KOGRUKLUK RIVER WEIR SALMON ESCAPEMENT REPORT, 1998-99

By

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ABSTRACT

Operation of the Kogrukluk River weir in 1998 was hampered by high water in the beginning of the season. The weir was operational on the evening of 6 July. On the morning of 8 July, rising water caused the weir to be removed. Water levels did not recede enough to allow reinstallation until the evening of 17 July. Operation continued thereafter until removal for the season on 19 September. The weir was operational for 64 of 75 days between 6 July and 19 September. The combination of late weir installation and high water resulted in incomplete run coverage for chinook, chum and sockeye salmon. Based on historical run timing information it is estimated that fish actually counted represent 25% of the chinook salmon run, 32% of the chum salmon, and 36% of sockeye salmon runs. The weir was returned to operational status in time to adequately monitor coho escapement. The actual counts by species were 3,009 chinook salmon, 5,321 sockeye salmon, and 13,014 chum salmon. The run midpoints and age composition of these species were not estimated due to incomplete seasonal coverage. Estimated escapements generated using historical run timing tables by species were 12,107 chinook salmon (75% estimated), 16,773 sockeye salmon (68% estimated), and 36,441 (64% estimated) chum salmon. The estimated escapement of coho salmon was 24,348 (7% estimated). This estimate is 97% of the Biological Escapement Goal (BEG) for coho salmon. The midpoint of the run occurred on 3 September, four days later than normal. Age-sex-length (ASL) data were collected from 455 coho salmon.

The weir became operational on 5 July in1999, and remained operational until 18 September, except for a span of 21 consecutive hours on 5 and 6 August. The weir was operational for 74 of 75 days between 5 July and 18 September. Estimated escapements by species are: 5,570 chinook salmon, 13,820 chum salmon, 5,864 sockeye salmon, and 12,609 coho salmon. Run coverage for all species except coho salmon was fairly complete. The final 20% of the coho salmon run was estimated based on run timing models. All species exhibited late run timing, with the midpoint occurring on 20 July for chinook salmon, on 18 July for chum salmon, 18 July for sockeye salmon, and 9 September for coho salmon. Chinook and sockeye salmon run midpoints were the latest on record. ASL data were collected from 305 chinook, 737 chum, and 343 coho salmon.

INTRODUCTION

The Holitna River is the largest salmon-producing tributary of the Kuskokwim River. Recorded evidence of salmon escapements in the Holitna have been documented since 1961 (Schneiderhan 1983, Burkey 1994), when the earliest aerial survey of the Holitna River was conducted. The importance of the Holitna River as a salmon producer and the necessity to more closely monitor salmon escapement motivated the Alaska Department of Fish and Game (ADF&G) to establish a weir on the Kogrukluk River in 1976 (Baxter, 1976) (Figure 1).

Chinook *Oncorhynchus tshawytscha*, chum *O. keta*, sockeye *O. nerka*, coho *O. kisutch*, and pink salmon *O. gorbuscha* spawn in the Kogrukluk River. Kogrukluk River salmon escapements are a relatively small percentage of the overall escapement in the Kuskokwim River drainage. Because stocks are widely dispersed and the monitoring program is limited, it is believed that numbers of chinook, sockeye, chum and coho salmon that pass the Kogrukluk River weir are relatively large compared to escapements in most other systems within the Kuskokwim River drainage (Burkey et al. 1999).

A unique feature of the Kogrukluk River weir is that it is currently the only site in the Kuskokwim River drainage with a history of enumerating sockeye salmon. Typical sockeye salmon rearing habitat, i.e. large volume lakes, is absent from the Kogrukluk River drainage, although there are some small headwater lakes with an unknown capacity for sockeye salmon production. Sockeye salmon have been observed spawning in the mainstem and in backwaters and sloughs. Sockeye salmon have been documented in several tributaries in the Kuskokwim Basin (Burkey and Salomone, 1999) but little is known about these populations. The rearing ecology of these "river-type" sockeye salmon is unknown; apparently they have adapted well to a lotic environment. The contribution of river-type sockeye salmon in the Kuskokwim drainage should not be overlooked. Wood et al. (1987) found that river-type sockeye contributed 39-48% to the total return of sockeye salmon to the Stikine River in 1984 and 1985.

The relative abundance of pink salmon is unknown in the Kogrukluk River because they are able to swim between the weir pickets, but the annual numbers observed are usually very low. Considering that the Kogrukluk River weir is approximately 750 km from the mouth of the Kuskokwim River, these pink salmon are among the furthest-inland spawning pink salmon in the world (Morrow 1980; Groot and Margolis 1991).

Subsistence and commercial fishers who live along the Kuskokwim River place major cultural and economic importance on harvests of salmon. Commercial fisheries occur in two non-contiguous districts in the Kuskokwim River stretching from the river mouth to Chuathbaluk. The 10-year average (1988-1997) commercial harvest for both districts combined is approximately 31,000 chinook, 64,000 sockeye, 451,000 chum, and 545,000 coho salmon (Burkey et al. 1999). The 1988-1997 average subsistence harvest of chinook, sockeye, chum, and coho salmon in the Kuskokwim River is approximately 83,000, 40,000, 93,000 and 43,000 respectively (Burkey et al. 1999).

In the early 1980s, commercial fisheries management began to shift from a strategy emphasizing guideline-harvest-level to an escapement based strategy. ADF&G established species-specific escapement objectives for streams that had sufficient historical information (Buklis 1993). In most cases, these objectives, later termed biological escapement goals (BEG's), represent simple averages or medians of historical information. The underlying principle in establishing BEG's was that maintenance of average or above average spawning escapement should provide for sustained yield consistent with historical levels. Although commercial fishery harvests usually occur before many escapements can be fully assessed, postseason escapement assessments are useful for evaluating the effectiveness of fishery management plans and inseason management decisions.

In 1983, BEG's for the Kogrukluk River weir were established for chinook (10,000), chum (20,000), sockeye (2,000), and coho salmon (20,000). In 1984, BEG's were increased to 30,000 for chum salmon, and 25,000 for coho salmon. The Kogrukluk River weir is the only project in the Kuskokwim River drainage with a BEG for coho salmon.

Study Site

The Kogrukluk River is formed by surface runoff from the north side of the plateau that divides the Tikchik Lakes and Nushagak River drainages from the Kuskokwim River drainage. 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 about 1.5 km above the site of Kashegelok village (Figure 1). The Kogrukluk River weir is located about 3 km upstream from the Chukowan confluence and 1 km below the confluence of Shotgun Creek.

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. Salmon escapement was originally enumerated by means of a counting tower from 1969 to 1978. The tower was originally located about 2 km above the confluence of Shotgun Creek. Due to annual changes in the river channel, the tower was moved in some years to different locations, but remained above the confluence of Shotgun Creek. Initial installation of a weir was attempted in 1971, but it was destroyed by high water early in the season. Tower (and weir) operation in this section of the Kogrukluk River was hindered by log jams and shifting channels. The presence of a suitable weir site below the confluence of Shotgun Creek resulted in the replacement of the tower by a weir between 1976 and 1978. Because the weir was located below the confluence of Shotgun Creek, the tower and weir were operated concurrently from 1976 to 1978 to compare escapement estimates between projects. Only the 1978 operations provided an acceptable set of data from each project. In 1978, the tower counts of chinook, chum, and sockeye salmon were 56%, 37% and 47%, respectively, of the weir counts (Baxter 1979). Beginning in 1981, the weir operational period was extended to include coho salmon.

OBJECTIVES

The objectives of the Kogrukluk River weir project are to:

1. Enumerate the daily and total annual spawning escapement of chinook, chum, sockeye, and coho salmon, by sex.

2. Estimate the age, sex and length (ASL) composition of the chinook, chum and coho salmon escapements such that simultaneous 95% interval estimates of the age composition will have a maximum width of 0.20.

3. Monitor the carcass wash-out rate and timing by species.

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

5. In 1999, conduct a mark and recapture study on chums in an attempt to develop an alternate method for estimating escapement for periods when the weir is not operational due to high water.

METHODS

Weir Operation

The weir consists of pickets made of 2 cm black iron pipe held in position by two angle-iron stringers (Figure 2). Each stringer is 3 m in length and perforated to receive about 45 pickets. The stringers are overlapped and braced by "A" shaped steel pipe support pods at each 3 m 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™[1]. 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. Other details of weir construction may be found in *Ignatti Weir Construction Manual* (Baxter 1981).

Salmon Counts

Between 0730 and 2400 hours, salmon are enumerated periodically from an observation position either from a boardwalk on the weir or on top of the trap. If fish are not needed for ASL sampling, four or five pickets are pulled out of the weir to allow salmon to pass. Generally, salmon are allowed to pass 4 to 8 times a day, with the frequency depending on fish behavior and run magnitude. The weir and trap are normally closed from 2400 to 0730 hours because few salmon migrate upstream during this time. When ASL samples are needed, salmon are sampled from the trap and allowed to proceed upstream. Seven data categories are tallied on different counters. Categories are: male chinook, jack chinook, female chinook, male chum, female chum, male sockeye, female sockeye, male coho, female coho. Salmon carcasses that wash down the river and are stopped by the weir are counted by species during daily weir cleaning.

[1] Mention of brand or product names does not constitute an endorsement by Alaska Department of Fish and Game.

Escapement Estimation / Migration-Timing Database

Every year the Kogrukluk River weir has experienced one or more periods of ineffective operational periods due to high water levels or lack of funds. Schneiderhan (1989) used an expansion method for estimating daily counts and, hence, total escapement. After the 1988 field season, he subjectively expanded the historical salmon counts to the historic earliest and latest operational dates to produce a run-timing database with as many years represented as possible. The criteria for accepting a given year for inclusion into the database was that more than 50% of the estimates had to be derived from actual counts. The run-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). For each species, the salmon migrations in each year were characterized as early, normal, or late depending on the relationship of each years' mean passage to the mean date of all years combined. Early-, normal- and late-run models were used in subsequent years to estimate missing or partial daily counts and total escapement (Appendix A). 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 (Appendix B). In 1999 the acceptable criteria was changed. Only years where actual counts comprised more than 80% of the total estimated escapement were included in the database that is used to estimate escapement for days when the weir is not operational.

In 1991, the methodology for establishing run-timing models was altered. For each salmon species mentioned above, the historical daily proportions (from actual and estimated counts) were ranked across years. 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 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, the normal model was used to estimate missing daily counts. The sum of the model daily proportions, for days with actual counts during the current season, 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. The model chosen was based on a visual "best-fit" of the actual data. This was accomplished by comparing midpoints of the normal model and the reconstructed run, and, to a lesser extent, by comparing the daily estimates to actual counts on days before and after. If the midpoint of the reconstructed run was closer to the midpoint of either the early or late model, then the estimates were again calculated with the appropriate model. No attempt was made to partition the estimated daily counts by sex.

In 1999, the method chosen to estimate missing daily counts was slightly different due to the lateness of the migration for all species. The method was to off set the late run timing curve by the same number of days as separated the midpoints, then match up the late curve for that species. Whatever days the weir was not operational were then estimated using the appropriate proportions.

For coho this method resulted in estimates that were clearly not tracking with the actual data. As a result, coho estimates were derived by using the 1983 run daily proportions because of similarity to the 1999 run timing. The resulting estimates tracked the actual data reasonably well.

Age, Sex and Length

Beginning in 1992, the age, sex and length (ASL) sampling plan was altered to a "pulse" sampling design described by Molyneaux and Dubois (1996). The goal of pulse sampling is to collect samples from each temporal stratum in as short a time as possible and from as many strata as possible. A minimum of 3 strata are established for each species. Sample size goals for each time stratum are 210 chinook, 200 chum, and 170 coho salmon. Sockeye salmon are not sampled. These sample sizes are sufficient to construct simultaneous 95% interval estimates of the age composition having a maximum width of 0.20 using the methods of Bromaghin (1993). The recommended sample sizes are increased to account for the typical proportion of scale samples that are unusable. Within each stratum, a single species is sampled until the objective is achieved, after which another species is sampled.

ASL information is collected from salmon that are caught in the trap. Length is measured from mid eye to fork of tail to the nearest 5 mm and sex is determined by inspection of external characteristics. After being sampled, salmon are released on the upstream side of the weir. Scales are taken from the preferred area (INPFC 1963) and mounted on gum cards. Gum cards are pressed in acetate using methods described by Clutter and Whitesel (1956). Scale impressions are viewed through a microfiche reader and age is determined by visual identification of annuli. Ages are recorded on mark-sense forms, which are also used to record sex and length data. Completed mark-sense forms are processed through an OPSCAN machine to produce ASCII computer files. These files are then summarized using various custom computer programs. Estimates of age, sex, and length compositions from each stratum are weighted by fish passage to provide estimates for the entire escapement (Molyneaux and Dubois, 1999).

1999 Chum Mark and Recapture

Beginning in 1999, an experiment was conducted using mark and recapture techniques in an attempt to develop an auxiliary method to estimate escapement for periods when the weir is inoperative. It has been observed that chum salmon carcasses are recovered on the weir in high proportion to the number of live fish that pass the weir. This experiment was designed to determine if the high carcass recovery rate might be used to estimate escapement based on the proportion of marked to unmarked carcasses. Similar studies have been conducted in Southeast Alaska (McGregor, 1993). A constant proportion of fish are marked (fin clipped) as they are counted through the weir. Because of the possibility of low escapement this year, we decided to attempt to mark 1 in 5 of the chums (20%) that passed the weir. In order to keep the daily proportion of marked fish constant the fish were counted on one day, and 20% of that number were marked the following day. This resulted in a one day lag from the actual counts, but allowed us to keep the proportion of marked fish constant throughout the study.

Chum salmon were marked by clipping a fin (adipose, dorsal etc.) or combination of fins in strata of seven days so that any temporal variability in carcass recovery could be monitored. Put

another way, to determine whether fish that passed the weir early in the run had differential carcass recovery rates than fish that passed near the end of the run. As part of normal weir cleaning activity, chum carcasses that washed up on the weir were examined for fin clips and results tallied. Marked fish were tallied according to temporal strata as determined by the fin clip.

Meteorological and Hydrological Factors

Water temperature is measured to the nearest 1° C with a non-calibrated thermometer. Precipitation for the prior 24-hour period is measured to the nearest 1 mm using a standard precipitation gauge (10 to 1 ratio). The amount of cloud cover, wind speed and direction are estimated by the observer. Water level is measured to the nearest 5 mm from a meter stick set at an arbitrary point in the river. A standardized water level is obtained by measuring the distance between the water level and a benchmark height of 5 m (Baxter 1981). The time is recorded when the meteorological and hydrological measurements are made. Generally, measurements are taken at 1700 hours.

RESULTS

Weir Operation

1998

The weir was installed and operational at 1930 hours on 6 July and then pulled out because of rising water at 0830 hours 8 July. Water conditions remained high and made redeployment impossible until 17 July, when the weir was again made fish tight at 2000 hours. It remained operational until removed for the season on 19 September. These high water conditions rendered the weir inoperable for a high percentage of the chinook, sockeye, and chum salmon migrations. As a result it was not possible to reconstruct the run timing curves, run midpoints, or ASL compositions for these species. However, the weir was operational for a sufficient portion of the coho salmon run for these parameters to be estimated.

1999

The weir was installed and made operational at 1500 hours on 5 July. This represents the earliest possible date the weir could have been made operational due to spring run-off conditions. At 1800 hours on 5 August, the crew pulled weir pickets and left the weir open for approximately 21 hours due to rising water. The pickets were reinstalled on 6 August at approximately 1500 hours. The weir continued to operate until high water forced removal for the season on 18 September. In 1999, the migration for all species was extremely late. The operational period covered about 99 percent of the chinook and chum salmon migrations, and 100 percent of the sockeye salmon migration. Approximately 80 percent of the coho run was enumerated.

Salmon Counts and Estimates

1998

Chinook Salmon

The actual count of chinook salmon was 1,713 males (which included 172 jacks) and 1,296 females (Table 1). Females comprised 43% of the actual counts. Chinook run timing was thought to be late. Using a late run-timing model (Table 2) to estimate passage for the time before the weir was installed and for the period during which the weir was inoperative due to high water (8-17 July), an escapement estimate of 12,107 fish was calculated. A total of 9,098 fish are estimated using this method, 75% of the total. Peak days of passage, according to the historic run timing models, were probably during the non-operational period. A total of 948 chinook carcasses were recovered from the weir (Table 3).

Sockeye Salmon

The actual count of sockeye salmon was 4,468 males and 853 females (Table 1). Females comprised 16% of the actual counts. The sockeye run was also thought to be late. Using a late-run model (Table 2) to estimate passage for the period before the weir was installed and for the time the weir was inoperative due to high water (8-17 July) an estimated escapement of 16,773 fish was calculated. A total of 11,452 fish were estimated using this method, or 68% of the total. A total of 623 sockeye salmon carcasses were recovered on the weir (Table 3).

Chum Salmon

The actual count of chum salmon was 10,951 males and 2,063 females (Table 1). Females comprised 16% of the actual counts. A late-run model (Table 2) was used to estimate total counts for days prior to weir installation and for 8-17 July, an estimated escapement of 36,441 fish was calculated. A total of 23,427 fish were estimated using this method, 64% of the total. Days of peak passage probably occurred while the weir was non-operational. A total of 5,588 chum salmon carcasses were recovered on the weir (Table 3).

Coho Salmon

The actual count of coho salmon was 12,567 males and 10,047 females (Table 1). Females comprised 44% of the actual counts. A late-run model (Table 2) was used to estimate counts for days after the weir was pulled out (19 September-5 October). The estimated portion was 1,734 fish or 7.1% of the total escapement estimate of 24,348 fish. The midpoint of the run occurred on 3 September, which is three days later than the historical average, or "normal" timing of the midpoint. The overall pattern of fish passage generally followed the late-run model (Figure 3). Twenty carcasses were counted, however project operation terminated well before most of the coho salmon could be expected to have died.

1999

Chinook Salmon

The actual count of chinook salmon was 2,766 males (which included 335 jacks) and 2,706 females (Table 4). Ninety-eight fish were estimated to have passed the site during days of non-operation in early August and days before the project became operational resulting in an estimated escapement of 5,570 fish. Females comprised 49% of the actual chinook salmon counts. The midpoint of the chinook salmon migration occurred on 20 July, the latest on record for the project and 8 days later than the average midpoint of 12 July (Figure 4). A total of 507 chinook salmon carcasses were recovered on the weir (Table 5).

Sockeye Salmon

The actual count of sockeye salmon was 4,402 males and 1,375 females (Table 4). Eighty-seven fish were estimated to have passed the site during days of non-operation in early August, resulting in an estimated escapement of 5,864 fish. Females comprised 24% of the actual sockeye counts. The midpoint of the sockeye salmon migration occurred on 22 July, which is also the latest on record for the project and 9 days later than the average midpoint of the migration (Figure 5). The operational period spanned the entire sockeye salmon migration. A total of 446 sockeye salmon carcasses were recovered on the weir (Table 5).

Chum Salmon

The actual count of chum salmon was 11,346 males and 2,151 females (Table 4). A total of 323 fish were estimated to have passed the site during times of non-operation in early August and on days before the project became operational, making a total estimated escapement of 13,820 fish. Females comprised 16% of the actual chum counts. The midpoint of the chum migration occurred on 18 July, which is the second latest run timing on record for the project. The historical average midpoint is 12 July (Figure 6). A total of 3,286 chum salmon carcasses were counted on the weir (Table 5).

Coho Salmon

The actual count of coho salmon was 7,063 males and 3,031 females (Table 4). Using the historical run timing tables 2,515 fish were estimated to have passed after the project operation was terminated due to high water, for a total estimated escapement of 12,609 fish. Females comprised 30% of the coho salmon actually counted. The overall pattern of coho salmon passage was the second latest on record for the project. As such it falls outside the usable range of the historical data for the purposes of estimating passage for days the weir was not operational. It is likely that the coho migration continued well past the final date of operation of 18 September. Using the historic models to generate estimates for the last portion of the run it is apparent that the estimates do not track well with the actual counts. Subjective comparison of the 1999 migration to other years shows 1983 data to be the closest to the observed run timing in 1999 (Figure 7). The midpoint of the 1999 coho salmon migration occurred on 7 September. In 1983 the midpoint of the run was slightly later, occurring on 10 September. The average midpoint is 1 September, using the historical data tables.

For this reason the 1983 run timing was used to generate the last portion, or tail, of the 1999 coho salmon run (Table 6). Only one coho salmon carcass had been recovered by the cessation of operations.

Age, Sex and Length

1998

Chinook Salmon

ASL data were obtained from 86 live specimens in one temporal stratum. This limited sampling is considered insufficient for characterizing the entire spawning population (Molyneaux and Dubois, 1999). The age composition of fish sampled was 4.7% age-1.2, 54.7% age-1.3, 38.4% age-1.4, and 2.3% age-1.5. The sex composition was 56% male and 44% female (Table 7). The mean lengths of females ages-1.3, -1.4, and -1.5, were 818 mm (n=15), 861 mm (n=22), and 870 mm (n=1). The mean lengths of males ages-1.2, -1.3, and -1.4, were 558mm (n=4), 749 mm (n=32), and 836 mm (n=11) (Table 8).

Chum Salmon

ASL data were obtained from 193 live specimens in one temporal stratum. This was also insufficient to characterize the spawning population. The age composition of fish sampled was 90.2% age-0.3 and 9.8% age-0.4 (Table 9) The mean lengths of females age-0.3 and -0.4 were 558 mm (n=20) and 580mm (n=2) respectively. The mean lengths of males age-0.3 and -0.4 were 596 mm (n=154) and 621 mm (n=17) respectively (Table 10). The sex composition was 89% male and 11% female.

Coho Salmon

A total of 455 live specimens from three temporal strata were sampled. Based on these samples the estimated age composition of the escapement was 1.6% age-1.1, 94.1% age-2.1, and 4.2% age-3.1 The sex composition was 59 % male and 41 % female (Table 11). The mean lengths of females age-1.1, -2.1, and -3.1 were 567 mm (n=4), 579 mm (n=178), and 573mm (n=7), respectively. The mean lengths of males age-1.1, -2.1, and -3.1 were 595 mm (n=2), 581 mm (n=250), and 593 mm (n=14), respectively (Table 12).

1999

Chinook Salmon

ASL data were obtained from 305 live specimens in three temporal strata. Based on these samples the estimated age composition of the escapement was 5.4% age-1.2, 25.2% age-1.3, 67.3% age-1.4, and 1.5% age-1.5. The sex composition was 47% male and 53% female (Table 7). The mean lengths of females aged-1.3, -1.4, and -1.5 were 790 mm (n=5), 868 mm (n=52), and 911 mm (n=1). The mean lengths of males aged -1.2, -1.3, and -1.4, were 587 mm (n=17), 694 mm (n=69),

and 792 mm (n=66), respectively (Table 8).

Chum Salmon

ASL data was obtained from 737 live specimens in three temporal strata. Based on these samples the estimated age composition of the escapement was 49.3% age-0.3 and 50.4% age-0.4. The sex composition was 91% male and 9% female (Table 9). The mean lengths of females age-0.3, -0.4, and -0.5, were 562 mm (n=37), 584 mm (n=29) and 540 mm (n=1), respectively. The mean lengths of males age-0.3, -0.4, -0.5 were 587 mm (n=345), 604 mm (n=324), and 600 mm (n=1), respectively (Table 10).

