3		0
		Range	585- 585	535- 640		570- 570
		Sample Size	1	54	0	1
8/27 - 28 (8/24 - 9/2)	M	Mean Length	589	598		595
		Std. Error	6	3		0
		Range	580- 605	505- 655		595- 595
		Sample Size	4	86	0	1
	F	Mean Length	595	597		573
		Std. Error	0	3		0
		Range	595- 595	520- 665		573- 573
		Sample Size	1	55	0	1
9/7 - 8 (9/3 - 10)	M	Mean Length	620	604		600
		Std. Error	5	3		13
		Range	615- 625	520- 680		580- 625
		Sample Size	2	73	0	3
	F	Mean Length		599		570
		Std. Error		3		42
		Range		505- 650		490- 630
		Sample Size	0	69	0	3
9/13 - 16 (9/11 - 15)	M	Mean Length	589	586	555	590
		Std. Error	5	4	0	0
		Range	580- 598	498- 690	555- 555	590- 590
		Sample Size	3	76	1	1
	F	Mean Length	600	596		609
		Std. Error	0	4		8
		Range	600- 600	540- 655		565- 630
		Sample Size	1	54	0	7
Season [a]	M	Mean Length	587	596	555	571
		Range	540- 670	495- 690	555- 555	507- 625
		Sample Size	14	364	1	8
	F	Mean Length	591	594		575
		Range	585- 600	505- 665		490- 630
		Sample Size	3	237	0	12

[a] Season summaries are weighted by fish passage during each stratum.

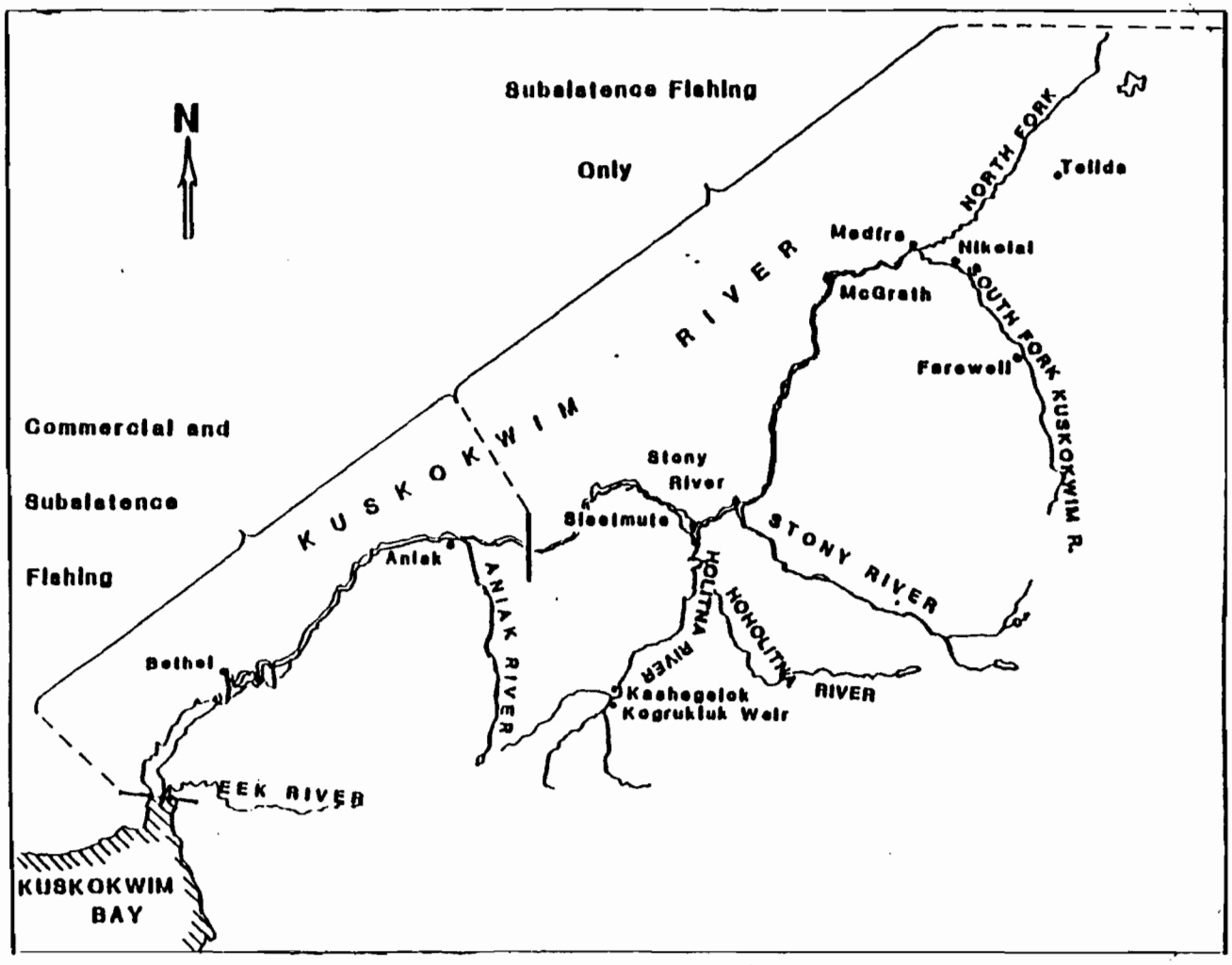

Figure 1. Kuskokwim River map.

