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Salmonid Escapements at Kwiniuk, Niukluk and Nome Rivers, 2006

Scott Kent

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Divisions of Sport Fish and Commercial Fisheries



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**SALMONID ESCAPEMENTS AT KWINIUK, NIUKLUK AND NOME
RIVERS, 2006**

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ABSTRACT

The Alaska Department of Fish and Game (ADF&G) operated counting tower projects on the Kwiniuk and Niukluk Rivers and a weir project on the Nome River during the 2006 season. Runs of chum salmon *Oncorhynchus keta*, pink salmon *O. gorbuscha*, Chinook salmon *O. tshawytscha*, sockeye salmon *O. nerka*, coho salmon *O. kisutch*, and Dolly Varden *Salvelinus malma* were enumerated. Objectives of the projects were to obtain daily and seasonal estimates of the timing and magnitude of salmon escapements and to collect biological data (age, sex, and length) from chum salmon and coho salmon.

Expanded tower counts at Kwiniuk River were 39,519 chum salmon, 1,347,090 pink salmon, 195 Chinook salmon, 22,341 coho salmon, and 1,486 Dolly Varden. Expanded tower counts at Niukluk River were 29,199 chum salmon, 1,371,919 pink salmon, 39 Chinook salmon, 11,169 coho salmon, and 1,934 Dolly Varden. Total cumulative counts at the Nome River weir were: 5,678 chum salmon, 578,555 pink salmon, 45 Chinook salmon, 8,308 coho salmon, 196 sockeye salmon, and 1,724 Dolly Varden. The Kwiniuk River and Nome River coho salmon escapements were both records. The Nome River chum salmon escapement was record setting and the Kwiniuk River chum salmon escapement was the sixth highest in the project's history (1965-2006).

Predominant age compositions during 2006 for the sampled chum salmon escapements by river were: Kwiniuk River 75% age-0.3 and 24% age-0.4, Niukluk River 45% age-0.3 and 54% age-0.4, and Nome River 53% age-0.3 and 45% age-0.4. Most of the coho salmon escapement samples were age class 2.1 representing 75% from Kwiniuk River, Niukluk River 88%, and 87% from the Nome River.

Key words: Kwiniuk, Niukluk, Nome, escapement, *Oncorhynchus tshawytscha*, *O. nerka*, *O. keta*, *O. kisutch*, *O. gorbuscha*.

INTRODUCTION

Norton Sound Salmon Management District includes all waters between the latitude of Point Romanof in the south and north to the latitude of Cape Douglas. This district includes 6 commercial salmon fishing subdistricts. All 5 species of pacific salmon (*Oncorhynchus spp.*) return to natal rivers in Norton Sound and numerous anadromous streams are located within district boundaries (Figure 1). Current salmonid enumeration programs operated by the Alaska Department of Fish and Game (ADF&G) in this district include 2 counting towers located on the Kwiniuk River, which drains into Subdistrict 3 (Moses Point), and Niukluk River, a tributary of the Fish River, which empties into Subdistrict 2 (Golovin), one weir project located on the Nome River, east of the city of Nome, in Subdistrict 1, and one test fish project on the Unalakleet River in Subdistrict 6. Additionally, 6 escapement counting projects are operated by cooperating agencies. Kawerak Inc. operates 2 weir projects in Subdistrict 1, on the Eldorado River and the Snake River, and a weir on the Pilgrim River in the Port Clarence District to the north, and an enumeration tower on the Pikmiktalik River near Stebbins. Unalakleet IRA council operates a tower project on the North River, a tributary of the Unalakleet River, which drains into Subdistrict 6 (Unalakleet). U.S. Bureau of Land Management (BLM) (2000-2005) and Norton Sound Economic Development Corporation (NSEDC) (2006) operate a weir on a tributary of the Sinuk River, which empties into the northwestern portion of Norton Sound Subdistrict 1. Returns of chum salmon *Oncorhynchus keta*, pink salmon *O. gorbuscha*, Chinook salmon *O. tshawytscha*, sockeye salmon *O. nerka*, coho salmon *O. kisutch*, and Dolly Varden *Salvelinus malma* are enumerated at ADF&G and cooperative projects. ADF&G personnel also conduct numerous in-season aerial surveys on selected district rivers to monitor adult salmon escapements and assess run timing. Some aerial surveys are conducted on rivers with enumeration projects to ground truth and calibrate survey counts and to correlate data with historical data. This report summarizes 2006 data from ADF&G tower and weir projects.

The Kwiniuk River drains into Norton Sound just east of Moses Point, approximately 160 km east of Nome (Figures 1 and 2). Kwiniuk and Tubutulik Rivers are the primary salmon spawning tributaries in Subdistrict 3 (Moses Point). In 1962 commercial salmon fishing began in Subdistrict 3, primarily targeting chum, pink and coho salmon. No significant chum salmon commercial harvest has occurred since 1988 (Bue and Lean 1997). There were no commercial salmon harvested in this subdistrict in 2006. Subsistence fisheries occur in both drainages and in marine waters in the subdistrict. Subsistence permits for salmon fishing have been required in this subdistrict since 2004. In previous years, harvest data was gathered through ADF&G Division of Subsistence village surveys. Since 1965, a salmon counting tower has operated on the Kwiniuk River enumerating chum, pink, and Chinook salmon runs, but only since 2001 has the tower operated through the coho salmon run (Lean 1994; Kent 2006, Kohler 2000a, 2003; Kohler and Knuepfer 2001a, 2002a; Kohler and Todd 2003; Menard and Kent 2005, Rob 1996a,b, 1997a, 1998b, 1999c). The project provides fish passage data, age, sex, and length (ASL) data, and allows management biologists to calibrate aerial surveys.

The Niukluk River is a major tributary of the Fish River drainage and enters the Fish River approximately 16 km above the village of White Mountain (Figures 1 and 2). The Fish River empties into Golovin Bay (Subdistrict 2) on the north coast of Norton Sound, and is the primary salmon spawning drainage in this subdistrict. Council, a seasonal village, is located on the Niukluk River approximately 20 km above the confluence with Fish River. A road provides access from Nome to the Niukluk River at Council. As in the Moses Point Subdistrict, subsistence permits for salmon fishing have been required since 2004 in the Golovin Bay Subdistrict. Subsistence and sport fisheries occur on the Niukluk and Fish Rivers for all salmon species, Arctic grayling *Thymallus arcticus*, whitefish species *Prosopium spp.* and *Coregonus spp.*, and Dolly Varden. Commercial salmon fishing has been conducted sporadically in Subdistrict 2, and no commercial fisheries occurred during 2006.

The Niukluk River counting tower has successfully operated since 1995 (Jones and Knuepfer 2002; Kent 2006, Kohler 2000b, 2001, 2003; Kohler and Todd 2003; Menard and Kent 2005, Rob 1995b, 1997c, 1998c, 1999b), and previously operated for approximately 3 weeks during 1979 (Schaefer 1979). The project is operated to obtain escapement information, ASL data, and as a means to calibrate the accuracy of aerial surveys to other tributaries in the Fish River drainage. Also, coho salmon passage at the tower is used in the Fish River telemetry project to estimate coho salmon escapement in the Fish River drainage.

Nome River flows approximately 50 km south from the Kigluaik Mountains and drains into Norton Sound approximately 5 km east of Nome (Figures 1 and 2). Commercial fishing has been progressively reduced through regulatory restrictions since the late 1970s and marine waters near the mouth (Subdistrict 1) have been closed since 1984. Sport and subsistence fishing in Nome River have been restricted for many years because of low salmon returns (primarily chum salmon) and Arctic grayling population concerns. Subsistence and sport fisheries are currently managed similar to a commercial fishery, with emergency orders regulating restrictions and fishing periods. Improvements in recent years of salmon runs have resulted in a lessening of restrictions on the subsistence salmon fishery. For the first time since 1999 the Nome Subdistrict was not under Tier II fishing restrictions for chum salmon. A Tier I subsistence permit/catch calendar was required when subsistence fishing in the Nome Subdistrict in 2006, but for the first time since 1990 the salmon fishery was open to the regular subsistence fishing schedule.

Subsistence harvests are reported to ADF&G Division of Commercial Fisheries through returned catch calendars.

A salmon counting tower was first operated on the Nome River in 1993 (Bue 1994; Rob 1995a,c). Beginning in 1996, a weir replaced the counting tower and the camp/enumeration location was moved down river approximately 5 km to the current site. The 2006 season was the eleventh year of weir operations (Kent 2006, Kohler 2000c, 2003; Kohler and Knuepfer 2001b, 2002b; Kohler and Todd 2003; Menard and Kent 2005, Rob 1997b, 1998a, 1999a).

All ADF&G enumeration projects, and cooperative projects, operate as a means to obtain timely and accurate escapement information and for the collection of biological data (ASL) spread throughout salmon runs. Daily count totals by species are relayed to the Nome ADF&G office via single sideband (UHF), marine (VHF) radio or satellite phone.

OBJECTIVES

The objectives of these projects were to:

1. Obtain daily and seasonal estimates of timing and magnitude of salmon and Dolly Varden escapements to the Kwiniuk, Niukluk, and Nome Rivers.
2. Sample chum and coho salmon runs and collect ASL data for development of brood tables and age, sex, and length frequencies for comparison of seasonal and yearly variations.

METHODS

Tower project crews enumerate fish passage up and down river from a tower in timed periods. Usually, counts are conducted for a 20-minute period each hour and the counts are expanded to the whole hour; count times three equals one hour (20 min. x 3 = 60 min.). If all periods for 24 hours each day are counted, further expansion is not necessary and the expanded hourly total counts are summed to produce a daily total. Expansion methods used when count periods were missed are explained under each project. Negative count numbers signify down river passage. A tower or scaffold made of wood, aluminum or steel is placed on the bank next to the river where an observer sits or stands on the elevated platform to count fish. Guy wires are attached to the tower and staked to the ground or cabled to trees to stabilize the tower. A flash panel (usually white plastic, vinyl, or canvas) is placed across the river bottom perpendicular to the river at the tower site and is anchored in place with sand bags and stakes. A flash panel provides a contrasting background to aid identification and count of passing fish. Partial (diversion) weirs are placed from the river bank(s) toward mid-channel over the panel ends to force migrating fish over the panel for easy observation. The Alaska Department of Natural Resources issued permits for all weirs and partial weirs. To count fish during darkness, lights are placed on the tower or suspended from a cable strung across the river above the flash panel. Either a 12-volt battery system or 120-volt generator system is used to provide power for lighting.

Weirs are built across the entire river and do not allow unmonitored fish passage. The Nome River weir has aluminum weir stringers, top and bottom, that span the river and are supported by metal "A" frames. Metal conduit pickets are placed in the stringer holes and pounded into the bottom substrate effectively blocking fish passage. Picket spacing determines the size of fish to be passed and enumerated. Fish are enumerated through the weir by opening a gate or pulling

weir pickets and counting the fish as they migrate through the opening. The weir has a “boat gate” that allows the weir to be quickly opened between two “A” frames to allow for boat passage. Lighting systems similar to tower projects are used to illuminate the weir area for counting fish passage at night.

ASL samples at tower projects are collected from chum and coho salmon by seining in the river with a beach seine at weir sites. Fish that are sampled are normally caught in a live box; the live box is installed and built into the upstream face of the weir. However, fish are seined near the weir if the live box does not effectively capture fish. In 2006, the goal for Niukluk and Kwiniuk projects was to sample 3 pulses of 160 chum salmon and one pulse of 160 coho salmon. The goal at the Nome River weir was to sample chum salmon in proportion to the run passage and one pulse of at least 160 coho salmon. Scales were taken for age determination, sex was determined by visually examining external characteristics (such as body symmetry, kype development and presence of an ovipositor), and fork lengths were measured on all sampled fish. Scales were removed from the left side of the fish in an area 2–3 scale rows above the lateral line crossed by a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin. Once cleansed of slime, scales were mounted on gummed cards, and impressions were later made in cellulose acetate cards with a scale press for age determination. Scale impressions were read with the aid of a microfiche reader and ages were reported in European notation where the first digit denotes the freshwater age excluding the year spent in the gravel, and the second digit refers to the ocean age (Koo 1962a, b). Fish length was measured to the nearest 0.5 cm from mid-eye to tail fork (METF). Tower project ASL samples for chum salmon were divided into 3 segments (3 samples of 160) by time to track changes in age and sex composition.

At the Kwiniuk and Niukluk River towers, field crews used beach seines to collect salmon for ASL samples. At Nome River weir, ASL samples were obtained from salmon caught in the weir trap throughout the duration of the chum and coho salmon runs.

KWINIUK RIVER TOWER

Kwiniuk River tower camp is located approximately 6 km upstream from the mouth of the Kwiniuk River, on land leased to ADF&G by Hans Jemewouk of Moses Point (Figure 2). Access to the site is by jet outboard riverboat from the seasonal village of Moses Point where aircraft deliver personnel, supplies, and equipment. Additional ADF&G staff from Nome helped during tower installation and set up. A 15 m vinyl flash panel was used at the Kwiniuk site and covered approximately half the width of the river. One 6 m high aluminum scaffold tower was used for counting and the diversion weir extended from midstream (end of the flash panel) to the shore opposite the tower. A 12-volt battery lighting system illuminated the flash panel during dark counting periods.

