

2001 KANEKTOK RIVER WEIR REPORT



By

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Regional Information Report¹ No. 3A02-39

Alaska Department of Fish and Game
Commercial fisheries Division
Arctic-Yukon-Kuskokwim Region
333 Raspberry Road
Anchorage, Alaska 99519

August 2002

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ACKNOWLEDGMENTS

This project was made possible through funding from the Federal Office of Subsistence Management, Grant #701811J334, Bering Sea Fisherman's Association, and FWS. The author would like to thank Ron Vanderpool of the Kuskokwim Native Association (KNA), Doug Molyneaux, Doug Bue, Charlie Burkey, Andrew Ballesteros, Roger Minton, and Rob Stewart all with the Alaska Department of Fish and Game Commercial Fisheries Division, and Willard Church and Carl Jones both with the Native Village of Kwinhagak (NVK) for their involvement in this project.

PROJECT SPONSORSHIP

This project was made possible through funding from the Federal Office of Subsistence Management (FOSM) grant # 701811J334, Bering Sea Fisherman's Association, and from the U.S Fish and Wildlife Service.

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ABSTRACT

The commercial harvest, and the age, sex, and length composition of the commercial harvest are summarized for District W-5. In the Kanektok River, escapement and abundance estimates for chinook, *Oncorhynchus tshawytscha*, sockeye, *O. nerka*, coho, *O. kisutch*, and chum, *O. Keta*, salmon are reported. Escapement age, sex, and length are reported for coho salmon. A resistance-board floating weir on the Kanektok River was used to estimate escapement and provide a platform for the collection of age, sex and length data. The 2001 commercial salmon harvest was 12,775 chinook, 33,807 sockeye, 18,531 coho, and 17,209 chum salmon, for a total of 82,322 fish, all being below their most recent 10-year averages. The weir was operational from August 9 until October 3. Passage was 129 chinook, 739 sockeye, 1,039 chum, and 35,650 coho salmon, 2,556 Dolly Varden, 18 white fish, and 60 rainbow trout. No biological escapement goals have been established for any species of salmon for the Kanektok River weir. The delay in weir installation did preclude the project from meeting its objectives of enumerating and collecting ASL information from chinook, sockeye, and chum salmon escapements. The predominant age classes were age 1.4, 1.3, 0.3 and .04, and 2.1 for chinook, sockeye, chum, and coho salmon, respectively. The predominant age class composition for coho salmon escapement was age-2.1 fish.

KEY WORDS: Kanektok River, Kuskokwim Area, District W-4, chinook, sockeye, chum, coho, salmon Kanektok River, Dolly Varden, *Oncorhynchus tshawytscha*, *O. nerka*, *O. kisutch*, *O. Keta*, rainbow trout, whitefish

INTRODUCTION

Study Area

The Kanektok River is located in the Togiak National Wildlife Refuge in Southwestern Alaska (Fig. 1). The river originates at Kegati Lake and flows westerly for 91 mi (146 km) until it empties into Kuskokwim Bay near the village of Quinhagak. The upper portion of the river is a single channel flowing primarily through mountainous area, the lower portion of the river flows through a broad fluvial plain and is braided with many side channels. The Kanektok River and its many tributaries drain approximately 500 mi² of surface area dominated by largely undisturbed tundra. The surrounding riparian vegetation is composed primarily of cottonwood, willow, and alder. The weir is located at river mile 42 (67.60 km), GPS coordinates N 59 46.057, W 161 03.616 (Fig.1).

Project History

Establishing an accurate and reliable method for assessing salmon escapement in the Kanektok River has been problematic since the inception of the District W-4 commercial fishery in 1960. The first attempt was a counting tower in 1960 located on the lower river near the village of Quinhagak (ADF&G 1960). The project was limited by logistical problems, poor visibility into the water column, and difficulties in species identification (ADF&G 1960). In 1961 the tower was relocated to the outlet of Kegati Lake where it was operational for two seasons (ADF&G 1961, 1962). Although the tower provided useful sockeye salmon escapement information, it was abandoned after 1962 (ADF&G 1962). Hydroacoustic sonar was attempted from 1982 through 1987 but was unsuccessful because of budget constraints, technical obstacles, and site limitations (Schultz and Williams 1984, Huttunen 1984c, 1985c, 1986a, 1988). In 1996, a cooperative effort by The Native Village of Quinhagak (NVK), FWS, and ADF&G revisited the counting tower, again meeting with little success (Fox 1997) despite improvements to the project in 1998 (Menard and Caole 1999). In 1999, resources were redirected toward developing a resistance board-floating weir (Burkey et al 2001). The weir was scheduled to be operational in 2000, but technical limitations, personnel problems, and high water levels prevented meeting project objectives (Linderman 2000). Also, the weir caused extensive bank erosion at the site, rendering it incapable of facilitating a weir (Linderman 2000). In 2001 the weir was relocated approximately 20 mi upriver from the original site.

Salmon Fisheries

Commercial salmon fishing occurs in District W-4, the marine waters adjacent to the village of Quinhagak where the Kanektok River empties into Kuskokwim Bay (Fig. 2). Commercial fishing occurred sporadically in the area from 1913 until 1959, with the present day District W-4

commercial fishery being established in 1960 (Pennoyer et al. 1965). Commercial fishing is conducted with the use of drift gillnets in the tidal channels radiating into the bay from the freshwater streams in the district, and with gillnets set near the mouth of the Kanektok River. The fishery is directed towards chinook, *Oncorhynchus tshawytscha*, sockeye, *O. nerka*, and coho, *O. kitsuch*, salmon. Chum, *O. keta*, salmon are harvested incidentally. Pink, *O. gorbushcha*, salmon is the least valuable species commercially and not targeted.

Since 1960, commercial salmon harvests in District W-4 have ranged from 4,186 to 302,130 fish, the historic average being 118,683 fish (Table 1). Over the last 5 years, commercial harvests in District W-5 have been below the most recent 10-year average of 206,443 fish (Table 1), likely a result of declining effort in the district since 1995 (Table 2). Since 1970, the number of permits fishing the district has ranged from 61 to 409 permits, with the average being 237 permits (Table 2). In recent years the number of permits fishing the district has been below the most recent 10-year average of 277 (Table 2). The observed decline is likely the result of the poor market value of salmon since 1995, increasing fuel prices, and other economic opportunity in the area. Collectively, these factors have resulted in the value of the commercial salmon fishery in the district having been below the most recent 10-year average of 624,428 since 1995 (Table 3).

Subsistence fishing for salmon occurs throughout the Kanektok River drainage. Subsistence caught salmon make an important contribution to the annual subsistence harvests of residents from Quinhagak, Goodnews, Eek, and Platinum (Burkey, et. al. 2000). The Department has quantified subsistence harvests in the Quinhagak area since 1968. Over the last 10 years, annual subsistence harvests have averaged 3,407 chinook, 1,112 sockeye, 1,227 chum, and 2,118 coho salmon (Table 4).

The Kanektok River is considered a world-class sport fishery, both guided and non-guided sport anglers from around the world fish the drainage. Sport fishermen raft from Kegati Lake to the village of Quinhagak, targeting salmon, Rainbow Trout, and Dolly Varden. Most of the powerboat anglers fish within 45 miles of the mouth of the river. Guiding outfits generally operate from mid-June to the beginning of September.

Escapement

Salmon escapement information for the Kanektok River is scant because establishing a continuing escapement project on the Kanektok River has been problematic (Table 5). As a result, Biological Escapement Goals (BEGs) have not been established for any salmon species for the Kanektok River.

Age, Sex, and Length

Annual escapement age, sex, and length (ASL) composition information is used to develop stock-recruitment models, in turn providing information used for projecting future run sizes. Available escapement ASL information for chinook, sockeye, chum, and coho salmon is limited on the Kanektok River, because establishing a continuous long term escapement project has been problematic. Historical summaries of existing ASL information for salmon returning to the

Kanektok River can be found in DuBois and Molyneaux (2001) and DuBois and Folletti (unpublished data). The summary for chinook salmon is based on information from the 1997 Kanektok River counting tower project, from sport samples collected in 1991, 1993, and 1994 from a Kanektok River sport fishery creel survey conducted by ADF&G Sport Fish Division (Molyneaux and DuBois 2001), and from carcass sampling from 1992 through 1996 (MacDonald 1997). Samples collected from the Kanektok River sonar project from 1984-87 (Huttunen 1984, 1985, 1986, 1988), and carcass sampling from a survey trip in 1984 (Snellgrove and Bue 1984) are not included in these summaries. The summaries for sockeye, chum, and coho salmon are based on information from the 1997 Kanektok River counting tower project (see DuBois and Molyneaux 2001).

Chinook salmon age and sex information has been collected from the District W-4 commercial harvest since 1990, and length information has been collected since 1995 (Dubois and Folletti unpublished). Since 1990, 62 % of the chinook salmon commercial harvested have been male, and been comprised mostly (43 %) of age-1.4 fish. Since 1995, the average seasonal mean lengths of age-1.4 fish have been 836 and 853 mm, males and females, respectively.

Sockeye salmon age and sex information has been collected from the District W-4 commercial fishery since 1990, and length information since 1995 (Dubois and Folletti unpublished). Since 1990, 51 % of the sockeye salmon commercially harvested have been male, and been comprised mostly (61 %) of age-1.3 fish. Since 1995, the average seasonal mean lengths of age-1.3 fish have been 584 mm and 551 mm, males and females, respectively.

Chum salmon ASL information has been collected from the District W-4 commercial harvest since 1984 (Dubois and Folletti unpublished). Since then, 55 % of the chum salmon commercially harvested have been female, and been comprised mostly (58 %) of age-0.3 fish. The average mean seasonal lengths of age-0.3 fish have been 585 mm and 563 mm, males and females, respectively.

Coho salmon age and sex information has been collected from the District W-4 commercial harvest since 1990, and length information has been collected since 1996 (Dubois and Folletti unpublished). Since 1990, 52 % of the coho salmon commercially harvested have been male, and been comprised mostly (87 %) of age-2.1 fish. Since 1996, the average mean seasonal lengths of age-2.1 fish have been 592 mm and 595 mm, males and females, respectively.

Aerial Survey

Aerial survey escapement objectives were established in 1993 and set at 5,800, 15,000, 30,500, and 25,000 fish for chinook, sockeye, chum, and coho salmon, respectively (Buklis 1993). Aerial surveys for chinook, sockeye, and chum salmon in the Kanektok River have been consistent from 1981 through 2001 (Table 6). Chinook and sockeye salmon have met their aerial escapement goals consistently since 1993. Chum salmon have not met their aerial escapement goals since its establishment 1993. Aerial surveys for coho salmon have been sporadic since 1981.

