Fishery Data Series No. 06-48

Kanektok River Salmon Monitoring and Assessment, 2005

Annual Report for Project FIS 04-305

USFWS Office of Subsistence Management

Fisheries Information Services Division

by

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and

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August 2006

Alaska Department of Fish and Game Divisions of Sport Fish and Commercial Fisheries

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_{2}$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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by

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August 2006

This investigation was partially financed by U. S. Fish and Wildlife Service, Office of Subsistence Management (Project No. FIS 04-305), Fisheries Resource Monitoring Program under agreement number 701811J334.

The Division of Sport Fish Fishery Data Series was established in 1987 for the publication of technically oriented results for a single project or group of closely related projects. Since 2004, the Division of Commercial Fisheries has also used the Fishery Data Series. Fishery Data Series reports are intended for fishery and other technical professionals. Fishery Data Series reports are available through the Alaska State Library and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm This publication has undergone editorial and peer review.

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This document should be cited as:
Jones, P. W. and J. C. Linderman Jr. 2006. Kanektok River salmon monitoring and assessment, 2005. Alaska Department of Fish and Game, Fishery Data Series No. 06-48, Anchorage.

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ABSTRACT

A resistance board weir was used on the Kanektok River to estimate escapement and provide a platform to collect samples used in estimating age, sex, and length for Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, chum *O. keta*, and coho *O. kisutch* salmon. The weir was installed in early July and was operational from 8 July until 8 September. Escapement at the weir was estimated to be 14,331 Chinook, 242,208 sockeye, 53,580 chum, and 26,343 coho salmon. Aerial counts are used with weir escapement counts to derive escapement estimates for the Kanektok River drainage. The 2005 season was the fourth year Chinook, sockeye, and chum salmon escapement and age, sex, length composition data were collected and the fifth year coho salmon data were collected. Salmon in the Kanektok River are harvested in subsistence, commercial, and sport fisheries conducted both inriver and in adjacent marine waters of Kuskokwim Bay (District W-4). The Alaska Department of Fish and Game has quantified subsistence harvests in the Quinhagak area of the Kuskokwim Bay since 1968. From 1995 through 2004, annual subsistence harvests have averaged 3,259 Chinook, 1,345 sockeye, 1,121 chum, and 1,598 coho salmon. Subsistence harvest estimates for 2005 were not available at the time of publication. The 2005 District W-4 commercial salmon harvest was 24,195 Chinook, 68,801 sockeye, 51,708 coho, and 13,529 chum salmon, for a total of 158,252 fish. Samples were also collected from the District W-4 commercial catch for use in estimating age, sex, and length of the 2005 commercial harvest.

Key words: Kanektok River, Kuskokwim Area, District W-4, resistance board weir, Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, chum *O. keta*, coho *O. kisutch*, salmon, Dolly Varden *Salvelinus malma*, rainbow trout *O. mykiss*, whitefish *Coregonus spp.*

INTRODUCTION

STUDY AREA

Kanektok River is located in Togiak National Wildlife Refuge in southwestern Alaska (Figure 1). The river originates at Kegati/Pegati Lake, flows westerly for 91 mi (146 km), and empties into Kuskokwim Bay near the village of Quinhagak. The upper portion of the river is primarily a single channel flowing through mountainous terrain. The lower portion of the river flows through a broad fluvial plain and is highly braided with many side channels. Kanektok River and its many tributaries drain approximately 500 mi^2 (1,295 km^2) of surface area dominated largely by undisturbed tundra. The surrounding riparian vegetation is composed primarily of cottonwood, willow, and alder. Kanektok River weir is located at river mile 42 (67.60 km), GPS coordinates N 59° 46.057, W 161° 03.616.

SALMON FISHERIES

Subsistence fishing for salmon occurs throughout the Kanektok River drainage, in nearby streams of the Quinhagak area, and in the open waters of Kuskokwim Bay. Salmon caught for subsistence use make an important contribution to the annual subsistence harvests of residents from Quinhagak, Goodnews Bay, Eek, and Platinum (Ward et al. 2003). The Alaska Department of Fish and Game (ADF&G) has quantified subsistence harvests in the Quinhagak area since 1968. Chinook salmon *Oncorhynchus tshawytscha* are the most utilized subsistence salmon species in the Quinhagak area followed by coho *O. kisutch*, sockeye *O. nerka*, and chum *O. keta* salmon (Appendix A1). Over the last 10 years, annual subsistence harvests have averaged 3,259 Chinook salmon, 1,598 coho salmon, 1,345 sockeye salmon, and 1,121 chum salmon. In 2004, 75 of the 96 households contacted for the Kuskokwim River salmon subsistence harvest survey fished for subsistence use in the village of Quinhagak. Within the same subsistence survey, 39 of the 145 permit holders participating in the local commercial fishery were contacted; 9 of the 39 reported retaining catch for subsistence use.

Commercial salmon fishing has occurred in the Quinhagak area since before statehood. In 1960, commercial fishing District W-4 was established by ADF&G offshore of Quinhagak in Kuskokwim Bay (Figure 2). In 2004, the Alaska Board of Fisheries moved the northern boundary 3 miles up the coast from the southern edge of Oyak Creek to the southern edge of Weelung Creek. The northern boundary was expanded to address overcrowding of fishermen in the district during commercial openings. Since the inception of District W-4, its northern boundary has been shifted between Weelung Creek and Oyak Creek in response to overcrowding issues and concern over the interception of fish bound for the Kuskokwim River.

The commercial fishery is directed towards Chinook, sockeye, and coho salmon. Chum salmon are harvested incidentally. Pink salmon *O. gorbuscha*, are the least valuable species commercially and are not targeted. Historical average commercial salmon harvests in District W-4 are 15,895 Chinook, 25,533 sockeye, 35,861 coho, and 32,672 chum salmon. The average harvests for these species from 1995 through 2005 are 20,857 Chinook, 48,696 sockeye, 51,265 coho, and 39,121 chum salmon (Appendix A1). The historical average of total harvest is 117,267 salmon and the average total harvest from 1995 through 2004 is 208,777 salmon (Whitmore et al. *In prep*). District W-4 commercial fishery participation has declined since 1999. The decline is likely attributable to the poor market value of salmon since 1995, increasing fuel prices, limited number of tenders, limited capacity of the local processing plant, and other economic opportunity in the area. The fishery rebounded slightly in 2004, which carried over to 2005. Participation in 2005 increased again compared to 2004, but was still below historical highs seen in the late 1980s and early 1990s. Chinook and sockeye salmon harvests were 11% and 32% above the recent 10-year average, respectively. Coho salmon harvest was similar to the recent 10-year average, and chum salmon harvest was below the recent 10-year average. The below average chum salmon harvest can also be attributed to a lack of market interest in this species.

Kanektok River supports a popular sport fishery. Each year, sport anglers from around the world fish the drainage from mid-June to the beginning of September, targeting salmon, rainbow trout *O. mykiss*, and Dolly Varden *Salvelinus malma*. There are currently three seasonal sport fishing guide operations located on Kanektok River and numerous guided and non-guided anglers float the Kanektok River from its headwaters to the village of Quinhagak. From 1995 through 2004, average sport fishing harvests included 856 Chinook, 359 sockeye, 190 chum, and 1,238 coho salmon (Appendix A1).

ESCAPEMENT MONITORING

Kanektok River is the primary spawning stream in the Quinhagak area. Establishing a viable method for assessing salmon escapement in Kanektok River has been problematic. The first attempt was a counting tower established in 1960 on the lower river near the village of Quinhagak (ADF&G 1960). The project was plagued by logistical problems, poor visibility into the water column, and difficulties with species apportionment. In 1961, the tower was relocated to the outlet of Kegati/Pegati Lake and operated through 1962 (ADF&G 1961, 1962). Although successful in providing sockeye salmon escapement information, it was abandoned after 1962. The next attempt was hydroacoustic sonar (1982 through 1987) but was deemed unfeasible because of budget constraints, technical obstacles, and site limitations (Huttunen 1984–1986, 1988; Schultz and Williams 1984). In 1996, a cooperative effort between the Native Village of Quinhagak (NVK), United States Fish and Wildlife Service (USFWS), and ADF&G reinitiated a counting tower located 15 mi upriver from the confluence of the Kanektok River. The counting tower again met with limited success (Fox 1997) despite improvements to the project in 1998 (Menard and Caole 1999). In 1999, resources were redirected towards developing a resistance board weir (Burkey et al. 2001). The weir was briefly operational in 2000, but technical limitations, personnel problems, and high water levels precluded the project from meeting its objectives (Linderman 2000). During operation in 2000, the site was determined incapable of facilitating a weir because of extensive bank erosion.

In 2001, the weir was relocated approximately 20 mi upriver from the original site. The weir was successfully installed and operated in 2001; however, installation was delayed until 10 August because of high water. In 2002, an attempt was made to install the weir just after ice-out in early May, but high water still delayed complete installation until late June. In 2003, crews arrived on-site even earlier and successfully installed the weir during the last week in April before snowmelt and spring precipitation raised water levels to an unworkable condition. Installation and successful operation of the weir is contingent upon "early installation" in late April or just after ice-out each year. When feasible, an early installation strategy should be employed for the duration of the project. The project continues as a cooperative venture between the ADF&G, USFWS Togiak National Wildlife Refuge, USFWS OSM, Bering Sea Fisherman's Association (BSFA), and NVK.

Monitoring escapement for salmon stocks in Kanektok River is in the beginning stages (Appendix B1). The 2005 season represents the fifth year of operation for the Kanektok weir. Five years of coho salmon counts and 4 years of Chinook, sockeye, and chum salmon counts have been collected. Previous escapement information includes partial counts from a counting tower in 1996 and 1997.

The current location of the weir project is 42 river miles from the confluence with Kuskokwim Bay. Significant spawning of Chinook, sockeye, chum, pink, and coho salmon occurs downstream of the weir. Escapement counts derived from the weir are evaluated as an index of escapement for these species and are used in combination with aerial survey counts to estimate escapement for the entire Kanektok River drainage.

Kanektok River drainage salmon escapements have been monitored by aerial surveys since 1962 (Appendix C1). Aerial survey escapement assessment can be subject to variability depending on viewing conditions and survey observers; however, when observers, timing, and methods are standardized to the extent feasible and survey conditions meet acceptable criteria, the resulting counts are used as an index of escapement. Procedures established in recent years have increased the annual consistency of Kanektok River aerial surveys through the creation of an aerial survey location database, intensive pre flight planning, and establishment of a dedicated aerial survey project staff. Additionally, variability between observers and methods has been addressed through standardized training and consistency of the observers, pilots, and aircraft used.

Aerial surveys are most reliable for indexing spawning populations of sockeye and Chinook salmon because these species are typically more visible than chum and coho salmon. Chum salmon have protracted run timing requiring multiple surveys throughout their runs to ensure accuracy of the index. Chum salmon aerial surveys have been discontinued as an escapement index until survey methods can be improved or funding can be secured to allow for multiple aerial surveys of chum salmon populations throughout the duration of their runs. Additionally, Kanektok River coho salmon have been difficult to survey because of poor fall weather conditions. Coho salmon aerial surveys have been conducted when funding and weather conditions allow.

Kanektok River aerial survey escapement goals were initially established in 1992 and set at 5,800 for Chinook, 15,000 for sockeye, 30,500 for chum, and 25,000 for coho salmon (Buklis 1993). Recent evaluation of Arctic-Yukon-Kuskokwim Region escapement goals has resulted in establishment of revised Sustainable Escapement Goals (SEG) for Kanektok River aerial surveys (ADF&G 2004). The revised SEG's represent ranges or thresholds and were set at 3,500–8,000 for Chinook salmon, >5,200 for chum salmon, 14,000–34,000 for sockeye salmon, and 7,700–36,000 for coho salmon.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Annual escapement age, sex, and length (ASL) composition estimates are 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. Historical summaries of existing ASL information for salmon returning to Kanektok River can be found in Folletti (*Unpublished*). Historical escapement ASL samples prior to 1997 are not included in these summaries (e.g. Huttunen 1984–1986, 1988).