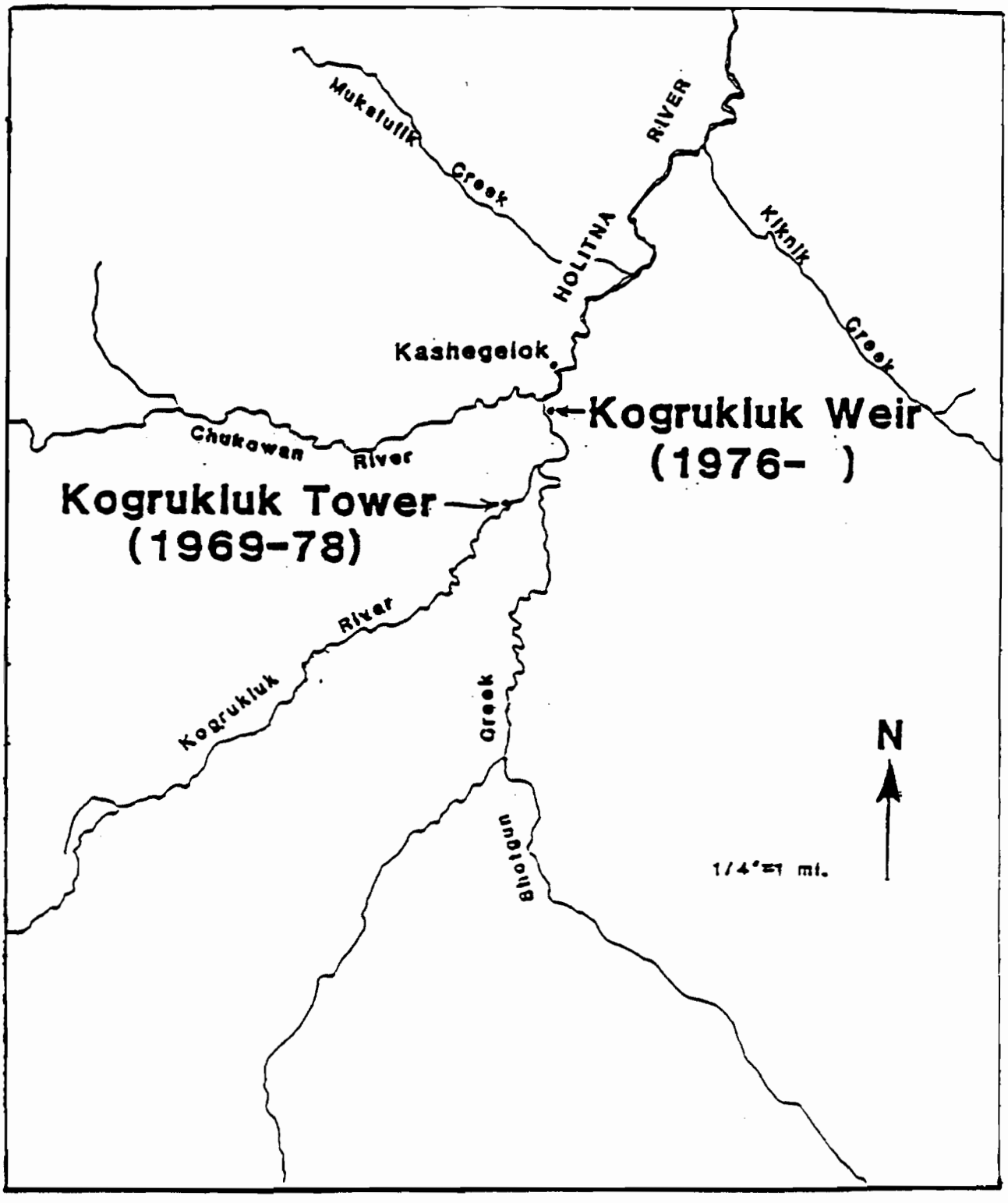

Figure 2. Upper Holitna River and location of the Kogrukluk River weir.

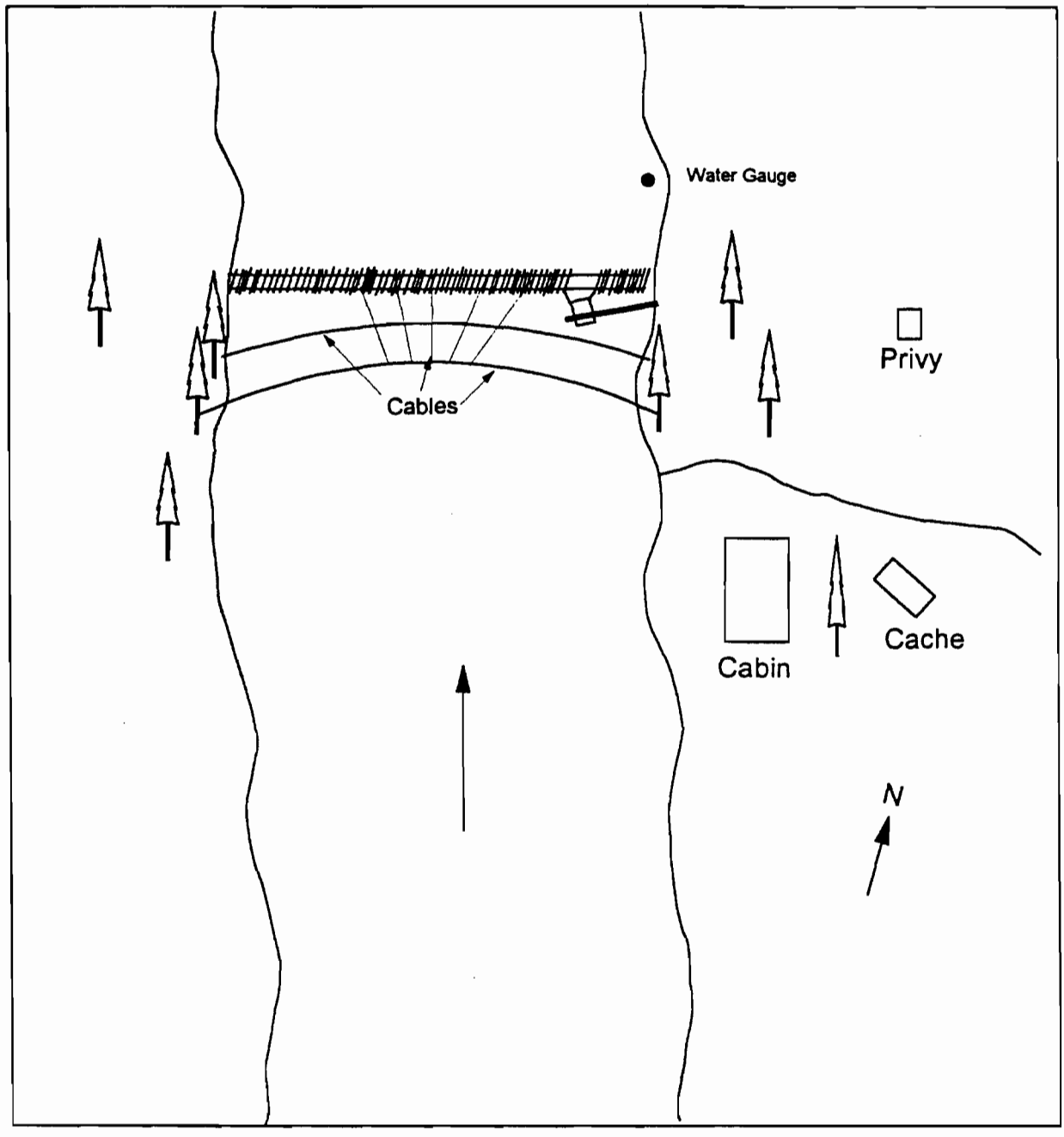

Figure 3. Schematic of the Kogrukluk River weir.