Counting began on 22 June at 1800 hours and ended after the 0700 hour count on 12 September 2006. The 3-person crew counted one 20-minute period each hour for 24 hours, from midnight to midnight the following day. Daily counts presented in this report ran from midnight to midnight the following day. The only hours not counted this season were from 0000 on 8 September through 0900 hours on 9 September. Expanded counts for missed times in this report were calculated as follows. For the day that counts did not occur, the preceding day’s count for a particular hour was added to the following day’s count for the same hour and the total was divided by 2. If 2 days of counts for a particular hour were missed, the 2 preceding day’s counts

for that hour and the following 2 day's counts for that same hour were added and the total divided by 4. Small adjustments were made to account for rounding to whole numbers.

NIUKLUK RIVER TOWER

Niukluk River tower camp is located approximately 4 km upstream from the confluence of the Fish and Niukluk Rivers (Figure 2), just upstream of Tom Gray's camp, known locally as Mosquito Bar. A letter of understanding from the Council Native Corporation allowed ADF&G to use their lands to conduct the tower operation. Access to this site is via road to Council and by jet outboard riverboat from Council to the tower. For 2006, the counting tower, partial weir, and flash panel were installed using the same methods as reported in detail in the 1995 Niukluk project report (Rob 1995b). Additional ADF&G staff provided assistance during project installation and set up. A 120-volt generator lighting system was installed on the tower to illuminate the flash panel during dark periods.

Counting began at 1200 hours on 28 June, and ended after the 1100 count on 9 September 2005. One 20-minute period was counted each hour for 24 hours, from midnight to midnight the following day. Hours not counted this season were from 0900 29 June through 2300 on 30 June, 1300 count on 20 July, 2100 on 29 July, 1900 on 30 July, 1800 count on 5 August, 1600-1700 on 6 August, 2100 count 7 August and the 2000 count on 12 August. An average of the previous and following day's counts for the same hours was calculated for hours not counted and the methods used to generate expanded counts were the same as those described for Kwiniuk tower.

NOME RIVER WEIR

Nome River weir camp is located approximately 5 km upstream from the mouth of the river on land that ADF&G leases from Sitnasuak Native Corporation (Figure 2). The weir is made of a series of 3.2 cm (1¼") pipes assembled in pairs using locking metal brackets. Aluminum stringers 5.6 m (12') long connect the pairs of pipes horizontally. Metal conduit pipes of varying lengths, depending on water depth, are inserted vertically in holes drilled in the stringers on 4.5 cm (1¾") centers. Pipes in the weir are removed to create openings that allow fish to pass through and be enumerated by staff. The weir was designed to be easily cleaned, allow no unmonitored escapement of fish, and be quickly removed in the event of a flash flood.

The project crew, with the help of additional ADF&G staff, began installing the weir on 1 July and the weir was in operation from 2 July through 7 September, 2006. The weir was inoperable for two days from 19 July to 20 July as a result of high water. An estimated 750 and 40,000 pink salmon were observed between the weir and VOR site prior to partial disassembly of the weir on 19 July. Daily counts for Chinook salmon, coho salmon, sockeye salmon and Dolly Varden were expanded by taking the average of the counts from the two preceding days and two following days.

RESULTS

ESCAPEMENT

Kwiniuk River expanded daily and cumulative total counts by species for 2006 are shown in Table 1. Expanded cumulative counts were: 39,519 chum salmon, 1,347,090 pink salmon, 195 Chinook salmon, 22,341 coho salmon, and 1,486 Dolly Varden. Historical migration by year and species are shown in Appendix A1.

Niukluk Tower expanded cumulative counts for 2006 were: 29,199 chum salmon, 1,371,919 pink salmon, 39 Chinook salmon, 11,169 coho salmon, and 1,934 Dolly Varden (Table 2). Historical escapements at the Niukluk River counting tower by year and species are shown in Appendix A2.

Nome River weir total cumulative counts for 2006 were: 5,678 chum salmon, 578,555 pink salmon, 45 Chinook salmon, 8,308 coho salmon, 196 sockeye salmon, and 1,724 Dolly Varden (Table 3). Historical escapements at the Nome River weir by year and species are shown in Appendix A3.

AGE AND SEX COMPOSITION AND LENGTH FREQUENCY

Chum salmon age and sex composition during 2006 for the 3 rivers were as follows: Kwiniuk River samples (474) were 0.2% age-0.2, 75.1% age-0.3, 24.3% age-0.4 and 0.4% age-0.5 fish, and 51.3% males (Table 4). Niukluk River samples (425) were 0.2% age-0.2, 44.9% age-0.3, 54.1% age-0.4, and 0.7% age-0.5 fish, and 53.4% females (Table 5). Nome River samples (458) were 1.7% age-0.2, 52.8% age-0.3, 45.4% age-0.4 fish, and 52.6% females (Table 6).

Kwiniuk River chum salmon mean lengths (METF) for the major age classes were 580 mm for age-0.3 males and 560 mm for females, and age-0.4 chum were 601 mm for males and 577 mm for females (Table 4). Niukluk age-0.3 chum salmon were 577 mm for males and 547 mm for females, and age-0.4 chum were 604 mm for males and 565 mm for females (Table 5). Nome age-0.3 males were 574 mm and females 555 mm, and age-0.4 males were 583 mm and age 0.4 females were 556 mm (Table 6).

Coho salmon escapement samples from the Kwiniuk (182), Niukluk (121), and Nome (191) rivers were 74.7%, 88.4%, and 87.4% age-2.1, respectively (Tables 7-9). Mean lengths by age group for all samples collected ranged from 495 mm for age-1.1 males in the Nome River escapement sample to 575 mm for age-3.1 males from the Nome River samples. Females comprised 56.6% of the samples at Kwiniuk River, 38.0% at Niukluk River, and 60.7% at Nome River (Tables 7-9).

DISCUSSION

Normally, high water conditions are encountered in August and September in the Norton Sound Area. However, escapement project crews had to contend with rainy weather throughout much of the 2006 field season. Flooding and turbidity associated with high water levels reduce visibility for species determination and accuracy of enumeration, often resulting in days of missed counts. There were missed counts for several hours in September at the Kwiniuk River Tower, and in late-June, July and August at the Niukluk Tower. Rainy weather also led to suspended counts at the Nome River weir from 19-20 July.

Chum salmon passage at Kwiniuk River tower was 39,519 fish. This was well above the upper end of the current biological escapement goal range of 11,500–23,000 fish and was the sixth highest count on record (1965-2006) (Figure 3, Appendix A1). Chinook salmon passage of 195 fish was below the low end of the escapement goal range of 300–550 and represented the lowest Chinook count since 2000 (Figure 5, Appendix A1). The pink salmon cumulative passage of 1,347,090 fish was the fourth highest in the project's history (Figure 4, Appendix A1). Funds from the Norton Sound Initiative extended counting tower operations through the coho salmon run for the sixth consecutive year. The 22,341 coho salmon that passed the tower was a new

record and was nearly double the previous record of 12,950 coho set in 2005 (Figure 6, Appendix A1).

At Niukluk River counting tower, the 2006 expanded count of 29,199 chum salmon was the fourth lowest to date and was 11% below the previous 10-year average (1996–2005) (Figure 7, Appendix A2). The Chinook salmon escapement of 39 fish was the second lowest on record (Figure 9, Appendix A2). Pink salmon escapement of 1,371,919 fish was the second only to the 1,624,436 counted in 1998 and 28% above the historical even-numbered year average (1996–2004) (Figure 8, Appendix A2). 11,169 coho salmon were counted at the Niukluk River tower in 2006, which was the third highest on record and more than twice the previous 10-year average (1995–2005, excluding 1998) (Figure 10, Appendix A2).

Nome River salmon escapements were above average in 2006 (Appendix A3). The weir was only inoperable from 19–20 July as previously discussed. Nome River weir personnel carried out a survey prior to pulling pickets and determined that an estimated 750 chum salmon and 40,000 pink salmon escaped during this period. Chinook salmon, coho salmon, sockeye salmon and Dolly Varden escapements were estimated using linear interpolation during the inoperable period. The Chinook salmon passage (45) was above average (Figure 13, Appendix A3). The coho salmon passage (8,308) was record setting and 42% above the previous record of 5,848 (Figure 14, Appendix A3). The 2006 chum salmon passage of 5,678 also represents a new record and was well above the high end of the current escapement goal range of 2,900–4,300 fish (Figure 11, Appendix A3). The pink salmon passage of 578,555 was the second highest on record and 82% above the historical even-numbered year average (Figure 12, Appendix A3).

Chum salmon escapement age structure was apportioned by dividing chum ASL samples into 3 temporal strata for the Kwiniuk, Niukluk, and Nome projects. Samples were obtained by seining at the Kwiniuk and Niukluk projects, and by weir trap at Nome River weir. Despite large numbers of pink salmon in the Nome River, crew members were able to use the weir trap to sample chum salmon and coho salmon throughout duration of the migration of these species.

Only the Nome River ASL samples had a slightly higher than normal percentage (1.7%) of age-0.2 chum salmon (Table 6). In contrast, the Kwiniuk and Niukluk projects percentage of age-0.2 chum salmon was less than 1% (Tables 4–5).

Kwiniuk and Nome project crews were able to get the required 160 coho salmon samples by either seining or using the weir trap. Niukluk crews fell short with only 121 samples. The majority of Kwiniuk, Niukluk, and Nome Rivers coho salmon escapement samples were age-2.1. Most coho salmon return as age-2.1 fish and the age composition of the run was similar to what has been observed in previous years. However, the nearly 23% age-1.1 coho salmon from the Kwiniuk River samples was well above average and much higher than the percentage of age-1.1 observed at the Niukluk and Nome projects.

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REFERENCES CITED

- Bue, F. 1994. Nome River salmon counting tower project summary report, 1993. Alaska Department of Fish & Game, Commercial Fisheries, Regional Information Report No. 3A94-26, Anchorage.
- Bue, F. and C. Lean. 1997. Norton Sound District salmon report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A97-39, Anchorage.
- Jones, W. W. and G. Knuepfer. 2002. Niukluk River salmon counting tower project 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A02-46, Anchorage.
- Kent, S. 2006. Salmonid escapements at Kwiniuk, Niukluk and Nome rivers, 2005. Alaska Department of Fish and Game, Fishery Data Series No. 06-22, Anchorage.
- Kohler, T. 2000a. Kwiniuk River salmon counting tower project summary report, 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A00-08, Anchorage.
- Kohler, T. 2000b. Niukluk River salmon counting tower project summary report 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A00-09, Anchorage.
- Kohler, T. 2000c. Nome River salmon counting weir project summary report, 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A00-15, Anchorage.
- Kohler, T. 2001. Niukluk River salmon counting tower project report 2000. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A01-28, Anchorage.
- Kohler, T. G. 2003. Salmonid escapements into selected Norton Sound drainages using towers and weirs, 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A03-33, Anchorage.
- Kohler, T. and G. Knuepfer. 2001a. Kwiniuk River salmon counting tower project summary report, 2000. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A01-17, Anchorage.
- Kohler, T. and G. Knuepfer. 2001b. Nome River salmon counting weir project summary report, 2000. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A01-21, Anchorage.
- Kohler, T. and G. Knuepfer. 2002a. Kwiniuk River salmon counting tower project, 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A02-12, Anchorage.
- Kohler, T. and G. Knuepfer. 2002b. Nome River salmon counting weir project, 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A02-13, Anchorage.
- Kohler, T. G. and G. L. Todd. 2003. Salmonid escapements into selected Norton Sound drainages using towers and weirs, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A03-18, Anchorage.
- Koo, T. S. Y. 1962a. Age designation in salmon. Pages 41-47 in Publications in Fisheries, New Series, I, Studies of Alaska Red Salmon. Univ. Washington Press, Seattle.

REFERENCES CITED (Continued)

- Koo, T. S. Y. 1962b. Age and growth studies of red salmon scales by graphical means. Pages 54-57 in Publications in Fisheries, New Series, I, Studies of Alaska Red Salmon. Univ. Washington Press, Seattle.
- Lean, C. 1994. Kwiniuk River salmon counting tower project, 1993. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A94-08, Anchorage.
- Menard, J. and S. Kent. 2005. Salmonid escapements at Kwiniuk, Niukluk and Nome Rivers, 2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-24, Anchorage.
- Rob, P. J. 1995a. Nome River salmon counting tower project summary report, 1995. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A95-26, Anchorage.
- Rob, P. J. 1995b. Niukluk River salmon counting tower project summary report 1995. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A95-27, Anchorage.
- Rob, P. J. 1995c. Nome River salmon counting tower project summary report, 1994. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A95-35, Anchorage.
- Rob, P. J. 1996a. Kwiniuk River salmon counting tower project summary report, 1994. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A96-05, Anchorage.
- Rob, P. J. 1996b. Kwiniuk River salmon counting tower project summary report, 1995. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A96-08, Anchorage.
- Rob, P. J. 1997a. Kwiniuk River salmon counting tower project summary report, 1996. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A97-01, Anchorage.
- Rob, P. J. 1997b. Nome River salmon counting weir project summary report, 1996. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A97-03, Anchorage.
- Rob, P. J. 1997c. Niukluk River salmon counting tower project summary report 1996. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A97-04, Anchorage.
- Rob, P. J. 1998a. Nome River salmon counting weir project summary report, 1997. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A98-02, Anchorage.
- Rob, P. J. 1998b. Kwiniuk River salmon counting tower project summary report, 1997. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A98-04, Anchorage.
- Rob, P. J. 1998c. Niukluk River salmon counting tower project summary report 1997. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A98-19, Anchorage.
- Rob, P. J. 1999a. Nome River salmon counting weir project summary report, 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A99-06, Anchorage.
- Rob, P. J. 1999b. Niukluk River salmon counting tower project summary report 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A99-10, Anchorage.
- Rob, P. J. 1999c. Kwiniuk River salmon counting tower project summary report, 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A99-14, Anchorage.
- Schaefer, G. 1979. Niukluk River counting tower project. AYK Region, Norton Sound Escapement Report 21.