Coho Salmon

A total of 343 live specimens from three temporal strata were sampled. Based on these samples the estimated age composition of the escapement was 2.5% age 1.1, 88.1% age 2.1, and 9.4% age 3.1. The sex composition was 83 % male and 17 % female (Table 11). The mean lengths of females age-1.1, -2.1, and -3.1 was 560 mm (n=1), 565 mm (n=53), and 563 mm (n=9), respectively. The mean lengths of males age -1.1, -2.1, and -3.1 was 525 mm (n=8), 564 mm (n=251), and 596 mm (n=21), respectively (Table 12).

Chum Mark and Recapture

Fin clipping of live chum salmon started on 9 July and continued until 14 August. A total of 1,550 fish were marked in six temporal strata, the first five consisting of seven days, and the sixth spaning 9 days. The number of fish marked represents 11 % of the actual weir counts. A total of 309 chum carcasses out of 3,288, approximately 9 % of the carcasses recovered, were fin clipped. Approximately 1,000 fish passed through the weir before the marking program was initiated. Results from the analysis of these data will be reported in a subsequent report, but at this time the method does not appear to hold much promise in terms of estimating fish passage during weir downtime.

Meteorological and Hydrological Factors

1998

Water levels were very high at the beginning of the season but tracked historical averages as the season progressed (Figure 8). Rainfall was well above the historical averages until early August, when it returned to near average amounts. Total rainfall was 189 mm for the season, which is only slightly above the historical average of 182 mm (Figure 9).

Water temperatures, probably influenced by the rainfall patterns, were below historical values for most of the season, averaging 10.4 degrees for the season compared to 11.1 historically (Figure 10).

The EL Nino conditions present in 1997 (Cappiello, 1997) persisted through the 1998 season. The condition seemed to diminish towards the end of the summer. The effects of these

conditions in the marine environment in general and on salmon populations in particular are poorly understood. It has been speculated by various authors that higher ocean temperatures observed during the 97-98 El Nino may have caused a shift in primary components of lower level trophic communities, thereby disrupting relationships in the feeding patterns of organisms higher up the food chain (Kruse, 1998).

1999

Conditions in 1999 started off with water levels higher than historical averages for the very early stages of the project and then more or less followed historical trends (Figure 11). There were two high water events, one in late July and another in early August. Water temperatures were erratic for most of the season and were generally cooler than normal, again probably as a result of intermittent rainfall patterns. Precipitation trends were close to historical averages throughout the season, except for being slightly below average in the month of September (Figure 12). Generally speaking, 1999 was a drier summer than 1998, with 172 mm of total rainfall. Precipitation tended to occur at sporadic intervals in moderate to high amounts that caused water levels to fluctuate accordingly (Figure 13).

DISCUSSION

Annual Escapements

When environmental conditions prevent projects from operating over the complete range of species passage during a given season, it is incumbent on project managers to interpret available data as best as possible and develop, if feasible, some estimate of total escapement. Sometimes these estimates may be quite subjective. In 1998, the weir project was out of the water for a significant portion of the time when chinook, sockeye, and chum salmon normally migrate past the site. Early in the history of the project, a method was developed to estimate missed portions of migrations, using an average of historical run timings. The method has some utility in estimating passage for short periods when the weir is not operating *within* the span of the normal migration period, but begins to suffer from inherent assumptions when the attempt is made to extend the "tails" of the migration before or after the operational period. In this case, the missing portion of the migration occurred before enough data had been collected to judge how the runs were developing at the site. By using the run timing models to generate fish passage estimates, we assume that the run developed in a normal fashion that followed historical trends.

Chinook Salmon

Commercial fishing for chum salmon was again reduced on the Kuskokwim River in 1998 due to the low number of returning chum salmon. The relationship between commercial chum salmon harvest and incidental harvest of chinook salmon has been discussed in earlier reports in this series (Cappiello, 1997). It is assumed that, all other factors being equal, the commercial harvest of chinook salmon will vary as effort in the commercial chum salmon fishery varies.

The chum salmon season was curtailed in 1998 due to concerns over stock status. A total of four

commercial periods targeting chum salmon were held between the end of June and mid-July, when the majority of the chum salmon harvest usually occurs, although there is some overlap with the coho salmon run. It is likely the reduced season for chum salmon would have benefited chinook salmon escapement, however, it is hard to judge based on the time the weir was operational; the run-timing models suggest that the weir was operational for 25% of the normal temporal span of the chinook migration. During this time, it is believed that approximately 33% of the BEG for chinook salmon passed the weir. Though not conclusive, this would appear to indicate escapement was strong enough to approach the escapement goal. Using the run timing models to estimate the fish passage during the time the weir was inoperative yields an estimate that is 21% above the escapement goal. While the best method currently employed, estimating this large of a percentage (75%) of the escapement with the run timing models is extremely uncertain and should be viewed accordingly.

Coverage of the chinook salmon escapement was almost complete in 1999. The commercial fishing season for chum salmon was further reduced to just one openning, due to an extremely weak run. Lack of commercial fishing for chum salmon should have allowed a good escapement of chinook salmon, but in the Kuskokwim River a confounding factor is a preference for chinook salmon by subsistence users. Even though the run was late in 1999, considering the single commercial opening, the chinook salmon escapement should have been adequate. It was not, indicating a weaker than normal run. However, for the period between 1989 and 1998, the escapement goal of 10,000 chinook has been met for eight of ten years, so the Kogrukluk River chinook salmon stocks will probably not be negatively impacted in the long term by the low escapement in the 1999 run.

Sockeye Salmon

During the 1998 season the majority of the sockeye migration passed upstream of the project while it was not operated. Estimated sockeye escapement for the season was 16,773; however only 32% of the escapement was actually observed passing through the weir. The estimate is derived from the historic run timing tables. Little is known about sockeye salmon biology in the Kuskokwim River.

The sockeye salmon run was fully enumerated in 1999. The midpoint of the run was the latest recorded since project operation began in 1976. The total passage of 5,864 was below recent year averages of approximately 9,000.

Annual escapements of sockeye salmon at the Kogrukluk River weir have been highly variable, ranging from 1,670 in 1978 to 29,358 fish in 1993. As with chinook salmon, sockeye salmon are not a targeted species in the commercial fishery and are caught incidentally during the directed chum salmon fishery. Sockeye salmon escapement was likely higher throughout the Kuskokwim Basin in 1998 and 1999, due to curtailments in the directed chum fishery. The Kogrukluk River weir is the only project currently operating in the system that has a history of sockeye salmon assessment.

Sockeye salmon escapement at the Kogrukluk River in the 1990s has been higher than during prior years when escapement has been monitored. Commercial harvests of chum salmon in the Kuskokwim River during the same period have fluctuated widely. Aerial survey data from selected

tributaries for sockeye salmon in the Kuskokwim basin and Kuskokwim Bay have also shown a slight increase in recent years (Cappiello 1997), but survey data can vary by observer, and the accuracy and precision of this data is a factor.

Chum Salmon

As with chinook and sockeye salmon the weir was not operational for a majority of the 1998 chum salmon migration. Estimated chum escapement for the season was 36,441; however only 36% of the escapement was actually observed passing through the weir. The estimate is derived from historical run timing tables and represents a best guess.

Coverage of the chum migration in 1999 was nearly complete. There was a minimal period at the beginning of the run when some fish likely went undocumented but this number is thought to be minor. The run was weak and had the second latest run timing on record. With only one commercial opening during the chum salmon season in the lower river and the associated reduced commercial harvest, the escapement of 13,820 fish still fell far below the goal of 30,000 fish.

Reasons for the weak run are not entirely clear, but the 1999 chum salmon run represents fish spent two years in the ocean during the 97-98 El Nino. The fish that returned represent the survivors of an extremely stressful environment. In the period between 1990 and 1999 the chum escapement goal of 30,000 has been met in 7 of 10 years in the Kogrukluk River. Continued close monitoring is essential, however, and continued careful management is necessary to avoid any human-induced impact on stocks that are likely already stressed due to natural conditions.

Coho Salmon

Commercial fishing for coho salmon in 1998 opened for eight periods in the Kuskokwim River with a total harvest of 210,000 coho. This is below the average harvest of 514,000 fish during the 1990s. The 1998 Kogrukluk River coho salmon escapement was relatively well documented; using the historical run timing models, only 7% of the run was estimated to have passed after the project was shut down due to high water on 16 September. The total escapement was just under the BEG of 25,000 fish. While these numbers indicate the run was stronger than that of 1997, it was still below recent averages. Brood year escapement (1994) was well above the BEG at 35,000 fish.

The commercial fishery was opened for only one period in 1999, with a harvest of 22,000 coho salmon. This represents the lowest harvest on record since development of the commercial fishery. The coverage of the migration at the Kogrukluk River weir was again good, although the run was the second latest on record and roughly 20% of the migration was thought to have passed after high water caused the project to be shut down on 18 September. Total estimated escapement of 12,609 was less than half the escapement goal and coupled with the low harvest numbers indicate a very weak run. The reasons for a weak run are unclear, but El Nino effects likely played a part here as well. Brood year escapement (1995) was considered adequate at almost 28,000 fish.

In the ten year span between 1989 and 1998, the coho salmon escapement goal (25,000) was met four times. The 1993 escapement was estimated at 20,000 and the 1998 escapement was estimated at 24,000 fish. In only four years (1989, 1990, 1991 and 1997) did the escapement fall significantly below the escapement goal.

All Kuskokwim River salmon species suffered from low returns in 1999. None of the parent age class escapements for any of the species were drastically low. The only thing all these fish had in common other than the year they returned to their natal streams was the time they spent in saltwater. Most perplexing is that while other stocks, particularly in Southeast Alaska, seemed to be more abundant in 1999, stocks in Western Alaska seemed to be just the opposite, with returns on the Kuskokwim River showing record low numbers.

Age, Sex, and Length

Age compositions of escapements can be useful for developing stock-recruitment models, which can be used to project run size. Unfortunately this is not possible for any one spawning stock or the entire Kuskokwim River drainage because stock specific exploitation and total run size, for most years, is unknown. Still, age composition information 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 in some species for the age compositions to shift towards younger fish as the run progresses, therefore, thoroughness of the sampling regimen is important, (2) disparate removal of age classes in the commercial and subsistence fisheries may occur, (3) seemingly high percentages of one age class could also be caused by low percentages of another, and (4) scale aging error within and among readers has not been fully assessed.

Comparisons between ASL data collected at the Kogrukluk River weir and other escapement projects should be made with the weir's location in mind. The Kogrukluk River weir is within the upper drainage area (altitude ~107 m) 205 km from the confluence of the Holitna and Kuskokwim Rivers. A majority of the salmon that enter the Holitna River drainage spawn in the mainstem and tributaries downstream from the Kogrukluk River. How these factors come into play is uncertain, but most escapement assessment projects are located closer to the Kuskokwim River or Bay and downstream of major spawning grounds, hence may be more representative of the entire primary-tributary spawning aggregates. Comparisons made in this discussion are non-statistical.

Chinook Salmon

The male-female ratio in 1998 was difficult to ascertain. The single ASL sample collected was obtained during a time that would normally be late in the run and was 44% female (Table 8). The sample was small and of limited temporal scope. Because of this, it may not have representative of the total escapement. The sex ratio of the actual counts was 43 % female, but this was biased towards the end of the run when the weir was operational (Table 1).

The older age class fish (-1.3, -1.4 males and -1.3 females) averaged well above the historical mean length for their respective age classes except for the 1.4 females that were right at the historical averages (Table 9). This is surprising considering the poor ocean conditions documented in the summer of 1997 when these fish were in the last year of their saltwater cycle. The sample sizes are small and these fish may just represent the largest and most fit individuals, which enabled them to survive the stresses of the ocean environment and subsequent journey to the spawning areas. A better measure of exactly how, or if, these fish were impacted would include some form of weight or girth data, but this information has not been collected as part of the sampling regime.

The age-1.2 males were smaller than historical averages, but, again, sample size here is very minimal and may not be representative.

The age-1.3 and -1.4 fish had shorter average lengths in 1999 than the historical averages for both sexes (Table 11). Age-1.3 males were 1.7 cm below the historical averages. Age-1.4 males were 3.7 cm below the historical average. Age-1.3 females were virtually the same as the historical average, age-1.4 females were 2.3 cm below average. The age-1.2 males were slightly larger, by almost 2 cm than the average, but the sample was small at 12 fish. The below average lengths seen in the older fish could be indicative of poor oceanic feeding conditions and do seem to follow trends observed in the limited 1998 data. The slightly larger size of the age-1.2 males may be an indication that oceanic conditions may have returned to an environment that is more favorable to chinook salmon growth and survival. Again, weight or girth measurements would be of use in trend analysis.

The sex ratio obtained from the ASL data in 1999 was 53% female (Table 10). The composition in the actual counts was 49% female (Table 4). Both estimates are above the historical average of close to 33% female (2 males to 1 female), which has been gradually increasing since the late 1980s. This could be yet another artifact of reduced commercial fishing pressure, or due to changes in commercial net size regulations in the late 80s that were designed to allow greater escapement of larger chinook salmon which tend to be older females.

Chum Salmon

Females comprised 11% of the ASL sample in 1998 (Table 12). Females comprised 16% of the actual counts (Table 1). Fish averaged slightly larger in length than historical data for males and right at historical averages for females (Table 13). However, the sample size is rather small and was collected over a short temporal period of the run after a majority of the fish were believed to have passed the weir. There was a lower percentage of age-0.4 chum salmon drainage wide in 1998 (Molyneaux and Dubois 1999, Vania 1999). Chum salmon sampled at the Kogrukluk River weir in 1998 were mainly age-0.3 fish but this may also have been an artifact of the narrow temporal window over which the data was collected (Table 12).

The age structure returned to a more even mix in 1999, age-0.3 fish comprising 49.3 % and age-0.4 fish 50.4 % (Table 14). This is very close to proportions reported in prior years.

The sex composition of the 1999 ASL samples was 9% females (Table 14). The actual count was

comprised of 16% females (Table 4). The 16 % number is the same as the actual counts in 1998 and the 9% number represents a historic low. The disparity is not as significant as the continued low percentage, which for unexplained reasons, has been exhibiting a downward trend in recent years. Reasons for this are not clear, but the project is located high in the Holitna drainage with a great deal of suitable chum salmon spawning habitat below the project site. Females may just simply be selecting and using suitable spawning habitat prior to reaching the vicinity of the weir, then remaining near these areas before dying. Males may continue to move up the drainage, thus biasing the counts. This may be more acute in years when abundance is low and competition among females for available spawning space is reduced. In order to determine if the ratio is abnormal for the entire Holitna drainage, sampling efforts would need to be conducted closer to the mainstem Kuskokwim River.

Mean chum salmon lengths for 1999 were very close to the historic data. Males of age-0.3 averaged 587 mm (n=345) and females averaged 562 mm (n=37). Males age-0.4 averaged 604mm (n=324) and females averaged 504mm (n=29) (Table 10).

Coho Salmon

The 1998 coho salmon run at the weir was 41% female according to the ASL data (Table 11). The actual counts were identified as 44% female (Table 1). Coho aged-1.1 are slightly below the historical averages, while the -2.1 age class makes up a slightly higher than average component of the 1998 migration (Table 11).

Coho salmon lengths in 1998 were a bit of a surprise, given the presumed unfavorable ocean conditions present in the winter of 97-98. For both sexes, lengths were slightly larger than historical averages, with males at 581 mm (n= 250) and females at 579mm (n=178) (Table 12).

In 1999, the sex composition was 17% females according to the ASL data (Table 11) and 30% female according to the actual counts (Table 4). The reason for the disparity between ASL and observer data is unknown but may be due some type of selectivity related to the location of the trap, or to observer identification error.

Coho lengths in 1999 were near the averages with males at 564 mm (n= 251) and females at 567mm (n=53) (Table 12).

A potential bright spot in the future for salmon stocks on the Kuskokwim River is that El Nino conditions seemed to abate somewhat in the fall -winter of 1998-99. Any marine effects that occurred during 97-98 would have also had some impact on Kuskokwim River runs in 1999, and may continue to have ramifications for at least the 2000 return of chinook, chum, and sockeye salmon. The 2000 return of coho salmon will be the progeny of the record large brood year of 1996. Kuskokwim coho's are primarily fish that emigrate from natal streams to spend a single year in the ocean, then return to freshwater. The 2000 return of coho salmon will be the first return of Kuskokwim salmon to spend an ocean cycle in post-El Nino conditions since the current cycle of poor returns began in 1997.

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Tables

Table 1. Actual daily and estimated counts of chinook, **sockeye, chum and coho salmon, Kogrukluk River weir, 1998.**
Bold italic numbers are estimates derived using run timing models.

	chinook				sockeye			chum			coho		
Date	male	jacks[1]	female	Totals	male	female	Totals	male	female	Totals	male	female	Totals
21-Jun				*1*			*0*			*0*			
22-Jun				*4*			*0*			5			
23-Jun				*2*			*0*			5			
24-Jun				*4*			*0*			*10*			
25-Jun				*3*			*0*			*29*			
26-Jun				*9*			*0*			*38*			
27-Jun				*88*			*0*			*33*			
28-Jun				*39*			*8*			*54*			
29-Jun				*118*			*3*			*203*			
30-Jun				*79*			*111*			*230*			
1-Jul				*198*			*40*			*401*			
2-Jul				*157*			*140*			*430*			
3-Jul				*254*			*122*			*573*			
4-Jul				*398*			*428*			*1,146*			
5-Jul				*433*			*391*			*788*			
6-Jul				*516*			*238*			*1,377*			
7-Jul	117	15	28	145	10	3	13	680	156	836			
8-Jul				*817*			*535*			*2,053*			
9-Jul				*769*			*757*			*1,442*			
10-Jul				*452*			*397*			*1,652*			
11-Jul				*719*			*666*			*2,691*			
12-Jul				*992*			*1,461*			*1,876*			
13-Jul				*699*			*2,069*			*1,649*			
14-Jul				*598*			*1,396*			*1,312*			
15-Jul				*675*			*992*			*2,069*			
16-Jul				*617*			*1,108*			*1,274*			
17-Jul				*455*			*589*			*2,089*			
18-Jul	151	18	78	229	73	65	138	427	165	592			
19-Jul	204	13	125	329	287	118	405	912	263	1,175			
20-Jul	160	33	104	264	319	143	462	1,229	293	1,522			
21-Jul	122	12	103	225	364	105	469	1,226	266	1,492			
22-Jul	125	10	90	215	364	77	441	929	172	1,101			
23-Jul	49	7	49	98	208	36	244	683	139	822			
24-Jul	59	4	53	112	155	9	164	493	92	585			
25-Jul	91	4	114	205	416	33	449	636	86	722			
26-Jul	67	4	60	127	308	26	334	461	53	514	0	2	2
27-Jul	93	6	91	184	395	57	452	587	83	670	2	0	2
28-Jul	93	10	101	194	360	64	424	616	94	710	0	0	0
29-Jul	65	9	49	114	231	27	258	453	54	507	0	0	0
30-Jul	50	3	60	110	207	21	228	334	25	359	1	0	1
31-Jul	60	4	41	101	171	18	189	269	21	290	2	0	2
1-Aug	34	7	30	64	117	13	130	150	3	153	2	0	2
2-Aug	32	2	26	58	98	1	99	134	7	141	3	0	3
3-Aug	12	2	19	31	90	6	96	114	6	120	8	2	10
4-Aug	9	1	16	25	75	2	77	171	21	192	5	2	7
5-Aug	16	5	14	30	66	8	74	126	19	145	10	4	14
6-Aug	14	0	3	17	14	5	19	81	11	92	2	4	6

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Table 1. (page 2 of 3)

Date	chinook				sockeye			chum			coho		
	male	jacks[a]	female	Totals	male	female	Totals	male	female	Totals	male	female	Totals
7-Aug	7	0	7	14	24	1	25	42	9	51	4	3	7
8-Aug	14	1	6	20	12	6	18	42	0	42	3	2	5
9-Aug	11	0	4	15	22	1	23	22	3	25	10	7	17
10-Aug	4	0	1	5	17	0	17	23	0	23	4	2	6
11-Aug	8	0	2	10	15	1	16	19	0	19	20	7	27
12-Aug	1	0	2	3	6	0	6	9	1	10	15	2	17
13-Aug	3	0	4	7	6	0	6	7	1	8	18	17	35
14-Aug	1	0	4	5	10	1	11	11	0	11	68	59	127
15-Aug	2	1	3	5	5	1	6	9	2	11	45	46	91
16-Aug	2	0	3	5	5	1	6	3	0	3	159	85	244
17-Aug	1	0	2	3	3	0	3	9	2	11	125	100	225
18-Aug	2	0	0	2	2	1	3	3	0	3	35	19	54
19-Aug	6	1	1	7	1	0	1	4	0	4	10	14	24
20-Aug	4	0	0	4	2	0	2	3	1	4	73	55	128
21-Aug	4	0	0	4	0	0	0	0	1	1	456	291	747
22-Aug	1	0	0	1	2	2	4	1	2	3	171	127	298
23-Aug	0	0	0	0	1	0	1	1	0	1	155	105	260
24-Aug	1	0	0	1	0	0	0	1	2	3	603	337	940
25-Aug	1	0	0	1	1	0	1	1	0	1	263	207	470
26-Aug	3	0	0	3	1	0	1	3	2	5	805	526	1,331
27-Aug	1	0	0	1	1	0	1	2	0	2	302	136	438
28-Aug	0	0	0	0	1	0	1	4	1	5	341	140	481
29-Aug	0	0	0	0	0	0	0	1	0	1	364	226	590
30-Aug	3	0	0	3	0	0	0	1	0	1	541	362	903
31-Aug	4	0	0	4	0	0	0	0	0	0	769	672	1,441
1-Sep	0	0	0	0	1	0	1	0	0	0	796	609	1,405
2-Sep	1	0	0	1	1	1	2	1	1	2	811	763	1,574
3-Sep	1	0	1	2	0	0	0	1	1	2	740	655	1,395
4-Sep	0	0	0	0	0	0	0	3	1	4	1,067	915	1,982
5-Sep	1	0	0	1	0	0	0	1	0	1	618	571	1,189
6-Sep	0	0	0	0	0	0	0	0	0	0	344	298	642
7-Sep	0	0	0	0	0	0	0	1	0	1	137	105	242
8-Sep	1	0	0	1	0	0	0	0	0	0	269	214	483
9-Sep	0	0	0	0	0	0	0	1	0	1	225	199	424
10-Sep	1	0	0	1	0	0	0	2	1	3	418	349	767
11-Sep	1	0	0	1	0	0	0	4	0	4	345	377	722
12-Sep	0	0	1	1	1	0	1	1	0	1	251	302	553
13-Sep	0	0	0	0	0	0	0	1	0	1	189	238	427
14-Sep	0	0	0	0	0	0	0	1	1	2	147	123	270
15-Sep	0	0	0	0	0	0	0	0	1	1	201	155	356
16-Sep	0	0	1	1	0	0	0	0	0	0	178	185	363
17-Sep	0	0	0	0	0	0	0	1	0	1	227	208	435
18-Sep	0	0	0	0	0	0	0	1	0	1	96	133	229
19-Sep	0	0	0	0	0	0	0	0	0	0	114	87	201
20-Sep													*330*
21-Sep													*222*
22-Sep													*273*
23-Sep													*196*
24-Sep													*182*

-continued-

Table 1 (page 3 of 3)

	chinook				sockeye			chum			coho		
Date	male	jacks[a]	female	Totals	male	female	Totals	male	female	Totals	male	female	Totals
25-Sep													*87*
26-Sep													*114*
27-Sep													*59*
28-Sep													*46*
29-Sep													*37*
30-Sep													*32*
1-Oct													*25*
2-Oct													*36*
3-Oct													*34*
4-Oct													*38*
5-Oct													*21*
Totals	1,713	172	1,296	***12,107***	4,468	853	***16,773***	10,951	2,063	***36,441***	12,567	10,047	***24,348***

[a] Chinook jacks included in male totals.