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 (Folletti *Unpublished*). Since 1990, 62% of commercially harvested Chinook salmon have been male, and have been comprised mostly (43%) of age-1.4 fish. Since 1995, the average seasonal mean lengths of age-1.4 Chinook salmon have been 836 mm for males and 853 mm for females.

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

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

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 (Folletti *Unpublished*). Since 1990, commercially harvested coho salmon have been 52% male, and have been comprised mostly (87%) of age-2.1 fish. Since 1996, the average mean seasonal lengths of age-2.1 coho salmon have been 592 mm for males and 595 mm for females.

OBJECTIVES

The annual project objectives for Kanektok River weir are to:

1. Enumerate the daily passage of Chinook, chum, sockeye and coho salmon through the weir from mid-June through September.
2. Describe the run-timing or proportional daily passage of Chinook, sockeye, chum, and coho salmon through the weir.

3. Estimate the weekly sex and age composition of Chinook, sockeye, chum, and coho salmon such that simultaneous 90% confidence intervals have a maximum width of 0.20.
4. Estimate the mean length of Chinook, chum, sockeye, and coho salmon and Dolly Varden by sex and age.
5. Enumerate the number of Chinook, sockeye, chum, and coho salmon carcasses that wash down onto the weir.
6. Monitor environmental variables at the weir site, such as relative water level, discharge rate, water chemistry, and water temperature.

Though this report represents an annual report for project FIS 04-305 funded by the USFWS OSM, additional information necessary for sustainable management of fisheries harvesting Kanektok River salmon have been included. These types of data include harvests from subsistence, commercial, and sport fisheries, ASL sampling of the commercial fishery, and resulting exploitation rates for Chinook and sockeye salmon. Eventually, run reconstruction and brood-year-return tables, which are built upon Kanektok River weir and area fishery information, will be included.

METHODS

RESISTANCE BOARD WEIR

Methods for the design, construction, and installation of the resistance board weir follow those described in Stewart (2002, 2003), and Tobin (1994). The approximately 250 ft (76.2 m) weir used at the Kanektok River site is comprised of 3 major parts: the substrate rail, the resistance board panel section, and the fixed picket section. During weir operations, picket spacing of the weir panels allows for a complete census of all but the smallest returning Chinook, sockeye, chum, and coho salmon. The picket spacing allows smaller fish such as pink salmon and other non-salmon species to pass upstream and downstream through the weir between pickets. Further details of the resistance board weir components used on Kanektok River weir are described in Estensen and Diesinger (2004).

Two fish passage chutes were installed on the weir, one approximately 100 ft (30.48 m) from the left bank (as looking downstream), the other approximately 25 feet (7.62 m) from the right bank. A 10 ft (3 m) by 15 ft (4.6 m) live trap box used to collect fish for ASL sampling was installed directly upstream of the right bank passage chute. Gates were attached on both chutes to control fish passage.

Boats passed at a designated boat gate located in the center of the weir and boat operators were able to pass with little or no involvement by the weir crew. The boat gate consisted of boat passage panels described in Estensen and Diesigner (2004). Weight of a passing boat temporarily submerges the boat passage panels, allowing boats to pass over the weir. Boats with jet-drive engines were most common and could pass upstream and downstream over the boat gate at reduced speed. Rafts could pass downstream by submerging the boat passage panels and drifting over the weir. Boats with propeller-drive engines were uncommon and required a towrope when passing upstream.

AERIAL SURVEYS

Aerial surveys are flown during peak spawning periods for each species in order to maximize the number of observable fish on the spawning grounds. Peak spawning periods were developed from run timing estimates and vary by species. Aerial surveys are numerically ranked on a scale of 1 = good, 2 = fair, and 3 = poor. Ranking criteria are based on survey method, weather and water conditions, time of survey, and spawning stage. Only surveys with rankings of fair and good (1 and 2) and conducted within the peak spawning period are included as part of the Kanektok River aerial survey database.

Chinook and coho aerial surveys focus on the main river channel and larger tributaries while sockeye aerial surveys focus on the main river channel, larger tributaries and lakes, and larger lake tributaries. Kanektok River aerial survey counts are tallied to derive a total count of observable fish throughout the drainage upon which attainment of the SEG is judged. Aerial survey counts are also tallied by the total count of fish observed upstream and downstream of the weir.

ESCAPEMENT MONITORING AND ESTIMATES

To determine salmon escapement past the weir, fish passage counts were made daily during the operational period of the project. Passage counts occurred regularly throughout the day, typically for 1–2 hour periods, beginning in the morning and continuing as late as light permitted. During counting periods, the passage chute gate was opened to pass fish through the weir. Crew members identified and enumerated all fish by species as they exited the passage chute. Any fish observed traveling downstream through the fish passage chutes were subtracted from the count tally. Spawned out salmon and carcasses of dead salmon (both hereafter referred to as carcasses) that washed up on the weir, were counted by species/sex and passed downstream.

For various reasons, fish sometimes migrated downstream and required an avenue for safe passage over the weir. This behavior was more typical among non-salmon species such as rainbow trout, Dolly Varden, and whitefish species *Coregonus spp.* The resistance board weir provided a means of accommodating downstream fish passage through incorporation of downstream passage chutes. Each chute consisted of a single panel set to allow some water to flow over the distal end of the panel. Further details of downstream passage chutes are described in Linderman et al. (2002). Fish do not typically pass upstream over these chutes, and they are only set during periods of active downstream fish migration. Downstream passage chutes were not used during periods of strong upstream salmon passage. Downstream fish passage over these chutes was not enumerated.

Weir escapement was estimated for periods when the weir was inoperable and when a breach occurred in the weir. Estimates were assumed to be zero if passage was considered negligible based on historical data and run timing indicators. Estimates were calculated based on the proportional relationship between observed weir counts at the Kanektok River weir and weir counts from a model data set. The model data set could be from a different year at Kanektok River or from the same year at a neighboring project. The model data set was selected based on the strongest (Pearson) correlation between observed passage during the operational period at Kanektok River weir and observed passage from the model data set during the same time period. Daily passage estimates were the result of relative daily passage proportions of the model data set minus any observed passage from the day being estimated, and were calculated using the formula:

$$\breve{n}_d = \frac{\left(n_{dc} \times \left(\sum_{d_z}^{d_a} y_e\right)\right)}{\left(\left(\sum_{d_z}^{d_a} y_c\right) - n_{d_e}\right)} \tag{1}$$

where:

$\breve{n}_d$ = passage estimate for the day weir was not operational,

n_{dc} = the number of fish per species that passed the weir on that day for the corresponding year,

$\sum_{d_z}^{d_a} y_e$ = the sum of all daily counts per species for the year being estimated,

$\sum_{d_z}^{d_a} y_c$ = the corresponding sum of all daily counts per species, for the year with the strongest correlation to the year being estimated, and

n_{d_e} = the number of fish per species that passed the weir on that day for the year being estimated.

Drainage escapement for Chinook and sockeye salmon was estimated by summing the weir escapement count with the estimated number of fish that spawn below the weir. The number of fish estimated to spawn downstream of the weir was calculated by applying the proportion of fish observed upstream and downstream of the weir during the aerial survey to the weir escapement. The drainage escapement estimates account for the number of fish counted past the weir after the aerial survey date and was calculated using the following formula:

$$N_d = \left(\frac{\left(n_{a_d} \times n_{w_2}\right)}{n_{a_u}}\right) + n_{w_2} \tag{2}$$

where:

N_d = total drainage escapement estimate,

n_{a_d} = aerial survey count downstream of the weir,

n_{a_u} = aerial survey count upstream of the weir, and

n_{w_2} = final weir escapement count including any estimates.

AGE, SEX, AND LENGTH ESCAPEMENT SAMPLING

Escapement sampling for Chinook, sockeye, and chum salmon ASL composition estimates was conducted following the pulse sampling design of DuBois and Molyneaux (2000). Intensive sampling was conducted for 1 to 3 days followed by a few days without sampling. Sample objectives were 4 to 5 pulses of 210 Chinook salmon and 6 pulses of 210 sockeye salmon, 200 chum salmon, and 170 coho salmon, distributed equally over their respective runs. These sample sizes were selected for simultaneous 95% confidence interval estimates of age composition ± 0.1 and are adjusted from sample sizes recommended by Bromaghin (1993) to account for regenerated and otherwise unreadable scales.

Salmon were sampled from the fish trap installed in the weir. The general practice was to open the entrance gate and leave the exit gate closed allowing fish to accumulate inside the holding pen. The holding pen was typically allowed to fill with fish and sampling was done during scheduled counting periods. To avoid potential bias caused by the selection or capture of individual fish, all fish within the trap were included in the sample, even if the sample size objective was exceeded.

Scales were removed from the preferred area of the fish (INPFC 1963). A minimum of 3 scales were removed from each Chinook and coho salmon, and one scale was removed from chum and sockeye. Removed scales were mounted on numbered and labeled gum cards. Sex was determined by visually examining external morphology, keying in on the development of the kype, roundness of the belly and the presence or absence of an ovipositor. Length was measured to the nearest millimeter from mideye to tail fork. After each fish was sampled, it was released into a recovery area upstream of the weir. After sampling was completed, relevant information such as sex, length, date, and location was copied from hardcopy forms to computer mark-sense forms. The completed gum cards and data forms were sent to the Bethel and Anchorage ADF&G offices for processing. Further details of sampling procedures can be found in DuBois and Molyneaux (2000) and Estensen and Diesigner (2004).

In times when the abundance of Chinook passing through the weir was low, and thus fish capture in the trap was low, the crew used dip nets to capture Chinook from behind the weir for sampling purposes. The weir crew also conducted active sampling to increase Chinook salmon sample sizes. Active sampling consisted of capturing and sampling Chinook salmon while actively passing and enumerating all other fish. Further details of active sampling procedures are described in Linderman et al. (2002).

AGE, SEX, AND LENGTH COMMERCIAL HARVEST SAMPLING

Commercial catch sampling for Chinook, sockeye, chum, and coho salmon ASL composition estimates was conducted based on the pulse sampling design of DuBois and Molyneaux (2000). The primary goal was to characterize ASL composition of the entire commercial harvest for each species. Pulse samples were collected from a minimum of 3 commercial openings, each representing a third of the total harvest. The goal for each pulse was to collect samples from 210 Chinook, 210 sockeye, 200 chum, and 170 coho salmon.

In a cooperative effort between Coastal Villages Region Fund (CVRF) and ADF&G, student interns sampled salmon from the Quinhagak dock area where fishers unloaded their catch to the on-site processor. An area was set aside for the sampling crew and processor workers supplied the crew with totes of iced fish for sampling. Fish were sampled as efficiently and carefully as possible to reduce processing delays and prevent bruising. Sampled fish were returned to iced totes in an ongoing effort to preserve catch quality.

Scales were removed from the preferred area of the fish (INPFC 1963). A minimum of 3 scales were taken from Chinook and coho were only one scale was removed from chum and sockeye mounted on numbered and labeled gum cards. All sampled fish were sex determined by visual inspection of internal gonads. Length was measured to the nearest millimeter from mideye to tail fork. After sampling was concluded, gum cards and data forms that were complete were returned to the Bethel ADF&G offices for data transfer to computer mark-sense forms and sample processing. Further details of sampling procedures can be found in DuBois and Molyneaux (2000).