Objectives

The objectives for the Kanektok River Weir in 2001 were to:

- successfully install and operate the weir from mid-June through September,
- enumerate the daily passage of all fish species through the weir,
- describe the run-timing or proportional daily passage of chinook, sockeye, chum, and coho salmon through the weir,
- collect samples from chinook, sockeye, chum, and coho salmon at the weir for age-sex-length (ASL) determination,
- enumerate the carcasses of all fish species washed up on the weir,
- record daily meteorological and hydrological data at the weir.

METHODS

Resistance Board Floating Weir

Methods for the design, construction, and installation of the resistance board, floating weir largely follow those described in Tobin (1994). The approximately 250 ft (76.2 m) weir used at the Kanektok River site was comprised of three major parts: the resistance board panel section, the fixed picket section, and the substrate rail.

The 230 ft (70.1 m) resistance board panel section was constructed with both 3 ft (0.91 m) x 20 ft (6.1 m) and 4 ft (1.2 m) x 20ft (6.1 m) floating resistance board panels made out of 18 PVC Schedule 40 pipes (1 in diameter) with 2 ft (.61 m) by 4 ft (1.2 m) resistance boards attached to the downstream edge. The resistance board panels were anchored to a substrate rail by two hooks attached to a cable running the length of the rail. The substrate rail was anchored to the stream bottom with metal stakes and duckbill anchors.

Approximately 14 ft (4.3 m) of fixed-picket weir was used on the north bank, and approximately 6 ft (1.8 m) was used on the south bank to attach the floating resistance board weir to the banks. The fixed-picket sections were comprised of wooden tripods (2 on the south bank, 1 on the north bank) with two horizontal metal beams attached spanning the distance of the tripod legs. The metal beams had holes placed in them that allowed aluminum bars to be placed vertically across the front of the tripods, completing the fixed picket section.

Two passage chutes were installed on the weir, one approximately 100 ft (30.48 m) from the south bank, the other approximately 25 feet (7.62 m) from the north bank. A 10 ft (3 m) x 15 ft (4.6 m) live trap box used to collect fish for age-sex-length (ASL) sampling was installed directly upstream side to the north bank passage chute. Gates were attached on both chutes to prevent fish passage.

To allow boaters and rafters to cross the weir without difficulty, two 3 ft (0.91 m) and two 4 ft (1.22 m) resistance board panels were modified into a boat passage gate by bending downward the downriver end of the pickets. Hard rubber sheets were placed on top of the bent pickets. The boat gate was located near the middle of the weir.

Escapement

To determine salmon escapement past the weir, fish passage counts were made daily from August 10 through October 3. During passage counts, the passage chute gate was opened to pass fish through the weir. Crewmembers identified and enumerated fish as they moved through the chute. Passage counts occurred regularly throughout the day, typically for 1-2 hour periods, beginning in the morning and continuing as late as light permitted. Substantial delays in fish passage occurred only at night or during ASL sampling.

Age, Sex, and Length

Escapement sampling for ASL determination was conducted based on the pulse sampling design of Molyneaux and DuBois (1999). The sampling objective for chinook salmon escapement was 4-5 strata (pulses) of 210 fish each, distributed equally over the run. Objectives for sockeye and chum salmon were a minimum of 6 pulses of 210 and 200 fish each, respectively, distributed equally over their runs. The objective for coho salmon was 3 pulses of 170 fish each, distributed equally over the run. Each pulse sample was used to estimate the ASL composition of the run at a given point of time during the run. A weighted mean, based on relative fish passage during each defined pulse as the weight, was used to estimate age composition of the total season passage.

To obtain salmon for escapement ASL sampling, a gate on the live trap was opened for a period to allow a sufficient number fish to enter. The live trap gate was closed and individual salmon were removed from the trap using a dip net. To sample salmon from the commercial harvest, fish were obtained from the processor. For both escapement and harvest ASL data collection, fish were measured for length (from the mid-eye to fork-of-tail). Escapement samples were sexed by examination of external characteristics. Harvest samples were sexed by making a small incision (approx. 1 in) anterior to the anus and then checking for the presence of eggs in the body cavity. For both escapement and commercial harvest samples, scales were removed (3 scales each from chinook, chum, and coho salmon, one scale from sockeye salmon) from the left side of the fish, approximately two rows above the lateral line in the area crossed by a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963, DuBois and Molyneaux 2001). After escapement sampling was complete, fish were released on the upriver side of the weir. Scales were arranged on gum cards in the field and sent to the Bethel office for processing. Impressions from the gum cards were made on cellulose acetate cards with a heated hydraulic press (Clutter and Whitesel 1956). Ages of the salmon were determined by examining the scale impressions (Mosher 1968), and ages were recorded in European notation (Koo 1962).

Aerial Surveys

An aerial survey for chinook, sockeye, and chum salmon was flown on August 4. The survey was flown in a Cessna 185 at an altitude of 500 ft. Conditions were classified as fair. An aerial survey was not flown for coho salmon because of poor weather conditions.

Weir Maintenance, Cleaning, and Mortality counts

The weir was cleared of debris and fish carcasses daily. At each cleaning, fish carcasses were enumerated and identified by species. The weir was checked regularly for damage and repairs were made as necessary.

Atmospheric and Hydrological Observations

From August 10 through October 14, water level (standardized to an established benchmark height), precipitation, air and water temperatures, percent cloud cover, and cloud ceiling height were recorded twice daily at the weir site.

RESULTS

Resistance Board Floating Weir

High water level in June and July prevented crews from installing the weir until August 9. Once installed, the weir was subjected to two high water events (September 6 and October 5) that warranted concern for the stability of the weir. During both events the weir remained intact and showed no obvious signs of weakening or becoming dislodged. While the weir was in place, there were no signs of enhanced bank erosion or scouring behind the substrate rail. There was some scouring of the substrate directly behind the rail near the north shore prior to weir installation. After installation, sandbags were placed along the upstream side of the rail, and no further scouring was observed. A high water event rendered the weir inoperable for one day (September 6) as approximately 1/3 of the weir became submerged. Portions of the weir remaining submerged until September 11. As a note, water levels on the Kanektok River observed in 2001 elevated rapidly following a precipitation event, and subsequently were slow to recede (Figure of Hydrograph).

Salmon Fisheries

The 2001 commercial salmon harvest was 12,775 chinook, 33,807 sockeye, 18,531 coho, and 17,209 chum salmon, for a total of 82,322 fish (Table 1). Harvests were below their most recent 10-year averages for all species. The total harvest was the lowest since 1977, 45 % less than the 2000 harvest of 150,871, and 60 % below the most recent 10-year average of 206,943 fish (Table 1). The 2001 exvessel value was \$255,789 (Table 3), 52 % below the 2000 exvessel value of \$466,167 and 64 % below the most recent 10-year average of \$624,428.

There were 20 fishing periods in 2001, 26 % below the 27 periods in 2000 and 34 % below the most recent 10-year average of 30. The 231 hours of fishing hours in 2001 was 29 % below the 324 hours in 2000, and 36 % below the most recent 10-year average of 360. The number of permits (159) that fished the district in 2001 was 31% below the 230 permits that fished in 2000, and 46 % below the most recent 10-year average of 277 (Table 2).

The estimated 2001 subsistence harvest was 2,923 chinook, 914 sockeye, 747 chum, and 1,525 coho salmon (Table 4). Harvests for all species were below both their most recent 10-year and historic averages. No sport fish harvest information for 2001 was available at the time of this writing.

Escapement

Total fish passage at the weir from August 9 until October 3 was 132 chinook, 739 sockeye, 1,056 chum, and 35,650 coho salmon (Table 5, Appendix A), 2,556 Dolly Varden (Appendix A), 18 white fish, and 60 rainbow trout. High water level rendered the weir inoperable on September 6. Passage counts were not made on this day and interpolation was used to estimate coho salmon passage, resulting in 1% of the coho salmon escapement being estimated. Estimates were not made for the other fish species. From September 7 through September 12, small sections of the weir remained submerged, resulting in partial counts for these days. However, estimates were not made on these days because crewmembers did not observe any fish passing the weir at the breached areas, nor did daily passage counts appear unusually low. Run timing information was obtained for coho salmon (Fig. 3).

Age, Sex, and Length

Escapement, Kanektok River Weir

Coho : A total of 432 coho salmon were examined. Of these, 50.1 % were males and 86.1 % were age-2.1 fish (Table 7). The mean lengths for age 2.1 males and females were 586 mm and 597 mm, respectively (Table 8).

Commercial, District W-4

Chinook: A total of 570 were examined. Of these, 60.5 % were male, and 75.3 % were age-1.4 fish (Table 9). The mean lengths for age 1.4 males and females were 825 mm and 853 mm, respectively (Table 10).

Sockeye Salmon: A total of 713 sockeye salmon were examined. Of these, 56 % were male and 89.8 % were age-1.3 fish (Table 11). The mean lengths for age-1.3 males and females were 585 and 551 mm, respectively (Table 12).

Chum Salmon: A total of 576 chum salmon were examined. Of these, 59 % were female, with 49.9% being age-0.3 and 49.5% being age-0.4 (Table 13). The mean lengths for age-0.3 males and females were 579 mm and 554 mm, respectively, and mean lengths for age-0.4 males and females were 600 and 579 mm, respectively (Table 14).

Coho Salmon: A total of 415 coho salmon were examined. Of these, 60.7 % were male, and 85.2 % were age-2.1 fish (Table 15). The mean lengths for age-2.1 males and females were 594 and 599 mm, respectively (Table 16).

Aerial Survey

During an aerial survey on August 4, an estimated 6,483 chinook, 38,610 sockeye, and 11,440 chum salmon were observed (Table 6). No aerial survey of coho salmon was done.

Carcass Counts

Carcass counts at the weir were 654 chinook, 1,665 sockeye, 1,968 chums, 425 coho, and 19 pink salmon, 4 dolly varden, and 3 rainbow trout.

Atmospheric and Hydrological Observations

A complete listing of daily observations can be found in Table 17. Daily water level (Fig 4) and precipitation (Fig. 5) were charted.

DISCUSSION/RECOMENDATIONS

In 2001, the project objective of installing and operating a resistance board, floating weir on the Kanektok River was met. The resistance board, floating weir demonstrated its ability to withstand the high water discharge of the Kanektok River. Operation of the weir allowed for the

nearly complete enumeration of coho salmon and Dolly Varden migration past the weir site. The weir also provided a platform for the collection of coho salmon escapement ASL information, and daily meteorological and hydrological information. The delay in weir installation did preclude meeting the project objectives of enumerating and collecting ASL information from chinook, sockeye, and chum salmon.