Table 2. Run timing models (cumulative proportion) used to calculate missing total and daily counts of salmon at the Kogrukluk River Weir, 1998.
Bold italic proportions were used to estimate days of missing fish passage.

Date	Late Run Timing chinook	Late Run Timing sockeye	Late Run Timing chum	Late Run Timing coho
17-Jun	***0.000***	***0.000***	***0.000***	0.000
18-Jun	***0.000***	***0.000***	***0.000***	0.000
19-Jun	***0.000***	***0.000***	***0.000***	0.000
20-Jun	***0.000***	***0.000***	***0.000***	0.000
21-Jun	***0.000***	***0.000***	***0.000***	0.000
22-Jun	***0.000***	***0.000***	***0.000***	0.000
23-Jun	***0.000***	***0.000***	***0.000***	0.000
24-Jun	***0.000***	***0.000***	***0.000***	0.000
25-Jun	***0.000***	***0.000***	***0.000***	0.000
26-Jun	***0.001***	***0.001***	***0.001***	0.000
27-Jun	***0.001***	***0.007***	***0.001***	0.000
28-Jun	***0.001***	***0.009***	***0.002***	0.000
29-Jun	***0.002***	***0.017***	***0.003***	0.000
30-Jun	***0.010***	***0.024***	***0.005***	0.000
01-Jul	***0.014***	***0.049***	***0.010***	0.000
02-Jul	***0.024***	***0.071***	***0.016***	0.000
03-Jul	***0.030***	***0.084***	***0.027***	0.000
04-Jul	***0.048***	***0.111***	***0.038***	0.000
05-Jul	***0.064***	***0.141***	***0.053***	0.000
06-Jul	***0.094***	***0.185***	***0.083***	0.000
07-Jul	0.133	0.207	0.104	0.000
08-Jul	***0.173***	***0.245***	***0.141***	0.000
09-Jul	***0.198***	***0.328***	***0.205***	0.000
10-Jul	***0.226***	***0.446***	***0.259***	0.000
11-Jul	***0.293***	***0.526***	***0.297***	0.000
12-Jul	***0.356***	***0.582***	***0.341***	0.000
13-Jul	***0.393***	***0.645***	***0.412***	0.000
14-Jul	***0.452***	***0.679***	***0.462***	0.000
15-Jul	***0.533***	***0.724***	***0.505***	0.000
16-Jul	***0.590***	***0.748***	***0.540***	0.000
17-Jul	***0.639***	***0.792***	***0.594***	0.000
18-Jul	0.695	0.835	0.628	0.000
19-Jul	0.745	0.859	0.683	0.000
20-Jul	0.782	0.878	0.716	0.000
21-Jul	0.821	0.900	0.754	0.000
22-Jul	0.849	0.912	0.772	0.000
23-Jul	0.875	0.927	0.804	0.000
24-Jul	0.898	0.936	0.834	0.000
25-Jul	0.917	0.950	0.863	0.000
26-Jul	0.935	0.964	0.875	0.000
27-Jul	0.947	0.967	0.879	0.000

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Table 2. (page 2 of 3)

Date	Late Run Timing chinook	Late Run Timing sockeye	Late Run Timing chum	Late Run Timing coho
28-Jul	0.954	0.975	0.883	0.000
29-Jul	0.957	0.981	0.886	0.000
30-Jul	0.963	0.987	0.904	0.000
31-Jul	0.969	0.989	0.919	0.000
01-Aug	0.974	0.991	0.929	0.000
02-Aug	0.977	0.992	0.934	0.000
03-Aug	0.980	0.993	0.944	0.000
04-Aug	0.983	0.994	0.957	0.000
05-Aug	0.985	0.995	0.967	0.001
06-Aug	0.985	0.996	0.973	0.001
07-Aug	0.987	0.996	0.977	0.001
08-Aug	0.988	0.998	0.982	0.002
09-Aug	0.989	0.998	0.986	0.002
10-Aug	0.990	0.999	0.988	0.003
11-Aug	0.992	0.999	0.989	0.006
12-Aug	0.993	0.999	0.990	0.011
13-Aug	0.994	0.999	0.992	0.013
14-Aug	0.995	0.999	0.994	0.015
15-Aug	0.996	0.999	0.995	0.020
16-Aug	0.997	0.999	0.996	0.022
17-Aug	0.997	0.999	0.997	0.036
18-Aug	0.998	1.000	0.998	0.055
19-Aug	0.998	1.000	0.998	0.073
20-Aug	0.998	1.000	0.999	0.083
21-Aug	0.999	1.000	0.999	0.091
22-Aug	0.999	1.000	0.999	0.096
23-Aug	0.999	1.000	1.000	0.107
24-Aug	0.999	1.000	1.000	0.119
25-Aug	1.000	1.000	1.000	0.152
26-Aug	1.000	1.000	1.000	0.182
27-Aug	1.000	1.000	1.000	0.215
28-Aug	1.000	1.000	1.000	0.251
29-Aug	1.000	1.000	1.000	0.301
30-Aug	1.000	1.000	1.000	0.351
31-Aug	1.000	1.000	1.000	0.387
01-Sep	1.000	1.000	1.000	0.413
02-Sep	1.000	1.000	1.000	0.442
03-Sep	1.000	1.000	1.000	0.468
04-Sep	1.000	1.000	1.000	0.521
05-Sep	1.000	1.000	1.000	0.568
06-Sep	1.000	1.000	1.000	0.625
07-Sep	1.000	1.000	1.000	0.669
08-Sep	1.000	1.000	1.000	0.715
09-Sep	1.000	1.000	1.000	0.764
10-Sep	1.000	1.000	1.000	0.794
11-Sep	1.000	1.000	1.000	0.814
12-Sep	1.000	1.000	1.000	0.830

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Table 2. (page 3 of 3)

Date	Late Run Timing chinook	Late Run Timing sockeye	Late Run Timing chum	Late Run Timing coho
13-Sep	1.000	1.000	1.000	0.861
14-Sep	1.000	1.000	1.000	0.878
15-Sep	1.000	1.000	1.000	0.891
16-Sep	1.000	1.000	1.000	0.893
17-Sep	1.000	1.000	1.000	0.905
18-Sep	1.000	1.000	1.000	0.922
19-Sep	1.000	1.000	1.000	0.935
20-Sep	1.000	1.000	1.000	***0.948***
21-Sep	1.000	1.000	1.000	***0.957***
22-Sep	1.000	1.000	1.000	***0.964***
23-Sep	1.000	1.000	1.000	***0.972***
24-Sep	1.000	1.000	1.000	***0.978***
25-Sep	1.000	1.000	1.000	***0.982***
26-Sep	1.000	1.000	1.000	***0.987***
27-Sep	1.000	1.000	1.000	***0.989***
28-Sep	1.000	1.000	1.000	***0.991***
29-Sep	1.000	1.000	1.000	***0.992***
30-Sep	1.000	1.000	1.000	***0.994***
01-Oct	1.000	1.000	1.000	***0.995***
02-Oct	1.000	1.000	1.000	***0.996***
03-Oct	1.000	1.000	1.000	***0.998***
04-Oct	1.000	1.000	1.000	***0.999***
05-Oct	1.000	1.000	1.000	***1.000***

Table 3. Daily counts of chinook, chum, and sockeye salmon cacasses at the Kogrukluk River weir, 1998.

Date	chinook	chum	sockeye
17-Jul		4	
18-Jul		49	
19-Jul		53	
20-Jul		99	
21-Jul		84	
22-Jul		93	
23-Jul	2	160	
24-Jul	4	155	
25-Jul	1	154	1
26-Jul	4	166	2
27-Jul	2	154	0
28-Jul	4	202	0
29-Jul	13	288	0
30-Jul	6	225	0
31-Jul	31	330	1
01-Aug	46	440	0
02-Aug	41	363	1
03-Aug	42	346	1
04-Aug	44	326	2
05-Aug	68	305	1
06-Aug	41	276	0
07-Aug	72	192	2
08-Aug	57	164	6
09-Aug	63	131	7
10-Aug	65	184	15
11-Aug	54	83	14
12-Aug	80	120	23
13-Aug	70	115	31
14-Aug	29	75	40
15-Aug	33	47	22
16-Aug	23	47	30
18-Aug	11	38	34
19-Aug	16	21	38
20-Aug	8	18	46
21-Aug	1	14	45
22-Aug	1	11	28
23-Aug	1	5	29
24-Aug	1	10	37
25-Aug	3	7	38
26-Aug	0	5	8
27-Aug	2	6	23
28-Aug	1	1	16
29-Aug	1	3	15
30-Aug	1	4	17
31-Aug	1	2	16
01-Sep	1	2	7
02-Sep	1	2	5
03-Sep	0	2	10
04-Sep	0	1	7
05-Sep	0	0	1
06-Sep	0	0	2
07-Sep	0	1	0
08-Sep	0	2	2
09-Sep	0	1	0
10-Sep	0	0	0
11-Sep	0	0	0
12-Sep	0	0	0
13-Sep	1	2	0
14-Sep	1	0	0
15-Sep	1	0	0
Totals	**948**	**5588**	**623**

Table 4. Actual daily and estimated counts of chinook, sockeye, chum, and coho salmon, Kogrukluk River weir, 1999.
Bold italic numbers are estimates derived using run timing models.

Date	chinook				chum			sockeye			coho		
	male	jacks*	female	Total	male	female	Total	male	female	Total	male	female	Total
30-Jun													
1-Jul				***6***			***3***						
2-Jul				***2***			***15***						
3-Jul				***2***			***7***						
4-Jul				***5***			***21***						
5-Jul				***43***			***51***			0			0
6-Jul	12	3	5	17	140	32	172	1	0	1			0
7-Jul	41	12	12	53	243	69	312	6	1	7			0
8-Jul	34	6	7	41	305	74	379	3	3	6			0
9-Jul	45	11	11	56	347	74	421	10	4	14			0
10-Jul	107	11	41	148	506	84	590	25	16	41			0
11-Jul	162	6	37	199	623	143	766	27	18	45			0
12-Jul	184	17	74	258	766	197	963	49	43	92			0
13-Jul	128	14	76	204	711	169	880	73	70	143			0
14-Jul	195	21	92	287	559	92	651	98	46	144			0
15-Jul	80	15	49	129	465	74	539	153	75	228			0
16-Jul	214	21	141	355	478	112	590	280	120	400			0
17-Jul	185	23	146	331	391	82	473	232	86	318			0
18-Jul	68	7	58	126	386	55	441	188	48	236			0
19-Jul	211	25	184	395	496	95	591	257	91	348			0
20-Jul	110	7	111	221	476	80	556	266	86	352			0
21-Jul	357	29	431	788	484	93	577	260	78	338			0
22-Jul	115	16	150	265	364	58	422	249	96	345			0
23-Jul	85	19	145	230	409	72	481	191	57	248			0
24-Jul	98	22	137	235	412	46	458	347	93	440	1	0	1
25-Jul	126	12	303	429	303	62	365	260	94	354	0	0	0
26-Jul	20	0	61	81	275	45	320	127	30	157	0	0	0
27-Jul	29	7	84	113	307	46	353	245	63	308	0	0	0
28-Jul	19	3	49	68	226	43	269	127	21	148	0	0	0
29-Jul	16	4	77	93	252	36	288	126	22	148	0	0	0
30-Jul	26	6	62	88	299	25	324	201	31	232	0	1	1
31-Jul	11	1	41	52	231	21	252	147	15	162	0	0	0
1-Aug	20	2	34	54	224	21	245	133	32	165	0	0	0
2-Aug	11	5	30	41	145	28	173	84	11	95	0	0	0
3-Aug	8	1	16	24	111	18	129	70	7	77	0	0	0
4-Aug	5	0	13	18	162	25	187	67	8	75	0	0	0
5-Aug				***23***			***123***			***68***			***0***
6-Aug				***17***			***103***			***19***			***0***
7-Aug	2	0	5	7	30	4	34	27	1	28	1	0	1
8-Aug	9	1	1	10	36	21	57	21	1	22	1	0	1
9-Aug	2	0	2	4	28	7	35	14	0	14	0	1	1
10-Aug	1	0	1	2	26	4	30	10	3	13	4	2	6
11-Aug	1	0	1	2	23	4	27	7	0	7	3	1	4
12-Aug	3	1	5	8	28	6	34	3	2	5	1	3	4
13-Aug	1	1	3	4	20	3	23	2	1	3	9	2	11
14-Aug	2	2	2	4	11	1	12	6	0	6	5	0	5
15-Aug	0	0	1	1	9	2	11	1	2	3	20	4	24
16-Aug	1	0	1	2	4	1	5	3	0	3	54	8	62
17-Aug	2	1	1	3	7	3	10	3	0	3	40	9	49
18-Aug	3	0	0	3	2	1	3	0	0	0	15	0	15
19-Aug	0	0	0	0	0	0	0	2	0	2	5	1	6
20-Aug	0	0	1	1	3	1	4	1	0	1	187	51	238
21-Aug	0	0	0	0	1	4	5	0	0	0	46	23	69
22-Aug	2	0	0	2	3	3	6	0	0	0	131	57	188
23-Aug	0	0	0	0	1	1	2	0	0	0	145	46	191
24-Aug	0	0	1	1	0	1	1	0	0	0	125	50	175
25-Aug	1	0	1	2	1	3	4	0	0	0	135	36	171
26-Aug	1	0	0	1	0	1	1	0	0	0	64	13	77
27-Aug	2	0	0	2	0	2	2	0	0	0	213	48	261
28-Aug	0	0	0	0	0	0	0	0	0	0	76	27	103
29-Aug	0	0	0	0	2	0	2	0	0	0	157	49	206
30-Aug	1	0	1	2	3	1	4	0	0	0	206	59	265
31-Aug	0	0	0	0	2	1	3	0	0	0	158	50	208
1-Sep	0	0	0	0	3	0	3	0	0	0	273	76	349

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Table 4 (page 2 of 2)

1996	chinook				chum			sockeye			coho		
	male	jacks*	female	Total	male	female	Total	male	female	Total	male	female	Total
2-Sep	0	0	0	0	1	0	1	0	0	0	350	132	482
3-Sep	2	1	1	3	0	1	1	0	0	0	370	131	501
4-Sep	1	0	1	2	1	0	1	0	0	0	608	268	876
5-Sep	1	0	0	1	1	0	1	0	0	0	645	356	1001
6-Sep	1	0	0	1	0	0	0	0	0	0	287	137	424
7-Sep	0	0	0	0	0	1	1	0	0	0	402	128	530
8-Sep	0	0	0	0	2	0	2	0	0	0	365	164	529
9-Sep	2	1	0	2	1	0	1	0	0	0	289	117	406
10-Sep	0	0	0	0	1	0	1	0	0	0	272	141	413
11-Sep	1	0	0	1	0	0	0	0	0	0	176	82	258
12-Sep	1	0	0	1	0	0	0	0	0	0	251	95	346
13-Sep	1	1	0	1	0	2	2	0	0	0	147	78	225
14-Sep	0	0	0	0	0	0	0	0	0	0	392	217	609
15-Sep	0	0	0	0	0	0	0	0	0	0	254	188	442
16-Sep	0	0	0	0	0	0	0	0	0	0	70	58	128
17-Sep	0	0	0	0	0	1	1	0	0	0	110	122	232
18-Sep				0			0			0			571
19-Sep				0			0			0			380
20-Sep				0			0			0			267
21-Sep				0			0			0			176
22-Sep				0			0			0			363
23-Sep				0			0			0			161
24-Sep				0			0			0			190
25-Sep				0			0			0			66
26-Sep				0			0			0			63
27-Sep				0			0			0			61
28-Sep				0			0			0			41
29-Sep				0			0			0			37
30-Sep				0			0			0			18
1-Oct				0			0			0			20
2-Oct				0			0			0			28
3-Oct				0			0			0			27
4-Oct				0			0			0			25
5-Oct				0			0			0			21
totals	2,760	335	2,700	5,570	11,346	2,151	13,820	4,402	1,375	5,864	7,063	3,031	12,609

* Chinook jacks included in male totals.

Table 5. Daily counts of chinook, chum, and sockeye, salmon carcasses at the Kogrukluk River weir, 1999.

Date	chinook	chum	sockeye
06-Jul		2	
07-Jul		10	
08-Jul		8	
09-Jul		6	
10-Jul		8	
11-Jul		18	
12-Jul		17	
13-Jul		23	
14-Jul		22	
15-Jul		28	
16-Jul		42	
17-Jul		49	
18-Jul		71	
19-Jul		49	
20-Jul		51	
21-Jul		79	
22-Jul		75	
23-Jul		87	
24-Jul		110	
25-Jul	1	151	1
26-Jul	0	131	0
27-Jul	0	117	0
28-Jul	2	87	0
29-Jul	0	111	0
30-Jul	3	77	0
31-Jul	5	162	0
01-Aug	1	114	0
02-Aug	10	125	0
03-Aug	9	149	0
04-Aug	16	143	0
05-Aug	5	166	1
06-Aug	42	14	0
07-Aug	32	74	3
08-Aug	51	83	1
09-Aug	48	87	5
10-Aug	39	76	4

Date	chinook	chum	sockeye
11-Aug	48	67	14
12-Aug	46	89	6
13-Aug	32	107	26
14-Aug	24	68	21
15-Aug	16	55	23
16-Aug	21	30	33
18-Aug	9	36	41
19-Aug	26	17	26
20-Aug	4	31	8
21-Aug	4	12	30
22-Aug	0	32	52
23-Aug	3	7	12
24-Aug	1	22	27
25-Aug	1	12	13
26-Aug	0	10	11
27-Aug	1	8	12
28-Aug	1	9	13
29-Aug	0	8	12
30-Aug	0	5	10
31-Aug	0	2	6
01-Sep	0	3	7
02-Sep	0	1	5
03-Sep	1	2	6
04-Sep	1	6	5
05-Sep	0	4	3
06-Sep	0	4	3
07-Sep	1	2	1
08-Sep	0	1	1
09-Sep	0	6	2
10-Sep	1	3	1
11-Sep	1	2	1
12-Sep	1	2	0
13-Sep	0	1	0
14-Sep	0	0	0
15-Sep	0	0	0
Totals	507	3286	446

Table 6. Run timing models (cumulative proportion) used to calculate missing total and daily counts of salmon at the Kogrukluk River Weir, 1999.
Bold italic proportions were used to estimate days of missing fish passage.

Date	Late Run Timing chinook[a]	Late Run Timing sockeye	Late Run Timing chum[a]	Late Run Timing coho[b]
17-Jun				0.000
18-Jun				0.000
19-Jun				0.000
20-Jun		0.000		0.000
21-Jun		0.000		0.000
22-Jun		0.000		0.000
23-Jun		0.000		0.000
24-Jun	***0.001***	0.000		0.000
25-Jun	***0.001***	0.000		0.000
26-Jun	***0.001***	0.000	***0.002***	0.000
27-Jun	***0.002***	0.000	***0.002***	0.000
28-Jun	***0.010***	0.000	***0.004***	0.000
29-Jun	0.014	0.001	***0.007***	0.000
30-Jun	0.024	0.005	***0.013***	0.000
01-Jul	0.027	0.008	0.024	0.000
02-Jul	0.040	0.012	0.037	0.000
03-Jul	0.060	0.020	0.052	0.000
04-Jul	0.083	0.029	0.078	0.000
05-Jul	0.116	0.037	0.100	0.000
06-Jul	0.149	0.061	0.131	0.000
07-Jul	0.177	0.099	0.166	0.000
08-Jul	0.211	0.139	0.205	0.000
09-Jul	0.241	0.165	0.262	0.000
10-Jul	0.296	0.206	0.337	0.000
11-Jul	0.337	0.243	0.378	0.000
12-Jul	0.404	0.319	0.441	0.000
13-Jul	0.486	0.386	0.489	0.000
14-Jul	0.572	0.440	0.537	0.000
15-Jul	0.621	0.489	0.584	0.000
16-Jul	0.683	0.542	0.627	0.000
17-Jul	0.742	0.593	0.669	0.000
18-Jul	0.782	0.647	0.707	0.000
19-Jul	0.814	0.696	0.747	0.000
20-Jul	0.843	0.749	0.768	0.000
21-Jul	0.874	0.794	0.801	0.000
22-Jul	0.893	0.833	0.820	0.000
23-Jul	0.915	0.853	0.843	0.000
24-Jul	0.932	0.888	0.852	0.000
25-Jul	0.940	0.910	0.859	0.000
26-Jul	0.951	0.927	0.871	0.000
27-Jul	0.957	0.934	0.881	0.000

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Table 6. (page 2 of 3)

Date	Late Run Timing chinook[a]	Late Run Timing sockeye	Late Run Timing chum[a]	Late Run Timing coho[b]
28-Jul	0.962	0.949	0.895	0.000
29-Jul	0.969	0.961	0.909	0.000
30-Jul	0.973	0.967	0.921	0.000
31-Jul	0.976	0.974	0.930	0.000
01-Aug	0.979	0.979	0.942	0.000
02-Aug	0.981	0.986	0.955	0.000
03-Aug	0.983	0.988	0.965	0.000
04-Aug	0.984	0.990	0.971	0.000
05-Aug	***0.985***	***0.992***	***0.975***	***0.000***
06-Aug	***0.987***	***0.993***	***0.979***	***0.000***
07-Aug	0.988	0.994	0.983	0.000
08-Aug	0.990	0.995	0.985	0.001
09-Aug	0.991	0.996	0.987	0.001
10-Aug	0.993	0.996	0.990	0.002
11-Aug	0.994	0.997	0.991	0.004
12-Aug	0.995	0.998	0.993	0.006
13-Aug	0.996	0.998	0.994	0.008
14-Aug	0.996	0.999	0.995	0.012
15-Aug	0.997	0.999	0.996	0.019
16-Aug	0.997	0.999	0.997	0.021
17-Aug	0.998	0.999	0.998	0.024
18-Aug	0.998	0.999	0.999	0.029
19-Aug	0.998	0.999	0.999	0.032
20-Aug	0.999	0.999	0.999	0.033
21-Aug	0.999	1.000	0.999	0.034
22-Aug	0.999	1.000	1.000	0.041
23-Aug	1.000	1.000	1.000	0.059
24-Aug	1.000	1.000	1.000	0.071
25-Aug	1.000	1.000	1.000	0.075
26-Aug	1.000	1.000	1.000	0.076
27-Aug	1.000	1.000	1.000	0.079
28-Aug	1.000	1.000	1.000	0.111
29-Aug	1.000	1.000	1.000	0.116
30-Aug	1.000	1.000	1.000	0.120
31-Aug	1.000	1.000	1.000	0.139
01-Sep	1.000	1.000	1.000	0.207
02-Sep	1.000	1.000	1.000	0.210
03-Sep	1.000	1.000	1.000	0.265
04-Sep	1.000	1.000	1.000	0.307
05-Sep	1.000	1.000	1.000	0.319
06-Sep	1.000	1.000	1.000	0.384
07-Sep	1.000	1.000	1.000	0.408
08-Sep	1.000	1.000	1.000	0.421
09-Sep	1.000	1.000	1.000	0.439
10-Sep	1.000	1.000	1.000	0.539
11-Sep	1.000	1.000	1.000	0.582
12-Sep	1.000	1.000	1.000	0.583

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Table 6. (page 3 of 3)

Date	Late Run Timing chinook[a]	Late Run Timing sockeye	Late Run Timing chum[a]	Late Run Timing coho[b]
13-Sep	1.000	1.000	1.000	0.604
14-Sep	1.000	1.000	1.000	0.708
15-Sep	1.000	1.000	1.000	0.724
16-Sep	1.000	1.000	1.000	0.741
17-Sep	1.000	1.000	1.000	0.791
18-Sep	1.000	1.000	1.000	*0.838*
19-Sep	1.000	1.000	1.000	*0.870*
20-Sep	1.000	1.000	1.000	*0.892*
21-Sep	1.000	1.000	1.000	*0.907*
22-Sep	1.000	1.000	1.000	*0.937*
23-Sep	1.000	1.000	1.000	*0.950*
24-Sep	1.000	1.000	1.000	*0.966*
25-Sep	1.000	1.000	1.000	*0.972*
26-Sep	1.000	1.000	1.000	*0.977*
27-Sep	1.000	1.000	1.000	*0.982*
28-Sep	1.000	1.000	1.000	*0.985*
29-Sep	1.000	1.000	1.000	*0.988*
30-Sep	1.000	1.000	1.000	*0.990*
01-Oct	1.000	1.000	1.000	*0.992*
02-Oct	1.000	1.000	1.000	*0.994*
03-Oct	1.000	1.000	1.000	*0.996*
04-Oct	1.000	1.000	1.000	*0.998*
05-Oct	1.000	1.000	1.000	*1.000*

[a] Run timing curve offset by 5 days due to lateness of run.