TABLES AND FIGURES

Table 1.—Expanded daily and cumulative (Cum.) migration of all salmonid species past Kwiniuk River counting tower, Norton Sound, 2006.

Date	Daily Chum Salmon	Cum. Chum Salmon	Daily Pink Salmon	Cum. Pink Salmon	Daily Chinook Salmon	Cum. Chinook Salmon	Daily Coho Salmon	Cum. Coho Salmon	Daily Dolly Varden	Cum. Dolly Varden
22-Jun	3	3	0	0	0	0	0	0	3	3
23-Jun	93	96	-6	-6	0	0	0	0	-15	-12
24-Jun	-45	51	0	-6	0	0	0	0	12	0
25-Jun	144	195	15	9	0	0	0	0	27	27
26-Jun	1,656	1,851	174	183	0	0	0	0	-54	-27
27-Jun	2,676	4,527	1,182	1,365	6	6	0	0	-150	-177
28-Jun	-1,941	2,586	-615	750	-6	0	0	0	-15	-192
29-Jun	-768	1,818	-123	627	0	0	0	0	6	-186
30-Jun	108	1,926	210	837	6	6	0	0	3	-183
1-Jul	3,132	5,058	405	1,242	3	9	0	0	-6	-189
2-Jul	3,606	8,664	795	2,037	0	9	0	0	0	-189
3-Jul	2,553	11,217	2,766	4,803	0	9	0	0	6	-183
4-Jul	1,050	12,267	2,589	7,392	0	9	0	0	3	-180
5-Jul	5,247	17,514	22,524	29,916	15	24	0	0	-12	-192
6-Jul	5,055	22,569	107,904	137,820	21	45	0	0	-9	-201
7-Jul	3,135	25,704	106,134	243,954	42	87	0	0	-75	-276
8-Jul	1,986	27,690	78,210	322,164	9	96	0	0	0	-276
9-Jul	1,836	29,526	111,624	433,788	0	96	0	0	-3	-279
10-Jul	2,025	31,551	76,080	509,868	6	102	0	0	0	-279
11-Jul	1,452	33,003	217,416	727,284	54	156	0	0	0	-279
12-Jul	579	33,582	136,701	863,985	21	177	0	0	0	-279
13-Jul	324	33,906	-11,820	852,165	-6	171	3	3	0	-279
14-Jul	-78	33,828	-12,516	839,649	0	171	3	6	0	-279
15-Jul	204	34,032	16,602	856,251	3	174	9	15	0	-279
16-Jul	453	34,485	12,156	868,407	6	180	27	42	0	-279
17-Jul	726	35,211	18,735	887,142	3	183	60	102	-3	-282
18-Jul	255	35,466	13,635	900,777	3	186	96	198	0	-282
19-Jul	474	35,940	23,742	924,519	0	186	102	300	0	-282
20-Jul	1,164	37,104	113,745	1,038,264	3	189	240	540	0	-282
21-Jul	150	37,254	39,543	1,077,807	0	189	108	648	0	-282
22-Jul	357	37,611	25,320	1,103,127	0	189	171	819	0	-282
23-Jul	477	38,088	66,732	1,169,859	0	189	165	984	0	-282
24-Jul	669	38,757	78,153	1,248,012	3	192	189	1,173	0	-282
25-Jul	168	38,925	15,267	1,263,279	0	192	183	1,356	0	-282
26-Jul	207	39,132	34,005	1,297,284	0	192	192	1,548	0	-282
27-Jul	69	39,201	6,927	1,304,211	0	192	150	1,698	0	-282
28-Jul	51	39,252	10,023	1,314,234	0	192	135	1,833	0	-282
29-Jul	15	39,267	6,623	1,320,857	3	195	192	2,025	0	-282
30-Jul	0	39,267	3,773	1,324,630	0	195	168	2,193	0	-282
31-Jul	6	39,273	2,790	1,327,420	0	195	51	2,244	0	-282
1-Aug	12	39,285	2,055	1,329,475	0	195	114	2,358	0	-282
2-Aug	18	39,303	3,567	1,333,042	0	195	279	2,637	12	-270
3-Aug	39	39,342	3,348	1,336,390	0	195	381	3,018	0	-270
4-Aug	48	39,390	4,278	1,340,668	0	195	642	3,660	0	-270
5-Aug	3	39,393	1,452	1,342,120	0	195	291	3,951	0	-270
6-Aug	9	39,402	1,842	1,343,962	0	195	771	4,722	0	-270
7-Aug	0	39,402	630	1,344,592	0	195	663	5,385	0	-270

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Table 1.-Page 2 of 2.

Date	Daily Chum Salmon	Cum. Chum Salmon	Daily Pink Salmon	Cum. Pink Salmon	Daily Chinook Salmon	Cum. Chinook Salmon	Daily Coho Salmon	Cum. Coho Salmon	Daily Dolly Varden	Cum. Dolly Varden
8-Aug	21	39,423	594	1,345,186	0	195	285	5,670	0	-270
9-Aug	27	39,450	639	1,345,825	0	195	1,413	7,083	0	-270
10-Aug	18	39,468	381	1,346,206	0	195	771	7,854	186	-84
11-Aug	9	39,477	183	1,346,389	0	195	303	8,157	111	27
12-Aug	6	39,483	57	1,346,446	0	195	159	8,316	300	327
13-Aug	0	39,483	69	1,346,515	0	195	309	8,625	300	627
14-Aug	0	39,483	78	1,346,593	0	195	444	9,069	420	1,047
15-Aug	3	39,486	54	1,346,647	0	195	729	9,798	132	1,179
16-Aug	0	39,486	54	1,346,701	0	195	705	10,503	66	1,245
17-Aug	0	39,486	30	1,346,731	0	195	381	10,884	135	1,380
18-Aug	0	39,486	3	1,346,734	0	195	-159	10,725	45	1,425
19-Aug	3	39,489	33	1,346,767	0	195	534	11,259	261	1,686
20-Aug	3	39,492	21	1,346,788	0	195	783	12,042	411	2,097
21-Aug	3	39,495	27	1,346,815	0	195	720	12,762	189	2,286
22-Aug	6	39,501	69	1,346,884	0	195	807	13,569	717	3,003
23-Aug	3	39,504	57	1,346,941	0	195	51	13,620	476	3,479
24-Aug	0	39,504	24	1,346,965	0	195	378	13,998	561	4,040
25-Aug	0	39,504	24	1,346,989	0	195	126	14,124	144	4,184
26-Aug	0	39,504	18	1,347,007	0	195	714	14,838	132	4,316
27-Aug	3	39,507	12	1,347,019	0	195	582	15,420	273	4,589
28-Aug	3	39,510	21	1,347,040	0	195	441	15,861	417	5,006
29-Aug	3	39,513	0	1,347,040	0	195	492	16,353	27	5,033
30-Aug	0	39,513	9	1,347,049	0	195	597	16,950	-480	4,553
31-Aug	6	39,519	6	1,347,055	0	195	975	17,925	-660	3,893
1-Sep	0	39,519	3	1,347,058	0	195	-129	17,796	-264	3,629
2-Sep	0	39,519	3	1,347,061	0	195	474	18,270	-504	3,125
3-Sep	0	39,519	0	1,347,061	0	195	462	18,732	189	3,314
4-Sep	0	39,519	12	1,347,073	0	195	486	19,218	81	3,395
5-Sep	0	39,519	6	1,347,079	0	195	306	19,524	-1,245	2,150
6-Sep	0	39,519	-9	1,347,070	0	195	1,014	20,538	27	2,177
7-Sep	0	39,519	9	1,347,079	0	195	813	21,351	-222	1,955
8-Sep	0	39,519	5	1,347,084	0	195	500	21,851	-185	1,771
9-Sep	0	39,519	0	1,347,084	0	195	187	22,038	-159	1,612
10-Sep	0	39,519	6	1,347,090	0	195	126	22,164	-15	1,597
11-Sep	0	39,519	0	1,347,090	0	195	135	22,299	-48	1,549
12-Sep	0	39,519	0	1,347,090	0	195	42	22,341	-63	1,486
Total	39,519		1,347,090		195		22,341		1,486	

Table 2.—Expanded daily and cumulative (Cum.) migration of all salmonid species past Niukluk River counting tower, Norton Sound, 2006.

Date	Daily Chum Salmon	Cum. Chum Salmon	Daily Pink Salmon	Cum. Pink Salmon	Daily Chinook Salmon	Cum. Chinook Salmon	Daily Coho Salmon	Cum. Coho Salmon	Daily Dolly Varden	Cum. Dolly Varden
28-Jun	9	9	174	174	0	0	0	0	300	300
29-Jun	24	33	77	251	0	0	0	0	78	378
30-Jun	33	66	113	364	0	0	0	0	77	455
1-Jul	54	120	93	457	0	0	0	0	18	473
2-Jul	111	231	399	856	0	0	0	0	0	473
3-Jul	540	771	2,349	3,205	6	6	0	0	9	482
4-Jul	750	1,521	2,982	6,187	9	15	0	0	9	491
5-Jul	2,727	4,248	10,899	17,086	9	24	0	0	0	491
6-Jul	4,584	8,832	37,581	54,667	3	27	0	0	9	500
7-Jul	3,192	12,024	78,876	133,543	0	27	0	0	0	500
8-Jul	-228	11,796	14,934	148,477	0	27	0	0	0	500
9-Jul	1,209	13,005	41,751	190,228	0	27	0	0	0	500
10-Jul	2,724	15,729	130,353	320,581	0	27	0	0	0	500
11-Jul	2,769	18,498	280,005	600,586	0	27	0	0	0	500
12-Jul	1,026	19,524	135,567	736,153	0	27	0	0	0	500
13-Jul	123	19,647	-61,251	674,902	0	27	0	0	0	500
14-Jul	810	20,457	39,144	714,046	0	27	0	0	0	500
15-Jul	1,308	21,765	55,227	769,273	0	27	0	0	6	506
16-Jul	522	22,287	24,972	794,245	0	27	0	0	0	506
17-Jul	708	22,995	44,097	838,342	0	27	6	6	0	506
18-Jul	813	23,808	66,324	904,666	0	27	6	12	0	506
19-Jul	369	24,177	38,364	943,030	0	27	24	36	0	506
20-Jul	647	24,824	41,358	984,388	0	27	36	72	-27	479
21-Jul	156	24,980	21,654	1,006,042	0	27	63	135	0	479
22-Jul	282	25,262	25,743	1,031,785	0	27	39	174	0	479
23-Jul	303	25,565	45,213	1,076,998	0	27	42	216	0	479
24-Jul	639	26,204	81,090	1,158,088	3	30	84	300	0	479
25-Jul	222	26,426	45,573	1,203,661	0	30	75	375	0	479
26-Jul	234	26,660	51,129	1,254,790	0	30	117	492	0	479
27-Jul	144	26,804	15,966	1,270,756	0	30	39	531	0	479
28-Jul	129	26,933	15,258	1,286,014	0	30	21	552	0	479
29-Jul	312	27,245	30,185	1,316,199	0	30	179	731	0	479
30-Jul	253	27,498	18,471	1,334,670	0	30	165	896	0	479
31-Jul	171	27,669	7,728	1,342,398	0	30	129	1,025	0	479
1-Aug	132	27,801	4,776	1,347,174	0	30	102	1,127	0	479
2-Aug	183	27,984	6,228	1,353,402	0	30	90	1,217	0	479
3-Aug	249	28,233	6,243	1,359,645	0	30	135	1,352	0	479
4-Aug	180	28,413	3,129	1,362,774	0	30	102	1,454	0	479
5-Aug	108	28,521	2,018	1,364,791	0	30	138	1,592	0	479
6-Aug	63	28,584	2,067	1,366,858	0	30	153	1,745	0	479
7-Aug	63	28,647	423	1,367,281	0	30	87	1,832	6	485
8-Aug	48	28,695	438	1,367,719	0	30	75	1,907	0	485
9-Aug	66	28,761	201	1,367,920	0	30	153	2,060	0	485
10-Aug	108	28,869	363	1,368,283	0	30	252	2,312	3	488
11-Aug	111	28,980	828	1,369,111	0	30	180	2,492	3	491
12-Aug	45	29,025	711	1,369,822	0	30	131	2,622	6	497
13-Aug	30	29,055	486	1,370,308	0	30	216	2,838	6	503

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Table 2.-Page 2 of 2.