Installation of the weir was delayed because high water discharge in July prevented crews from working in river to maneuver panels into place and setting them on the rail. Generally, 2,500 cfs is the maximum discharge allowed to install a weir (Rob Stewart personal communication). In 2001, water discharge near the weir site did not fall below this level until early August (Appendix C.1). Anecdotal information from area residents suggest water discharge in June and July of 2001 was unseasonally high. Water discharge information from 2000 and 2001 (collected at a FWS gauging station located approx. 1 mi below the weir site, appendices C.1 and C.2; Peck unpublished data) suggests water discharge may typically be above 2,500 cfs in June and July because of increased runoff from snow melt. The project currently schedules weir installation during this time frame, which may be unrealistic. Available information suggests water discharge is optimal (below 2,500 cfs) for installation in late-April to early-May (Appendices C.1 and C.2). As a note, installation was attempted in early May of 2002, however river ice prevented crews from reaching the weir site until May 5. By that time, record-breaking precipitation in the area resulted in unseasonally high river discharge, preventing installation. In 2003, the Department will seek permission from the Togiak National Wildlife Refuge to use helicopters to transport crew and equipment to the weir site.

The below average harvest in District W-4 in 2001 was likely the result of a combination of reduced fishing time and the reduction in the number of permits that fished the district. The District W-4 opening was delayed a week as the single registered buyer in the district was not prepared to buy fish until June 21 (by regulation the district is to open before June 15). In-season, limited processing capacity restricted the fishing schedule to two periods a week (opposed to the normal 3-period a week schedule) for the entire sockeye salmon directed fishery and much of the coho salmon directed fishery. The district only fished a 3-period a week schedule during the last two weeks in August. The single buyer in the district ceased operations from July 24 through August 1, and again for the season on August 24. The 159 permits that fished the district in 2001 were well below the 230 that fished in 2000, and the lowest since 1975. The number of permits fishing the district has declined steadily since 1993, the year a record 409 permits fished the district. The observed decrease in permits fished is likely the result of poor salmon markets since 1995, other economic opportunity in the area, and the recent increase in fuel prices. The decline in permits fished has resulted in below average commercial salmon harvests over the last 5 years. Collectively, these factors have contributed to the decline in the value of the commercial salmon fishery in the district since 1995.

Operation of the weir did allow the collection of the first complete year of information of coho salmon abundance in the Kanektok River. Operations also provided the first opportunity to gain information on the Dolly Varden migration in the Kanektok River. However, aerial survey remains the only means of assessing chinook, sockeye, and chum salmon escapement in the Kanektok River. Chinook and sockeye salmon met their respective aerial survey escapement objectives in 2001, but chum salmon failed to meet theirs. Chum salmon have only met their escapement objective once (1985) since 1981.

The ability to fly aerial surveys of chinook, sockeye, and chum salmon has been consistent since 1981, but surveys of coho salmon have historically been unreliable because of poor weather. Another limitation to aerial survey is that they observe only a percentage of the fish present and do not reflect actual spawner abundance (they can, however, indicate trends in spawner abundances). Also, the accuracy of aerial survey information is limited because they are influenced by observer experience, lack of repeatability between multiple observers, and by survey conditions (i.e. turbid water, overcast skies). Finally, aerial surveys are typically flown once a year when most fish are on the spawning grounds, thus they provide little inseason management information.

Clearly, the continued operation of the weir is necessary to provide a more precise assessment of salmon escapement in the Kanektok River. Escapement information can aid managers in assessing the impact of the District W-4 commercial fishery on salmon stocks in the Kanektok River. The long-term operation of the weir would build a run timing and escapement database for salmon in the Kanektok River, in turn providing an inseason management tool for salmon resource. Also, long-term monitoring of salmon escapement should lead to the establishment of Biological Escapement Goals (BEG) for salmon in the Kanektok River.

Continued funding of this project will help elucidate the status of Dolly Varden populations in the Kanektok River. The Dolly Varden run in the Kanektok River may consist of a mixture of mature fish returning to spawn and immature or non-spawning fish that may have traveled great distances to feed and overwinter in freshwater. The Kanektok River weir can aid biologists in determining Dolly Varden run timing and in estimating total abundance. FWS biologists can use the weir to capture and radio tag Dolly Varden and to collect other biological data. Through continued cooperative effort it will become possible to estimate the spawning run abundance of Dolly Varden in the Kanektok River. The Kanektok weir, coupled with the Middle Fork Goodnews River weir is the only project that provides an abundance estimate and biological sampling of Dolly Varden throughout the run in southwest Alaska.

Chinook and sockeye salmon ASL determination from the 2001 District W-4 commercial harvest showed a below average composition of age-1.2 (four year olds) and age 1.3 (five year old) fish which could be an indication of poor abundance of 5 and 6 year old fish in 2002. Most chinook salmon harvested in District W-4 commercial harvest are comprised of 3, 4, and 5 year old fish. The commercial salmon season in District W-4 did open late (typically opens prior to June 15), and the 2001 results may be biased toward older fish. Regardless, the Department will be taking a conservative management approach toward the 2002 chinook and sockeye directed commercial fisheries.

As a note, when this project was initiated in 1997, the weir location was 20 mi upriver from the District W-4 commercial fishery. However, instability of the original site necessitated the relocation of the weir to a new site located approximately 40 mi upriver from the District W-4 commercial fishery. Presumably, a significant proportion of salmon spawn below the current site, potentially resulting in an incomplete assessment of salmon escapement in the Kanektok River. The Department is currently drawing up a proposal for a tagging study to examine this question.

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Table 1. Historic commercial salmon harvest, District W-4, 1960- 2001.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,551	160	53,334	142,861
1982	22,106	25,685	73,652	11,838	34,346	167,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,663	17,255	132,151	16,249	50,422	249,740
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988	13,883	21,556	68,605	21,310	29,220	154,574
1989	20,820	20,582	44,607	273	39,395	125,677
1990	27,644	83,681	26,926	12,056	47,717	198,024
1991	9,480	53,657	42,571	115	54,493	160,316
1992	17,197	60,929	86,404	64,217	73,383	302,130
1993	15,784	80,934	55,817	7	40,943	193,485

Continued

Table 1 (page 2 of 2)

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1994	8,564	72,314	83,912	35,904	61,301	261,995
1995	38,584	68,194	66,203	186	81,462	254,629
1996	14,165	57,665	118,718	20	83,005	273,573
1997	35,510	69,562	32,862	5	38,445	176,384
1998	23,158	41,382	80,183	2,217	45,095	192,035
1999	18,426	41,315	6,184	0	38,091	104,016
2000	21,229	68,557	30,529	3	30,553	150,871
2001	12,775	33,807	18,531	0	17,209	82,322
10-Year Avg.	20,210	61,451	60,338	20,472 ^a	54,677	206,943
Historic Avg	15,923	24,037	34,643	10,196	33,884	118,683

^a Average of even years only

Table 2. Historic number of permits fished and fishing time,
District W-4, 1970-2001.

Year	# of Periods	# of Fishing Hours	# of Permits Fished
1970	14	1,494	88
1971	6	630	61
1972	16	192	107
1973	28	504	109
1974	30	360	196
1975	24	288	127
1976	27	324	181
1977	27	324	258
1978	37	444	200
1979	36	432	206
1980	36	432	169
1981	33	396	186
1982	34	408	177
1983	28	318	226
1984	33	396	263
1985	23	276	300
1986	29	348	324
1987	19	216	310
1988	32	384	288
1989	29	348	227
1990	30	444	390
1991	31	372	346
1992	34	420	349
1993	32	384	409
1994	32	384	308
1995	35	414	382
1996	27	298	218
1997	31	372	289
1998	34	408	203
1999	19	228	218
2000	27	324	230
2001	20	231	159
10-year avg.	30	360	277
Historic avg.	28	405	237

Table 3. Exvessel value of the District W-4 commercial harvest, 1990-2001

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	251,304	544,008	123,815	4,179	90,941	1,014,238
1991	95,800	247,117	144,455	36	107,228	594,636
1992	165,310	368,598	303,371	15,086	137,356	989,721
1993	142,918	402,910	245,982	4	104,347	896,161
1994	66,918	256,091	423,612	10,237	84,351	841,209
1995	417,029	322,113	202,834	83	106,041	1,048,099
1996	61,296	165,318	245,662	6	61,323	533,604
1997	168,933	206,562	92,396	1	30,769	498,661
1998	81,566	150,261	198,041	850	35,254	465,972
1999	93,886	141,492	14,800	0	28,116	278,894
2000	131,001	249,473	61,763	1	23,929	466,167
2001	92,423	11,832	88,957	0	32,577	225,789
10-year avg	142,466	250,994	193,292	2,630	71,871	624,428

Table 4. Historic subsistence harvest, Quinhagak Area, 1967-2001

Year	Chinook	Sockeye	Chum	Coho
1967	1,349			
1968	2,756			
1969				
1970				
1971				
1972				
1973				
1974				
1975				
1976				
1977	2,012			
1978	2,328			
1979	1,420			
1980	1,940			
1981	2,562			
1982	2,402			
1983	2,542			
1984	3,109			
1985	2,341	106	901	67
1986	2,682	423	808	41
1987	3,663	1,067	1,084	125
1988	3,690	1,261	1,065	4,317
1989	3,542	633	1,568	3,787
1990	6,013	1,951	3,234	4,174
1991	3,693	1,772	1,593	3,232
1992	3,447	1,264	1,833	2,958
1993	3,368	1,082	1,008	2,152
1994	3,995	1,000	1,452	2,739
1995	2,746	573	686	2,561
1996	3,075	400	930	1,467
1997	3,433	556	600	1,264
1998	4,041	1,490	1,448	1,702
1999	3,167	1,639	1,810	2,021
2000	3,106	1,341	912	1,088
2001	2,923	914	747	1,525
10-year avg.	3,407	1,112	1,227	2,118
Historic avg.	3,016	1,035	1,308	2,106

Table 5. Historic escapement, Kanektok River escapement project, 1996-2001

Year	Dates of Operation	Chinook	Sockeye	Chum	Coho	Pink ^a
1996	July 2-13; 20-25	6,827 ^b	71,637 ^b	70,617 ^b	b	b
1997	June 11- Aug. 21	16,731	96,348	51,180	23,172 ^b	7,872 ^b
1998	July 23- Aug.17	b	b	b	b	b
1999		Not operational				
2000		Not operational				
2001 ^c	Aug. 10-Oct 3	132 ^b	739 ^b	1,056 ^b	35,650	19 ^b

^a Pink salmon can pass freely through the Kanektok River weir.

^b No counts or incomplete counts as project was not operated during significant portion of species migration.

^c Project was operated as a resistance board, floating weir.

Table 6. Historical aerial surveys estimates, Kanektok River, 1962-2000a.