[b] Estimated coho passage derived using 1983 run timing due to lateness of run.

Table 7. Escapement of chinook salmon partitioned by age, sex, and time stratum based on mid-creek samples for the Kogrukluk River, 1998 and 1999.

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 0.2 Esc.	0.2 %	1.1 Esc.	1.1 %	1.2 Esc.	1.2 %	2.1 Esc.	2.1 %	1.3 Esc.	1.3 %	2.2 Esc.	2.2 %	1.4 Esc.	1.4 %	2.3 Esc.	2.3 %	1.5 Esc.	1.5 %	2.4 Esc.	2.4 %	1.6 Esc.	1.6 %	2.5 Esc.	2.5 %	Total Esc.	Total %
1998*	7/23- 27	86	M		0.0		0.0		4.7		0.0		37.2		0.0		12.8		0.0		1.2		0.0		0.0		0.0		55.8
			F		0.0		0.0		0.0		0.0		17.5		0.0		25.6		0.0		1.1		0.0		0.0		0.0		44.2
			Total		0.0		0.0		4.7		0.0		54.7		0.0		38.4		0.0		2.3		0.0		0.0		0.0		100.0
1999	7/12, 14-16, 18	188	M	0	0.0	14	0.5	113	4.3	0	0.0	707	26.6	14	0.5	721	27.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1,569	59.0
	(6/30 - 7/19)		F	0	0.0	0	0.0	0	0.0	0	0.0	56	2.1	0	0.0	975	36.7	0	0.0	57	2.1	0	0.0	0	0.0	0	0.0	1,088	41.0
			Subtotal	0	0.0	14	0.5	113	4.3	0	0.0	763	28.7	14	0.5	1,696	63.8	0	0.0	57	2.1	0	0.0	0	0.0	0	0.0	2,657	100.0
	7/21, 23, 26	89	M	0	0.0	0	0.0	147	5.6	0	0.0	440	16.9	0	0.0	323	12.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	909	34.8
	(7/20 - 7/30)		F	0	0.0	0	0.0	0	0.0	0	0.0	147	5.6	0	0.0	1,525	58.4	0	0.0	29	1.1	0	0.0	0	0.0	0	0.0	1,702	65.2
			Subtotal	0	0.0	0	0.0	147	5.6	0	0.0	587	22.5	0	0.0	1,848	70.8	0	0.0	29	1.1	0	0.0	0	0.0	0	0.0	2,611	100.0
	8/3	28	M	0	0.0	0	0.0	43	14.3	0	0.0	43	14.3	0	0.0	43	14.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	129	42.9
	(7/31 - 9/13)		F	0	0.0	0	0.0	0	0.0	0	0.0	11	3.6	0	0.0	162	53.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	173	57.1
			Subtotal	0	0.0	0	0.0	43	14.3	0	0.0	54	17.9	0	0.0	205	67.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	302	100.0
	Season	305	M	0	0.0	14	0.3	303	5.4	0	0.0	1,190	21.4	14	0.3	1,087	19.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2,608	46.8
			F	0	0.0	0	0.0	0	0.0	0	0.0	214	3.8	0	0.0	2,662	47.8	0	0.0	86	1.5	0	0.0	0	0.0	0	0.0	2,962	53.2
			Total	0	0.0	14	0.3	303	5.4	0	0.0	1,404	25.2	14	0.3	3,749	67.3	0	0.0	86	1.5	0	0.0	0	0.0	0	0.0	5,570	100.0
	Historic	6,436	M	0	0.0	333	0.4	15,847	17.1	0	0.0	30,940	33.3	39	0.0	13,466	14.5	66	0.1	432	0.5	13	0.0	0	0.0	0	0.0	61,135	65.9
	Total		F	0	0.0	0	0.0	245	0.3	0	0.0	5,365	5.8	0	0.0	23,841	25.7	0	0.0	2,183	2.4	0	0.0	8	0.0	0	0.0	31,645	34.1
			Total	0	0.0	333	0.4	16,092	17.3	0	0.0	36,305	39.1	39	0.0	37,307	40.2	66	0.1	2,615	2.8	13	0.0	8	0.0	0	0.0	92,775	100.0

* Sampling dates do not meet criteria for estimating escapement percentages.

Table 8 Mean length (mm) by sex and age based on samples of trap-caught chinook salmon at the Kogrukluk River weir, 1998 and 1999.

Year	Sample Dates (Stratum Dates)	Sex		Age Class											
				0.2	1.1	1.2	2.1	1.3	2.2	1.4	2.3	1.5	2.4	1.6	2.5
1998[a]	7/23- 27	M	Mean Length			558		749		836		820			
			Std. Error			30		12		22		-			
			Range			500- 640		600- 860		750- 940		820- 820			
			Sample Size	0	0	4	0	32	0	11	0	1	0	0	0
		F	Mean Length					818		861		870			-
			Std. Error					9		10		-			
			Range					755- 870		785- 990		870- 870			
			Sample Size	0	0	0	0	15	0	22	0	1	0	0	0
1999	7/12, 14-16, 1 (6/30 - 7/19)	M	Mean Length		420	594		681	550	789					
			Std. Error		-	17		9	-	10					
			Range		420- 420	500- 660		580- 890	550- 550	585- 980					
			Sample Size	0	1	8	0	50	1	51	0	0	0	0	0
		F	Mean Length					753		855		891			
			Std. Error					13		6		37			
			Range					730- 790		760- 990		800- 970			
			Sample Size	0	0	0	0	4	0	69	0	4	0	0	0
	7/21, 23, 26 (7/20 - 7/30)	M	Mean Length			581		713		801					
			Std. Error			13		18		13					
			Range			545- 605		590- 850		730- 860					
			Sample Size	0	0	5	0	15	0	11	0	0	0	0	0
		F	Mean Length					812		841		930			
			Std. Error					22		7		-			
			Range					730- 860		750- 960		930- 930			
			Sample Size	0	0	0	0	5	0	52	0	1	0	0	0

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Year	Sample Dates (Stratum Dates)	Sex		Age Class											
				0.2	1.1	1.2	2.1	1.3	2.2	1.4	2.3	1.5	2.4	1.6	2.5
1999 (cont.)	8/3 (7/31 - 9/13)	M	Mean Length			586		708		773					
			Std. Error			11		11		48					
			Range			560- 610		690- 740		640- 860					
			Sample Size	0	0	4	0	4	0	4	0	0	0	0	0
		F	Mean Length					850		822					
			Std. Error					-		14					
			Range					850- 850		720- 930					
			Sample Size	0	0	0	0	1	0	15	0	0	0	0	0
	Season	M	Mean Length		420	587		694	550	792					
			Range		420- 420	500- 660		580- 890	550- 550	585- 980					
			Sample Size	0	1	17	0	69	1	66	0	0	0	0	0
		F	Mean Length					798		845		904			
			Range					730- 860		720- 990		800- 970			
			Sample Size	0	0	0	0	10	0	136	0	5	0	0	0
	Historic Total	M	Mean Length		425	569		711	605	829	826	935	775		
			Range		355- 639	381- 760		481- 935	550- 660	530- 1100	777- 875	786- 1089	775- 775		
			Sample Size	0	12	1,019	0	2,430	2	863	2	53	1	0	0
		F	Mean Length			602		790		868		911		912	
			Range			568- 635		613- 963		695- 1035		740- 1072		873- 950	
			Sample Size	0	0	6	0	284	0	1,557	0	201	0	2	0

* Sampling dates do not meet criteria for estimating escapement percentages.

Table 9. Escapement of chum salmon partitioned by age, sex, and time stratum based on trap caught samples for the Kogrukluk River, 1998 and 1999.

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 0.2 Esc.	0.2 %	0.3 Esc.	0.3 %	0.4 Esc.	0.4 %	0.5 Esc.	0.5 %	Total Esc.	Total %
1998 [a]	7/23 - 26	193	M		0.0		79.8		8.8		0.0		88.6
			F		0.0		10.4		1.0		0.0		11.4
			Subtotal		0.0		90.2		9.8		0.0		100.0
1999	7/8 - 11	196	M	0	0.0	1,589	34.7	2,570	56.1	23	0.5	4,183	91.3
	(7/1 - 13)		F	0	0.0	164	3.6	234	5.1	0	0.0	397	8.7
			Subtotal	0	0.0	1,753	38.3	2,804	61.2	23	0.5	4,580	100.0
	7/16 - 20	184	M	0	0.0	1,873	42.4	2,281	51.6	0	0.0	4,154	94.0
	(7/14 - 21)		F	0	0.0	96	2.2	144	3.3	24	0.5	264	6.0
			Subtotal	0	0.0	1,969	44.6	2,425	54.9	24	0.5	4,418	100.0
	7/23 - 24	110	M	0	0.0	894	51.8	659	38.2	0	0.0	1,553	90.0
	(7/22 - 25)		F	0	0.0	110	6.4	63	3.6	0	0.0	173	10.0
			Subtotal	0	0.0	1,004	58.2	722	41.8	0	0.0	1,726	100.0
	7/26 - 29	175	M	0	0.0	835	53.7	533	34.3	0	0.0	1,368	88.0
	(7/26 - 30)		F	0	0.0	133	8.6	53	3.4	0	0.0	186	12.0
			Subtotal	0	0.0	968	62.3	586	37.7	0	0.0	1,554	100.0
	7/31; 8/2	72	M	0	0.0	1,028	66.7	364	23.6	0	0.0	1,392	90.3
	(7/31 - 10/5)		F	0	0.0	86	5.5	64	4.2	0	0.0	150	9.7
			Subtotal	0	0.0	1,114	72.2	428	27.8	0	0.0	1,542	100.0
	Season	737	M	0	0.0	6,219	45.0	6,407	46.4	23	0.1	12,650	91.5
			F	0	0.0	588	4.3	558	4.0	24	0.2	1,170	8.5
			Total	0	0.0	6,807	49.3	6,965	50.4	47	0.3	13,820	100.0
	Historic	7,895	M	1,652	0.4	151,594	36.2	139,526	33.3	3,711	0.9	296,465	70.8
	Total		F	793	0.2	64,761	15.5	55,664	13.3	1,018	0.2	122,228	29.2
			Total	2,445	0.6	216,355	51.7	195,191	46.6	4,619	1.1	418,693	100.0

[a] The weir washed out in 1998; sampling dates do not meet criteria for estimating escapement percentages for season.

Table 10. Mean length (mm) by sex and age based on samples of trap caught chum salmon at the Kogrukluk River weir, 1998 and 1999.

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
1998 [a]	7/23 - 26	M	Mean Length		596	621	
			Std. Error		2	8	
			Range		500- 650	570- 680	
			Sample Size	0	154	17	0
		F	Mean Length		558	580	
			Std. Error		6	-	
			Range		510- 620	580- 580	
			Sample Size	0	20	2	0
1999	7/8 - 11	M	Mean Length		591	604	600
	(7/1 - 13)		Std. Error		3	3	-
			Range		535- 630	520- 675	600- 600
			Sample Size	0	68	110	1
		F	Mean Length		569	579	
			Std. Error		10	7	
			Range		535- 610	545- 615	
			Sample Size	0	7	10	0
	7/16 - 20	M	Mean Length		588	606	
	(7/14 - 21)		Std. Error		3	3	
			Range		525- 650	545- 670	
			Sample Size	0	78	95	0
		F	Mean Length		541	592	540
			Std. Error		10	12	-
			Range		510- 555	560- 645	540- 540
			Sample Size	0	4	6	1
	7/23 - 24	M	Mean Length		585	602	
	(7/22 - 25)		Std. Error		3	5	
			Range		515- 650	555- 660	
			Sample Size	0	57	42	0
		F	Mean Length		562	576	
			Std. Error		10	10	
			Range		535- 610	560- 600	
			Sample Size	0	7	4	0

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Table 10. (page 2 of 2).

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
1999 (cont)	7/26 - 29 (7/26 - 30)	M	Mean Length		578	598	
			Std. Error		2	4	
			Range		505- 630	530- 685	
			Sample Size	0	94	60	0
		F	Mean Length		564	583	
			Std. Error		6	15	
			Range		515- 600	530- 615	
			Sample Size	0	15	6	0
	7/31; 8/2 (7/31 - 10/5)	M	Mean Length		587	601	
			Std. Error		3	7	
			Range		540- 630	540- 640	
			Sample Size	0	48	17	0
		F	Mean Length		568	593	
			Std. Error		3	23	
			Range		560- 570	550- 630	
			Sample Size	0	4	3	0
	Season	M	Mean Length		587	604	600
			Range		505- 650	520- 685	600- 600
			Sample Size	0	345	324	1
		F	Mean Length		562	584	540
			Range		510- 610	530- 645	540- 540
			Sample Size	0	37	29	1
	Historic Total	M	Mean Length	567	583	604	611
			Range	470- 654	360- 698	439- 721	540- 703
			Sample size	45	3,364	2,501	74
		F	Mean Length	548	562	579	576
			Range	468- 606	453- 670	450- 689	533- 654
			Sample size	18	1,091	766	28

[a] The weir washed out in 1998; sampling period does not meet criteria for estimating season escapement.

Table 11. Escapement of coho salmon partitioned by age, sex, and time stratum based on trap caught samples for the Kogrukluk River, 1998 and 1999.

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 1.1 Esc.	1.1 %	2.1 Esc.	2.1 %	2.2 Esc.	2.2 %	3.1 Esc.	3.1 %	Total Esc.	Total %
1998	8/22- 26,	160	M	206	1.3	9,280	56.3	0	0.0	412	2.5	9,898	60.0
	9/3- 4		F	103	0.6	6,290	38.1	0	0.0	208	1.3	6,598	40.0
	(7/26- 9/5)		Subtotal	309	1.9	15,570	94.4	0	0.0	619	3.8	16,496	100.0
	9/7- 8	146	M	0	0.0	1,887	57.5	0	0.0	90	2.7	1,977	60.3
	(9/6- 11)		F	0	0.0	1,258	38.4	0	0.0	45	1.4	1,303	39.7
			Subtotal	0	0.0	3,145	95.9	0	0.0	135	4.1	3,280	100.0
	9/14- 17	149	M	0	0.0	2,330	51.0	0	0.0	184	4.0	2,514	55.0
	(9/12- 10/5)		F	92	2.0	1,870	40.9	0	0.0	92	2.0	2,054	45.0
			Subtotal	92	2.0	4,200	91.9	0	0.0	276	6.0	4,568	100.0
	Season	455	M	206	0.8	13,497	55.4	0	0.0	686	2.8	14,391	59.1
			F	195	0.8	9,418	38.7	0	0.0	343	1.4	9,957	40.9
			Total	401	1.6	22,915	94.1	0	0.0	1,029	4.2	24,344	100.0
1999	8/23- 27	135	M	86	5.2	1,183	71.1	0	0.0	99	5.9	1,368	82.2
	(7/24 - 8/28)		F	0	0.0	247	14.8	0	0.0	49	3.0	296	17.8
			Subtotal	86	5.2	1,430	85.9	0	0.0	148	8.9	1,664	100.0
	8/30; 9/1- 3	138	M	0	0.0	2,134	73.9	0	0.0	167	5.8	2,301	79.7
	(8/29 - 9/4)		F	0	0.0	523	18.1	0	0.0	63	2.2	586	20.3
			Subtotal	0	0.0	2,657	92.0	0	0.0	230	8.0	2,887	100.0
	9/6- 8	70	M	115	1.5	6,101	75.7	0	0.0	576	7.1	6,792	84.3
	(9/5 - 10/5)		F	115	1.4	921	11.4	0	0.0	230	2.9	1,266	15.7
			Subtotal	230	2.9	7,022	87.1	0	0.0	806	10.0	8,058	100.0
	Season	343	M	202	1.6	9,418	74.7	0	0.0	842	6.7	10,461	83.0
			F	115	0.9	1,691	13.4	0	0.0	342	2.7	2,148	17.0
			Total	317	2.5	11,109	88.1	0	0.0	1,184	9.4	12,609	100.0
	Historical Total	2956	M	3,178	2.0	88,503	55.9	6	0.0	4,826	3.0	96,630	61.1
			F	1,372	0.9	57,061	36.1	0	0.0	3,174	2.0	61,635	38.9
			Total	4,550	2.9	145,564	92.0	6	0.0	8,000	5.1	158,261	100.0

Table 12. Mean length (mm) by sex and age based on samples of trap caught coho salmon at the Kogrukluk River weir, 1998 and 1999.

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	2.2	3.1
1998	8/19 (7/25 - 8/22)	M	Mean Length		576		575
			Std. Error		14		-
			Range		480- 680		575- 575
			Sample Size	0	17	0	1
		F	Mean Length	645	611		
			Std. Error	10	6		
			Range	635- 655	565- 655		
			Sample Size	2	19	0	0
	8/26- 27 (8/23 - 29)	M	Mean Length	602	601		
			Std. Error	7	6		
			Range	550- 625	455- 680		
			Sample Size	10	59	0	0
		F	Mean Length	603	605		615
			Std. Error	18	4		-
			Range	555- 635	540- 655		615- 615
			Sample Size	4	58	0	1
	9/2- 3 (8/30 - 9/5)	M	Mean Length	569	625		
			Std. Error	14	6		
			Range	550- 610	490- 700		
			Sample Size	4	58	0	0
		F	Mean Length	594	611		555
			Std. Error	19	5		-
			Range	550- 640	400- 680		555- 555
			Sample Size	5	75	0	1
	9/9- 10 (9/6 - 17)	M	Mean Length	605	613		620
			Std. Error	23	8		-
			Range	545- 655	490- 660		620- 620
			Sample Size	4	28	0	1
		F	Mean Length	613	609		513
			Std. Error	7	4		52
			Range	585- 655	510- 665		420- 600
			Sample Size	9	70	0	3
	9/14- 17 (9/12- 10/5)	M	Mean Length		585		579
			Std. Error		4		17
			Range		460- 640		525- 625
			Sample Size	0	76	0	6
		F	Mean Length	598	588		563
			Std. Error	12	4		17
			Range	575- 615	505- 680		535- 595
			Sample Size	3	61	0	3
	Season	M	Mean Length	595	581		593
			Range	570- 620	460- 645		515- 625
			Sample Size	2	250	0	14
		F	Mean Length	567	579		573
			Range	540- 615	505- 680		535- 605
			Sample Size	4	178	0	7

-continued-

Table 12. (page 2 of 2).

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	2.2	3.1
1999	8/23- 27 (7/24 - 8/28)	M	Mean Length	549	551		580
			Std. Error	10	3		10
			Range	525- 595	470- 640		530- 605
			Sample Size	7	96	0	8
		F	Mean Length		559		550
			Std. Error		5		8
			Range		520- 595		530- 565
			Sample Size	0	20	0	4
	8/30; 9/1- 3 (8/29 - 9/4)	M	Mean Length		563		598
			Std. Error		3		5
			Range		500- 650		580- 620
			Sample Size	0	102	0	8
		F	Mean Length		556		573
			Std. Error		6		4
			Range		480- 615		565- 580
			Sample Size	0	25	0	3
	9/6- 8 (9/5 - 10/5)	M	Mean Length	525	567		599
			Std. Error	-	5		10
			Range	525- 525	440- 640		565- 620
			Sample Size	1	53	0	5
		F	Mean Length	560	573		563
			Std. Error	-	10		13
			Range	560- 560	510- 600		550- 575
			Sample Size	1	8	0	2
1999	Season	M	Mean Length	535	564		596
			Range	525- 595	440- 650		530- 620
			Sample Size	8	251	0	21
		F	Mean Length	560	565		563
			Range	560- 560	480- 615		530- 580
			Sample Size	1	53	0	9
	Historic Total	M	Mean Length	557	569	555	571
			Range	495- 670	435- 695	555- 555	480- 655
			Sample Size	96	1,786	1	113
		F	Mean Length	572	567		565
			Range	490- 610	465- 665		500- 650
			Sample size	34	1,054	0	73

Figures

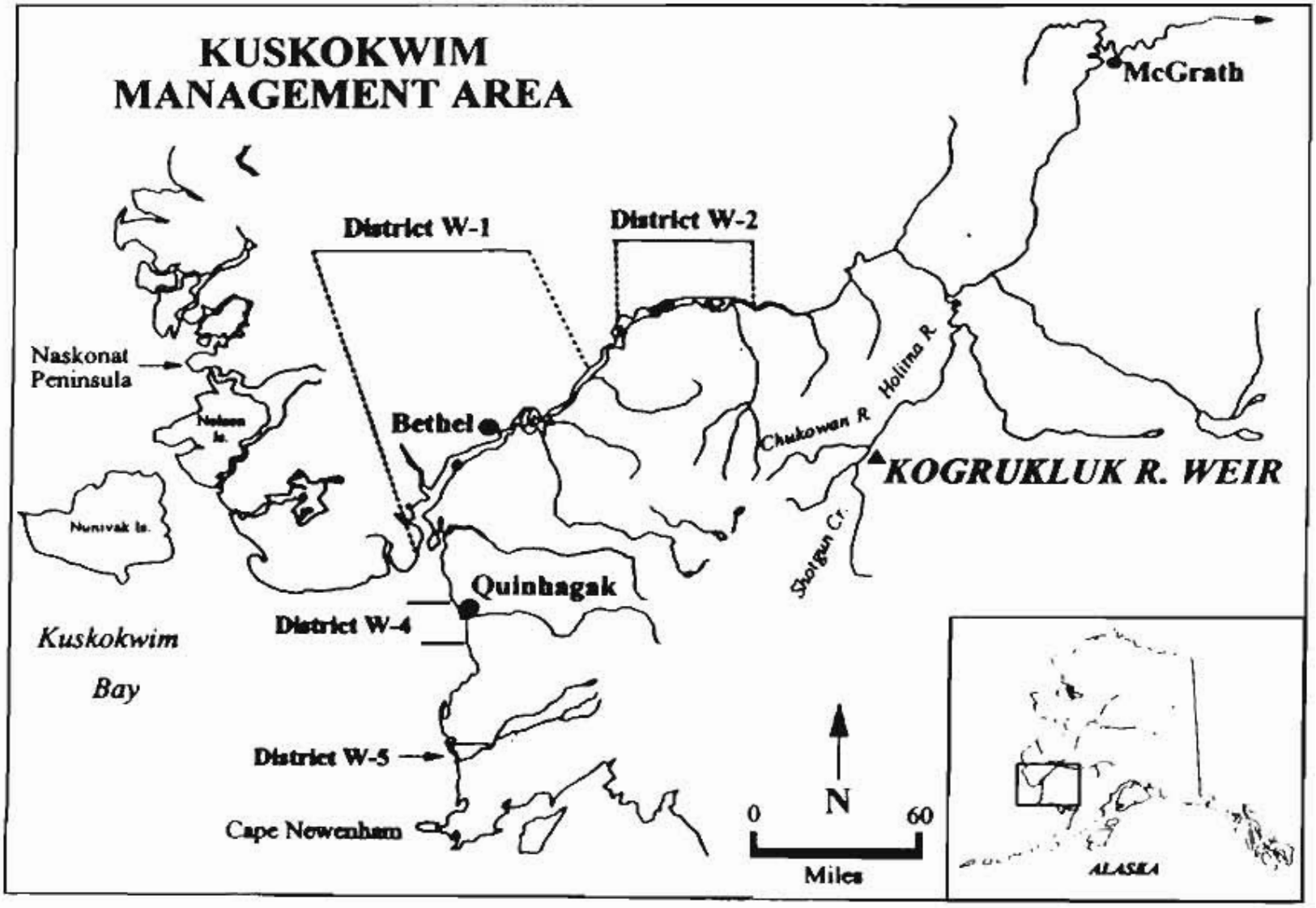

Figure 1. Kuskokwim Area map showing commercial salmon management districts.