Date	Daily Chum Salmon	Cum. Chum Salmon	Daily Pink Salmon	Cum. Pink Salmon	Daily Chinook Salmon	Cum. Chinook Salmon	Daily Coho Salmon	Cum. Coho Salmon	Daily Dolly Varden	Cum. Dolly Varden
14-Aug	30	29,085	750	1,371,058	3	33	162	3,000	9	512
15-Aug	45	29,130	231	1,371,289	0	33	156	3,156	12	524
16-Aug	30	29,160	12	1,371,301	0	33	147	3,303	18	542
17-Aug	3	29,163	138	1,371,439	6	39	303	3,606	42	584
18-Aug	0	29,163	177	1,371,616	0	39	39	3,645	3	587
19-Aug	12	29,175	72	1,371,688	0	39	147	3,792	93	680
20-Aug	6	29,181	66	1,371,754	0	39	438	4,230	108	788
21-Aug	6	29,187	54	1,371,808	0	39	198	4,428	48	836
22-Aug	-3	29,184	3	1,371,811	0	39	417	4,845	0	836
23-Aug	0	29,184	6	1,371,817	0	39	684	5,529	3	839
24-Aug	0	29,184	15	1,371,832	0	39	729	6,258	48	887
25-Aug	0	29,184	3	1,371,835	0	39	1,011	7,269	96	983
26-Aug	-3	29,181	18	1,371,853	0	39	585	7,854	81	1,064
27-Aug	6	29,187	24	1,371,877	0	39	597	8,451	99	1,163
28-Aug	6	29,193	21	1,371,898	0	39	516	8,967	81	1,244
29-Aug	6	29,199	18	1,371,916	0	39	348	9,315	96	1,340
30-Aug	0	29,199	3	1,371,919	0	39	408	9,723	36	1,376
31-Aug	0	29,199	0	1,371,919	0	39	222	9,945	45	1,421
1-Sep	0	29,199	0	1,371,919	0	39	159	10,104	63	1,484
2-Sep	0	29,199	0	1,371,919	0	39	264	10,368	93	1,577
3-Sep	0	29,199	0	1,371,919	0	39	234	10,602	90	1,667
4-Sep	0	29,199	0	1,371,919	0	39	123	10,725	57	1,724
5-Sep	0	29,199	0	1,371,919	0	39	117	10,842	57	1,781
6-Sep	0	29,199	0	1,371,919	0	39	162	11,004	60	1,841
7-Sep	0	29,199	0	1,371,919	0	39	153	11,157	93	1,934
8-Sep	0	29,199	0	1,371,919	0	39	12	11,169	0	1,934
Total	29,199		1,371,919		39		11,169		1,934	

Table 3.—Daily and cumulative (Cum.) passage of all salmonid species at Nome River weir, Norton Sound, 2006.

Date	Daily Chum Salmon	Cum. Chum Salmon	Daily Pink Salmon	Cum. Pink Salmon	Daily Chinook Salmon	Cum. Chinook Salmon	Daily Coho Salmon	Cum. Coho Salmon	Daily Dolly Varden	Cum. Dolly Varden	Daily Sockeye Salmon	Cum. Sockeye Salmon
2-Jul	3	3	1	1	0	0	0	0	0	0	0	0
3-Jul	4	7	0	1	0	0	0	0	5	5	0	0
4-Jul	16	23	40	41	0	0	0	0	16	21	0	0
5-Jul	63	86	536	577	0	0	0	0	27	48	0	0
6-Jul	329	415	6,219	6,796	0	0	1	1	14	62	2	2
7-Jul	460	875	41,023	47,819	0	0	0	1	4	66	17	19
8-Jul	304	1,179	38,447	86,266	0	0	0	1	2	68	29	48
9-Jul	13	1,192	3,232	89,498	0	0	0	1	0	68	1	49
10-Jul	320	1,512	24,822	114,320	0	0	0	1	9	77	13	62
11-Jul	754	2,266	80,392	194,712	0	0	0	1	2	79	14	76
12-Jul	184	2,450	51,484	246,196	1	1	0	1	2	81	4	80
13-Jul	115	2,565	22,931	269,127	0	1	0	1	4	85	3	83
14-Jul	284	2,849	42,076	311,203	0	1	1	2	1	86	7	90
15-Jul	58	2,907	8,282	319,485	0	1	0	2	0	86	2	92
16-Jul	64	2,971	3,767	323,252	0	1	7	9	1	87	1	93
17-Jul	415	3,386	11,747	334,999	2	3	14	23	10	97	3	96
18-Jul	311	3,697	11,150	346,149	2	5	15	38	9	106	6	102
19-Jul	375	4,072	20,000	366,149	1	6	34	72	12	118	4	106
20-Jul	375	4,447	20,000	386,149	1	7	52	124	11	129	4	110
21-Jul	30	4,477	5,140	391,289	0	7	4	128	9	138	0	110
22-Jul	84	4,561	27,160	418,449	0	7	102	230	19	157	6	116
23-Jul	67	4,628	25,530	443,979	0	7	59	289	5	162	0	116
24-Jul	151	4,779	42,220	486,199	0	7	50	339	0	162	1	117
25-Jul	139	4,918	30,740	516,939	0	7	40	379	1	163	1	118
26-Jul	8	4,926	7,250	524,189	0	7	6	385	1	164	0	118
27-Jul	10	4,936	8,150	532,339	0	7	3	388	1	165	0	118
28-Jul	5	4,941	1,930	534,269	0	7	1	389	0	165	0	118
29-Jul	139	5,080	35,530	569,799	13	20	113	502	3	168	6	124
30-Jul	3	5,083	1,300	571,099	0	20	2	504	0	168	0	124
31-Jul	0	5,083	0	571,099	0	20	0	504	0	168	0	124
1-Aug	6	5,089	90	571,189	0	20	14	518	0	168	0	124
2-Aug	0	5,089	60	571,249	0	20	2	520	0	168	0	124
3-Aug	1	5,090	430	571,679	0	20	3	523	0	168	0	124
4-Aug	0	5,090	47	571,726	0	20	2	525	0	168	0	124
5-Aug	1	5,091	240	571,966	0	20	0	525	1	169	0	124

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Table 3.–Page 2 of 2.

Date	Daily Chum Salmon	Cum. Chum Salmon	Daily Pink Salmon	Cum. Pink Salmon	Daily Chinook Salmon	Cum. Chinook Salmon	Daily Coho Salmon	Cum. Coho Salmon	Daily Dolly Varden	Cum. Dolly Varden	Daily Sockeye Salmon	Cum. Sockeye Salmon
6-Aug	13	5,104	740	572,706	0	20	18	543	0	169	0	124
7-Aug	7	5,111	405	573,111	2	22	13	556	1	170	0	124
8-Aug	14	5,125	870	573,981	0	22	21	577	0	170	0	124
9-Aug	12	5,137	560	574,541	0	22	13	590	0	170	0	124
10-Aug	44	5,181	69	574,610	0	22	1	591	0	170	2	126
11-Aug	84	5,265	826	575,436	0	22	252	843	33	203	6	132
12-Aug	51	5,316	583	576,019	1	23	196	1,039	38	241	1	133
13-Aug	57	5,373	385	576,404	4	27	206	1,245	71	312	1	134
14-Aug	53	5,426	235	576,639	1	28	159	1,404	33	345	1	135
15-Aug	38	5,464	358	576,997	0	28	125	1,529	40	385	0	135
16-Aug	43	5,507	177	577,174	2	30	55	1,584	24	409	1	136
17-Aug	3	5,510	156	577,330	0	30	42	1,626	26	435	0	136
18-Aug	29	5,539	150	577,480	1	31	85	1,711	27	462	3	139
19-Aug	18	5,557	144	577,624	0	31	151	1,862	58	520	3	142
20-Aug	5	5,562	104	577,728	0	31	119	1,981	33	553	1	143
21-Aug	7	5,569	120	577,848	0	31	131	2,112	48	601	2	145
22-Aug	30	5,599	191	578,039	5	36	606	2,718	154	755	2	147
23-Aug	18	5,617	132	578,171	0	36	703	3,421	85	840	3	150
24-Aug	2	5,619	31	578,202	1	37	377	3,798	51	891	0	150
25-Aug	7	5,626	44	578,246	4	41	252	4,050	76	967	3	153
26-Aug	5	5,631	29	578,275	1	42	201	4,251	96	1,063	11	164
27-Aug	3	5,634	29	578,304	1	43	171	4,422	76	1,139	3	167
28-Aug	4	5,638	24	578,328	0	43	218	4,640	28	1,167	2	169
29-Aug	8	5,646	31	578,359	1	44	386	5,026	106	1,273	6	175
30-Aug	2	5,648	33	578,392	0	44	393	5,419	43	1,316	0	175
31-Aug	7	5,655	27	578,419	0	44	227	5,646	30	1,346	0	175
1-Sep	3	5,658	20	578,439	0	44	259	5,905	57	1,403	3	178
2-Sep	8	5,666	64	578,503	1	45	733	6,638	137	1,540	11	189
3-Sep	4	5,670	33	578,536	0	45	612	7,250	136	1,676	7	196
4-Sep	5	5,675	19	578,555	0	45	343	7,593	40	1,716	0	196
5-Sep	2	5,677	0	578,555	0	45	114	7,707	8	1,724	0	196
6-Sep	1	5,678	0	578,555	0	45	12	7,719	0	1,724	0	196
7-Sep	0	5,678	0	578,555	0	45	589	8,308	0	1,724	0	196
Total	5,678		578,555		45		8,308		1,724		196	

Table 4.—Chum salmon age and sex composition and mean length (mm) by sampling period, Kwiniuk River, Norton Sound, 2006.

		Brood Year and (Age Group)				Total
		2003 (0.2)	2002 (0.3)	2001 (0.4)	2000 (0.5)	
Sampling Dates:	6/28					
Sample Size:	105					
Male	Percent of Samples	1.0	48.6	16.2	0.0	65.7
	Number of Samples	1	51	17	0	69
	Mean Length ^a	540.0	580.2	589.4	0.0	581.9
Female	Percent of Samples	0.0	21.0	13.3	0.0	34.3
	Number of Samples	0	22	14	0	36
	Mean Length ^a	0.0	556.6	581.1	0.0	566.1
Total	Percent of Samples	1.0	69.5	29.5	0.0	100.0
	Number of Samples	1	73	31	0	105
	Mean Length ^a	540.0	573.1	585.6	0.0	577.2
Sampling Dates:	7/1					
Sample Size:	221					
Male	Percent of Samples	0.0	38.5	13.1	0.0	51.6
	Number of Samples	0	85	29	0	114
	Mean Length ^a	0.0	585.2	610.0	0.0	591.6
Female	Percent of Samples	0.0	34.4	13.6	0.5	48.4
	Number of Samples	0	76	30	1	107
	Mean Length ^a	0.0	562.6	579.5	560.0	567.3
Total	Percent of Samples	0.0	72.9	26.7	0.5	100.0
	Number of Samples	0	161	59	1	221
	Mean Length ^a	0.0	574.6	594.5	560.0	579.8
Sampling Dates:	7/4-7/14					
Sample Size:	148					
Male	Percent of Samples	0.0	34.5	5.4	0.7	40.5
	Number of Samples	0	51	8	1	60
	Mean Length ^a	0.0	572.3	589.4	610.0	575.2
Female	Percent of Samples	0.0	48.0	11.5	0.0	59.5
	Number of Samples	0	71	17	0	88
	Mean Length ^a	0.0	558.0	568.5	0.0	560.1
Total	Percent of Samples	0.0	82.4	16.9	0.7	100.0
	Number of Samples	0	122	25	1	148
	Mean Length ^a	0.0	564.0	560.3	610.0	566.2

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Table 4.–Page 2 of 2.

		Brood Year and (Age Group)				
		<u>2003</u>	<u>2002</u>	<u>2001</u>	<u>2000</u>	
		(0.2)	(0.3)	(0.4)	(0.5)	Total
Sampling Dates:	6/28-7/14	Season Total				
Sample Size:	474					
Male	Percent of Samples	0.2	39.5	11.4	0.2	51.3
	Number of Samples	1	187	54	1	243
	Mean Length ^a	540.0	580.3	600.5	610.0	584.8
Female	Percent of Samples	0.0	35.7	12.9	0.2	48.7
	Number of Samples	0	169	61	1	231
	Mean Length ^a	0.0	559.9	576.8	560.0	564.4
Total ^b	Percent of Samples	0.2	75.1	24.3	0.4	100.0
	Number of Samples	1	356	115	2	474
	Mean Length ^a	540.0	570.6	584.7	585.0	575.0

^a Length was measured from mid-eye to tail fork (METF).

^b The number of fish in total are the stratum sums; total percentages are derived from the sums.

Table 5.—Chum salmon age and sex composition and mean length (mm) by sampling period, Niukluk River, Norton Sound, 2006.