Year	SPECIES			
	Chinook	Sockeye	Coho	Chum
1962	935	43,108		
1963				
1964				
1965				
1966	3,718			28,800
1967				
1968	4,170	8,000		14,000
1969				
1970	3,112	11,375		
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		22,936		8,697
1977	5,787	7,244		32,157
1978 b	19,180	44,215		229,290
1979				
1980				
1981 c	6,172	113,931	69,325	25,950
1982 d	15,900	49,175		71,840
1983	8,142	55,940		
1984 e	8,890	2,340		9,360
1985	12,182	30,840	46,830	53,060
1986	13,465	16,270		14,385
1987	3,643	14,940		16,790
1988	4,223	51,753	20,056	9,420
1989	11,180	30,440		20,583
1990	7,914	14,735		6,270
1991 d	2,563	32,082		2,475
1992 f	2,100	44,436	4,330	19,052
1993	3,856	14,955		25,675
1994	4,670	23,128		1,285
1995	7,386	30,090		10,000
1996				
1997 h				
1998	6,107	22,020	23,656	7,040

continued

Table 6 (page 2 of 2)

Year	SPECIES			
	Chinook	Sockeye	Coho	Chum
1999 i	8,080	27,100	5,192	3,270
2000	1,118	11,670	10,120	10,000
2001	6,483	38,610		11,440
OBJECTIVE:	5,800	15,000	25,000	30,500

- a Aerial surveys are those rated fair or good surveys obtained between 20 July and 5 August for chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon. Some surveys which do not meet these criteria may be referenced in this table; text are footnoted.
- b Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.
- c Poor survey for chinook, sockeye, chum salmon.
- d Late survey for chinook, sockeye salmon (after 5 August).
- e Poor coho survey.
- f Some chum may have been sockeye.
- g Chum count not at peak, estimate made during chinook survey.
- h Chinook, chum and sockeye numbers from 2 August. Chum not at peak. Coho survey on October 1, not at peak.
- i Survey occurred before peak for chinook, sockeye and chum salmon (July 14).

Table 7. Age and sex of coho salmon at the Kanektok River weir based on escapement sampling, 2001.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class							
			1.1		2.1		3.1		Total	
			Esc. %		Esc. %		Esc. %		Esc. %	
8/15 - 16 (8/10 - 8/21)	139	M	391	3.6	4,848	44.6	547	5.0	5,786	53.2
		F	156	1.4	4,222	38.9	704	6.5	5,082	46.8
		Subtotal	547	5.0	9,070	83.5	1,251	11.5	10,868	100.0
8/27 - 28 (8/22 - 9/4)	145	M	661	4.1	7,276	45.5	331	2.1	8,268	51.7
		F	221	1.4	6,724	42.1	771	4.8	7,716	48.3
		Subtotal	882	5.5	14,000	87.6	1,102	6.9	15,984	100.0
9/11/2013 (9/5 - 10/3)	148	M	297	3.4	3,151	35.8	357	4.0	3,805	43.2
		F	238	2.7	4,458	50.7	297	3.4	4,993	56.8
		Subtotal	535	6.1	7,609	86.5	654	7.4	8,798	100.0
Season	432	M	1,349	3.8	15,274	42.9	1,235	3.4	17,858	50.1
		F	615	1.7	15,405	43.2	1,772	5.0	17,792	49.9
		Total	1,964	5.5	30,679	86.1	3,007	8.4	35,650	100.0

Table 8. Mean length (mm) of coho salmon at the Kanektok River weir based on escapement sampling, 2001.

Sample Dates (Stratum Dates)	Sex		Age Class		
			1.1	2.1	3.1
8/15 - 16 (8/10 - 21)	M	Mean Length	520	558	531
		Std. Error	23	6	30
		Range	465- 590	395- 635	440- 610
		Sample Size	5	62	7
	F	Mean Length	508	584	587
		Std. Error	78	4	7
		Range	430- 585	475- 630	545- 620
		Sample Size	2	54	9
8/27 - 28 (8/22 - 9/4)	M	Mean Length	530	590	565
		Std. Error	11	7	41
		Range	499- 570	470- 675	507- 645
		Sample Size	6	66	3
	F	Mean Length	605	598	606
		Std. Error	15	4	10
		Range	590- 620	518- 640	575- 649
		Sample Size	2	61	7
9/11 - 13 (9/5 - 10/3)	M	Mean Length	603	620	655
		Std. Error	21	4	5
		Range	559- 657	540- 678	635- 665
		Sample Size	5	53	6
	F	Mean Length	563	607	609
		Std. Error	11	3	6
		Range	539- 586	534- 670	594- 631
		Sample Size	4	75	5
Season	M	Mean Length	543	586	576
		Range	465- 657	395- 678	440- 665
		Sample Size	16	181	16
	F	Mean Length	564	597	599
		Range	430- 620	475- 670	545- 649
		Sample Size	8	190	21

Table 9. Age and sex of chinook salmon from the District W-4 commercial harvest based on harvest sampling, 2001.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class											
			1.1		1.2		1.3		1.4		1.5		Total	
			Catch	%	Catch	%	Catch	%	Catch	%	Catch	%	Catch	%
6/21 (6/21)	191	M	21	0.5	169	4.2	653	16.2	1,622	40.3	0	0.0	2,465	61.3
		F	21	0.5	0	0.0	148	3.7	1,391	34.6	0	0.0	1,559	38.7
		Subtotal	42	1.0	169	4.2	801	19.9	3,013	74.9	0	0.0	4,024	100.0
6/28 (6/25, 28)	198	M	0	0.0	682	12.1	597	10.6	2,160	38.4	28	0.5	3,467	61.6
		F	0	0.0	0	0.0	85	1.5	2,018	35.8	57	1.0	2,160	38.4
		Subtotal	0	0.0	682	12.1	682	12.1	4,178	74.2	85	1.5	5,627	100.0
7/5 (7/2-8/24)	181	M	0	0.0	380	12.2	225	7.2	1,139	36.5	52	1.7	1,795	57.5
		F	0	0.0	0	0.0	17	0.5	1,295	41.4	17	0.5	1,329	42.5
		Subtotal	0	0.0	380	12.2	242	7.7	2,434	77.9	69	2.2	3,124	100.0
Season	570	M	21	0.2	1,230	9.6	1,474	11.5	4,921	38.5	80	0.6	7,727	60.5
		F	21	0.1	0	0.0	250	2.0	4,703	36.8	74	0.6	5,048	39.5
		Total	42	0.3	1,230	9.6	1,724	13.5	9,624	75.3	154	1.2	12,775	100.0

Table 10. Mean length (mm) of chinook salmon from the District W-4 commercial harvest based on harvest sampling, 2001

Sample Dates (Stratum Dates)	Sex		Age class				
			1.1	1.2	1.3	1.4	1.5
6/15 (6/15)	M	Mean Length	420	570	695	816	
		Std. Error	-	40	12	12	
		Range	420- 420	483- 834	591- 910	375-1015	
		Sample Size	1	8	31	77	0
	F	Mean Length	832		822	839	
		Std. Error	-		15	6	
		Range	832- 832		766- 890	743- 950	
		Sample Size	1	0	7	66	0
6/21 (6/25, 28)	M	Mean Length		518	690	823	954
		Std. Error		10	17	11	-
		Range		450- 635	552- 848	585-1014	954- 954
		Sample Size	0	24	21	76	1
	F	Mean Length			804	861	847
		Std. Error			18	5	52
		Range			782- 840	761- 966	795- 898
		Sample Size	0	0	3	71	2
7/5 (7/2-8/24)	M	Mean Length		524	688	844	805
		Std. Error		12	13	10	55
		Range		420- 625	641- 801	597-1002	749- 915
		Sample Size	0	22	13	66	3
	F	Mean Length			799	857	856
		Std. Error			-	6	-
		Range			799- 799	726- 985	856- 856
		Sample Size	0	0	1	75	1
Season	M	Mean Length	420	527	692	825	858
		Range	420- 420	420- 834	552- 910	375-1015	749- 954
		Sample Size	1	54	65	219	4
	F	Mean Length	832		814	853	849
		Range	832- 832		766- 890	726- 985	795- 898
		Sample Size	1	0	11	212	3

Table 11. Age and sex of sockeye salmon from the District W-4 commercial harvest based on harvested sampling, 2001

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class															
			0.3		1.2		0.4		1.3		2.2		1.4		2.4		Total	
			Catch	%	Catch	%	Catch	%	Catch	%	Catch	%	Catch	%	Catch	%	Catch	%
6/28 (6/21, 25, 28)	171	M	0	0.0	0	0.0	0	0.0	4,713	48.0	0	0.0	58	0.6	345	3.5	5,116	52.0
		F	172	1.8	0	0.0	0	0.0	4,081	41.5	0	0.0	172	1.7	287	2.9	4,713	48.0
		Subtotal	172	1.8	0	0.0	0	0.0	8,794	89.5	0	0.0	230	2.3	632	6.4	9,829	100.0
7/5 (7/2, 5)	181	M	0	0.0	237	1.7	0	0.0	7,423	51.9	0	0.0	79	0.6	395	2.8	8,134	56.9
		F	158	1.1	79	0.5	0	0.0	5,686	39.8	0	0.0	158	1.1	79	0.5	6,160	43.1
		Subtotal	158	1.1	316	2.2	0	0.0	13,109	91.7	0	0.0	237	1.7	474	3.3	14,294	100.0
7/12 (7/9, 12, 16)	185	M	0	0.0	212	2.7	0	0.0	4,230	54.0	0	0.0	127	1.6	85	1.1	4,653	59.5
		F	0	0.0	211	2.7	0	0.0	2,792	35.7	0	0.0	0	0.0	169	2.1	3,173	40.5
		Subtotal	0	0.0	423	5.4	0	0.0	7,022	89.7	0	0.0	127	1.6	254	3.2	7,826	100.0
7/23 (7/18,23,8/1,3,6,10,13, 15,18,20,22,24)	176	M	11	0.6	53	2.8	0	0.0	845	45.5	11	0.5	21	1.1	95	5.1	1,035	55.7
		F	0	0.0	105	5.7	11	0.6	591	31.8	42	2.3	11	0.6	63	3.4	823	44.3
		Subtotal	11	0.6	158	8.5	11	0.6	1,436	77.3	53	2.8	32	1.7	158	8.5	1,858	100.0
Season	713	M	11	0.0	501	1.5	0	0.0	17,212	50.9	11	0.1	284	0.8	919	2.7	18,938	56.0
		F	330	1.0	396	1.2	11	0.0	13,150	38.9	42	0.1	341	1.0	599	1.8	14,869	44.0
		Total	341	1.0	897	2.7	11	0.0	30,362	89.8	53	0.2	625	1.8	1,518	4.5	33,807	100.0

Table 12. Mean length (mm) of sockeye salmon from the District W-4 commercial harvest based on harvest sampling, 2001