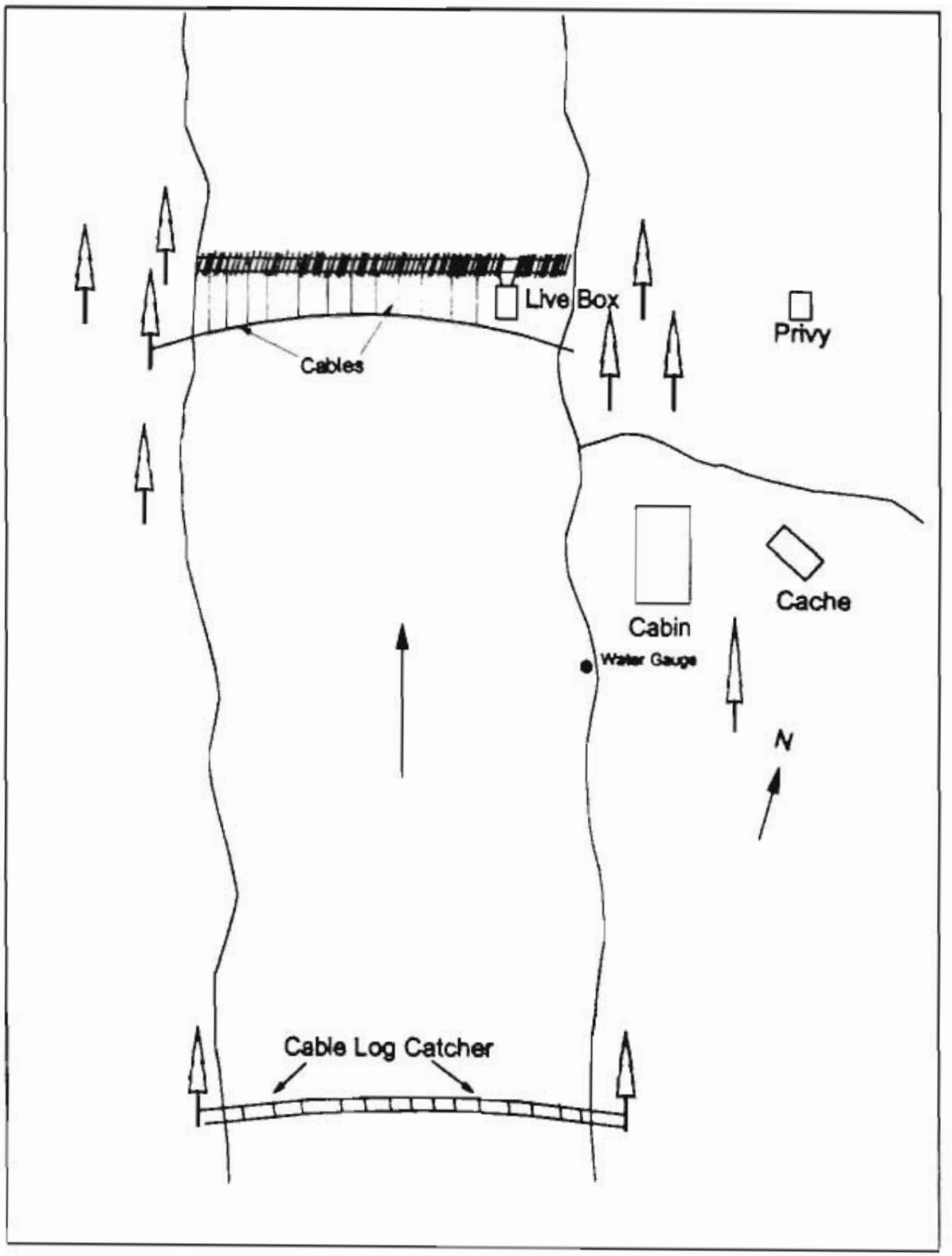

Figure 2. Schematic of the Kogrukluk River weir.

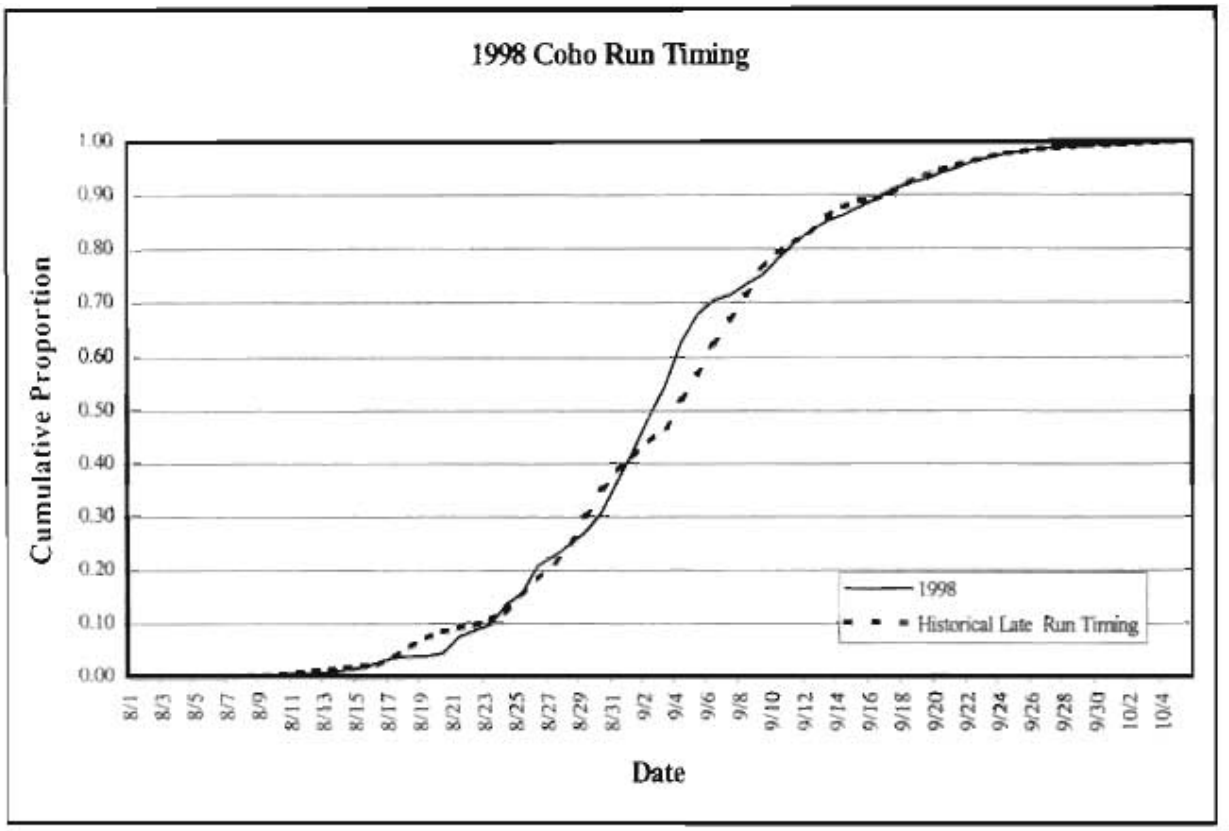

Figure 3. 1998 and historical late run timing for coho salmon at the Kogrukluk River weir.

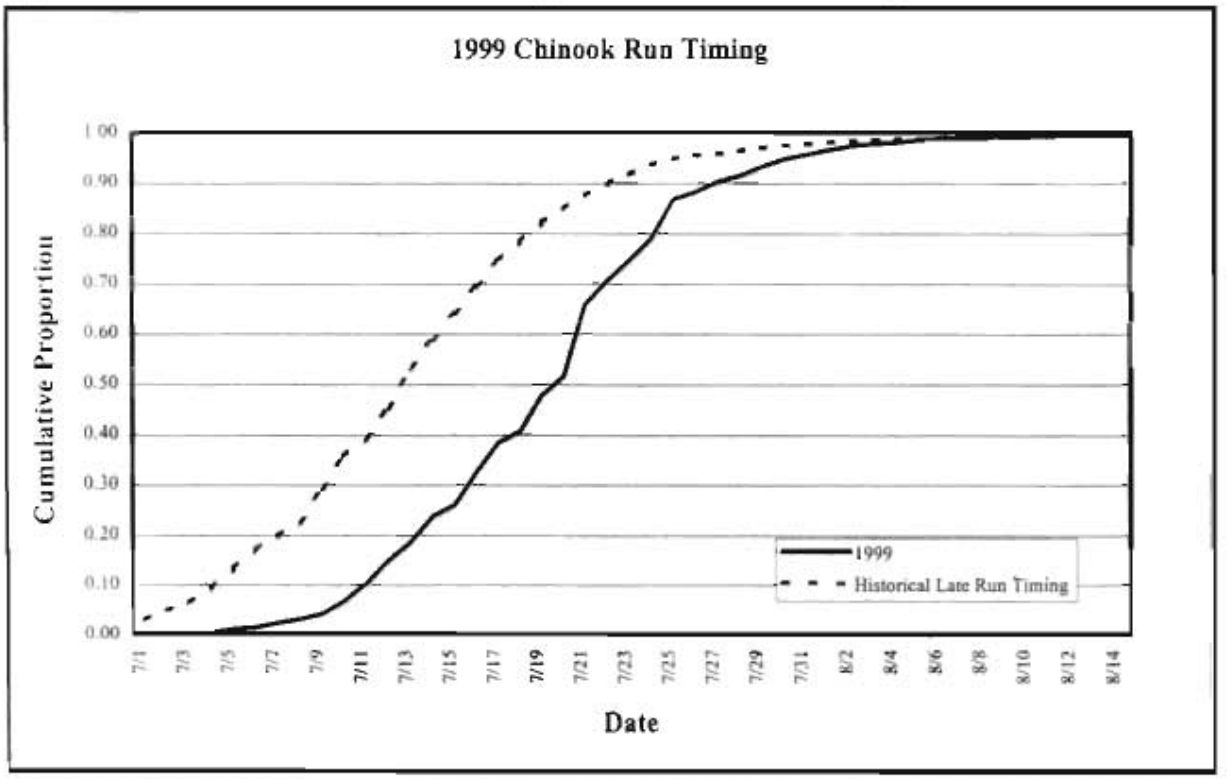

Figure 4. 1999 and historical late run timing for chinook salmon at the Kogrukluk River weir.

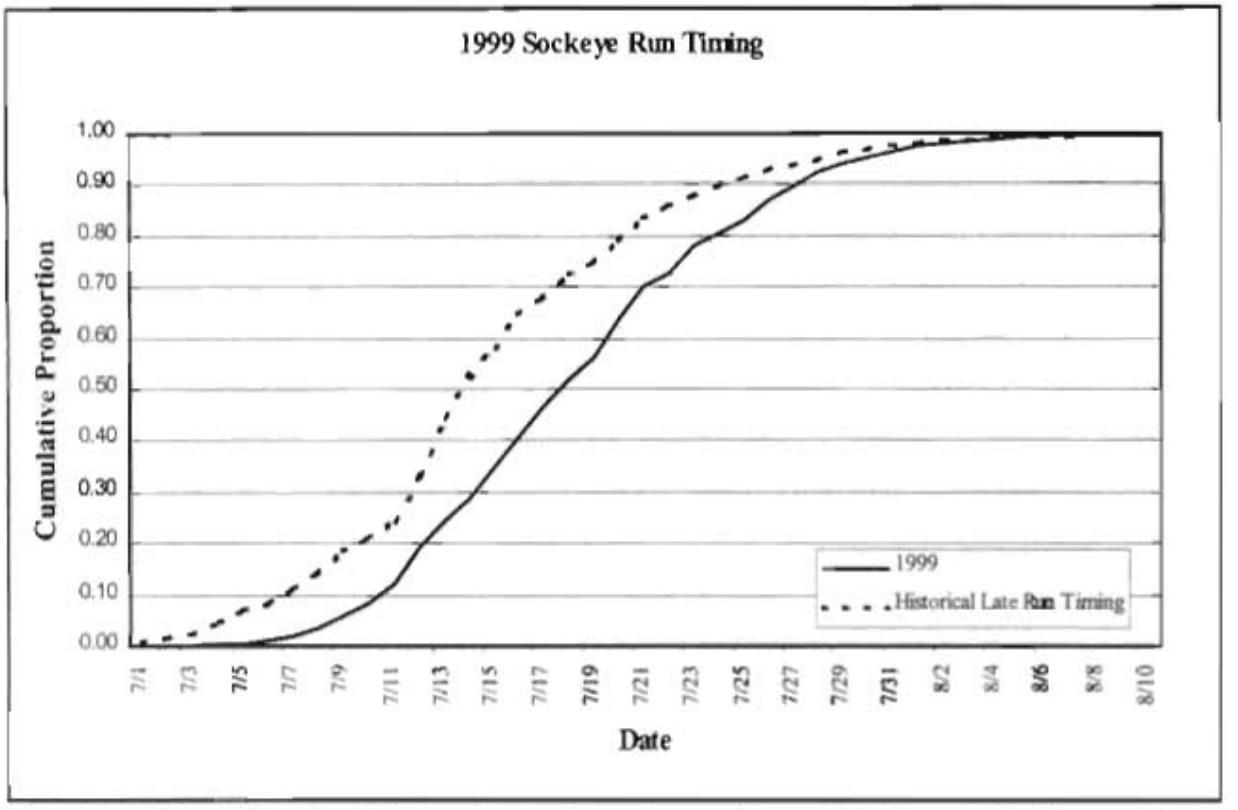

Figure 5. 1999 and historical late run timing for sockeye salmon at the Kogrukluk River weir.

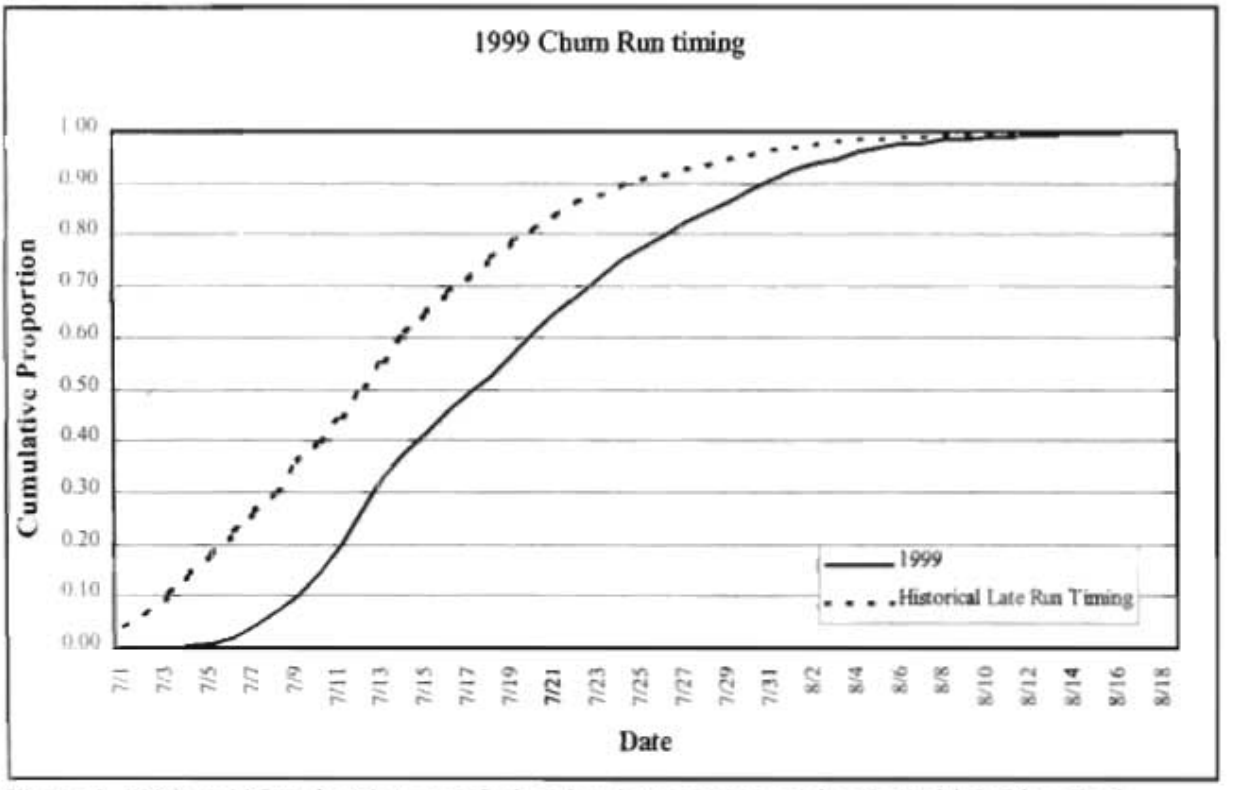

Figure 6. 1999 and historical late run timing for chum salmon at the Kogrukluk River weir.

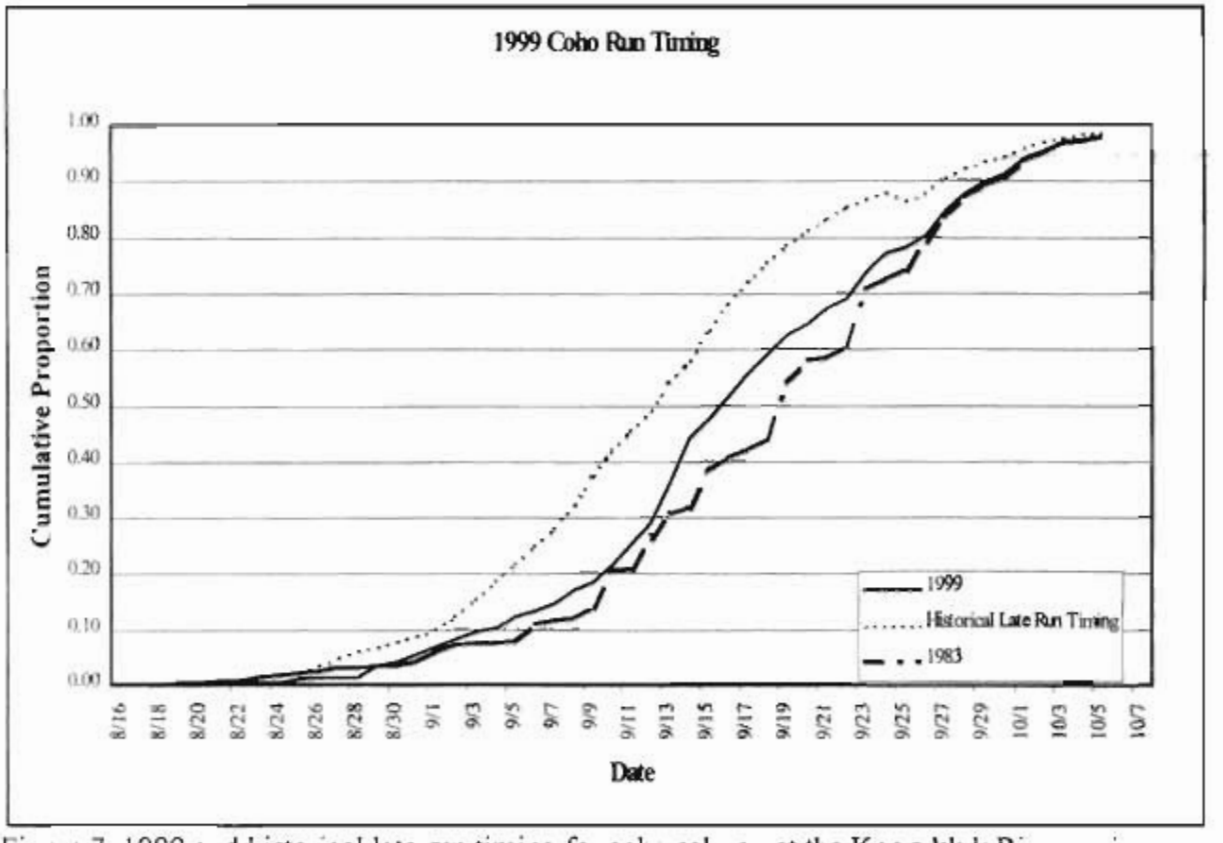

Figure 7. 1999 and historical late run timing for coho salmon at the Kogrukluk River weir.