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

ADF&G staff in Bethel and Anchorage aged scales, processed the ASL data, and generated data summaries (DuBois and Molyneaux 2000). These procedures generated two types of summary tables for each species; one described the age and sex composition and the other described length statistics. These summaries account for ASL composition changes over the season by first partitioning the season into temporal strata based on pulse sample dates, applying age and sex composition of individual pulse samples to the corresponding temporal strata, and finally summing the strata to generate the estimated age and sex composition for the season. This procedure ensured ASL composition estimates were weighted by fish abundance in the escapement or harvest rather than fish abundance in the samples. Likewise, estimated mean length composition was calculated by weighting sample mean lengths from each stratum by the escapement or harvest of salmon during that stratum. Similar procedures were used for coho salmon; however, sample design modifications implemented in 2004 reduced the ability to estimate changes in ASL composition over the season in favor of estimating ASL composition for the entire run or harvest.

Ages were reported in the tables using European notation. European notation is composed of two numerals separated by a decimal, where the first numeral indicates the number of winters spent by the juvenile fish in fresh water and the second numeral indicates the number of winters spent in the ocean (Groot and Margolis 1991). Total age is equal to the sum of these two numerals plus one to account for the single winter of egg incubation in the gravel. For example, a Chinook salmon described as an age-1.4 fish under European notation has a total age of 6 years. The original ASL gum cards, acetates, and mark-sense forms were archived at the ADF&G office in Anchorage. The computer files were archived by ADF&G in the Anchorage and Bethel offices.

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrologic conditions were recorded two times a day normally, at 0700 hours and 1700 hours. Cloud cover was judged from clear to overcast; wind speed was recorded in miles per hour and direction was noted; precipitation was measured in inches per 24 hours, daily air and water temperature were recorded in degrees Celsius. The river gauge height was recorded daily and was pegged to a benchmark established in 2001. The benchmark was initially set in 2001 and consists of a ¾ inch diameter steel length of rebar driven into the river bead adjacent to the field camp. The top of the benchmark represents a river stage of 100 cm. The river gauge is a steel rule installed near shore in the river and the 100 cm mark is pegged level with the top of a benchmark to achieve relative water level between project years.

RESULTS

SALMON FISHERIES

Subsistence, commercial, and sport fishing activities occurred in District W-4 or Kanektok River in 2005. At the time of this writing, 2005 subsistence harvest estimates for Quinhagak were not final though discussions with participants in season indicated subsistence needs were met and catches were average to above average. In District W-4, 145 permit holders fished commercially for total harvests of 24,195 Chinook, 68,801 sockeye, 13,529 chum, and 51,708 coho salmon (Table 1). In 2005, 19 pink salmon were commercially harvested. Exvessel value by species was $221,854 for Chinook, $241,478 for sockeye, $6,853 for chum, $101,776 for coho, and $4 for pink salmon for a total exvessel value of $571,965. Sport fish harvest estimates for Kanektok River in 2005 have not yet been determined.

PROJECT OPERATIONS

Kanektok River weir was operated from 8 July to 8 September 2005 (Table 2; Appendix B1). For the purposes of this report, the operational period is defined as 25 June through 18 September, inclusive of estimates.

High water coincided with ice-out in late April and precluded initiation of weir installation until late June. Continued high water through June prolonged weir installation until operations began on 8 July. A high water event began on 29 August rendering the weir inoperable from 30 August through 3 September. The weir became inoperable again on 8 September when the substrate rail cable broke. Project operations were discontinued for the remainder of the season and the crew began to disassemble the weir. The crew was able to remove 25% of the weir components before high water levels halted disassembly. The crew made two additional attempts in October and early November to completely remove the weir from the river without success.

Breaches in the weir caused by broken weir panel pickets also occurred in 2005. Breaches occurred for 10.5 hours on 8 August, approximately 80 hours on 21 through 25 August, and for 1 hour on 26 August. Counts were concurrent with these breach events and fish were observed passing through the breaches before they were repaired. Fish observed passing through the breaches were not enumerated.

AERIAL SURVEYS

An aerial survey of the Kanektok River drainage was conducted on 31 July 2005. The survey was flown with a Piper PA-18 aircraft and was rated as good (1) with excellent survey conditions throughout the drainage. A total of 14,202 Chinook and 110,730 sockeye salmon were counted in the Kanektok River drainage (Table 3; Appendix C1). Chinook and sockeye salmon aerial survey results exceeded the upper end of their respective SEG ranges. Of the 14,202 Chinook salmon observed, 8,055 (56.7%) were observed downstream of the weir and 6,147 (43.3%) were observed upstream of the weir. Of the 110,730 sockeye salmon observed, 14,390 (13.0%) were observed downstream of the weir and 96,340 (87.0%) were observed upstream of the weir. No chum or coho salmon aerial surveys were conducted in 2005.

WEIR ESCAPEMENT

Chinook salmon escapement past Kanektok River weir in 2005 was estimated to be 14,331 fish (Table 2). A total of 12,720 Chinook salmon were observed passing upstream through the weir and 1,611 fish (11.2%) were estimated to have passed upstream uncounted during breach events and inoperable periods. The first Chinook salmon was observed on 8 July, the first day of operation, and the last Chinook salmon was observed on 8 September. Based on the operational period and inclusive of estimated passage, the median passage date was 19 July and the central 50% of the run occurred between 11 July and 25 July (Appendix D1).

Sockeye salmon escapement past Kanektok River weir in 2005 was estimated to be 242,208 fish (Table 2). A total of 160,831 sockeye salmon were observed passing upstream through the weir and 81,377 fish (33.6%) were estimated to have passed upstream uncounted during breach events and inoperable periods. The first sockeye salmon was observed on 8 July, the first day of operation, and the last sockeye salmon was observed on 8 September. Based on the operational period and inclusive of estimated passage, the median passage date was 12 July and the central 50% of the run occurred between 6 July and 20 July (Appendix D1).

Chum salmon escapement past Kanektok River weir in 2005 was estimated to be 53,580 fish (Table 2). A total of 50,881 chum salmon were observed passing upstream through the weir and 2,699 fish (5.0%) were estimated to have passed upstream uncounted during breach events and inoperable periods. The first chum salmon was observed on 8 July, the first day of operation, and the last chum salmon was observed on 7 September. Based on the operational period and inclusive of estimated passage, the median passage date was 21 July and the central 50% of the run occurred between 14 July and 28 July (Appendix D1).

Coho salmon escapement past Kanektok River weir in 2005 was estimated to be 26,343 fish (Table 2). 13,700 coho were observed passing upstream through the weir and 12,643 fish (48.0%) were estimated to have passed upstream uncounted during breach events and inoperable periods. The first coho salmon was observed on 13 July and the last coho salmon was observed on 8 September. Coho salmon continued migrating upstream after the weir became inoperable on 9 September. Based on the operational period, the median passage date was 31 August and the central 50% of the run occurred between 23 August and 6 September (Appendix D1).

The total count of pink salmon upstream of Kanektok River weir in 2005 was 3,530 fish (Table 4). No escapement estimate was made for pink salmon in 2005 because picket spacing of the weir panels allows them to freely pass through the weir unobserved and they are not a species targeted for escapement estimation. The first pink salmon was observed on 8 July and the last pink salmon was observed on 8 September.

Dolly Varden, whitefish, rainbow trout, and Arctic Grayling *Thymallus arcticus* were also counted through the weir in 2005. A total of 10,193 Dolly Varden, 21 whitefish, 234 rainbow trout and 3 Arctic Grayling were observed passing upstream through the weir during project operations (Table 4). No passage estimates were made for these species because picket spacing of the weir panels allow them to freely pass through the weir unobserved and they are not targeted for escapement determination.

CARCASS COUNTS

Fish carcasses were cleaned off the weir each day during the operational period (Table 5). A total of 1,160 Chinook, 3,481 sockeye, 9,595 chum, 504 pink, and 33 coho salmon carcasses were counted during project operations. Additionally, 15 Dolly Varden, 5 rainbow trout, 2 Arctic Grayling, and 4 whitefish carcasses were counted.

DRAINAGE ESCAPEMENT

Kanektok River drainage escapement was estimated for Chinook and sockeye salmon in 2005. Chinook salmon total drainage escapement was estimated to be 33,110 fish, of which 18,779 (56.7%) were estimated to have spawned downstream of the weir (Table 3). Sockeye salmon total drainage escapement was estimated to be 278,386 fish, of which 14,390 (13.0%) were estimated to have spawned downstream of the weir.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Kanektok River Weir Escapement

Scale samples, sex, and length were collected from 284 Chinook salmon at the weir in 2005. The samples did not achieve the minimum sample objectives and were not adequate for estimating ASL composition of estimated escapement past the weir. Age was determined for 224 fish sampled (78.9%). Observed escapement was partitioned into 4 temporal strata based on sample dates. Applied to observed escapement, age-1.3 Chinook salmon was the most abundant age class (54.9%), followed by age-1.4 (24.1%), age-1.2 (20.4%), age-1.1 (0.4%), and age-1.5 (0.2%) fish (Table 6). Sex composition of observed escapement was 70.4% males and 29.6% females. Mean male length by age class was 370 mm for age-1.1 fish, 559 mm for age-1.2 fish, 716 mm for age-1.3 fish, and 801 mm for age-1.4 fish (Table 7). There were no age-1.5 male fish in the sample. Mean female length by age class was 772 mm for age-1.3 fish, 827 mm for age-1.4 fish, and 893 mm for age-1.5 fish. There was no age-1.1 or 1.2 female fish in the sample. Overall, male lengths ranged from 345 to 930 mm and female lengths ranged from 610 to 920 mm.

Scale samples, sex, and length were collected from 1,194 sockeye salmon at the weir in 2005. The samples did not achieve the minimum sample objectives and were not adequate for estimating ASL composition of estimated escapement past the weir. Age was determined for 688 of the 1,194 fish sampled (57.6%). Observed escapement was partitioned into 6 temporal strata based on sample dates. Applied to observed escapement, age-1.2 sockeye salmon was the most abundant age class (62.0%), followed by age-1.3 (36.0%), age-1.4 (0.9%), age-2.2 (0.9%), and age-2.3 (0.2%) fish (Table 8). Sex composition of observed escapement was 66.0% males and 34.0% females. Mean male length by age class was 540 mm for age-1.2 fish, 573 mm for age-1.3 fish, 540 mm for age-2.2 fish, and 574 mm for age-1.4 fish. There were no age-0.2,-0.3, and -2.3 male fish in the sample for (Table 9). Mean female length by age class was 522 mm for age-1.2 fish, 540 mm for age-1.3 fish, 525 mm for age-2.2 fish, and 542 mm for age 2.3 fish. There was one female age-1.4 fish in the sample at a length of 500 mm and there were no female age-0.2, and -0.3 fish in the sample. Overall, male lengths ranged from 465 to 688 mm and female lengths ranged from 452 to 600 mm.

Scale samples, sex, and length were collected from 1,129 chum salmon at the weir in 2005. The samples did not achieve the minimum sample objectives and were not adequate for estimating ASL composition of estimated escapement past the weir. Age was determined for 894 of the 1,129 fish sampled (79.2%). Observed escapement was partitioned into 6 temporal strata based on sample dates. Applied to observed escapement, age-0.3 chum salmon was the most abundant age class (87.7%), followed by age-0.4 (10.3 %), age-0.2 (1.6%), and age-0.5 (0.4%) fish (Table 10). Sex composition of observed escapement was 63.5% males and 36.5% females. Mean male length of sampled fish by age class was 534 mm for age-0.2 fish, 580 mm for age-0.3 fish, 603 mm for age-0.4 fish, and 596 mm for age-0.5 (Table 11). Mean female length by age class was 540 mm for age-0.2 fish, 555 mm for age-0.3 fish, and 577 mm for age-0.4 fish. There was one age age-0.5 female fish in the sample with a length of 512 mm. Overall, male lengths ranged from 478 to 694 mm and female lengths ranged from 489 to 840 mm.