Sample Dates (Stratum Dates)	Sex	Age Class							
		0.3	1.2	0.4	1.3	2.2	1.4	2.3	
6/28 (6/21, 25, 28)	M	Mean Length				595		610	607
		Std. Error				3		-	6
		Range				461- 642		610- 610	586- 631
		Sample Size	0	0	0	82	0	1	6
	F	Mean Length	571			557		583	560
		Std. Error	9			2		9	9
		Range	554- 584			501- 593		570- 601	529- 575
		Sample Size	3	0	0	71	0	3	5
7/5 (7/2, 5)	M	Mean Length		538		582		610	583
		Std. Error		19		3		-	8
		Range		512- 575		497- 638		610- 610	562- 613
		Sample Size	0	3	0	94	0	1	5
	F	Mean Length	557	549		551		611	559
		Std. Error	16	-		3		50	-
		Range	541- 572	549- 549		467- 601		561- 661	559- 559
		Sample Size	2	1	0	72	0	2	1
7/12 (7/9, 12, 16)	M	Mean Length		516		577		568	550
		Std. Error		17		3		27	14
		Range		491- 582		500- 640		539- 623	536- 564
		Sample Size	0	5	0	100	0	3	2
	F	Mean Length		492		544			536
		Std. Error		9		3			5
		Range		473- 517		496- 591			527- 550
		Sample Size	0	5	0	66	0	0	4
7/23 (7/18,23,8/1,3, 6,10,13,15,18, 20,22,24)	M	Mean Length	620	499		586	558	626	563
		Std. Error	-	35		4	-	15	15
		Range	620- 620	363- 560		496- 694	558- 558	611- 641	473- 613
		Sample Size	1	5	0	80	1	2	9
	F	Mean Length		505	534	543	506	566	550
		Std. Error		5	-	5	8	-	7
		Range		468- 519	534- 534	432- 609	491- 520	566- 566	519- 568
		Sample Size	0	10	1	56	4	1	6
Season	M	Mean Length	620	524		585	558	593	587
		Range	620- 620	363- 582		461- 694	558- 558	539- 641	473- 631
		Sample Size	1	13	0	356	1	7	22
	F	Mean Length	564	507	534	551	506	596	552
		Range	541- 584	468- 549	534- 534	432- 609	491- 520	561- 661	519- 575
		Sample Size	5	16	1	265	4	6	16

Table 13. Age and sex of chum salmon from the District W-4 commercial harvest based on harvest sampling, 2001.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age class									
			0.2		0.3		0.4		0.5		Total	
			Catch	%	Catch	%	Catch	%	Catch	%	Catch	%
7/5 ^d (6/21, 25, 28, 7/2, 5)	185	M	0	0.0	1,687	19.4	1,828	21.1	0	0.0	3,515	40.5
		F	47	0.5	1,922	22.2	3,187	36.7	0	0.0	5,155	59.5
		Subtotal	47	0.5	3,609	41.6	5,015	57.8	0	0.0	8,670	100.0
7/12 ^d (7/9, 12, 16)	195	M	0	0.0	1,412	25.1	1,153	20.5	0	0.0	2,565	45.6
		F	0	0.0	1,730	30.8	1,297	23.1	29	0.5	3,056	54.4
		Subtotal	0	0.0	3,142	55.9	2,450	43.6	29	0.5	5,621	100.0
7/23 ^d (7/18, 23, 8/1, 3, 6, 10, 13, 15, 18, 20, 22, 24)	196	M	0	0.0	625	21.5	357	12.2	0	0.0	983	33.7
		F	30	1.0	1,206	41.3	700	24.0	0	0.0	1,935	66.3
		Subtotal	30	1.0	1,831	62.8	1,057	36.2	0	0.0	2,918	100.0
Season	576	M	0	0.0	3,725	21.7	3,338	19.4	0	0.0	7,063	41.0
		F	77	0.4	4,857	28.2	5,184	30.1	29	0.2	10,146	59.0
		Total	77	0.4	8,582	49.9	8,522	49.5	29	0.2	17,209	100.0

Table 14. Mean length (mm) of chum salmon from the District W-4 commercial fishery based on harvest sampling, 2001

Sample Dates (Stratum Dates)	Sex	Age Class				
		0.2	0.3	0.4	0.5	
7/5 (6/21, 25, 28, 7/2, 5)	M	Mean Length		579	599	
		Std. Error		4	6	
		Range		529- 622	521- 678	
		Sample Size	0	36	39	0
	F	Mean Length	521	551	580	
		Std. Error	-	4	3	
		Range	521- 521	509- 589	522- 636	
		Sample Size	1	41	68	0
7/12 (7/9, 12, 16)	M	Mean Length		579	600	
		Std. Error		4	6	
		Range		523- 648	535- 674	
		Sample Size	0	49	40	0
	F	Mean Length		554	575	554
		Std. Error		2	4	-
		Range		511- 591	531- 629	554- 554
		Sample Size	0	60	45	1
7/23 (7/18, 23, 8/1, 3, 6, 10, 13, 15, 18, 20, 22, 24)	M	Mean Length		576	607	
		Std. Error		4	8	
		Range		521- 634	532- 672	
		Sample Size	0	42	24	0
	F	Mean Length	528	557	582	
		Std. Error	2	3	4	
		Range	526- 530	506- 610	532- 691	
		Sample Size	2	81	47	0
Season	M	Mean Length		579	600	
		Range		521- 648	521- 678	
		Sample Size	0	127	103	0
	F	Mean Length	524	554	579	554
		Range	521- 530	506- 610	522- 691	554- 554
		Sample Size	3	182	160	1

Table 15. Age and sex of coho salmon from the District W-4 commercial harvest based on harvest sampling, 2001

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class							
			1.1		2.1		3.1		Total	
			Catch	%	Catch	%	Catch	%	Catch	%
8/10 (7/23, 8/1,3,6,10,13)	145	M	720	7.6	5,234	55.2	523	5.5	6,477	68.3
		F	523	5.5	2,421	25.5	66	0.7	3,010	31.7
		Subtotal	1,243	13.1	7,655	80.7	589	6.2	9,487	100.0
8/18 (8/15, 18, 20)	139	M	55	0.7	3,746	48.9	331	4.3	4,131	54.0
		F	55	0.7	3,195	41.7	275	3.6	3,526	46.0
		Subtotal	110	1.4	6,941	90.6	606	7.9	7,657	100.0
8/24 (8/22, 24)	131	M	32	2.3	561	40.5	42	3.0	635	45.8
		F	63	4.6	625	45.0	64	4.6	752	54.2
		Subtotal	95	6.9	1,186	85.5	106	7.6	1,387	100.0
Season	415	M	807	4.3	9,541	51.5	896	4.8	11,244	60.7
		F	642	3.5	6,241	33.7	405	2.2	7,287	39.3
		Total	1,449	7.8	15,782	85.2	1,301	7.0	18,531	100.0

Table 16. Mean length (mm) of coho salmon from the District W-4 commercial harvest based on harvest sampling, 2001.

Sample Dates (Stratum Dates)	Sex	Age Class			
		1.1	2.1	3.1	
8/10 (7/23-8/1, 3, 6, 10, 13)	M	Mean Length	576	587	596
		Std. Error	13	5	19
		Range	523- 692	410- 655	483- 643
		Sample Size	11	80	8
	F	Mean Length	595	592	608
		Std. Error	6	4	-
		Range	570- 620	519- 642	608- 608
		Sample Size	8	37	1
8/18 (8/15, 18, 20)	M	Mean Length	625	601	580
		Std. Error	-	5	22
		Range	625- 625	477- 679	509- 654
		Sample Size	1	68	6
	F	Mean Length	604	604	614
		Std. Error	-	4	10
		Range	604- 604	529- 650	584- 639
		Sample Size	1	58	5
8/24 (8/22, 24)	M	Mean Length	602	601	567
		Std. Error	13	6	18
		Range	581- 625	473- 678	543- 620
		Sample Size	3	53	4
	F	Mean Length	601	600	614
		Std. Error	7	4	12
		Range	578- 622	534- 664	562- 640
		Sample Size	6	59	6
Season	M	Mean Length	581	594	589
		Std. Error	13	3	14
		Range	523- 692	410- 679	483- 654
		Sample Size	15	201	18
	F	Mean Length	596	599	613
		Std. Error	6	2	8
		Range	570- 622	519- 664	562- 640
		Sample Size	15	154	12

Table 17. Kanektok River meteorological and hydrological observations, 2001.

Date	Obsevation		Precip. ^b	wind (kts)	Temp. (C)		Water Level (cm) ^c	Estimated Ceiling (ft)	Precip. (mm)
	time	Sky ^a			Air	Water			
8/10	am	3	0	SW 3	10	10.5	55	3000	
	pm	1700	4	0	SW 7	15	11.0	54	700-800
8/11	am	4	A	W 10	12	10.0	54	800	
	pm	1700	4	A	NW 7	14	11.0	54	800
8/12	am	4	A	W 5	12	10.0	54	600	
	pm	1700	4	0	W 5	17	11.5	53	1000
8/13	am	3	0	E 5	14	10.5	52	2500	
	pm	1700	4	B	E 10	14	11.0	52	700-800
8/14	am	3	0	E2	10	10.5	55	700-1200	
	pm	1700	4	B	E 7	15	11.5	54	500
8/15	am	4	0	E 10	16	11.0	55	900	
	pm	1700	4	A	SW 3	15	11.5	57	500
8/16	am	5	0	0	13	10.5	60	400	
	pm	1700	4	0	W 6	18	12.5	58	900
8/17	am	4	A	0	14	11.0	56	fog	
	pm	1700	4	A	W 7	13	11.0	55	700
8/18	am	4	A	W 3-5	12	10.0	56	700	
	pm	1700	3	0	W 8-10	14	11.0	56	1000
8/19	am	4	A	E 10	13	10.5	57	1000	
	pm	1700	4	A	E 3-5	14	11.5	59	2000-2500
8/20	am	4	B	W 30-40	13	10.0	70	700	
	pm	1700	4	0	NW 15-20	10	9.5	81	800
8/21	am	3	0	NW 5	7	9.0	82	900	
	pm	1700	3	0	W 8-10	15	11.0	78	3000
8/22	am	3	0	NE 3-5	7	9.5	75	5000	
	pm	1700	4	A	E 10	11	9.5	74	900
8/23	am	3	0	0	9	9.0	74	1000	
	pm	1700	3	A	SW 5	11	13.5	72	800-1100
8/24	am	5	0	0	12	10.0	70	fog	
	pm	1700	4	0	W 5	17	10.5	70	900
8/25	am	3	A	E 5	13	9.5	69	800-1000	
	pm	1700	4	A	SE 5-8	15	11.0	69	2500
8/26	am	3	0	0	15	9.5	68	2500	
	pm	1700	2	0	E 5-8	20	11.5	68	2500
8/27	am	3	A	E 0-5	19	9.5	69	2500	
	pm	1700	3	0	W 3	20	11.5	68	3000
8/28	am	3	0	0	16	9.5	66	2500	
	pm	1700	3	A	W 3-5	18	11.0	65	2500
8/29	am	4	A	E 7	11	9.5	70	700-800	
	pm	1700	4	A	E 5	13	10.0	76	800-1000

continued

Table 17 continued (page 2 of 4)