		Brood Year and (Age Group)				Total
		2003 (0.2)	2002 (0.3)	2001 (0.4)	2000 (0.5)	
Sampling Dates:		7/5-7/6				
Sample Size:		144				
Male	Percent of Samples	0.0	21.5	34.7	0.0	56.3
	Number of Samples	0	31	50	0	81
	Mean Length ^a	0.0	582.6	610.5	0.0	599.8
Female	Percent of Samples	0.0	13.2	29.2	1.4	43.8
	Number of Samples	0	19	42	2	63
	Mean Length ^a	0.0	551.5	570.9	562.5	564.8
Total	Percent of Samples	0.0	34.7	63.9	1.4	100.0
	Number of Samples	0	50	92	2	144
	Mean Length ^a	0.0	570.8	592.4	562.5	584.5
Sampling Dates:		7/7-7/12				
Sample Size:		163				
Male	Percent of Samples	0.0	19.0	26.4	0.0	45.4
	Number of Samples	0	31	43	0	74
	Mean Length ^a	0.0	573.4	597.5	0.0	587.4
Female	Percent of Samples	0.0	19.0	35.0	0.6	54.6
	Number of Samples	0	31	57	1	89
	Mean Length ^a	0.0	549.8	561.5	547.0	557.3
Total	Percent of Samples	0.0	38.0	61.3	0.6	100.0
	Number of Samples	0	62	100	1	163
	Mean Length ^a	0.0	561.6	577.0	547.0	571.0
Sampling Dates:		7/13-7/20				
Sample Size:		118				
Male	Percent of Samples	0.8	24.6	11.0	0.0	36.4
	Number of Samples	1	29	13	0	43
	Mean Length ^a	520.0	573.7	600.6	0.0	580.6
Female	Percent of Samples	0.0	42.4	21.2		63.6
	Number of Samples	0	50	25	0	75
	Mean Length ^a	0	542.8	565.1	0	550.2
Total	Percent of Samples	0.8	66.9	32.2	0.0	100.0
	Number of Samples	1	79	38	0	118
	Mean Length ^a	520.0	554.1	577.2	0.0	561.3
Sampling Dates:		7/5-7/20				
Sample Size:		425				
		Season Total				
Male	Percent of Samples	0.2	21.4	24.9	0.0	46.6
	Number of Samples	1	91	106	0	198
	Mean Length ^a	520.0	576.6	604.0	0.0	591.0
Female	Percent of Samples	0.0	23.5	29.2	0.7	53.4
	Number of Samples	0	100	124	3	227
	Mean Length ^a	0.0	546.6	565.4	557.3	557.0
Total ^b	Percent of Samples	0.2	44.9	54.1	0.7	100.0
	Number of Samples	1	191	230	3	425
	Mean Length ^a	520.0	560.9	583.2	557.3	572.9

^a Length was measured from mid-eye to tail fork (METF).

^b The number of fish in total are the sample sums; total percentages are derived from the sums.

Table 6.—Chum salmon age and sex composition, and mean length (mm) by sampling period, Nome River, Norton Sound, 2006.

		Brood Year and (Age Group)				
		<u>2003</u>	<u>2002</u>	<u>2001</u>	<u>2000</u>	
		(0.2)	(0.3)	(0.4)	(0.5)	Total
Sampling Dates:	7/2-7/10					
Sample Size:	155					
Male	Percent of Samples	0.0	23.2	43.2	0.0	66.5
	Number of Samples	0	36	67	0	103
	Mean Length ^a	0.0	576.5	580.8	0.0	579.3
Female	Percent of Samples	0.0	9.7	23.9	0.0	33.5
	Number of Samples	0	15	37	0	52
	Mean Length ^a	0.0	555.7	562.6	0.0	560.6
Total ^b	Percent of Samples	0.0	32.9	67.1	0.0	100.0
	Number of Samples	0	51	104	0	155
	Mean Length ^a	0.0	570.4	574.3	0.0	573.0
Sampling Dates:	7/11-7/19					
Sample Size:	97					
Male	Percent of Samples	1.0	18.6	14.4	0.0	34.0
	Number of Samples	1	18	14	0	33
	Mean Length ^a	550.0	570.6	582.9	0.0	575.2
Female	Percent of Samples	1.0	39.2	25.8	0.0	66.0
	Number of Samples	1	38	25	0	64
	Mean Length ^a	475.0	540.1	551.8	0.0	543.7
Total ^b	Percent of Samples	2.1	57.7	40.2	0.0	100.0
	Number of Samples	2	56	39	0	97
	Mean Length ^a	512.5	549.9	562.9	0.0	554.4
Sampling Dates:	7/24-8/22					
Sample Size:	206					
Male	Percent of Samples	1.0	24.8	13.6	0.0	39.3
	Number of Samples	2	51	28	0	81
	Mean Length ^a	550.0	573.2	573.5	0.0	576.4
Female	Percent of Samples	1.9	40.8	18.0	0.0	60.7
	Number of Samples	4	84	37	0	125
	Mean Length ^a	507.5	536.9	551.9	0.0	555.8
Total ^b	Percent of Samples	2.9	65.5	31.6	0.0	100.0
	Number of Samples	6	135	65	0	206
	Mean Length ^a	521.7	550.6	552.2	0.0	563.3

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Table 6.—Page 2 of 2.

		Brood Year and (Age Group)				
		<u>2003</u>	<u>2002</u>	<u>2001</u>	<u>2000</u>	
		(0.2)	(0.3)	(0.4)	(0.5)	Total
Sampling Dates:	7/2-8/22	Season Total				
Sample Size:	458					
Male	Percent of Samples	0.7	22.9	23.8	0.0	47.4
	Number of Samples	3	105	109	0	217
	Mean Length ^a	550.0	573.9	583.4	0.0	578.3
Female	Percent of Samples	1.1	29.9	21.6	0.0	52.6
	Number of Samples	5	137	99	0	241
	Mean Length ^a	501.0	554.6	555.9	0.0	545.6
Total ^b	Percent of Samples	1.7	52.8	45.4	0.0	100.0
	Number of Samples	8	242	208	0	458
	Mean Length ^a	519.4	554.6	570.3	0.0	561.1

^a Length was measured from mid-eye to tail fork (METF).

^b The number of fish in total are the sample sums; total percentages are derived from the sums.

Table 7.—Coho salmon age and sex composition, and mean length (mm), Kwiniuk River, Norton Sound, 2006.

		Brood Year and (Age Group)			Total
		2003 (1.1)	2002 (2.1)	2001 (3.1)	
Sampling Dates:	8/13-8/26				
Sample Size:	182				
Male	Percent of Samples	9.9	31.9	1.6	43.4
	Number of Samples	18	58	3	79
	Mean Length ^a	516.6	561.6	535.7	550.4
Female	Percent of Samples	12.6	42.9	1.1	56.6
	Number of Samples	23	78	2	103
	Mean Length ^a	553.8	561.9	558.5	560.0
Total ^b	Percent of Samples	22.5	74.7	2.7	100.0
	Number of Samples	41	136	5	182
	Mean Length ^a	537.4	561.8	544.8	555.8

Table 8.—Coho salmon age and sex composition, and mean length (mm), Niukluk River, Norton Sound, 2006.

		Brood Year and (Age Group)			Total
		2003 (1.1)	2002 (2.1)	2001 (3.1)	
Sampling Dates:	7/20-8/12				
Sample Size:	121				
Male	Percent of Samples	4.1	55.4	2.5	62.0
	Number of Samples	5	67	3	75
	Mean Length ^a	540.0	569.2	573.3	567.5
Female	Percent of Samples	3.3	33.1	1.7	38.0
	Number of Samples	4	40	2	46
	Mean Length ^a	526.3	549.7	540.0	547.2
Total ^b	Percent of Samples	7.4	88.4	4.1	100.0
	Number of Samples	9	107	5	121
	Mean Length ^a	533.9	561.9	560.0	559.8

Table 9.—Coho salmon age and sex composition, and mean length (mm), Nome River, Norton Sound, 2006.

		Brood Year and (Age Group)			Total
		2003 (1.1)	2002 (2.1)	2001 (3.1)	
Sampling Dates:	7/24-9/2				
Sample Size:	191				
Male	Percent of Samples	3.1	33.5	2.6	39.3
	Number of Samples	6	64	5	75
	Mean Length ^a	495.0	551.7	575.0	548.7
Female	Percent of Samples	5.2	53.9	1.6	60.7
	Number of Samples	10	103	3	116
	Mean Length ^a	539.0	543.6	541.7	543.2
Total ^b	Percent of Samples	8.4	87.4	4.2	100.0
	Number of Samples	16	167	8	191
	Mean Length ^a	441.1	536.1	529.0	545.4

^a Length was measured from mid-eye to fork-of-tail (METF)

^b The number of fish in total are the sample sums; total percentages are derived from the sums.

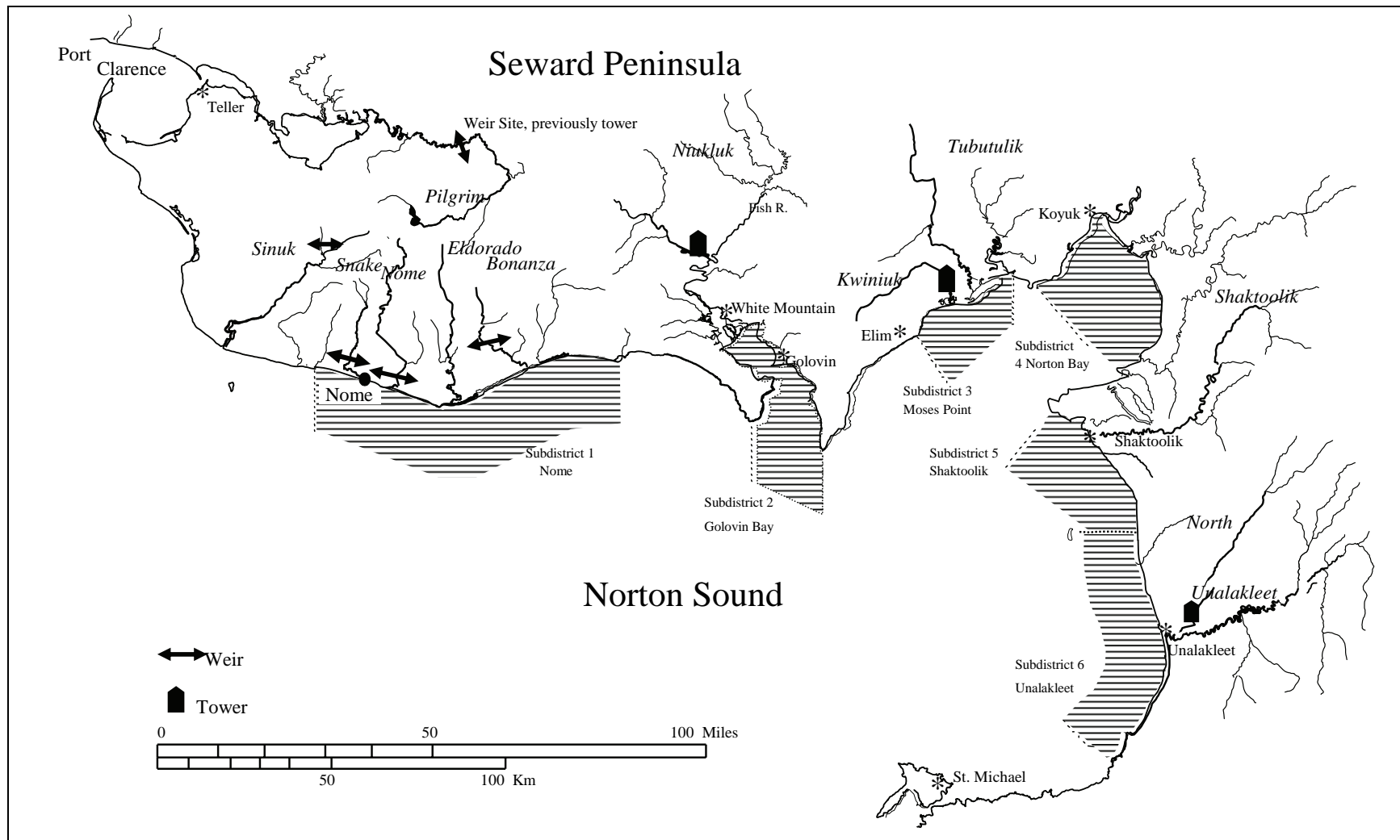


Figure 1.—Norton Sound and southern Seward Peninsula, Alaska, showing commercial fishery subdistricts and tower or weir enumeration project locations.