Scale samples, sex, and length were collected from 348 coho salmon at the weir in 2005. The samples did not achieve the minimum sample objectives and were not adequate for estimating ASL composition of estimated escapement past the weir. Age was determined for 209 of the 348 fish sampled (60.1%). Observed escapement was partitioned into 2 temporal strata based on sample dates. Applied to observed escapement, age-2.1 coho salmon was the most abundant age class (87.2%), followed by age-1.1 (6.8%), and age-1.3 (6.1%) fish (Table 12). Sex composition of observed escapement was 62.2% males and 37.8% females. Mean male length by age class was 594 mm for age-1.1 fish, 577 mm for age-2.1 fish, and 589 mm for age-3.1 fish (Table 13).

Mean female length by age class was 515 mm for age-1.1 fish, 573 mm for age-2.1 fish, and 582 mm for age-3.1 fish. Overall, male lengths ranged from 431 to 655 mm and female lengths ranged from 467 to 742 mm.

District W-4 Commercial Harvest

Scale samples, sex, and length were collected from 950 Chinook salmon harvested in the 2005 District W-4 commercial fishery. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-4 commercial harvest. Age was determined for 866 of the 950 fish sampled (93.3%). The harvest was partitioned into 5 temporal strata based on sample dates. Applied to total harvest, age-1.3 Chinook salmon was the most abundant age class (49.4%), followed by age-1.4 (27.3%), age-1.2 (22.1%), age-1.5 (0.7%), and age-1.1 (0.5%) fish (Table 14). Sex composition was estimated to include 17,962 males (74.2%) and 6,233 females (25.8%). Mean male length by age class was 361 mm for age-1.1, 546 mm for age-1.2 fish, 702 mm for age-1.3 fish, 702 mm for age-2.2 fish, 824 mm for age-1.4 fish, and 708 mm for age-1.5 fish (Table 15). Mean female length by age class was 617 mm for age-1.2 fish, 776 mm for age-1.3 fish, 833 mm for age-1.4 fish, and 852 mm for age-1.5 fish. There were no age-1.1 female fish in the sample. Overall, male lengths ranged from 335 to 1,405 mm and female lengths ranged from 576 to 1,102 mm.

Scale samples, sex, and length were collected from 1,050 sockeye salmon harvested in the 2005 District W-4 commercial fishery. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-4 commercial harvest. Age was determined for 937 of the 1,050 fish sampled (89.2%). The harvest was partitioned into 5 temporal strata based on sample dates. Applied to total harvest, age-1.3 sockeye salmon was the most abundant age class (66.6%), followed by age-1.2 (28.6%), age-0.3 (2.0%), age-2.3 (1.3%), age-1.4 (1.0%), and age-2.2 (0.5%) fish (Table 16). Sex composition was estimated to include 37,295 males (54.2%) and 31,506 females (45.8%). Mean male length by age class was 550 mm for age-0.3 fish, 516 mm for age-1.2 fish, 564 mm for age-1.3 fish, 525 mm for age-2.2 fish, 561 mm for age-1.4 fish, and 545 mm for age-2.3 fish (Table 17). Mean female length by age class was 530 mm for age-0.3 fish, 504 mm for age-1.2 fish, 535 mm for age-1.3 fish, 502 mm for age-2.2 fish, 559 mm for age-1.4 fish, and 518 mm for age-2.3 fish. Overall, male lengths ranged from 357 to 663 mm and female lengths ranged from 300 to 642 mm.

Scale samples, sex, and length were collected from 1,000 chum salmon harvested in the 2005 District W-4 commercial fishery. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-4 commercial harvest. Age was determined for 958 of the 1,000 fish sampled (95.8%). The harvest was partitioned into 5 temporal strata based on sample dates. Applied to total harvest, age-0.3 chum salmon was the most abundant age class (86.0%), followed by age-0.4 (12.7%), age-0.5 (0.7%), and age-0.2 (0.6%) fish (Table 18). Sex composition was estimated to include 7,042 males (52.0%) and 6,487 females (48.0%). Mean male length by age class was 512 mm for age-0.2 fish, 570 mm for age-0.3 fish, 581 mm for age-0.4 fish, and 600 mm for age-0.4 fish (Table 19). Mean female length by age class was 493 mm for age-0.2 fish, 547 mm for age-0.3 fish, 567 mm for age-0.4 fish, and 560 mm for age-0.5 fish. Overall, male lengths ranged from 490 to 675 mm and female lengths ranged from 476 to 678 mm.

Scale samples, sex, and length were collected from 750 coho salmon harvested in the 2005 District W-4 commercial fishery. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-4 commercial harvest. Age was determined for 666 of the 750 fish sampled (88.8%). The harvest was partitioned into 5 temporal strata based on sample dates. Applied to total harvest, age-2.1 coho salmon was the most abundant age class (79.3%), followed by age-1.1 (15.6%), and age-3.1 (5.1%) fish (Table 20). Sex composition was estimated at 29,225 males (56.5%) and 22,483 females (43.5%). Mean male length by age class was 536 mm for age-1.1 fish, 560 mm for age-2.1 fish, and 561 mm for age-3.1 fish (Table 21). Mean female length by age class was 578 mm for age-1.1 fish, 576 mm for age-2.1 fish, and 594 mm for age-3.1 fish. Overall, male lengths ranged from 369 to 671 mm and female lengths ranged from 405 to 669 mm.

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological observations were recorded at 0700 hours daily from 29 June through 10 September (Table 22). Air temperatures ranged from -2˚ to 24˚ C. Water temperature was more consistent ranging from 7˚ to 17.5˚ C. Several rain events resulted in accumulations of up to 1.5 in (3.8 cm) during a 24 hour period. Relative water level ranged from 16 to 84 cm. Water level was estimated as high as 112 cm in days following the end of weir operations in September. Water chemistry samples were not collected in 2005.

DISCUSSION

PROJECT OPERATIONS

Operation of the weir in 2005 was moderately successful with a nearly complete enumeration of Chinook, sockeye, and chum salmon escapement, while approximately half of the coho salmon escapement was enumerated. The initial plan of early installation of the weir in late April was precluded when high water coincided with ice-out. NVK crews regularly monitored the weir sight and water level through May and June until it dropped to a workable level. The weir crew arrived on site for the season on 21 June, but continued high water prevented installation of the weir until 8 July. This is comparable to the starting date of 1 July in 2002. Every effort will be made to initiate weir installation just after ice-out each year; however, it must be conceded that variations in ice-out timing and water levels may hamper this strategy in given years. To the extent feasible, aerial monitoring of the weir site and water level should begin in mid-April each year to facilitate planning and preparation for early installation.

Trapping Chinook salmon for ASL sampling proved to be difficult. Chinook were reluctant to enter the trap when other fish were present or when the fyke doors on the trap were set. This problem was addressed though active sampling of Chinook salmon.

Water levels throughout the Kuskokwim area, including the Kanektok River, were below average from mid-July through mid-August for the second consecutive year. Low water did not appear to hamper fish passage through the weir; however, navigation of the river by jet boat proved difficult during low water conditions.

In late August, the Kanektok River experienced large amounts of rainfall. Water level rose to a height that submerged the majority of weir panels, rendering the weir inoperable. High water continued into September and contributed towards the premature termination of weir operations in 2005. When the weir was operational during high water events, the majority of fish were counted from the trap located near the right bank for practical and safety reasons.

On 8 September, the crew observed that the substrate rail cable connecting the panels to the river bottom had broken allowing fish to pass unobserved and rendering the weir inoperable. It is unknown what specifically caused the rail cable to break; however, the cable had remained inriver as part of normal operations since 2002 and was corroded and frayed in some sections. Initial plans for weir installation in 2005 included replacement of the existing galvanized steel rail cable with a new stainless steel cable. This proved difficult as water level has a greater effect on successful weir rail installation than on weir panel installation, i.e. water levels must be lower to install a resistance board weir rail assembly as the rail is installed at the bottom of the water column. High water levels from April and into June precluded weir panel installation and by extension precluded replacement of the existing rail cable. It was known that the existing rail cable had outlived its useful life after it broke twice during weir panel installation in late June and early July. Crews were able to repair breaks in the cable both times, eventually splicing new rail cable into the existing cable along the majority of its length. This option was chosen over complete removal of the existing rail cable in order to complete weir installation in as timely a manner as possible. Low water levels certainly contributed to uninterrupted operations through mid-August. Conversely, it can be assumed that the high water events in late August which rendered the weir inoperable also contributed to failure of the rail cable on 8 September.

Given the late date of project operations, the extent of repairs needed to re-initiate operations, and rising water levels from continuous rain events, it was decided to initiate weir removal and project closure on 9 September. High water persisted through September and precluded complete removal of the weir. As a result, approximately 70% of the weir panels remained in the river channel. The project crew made two additional attempts to remove the remaining panels in mid-October and early November, but continuous high water and heavy ice flows in November derailed these efforts and the panels remained inriver through the winter. To the extent feasible, contingencies were discussed and put in place to mitigate weir component damage from over-wintering in the river. Implementation of any contingencies will remain uncertain until component damage can be assessed after ice-out in 2006.

ESCAPEMENT MONITORING AND ESTIMATES

Weir escapements were estimated for periods when the weir was breached and to a larger extent when the weir was inoperable prior to 8 July, during inoperable periods caused by high water in late August, and when weir operations ceased after 8 September. The percentage of estimated escapement varied from 48.0% for coho salmon, 33.6% for sockeye salmon, 11.2% for Chinook salmon, and 5.0% for chum salmon. This variation is primarily a function of species run timing in relation to the timing of inoperable periods throughout the season. The high percentage of escapement estimates for coho and sockeye salmon makes these estimates somewhat speculative; however, they are believed to be a reasonable approximation of unobserved passage during breach events and inoperable periods.

The 2005 Chinook salmon weir escapement of 14,331 fish was the second highest escapement in 4 years of complete data (Figure 3). Chinook salmon weir escapement of 19,528 fish in 2004 was the highest escapement in this time period. The Chinook salmon aerial survey count of 14,202 was the third highest aerial survey count on record and exceeded the upper end of the SEG range by 56.3% (Appendix C1). It should be noted that aerial survey conditions were ideal and fish visibility was optimal because of high water clarity, extreme low water, and good weather conditions on the day of the survey. It is possible that these conditions inflated the survey count compared to historical surveys flown under less optimal conditions. The drainage escapement estimate of 33,110 fish is 56.7% higher than the weir escapement indicating approximately 55% of Chinook salmon returning to Kanektok River in 2005 spawned downstream of the weir (Table 3). These results are consistent with estimates of Chinook salmon upstream and downstream of the weir in 2004. Total exploitation of Kanektok River Chinook salmon in 2005 was estimated to be 46.1%. This estimate is based on the drainage escapement estimate, District W-4 commercial harvest, and estimates of subsistence and sport fishing harvest. Subsistence and sport fish harvest estimates were not available at the time of publication so the most recent 10-year average (1995 through 2004) of Quinhagak subsistence and Kanektok River sport fish harvest was used in determining total run and exploitation.

Sockeye salmon weir escapement in 2005 of 242,208 fish was the highest escapement of 4 years with complete data (Figure 3). Weir escapement in 2005 was 47.4% higher than the second highest escapement of 127,471 sockeye salmon in 2003. The sockeye salmon aerial survey count of 110,730 fish was also the highest aerial survey count on record and exceeded the upper end of the SEG range by 69.3% (Appendix C1). It is notable that a high escapement in 2003 resulted in a relatively average aerial survey count of 21,335 fish. Similar to Chinook aerial surveys, conditions in 2005 were ideal and it is possible that these conditions inflated the survey count compared to historical surveys flown under less optimal conditions. In 2004, aerial surveys were also flown under perfect conditions and had the second highest count on record at 78,380 fish. Additionally, 15% of the aerial survey count was observed downstream of the weir which was lower than escapement estimates in 2004 where approximately 22% of sockeye salmon were observed downstream of the weir. In less optimal survey conditions, these fish may not have been observed or identified to species correctly. It is also unclear whether tributaries of Kegati/Pegati Lake are surveyed on a consistent basis. The majority of sockeye salmon counted in the lake index area in 2004 and 2005 were observed in 3 major feeder tributaries of the lake and not in the lake itself. These factors combined may have inflated the aerial survey count compared to historical aerial survey results. The drainage escapement estimate of 278,386 sockeye salmon is 13% higher than the weir escapement which indicates that approximately 15% of sockeye salmon returning to Kanektok River in 2005 spawned downstream of the weir (Table 3). Total exploitation of Kanektok River sockeye salmon in 2005 was estimated to be 19.3%. This estimate is based on the drainage escapement estimate, District W-4 commercial harvest, and estimates of subsistence and sport fishing harvest. Subsistence and sport fish harvest estimates were not available at the time of publication so the most recent 10-year average (1995 through 2004) of Quinhagak subsistence and Kanektok River sport fish harvest was used to determine total run and exploitation.