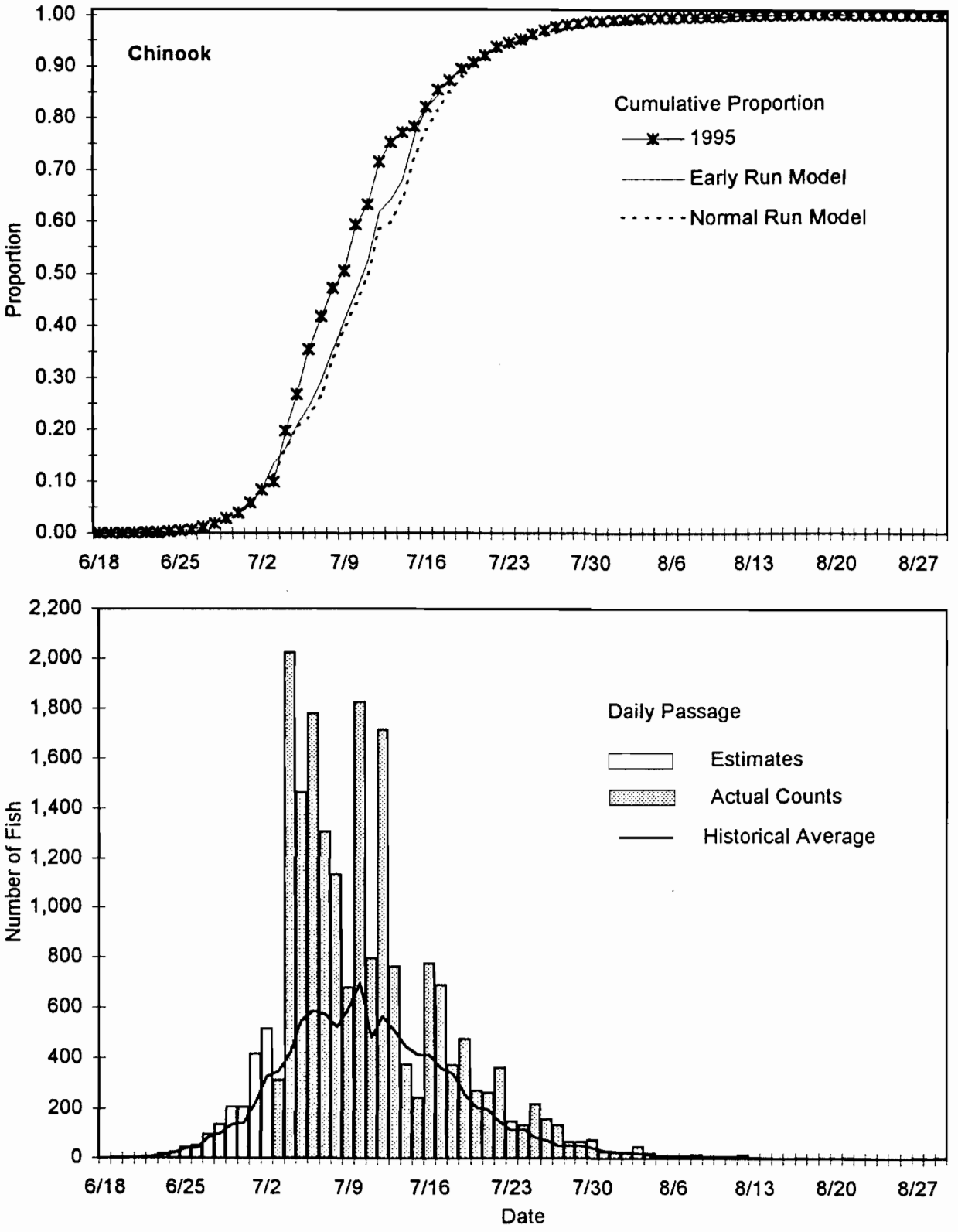

Figure 4. Chinook salmon run timing (top) and total daily passage (bottom) at the Kogrukluk River weir, 1995.

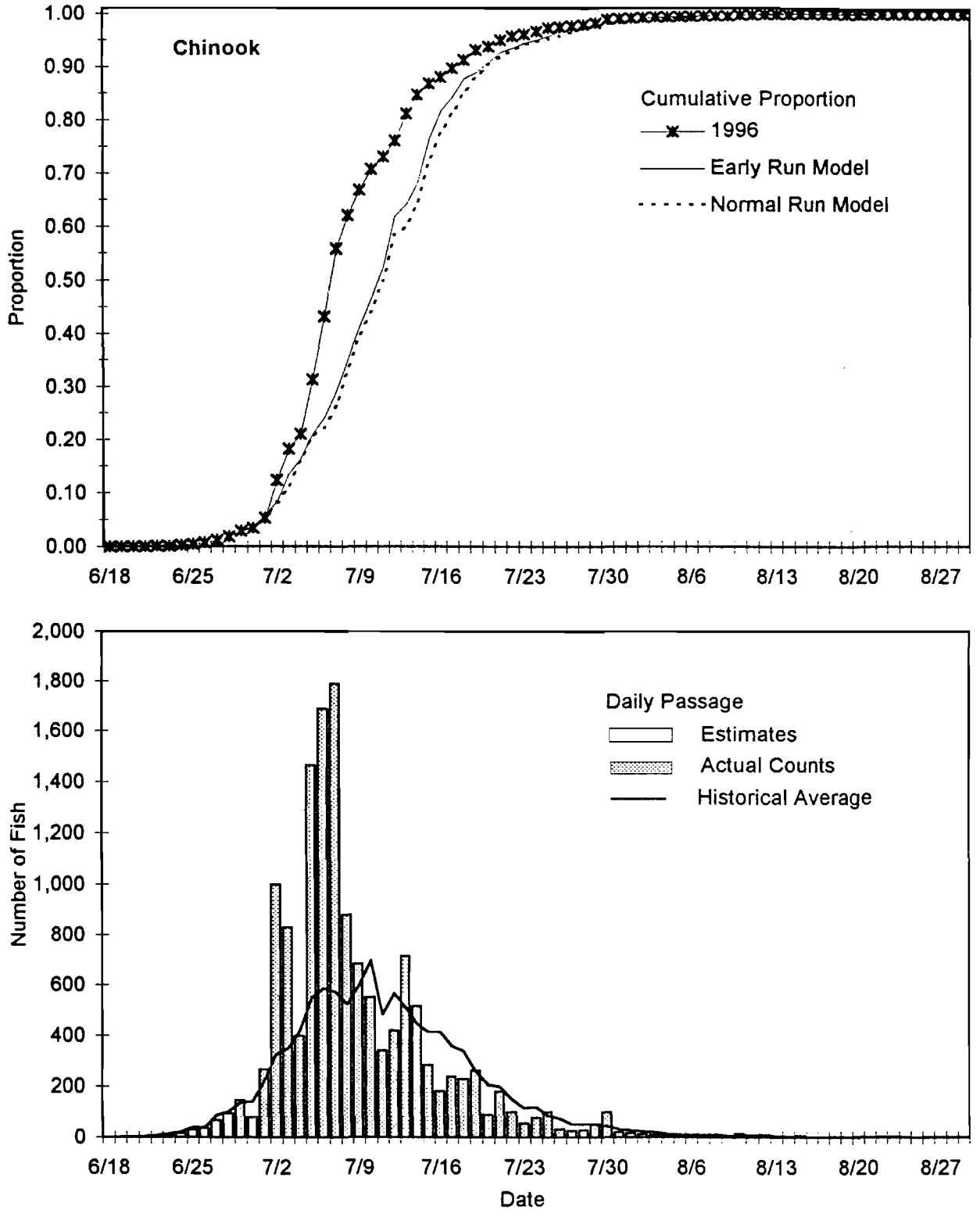

Figure 5. Chinook salmon run timing (top) and total daily passage (bottom) at the Kogrukluk River weir, 1996.