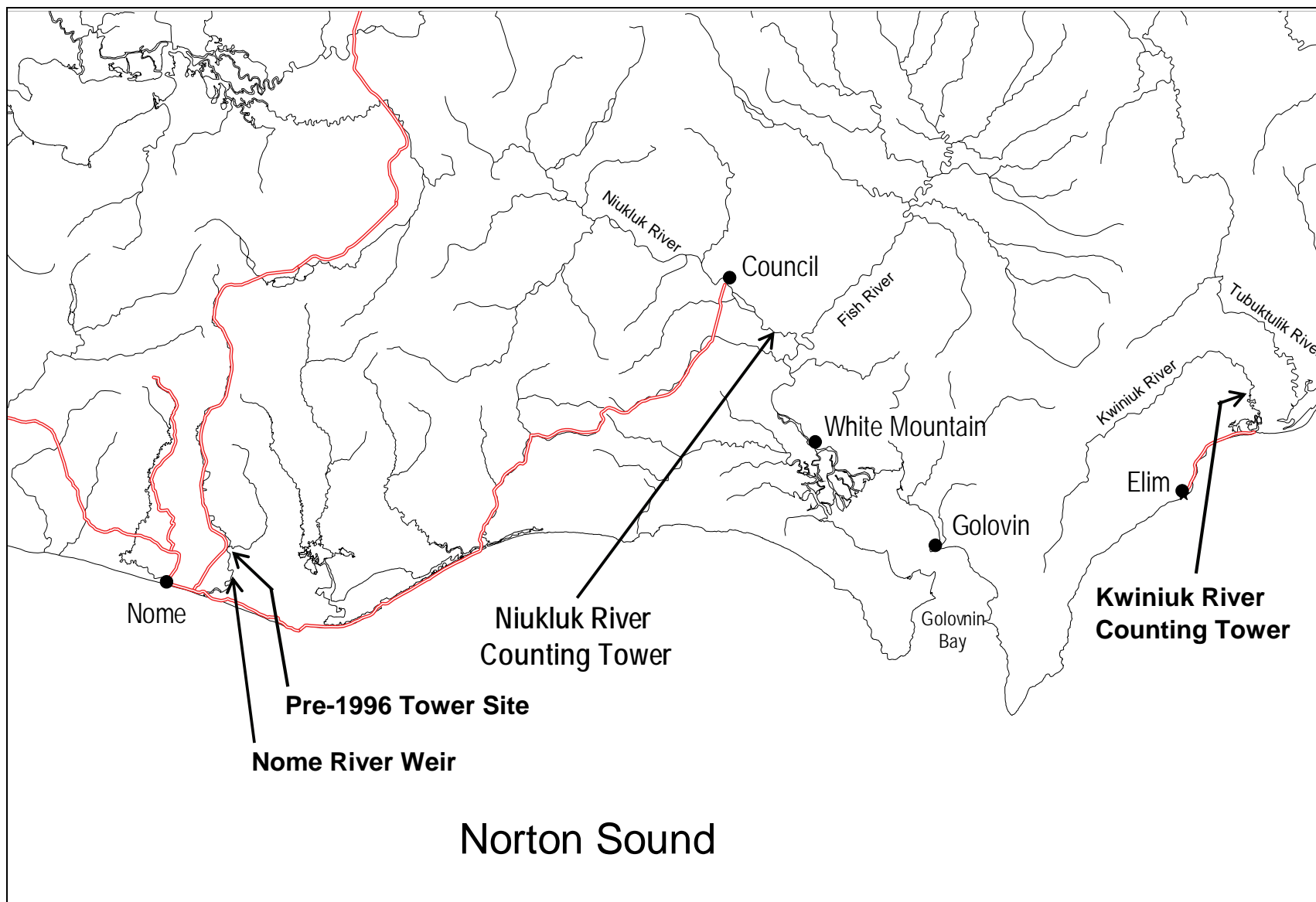


Figure 2.—ADF&G escapement project sites; Kwiniuk and Niukluk counting towers and Nome River weir and previous tower site, Norton Sound.

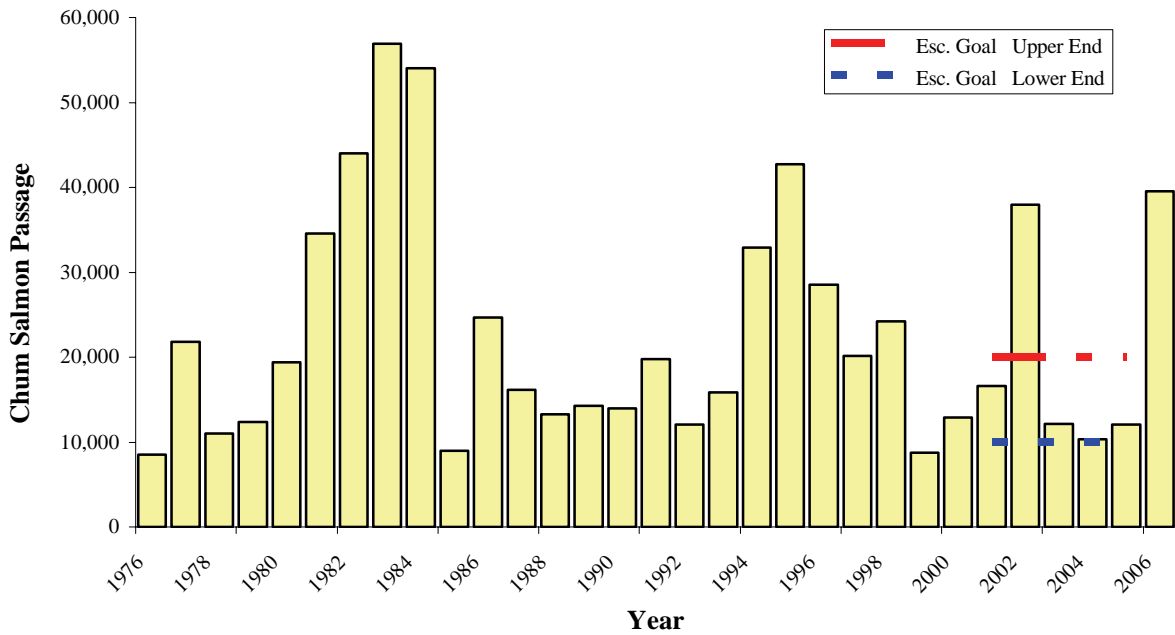


Figure 3.—Annual chum salmon passage and historical average at the Kwiniuk River counting tower, 1976-2006, Norton Sound.

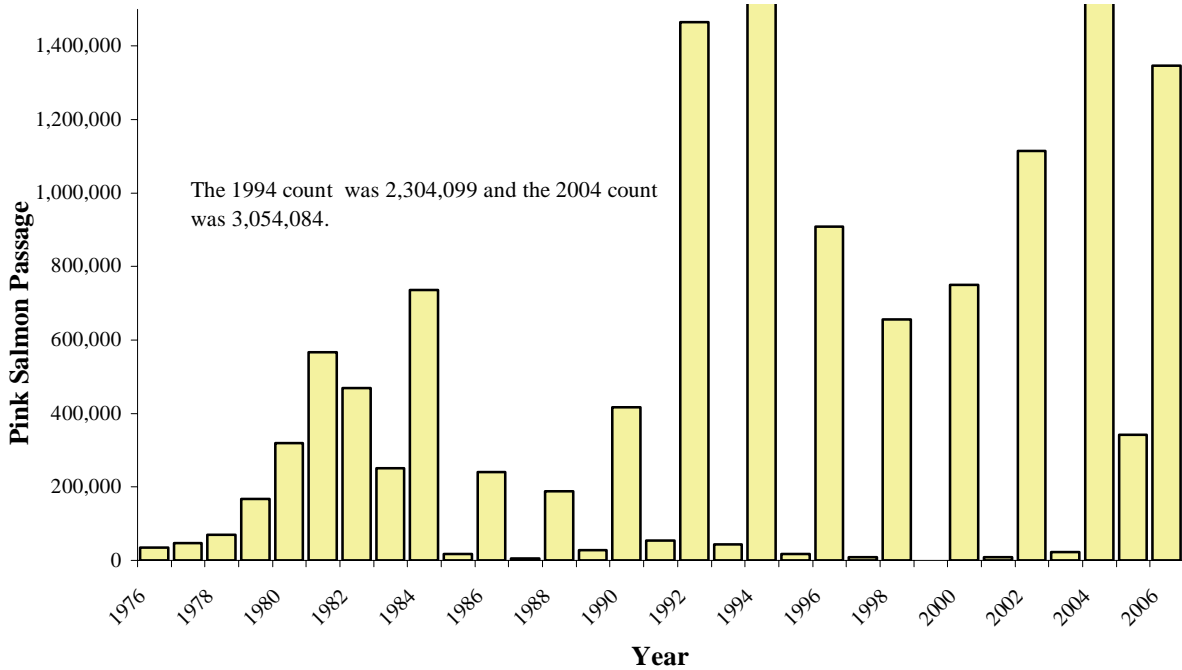


Figure 4.—Annual pink salmon passage and historical odd and even-year averages at the Kwiniuk River counting tower, 1976-2006, Norton Sound.

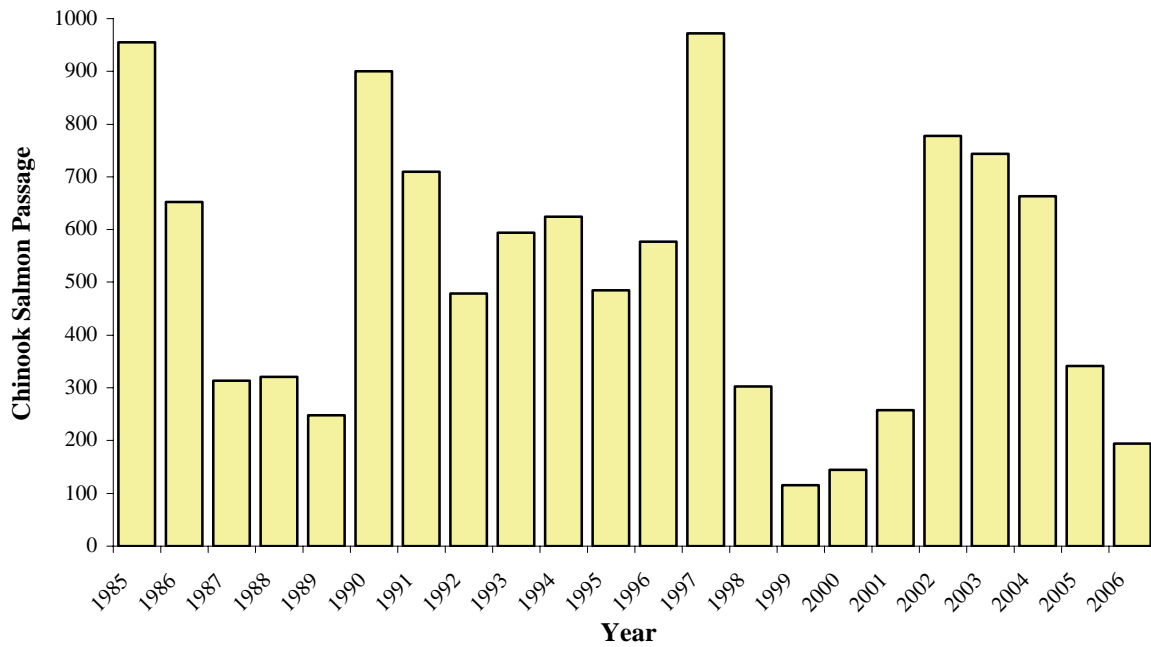


Figure 5.—Annual Chinook salmon passage and historical average at the Kwiniuk River counting tower, (1985-2006), Norton Sound.

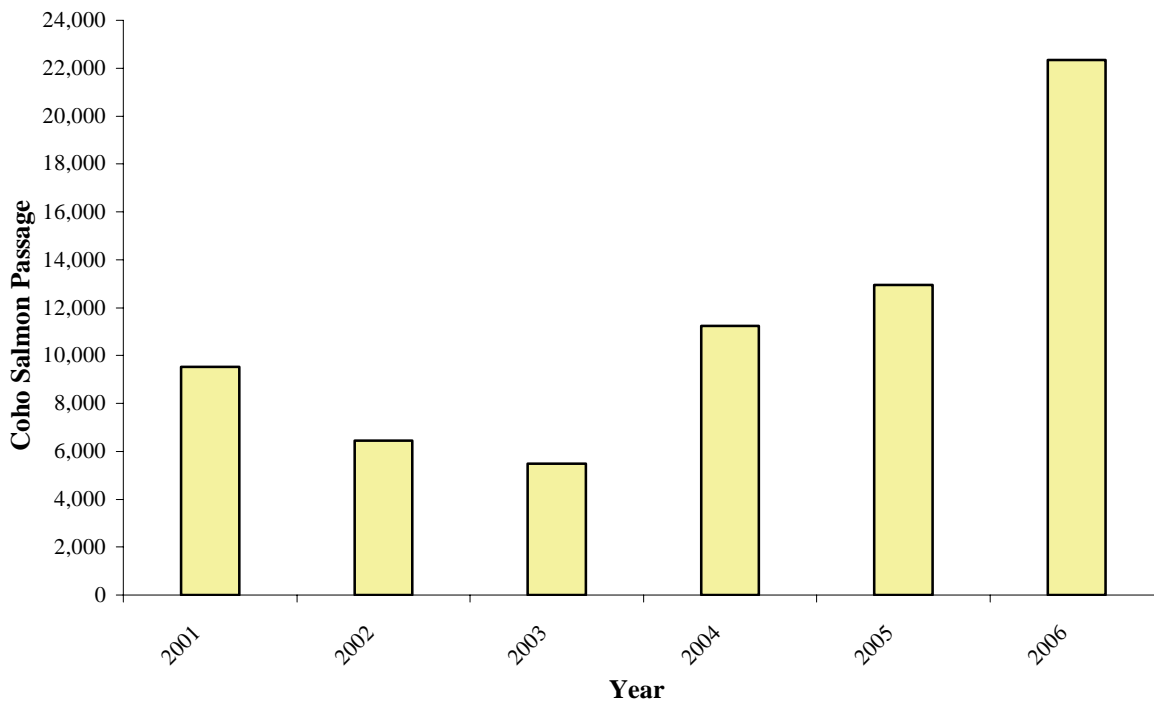


Figure 6.—Annual coho salmon passage and historical average at the Kwiniuk River counting tower, (2001-2006), Norton Sound.