obsevation		Sky ^a	Precip. ^b	Wind (knts)	Temp. (C)		Water Level (cm) ^c	Estimated Ceiling (ft)	Precip. (mm)
Date	time				Air	Water			
8/30	am	3	0	0	15	9.0	78	2000-2500	
	pm	1700	4	A	SW 2-3	13	10.0	74	1900
8/31	am	4	A	0		11	9.0	76	1200
	pm	1700	4	A	W 8-10	13	10.0	75	1000
9/1	am	4	A	0		11	9.0	76	900
	pm	1700	4	0	W 10-15	11	9.0	75	800-900
9/2	am	4	A	W 5-8		8	8.0	75	fog
	pm	1700	4	A	W 10-15	10	9.0	75	1000
9/3	am	4	0	0		6	8.0	73	2300
	pm	1700	4	A	E 15-20	8	8.0	73	1500
9/4	am	3	A	E 15-20		9	8.0	75	2000
	pm	1700	4	A	W 5-8	10	9.0	74	800
9/5	am	4	A	W 10-15		7	7.0	84	1200
	pm	1700	4	A	W 15-20	8	8.0	90	800-1200
9/6	am	4	B	0		8	7.0	107	fog
	pm	1700	4	0	W 3-5	7	8.0	107	2000
9/7	am	4	A	0		8	7.5	104	2000
	pm	1700	4	0	SW 3-5	11	8.0	102	2200
9/8	am	1	0	E 2-3		9	7.5	98	3000
	pm	1700	3	0				95	
9/9	am	1	0	0		7	6.5	93	clear
	pm	1700	1	0	E 10-15	17	8.5	92	clear
9/10	am	3	0	0		7	7.0	89	2500
	pm	1700	3	0	SW 3	21	8.5	88	2000-3000
9/11	am	3	0	E 8		13	7.0	85	2500
	pm	1700	3	0	E 10	15	8.0	84	2200
9/12	am	3	A	NW 3		12	7.0	82	2200
	pm	1700	3	0	E 5-8	15	8.5	80	2500
9/13	am	5	0	0		9	7.0	79	fog
	pm	1700	2	0	W 3	17	9.0	77	2300
9/14	am	4	0	E 2-3		10	7.0	76	1900
	pm	1700	4	0	SE 5	15	8.0	75	2000
9/15	am	3	0	0		9	6.5	73	2700
	pm	1700	4	0	NE 3-5	17	8.5	72	2400
9/16	am	2	0	SE 2		8	6.5	70	
	pm	3	0	NE 3		14	9.5	69	0.000
9/17	am	4	0	W 5		11	8.0	67	600
	pm	4	0	NW 7		11	8.5	66	1500
9/18	am	5	0	0		6	7.0	65	fog
	pm	1	0	NW 8-10		14	9.5	64	0.000

Continued

Table 17 continued (page 3 of 4)

Date	obsevation		Precip. ^b	Wind (knts)	Temp. (C)		Water Level (cm) ^c	Estimated Ceiling (ft)	Precip. (mm)
	time	Sky ^a			Air	Water			
9/19	am	3	0	E 3	6	6.0	64	2800	
	pm	3	0	0	18	7.5	62	2700	0.000
9/20	am	4	0	E 15	10	7.0	61	2200	
	pm	4	A	SW 15-20	10	9.0	61	1500-2000	0.000
9/21	am	3	0	E 5	10	7.0	61	3000	
	pm	4	0	NE 7	15	8.0	61	3000	0.000
9/22	am	1	0	NW 2	6	6.0	60	clear	
	pm	1	0	W 5	16	8.0	60	clear	3.302
9/23	am	4	0	0	7	7.0	59	2000	
	pm	4	0	NE 5	15	8.0	59	2500	0.000
9/24	am	4	0	W 5	8	7.0	58	1000	
	pm	4	0	NW 7	9	7.0	57	900	0.000
9/25	am	3	0	0	4	6.0	57	900-1800	
	pm	3	0	SW 2	10	7.0	56	2200	2.032
9/26	am	3	0	E 7	4	5.0	55	2000	
	pm	3	0	E 5	12	7.0	55	2000	0.762
9/27	am	4	0	0	6	7.0	54	900	
	pm	3	0	W 3	11	7.0	54	2000	0.000
9/28	am	3	0	NW 3	7	6.0	54	1800	
	pm	3	0	NW 8	11	7.0	53	2000	0.000
9/29	am	4	0		4	6.0	53	500	
	pm	4	B	NW 5	4	6.5	52	500	0.000
9/30	am	4	0	E 2	2	5.0	52	2000	
	pm	4	D		2	5.5	52		13.208
10/1	am	4	A	E 2	5	5.0	57	500	
	pm	4	A	S 7	9	6.0	57	600-1500	1.778
10/2	am	3	0	E 2	4	6.0	60	500	
	pm	3	0	NE 5	11	7	60	2300	0.000
10/3	am	4	B	E 20	11	7.0	58	2000	
	pm	4	B	E 20	13	8	57	400	19.304
10/4	am	4	B	E 3	12.0	8.0	78	500	
	pm	4	B	E 3	9	8	95	500	19.812
10/5	am	3	0	E 3	6.5	8.0	120	900	
	pm	3	A	NE 3	8	7	120	800-1000	0.000
10/6	am	1	0	E 3	1.0	6.0	114	clear	
	pm	3	0	E 3	8	6	108	2400	4.572
10/7	am	3	0	E 3	4.0	6.0	102	1800	
	pm	3	0	E 2	9	6.5	101	1800	1.016
10/8	am	4	0	E 2	6.0	5.0	99	2200	
	pm	4	B		7	5	98	2200	0.000

Continued

Table 17 continued (page 4 of 4)

Date	obsevation		Precip. ^b	Wind (knts)	Temp. (C)		Water Level (cm) ^c	Estimated Ceiling (ft)	Precip. (mm)
	time	Sky ^a			Air	Water			
10/9	am	4	C	NW 7	1.0	5.0	93	500	
	pm	4	C	NW 7	1	5	92	500	0.000
10/10	am	1	0	0	-5.0	3.5	88	clear	
	pm	2	C	W 5-8	1	4	87	2200-2500	0.000
10/11	am	4	0	0	-5.0	3.0	84	400	0.000
10/12	am	1	0	E 3	-6.0	2.0	79	clear	0.000
10/13	am	3	A	SW 4	3.5	4.0	74	1100	0.000
10/14	am	3	0	NW 6	-1.0	2.5	71	700	

^a Sky code: 1 - Clear or mostly clear (<10% cloud cover), 2 - Cloud cover not more than 50% of sky, 3 - Cloud cover more than 50% of sky, 4 - Complete overcast, 5 - Thick fog.

^b Precipitation code: 0 - none, A - Intermittent rain, B - Continuous rain, C - Snow, D - Snow and rain.

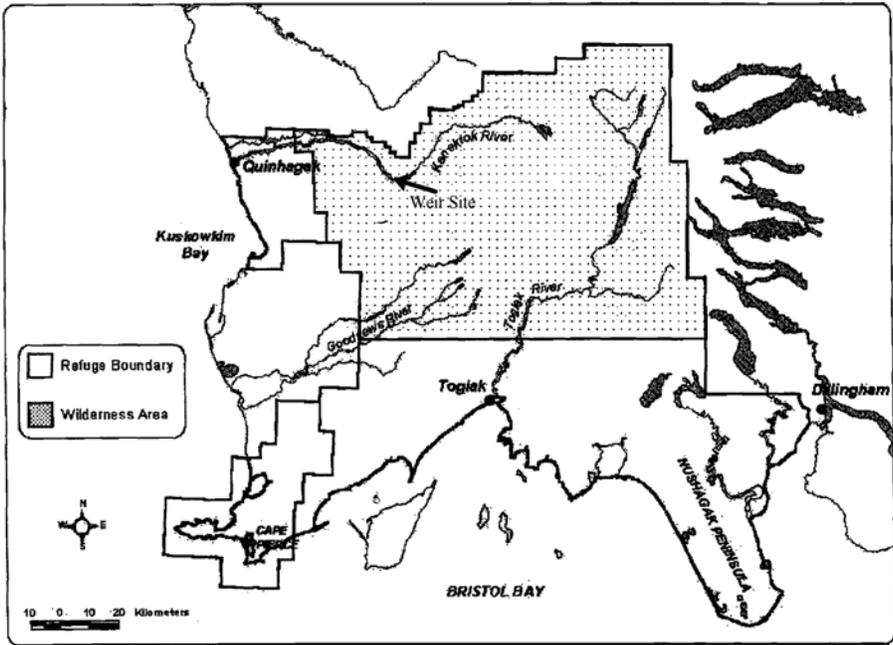


Figure 1. Kanektok River drainage and weir location.

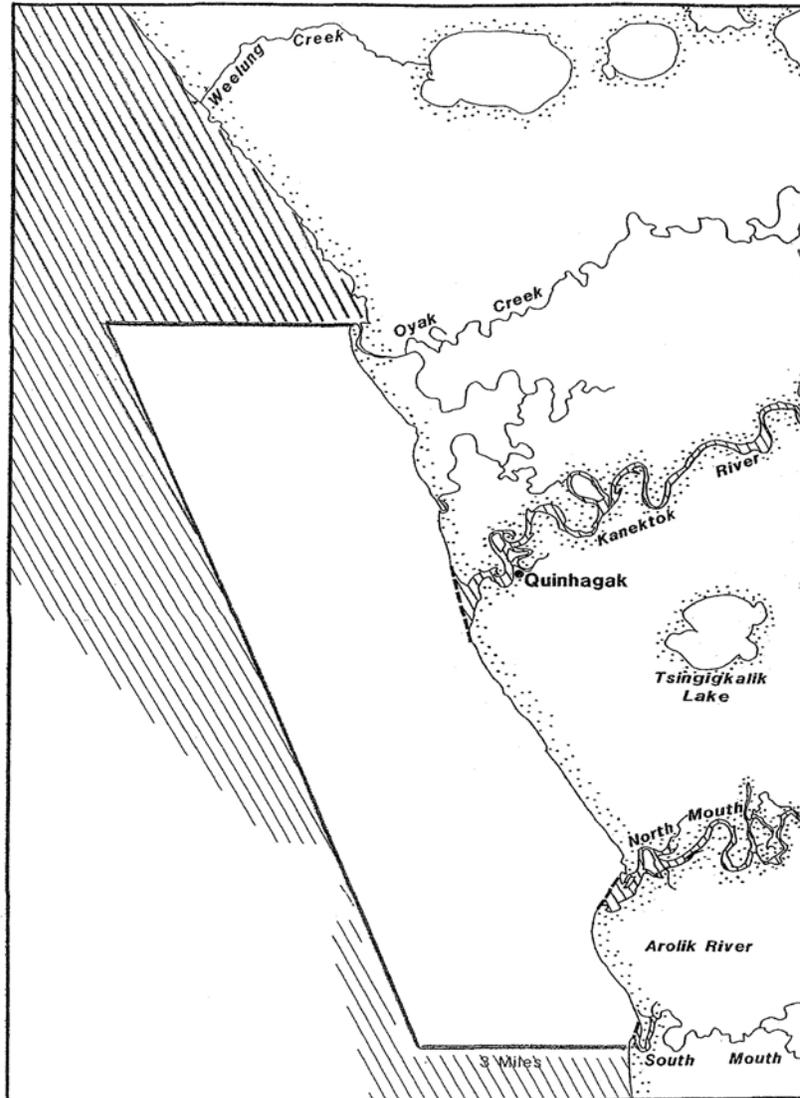


Figure 2. Map of the District W-4 commercial fishery. Striped areas are closed to commercial fishing. North is at the top of the map.