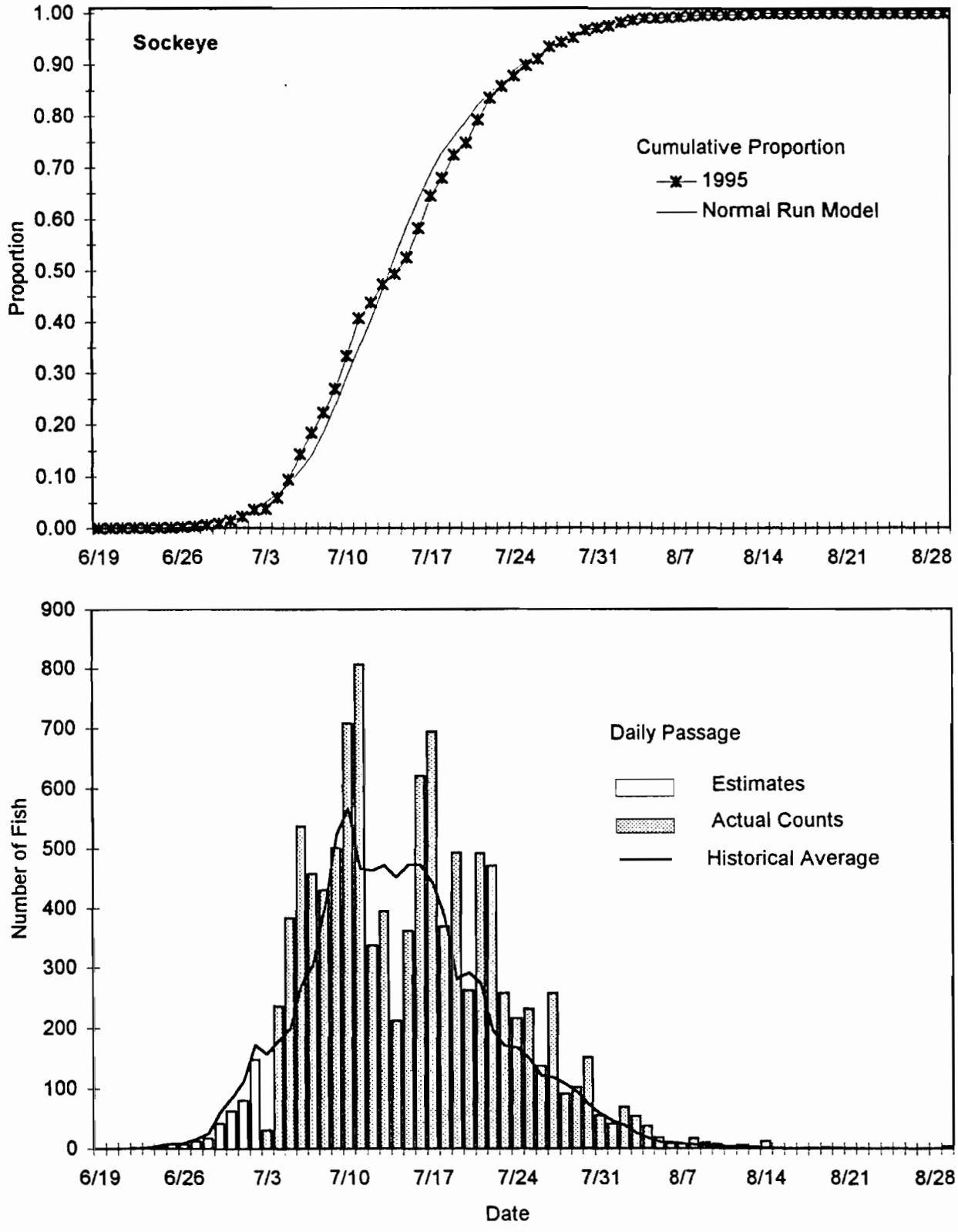

Figure 6. Sockeye salmon run timing (top) and total daily passage (bottom) at the Kogrukluk River weir, 1995.

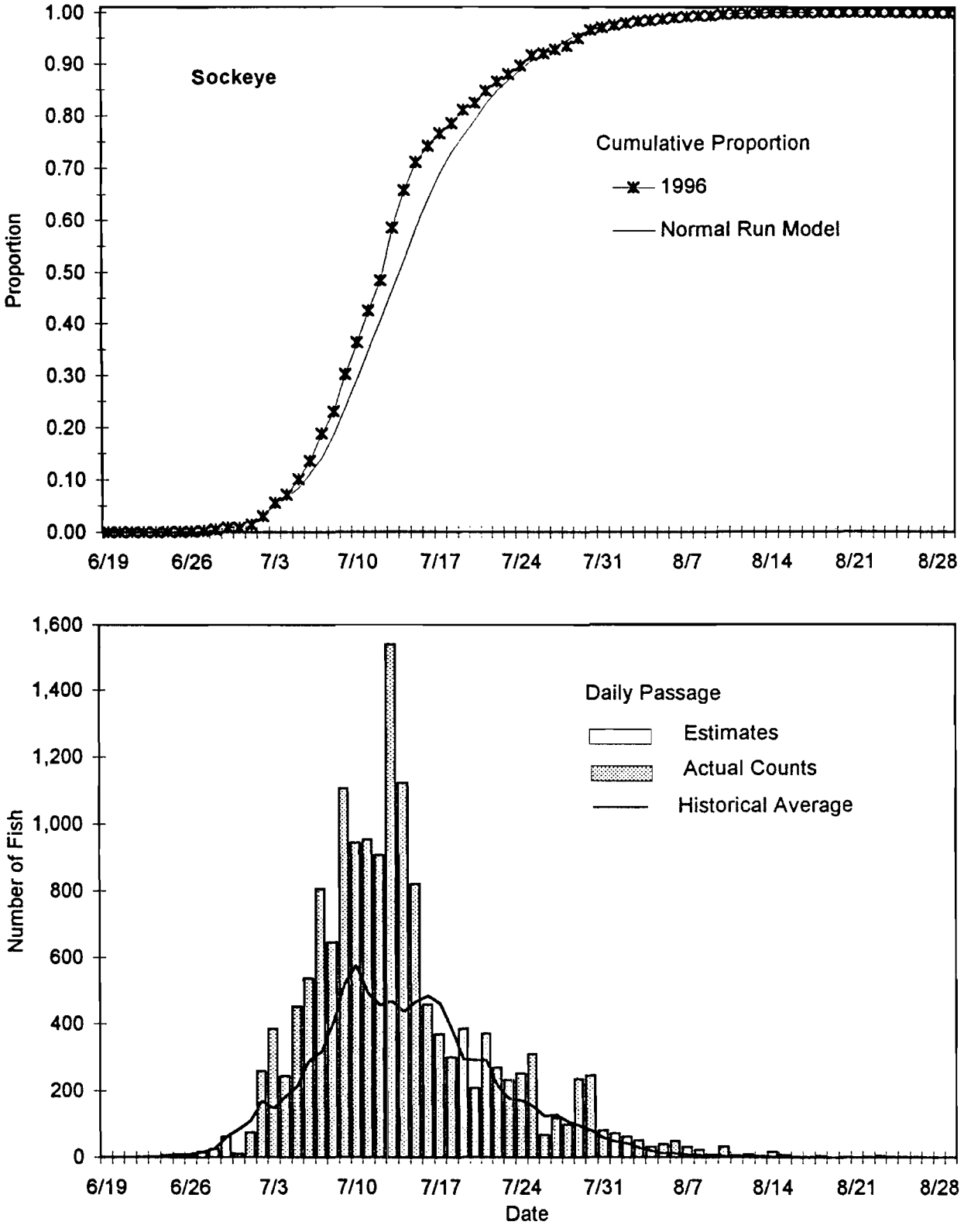

Figure 7. Sockeye salmon run timing (top) and total daily passage (bottom) at the Kogrukluk River weir, 1996.