The methodology used to estimate drainage escapement for Chinook and sockeye salmon in 2005 is not optimal and is subject to the inaccuracies inherent to aerial surveys. However, the aerial survey data are only used to determine the proportion of fish upstream and downstream of the weir while the abundance of fish in the estimate is weighted by weir escapement counts. Therefore, the drainage escapement estimate represents a more accurate index compared to an aerial survey because it is weighted by weir escapement counts. Regardless, a more rigorous methodology should be employed on Kanektok River to more accurately determine the proportion of fish downstream of the weir and to verify aerial survey results.

Data are not available to estimate the productivity of salmon stocks in the Kanektok River and place 2005 estimates of exploitation in perspective. ADF&G staff generally uses a Ricker-type spawner-recruit model to estimate the number of spawners that provide maximum sustained yield (MSY), total return at MSY, and the resulting exploitation fraction. Exploitation at MSY for 9 sockeye stocks in Bristol Bay averaged 65% (Fair et al. 2004) and ranged from 49% for the least productive Kvichak River off-peak runs to 77% for Ugashik sockeye salmon. Similarly, derived estimates of exploitation at MSY for 26 Chinook salmon stocks in Oregon, Washington, and Alaska averaged 67% (C. Parkin, Department of Fisheries and Oceans Canada; personal communication). Exploitation at MSY for Bering Sea Chinook salmon from Salcha, Chena (Evenson 2002), and Nushagak Rivers (Fair et al. 2004) averaged 75%. In comparison to these stocks, the exploitation of Kanektok River sockeye salmon is below the level providing MSY and Chinook salmon exploitation is well below other northern Alaskan stocks.

It is difficult to assess the quality or any directional bias of the estimates of total abundance and exploitation. Three main issues affect these estimates for 2005: 1) lack of 2005 estimates of subsistence and sport fish harvests, 2) lack of escapement monitoring of other tributaries and salmon stocks that are harvested in District W-4, and 3) the comparability of aerial surveys of the Kanektok River above and below the weir. The 10-year average subsistence and sport fish harvest was added to the 2005 commercial harvest for an estimate of total harvest. The contribution of other stocks of salmon to the District W-4 harvest is unknown. An important assumption underlying the estimate of total drainage escapement is that the same proportion of observable salmon are counted during aerial surveys flown above and below the weir.

The use of the 10-year average sport and subsistence harvest should not have a large affect on the 2005 estimates of total abundance and exploitation. For sockeye salmon, subsistence and sport harvest represent 5% of the total and misrepresenting the 2005 value by a historic mean will make little difference. In contrast, on average 23% of the Chinook harvest is taken by subsistence and sport fishers and the coefficient of variation for these harvests are 17% and 42% respectively. If the actual 2005 harvest is greater than the 10-year mean, then total return and exploitation will be higher and the estimate published here biased low. If the 2005 actual harvest is lower than the mean then the opposite will occur. Yet even when substituting the highest Chinook subsistence and sport harvests since 1983, the 2005 estimated exploitation rate increases to only 49.2% and if these harvests are ignored the exploitation rate drops to 42.2%, both values below other Chinook stocks exploitation at MSY.

The direction of the bias in total abundance and exploitation rates due to the omission of other stocks of Chinook and sockeye salmon in the escapement is known. The estimates of total abundance will be biased low and the exploitation will be biased high. The Arolik River is the only other significant salmon-producing river that drains into District W-4, and is thought to have lower abundance relative to the Kanektok River. In 2005, the first aerial survey of the Arolik River was conducted with a total of 4,061 Chinook and 37,410 sockeye observed further supporting what has been thought historically. Kuskokwim River salmon potentially pass through District W-4 on their return migration. Few Chinook salmon and no sockeye salmon tagged in District W-4 in 1969 and 1970 were recovered in the Kuskokwim River (Baxter *Unpublished*). The bias is thought to be small and in a direction that it leads managers to take a precautionary approach to fishery management.

An assumption necessary for an unbiased estimate of total escapement, abundance, and exploitation is that the proportion of observable salmon counted during aerial surveys upriver and downriver of the Kanektok River weir is equal. Differences could arise with differences in environmental conditions or salmon run timing. If a higher proportion of observable salmon are counted above the weir and that relationship is assumed for the area below the weir, total escapement and abundance will be underestimated and exploitation will be biased high. The reverse will occur if a lower proportion of observable salmon are counted during the aerial survey above the weir than occurred during the survey below the weir.

Aerial surveys of the Kanektok River above and below the weir are typically conducted on the same day so conditions and methods used during each survey are also similar. Additionally, it is likely that surveys would be conducted by the same observer in a given year. This reduces the possibility of bias caused by differences in methods or different observers employed between the two areas; however, experienced staff has described hydrologic differences between river sections above and below the weir that may affect Kanektok River aerial surveys. Although overall depth, watercolor, riparian vegetation, and substrate type is nearly identical between river sections, the river is more braided and spread out over a wider channel below the weir. This braiding makes it difficult to observe every channel for spawning fish during a given survey. This may result in a higher proportion of observable fish being counted upstream of the weir if fewer salmon are observable in the braided sections downstream. Determining whether this actually occurs or not is difficult to do, but the result would bias escapement estimates low and exploitation high.

A different proportion of observable fish during aerial surveys above and below the weir may also arise if spawning time is not the same or the area surveyed differs. For Chinook and coho salmon, these factors are not as pronounced because they are primarily main channel spawners, their peak spawning period is consistent between areas, and similar areas are surveyed. In contrast, the majority of sockeye salmon are lake and lake tributary spawners. The time when sockeye salmon enter the lakes and later move into lake tributaries to spawn is a critical factor for sockeye salmon aerial surveys. If few sockeye salmon are observed in the lakes and the lake tributaries are not surveyed, it will be unknown whether abundance was actually low (small percent observed) or the majority of sockeye salmon had already moved into the lake tributaries to spawn. In order to reduce this potential for bias, sockeye salmon aerial surveys should be conducted around the perimeter of the lakes but also on the lake spawning tributaries on a consistent annual basis. Historically, it is unclear whether sockeye salmon aerial surveys of the Kanektok River drainage have consistently included lake tributaries. This uncertainty has been addressed in recent years through improvements and standardization of the Kuskokwim Area aerial survey program and the inclusion of lake spawning tributaries in all sockeye salmon aerial surveys.

Lastly, the timing of aerial surveys must be such that few salmon counted below the weir will pass through the weir after the survey has been conducted. Historically, 90% of Chinook and sockeye salmon have passed the weir by late July and early August when surveys are conducted.

Though it is not known for certain, estimates of exploitation rates for Chinook and sockeye salmon in 2005 seem reasonable. No large source of bias is apparent and any overall bias would likely skew actual exploitation high. The exploitation percents for Kanektok River Chinook and sockeye salmon seem low given the productivity seen in other and adjacent salmon stocks.

Chum salmon weir escapement in 2005 of 50,881 fish was the highest escapement of 4 years with complete data (Figure 3). Weir escapement in 2005 was 8.7% higher than the next highest escapement of 46,444 chum salmon in 2004. It is notable that chum salmon escapements in all 4 years with available data were similar and within 21% of each other indicating chum salmon escapement to Kanektok River weir is relatively stable. However, it is known that large numbers of chum salmon, perhaps in excess of weir escapements, spawn downstream of the weir. Aerial surveys are not an effective method for determining chum salmon escapement indices because of chum salmon run timing and spawning behavior is protracted. By extension, aerial surveys would not be an accurate method for determining chum salmon drainage escapement on Kanektok River unless multiple surveys could be conducted throughout the chum salmon run. Currently, funding and personnel shortages preclude this from occurring. Continued accumulation of chum salmon weir escapement data will increase the ability to evaluate Kanektok River chum salmon escapements in the future.

Coho salmon weir escapement in 2005 of 26,087 fish was the fourth lowest escapement of 5 years with complete data (Figure 3). Weir escapement in 2004 was 87,828, 17.5% higher than the next highest escapement of 72,448 coho salmon in 2003. Coho salmon aerial surveys were not conducted in 2005 because of poor weather conditions in late September. Coho salmon migration timing has been shown to coincide with rising water levels (Linderman et al. 2003a). During inriver spawning migration, coho salmon typically move in pulses that are triggered by even small increases in water level. Water level was rising throughout late August and much of September, which rendered the weir inoperable during the peak coho migration. Additionally, during high water events when the weir was inoperable, the water was turbid and the crew did not observe many coho salmon passing the weir on a daily basis. The Kanektok River experienced its lowest water level on record for the 5 years the weir has been in operation with the lowest staff gauge reading occurring on 20 August. However, on 23 August the water levels started rising rapidly, and by 30 August the water level was unworkable for weir operations. Given the high percentage (48%) of estimated coho salmon escapement in 2005, the total escapement reported here should be viewed as an index of coho salmon escapement past the weir. Coho salmon estimates in 2005 were based on the relative daily proportion of fish passage in 2003. This year was used as the model data set because it indicated the strongest the strongest correlation with observed passage in 2005 compared to the 4 other years of project operations.

Chinook salmon run timing in 2005 was similar to 2003 (Figure 4; Appendix D1). Overall, Chinook salmon run timing has been intermediate between years. Sockeye salmon run timing in 2005 was similar to 2003. Chum salmon run timing was similar to 2004, but earlier overall to 2003. Coho salmon run timing in 2005 was most comparable to 2003 but later over all when compared to 2001, 2002, and 2004. The inter-annual run timing pattern between these species has varied but with 4 years of data for Chinook, sockeye and chum and 5 years for coho the sample size is still small for forecasting long term patterns.

The small percentage of carcasses counted at the weir has positive ramifications for aerial stream surveys because most observable spawning salmon and their carcasses are retained inriver when surveys are typically flown. Another benefit is protracted retention of carcasses on the spawning grounds enhances absorption of marine derived nutrients within Kanektok River (Cederholm et al. 1999; 2000).

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Chinook, sockeye, and chum salmon minimum sample objectives for the Kanektok River weir have not been met in any year of project operation. The late start date of project operations in 2005 was the primary reason for not achieving Chinook salmon sample goals at the weir in 2005 because a large portion of the run had already passed the weir site when operations began on 8 July. The majority of weir projects in the Kuskokwim area experience difficulties in achieving

Chinook salmon ASL sample objectives that are less stringent than those set for the Kanektok River weir (Gilk and Molyneaux 2004; Linderman et al. 2003b; 2004; Shelden et al. 2004; Stewart 2004). Even in years when Kanektok River weir operations began earlier, 210 fish must be sampled each week for a minimum of 6 weeks in order to successfully achieve the ASL sample objectives at the weir. Chum and sockeye salmon runs last from 5 to 6 weeks at a maximum. It is unrealistic to expect 210 pulse samples at the onset and end of their respective runs when weekly counts may be slightly more or less than the sample size objective. Additionally, Kanektok River weir ASL sample objectives are dissimilar to ASL sample objectives at other Kuskokwim Area escapement and ASL assessment projects. It is the intention of the Kanektok River weir project leader to modify current weir ASL sample goals to a more realistic sample design for the next season of operations. The new objectives will be more in line with other Kuskokwim Area salmon weir assessment projects where ASL sample objectives for all species require a minimum of 3 pulse samples, each one representing a third of the overall salmon run.