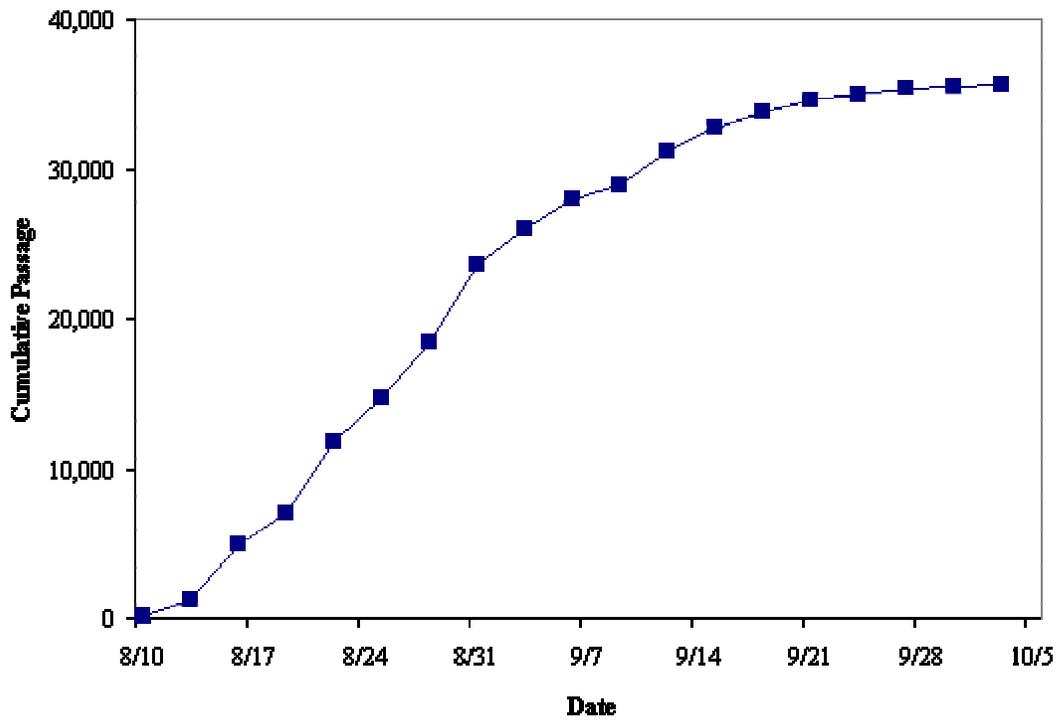


Figure 3. Coho run timing at the Kanektok River weir, 2001.

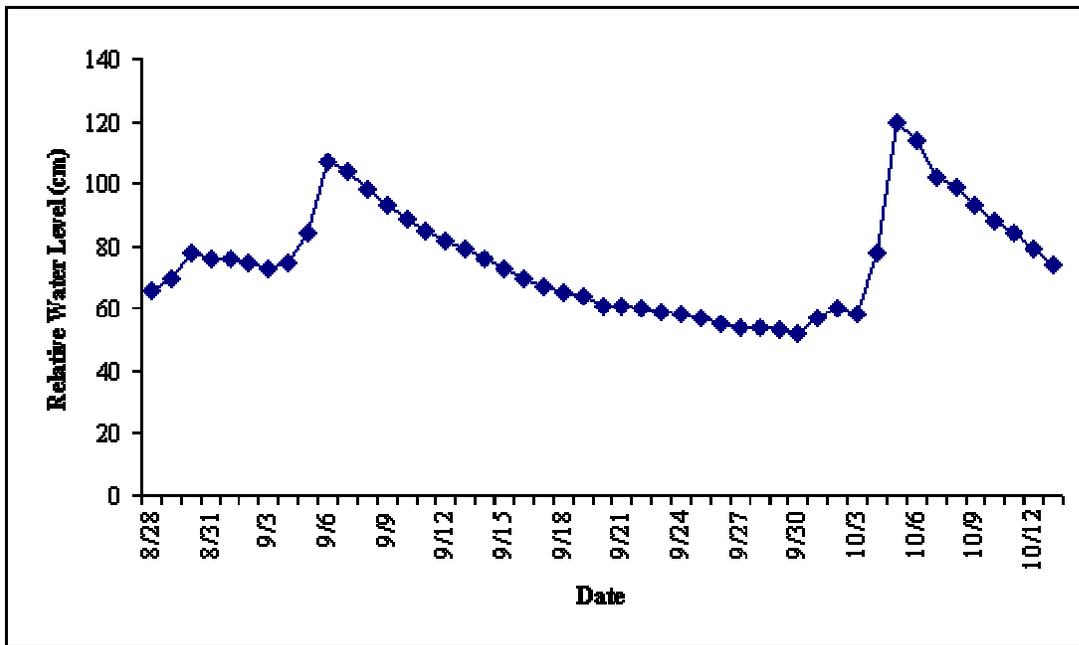


Figure 4. Water level over time at the Kanektok River weir site, 2001. Values are not actual water levels, they are relative values determined with a meter stick calibrated to an established bench mark.

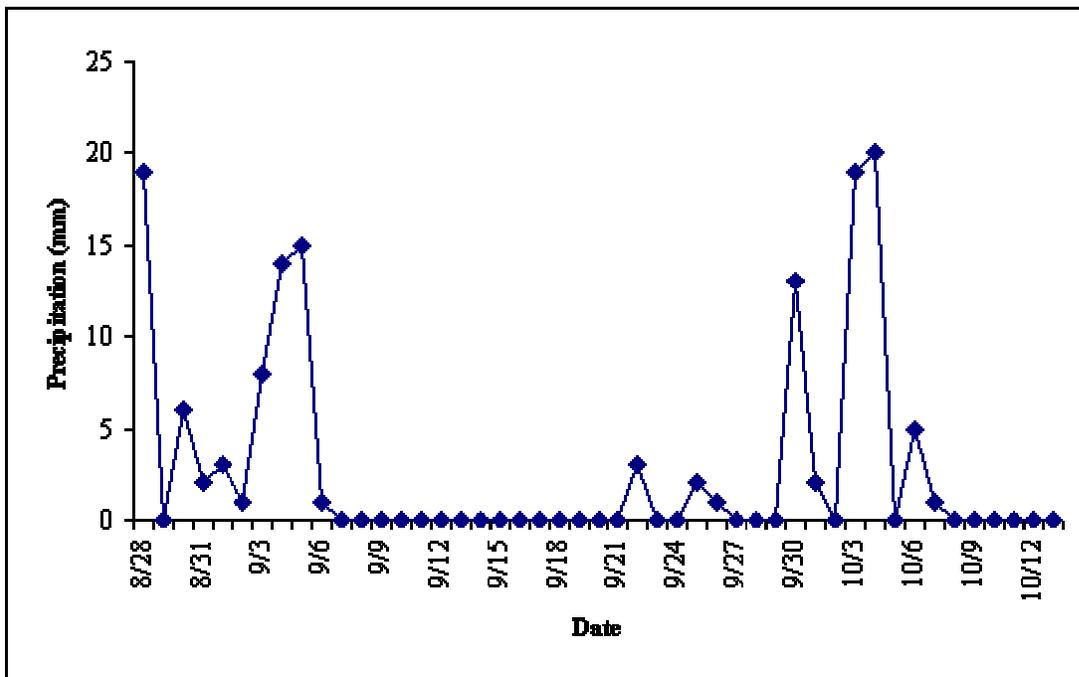


Figure 5. Daily precipitation at the Kanektok River weir site, 2001.

Appendix A. Daily and cumulative fish passage, Kanektok River Weir, 2001

date	chinook		sockeye		chum		pink		coho		Dolly Varden	
	daily	cum	daily	cum	daily	cum	daily	cum	daily	cum	daily	cum
10-Aug	11	11	56	56	101	101	0	0	87	87	46	46
11-Aug	11	22	137	193	164	265	9	9	167	254	118	164
12-Aug	15	37	87	280	197	462	2	11	368	622	144	308
13-Aug	25	62	93	373	134	596	1	12	551	1,173	261	569
14-Aug	14	76	57	430	153	749	0	12	971	2,144	406	975
15-Aug	5	81	19	449	89	838	2	14	838	2,982	137	1,112
16-Aug	9	90	48	497	84	922	0	14	1,863	4,845	184	1,296
17-Aug	4	94	33	530	33	955	1	15	893	5,738	115	1,411
18-Aug	3	97	23	553	25	980	0	15	733	6,471	56	1,467
19-Aug	3	100	14	567	15	995	0	15	583	7,054	63	1,530
20-Aug	14	114	16	583	6	1,001	0	15	2,579	9,633	62	1,592
21-Aug	3	117	12	595	12	1,013	2	17	1,235	10,868	39	1,631
22-Aug	2	119	9	604	3	1,016	0	17	931	11,799	39	1,670
23-Aug	0	119	9	613	4	1,020	0	17	853	12,652	46	1,716
24-Aug	2	121	8	621	4	1,024	0	17	818	13,470	39	1,755
25-Aug	2	123	14	635	5	1,029	0	17	1,293	14,763	93	1,848
26-Aug	3	126	7	642	5	1,034	0	17	1,293	16,056	50	1,898
27-Aug	1	127	11	653	5	1,039	0	17	972	17,028	75	1,973
28-Aug	2	129	11	664	0	1,039	0	17	1,378	18,406	58	2,031
29-Aug	1	130	2	666	0	1,039	1	18	1,800	20,206	86	2,117
30-Aug	0	130	4	670	3	1,042	0	18	1,964	22,170	44	2,161
31-Aug	0	130	7	677	2	1,044	0	18	1,442	23,612	38	2,199
1-Sep	0	130	1	678	6	1,050	0	18	973	24,585	34	2,233
2-Sep	0	130	0	678	0	1,050	0	18	736	25,321	16	2,249
3-Sep	0	130	8	686	1	1,051	0	18	610	25,931	13	2,262
4-Sep	0	130	8	694	0	1,051	0	18	921	26,852	23	2,285
5-Sep	0	130	8	702	0	1,051	0	18	685	27,537	14	2,299
6-Sept ^a	0	130	4	706	0	1,051	0	18	443.0	27,980	4	2,303
7-Sept ^b	0	130	0	706	0	1,051	0	18	201.0	28,181	6	2,309
8-Sept ^b	0	130	1	707	0	1,051	0	18	347.0	28,528	16	2,325
9-Sept ^b	0	130	0	707	0	1,051	0	18	407.0	28,935	19	2,344
10-Sept ^b	0	130	0	707	0	1,051	0	18	883.0	29,818	16	2,360
11-Sept ^b	0	130	0	707	0	1,051	0	18	649.0	30,467	16	2,376
12-Sep	0	130	1	708	0	1,051	0	18	627	31,094	13	2,389
13-Sep	1	131	2	710	0	1,051	0	18	622	31,716	29	2,418
14-Sep	0	131	3	713	0	1,051	0	18	527	32,243	17	2,435
15-Sep	0	131	4	717	0	1,051	1	19	452	32,695	11	2,446
16-Sep	0	131	6	723	1	1,052	0	19	373	33,068	12	2,458
17-Sep	0	131	2	725	0	1,052	0	19	405	33,473	18	2,476

continued

Appendix A continued (page 2 of 2)