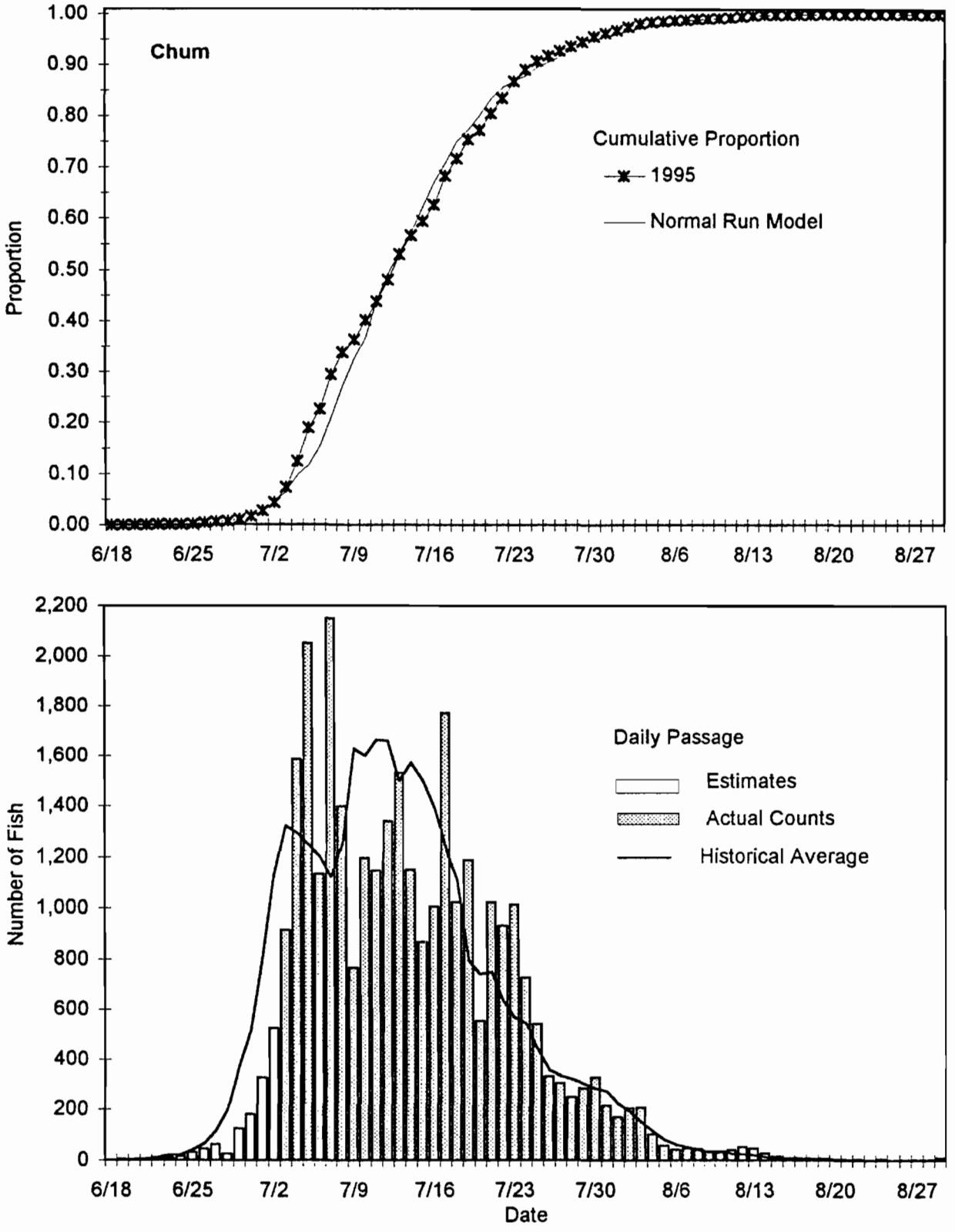

Figure 8. Chum salmon run timing (top) and total daily passage (bottom) at the Kogrukluk River weir, 1995.

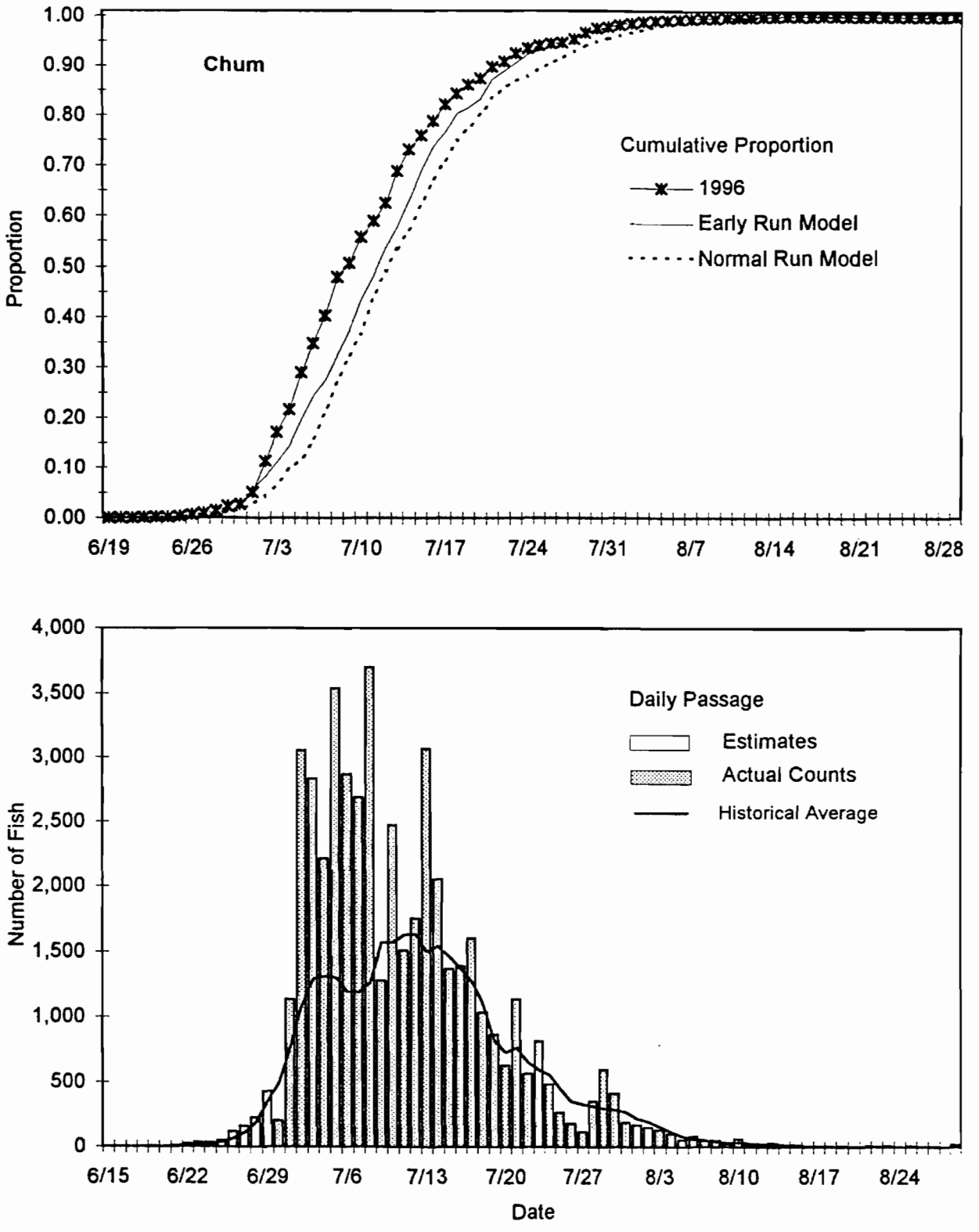

Figure 9. Chum salmon run timing (top) and total daily passage (bottom) at the Kogrukluk River weir, 1996.