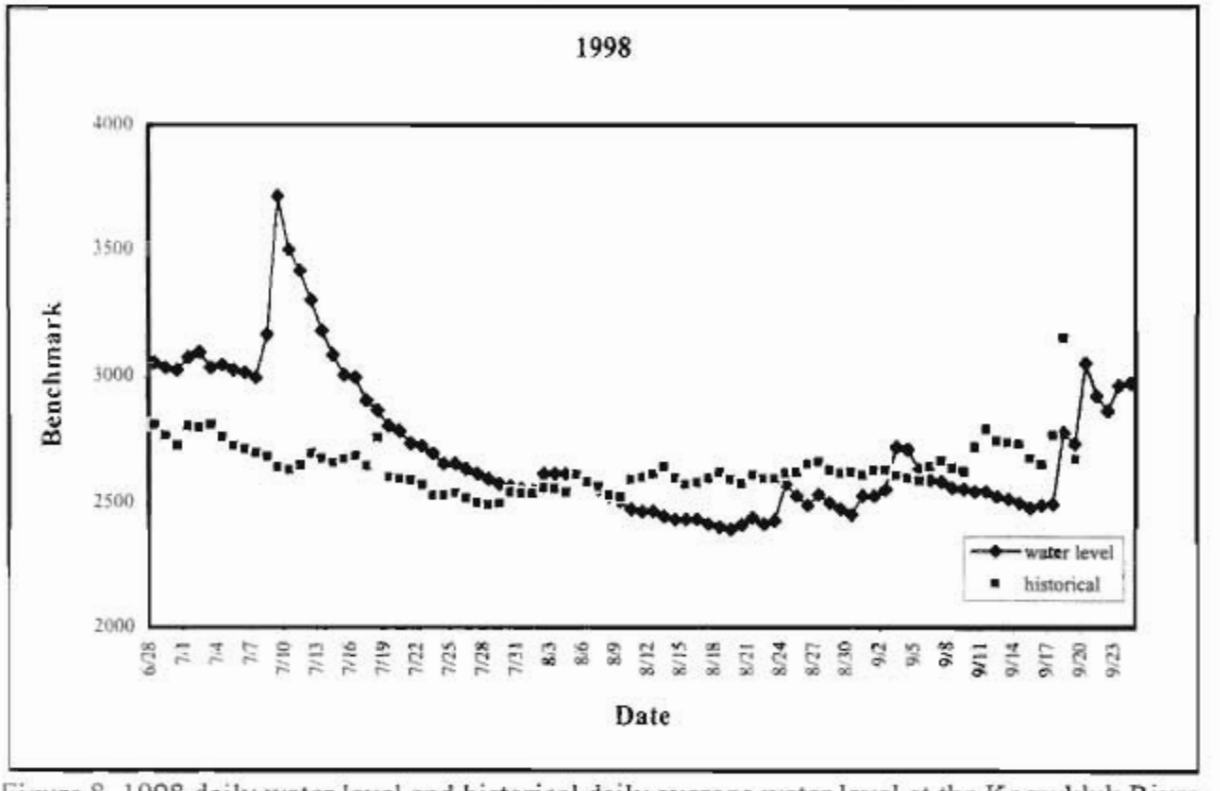

Figure 8. 1998 daily water level and historical daily average water level at the Kogrukluk River weir.

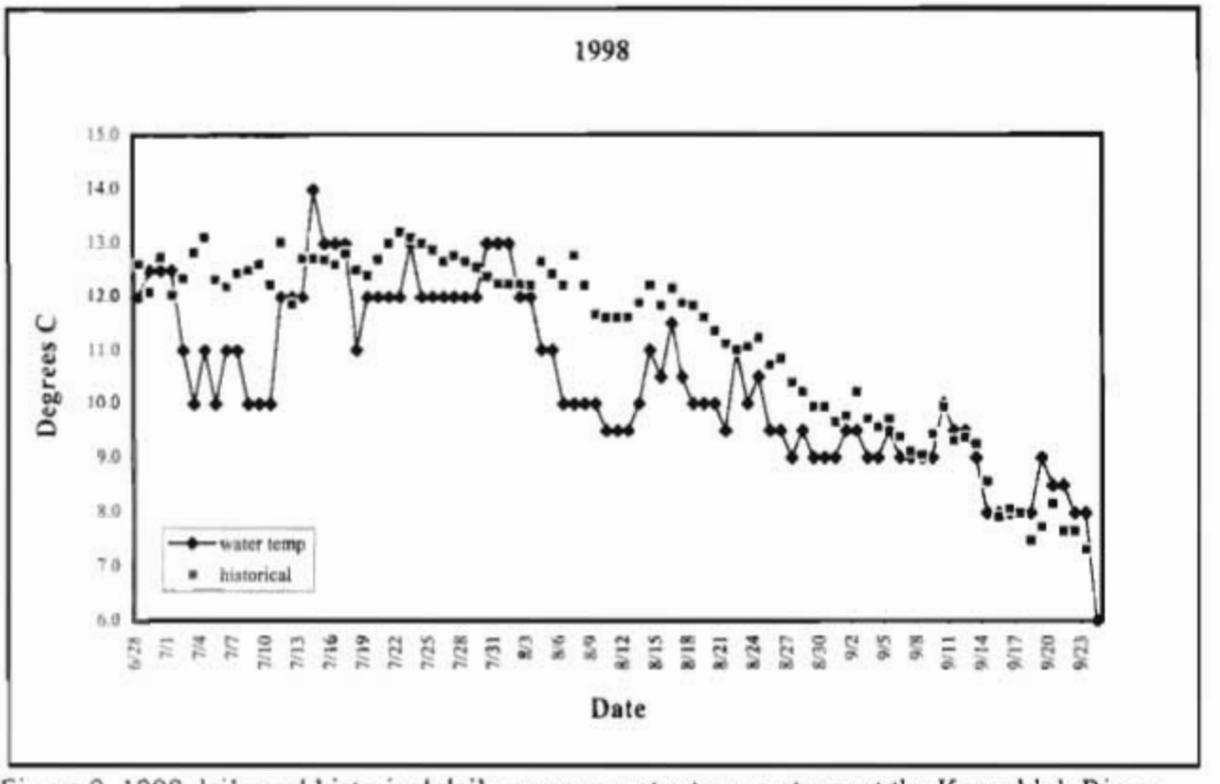

Figure 9. 1998 daily and historical daily average water temperatures at the Kogrukluk River weir.

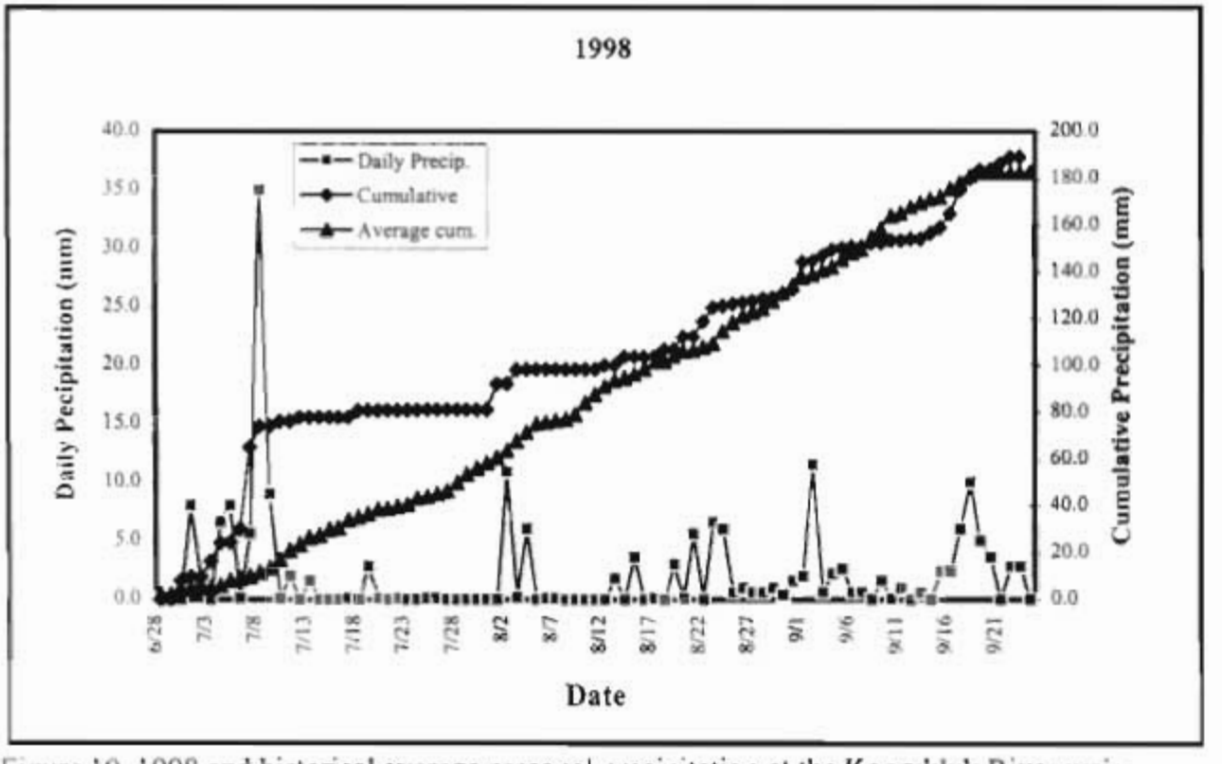

Figure 10. 1998 and historical average seasonal precipitation at the Kogrukluk River weir.

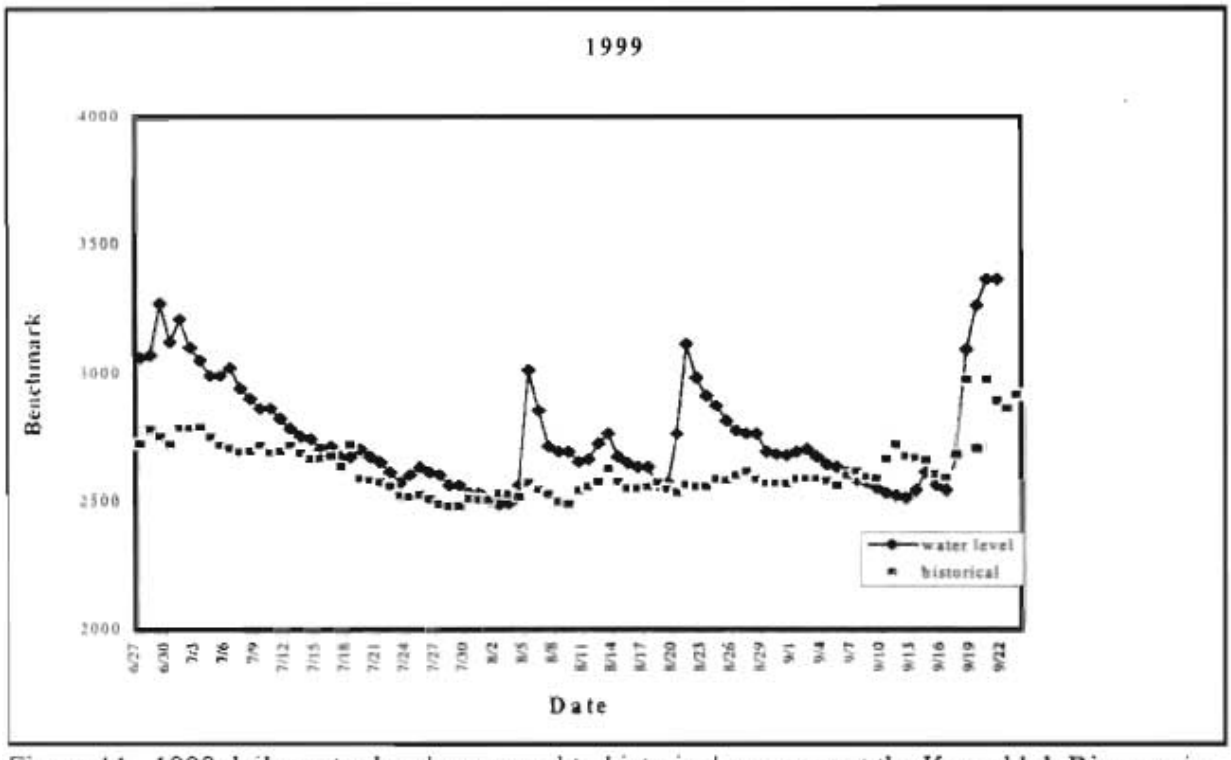

Figure 11. 1999 daily water level compared to historical averages at the Kogrukluk River weir.

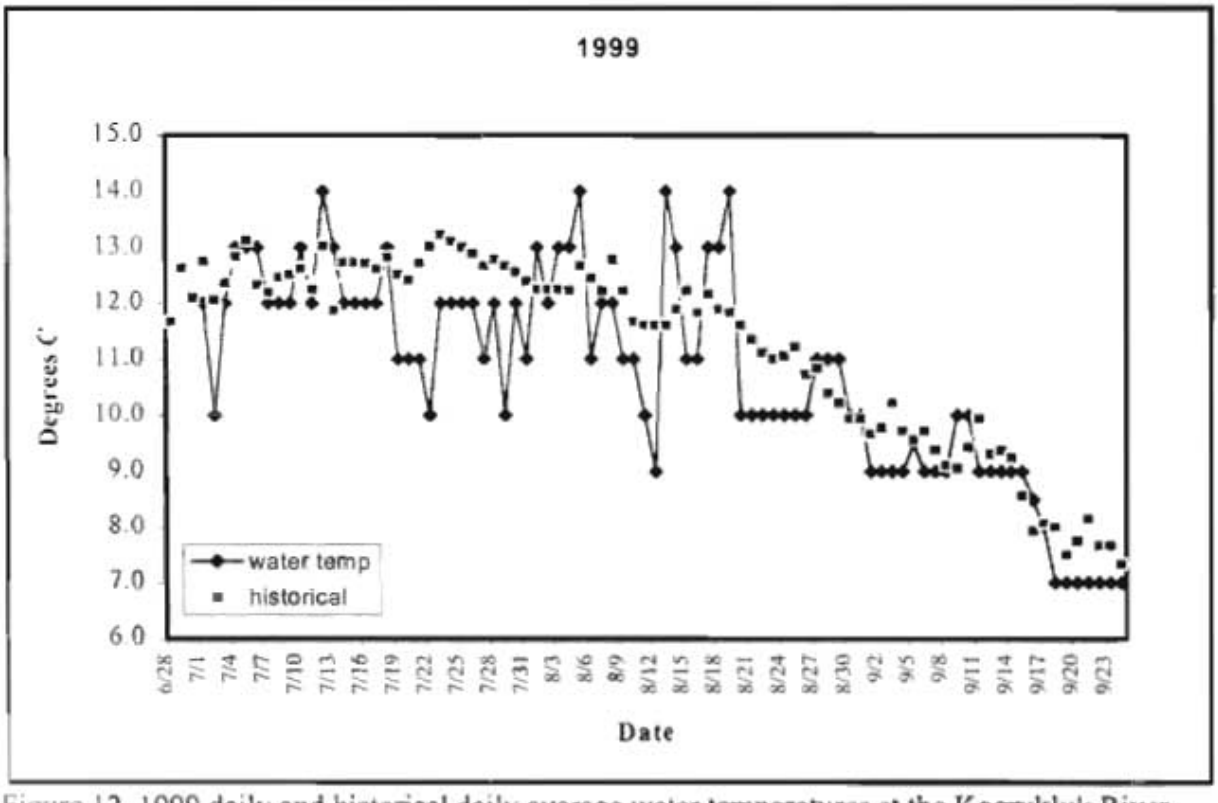

Figure 12. 1999 daily and historical daily average water temperatures at the Kogrukluk River weir.

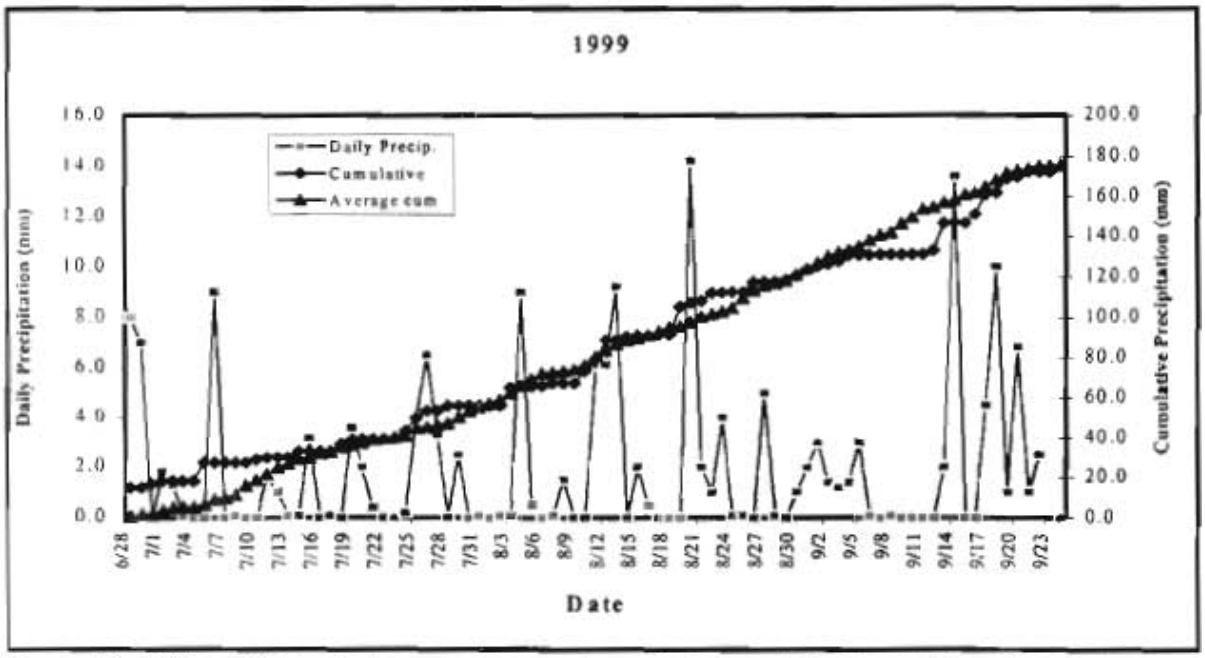

Figure 13. 1999 and historical average seasonal precipitation at the Kogrukluk River weir.

Appendices

Appendix A. Factor table for historical salmon escapement estimates, Kogrukluk River, 1976–2009

	Chinook				Sockeye				Coho[a]				Chum			
Year	T[b]	Count	Prop. Missed	Est'd Total	T[b]	Count	Prop. Missed	Est'd Total	T[b]	Count	Prop. Missed	Est'd Total	T[b]	Count	Prop. Missed	Est'd Total
1976	L	5,500	0.0142	5,579	N	2,302	0.0103	2,326					N	8,046	0.0087	8,117
1977	(N)	783	0.6077	1,945	(N)	732	0.5527	1,637					(N)	7,404	0.6192	19,443
1978	N	13,102	0.0413	13,667	N	1,646	0.0144	1,670					N	47,099	0.0213	48,125
1979	N	10,104	0.1088	11,338	N	2,432	0.0746	2,638					L	13,959	0.2495	18,599
1980		676	c	6,572		403	c	3,200						5,638	c	41,777
1981	E	16,052	0.0362	16,655	E	17,691	0.0208	18,066	N	11,450	0.0004	11,455	E	56,262	0.0192	57,365
1982	E	5,325	0.5156	10,993	E	11,729	0.3219	17,297	N	35,582	0.0586	37,796	N	40,549	0.3672	64,077
1983	(N)	1,032	0.6551	2,992	(N)	375	0.6812	1,176	L	8,327	0.0247	8,538	(N)	3,248	0.6547	9,407
1984	N	4,928	0.0000	4,928	N	4,133	0.0000	4,133	E	25,304	0.0830	27,595	N	41,484	0.0000	41,484
1985	L	4,034 0	0.0682	4,619	L	4,344	0.0034	4,359	E	14,318	0.1291	16,441	L	13,851	0.0769	15,005
1986	L	2,922	0.4200	5,038	N	3,252	0.2301	4,224	E	14,717	0.3461	22,506	N	11,980	0.1846	14,693
1987		d		4,063		d		973	N	19,756	0.1343	22,821		d		17,422
1988	N	7,677	0.0974	8,505	E	4,235	0.0368	4,397	N	11,722	0.1325	13,512	E	28,498	0.2793	39,540
1989	N	4,908	0 5889	11,940	N	2,599	0.5527	5,811				e	N	15,543	0.6070	39,540
1990	N	10,097	0.0118	10,218	N	8,382	0.0029	8,406	L	2,736	0.5538	6,132	N	26,555	0.0078	26,765
1991	N	6,132	0.2189	7,850	N	14,450	0.1218	16,455	L	7,059	0.2915	6,132	L	21,331	0.1181	24,188
1992	N	6,397	0.053	6,755	L	7,328	0.0210	7,540	(N)	2,715	0.8958	26,057	N	32,051	0.0602	34,105
1993	N	10,516	0.1473	12,332	N	27,219	0.0729	29,358	(N)	4,437	0.7837	20,517	N	26,926	0.1559	31,899
1994	(E)	8,310	0.4543 1	15,227	L	5,676	0.6001	14,192	(E)	27,461	0.2085	34,695	(E)	23,756	0.4490	46,635
1995	E	18,856	0.0860	20,630	N	10,581	0.0377	10,996	E	17,492	0.3721	27,861	N	28,292	0.0923	31,265
1996	E	13,734	0.0327	14,199	N	15,221	0.0107	15,385	E	47,011	0.0701	50,555	E	47,010	0.0306	48,495
1997	E	13,112	0.0131	13,286	N	13,059	0.0014	13,078	L	11,611	0.0511	12,237	L	7,902	0.0071	7,958
1998	(L)	3,009	0.7515	12,107	(L)	5,521	0.6828	16,773	L	22,614	0.0710	24,348	(L)	13,104	0.6429	36,441
1999	L	5,472	0.0176	5,570	L	5,777	0.0015	5,864	L	10,094	0.1994	12,609	L	13,497	0.0233	13,820

a Coho migrations were not monitored prior to 1981

b The timing model used for estimating missed counts depends on the distribution of the mean date of migration (E-early, N-normal, L- late). The use of () indicates assumed timing.

c From Baxter (1980); insufficient data to estimate escapements using time series techniques.

d Except for coho, escapements were estimated from a ratio of unknown 1987 escapement and known 1987 aerial assesments to known 1988 escapement and known 1988 aerial assesment. Coho escapments estimated using time series techniques.

e Heavy rain and high river levels allowed only two days of counts during the coho migration.

Appendix [illegible] Historical cumulative estimated escapement of chinook salmon at the Kogrukluk River weir, [illegible] years with adequate data.