In 2005, ADF&G partnered with CVRF to collect District W-4 and W-5 (Goodnews Bay) commercial ASL samples. ADF&G staff trained and maintained oversight of Quinhagak-based CVRF staff and student interns that collected ASL and genetics samples from Chinook, sockeye, chum and coho salmon harvested in the District W-4 and W-5 commercial fisheries. All sample goals were achieved for District W-4 commercial harvest; however, collecting an adequate number of samples from District W-5 commercial harvest remained problematic. Overall, this sampling program in partnership with CVRF was very successful in the 2005 season. Although not all sample goals were achieved in this initial year, CVRF staff and student intern performance exceeded expectations. The ability of a local sampling crew to achieve annual ASL sample objectives outweighs the ability of ADF&G staff alone to successfully achieve sample goals as had been done in the past. CVRF crew samples were well collected and organized which helped to streamline ASL sample processing and data analysis. This program will be further refined in the coming season to address remaining difficulties in achieving District W-5 commercial ASL sample goals.

The following discussion focuses on describing ASL trends seen within the Kanektok River weir escapement and District W-4 commercial harvest in 2005. Some comparisons are made indicating similarities and differences between the weir escapement samples collected and commercial harvest ASL estimates. The limited historical data set for Kanektok River weir precludes any long-term comparisons in weir escapement ASL trends. Probably the greatest value in collecting ASL information is for future development of spawner-recruit models used for establishing escapement goals (e.g., Clark and Sandone 2001). The information can also be used for forecasting future runs, and to illustrate long-term trends in ASL composition (e.g., Bigler et al. 1996).

Chinook Salmon

Age 1.3 was the dominant age class for both the escapement samples collected and District W-4 commercial ASL estimates. The percentages of age-1.3 fish were similar at 43.4% for escapement samples and 49.4% for commercial estimates resulting in a difference of 6% (Tables 6 and 14; Figure 5). The high percentage of age-1.3 fish is consistent with 2004 ASL estimates when age-1.2 fish were dominant. This trend is encouraging for future returns as such high percentages of age-1.3 fish in combination with above average abundance indicates a good return of larger age-1.4 fish in 2006. Males were dominant in both the weir samples and commercial estimates with similar percentages at 69.6% for escapement samples and 74.2% for commercial estimates for a difference of 4.6%. This is down from 2004 when males represented 86% of the run when the primarily male age-1.2 fish were dominant in both escapement and commercial ASL estimates. The high male percentage in both estimates was likely a function of the combined high percentage of age-1.2 and -1.3 fish, which were predominantly male with 0.1% age-1.2 and 11.9% female age-1.3 female fish in the commercial estimates with similar female percentages in the escapement samples. Males exhibited mean length partitioning by age class for age-1.1 through age-1.4 fish in both weir escapement samples and commercial ASL estimates (Figure 6). The only discrepancy was age-1.5 which had a small commercial sample size of only 2 fish. Mean male lengths by age class were nearly identical between the escapement samples and commercial estimates. Females exhibited similar mean length partitioning by age class and female length by age class was also nearly identical between escapement samples and commercial ASL estimates (Figure 7).

Similarities between commercial ASL estimates and escapement samples collected indicate escapement samples collected in 2005 may be adequate to estimate escapement ASL composition. However, the first Chinook salmon samples were collected on 12 July and historical run timing information indicates approximately 30% of the run may have passed the weir site by that time (Figure 4; Appendix D1). On this basis, it is unknown whether the escapement samples accurately estimate escapement ASL composition because they may not represent a third of the overall Chinook salmon run.

Sockeye Salmon

Age 1.2 was the dominant age class for escapement samples collected and age 1.3 was dominant for the commercial ASL estimates (Tables 8 and 16; Figure 5). This discrepancy was likely caused by the inadequate number of escapement samples in 2005; however, a similar discrepancy was seen in 2004. It is possible the discrepancy may have been caused by a harvest bias that selected for age-1.3 fish in the 2005 commercial fishery, or a trend in sockeye age class composition which cannot yet be analyzed until additional data are collected in coming years. In 2002 and 2003, the percentage of age-1.2 and -1.3 sockeye salmon were nearly identical between the escapement and commercial estimates (Figure 8). Females comprised 45.8% of the commercial estimates and 34.0% of escapement samples. It is of note that although sockeye salmon escapement samples were not adequate, males represented approximately 70% of the samples for each stratum during project operations (Table 8). Males were dominant in each age class throughout out all strata. This trend was not evident in the commercial samples with male to female percentages representing an approximate 50-50 split in each stratum (Table 16). It is unclear what this discrepancy represents, but it may be attributed to the location of the weir or a commercial harvest bias. Males did not exhibit length partitioning by age class for both weir escapement samples and commercial ASL estimates (Figure 6). Mean male lengths by age class were nearly identical between the escapement samples and commercial estimates. Females did not exhibit mean length partitioning by age class (Figure 7). Mean female length by age class was also nearly identical between escapement and commercial ASL estimates.

Some similarities existed between commercial ASL estimates and escapement samples collected. It is unclear whether these similarities indicate escapement samples collected in 2005 may be adequate to estimate escapement ASL composition as discrepancies existed between commercial estimates and escapement samples as well. Additionally, the first sockeye salmon samples were collected on 12 July and historical run timing information indicates approximately 50% of the run may have passed the weir site by that time (Figure 4; Appendix D1). On this basis, it remains unknown whether the escapement samples accurately estimate escapement ASL composition because they may not represent half of the overall sockeye salmon run.

Chum Salmon

Age 0.3 was the dominant age class for escapement samples and commercial ASL estimates (Tables 10 and 18; Figure 5). In 2002 and 2004, escapement and commercial percentages for age-0.3 and age-0.4 chum salmon were contrary to each other and in 2003 the percentages were nearly identical as they are in 2005 (Figure 8). Collection of paired escapement and commercial ASL data in coming years will aid in analyzing this discrepancy as a trend or bias. Male-to-female percentages were not 50-50 for the escapement samples and commercial ASL estimates with female escapement samples at 36.5% and female commercial at 48.0%. This discrepancy was likely caused by the inadequate number of escapement samples in 2005 as chum salmon have typically exhibited a 50-50 split between males and females (Folletti *Unpublished)*. It is notable, however, that male chum salmon percentages remained dominant throughout project operations when female percentages typically dominate towards then end of the chum salmon run (Table 10). Males exhibited minor mean length partitioning by age class for both weir escapement samples and commercial ASL estimates (Figure 6). Mean male lengths by age class were nearly identical between the escapement samples and commercial estimates with the exception of age 0.4 fish. Females also exhibited minor mean length partitioning by age class, with the exception of age-0.5 fish (Figure 7). This discrepancy was likely caused by small sample sizes of age-0.5 fish in both the escapement and commercial samples. Mean female lengths by age class were nearly identical between the escapement samples and commercial estimates.

Some similarities existed between commercial ASL estimates and escapement samples collected. It is unclear whether these similarities indicate escapement samples collected in 2005 may be adequate to estimate escapement ASL composition as discrepancies existed between commercial estimates and escapement samples as well. Additionally, the first chum salmon samples were collected on 11 July and historical run timing information indicates approximately 25% of the run may have passed the weir site by that time (Figure 4; Appendix D1). On this basis, it remains unknown whether the escapement samples accurately estimate escapement ASL composition because they may not represent a quarter of the overall chum salmon run.

Coho Salmon

Age 2.1 was the dominant age class for both escapement samples and commercial ASL estimates which is consistent with Kuskokwim Area coho salmon populations (Tables 12 and 20; Figure 5; Folletti *Unpublished*). However, the percentage of age-2.1 fish was not similar at 87.2% for escapement samples and 79.3% for commercial estimates. This resulted in a difference of 7.9% which can be attributed to a higher percentage of age-1.1 fish in the escapement samples caused by the inadequate number of ASL samples collected. Age-1.1 coho salmon are typically in higher abundance at the beginning of the run and taper off as the run progresses. This trend was exhibited in the commercial ASL estimates in 2005. The premature termination of project operations in 2005 likely resulted in an inflated percentage of age-1.1 coho salmon in the escapement samples. The commercial ASL estimate indicated a 50-50 split between males and females which is typical for Kuskokwim Area coho salmon populations. Escapement samples indicated approximately 60% male coho salmon and 40% females. This is again likely attributed to the inadequate number of escapement samples in 2005. Males and females did not exhibit mean length partitioning by age class for both weir escapement samples and commercial ASL estimates, which is again common for coho salmon populations (Figures 6 and 7). Mean male and female lengths by age class were similar between the escapement samples and commercial estimates, with the exception of age-1.1 males in the escapement samples. This exception is again attributable to the inadequate number of samples collected in 2005.

Few similarities existed between commercial ASL estimates and escapement samples which can be primarily attributed to the inadequate number of escapement samples collected. The last full coho salmon pulse was completed on 26 August and historical run timing information indicates only approximately 40% of the run had passed the weir site by that time (Figure 4; Appendix D1). On this basis, the samples collected may not represent half or more of the overall coho salmon run.

CONCLUSIONS

Since the inception of the resistance board floating weir in 2001 the project has:

1. Demonstrated the ability to successfully install and operate a weir in the Kanektok River.
2. Demonstrated the ability to achieve its annual objectives with the exception of ASL sample objectives.
3. Provided escapement and run timing information for Kanektok River salmon and Dolly Varden populations.
4. Provided a platform for the collection of ASL information from the salmon escapement and Dolly Varden migrating past the weir.
5. Provided a platform for the collection and continual tagging of Dolly Varden migrating past the weir.

RECOMMENDATIONS

Establishing long-term funding for the project would ensure a long-term escapement, run timing, and ASL database required to better understand the spawning populations in Kanektok River. A long-term database would lead to the establishment of Biological Escapement Goals for the spawning salmon populations, improving management of the spawning stocks for sustainable yields.

Implementing an inriver Chinook salmon radiotelemetry study would increase the accuracy in determining the number of Chinook salmon spawning below the Kanektok River weir, and in turn increase the accuracy of drainage escapement estimates. Radiotelemetry could also be used to compare and contrast distribution of salmon observed from aerial surveys with radiotelemetry results in order to ground truth aerial survey distribution estimates. Such a study could be expanded in the future to examine the number of chum and coho salmon spawning below the weir in addition to their spawning distribution.

The current Chinook, sockeye, and chum salmon ASL sample objectives should be reevaluated and modified. The current sample objectives are unrealistic based on run timing and differential abundance throughout the salmon runs. The ASL objectives should be modified to reflect ASL objectives used at other Kuskokwim Area ASL assessment projects where a minimum of 3 pulse samples representing each third of the overall run is required, but may be exceeded and analyzed accordingly if ASL results allow.

Continue the cooperative effort between NVK, USFWS, and ADF&G, with ADF&G maintaining its proactive role in the mentoring of NVK technicians, the development of the project, and the oversight of seasonal operation. Regular consultations between ADF&G, NVK, and USFWS occurred throughout the field season, coordinating logistics, discussing results, and exchanging ideas. NVK provided 3 technicians for the 2005 season. USFWS used the weir as a platform for a Dolly Varden population study to better understand their spawning populations in Kanektok River. The project can be used in future years as a platform for the study of other anadromous and resident freshwater species in Kanektok River.

Every effort should be made to continue with annual weir installation in mid-to late April to ensure the weir is operational by mid-to late June. As was demonstrated in 2005, high water level and water flow inherent to Kanektok River in May and into June has the potential to substantially delay installation until July or later depending on the severity and duration of high water conditions. In future years, crews should install the passage chute with a debris deflecting structure in order to increase the possibility of full operation by mid-June.