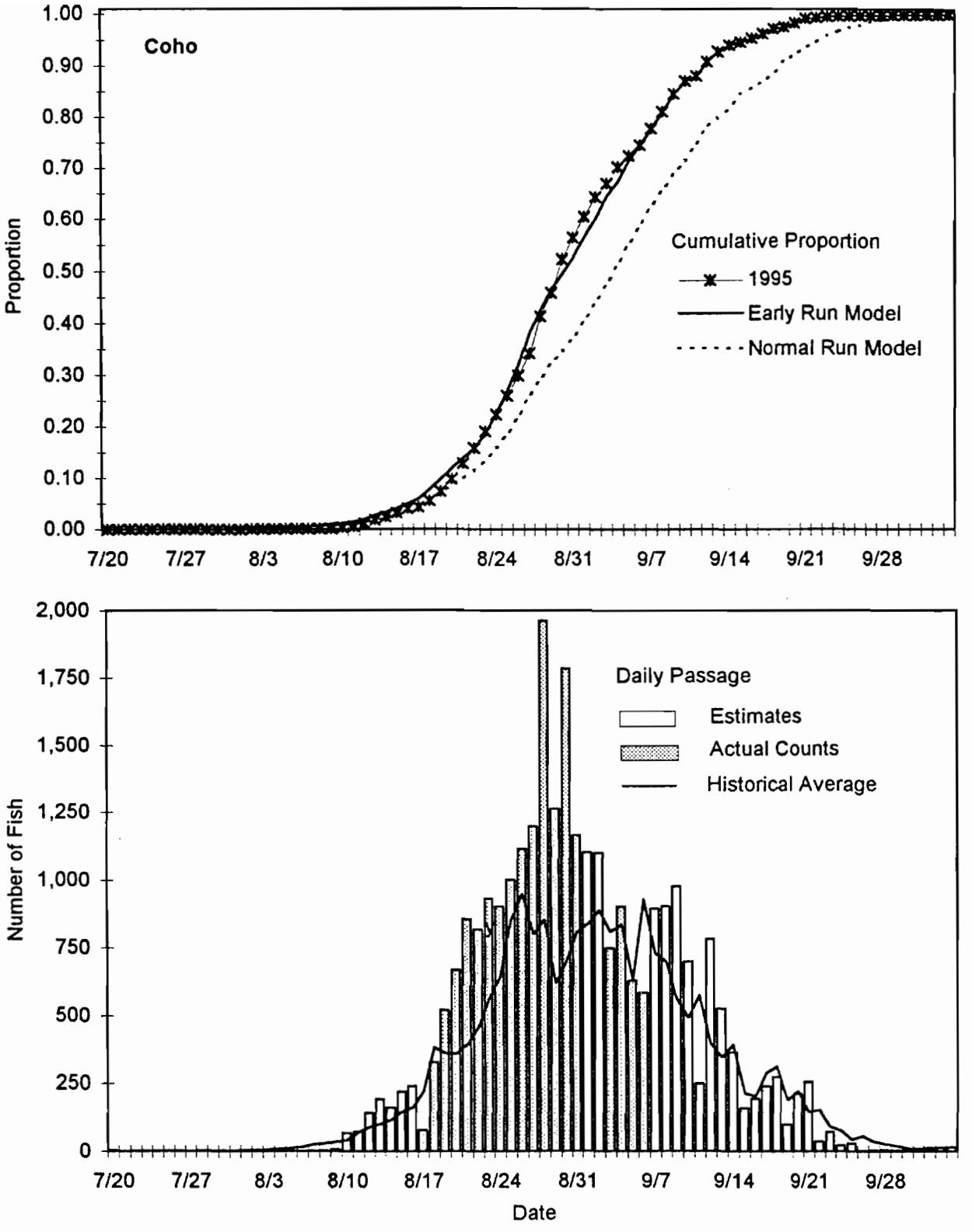

Figure 10. Coho salmon run timing (top) and total daily passage (bottom) at the Kogrukluk River weir, 1995.