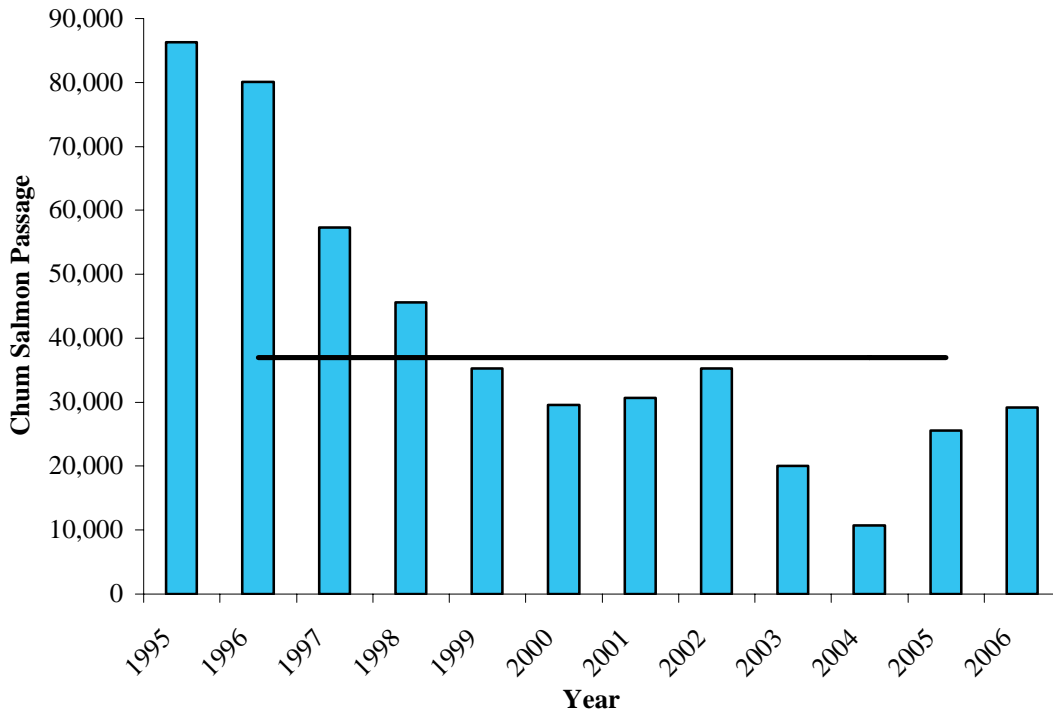


Figure 7.—Annual chum salmon passage and historical average at the Niukluk River counting tower (1995–2006), Norton Sound.

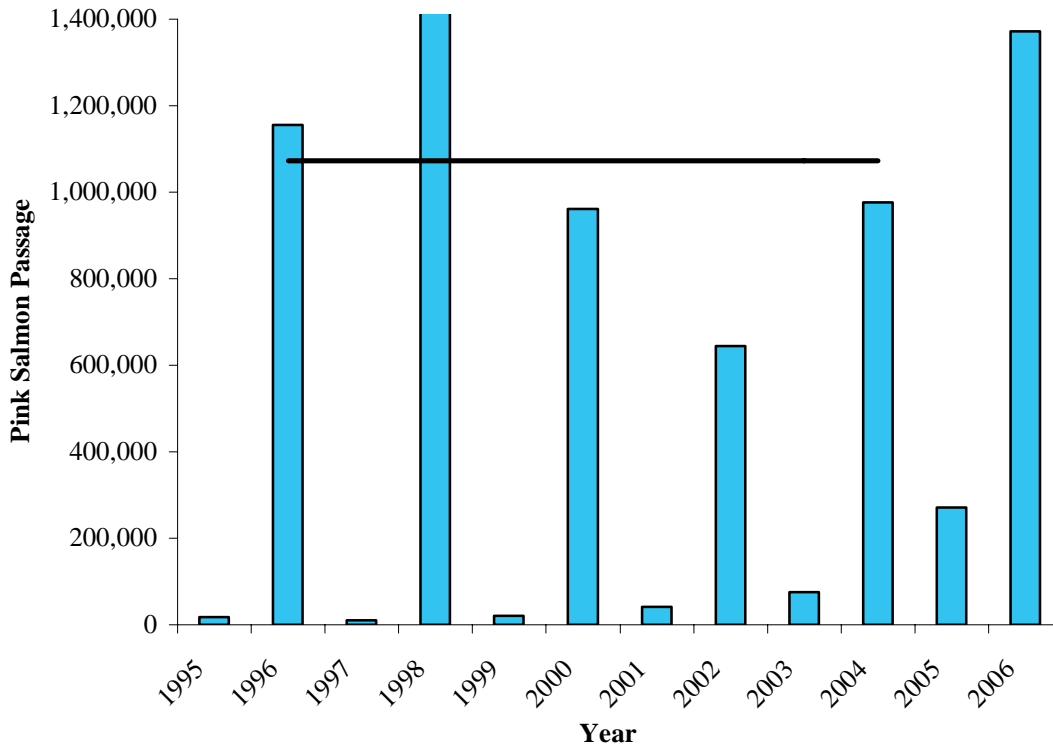


Figure 8.—Annual pink salmon passage and historical even-year average at the Niukluk River counting tower (1995–2006), Norton Sound.

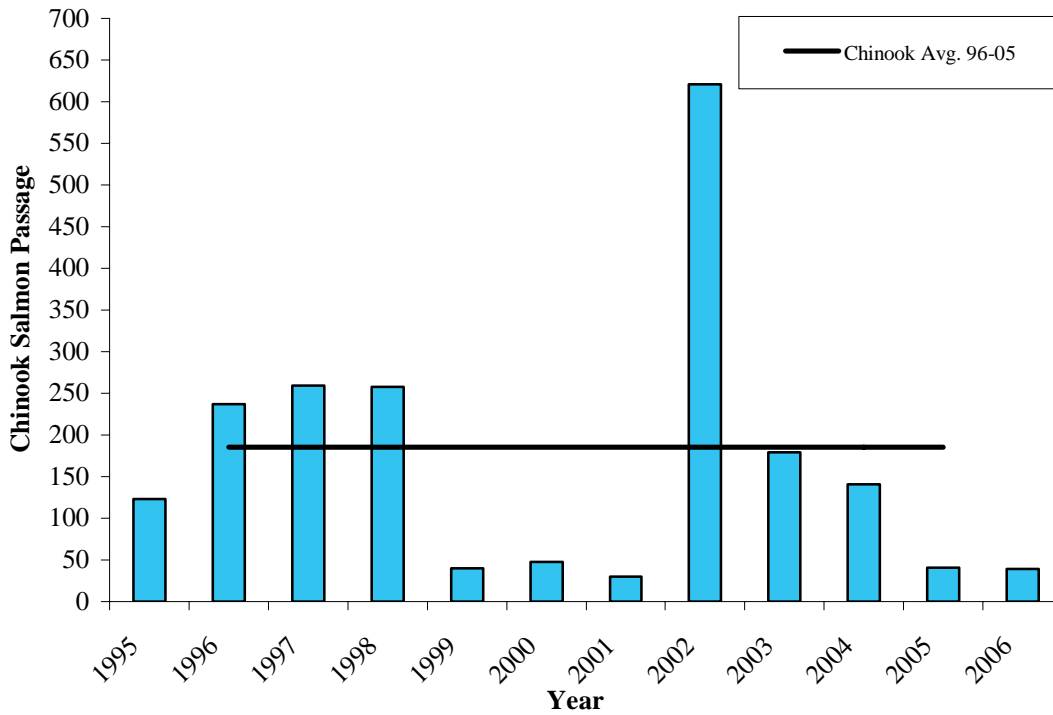


Figure 9.—Annual Chinook salmon passage and historical average at the Niukluk River counting tower (1995-2006), Norton Sound.

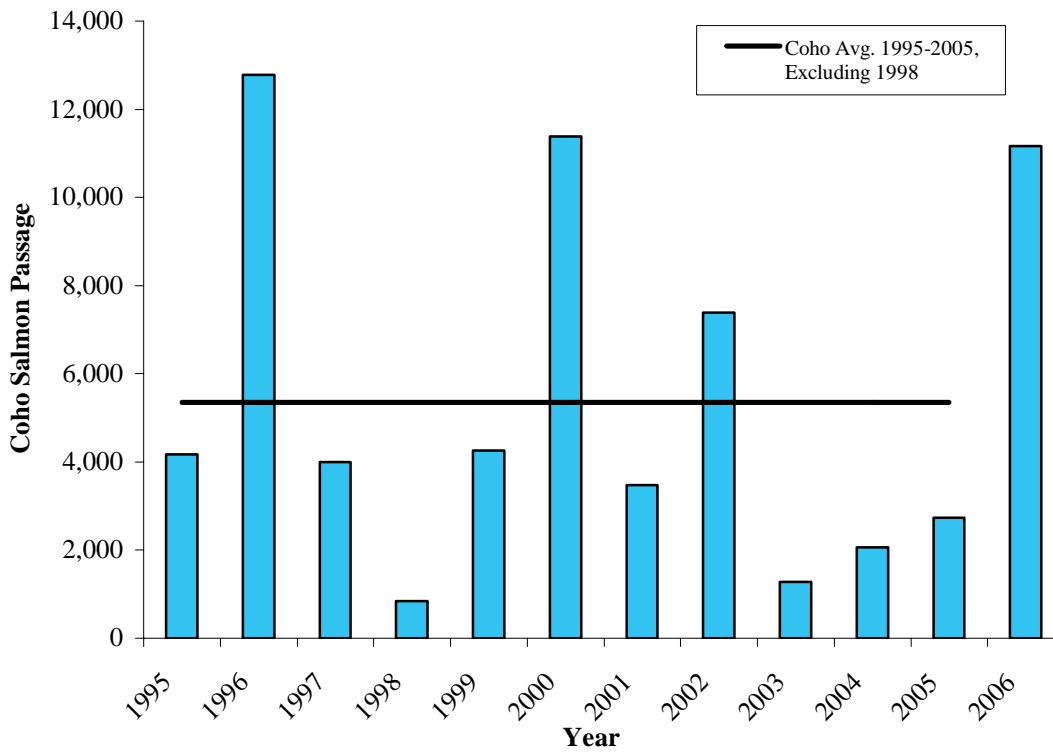


Figure 10.—Annual coho salmon passage and historical average at the Niukluk River counting tower (1995-2006), Norton Sound.

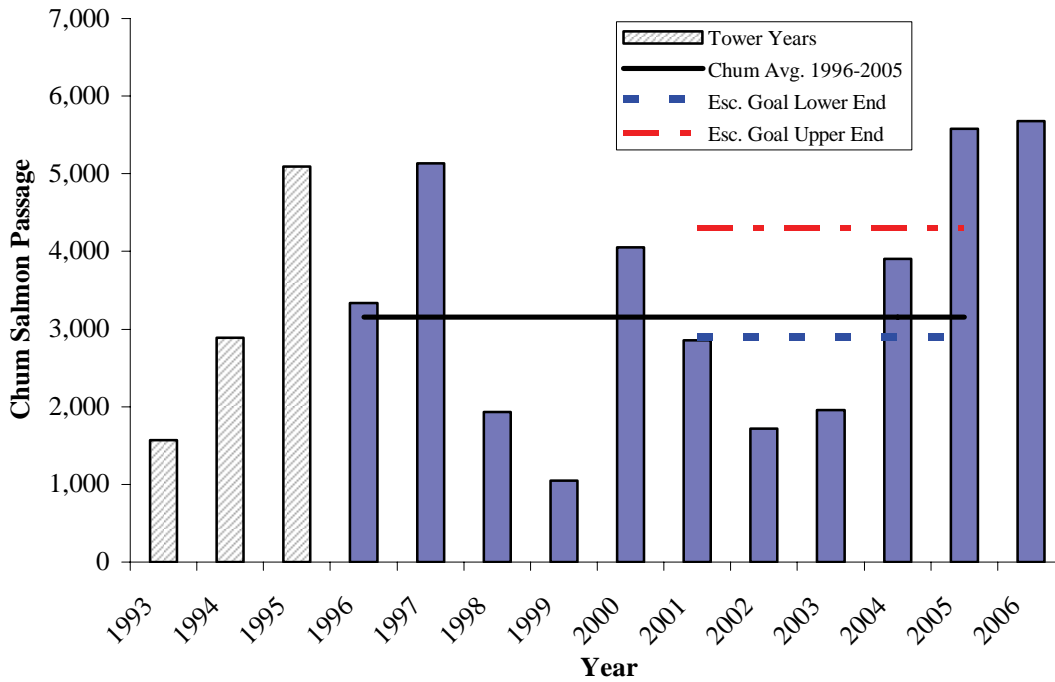


Figure 11.—Annual chum salmon passage and historical average at the Nome River tower and weir (1993-2006), Norton Sound.