ACKNOWLEDGMENTS

The author would like to thank Brian Latham with ADF&G and Edward Mark, Karl Jones, Thaddeus Foster, and Markus Henry with NVK for their hard work throughout the season and beyond. The author would also like to thank Mark Lisac and other crew with the USFWS, TNWR for their contributions to project operations, logistics, and planning. The USFWS, Office of Subsistence Management, provided $130,000 in funding support for this project (FIS 04-305) through the Fisheries Resource Monitoring Program, under agreement number 701811J334.

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TABLES AND FIGURES

Table 1.–District W-4 commercial harvest by period and exvessel value, 2005.

Period	Date Caught	Permits Fished	Chinook Harvest	Chinook Pounds	Sockeye Harvest	Sockeye Pounds	Chum Harvest	Chum Pounds	Coho Harvest	Coho Pounds
1	06/14	67	3,366	48,611	496	3,380	47	374	0	0
2	06/16	85	2,554	38,442	564	3,825	51	366	0	0
3	06/21	90	5,850	85,609	3,537	24,306	512	3,585	0	0
4	06/23	100	3,826	58,150	2,907	19,905	564	4,023	0	0
5	06/28	82	2,700	37,582	9,920	65,697	3,239	23,781	0	0
6	06/30	79	1,681	27,642	7,350	50,234	289	2,067	0	0
7	07/05	77	1,480	23,096	10,587	70,620	480	3,600	0	0
8	07/07	70	743	11,470	8,661	56,605	1,328	10,552	0	0
9	07/12	63	705	11,498	8,760	55,434	1,672	11,691	0	0
10	07/14	58	416	6,743	6,209	38,112	1,354	9,339	0	0
11	07/19	44	317	4,996	4,199	25,233	1,187	8,210	0	0
12	08/01	53	114	1,870	1,488	8,683	688	4,478	957	6,946
13	08/03	46	115	1,660	1,059	6,158	567	3,823	1,888	14,068
14	08/05	46	64	955	650	3,782	382	2,435	2,625	20,406
15	08/08	55	69	1,028	716	4,168	444	2,790	5,505	43,748
16	08/10	54	48	612	383	2,193	145	912	4,361	33,960
17	08/12	65	44	618	415	2,457	209	1,328	5,721	44,921
18	08/15	46	25	365	240	1,539	127	874	5,307	41,236
19	08/17	60	31	394	202	1,182	85	512	7,786	61,962
20	08/19	65	20	334	240	1,516	76	485	7,642	60,545
21	08/22	56	10	125	94	646	46	369	5,035	40,627
22	08/26	42	13	192	81	484	31	186	3,332	26,515
23	08/30	29	4	31	43	273	6	33	1,549	12,139
Total		145	24,195	362,023	68,801	446,432	13,529	95,813	51,708	407,073
Average Weight				14.96		6.49		7.08		7.87
Average Price				0.61		0.54		0.07		0.25
Exvessel Value				$221,854		$241,478		$6,853		$101,776

Total Number of Fish	158,252
Total Pounds	1,311,410
Total Exvessel Value	$571,965

Table 2.–Daily and cumulative Chinook, sockeye, chum, and coho salmon passage, Kanektok River weir, 2005.

	Chinook		Sockeye		Chum		Coho	
Date	**Daily**	**Cum.**	**Daily**	**Cum.**	**Daily**	**Cum.**	**Daily**	**Cum.**
06/25	3[a]	3	346[a]	346	3[a]	3	0[a]	0
06/26	10[a]	14	700[a]	1,046	16[a]	19	0[a]	0
06/27	16[a]	30	888[a]	1,935	20[a]	39	0[a]	0
06/28	12[a]	42	727[a]	2,661	19[a]	58	0[a]	0
06/29	17[a]	59	1,550[a]	4,211	15[a]	72	0[a]	0
06/30	73[a]	132	3,972[a]	8,183	80[a]	152	0[a]	0
07/01	64[a]	197	3,464[a]	11,647	63[a]	215	0[a]	0
07/02	176[a]	372	3,551[a]	15,198	156[a]	372	0[a]	0
07/03	132[a]	504	5,893[a]	21,091	111[a]	483	0[a]	0
07/04	254[a]	758	15,248[a]	36,339	473[a]	956	0[a]	0
07/05	290[a]	1,049	12,172[a]	48,511	551[a]	1,507	0[a]	0
07/06	252[a]	1,301	14,135[a]	62,646	388[a]	1,895	0[a]	0
07/07	106[a]	1,407	9,005[a]	71,651	281[a]	2,176	0[a]	0
07/08	275[b]	1,682	13,117[b]	84,768	963[b]	3,139	0[b]	0
07/09	667	2,349	13,963	98,731	2,452	5,591	0	0
07/10	655	3,004	11,740	110,471	2,103	7,694	0	0
07/11	671	3,675	9,167	119,638	1,611	9,305	0	0
07/12	302	3,977	6,859	126,497	590	9,895	0	0
07/13	321	4,298	10,363	136,860	1,608	11,503	21	21
07/14	467	4,765	8,236	145,096	2,371	13,874	1	22
07/15	501	5,266	6,832	151,928	1,483	15,357	0	22
07/16	753	6,019	10,149	162,077	1,835	17,192	0	22
07/17	704	6,723	5,730	167,807	2,110	19,302	0	22
07/18	303	7,026	4,068	171,875	1,213	20,515	0	22
07/19	455	7,481	6,456	178,331	2,033	22,548	3	25
07/20	626	8,107	9,949	188,280	2,649	25,197	5	30
07/21	742	8,849	4,824	193,104	2,568	27,765	28	58
07/22	738	9,587	5,333	198,437	1,842	29,607	40	98
07/23	542	10,129	3,896	202,333	1,916	31,523	31	129
07/24	533	10,662	5,081	207,414	2,197	33,720	59	188
07/25	317	10,979	3,167	210,581	1,429	35,149	34	222
07/26	390	11,369	4,082	214,663	1,825	36,974	28	250
07/27	423	11,792	4,332	218,995	1,931	38,905	26	276
07/28	313	12,105	2,114	221,109	1,356	40,261	5	281
07/29	374	12,479	1,994	223,103	1,607	41,868	9	290
07/30	296	12,775	2,518	225,621	1,343	43,211	26	316
07/31	256	13,031	2,219	227,840	1,544	44,755	66	382
08/01	142	13,173	636	228,476	912	45,667	8	390
08/02	216	13,389	1,653	230,129	1,170	46,837	44	434
08/03	111	13,500	956	231,085	518	47,355	44	478
08/04	167	13,667	1,687	232,772	849	48,204	58	536
08/05	165	13,832	1,313	234,085	787	48,991	104	640
08/06	103	13,935	716	234,801	637	49,628	92	732

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Table 2.–Page 2 of 3.

Date	Chinook		Sockeye		Chum		Coho	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
08/07	48	13,983	293	235,094	197	49,825	17	749
08/08	36	14,019	719	235,813	349	50,174	55	804
08/09	67	14,086	1,031	236,844	763	50,937	261	1,065
08/10	49	14,135	849	237,693	642	51,579	232	1,297
08/11	30	14,165	225	237,918	429	52,008	207	1,504
08/12	25	14,190	636	238,554	292	52,300	234	1,738
08/13	20	14,210	526	239,080	278	52,578	278	2,016
08/14	23	14,233	682	239,762	345	52,923	573	2,589
08/15	5	14,238	246	240,008	130	53,053	134	2,723
08/16	4	14,242	245	240,253	116	53,169	139	2,862
08/17	7	14,249	222	240,475	90	53,259	308	3,170
08/18	15[c]	14,264	341[c]	240,816	98[c]	53,357	337[c]	3,507
08/19	5[c]	14,269	139[c]	240,955	44[c]	53,401	223[c]	3,730
08/20	5[c]	14,274	164[c]	241,119	25[c]	53,426	547[c]	4,276
08/21	7[c]	14,281	217[c]	241,335	53[c]	53,479	1,015[c]	5,291
08/22	7[c]	14,288	167[c]	241,503	28[c]	53,507	743[c]	6,034
08/23	10[c]	14,299	165[c]	241,668	24[c]	53,531	745[c]	6,779
08/24	14[c]	14,313	190[c]	241,859	19[c]	53,550	1,189[c]	7,968
08/25	8	14,321	101	241,960	7	53,557	804	8,772
08/26	3[c]	14,324	89[c]	242,049	9[c]	53,566	675[c]	9,447
08/27	2	14,326	36	242,085	4	53,570	406	9,853
08/28	1	14,327	37	242,122	2	53,572	770	10,623
08/29	0	14,327	43	242,165	3	53,575	1,818	12,441
08/30	0[a]	14,327	0[a]	242,165	0[a]	53,575	914[a]	13,356
08/31	0[a]	14,327	0[a]	242,165	0[a]	53,575	1,449[a]	14,805
09/01	0[a]	14,327	0[a]	242,165	0[a]	53,575	747[a]	15,552
09/02	0[a]	14,327	0[a]	242,165	0[a]	53,575	922[a]	16,474
09/03	0[a]	14,327	0[a]	242,165	0[a]	53,575	783[a]	17,257
09/04	0[b]	14,327	4[b]	242,169	0[b]	53,575	1,243[b]	18,500
09/05	3	14,330	12	242,181	2	53,577	629	19,129
09/06	0	14,330	12	242,193	1	53,578	653	19,782
09/07	0	14,330	10	242,203	2	53,580	572	20,354
09/08	1[b]	14,331	5[b]	242,208	0[b]	53,580	650[b]	21,005
09/09	0[a]	14,331	0[a]	242,208	0[a]	53,580	626[a]	21,630
09/10	0[a]	14,331	0[a]	242,208	0[a]	53,580	518[a]	22,148
09/11	0[a]	14,331	0[a]	242,208	0[a]	53,580	833[a]	22,981
09/12	0[a]	14,331	0[a]	242,208	0[a]	53,580	761[a]	23,743
09/13	0[a]	14,331	0[a]	242,208	0[a]	53,580	735[a]	24,478
09/14	0[a]	14,331	0[a]	242,208	0[a]	53,580	535[a]	25,013
09/15	0[a]	14,331	0[a]	242,208	0[a]	53,580	353[a]	25,366
09/16	0[a]	14,331	0[a]	242,208	0[a]	53,580	346[a]	25,712
09/17	0[a]	14,331	0[a]	242,208	0[a]	53,580	311[a]	26,023
09/18	0[a]	14,331	0[a]	242,208	0[a]	53,580	321[a]	26,343
Total	14,331		242,208		53,580		26,343	

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Table 2.–Page 3 of 3.

	Chinook		Sockeye		Chum		Coho	
Date	**Daily**	**Cum.**	**Daily**	**Cum.**	**Daily**	**Cum.**	**Daily**	**Cum.**
Observed	12,720		160,831		50,881		13,700	
Estimated	1,611		81,377		2,699		12,643	
% Observed	88.8		66.4		95.0		52.0	

[a] The weir was not operational, daily passage was estimated.

[b] Partial day count, daily passage was estimated.

[c] A breach occurred in the weir, daily passage was estimated.

Table 3.–Escapement summary for the Kanektok River drainage, 2005.

	Chinook	Sockeye	Chum	Coho
Weir Escapement	14,331	242,208	53,580	26,343
Aerial Survey Count	6,147	96,340	[a]	[a]
Percentage Upstream of Weir	43.3	87.0	[a]	[a]

Escapement estimate downstream of the weir

	Chinook	Sockeye	Chum	Coho
Escapement Estimate	18,779	36,178	[a]	[a]
Aerial Survey Count	8,055	14,390	[a]	[a]
Percentage Downstream of Weir	56.7	13.0	[a]	[a]

Total drainage escapement estimate

	Chinook	Sockeye	Chum	Coho
Drainage Escapement	33,110	278,386	[a]	[a]
Drainage Aerial Survey	14,202	110,730	[a]	[a]
Aerial Survey (SEG)	3,500–8,000	14,000–34,000	>5,200	7,700–36,000

Total Run and Exploitation

	Chinook	Sockeye	Chum	Coho
District W-4 Commercial Harvest	24,195	68,801	13,529	51,708
Subsistence Harvest	[b]	[b]	[b]	[b]
Sport Fishing Harvest	[b]	[b]	[b]	[b]
Total Run Estimate [c]	61,420	361,000	[a]	[a]
Harvest Exploitation (%) [d]	46.1	19.3	[a]	[a]

[a] No estimate made in 2005.