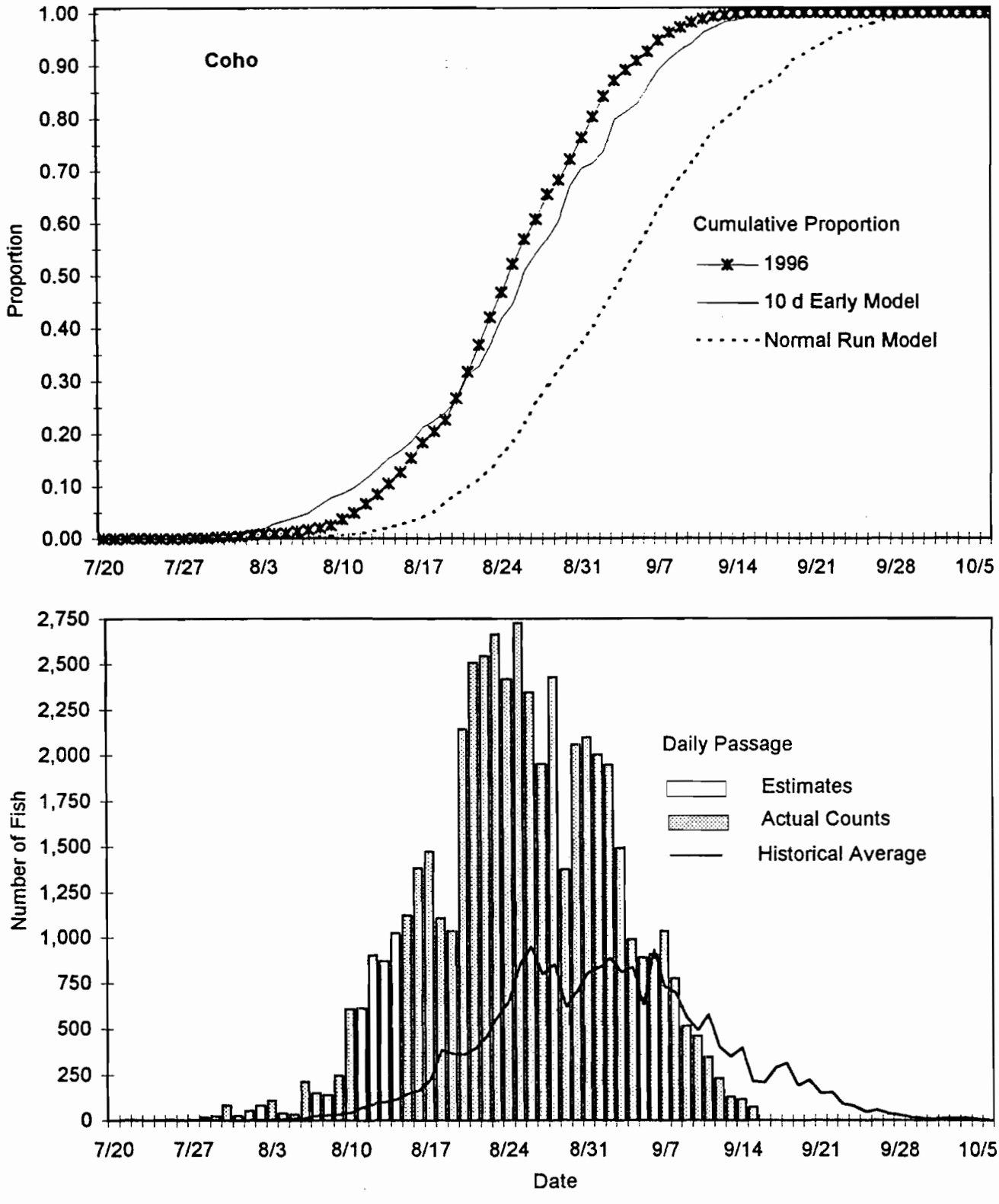

Figure 11. Coho salmon run timing (top) and total daily passage (bottom) at the Kogrukluk River weir, 1996.

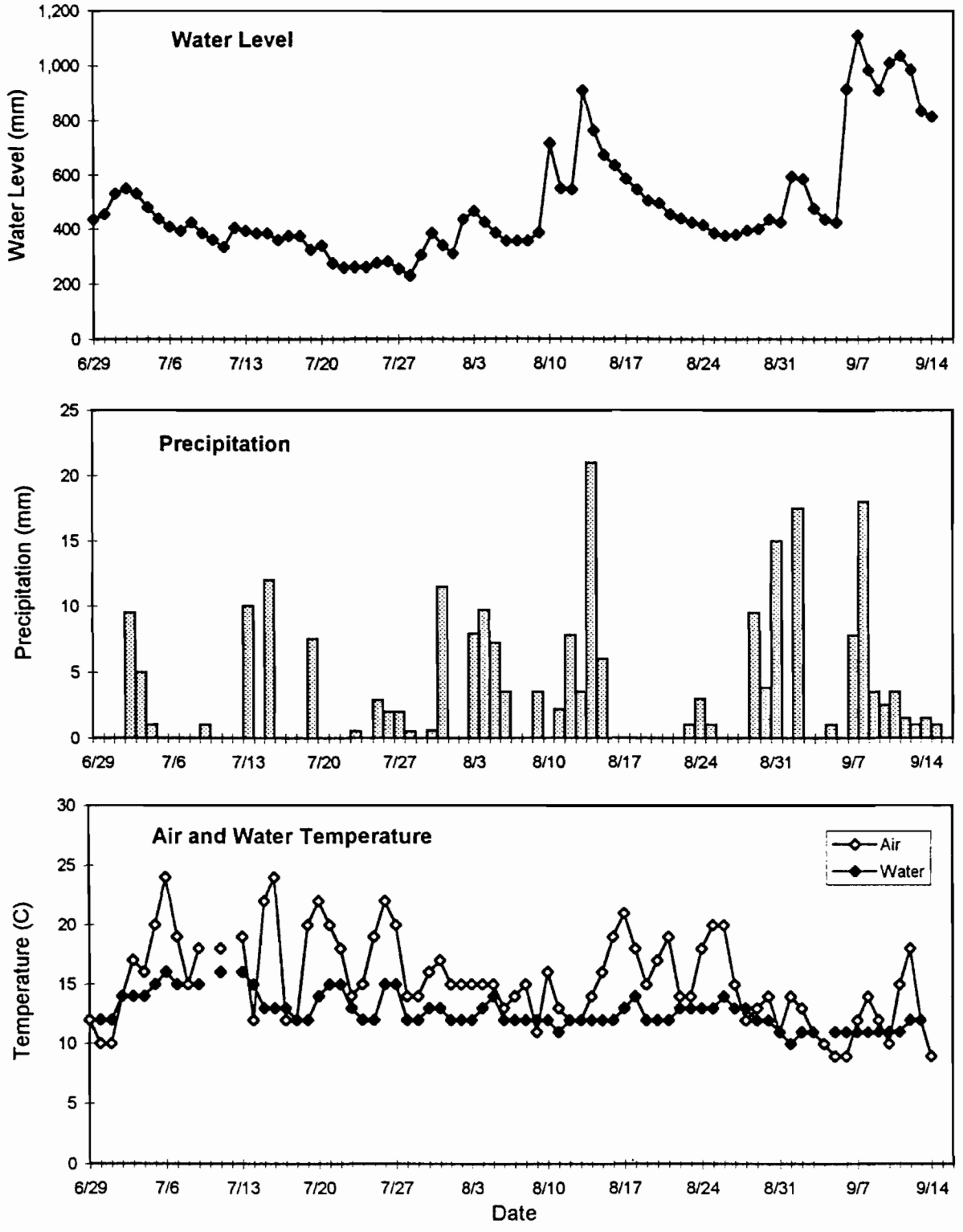

Figure 12. Meteorological and hydrological observations at the Kogrukluk River weir, 1995.