Date	1976(E) 5,379	1978(N) 13,667	1979(N) 11,239	1981(E) 16,655	1984(N) 4,925	1985(E) 4,619	1986(E) 5,038	1988(N) 8,505	1989(N) 10,218	1991(N) 7,850	1992(N) 6,755	1993(N) 12,332	1994(E) 15,227	1995(E) 20,630	1996(E) 14,199	1997(E) 13,286	1999(E) 5,576
15-Jun																	
16-Jun																	
17-Jun				0													
18-Jun		0		1									1				
19-Jun		1		3	1				1			1	3	2		1	
20-Jun		3	0	8	1				1	1	1	2	7	4	1	2	
21-Jun		6	1	18	1				3	2	2	4	16	6	3	4	
22-Jun		11	3	38	1				6	5	4	8	35	12	7	8	
23-Jun		19	7	78	3				13	11	9	17	73	29	19	17	
24-Jun		29	15	158	4	0		0	25	20	17	31	144	52	35	32	
25-Jun		49	30	318	6	1		3	47	37	31	57	290	95	65	60	
26-Jun		99	60	418	7	3		5	72	56	47	87	381	146	102	94	
27-Jun		179	105	738	11	6		18	121	93	79	146	672	243	170	161	
28-Jun		279	130	1,072	68	11		48	127	145	123	227	976	380	265	212	
29-Jun	0	391	205	1,605	155	21	0	98	150	223	190	349	1,461	588	412	822	
30-Jun	5	456	290	2,167	200	41	3	178	269	303	259	474	1,973	794	492	1,418	
01-Jul	21	798	420	2,784	515	61	28	228	318	462	331	724	2,535	1,211	756	1,925	6
02-Jul	23	916	576	3,688	819	111	125	338	781	649	586	1,017	2,958	1,727	1,754	2,097	8
03-Jul	41	1,401	683	4,567	1,073	231	192	553	1,142	872	973	1,623	3,226	2,040	2,585	3,024	10
04-Jul	56	2,205	941	5,307	1,212	276	283	828	1,321	1,102	1,136	1,985	3,684	4,064	2,982	3,611	15
05-Jul	126	2,834	1,312	6,308	1,309	311	344	1,177	1,748	1,252	1,371	2,642	4,814	5,526	4,446	4,636	58
06-Jul	169	3,179	1,694	7,388	1,547	333	395	1,642	2,201	1,420	1,445	3,350	5,924	7,305	6,134	5,426	75
07-Jul	235	3,432	2,003	8,603	1,721	393	455	2,338	2,456	1,606	1,590	4,226	6,861	8,611	7,922	6,568	128
08-Jul	392	4,051	2,393	9,376	1,865	499	585	2,921	3,298	1,810	1,728	4,941	7,553	9,744	8,802	7,054	169
09-Jul	704	4,935	2,736	10,423	2,030	618	662	3,492	3,449	2,432	2,545	5,821	8,798	10,423	9,485	7,762	225
10-Jul	1,165	5,606	3,355	11,406	2,053	1,034	1,144	4,176	4,677	2,949	2,870	6,825	9,573	12,249	10,037	7,981	373
11-Jul	1,512	6,307	3,817	12,155	2,157	1,200	1,426	4,880	5,205	3,230	3,301	7,508	10,255	13,046	10,376	8,205	572
12-Jul	1,786	6,939	4,577	12,681	2,442	1,445	1,535	5,538	6,206	3,671	3,786	8,161	10,734	14,760	10,794	8,737	830
13-Jul	2,502	7,536	5,509	13,172	2,704	1,750	1,992	6,030	6,317	4,359	3,924	8,849	11,181	15,524	11,509	9,040	1,034
14-Jul	2,814	8,149	6,491	13,630	3,028	2,019	2,273	6,625	6,704	4,876	4,229	9,275	11,598	15,899	12,024	9,592	1,321
15-Jul	3,065	8,822	7,039	14,190	3,359	2,165	2,577	7,075	7,759	5,196	4,637	9,642	12,108	16,145	12,306	9,990	1,450
16-Jul	3,312	9,549	7,739	14,642	3,635	2,493	2,712	7,386	8,406	5,613	4,802	10,051	12,520	16,919	12,487	10,314	1,805
17-Jul	3,599	10,201	8,409	15,021	3,860	2,668	2,906	7,536	8,624	6,128	5,128	10,385	12,865	17,608	12,724	10,691	2,136
18-Jul	4,023	10,689	8,873	15,343	3,965	2,967	3,205	7,639	9,032	6,506	5,408	10,796	13,463	17,981	12,951	11,168	2,262
19-Jul	4,306	11,250	9,228	15,641	4,064	3,226	3,464	7,763	9,092	6,834	5,603	10,958	13,734	18,456	13,211	11,525	2,657
20-Jul	4,400	11,725	9,562	15,884	4,201	3,403	3,661	7,810	9,189	7,125	5,747	11,230	13,955	18,730	13,299	11,917	2,878
21-Jul	4,792	11,996	9,907	16,071	4,325	3,554	3,812	7,917	9,386	7,283	5,914	11,430	14,126	18,996	13,479	12,263	3,666
22-Jul	4,982	12,298	10,085	16,254	4,436	3,626	3,904	8,025	9,487	7,452	6,079	11,489	14,292	19,358	13,577	12,471	3,931
23-Jul	5,153	12,501	10,216	16,372	4,525	3,730	4,008	8,109	9,615	7,498	6,238	11,590	14,400	19,509	13,633	12,581	4,161
24-Jul	5,235	12,800	10,524	16,450	4,594	3,900	4,223	8,165	9,672	7,544	6,341	11,678	14,471	19,643	13,710	12,634	4,396

-continued-

Upper page 2 of 2

Date	1976(L)	1978(N)	1979(N)	1981(E)	1984(N)	1985(L)	1986(L)	1988(N)	1990(N)	1991(N)	1992(N)	1993(N)	1994(E)	1995(E)	1996(E)	1997(E)	[illegible]	[illegible]
25-Jul	5,322	12,980	*10,640*	16,492	4,630	4,016	*4,359*	8,211	9,709	7,589	6,425	11,730	14,509	19,863	13,809	12,669	4,825	
26-Jul	5,378	13,094	*10,780*	16,533	4,674	4,146	*4,479*	8,249	9,763	7,628	6,458	11,806	14,546	20,022	13,840	12,768	4,906	
27-Jul	5,428	13,186	*10,846*	16,564	4,704	4,212	*4,545*	8,276	9,799	7,658	6,484	11,882	14,575	20,157	13,865	12,781	5,019	
28-Jul	5,448	13,258	*10,944*	16,600	4,741	4,290	*4,643*	8,292	9,843	7,690	6,511	12,004	14,622	20,224	13,892	12,862	5,087	
29-Jul	5,476	13,322	*10,999*	16,631	4,773	4,345	*4,698*	8,319	9,913	7,730	6,541	*12,060*	14,763	20,291	13,944	12,899	5,180	
30-Jul	5,500	13,381	*11,057*	16,655	4,799	4,373	*4,736*	8,350	9,960	7,742	6,561	*12,110*	14,871	20,367	14,043	12,946	5,268	
31-Jul	*5,518*	*13,433*	*11,070*		4,821	4,406	*4,769*	8,373	10,016	7,760	6,582	12,129	14,957	20,394	14,062	12,982	5,320	
01-Aug	*5,533*	*13,467*	*11,112*		4,837	4,441	*4,811*	*8,390*	10,061	7,771	6,599	12,143	15,015	20,418	14,078	13,002	5,374	
02-Aug	*5,545*	*13,487*	*11,147*		4,859	4,476	*4,846*	*8,400*	10,103	7,796	6,624	12,150	15,042	20,443	14,090	13,032	5,415	
03-Aug	*5,554*	*13,519*	*11,173*		4,877	4,500	*4,872*	8,404	10,132	7,812	6,634	12,166	15,067	20,490	14,099	13,057	5,439	
04-Aug	*5,560*	*13,543*	*11,180*		4,889	4,507	*4,879*	8,416	10,143	7,820	*6,643*	12,191	*15,089*	20,511	14,106	13,070	5,457	
05-Aug	*5,563*	*13,559*	*11,195*		4,893	4,521	*4,894*	8,422	10,157	7,823	*6,653*	12,214	*15,110*	20,522	14,108	13,088	*5,480*	
06-Aug	*5,566*	*13,577*	*11,209*		4,896	4,535	*4,908*	8,429	10,168	7,828	*6,661*	12,234	*15,128*	20,532	14,114	13,107	*5,497*	
07-Aug	*5,567*	*13,604*	*11,212*		4,900	4,537	*4,911*	8,435	10,174	7,833	*6,674*	12,263	15,144	20,536	14,122	13,120	5,504	
08-Aug	*5,568*	*13,624*	*11,230*		4,908	4,555	*4,929*	8,445	10,183	7,833	*6,687*	12,284	15,163	20,551	14,132	13,130	5,514	
09-Aug	*5,570*	*13,635*	*11,239*		4,911	4,563	*4,938*	8,448	10,190	7,833	*6,702*	12,295	15,165	20,561	14,134	13,153	5,518	
10-Aug	*5,575*	*13,643*	*11,258*		4,912	4,582	*4,957*	8,449	10,192	7,834	*6,709*	12,310	15,171	*20,571*	14,148	13,181	5,520	
11-Aug	*5,577*	*13,653*	*11,272*		4,915	4,595	*4,971*	8,454	10,202	7,837	6,716	12,315	*15,177*	*20,581*	*14,155*	13,214	5,522	
12-Aug	*5,578*	*13,658*	*11,284*		4,916	4,607	*4,983*	8,464	10,206	7,838	6,723	12,326	15,183	*20,596*	*14,165*	*13,223*	5,530	
13-Aug	*5,579*	*13,662*	*11,290*		4,921	4,612	*4,989*	8,466	10,208	7,840	6,731	12,332	15,188	*20,602*	*14,170*	*13,227*	5,535	
14-Aug	*5,579*	*13,665*	*11,296*		4,922	4,618	*4,995*	8,469	10,209	7,842	6,732		15,197	*20,606*	*14,173*	13,231	5,539	
15-Aug		*13,666*	*11,298*		4,923	4,619	*4,997*	8,471	10,212	7,842	6,737		15,204	*20,608*	14,178	13,244	5,540	
16-Aug		*13,666*	*11,298*		4,924	4,619	*4,997*	8,474	10,214	7,843	6,746		15,208	20,609	14,179	13,250	5,542	
17-Aug		*13,667*	*11,304*		4,925	4,619	*5,003*	8,479	10,214	7,845	6,748		15,211	20,612	14,179	13,255	5,545	
18-Aug		*13,667*	*11,307*		4,925	4,619	*5,006*	8,483	10,215	7,845	6,752		15,213	20,614	14,180	13,256	5,548	
19-Aug			*11,316*		4,927	4,619	*5,015*	8,486	10,216	7,846	6,754		15,216	20,614	14,180	13,261	5,548	
20-Aug			*11,323*		4,927	4,619	*5,022*	8,489	10,216	7,847	6,755		15,217	20,616	14,183	13,265	5,549	
21-Aug			*11,327*		4,928	4,619	5,024	8,492	10,217	7,847	6,755		15,220	20,619	14,185	13,266	5,549	
22-Aug			*11,332*			4,619	5,031	8,495	10,217	7,848			15,221	20,620	14,188	13,268	5,551	
23-Aug			*11,335*			4,619	5,035	8,497	10,218	7,848			15,221	20,621	14,192	13,269	5,551	
24-Aug			*11,337*			4,619	5,036	8,497	10,218	7,848			15,221	20,621	14,193	13,269	5,552	
25-Aug			*11,338*			4,619	5,036	8,498	10,218	7,849			15,221	20,621	14,193	13,271	5,554	
26-Aug			*11,338*			4,619	5,036	8,499	10,218	7,850			15,221	20,621	14,195	13,275	5,555	
27-Aug						4,619	5,037	8,500	10,218	7,850			15,221	20,624	14,196	13,279	5,557	
28-Aug						4,619	5,038	8,504	10,218	7,850			15,221	20,626	14,197	13,279	5,557	
29-Aug						4,619	5,038	8,505	10,218	7,850			15,227	20,630	14,199	13,286	5,557	

Letters next to year indicate run-timing model used for estimating missing counts: L = late; N = normal; E = early.

Bold italics represent estimated counts. Boxed areas are middle 50% of run. Midpoint is bounded by double lines. **ESCAPEMENT GOAL = 10,000**

a Includes counts after 8/29.

Appendix B.2. Historical cumulative estimated escapement of sockeye salmon at the Kogrukluk River weir for years with adequate data.

Date	1976(N)	1978(N)	1979(N)	1981(E)	1982(E)	1984(N)	1985(L)	1986(N)	1988(E)	1990(N)	1991(N)	1992(L)	1993(N)	1995(N)	1996(N)	1997(N)	1999 (L)
30-Jun				*1*		1							*1*	*0*		0	
01-Jul				*10*		1				*1*	*1*		*3*	*1*	*1*	0	
02-Jul				*29*		1		*1*		*2*	*3*	*1*	*6*	*2*	*3*	0	
03-Jul				*79*		4		*3*		*5*	*10*	*4*	*17*	*6*	*9*	0	
04-Jul				*155*		6		*5*	*2*	*10*	*19*	*8*	*34*	*13*	*17*	0	
05-Jul				*246*	*1*	7		*8*	*3*	*15*	*29*	*13*	*52*	*20*	*27*	0	
06-Jul				*375*	*10*	9		*13*	*11*	*24*	*47*	*21*	*85*	*32*	*44*	0	
07-Jul		0		*597*	*29*	12		*20*	*15*	*24*	*75*	*34*	*143*	*49*	*68*	0	
08-Jul	1	0		1,137	*79*	22		*22*	*25*	*24*	*145*	*66*	*260*	*92*	*129*	0	
09-Jul	1	1		1,842	*155*	34		*23*	*37*	*29*	*245*	*113*	*437*	*155*	*139*	8	
10-Jul	1	12	0	2,816	*246*	41		*31*	*74*	*35*	*381*	*165*	*679*	*236*	*214*	91	
01-Jul	6	48	1	4,068	*375*	126	*2*	*35*	*86*	112	*610*	*233*	*1,069*	*383*	171	121	
02-Jul	11	103	9	5,008	*597*	250	*3*	45	*184*	267	*868*	414	*1,209*	*414*	856	225	
03-Jul	15	175	28	5,632	*1,137*	307	*11*	77	*350*	374	*1,148*	545	1,707	650	1,099	316	
04-Jul	32	233	42	6,430	*1,842*	358	*15*	94	*225*	645	*1,202*	650	*2,231*	1,033	1,551	635	
05-Jul	59	299	51	7,271	*2,816*	639	*24*	106	375	1,105	*1,282*	727	*2,879*	1,570	2,087	926	
06-Jul	125	330	126	7,866	*4,068*	817	43	124	658	1,406	*1,388*	860	4,005	2,028	2,893	1,463	1
07-Jul	258	431	250	8,502	*5,568*	1,031	93	170	1,134	2,040	*1,520*	921	5,376	2,458	3,539	2,037	8
08-Jul	462	536	311	9,204	*7,593*	1,190	169	243	1,639	2,244	2,277	1,066	7,533	2,959	4,644	2,614	14
09-Jul	669	679	376	9,639	9,343	1,214	260	423	2,058	3,071	3,036	1,191	10,050	3,667	5,589	3,163	28
10-Jul	789	795	460	10,286	10,091	1,276	389	787	2,565	3,508	3,408	1,546	11,949	4,473	6,543	3,424	69
11-Jul	927	850	644	10,778	10,921	1,571	610	993	2,930	4,125	3,997	1,812	13,745	4,810	7,451	3,754	114
12-Jul	1,157	922	959	11,199	11,742	1,744	844	1,393	3,169	4,241	5,033	2,037	15,563	5,205	8,990	4,131	206
13-Jul	1,269	1,048	1,228	11,583	12,317	2,083	989	1,893	3,442	4,763	6,020	2,431	17,065	5,417	10,112	4,559	349
14-Jul	1,370	1,115	1,448	12,052	12,619	2,521	1,167	2,391	3,718	5,500	6,762	2,847	18,887	5,779	10,933	4,980	493
15-Jul	1,513	1,178	1,687	12,647	13,305	2,740	1,375	2,705	3,897	5,963	7,540	3,253	20,915	6,400	11,391	5,648	721
16-Jul	1,615	1,252	1,861	13,068	14,086	2,932	1,560	3,085	4,006	6,372	*8,354*	3,492	22,955	7,094	11,759	6,474	1,121
17-Jul	1,762	1,300	2,007	13,498	14,457	3,016	1,733	3,260	4,089	6,801	9,282	3,958	24,666	7,463	12,058	6,917	1,439
18-Jul	1,841	1,345	2,089	13,884	14,900	3,079	1,992	3,365	4,135	6,891	10,230	4,376	25,498	7,957	12,443	7,872	1,675
19-Jul	1,893	1,396	2,179	14,270	15,530	3,200	2,168	*3,470*	4,172	7,048	11,159	4,648	26,443	8,220	12,652	8,723	2,023
20-Jul	2,059	1,420	2,262	14,866	15,845	3,369	2,375	*3,595*	4,212	7,231	11,913	4,893	27,222	8,713	13,022	9,599	2,375
21-Jul	2,154	1,469	2,310	15,391	15,985	3,557	2,502	*3,692*	4,241	7,424	12,672	5,031	27,442	9,185	13,290	10,210	2,713
22-Jul	2,197	1,509	2,357	15,756	16,134	3,646	2,617	*3,760*	4,274	7,561	13,289	5,349	27,728	9,443	13,523	10,776	3,058
23-Jul	2,230	1,550	2,432	16,101	16,321	3,729	2,844	*3,843*	4,302	7,634	13,891	5,610	27,930	9,659	13,774	11,050	3,306
24-Jul	2,264	1,582	2,464	16,398	16,506	3,767	3,086	*3,909*	4,311	7,691	*14,477*	5,852	28,121	9,891	14,082	11,561	3,746
25-Jul	2,269	1,597	*2,482*	16,655	16,647	3,827	3,246	*3,953*	4,320	7,774	14,972	6,004	28,335	10,028	14,149	11,713	4,100
26-Jul	2,276	1,605	*2,496*	16,942	16,770	3,877	3,410	*3,994*	4,324	7,795	15,394	6,249	28,565	10,286	14,266	11,842	4,257
27-Jul	2,285	1,620	*2,528*	17,184	16,859	3,934	3,604	*4,043*	4,334	7,868	15,650	6,485	28,747	10,378	14,365	12,035	4,565
28-Jul	2,288	1 631	*2,553*	17,373	16,945	3,966	3,761	*4,080*	4,340	7,985	15,831	6,767	28,909	10,481	14,601	12,378	4,861
29-Jul	2,296	1,639	*2,576*	17,514	17,022	3,984	3,892	*4,111*	4,349	8,066	15,959	6,979	*29,051*	10,632	14,845	12,505	5,093
30-Jul	2,302	1,646	*2,596*	17,624	17,089	3,998	3,985	*4,135*	4,361	8,126	16,095	7,128	*29,138*	10,688	14,926	12,594	5,255
31-Jul	2,304	1,648	*2,604*	17,704	17,145	4,030	4,093	*4,157*	4,369	8,185	16,199	7,228	29,189	10,730	14,997	12,683	5,420
01-Aug	*2,307*	*1,651*	*2,606*	17,771	17,171	4,055	4,150	*4,171*	*4,373*	8,249	16,282	7,380	29,218	10,800	15,058	12,745	5,515
02-Aug	*2,310*	*1,654*	*2,609*	17,836	17,200	4,078	4,193	*4,183*	*4,374*	8,294	16,330	7,442	29,237	10,854	15,109	12,799	5,592
03-Aug	*2,313*	*1,657*	*2,612*	17,877	17,223	4,098	4,234	*4,194*	4,377	8,311	16,366	7,461	29,253	10,892	15,141	12,836	5,667
04-Aug	*2,314*	*1,658*	*2,615*	17,895	17,240	4,106	4,261	*4,200*	4,380	8,339	16,390	*7,472*	29,269	10,911	15,179	12,874	5,735
05-Aug	*2,320*	*1,664*	*2,616*	17,922	17,252	4,108	4,288	*4,208*	4,382	8,351	16,404	*7,485*	29,289	10,920	15,226	12,915	*5,754*
06-Aug	*2,323*	*1,667*	*2,622*	17,935	17,260	4,111	4,299	*4,216*	4,383	8,365	16,414	*7,499*	29,313	10,928	15,257	12,931	*5,782*
07-Aug	*2,323*	*1,667*	*2,625*	17,950	17,269	4,114	4,326	*4,218*	4,383	8,378	16,417	*7,502*	29,330	10,945	15,280	12,957	5,804
08-Aug	*2,324*	*1,668*	*2,625*	17,973	17,275	4,117	4,334	*4,221*	4,384	8,383	16,420	*7,508*	29,344	10,955	15,289	12,972	5,816
09-Aug	*2,325*	*1,669*	*2,626*	17,993	17,280	4,118	4,341	*4,224*	4,387	8,384	16,424	*7,514*	29,346	10,962	15,320	12,986	5,831
10-Aug	*2,325*	*1,669*	*2,627*	18,001	17,285	4,124	4,342	*4,227*	4,388	8,388	16,430	7,518	29,348	*10,966*	15,326	13,006	5,838
11-Aug	*2,325*	*1,669*	*2,627*	18,013	17,288	4,127	4,355	*4,230*	4,389	8,394	16,439	7,525	29,354	*10,972*	*15,335*	13,038	5,843
12-Aug	*2,325*	*1,669*	*2,627*	18,023	17,288	4,127	4,357	*4,232*	4,390	8,398	16,443	7,531	29,358	*10,975*	*15,339*	13,052	5,846
13-Aug	*2,326*	*1,670*	*2,627*	18,033	17,292	4,128	4,358	*4,232*	4,391	8,401	16,443	7,535		*10,987*	*15,355*	*15,057*	5,852
14-Aug	*2,326*	*1,670*	*2,628*	18,038	17,296	4,129	4,359	*4,232*	4,391	8,403	16,444	7,535		*10,987*	*15,362*	*13,061*	5,855
15-Aug			*2,628*	18,044	17,297	4,129	4,359	*4,232*	4,391	8,403	16,445	7,535		*10,987*	15,363	13,066	5,858
16-Aug				18,051	17,297	4,129	4,359	*4,232*	4,391	8,406	16,446	7,539		10,988	15,365	13,068	5,861
17-Aug				18,052		4,129	4,359	*4,232*	4,393	8,406	16,450	7,539		10,989	15,370	13,072	5,861
18-Aug				18,054		4,130	4,359	*4,232*	4,394	8,406	16,450	7,539		10,991	15,370	13,073	5,863
19-Aug				18,056		4,130	4,359	*4,232*	4,394	8,406	16,451	7,539		10,992	15,371	13,074	5,864
20-Aug				18,056		4,131	4,359	*4,235*	4,395	8,406	16,451	7,540		10,993	15,371	13,074	5,864
21-Aug				18,058		4,131	4,359	4,235	4,396	8,406	16,451			10,993	15,373	13,074	5,864
22-Aug				18,058		4,131	4,359	4,237	4,396	8,406	16,451			10,993	15,377	13,075	5,864
23-Aug				18,061		4,131	4,359	4,240	4,396	8,406	16,452			10,993	15,378	13,075	5,864
24-Aug				18,061		4,132	4,359	4,240	4,396	8,406	16,452			10,993	15,379	13,075	5,864
25-Aug				18,062		4,133	4,359	4,241	4,396	8,406	16,454			10,993	15,381	13,075	5,864
26-Aug				18,063		4,133	4,359	4,243	4,397	8,406	16,454			10,993	15,381	13,076	5,864
27-Aug				18,064		4,133	4,359	4,244	4,397	8,406	16,454			10,993	15,381	13,077	5,864
28-Aug				18,066		4,133	4,359	4,244	4,397	8,406	16,455			10,996	15,385	13,078	5,864
29-Aug																	

Letters next to year indicate run-timing model used to estimate missing counts: L = late; N = normal; E = early.

Bold italics represent estimated counts. Boxed areas are middle 50% of run. Midpoint is bounded by double lines. **NO ESCAPEMENT GOAL.**

Includes counts after 8/29.

Appendix B.3. Historical cumulative estimated escapement of chum salmon at the Kogrukluk River weir for years with adequate data.