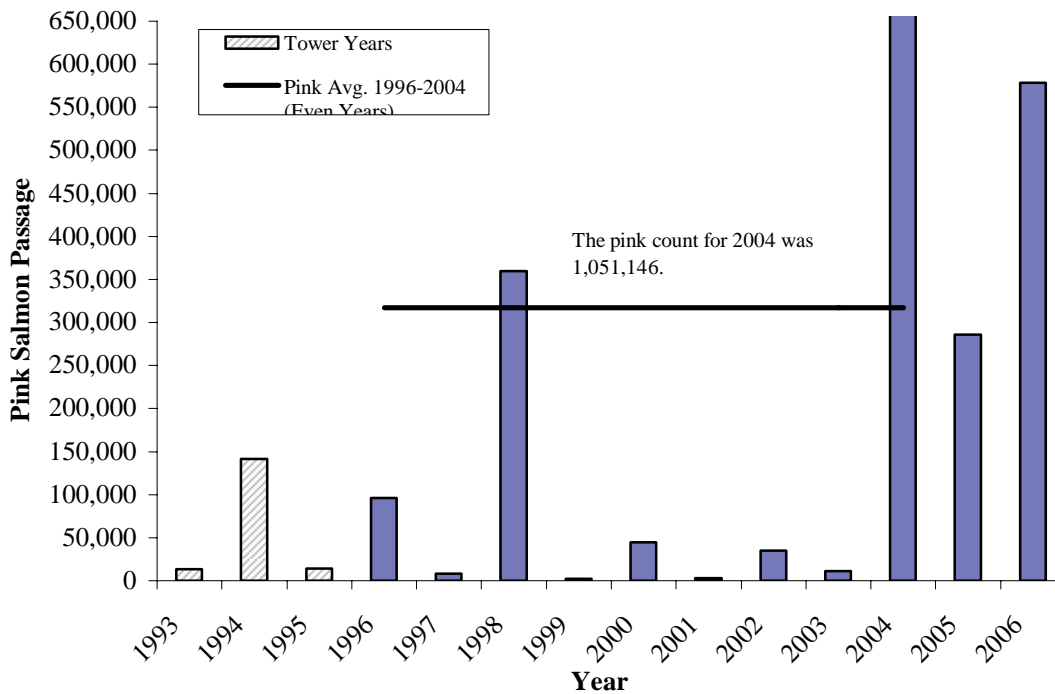


Figure 12.—Annual pink salmon passage and historical even-year average at the Nome River tower and weir (1993-2006), Norton Sound

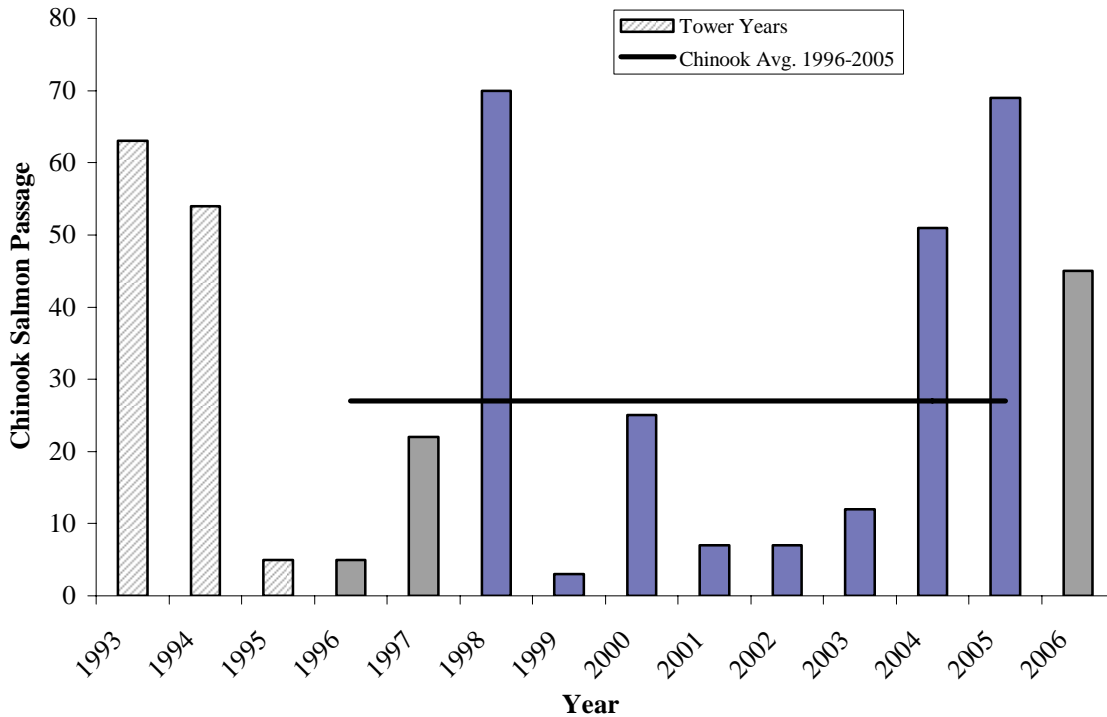


Figure 13.—Annual Chinook salmon passage and historical average at the Nome River weir (1993-2006).

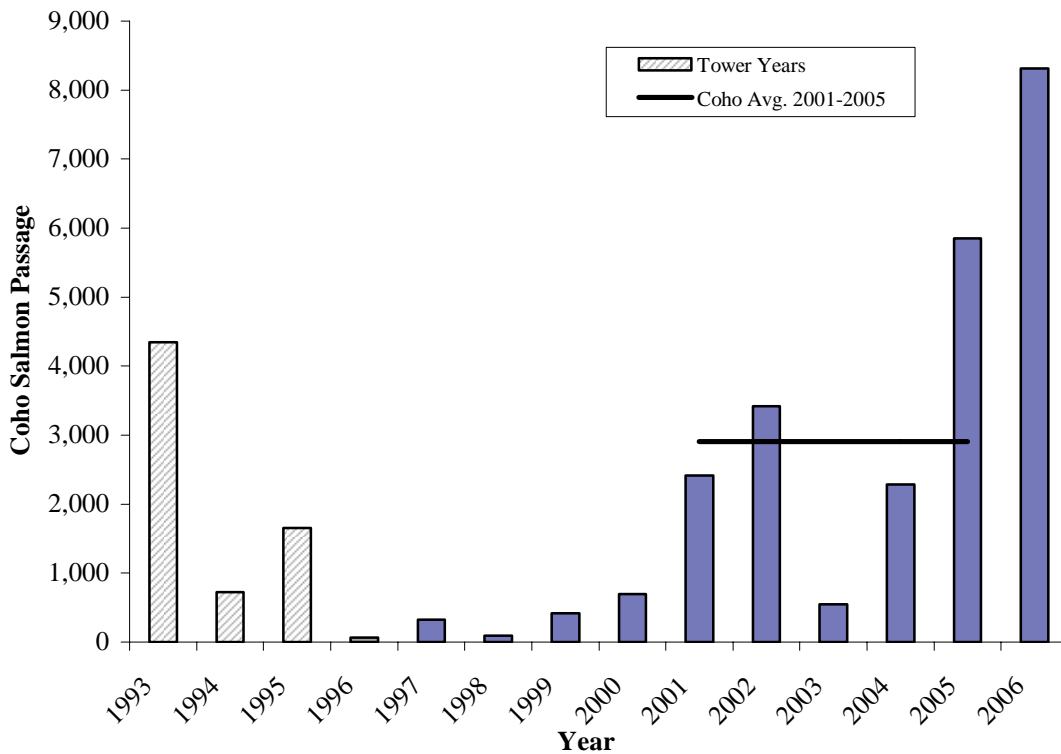


Figure 14.—Annual coho salmon passage and historical average at the Nome River tower and weir (1993-2006).

APPENDIX A

Appendix A 1.—Historical salmon escapements at Kwiniuk River counting tower, 1965–2006.

Year ^a	Operating period	Chum	Pink	Chinook	Coho
1965	June 18-Jul 19	32,861	8,668	19	
1966	June 19-Jul 28	32,786	10,629	7	
1967	June 18-Jul 28	26,661	3,587	13	
1968	June 18-Jul 24	19,976	129,052	27	
1969	June 26-Jul 26	19,687	56,683	12	
1970	June 25-Jul 29	66,604	226,831		
1971	June 29-Jul 29	38,679	16,634		
1972	June 28-Jul 27	30,686	62,461	65	
1973	June 25-Jul 25	28,029	37,070	57	
1974	June 20-Jul 26	35,161	39,375	62	
1975	July 4-Jul 26	14,049	55,293	44	
1976	July 4-Jul 25	8,508	35,226	12	
1977	June 26-Jul 25	21,798	47,934		
1978	July 4-Jul 22	11,049	70,148		
1979	June 28-Jul 25	12,355	167,492	107	
1980	June 22-Jul 28	19,374	319,363	177	
1981	June 19-Aug 2	34,561	566,417	136	
1982	June 21-Jul 26	44,036	469,674	138	
1983	June 19-Jul 27	56,927	251,965	267	
1984	June 19-Jul 25	54,043	736,544	736 ^d	
1985	June 26-Jul 28	9,013	18,237	955 ^c	
1986	June 19-Jul 26	24,704	241,446	653	
1987	June 25-Jul 23	16,134	5,567	314	
1988	June 18-Jul 26	13,302	187,991	321	
1989	June 27-Jul 27	14,282	27,487	248	
1990	June 21-Jul 25	13,957	416,511	900	
1991	June 18-Jul 27	19,800	53,499	709	
1992	June 27-Jul 28	12,077	1,464,717	479	
1993	June 27-Jul 27	15,823	43,065	594	
1994	June 23-Aug 9	32,875	2,304,099	625	2,547
1995	June 21-Jul 26	42,703	17,509	485	114
1996	June 20-Jul 25	28,493	907,894	577	461
1997	June 18-Jul 27	20,118	9,536	972	
1998	June 18-Jul 27	24,248	655,933	302	
1999	June 25-Jul 28	8,763	608	115	
2000	June 22-Jul 27	12,878	750,173	144	41
2001	June 27-Sept 15	16,598	8,423	258	9,532
2002	June 17-Sept 11	37,995	1,114,410	778	6,459
2003	June 15-Sept 15	12,123	22,329	744	5,490
2004	June 16-Sept 14	10,362	3,054,684	663	11,240
2005	June 18-Sept 12	12,083	341,048	342	12,950
2006	June 22-Sept 12	39,519	1,347,090	195	22,341
Average 1965-2005 ^{c, d}		24,541	364,786	532	9,134

^a Counts from 1965–1994 taken from the original project reports located in the Nome ADF&G office, counts for 1995–2003 are from Kohler 2003.

^b Chinook salmon counts from 1965–1984 are not expanded.

^c Chinook salmon counts in 1985 and after were expanded. Chinook salmon average is from 1985–2004.

^d Coho salmon average is from 2001–2005 as the majority of the run has been counted only since 2001.

Appendix A 2.–Historical salmon escapements at Niukluk River counting tower, 1995–2006.

Year	Operating period	Chum	Pink	Chinook	Coho
1995	June 29-Sept 12	86,333	17,089	123	4,173
1996	June 23-Sept 12	80,121	1,154,881	237	12,781
1997	June 28-Sept 9	57,304	10,466	259	3,994
1998	July 4-August 9	45,587	1,624,436	258	839
1999	July 4-Sept 4	35,240	20,355	40	4,260
2000	July 4-Aug-27	29,572	961,603	48	11,382
2001	July 10-Sept 8	30,662	41,625	30	3,468
2002	June 25-Sept 10	35,307	645,141	621	7,391
2003	June 25-Sept 10	20,018	75,855	179	1,282
2004	June 25-Sept 8	10,770	975,895	141	2,064
2005	June 28-Sept 9	25,598	270,424	41	2,727
2006	June 28-Sept 8	29,199	1,371,919	39	11,169
Average 1996-2005 ^a		37,018	578,068	185	5,352

^a Coho salmon average excludes 1998 because the majority of the run was not counted that year.

Appendix A 3.–Historical salmon escapements at Nome River counting tower, 1993 - 1995, and weir 1996-2006.

Year	Operating period	Chum	Pink	Chinook	Coho
1993	July 25-Aug 28	1,566	13,034	63	4,349
1994	June 24-Aug 15	2,893	141,246	54	726
1995	June 22-Sept 6	5,092	13,890	5	1,650
1996	June 26-Jul 23	3,339	95,681 ^a	5	66
1997	June 27-Aug 27	5,131	8,035	22	321
1998	July 01-Aug 11	1,930	359,469	70	96
1999	July 02-Aug 25	1,048	2,033	3	417
2000	June 29-Aug 25	4,056	44,368	25	698
2001	July 8-Sept 11	2,859	3,138	7	2,418
2002	June 29-Sept 11	1,720	35,057	7	3,418
2003	July 5-Sept 10	1,957	11,402	12	548
2004	June 25-Sept 8	3,903	1,051,146	51	2,283
2005	June 27-Sept 11	5,584	285,759	69	5,848
2006	July 2-Sept 7	5,678	578,555	45	8,308
Average 1993-2004 ^b		2,958	189,609	27	2,903

^a In 1996 the majority of pink salmon escaped through the pickets and were not counted.

^b Coho salmon average is from 2001–2005 as the majority of the run has been counted only since 2001.