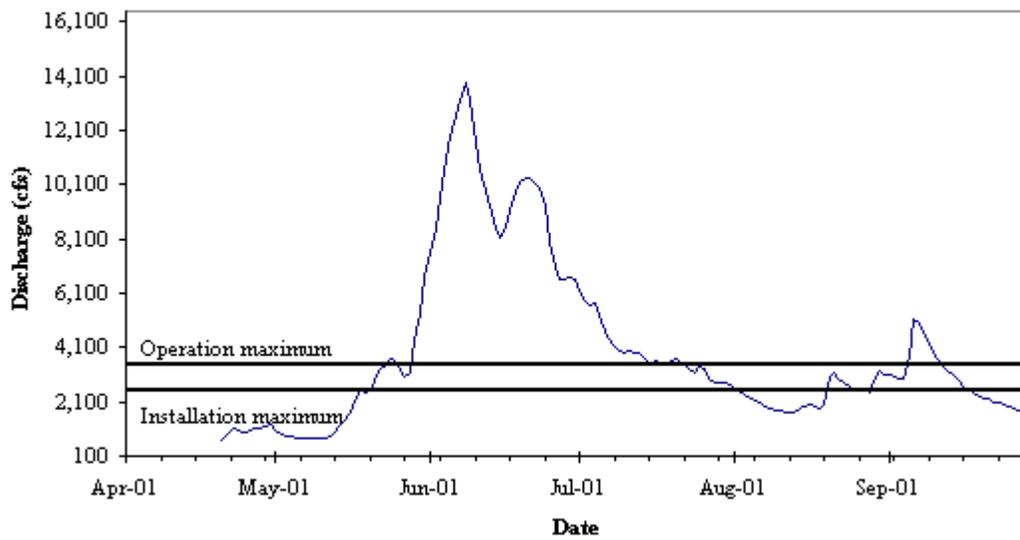
date	chinook		sockeye		chum		pink		coho		Dolly Varden	
	daily	cum	daily	cum	daily	cum	daily	cum	daily	cum	daily	cum
18-Sep	0	131	0	725	1	1,053	0	19	343	33,816	12	2,488
19-Sep	0	131	0	725	1	1,054	0	19	275	34,091	18	2,506
20-Sep	0	131	0	725	0	1,054	0	19	215	34,306	15	2,521
21-Sep	0	131	4	729	0	1,054	0	19	222	34,528	5	2,526
22-Sep	1	132	1	730	0	1,054	0	19	166	34,694	3	2,529
23-Sep	0	132	3	733	1	1,055	0	19	190	34,884	11	2,540
24-Sep	0	132	1	734	0	1,055	0	19	134	35,018	4	2,544
25-Sep	0	132	0	734	0	1,055	0	19	129	35,147	3	2,547
26-Sep	0	132	0	734	0	1,055	0	19	58	35,205	3	2,550
27-Sep	0	132	3	737	1	1,056	0	19	127	35,332	0	2,550
28-Sep	0	132	0	737	0	1,056	0	19	54	35,386	1	2,551
29-Sep	0	132	0	737	0	1,056	0	19	51	35,437	3	2,554
30-Sep	0	132	0	737	0	1,056	0	19	36	35,473	0	2,554
1-Oct	0	132	0	737	0	1,056	0	19	64	35,537	0	2,554
2-Oct	0	132	0	737	0	1,056	0	19	68	35,605	2	2,556
3-Oct	0	132	2	739	0	1,056	0	19	45	35,650	0	2,556

^a Weir was inoperable. Coho salmon passage estimated using interpolation.

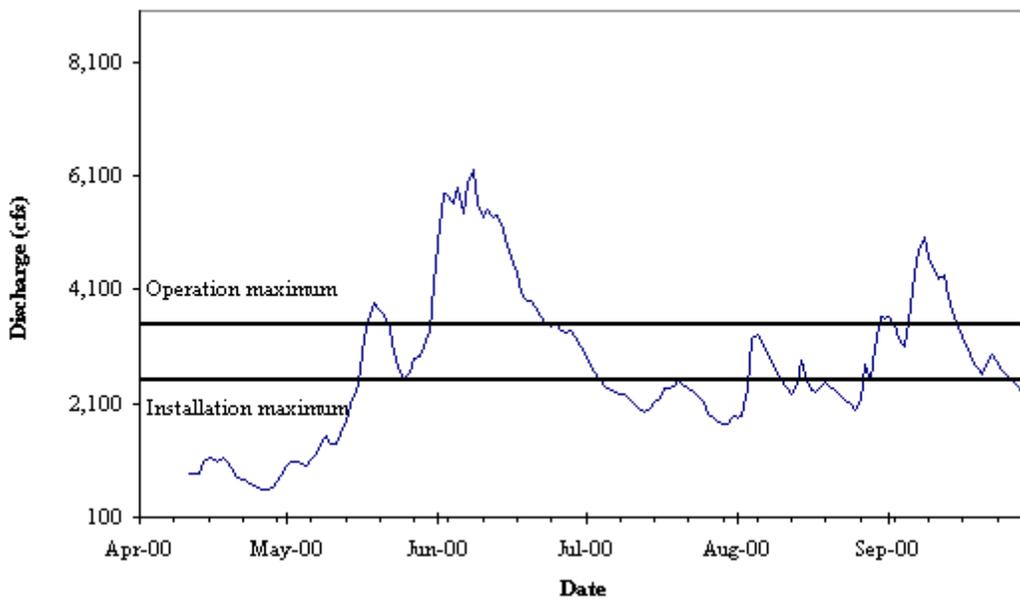
^b Weir was not fish tight. Partial counts, no estimations made.

Appendix B. Summary of the District W-4 commercial salmon season, 2001.

Period	Date	Permits	Deliveries	Chinook				Sockeye				Coho				Chum			
				# Fish	Lbs	Avg Wt.	Avg \$/Lbs.	# Fish	Lbs	Avg Wt.	Avg \$/Lbs.	# Fish	Lbs	Avg Wt.	Avg \$/lbs	# Fish	Lbs	Avg Wt.	Avg \$/Lbs.
01	6/21	52	90	4,024	78,009	19.4	\$0.40	1,225	9,091	7.4	\$0.40	0	0	0.0	\$0.00	154	1,217	7.9	\$0.10
02	6/25	108	133	3,137	65,200	20.8	\$0.35	3,382	25,164	7.4	\$0.35	0	0	0.0	\$0.00	1,463	12,030	8.2	\$0.10
03	6/25	106	117	2,490	52,633	21.1	\$0.35	5,222	39,588	7.6	\$0.35	0	0	0.0	\$0.00	2,486	19,946	8.0	\$0.10
04	7/02	86	110	934	19,191	20.5	\$0.35	6,656	51,531	7.7	\$0.35	0	0	0.0	\$0.00	2,292	17,956	7.8	\$0.10
05	7/05	80	119	828	17,268	20.9	\$0.35	7,638	58,178	7.6	\$0.35	0	0	0.0	\$0.00	2,275	17,583	7.7	\$0.10
06	7/09	86	89	432	8,442	19.5	\$0.35	3,317	24,932	7.5	\$0.35	0	0	0.0	\$0.00	1,794	12,273	6.8	\$0.10
07	7/12	61	74	318	5,302	16.7	\$0.35	2,831	20,716	7.3	\$0.35	0	0	0.0	\$0.00	2,060	14,974	7.3	\$0.10
08	7/16	48	51	267	4,577	17.1	\$0.35	1,678	12,027	7.2	\$0.35	0	0	0.0	\$0.00	1,767	12,570	7.1	\$0.10
09	7/18	42	52	138	2,405	17.4	\$0.35	977	6,970	7.1	\$0.35	0	0	0.0	\$0.00	1,316	9,430	7.2	\$0.10
10	7/23	25	29	89	1,577	17.7	\$0.34	380	2,788	7.3	\$0.35	41	312	7.6	\$0.20	938	6,688	7.1	\$0.10
11	8/01	28	36	34	557	16.4	\$0.32	180	1,147	6.4	\$0.35	1,005	8,232	8.2	\$0.20	278	1,842	6.6	\$0.10
12	8/03	23	28	20	427	21.4	\$0.31	57	410	7.2	\$0.34	913	7,133	7.8	\$0.20	94	643	6.8	\$0.10
13	8/06	31	42	23	494	21.5	\$0.33	62	393	6.3	\$0.35	1,828	15,252	8.3	\$0.20	141	911	6.5	\$0.10
14	8/10	28	36	11	193	17.5	\$0.31	58	249	4.3	\$0.35	2,570	22,516	8.8	\$0.20	46	297	6.5	\$0.10
15	8/13	31	44	9	163	18.1	\$0.29	37	251	6.8	\$0.35	3,130	27,988	8.9	\$0.20	24	140	5.8	\$0.10
16	8/15	31	35	6	57	9.5	\$0.35	28	192	6.9	\$0.33	3,612	32,292	8.9	\$0.20	28	199	7.1	\$0.10
17	8/18	37	37	5	72	14.4	\$0.35	34	237	7.0	\$0.35	3,844	34,777	9.0	\$0.20	26	183	7.0	\$0.10
18	8/20	7	7	0	0	0.0	\$0.00	2	14	7.0	\$0.35	201	1,759	8.8	\$0.20	1	5	5.0	\$0.10
19	8/22	24	25	4	65	16.3	\$0.35	28	197	7.0	\$0.35	955	8,604	9.0	\$0.20	21	144	6.9	\$0.10
20	8/24	15	16	6	101	16.8	\$0.22	15	90	6.0	\$0.35	432	4,021	9.3	\$0.20	5	37	7.4	\$0.10
Total		159	1,170	12,775	256,733	20.1	\$0.36	33,807	254,165	7.5	\$0.35	18,531	162,886	8.8	\$0.20	17,209	129,068	7.5	\$0.10



Appendix C.1. Water discharge at a gauging station located one mile down river from the Kanektok River weir site, 2001.



Appendix C.2. Water discharge at a gauging station located one mile down river from the Kanektok River weir site, 2000.