Date	1976(N)	1978(N)	1979(L)	1981(E)	1982(N)	1984(N)	1985(L)	1986(L)	1988(E)	1989(N)	1991(L)	1992(N)	1993(N)	1994(N)	1996(E)	1997(L)	1999(L)
15-Jun				2													
16-Jun		2		2												0	
17-Jun		2	2	3	2				2			1	1			0	
18-Jun		3	3	11	3				2	1		2	1			0	
19-Jun		11	2	14	3	3			2	2		3	4	3	3	0	
20-Jun		14	11	27	11	3			11	5		8	7	3	5	0	
21-Jun		27	14	66	14	5			14	9		13	13	6	15	0	
22-Jun		66	27	108	27	11			27	18		24	22	15	39	1	
23-Jun	2	108	66	151	66	14	2	2	66	35	3	46	42	24	73	2	
24-Jun	2	151	108	189	108	27	2	2	108	53	3	66	63	48	107	4	
25-Jun	2	189	151	411	151	66	2	2	151	83	3	161	97	71	136	10	
26-Jun	11	411	189	686	189	108	11	11	189	131	18	165	155	115	278	18	
27-Jun	14	686	239	1,103	411	151	14	14	411	210	23	263	249	178	439	25	
28-Jun	27	994	304	2,306	686	189	27	27	686	228	44	449	414	203	668	49	
29-Jun	53	1,612	384	4,570	1,101	411	46	57	1,101	297	94	769	722	328	1,096	263	
30-Jun	102	2,241	484	6,825	2,306	686	148	126	2,042	428	174	1,223	1,149	509	1,301	443	
01-Jul	259	2,880	579	9,479	4,570	1,303	151	310	4,042	607	243	2,279	1,824	837	2,435	598	3
02-Jul	301	3,921	766	12,991	6,825	2,042	189	402	6,542	1,353	304	4,695	2,482	1,862	3,050	765	18
03-Jul	431	5,610	823	16,598	9,473	3,196	411	753	9,043	2,390	662	7,310	3,498	2,275	8,324	1,014	25
04-Jul	620	7,295	1,130	18,705	12,991	4,567	686	1,225	11,042	3,829	1,105	9,225	4,562	3,856	10,536	1,259	46
05-Jul	802	9,349	1,434	20,641	16,598	5,498	1,103	1,531	12,887	5,612	1,445	10,929	5,562	5,908	14,071	1,798	97
06-Jul	1,141	11,400	1,644	23,514	18,705	7,024	1,364	1,874	14,267	7,204	1,782	11,931	6,876	7,042	16,941	2,104	259
07-Jul	1,654	12,803	1,903	25,760	20,641	8,920	2,049	2,240	17,961	8,095	2,064	13,138	8,294	9,191	19,627	2,493	581
08-Jul	2,277	14,959	2,118	27,660	23,514	10,870	2,430	2,749	17,920	9,746	2,309	14,152	9,538	10,590	23,326	2,855	960
09-Jul	2,956	17,255	3,153	30,552	27,083	12,834	3,048	3,674	20,671	10,835	3,089	15,221	10,955	11,356	24,603	3,017	1,381
10-Jul	3,466	20,093	2,922	34,085	31,579	13,926	3,290	5,073	21,822	12,822	3,658	15,946	12,391	12,932	27,073	3,204	1,971
11-Jul	3,831	23,026	3,767	36,953	34,578	15,221	3,972	6,694	21,460	14,236	4,155	17,201	13,642	13,698	28,594	3,414	2,737
12-Jul	4,253	25,376	5,014	38,984	36,959	17,593	4,471	7,861	23,095	15,229	5,314	18,451	14,734	15,037	30,330	3,686	3,700
13-Jul	4,588	27,348	6,310	40,853	39,910	20,070	5,010	8,800	30,055	15,957	6,750	19,385	16,114	16,565	33,402	4,020	4,589
14-Jul	4,919	30,899	7,475	43,140	42,362	22,393	5,717	9,654	32,153	16,829	7,768	20,738	17,130	17,719	35,456	4,349	5,231
15-Jul	5,233	33,403	8,285	45,596	44,307	24,965	6,274	10,545	33,925	18,382	8,760	22,304	18,525	18,586	36,822	4,745	5,770
16-Jul	5,574	35,961	9,252	47,520	46,728	27,176	7,119	11,091	34,502	19,605	9,789	23,458	20,036	19,893	38,713	5,041	6,160
17-Jul	5,839	37,862	10,251	48,796	49,746	29,083	7,834	11,621	35,629	20,269	10,708	24,365	22,066	21,363	39,814	5,291	6,833
18-Jul	6,172	39,384	10,454	50,086	52,309	30,409	8,490	11,983	36,039	21,386	11,748	25,627	23,831	22,386	40,947	5,604	7,274
19-Jul	6,454	40,765	11,448	50,934	54,228	31,368	9,108	12,327	36,498	21,589	12,490	26,690	24,375	23,534	41,711	5,924	7,665
20-Jul	6,694	42,070	11,999	51,363	55,938	32,808	9,619	12,567	36,833	21,992	12,957	27,300	25,392	24,127	42,339	6,098	8,421
21-Jul	7,269	42,728	12,972	52,067	57,852	34,404	10,091	12,780	37,477	22,008	13,419	27,994	26,634	25,150	43,478	6,261	8,898
22-Jul	7,559	43,698	12,986	52,773	58,250	36,149	10,964	12,976	37,487	23,085	14,207	28,502	27,134	26,083	44,047	6,488	9,429
23-Jul	7,708	44,462	13,441	53,364	59,177	37,355	11,613	13,073	37,606	23,256	15,020	29,422	27,621	27,096	44,861	6,652	9,901
24-Jul	7,877	45,341	14,559	53,865	59,919	38,007	11,538	13,187	37,826	23,432	15,878	29,877	27,957	27,825	45,344	6,723	10,259
25-Jul	7,951	46,150	15,059	54,070	60,557	38,405	12,113	13,300	37,823	23,531	16,781	30,655	28,447	28,367	45,609	6,778	10,724
26-Jul	7,983	46,710	15,304	54,438	61,104	38,872	12,572	13,419	38,047	23,620	17,721	31,155	28,713	28,701	45,791	6,901	11,044
27-Jul	8,010	47,100	15,652	54,790	61,280	39,329	12,888	13,510	38,150	23,721	18,488	31,520	29,090	29,007	45,908	7,002	11,397
28-Jul	8,025	47,348	16,830	55,288	61,973	39,654	13,229	13,663	38,269	23,883	19,136	31,804	29,579	29,256	46,203	7,193	11,666

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Appendix B. 9 (page 2 of 2)

Date	1976(N)	1977(N)	1978(L)	1979(E)	1980(N)	1981(N)	1982(L)	1983(L)	1984(E)	1985(N)	1986(E)	1987(N)	1988(N)	1989(E)	1990(N)	1991(N)	1992(N)	1993(N)	1994(N)	1995(N)	1996(E)	1997(L)	1998(L)
29-Jul	8,052	47,563	*16,522*	56,671	62,357	39,979	13,471	13,797	38,366	24,245	19,032	32,193	30,050	29,541	46,860	7,316	10,954						
30-Jul	8,066	47,673	*16,905*	56,033	62,797	40,242	13,688	13,910	38,919	24,569	20,244	*32,470*	30,448	29,870	47,275	7,393	12,275						
31-Jul	8,073	47,785	*17,267*	56,337	63,070	40,569	13,947	14,002	38,647	24,859	21,099	32,724	30,751	30,080	47,465	7,429	12,530						
01-Aug	*8,085*	*47,883*	*17,551*	56,526	63,800	40,845	14,096	14,073	38,768	25,098	21,850	32,888	30,956	30,257	*47,635*	7,477	12,775						
02-Aug	*8,097*	*47,959*	*17,760*	56,709	63,487	41,057	14,245	14,145	38,852	25,621	22,444	33,328	31,005	30,463	*47,786*	7,527	12,948						
03-Aug	*8,102*	*47,995*	*17,943*	56,855	63,659	41,216	14,336	14,206	38,929	25,919	22,931	33,311	31,192	30,672	47,917	7,563	13,057						
04-Aug	*8,111*	*48,024*	*18,089*	56,935	63,750	41,349	14,423	14,268	38,995	26,054	23,250	33,415	31,319	30,776	48,016	7,621	13,264						
05-Aug	*8,112*	*48,056*	*18,167*	56,968	63,858	41,399	14,481	14,323	39,056	26,211	23,533	33,480	31,423	30,835	48,069	7,654	13,383						
06-Aug	*8,112*	*48,060*	*18,203*	57,023	63,886	41,419	14,533	14,376	39,118	26,389	23,746	33,529	31,573	30,877	48,151	7,696	13,490						
07-Aug	*8,112*	*48,074*	*18,287*	57,066	63,923	41,432	14,585	14,421	39,173	26,464	23,838	33,625	31,687	30,924	48,202	7,728	13,524						
08-Aug	*8,113*	*48,083*	*18,300*	57,100	63,945	41,440	14,662	14,468	39,229	26,505	23,896	33,684	31,786	30,968	48,252	7,749	13,561						
09-Aug	*8,113*	*48,091*	*18,343*	57,150	63,983	41,449	14,707	14,503	39,271	26,554	23,932	33,714	31,809	31,005	48,276	7,775	13,614						
10-Aug	*8,114*	*48,105*	*18,384*	57,197	64,002	41,469	14,789	14,540	39,318	26,600	23,981	33,774	31,824	31,037	48,336	7,804	13,646						
11-Aug	*8,116*	*48,110*	*18,431*	57,226	64,035	41,471	14,843	14,558	39,353	26,642	23,996	33,843	31,834	*31,078*	*48,351*	7,872	13,673						
12-Aug	*8,117*	*48,119*	*18,469*	57,251	64,034	41,480	14,873	14,574	39,390	26,681	24,033	33,913	31,849	*31,131*	*48,370*	*7,887*	*13,707*						
13-Aug		*48,120*	*18,485*	57,278	64,049	41,480	14,911	14,581	*39,408*	26,699	24,061	33,995	31,875	*31,178*	*48,399*	*7,903*	*13,739*						
14-Aug		*48,120*	*18,512*	57,302	64,055	41,481	14,930	14,594	39,424	26,722	24,081	34,020	*31,879*	*31,206*	*48,404*	7,910	13,742						
15-Aug		*48,120*	*18,536*	57,325	64,057	41,482	14,946	14,614	*39,431*	26,734	24,089	34,045	*31,879*	*31,222*	48,420	7,921	13,753						
16-Aug		*48,121*	*18,559*	57,331	64,059	41,482	*14,961*	14,634	39,444	26,740	24,096	34,062	*31,883*	31,227	48,425	7,936	13,758						
17-Aug		*48,121*	*18,565*	57,336	64,063	41,483	*14,973*	14,649	39,464	26,751	24,110	34,078	*31,887*	31,229	48,427	7,941	13,766						
18-Aug		*48,122*	*18,570*	57,340	*64,066*	41,484	*14,985*	14,661	39,484	26,752	24,165	34,087	*31,891*	31,232	48,432	7,943	13,771						
19-Aug		*48,124*	*18,573*	57,342	*64,067*	41,484	*14,990*	*14,673*	39,499	26,756	24,177	34,088	*31,895*	31,239	48,438	7,945	13,771						
20-Aug		*48,125*	*18,576*	57,351	*64,072*	41,484	*14,999*	*14,678*	39,511	26,759	24,177	34,092	*31,899*	31,242	48,442	7,949	13,775						
21-Aug			*18,585*	57,356	*64,073*		*15,000*	*14,687*	39,523	26,761	24,182	34,105		31,243	48,450	7,950	13,780						
22-Aug			*18,590*	57,356	*64,077*		*15,000*	*14,688*	39,528	26,761	24,182			31,246	48,455	7,950	13,786						
23-Aug			*18,590*	57,357			*15,000*	*14,688*	39,537	26,761	24,182			31,246	48,461	7,950	13,788						
24-Aug			*18,591*	57,360			*15,001*	*14,688*	39,538	26,762	24,183			31,252	48,462	7,950	13,789						
25-Aug			*18,594*	57,362			*15,001*	*14,689*	39,538	26,763	24,186			31,252	48,469	7,951	13,793						
26-Aug			*18,596*	57,363			*15,002*	*14,689*	39,539	26,763	24,187			31,254	48,472	7,951	13,794						
27-Aug			*18,597*	57,365			*15,004*	*14,690*	39,539	26,764	24,187			31,255	48,474	7,951	13,796						
28-Aug			*18,599*	57,365			*15,005*	*14,692*	39,539	26,764	24,187			31,256	48,475	7,953	13,796						
29-Aug			*18,599*	57,365				*14,693*	39,540	26,765	24,188			31,265	48,495	7,958	13,798						

Letters next to year indicate run-timing model used for estimating missing counts: L = late; N = normal; E = early.

Bold italics represent estimated counts. Boxed areas are middle 50% of run. Midpoint is bounded by double lines. **ESCAPEMENT GOAL = 36,000.**

* Includes counts after 8/29.

Appendix B.4. Historical cumulative estimated escapement of coho salmon at the Kogrukluk River weir for years with adequate data.

	1981(N)	1982(N)	1983(L)	1984(E)	1985(E)	1986(E)	1987(N)	1988(N)	1991(L)	1994(E)	1995(E)	1996(E)	1997(L)	1998(L)	1999(L)
20-Jul	0	0		0	0			1	0		3	1	0	0	
21-Jul	0	0		0	0			1	0		3	3	0	0	
22-Jul	0	0		0	0			1	0		4	6	0	0	
23-Jul	0	0		0	0			1	0		5	6	0	0	
24-Jul	0	0		1	0			2	0		6	8	0	0	1
25-Jul	0	0		5	0			2	0		8	14	0	0	1
26-Jul	0	0		7	0			2	0		9	17	0	0	1
27-Jul	0	0		8	0			2	0	0	9	20	0	0	1
28-Jul	0	0		9	0			2	0	12	11	35	0	0	1
29-Jul	0	0		13	0	0		2	0	34	11	60	2	0	1
30-Jul	0	0		15	0	*1*		2	0	63	12	143	2	1	2
31-Jul	0	0		18	0	*1*		2	0	86	12	169	3	3	2
01-Aug	0	0		29	6	*3*		2	0	137	13	***223***	7	5	2
02-Aug	0	5		43	10	*2*	0	2	0	167	14	***305***	12	8	2
03-Aug	0	11		62	17	*4*	*1*	2	1	217	16	415	15	18	2
04-Aug	3	26		94	24	*9*	*1*	2	2	***276***	18	456	19	25	2
05-Aug	7	43		112	38	*13*	2	2	11	***344***	19	492	42	39	2
06-Aug	12	59	0	165	46	*20*	*2*	6	14	***421***	19	707	64	45	2
07-Aug	14	101	*2*	264	64	*38*	*4*	12	19	507	20	858	111	52	3
08-Aug	24	137	*7*	308	113	*67*	9	23	21	630	22	998	122	57	4
09-Aug	50	192	*12*	427	126	*102*	12	38	22	733	29	1,213	148	74	5
10-Aug	70	234	*18*	479	220	*141*	20	63	27	841	*97*	1,849	213	80	11
11-Aug	92	340	*33*	701	279	*202*	38	101	40	*1,003*	*171*	*2,462*	302	107	15
12-Aug	154	431	*50*	816	397	*288*	67	181	74	1,218	*312*	*3,363*	*359*	124	19
13-Aug	216	489	68	1,040	465	*428*	102	267	99	1,427	*506*	*4,232*	*432*	159	30
14-Aug	339	567	103	1,187	547	*671*	141	313	114	*1,723*	*668*	*5,257*	*453*	286	35
15-Aug	508	762	159	1,366	631	*870*	202	338	122	2,162	*889*	6,380	517	377	59
16-Aug	664	818	177	1,510	*855*	*1,168*	288	443	174	2,578	*1,130*	7,764	640	621	121
17-Aug	753	1,329	203	1,596	*1,002*	*1,580*	428	600	359	3,159	1,210	9,237	724	846	170
18-Aug	863	1,794	249	2,854	*1,181*	*1,866*	671	858	560	3,996	1,537	10,344	817	900	185
19-Aug	1,159	2,165	273	3,849	*1,325*	*2,184*	870	1,060	723	4,757	2,058	11,379	934	924	191
20-Aug	1,473	2,448	284	4,386	*1,411*	*2,711*	1,168	1,350	829	5,586	2,727	13,521	1,172	1,052	429
21-Aug	1,660	2,857	287	4,707	*1,911*	3,340	1,580	1,702	903	6,183	3,582	16,031	1,621	1,799	498
22-Aug	1,815	2,999	354	6,119	*2,361*	4,107	1,866	2,085	952	6,652	4,400	18,578	2,049	2,097	686
23-Aug	2,042	3,227	506	7,849	*2,661*	5,583	2,184	2,408	1,063	7,091	5,331	21,243	2,528	2,357	877
24-Aug	2,297	3,874	606	9,039	2,982	7,470	2,711	2,797	1,079	7,932	6,233	23,661	2,953	3,297	1,052
25-Aug	2,713	4,742	641	11,070	3,213	8,834	3,369	3,055	1,514	10,028	7,235	26,388	3,564	3,767	1,223
26-Aug	3,031	5,546	647	13,106	3,413	10,057	4,145	3,953	1,642	12,971	8,351	28,734	4,149	5,098	1,300
27-Aug	3,400	6,492	674	13,837	3,886	11,148	4,907	4,331	1,760	15,684	9,549	30,687	4,550	5,536	1,561
28-Aug	3,667	7,312	944	14,421	4,776	12,403	5,721	4,949	1,794	17,571	11,511	33,117	4,900	6,017	1,664
29-Aug	3,811	7,944	993	14,791	5,593	13,226	6,872	5,502	1,818	18,578	12,774	34,492	5,200	6,607	1,870
30-Aug	4,113	9,432	1,021	15,479	6,087	13,882	8,013	6,272	1,823	18,974	14,559	36,548	5,907	7,510	2,135
31-Aug	4,435	11,112	1,182	16,386	6,946	14,496	9,837	6,766	1,834	19,816	15,725	38,646	6,815	8,951	2,343
01-Sep	4,731	12,649	1,762	16,999	8,326	14,916	10,845	7,096	1,838	21,763	*16,829*	40,650	7,379	10,356	2,692
02-Sep	5,059	14,554	1,789	17,820	9,597	15,445	12,618	7,465	2,097	23,163	*17,931*	42,598	7,680	11,930	3,174
03-Sep	5,355	16,534	2,256	18,503	10,163	16,079	13,778	7,703	3,044	24,318	18,680	44,090	8,061	13,325	3,675
04-Sep	5,967	17,819	2,621	19,386	10,720	16,418	16,728	7,940	3,507	24,961	19,583	45,080	8,130	15,307	4,551
05-Sep	6,502	19,600	2,721	20,173	11,351	16,741	17,781	8,111	3,819	25,591	20,213	45,970	8,670	16,496	5,552
06-Sep	7,157	24,613	3,277	20,915	11,881	16,975	18,743	8,281	4,178	26,016	20,799	46,877	8,904	17,138	5,976
07-Sep	7,663	27,832	3,482	21,258	12,734	17,428	*19,299*	8,434	4,648	26,400	*21,694*	47,912	9,626	17,380	6,506
08-Sep	8,184	29,997	3,593	22,365	13,552	*17,873*	*19,504*	8,879	5,120	26,927	*22,598*	48,687	10,223	17,863	7,035
09-Sep	8,781	31,457	3,743	23,446	14,141	*18,052*	*19,615*	9,058	5,593	27,363	*23,575*	49,204	10,638	18,287	7,441
10-Sep	9,086	32,683	4,602	23,493	14,480	*18,486*	*19,766*	9,492	6,137	27,719	*24,274*	49,664	10,980	19,054	7,854
11-Sep	9,369	33,604	4,962	24,323	14,635	*19,452*	*20,624*	10,458	6,379	*28,233*	*24,525*	50,009	11,175	19,776	8,112
12-Sep	9,615	34,326	4,977	24,686	14,943	*19,888*	*20,984*	10,894	6,516	*28,800*	*25,308*	50,239	11,277	20,329	8,458
13-Sep	9,854	35,074	5,152	24,910	15,176	*20,145*	*20,999*	11,151	6,583	*29,882*	*25,834*	50,367	11,357	20,756	8,683
14-Sep	10,048	35,582	6,039	25,267	15,435	*20,297*	*21,174*	11,303	6,808	*30,950*	*26,198*	50,483	11,419	21,026	9,292
15-Sep	10,205	*36,006*	6,173	25,304	15,676	*20,409*	21,195	11,415	7,034	*31,687*	*26,359*	50,555	11,471	21,382	9,734
16-Sep	10,373	*36,411*	6,324	*25,479*	15,816	*20,530*	21,256	11,536	*7,149*	*32,288*	*26,555*		11,560	21,745	9,862
17-Sep	10,505	*36,680*	6,748	*26,366*	15,929	*20,716*	21,379	11,722	*7,357*	*32,703*	*26,796*		11,649	22,180	10,094
18-Sep	10,664	*36,869*	7,153	*26,500*	16,013	*21,121*	21,454	*12,127*	*7,972*	*33,410*	*27,070*		11,703	22,409	10,665

-continued-

Appendix B.1 (page 2 of 2)

	1981(N)	1982(N)	1983(L)	1984(E)	1985(E)	1986(E)	1987(N)	1988(N)	1991(L)	1994(E)	1995(E)	1996(E)	1997 (L)	1998(L)	1999(L)
19-Sep	10,772	**36,994**	7,422	**26,651**	16,151	**21,390**	21,605	**12,396**	**8,120**	**33,764**	**27,170**		11,751	22,610	11,045
20-Sep	10,910	**37,251**	7,611	**27,075**	16,241	**21,579**	21,858	**12,585**	**8,283**	**34,112**	**27,384**		11,779	**22,940**	11,312
21-Sep	11,013	**37,365**	7,736	**27,213**	16,301	**21,704**	21,968	**12,710**		**34,255**	**27,640**		11,805	**23,163**	11,488
22-Sep	11,127	**37,500**	7,993	**27,303**	16,339	**21,961**	22,021	**12,967**		**34,393**	**27,676**		**11,945**	**23,436**	11,850
23-Sep	11,205	**37,547**	8,107	**27,363**	16,348	**22,075**	22,196	**13,081**		**34,411**	**27,736**		**12,007**	**23,632**	12,011
24-Sep	11,249	**37,592**	8,242	**27,401**	**16,362**	**22,210**	**22,309**	**13,216**		**34,414**	**27,771**		**12,080**	**23,814**	12,202
25-Sep	11,279	**37,635**	8,289	**27,410**	**16,382**	**22,257**	**22,393**	**13,263**		**34,427**	**27,800**		**12,106**	**23,901**	12,268
26-Sep	11,308	**37,664**	8,334	**27,424**	**16,401**	**22,302**	**22,531**	**13,308**		**34,695**	**27,802**		**12,330**	**24,015**	12,332
27-Sep	11,334	**37,690**	8,377	**27,444**	**16,419**	**22,345**	**22,621**	**13,351**			**27,805**		**12,144**	**24,074**	12,392
28-Sep	11,347	**37,703**	**8,406**	**27,463**	**16,434**	**22,374**	**22,681**	**13,350**			**27,811**		**12,165**	**24,120**	12,433
29-Sep	11,361	**37,717**	**8,432**	**27,481**	**16,441**	**22,400**	**22,719**	**13,406**			**27,815**		**12,185**	**24,157**	12,470
30-Sep	11,381	**37,737**	**8,445**	**27,496**		**22,413**	**22,728**	**13,419**			**27,819**		**12,191**	**24,189**	12,488
01-Oct	11,400	**37,756**	**8,459**	**27,503**		**22,427**	**22,742**	**13,433**			**27,824**		**12,199**	**24,214**	12,508
02-Oct	11,418	**37,774**	**8,479**	**27,529**		**22,447**	**22,762**	**13,453**			**27,833**		**12,210**	**24,250**	12,536
03-Oct	11,433	**37,789**	**8,498**	**27,542**		**22,466**	**22,781**	**13,472**			**27,847**		**12,220**	**24,284**	12,563
04-Oct	11,440	**37,796**	**8,516**	**27,556**		**22,484**	**22,799**	**13,490**			**27,861**		**12,229**	**24,322**	12,588
05-Oct	11,450		**8,531**	**27,576**		**22,499**	**22,814**	**13,505**					**12,237**	**24,344**	12,609
06-Oct	11,455		**8,538**	**27,595**		**22,506**	**22,821**	**13,512**							

Letters next to year indicate run-timing model used for estimating missing counts: L = late; N = normal; E = early.
Bold italics represent estimated counts. Boxed areas are middle 50% of the run. Midpoint is bounded by double lines. **ESCAPEMENT GOAL 25,000.**