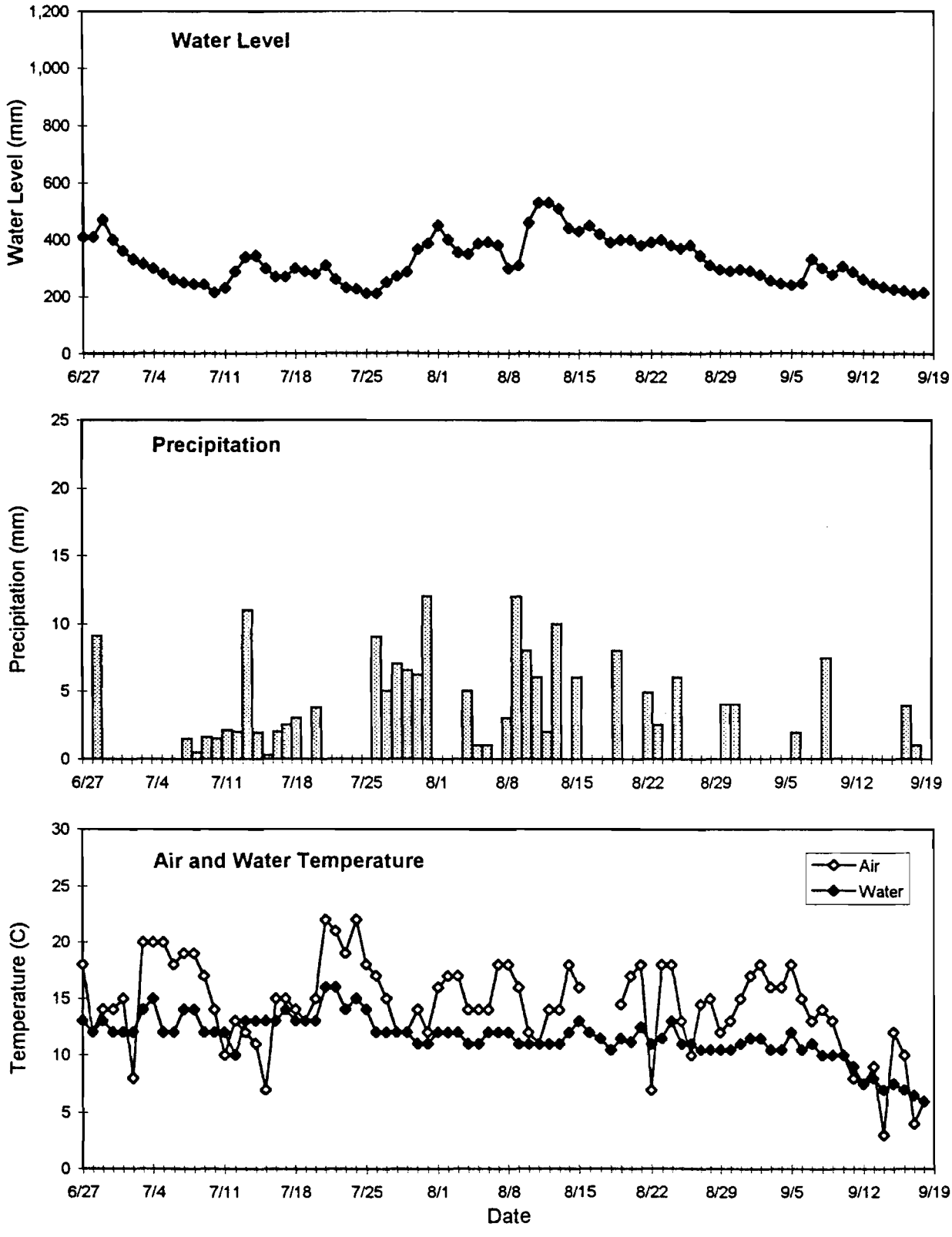

Figure 13. Meteorological and hydrological observations at the Kogrukluk River weir, 1996.

Appendix

Appendix A. Bibliography of the Kogrukluk River weir salmon escapement project in chronological order.

Yanagawa, C.M. 1972. Kogrukluk River weir project 1971. A-Y-K Region Kuskokwim Salmon Escapement Report No. 5. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Yanagawa, C.M. 1973. Kogrukluk River counting tower project 1972. A-Y-K Region Kuskokwim Salmon Escapement Report No. 6. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Kuhlman, F.W. 1974. Kogrukluk River counting tower project 1973. A-Y-K Region Kuskokwim Salmon Escapement Report No. 7. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Kuhlman, F.W. 1975. Kogrukluk River counting tower project 1974. A-Y-K Region Kuskokwim Salmon Escapement Report No. 8. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Kuhlman, F.W. 1976. Kogrukluk River counting tower project 1975. A-Y-K Region Data Report No. ?. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Baxter, R. 1976. Holitna weir developmental project, 1976. A-Y-K Region Kuskokwim Salmon Escapement Report No. 11. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Baxter, R. 1977. Holitna River salmon studies, 1977. A-Y-K Region Kuskokwim Salmon Escapement Report No. 13. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Baxter, R. 1979. Holitna River salmon studies, 1978. A-Y-K Region Kuskokwim Salmon Escapement Report No. 15. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Baxter, R. 1979. Holitna River salmon studies, 1979. A-Y-K Region Kuskokwim Salmon Escapement Report No. 17. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Baxter, R. 1980. Holitna River salmon studies, 1980. A-Y-K Region Kuskokwim Salmon Escapement Report No. 20. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

- continued -

Baxter, R. 1982. Ignatti weir study, 1981. A-Y-K Region Kuskokwim Salmon Escapement Report No. 25. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Schneiderhan, D.J. 1984. 1982 Ignatti weir study. A-Y-K Region Kuskokwim Salmon Escapement Report No. 30. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Schneiderhan, D.J. 1984. 1983 Ignatti weir study. A-Y-K Region Kuskokwim Salmon Escapement Report No. 31. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Schneiderhan, D.J. 1985. Salmon escapement study Kogrukluk River weir, 1984. A-Y-K Region Kuskokwim Salmon Escapement Report No. 35. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage.

Schneiderhan, D.J. 1988. Kogrukluk weir salmon escapement study 1985-1987. Regional Information Report No. 3A88-16. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region, Anchorage.

Schneiderhan, D.J. 1989. Kogrukluk weir salmon escapement study 1989. Regional Information Report No. 3A89-27. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region, Anchorage.

Burkey, C. Jr. 1991. Kogrukluk weir salmon escapement report 1990. Regional Information Report No. 3B91-19. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region, Anchorage.

Burkey, C. Jr. 1995. Kogrukluk weir salmon escapement report 1991-1994. Regional Information Report No. 3A95-24. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region, Anchorage.

Appendix B. Historical estimates of salmon escapement for the Kogrukluk River weir, 1976 - 1996.

Year	Chinook	Sockeye	Chum	Coho
1976	5,579	2,326	8,117	[b]
1977	[a]	[a]	10,388	[b]
1978	13,667	1,670	48,125	[b]
1979	11,338	2,628	18,599	[b]
1980	[a]	[a]	1,644	[b]
1981	16,655	18,066	57,365	11,455
1982	10,993	17,297	64,077	37,796
1983	[a]	[a]	[a]	8,538
1984	4,928	4,133	41,484	27,595
1985	4,619	4,359	15,005	16,441
1986	5,038	4,244	14,693	22,506
1987	[a]	[a]	[a]	22,821
1988	8,505	4,397	39,540	13,512
1989	[a]	[a]	39,549	[a]
1990	10,218	8,406	26,765	[a]
1991	7,850	16,455	24,188	9,964
1992	6,755	7,540	34,105	[a]
1993	12,332	29,358	31,899	[a]
1994	15,227	[a]	[a]	34,695
1995	20,630	10,996	31,265	27,861
1996	14,199	15,381	48,494	50,555
Mean	10,533	9,817	30,850	23,645

[a] Years with inadequate data to estimate escapement.

[b] Coho salmon were not counted until 1981.

Appendix C. Chinook salmon female composition, and percent with gillnet marks, Kogrukluk River weir, 1979-1996.

Year	Actual Number of Females	Percent of Escapement	% Females with Gillnet Marks
1979	10,125	17.8	11.03
1980	676	15.9	[b]
1981	16,075	47.0	12.47
1982	5,325	49.2	12.99
1983	1,049	28.9	16.49
1984	4,928	22.7	11.08
1985	4,306	32.2	18.99
1986	2,968	23.0	19.43
1987	770	[a]	
1988	7,677	34.4	13.34
1989	4,911	34.6	16.46
1990	10,093	22.5	14.35
1991	6,132	46.6	19.26
1992	6,397	33.4	30.03
1993	10,516	28.2	11.25
1994	8,310	24.6	9.53
1995	8,687	46.0	12.5
1996	5,406	38.1	4.4
1976-84 Mean		30.3	12.8
1985-96 Mean		33.1	15.4
Mean of All		32.1	14.6

[a] Sample size to small to assess sex ratio and percentage of gillnet marks.

[b] Gillnet-mark data was not collected.