[b] Unavailable at time of publication.

[c] Total Run estimate based on drainage escapement estimate, District W-4 commercial harvest, and 10-year averages (1995–2004) of Quinhagak subsistence and Kanektok River sport harvest.

[d] Exploitation rate based on District W-4 commercial harvest and 10-year averages (1995–2004) of Quinhagak subsistence and Kanektok River sport harvest.

Table 4.–Daily and cumulative pink salmon, Dolly Varden, whitefish, and rainbow trout passage, Kanektok River weir, 2005.

	Pink Salmon		Dolly Varden		Whitefish		Rainbow Trout	
Date	**Daily**	**Cum.**	**Daily**	**Cum.**	**Daily**	**Cum.**	**Daily**	**Cum.**
07/08	88[a]	88	65[a]	65	0[a]	0	0[a]	0
07/09	340	428	267	332	0	0	0	0
07/10	370	798	292	624	0	0	0	0
07/11	289	1,087	137	761	0	0	5	5
07/12	174	1,261	126	887	1	1	4	9
07/13	204	1,465	93	980	1	2	8	17
07/14	209	1,674	100	1,080	0	2	22	39
07/15	188	1,862	91	1,171	0	2	45	84
07/16	265	2,127	201	1,372	0	2	38	122
07/17	177	2,304	158	1,530	0	2	18	140
07/18	87	2,391	88	1,618	0	2	5	145
07/19	116	2,507	7	1,625	0	2	7	152
07/20	171	2,678	329	1,954	3	5	6	158
07/21	162	2,840	322	2,276	0	5	1	159
07/22	93	2,933	266	2,542	1	6	5	164
07/23	86	3,019	295	2,837	0	6	2	166
07/24	135	3,154	450	3,287	7	13	11	177
07/25	47	3,201	239	3,526	0	13	13	190
07/26	81	3,282	194	3,720	0	13	2	192
07/27	49	3,331	242	3,962	1	14	5	197
07/28	37	3,368	402	4,364	1	15	2	199
07/29	31	3,399	187	4,551	0	15	11	210
07/30	29	3,428	322	4,873	1	16	2	212
07/31	25	3,453	477	5,350	0	16	0	212
08/01	5	3,458	330	5,680	0	16	1	213
08/02	14	3,472	386	6,066	0	16	3	216
08/03	4	3,476	189	6,255	1	17	1	217
08/04	8	3,484	410	6,665	0	17	0	217
08/05	4	3,488	394	7,059	0	17	0	217
08/06	5	3,493	236	7,295	1	18	1	218
08/07	1	3,494	75	7,370	0	18	0	218
08/08	3	3,497	275	7,645	0	18	1	219
08/09	2	3,499	313[a]	7,958	0	18	1	220
08/10	2	3,501	251	8,209	0	18	1	221
08/11	1	3,502	336	8,545	1	19	0	221
08/12	1	3,503	319	8,864	0	19	0	221
08/13	3	3,506	457	9,321	0	19	0	221
08/14	3	3,509	191	9,512	0	19	2	223
08/15	2	3,511	279	9,791	1	20	1	224

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Table 4.–Page 2 of 2.

Date	Pink Salmon Daily	Pink Salmon Cum.	Dolly Varden Daily	Dolly Varden Cum.	Whitefish Daily	Whitefish Cum.	Rainbow Trout Daily	Rainbow Trout Cum.
08/16	2	3,513	36	9,827	0	20	0	224
08/17	3	3,516	23	9,850	0	20	3	227
08/18	1[b]	3,517	16[b]	9,866	0[b]	20	0[b]	227
08/19	2[b]	3,519	80[b]	9,946	1[b]	21	0[b]	227
08/20	1[b]	3,520	4[b]	9,950	0[b]	21	0[b]	227
08/21	1[b]	3,521	34[b]	9,984	0[b]	21	0[b]	227
08/22	0[b]	3,521	4[b]	9,988	0[b]	21	0[b]	227
08/23	7[b]	3,528	42[b]	10,030	0[b]	21	0[b]	227
08/24	0[b]	3,528	20[b]	10,050	0[b]	21	2[b]	229
08/25	0	3,528	37	10,087	0	21	2	231
08/26	1[b]	3,529	32[b]	10,119	0[b]	21	0[b]	231
08/27	0	3,529	9	10,128	0	21	0	231
08/28	0	3,529	13	10,141	0	21	0	231
08/29	0	3,529	32	10,173	0	21	0	231
08/30	[c]	3,529	[c]	10,173	[c]	21	[c]	231
08/31	[c]	3,529	[c]	10,173	[c]	21	[c]	231
09/01	[c]	3,529	[c]	10,173	[c]	21	[c]	231
09/02	[c]	3,529	[c]	10,173	[c]	21	[c]	231
09/03	[c]	3,529	[c]	10,173	[c]	21	[c]	231
09/04	0[a]	3,529	0[a]	10,173	0[a]	21	0[a]	231
09/05	0	3,529	9	10,182	0	21	2	233
09/06	0	3,529	2	10,184	0	21	0	233
09/07	0	3,529	8	10,192	0	21	0	233
09/08	1[a]	3,530	1[a]	10,193	0[a]	21	1[a]	234

Note: A total of 3 Arctic Grayling passed upstream through the weir.

[a] Partial day count, daily passage was not estimated.

[b] A breach occurred in the weir, daily passage was not estimated.

[c] The weir was not operational, daily passage was not estimated.

Table 5.–Daily fish carcass count, Kanektok River weir, 2005.

Date	Chinook	Sockeye	Chum	Pink	Coho	Other [a]
07/08	0	2	3	0	0	0
07/09	0	0	1	0	0	0
07/10	0	3	17	0	0	0
07/11	0	5	17	0	0	0
07/12	0	6	22	3	0	0
07/13	0	10	48	0	0	0
07/14	0	13	43	1	0	0
07/15	1	9	38	2	0	0
07/16	1	8	47	0	0	0
07/17	1	11	54	1	0	1DV
07/18	1	5	60	2	0	0
07/19	1	8	68	3	0	1DV, 1WF
07/20	1	7	45	0	0	0
07/21	1	4	109	3	0	0
07/22	1	5	79	1	0	0
07/23	0	11	140	4	0	0
07/24	1	6	99	3	0	0
07/25	2	5	106	6	0	0
07/26	4	11	121	3	0	0
07/27	2	10	257	16	1	1DV
07/28	11	7	202	10	0	1RB, 1AG
07/29	6	5	186	10	0	0
07/30	25	14	350	25	1	0
07/31	28	14	452	39	0	0
08/01	22	9	515	28	0	0
08/02	97	14	470	53	0	1AG
08/03	40	10	319	33	0	0
08/04	73	22	565	34	0	0
08/05	116	35	523	33	0	1DV
08/06	98	75	412	20	0	1RB
08/07	79	33	418	22	0	0
08/08	109	44	364	17	0	0
08/09	75	79	541	21	0	0
08/10	37	48	284	14	0	0
08/11	54	93	313	2	0	0
08/12	66	113	404	10	0	0
08/13	10	73	236	3	0	0
08/14	29	75	126	3	1	1DV
08/15	37	145	223	8	0	0
08/16	4	53	43	6	3	1WF
08/17	28	239	272	5	1	2DV
08/18	5	55	78	4	2	1RB
08/19	8	154	132	13	1	0
08/20	3	148	102	1	3	2DV
08/21	5	181	93	2	3	1RB
08/22	6	155	82	0	3	0

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Table 5.–Page 2 of 2.

Date	Chinook	Sockeye	Chum	Pink	Coho	Other [a]
08/23	26	238	154	26	6	1DV
08/24	13	153	65	7	3	1WF, 1RB
08/25	11	302	111	4	0	1,DV
08/26	10	204	52	3	0	2,DV
08/27	1	189	74	0	1	1WF
08/28	10	250	49	0	3	2DV
08/29	1	113	11	0	1	0
Total	**1,160**	**3,481**	**9,595**	**504**	**33**	**15DV, 4WF, 2AG, 5RB**

[a] DV = Dolly Varden, RB = Rainbow Trout, GR = Arctic Grayling, WF = Whitefish Spp.

Table 6.–Age and sex composition of Chinook salmon escapement, Kanektok River weir, 2005.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Esc	1.1 %	1.2 Esc	1.2 %	1.3 Esc	1.3 %	1.4 Esc	1.4 %	1.5 Esc	1.5 %	Total Esc	Total %
6/25-7/10			M	–	–	–	–	–	–	–	–	–	–	–	–
			F	–	–	–	–	–	–	–	–	–	–	–	–
			Subtotal											3,004	
7/12-16 (7/11-18)	44	34	M	0	0.0	946	23.5	2,129	52.9	237	5.9	0	0.0	3,312	82.4
			F	0	0.0	0	0.0	237	5.9	473	11.7	0	0.0	710	17.6
			Subtotal	0	0.0	946	23.5	2,366	58.8	710	17.6	0	0.0	4,022	100.0
7/20-23 (7/19-25)	59	43	M	0	0.0	644	16.3	1,747	44.2	368	9.3	0	0.0	2,758	69.8
			F	0	0.0	0	0.0	459	11.6	735	18.6	0	0.0	1,195	30.2
			Subtotal	0	0.0	644	16.3	2,206	55.8	1,103	27.9	0	0.0	3,953	100.0
7/27-29 (7/26-8/2)	102	78	M	0	0.0	556	23.1	525	21.8	216	9.0	0	0.0	1,298	53.8
			F	0	0.0	0	0.0	680	28.2	433	17.9	0	0.0	1,112	46.2
			Subtotal	0	0.0	556	23.1	1,205	50.0	649	26.9	0	0.0	2,410	100.0
8/4-6,12,21 (8/3-9/18)	79	69	M	41	4.3	164	17.4	246	26.1	68	7.3	0	0.0	519	55.1
			F	0	0.0	0	0.0	191	20.3	205	21.7	27	2.9	423	44.9
			Subtotal	41	4.3	164	17.4	437	46.4	273	29.0	27	2.9	942	100.0
Season	284	224	M		0.4		20.4		41.0		7.8		0.0		69.6
			F		0.0		0.0		13.8		16.3		0.2		30.4
			Total		0.4		20.4		54.9		24.1		0.2	14,331	100.0
Grand Total[a]		875	M	700	1.4	20,589	41.4	8,996	18.1	4,631	9.3	129	0.3	35,044	70.4
			F	0	0.0	1,876	3.8	1,567	3.1	10,752	21.6	536	1.1	14,732	29.6
			Total	700	1.4	22,465	45.1	10,563	21.2	14,386	28.9	665	1.3	49,776	100.0

Note: The numbers of fish in each stratum category are derived from sample percentages; discrepancies are attributed to rounding errors. For the stratum date 6/25-7/10, no fish were sampled for ASL data.

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1997 and 2002–2004.

Table 7.–Mean length (mm) of Chinook salmon escapement, Kanektok River weir, 2005.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	1.5
7/12-16 (7/11-18)	M	Mean Length		546	704	738	
		Std. Error		12	18	18	
		Range		493- 590	510- 856	720- 756	
		Sample Size	0	8	18	2	0
	F	Mean Length			798	788	
		Std. Error			35	25	
		Range			763- 833	750- 855	
		Sample Size	0	0	2	4	0
7/20-23 (7/19-25)	M	Mean Length		565	725	855	
		Std. Error		8	18	18	
		Range		533- 597	515- 880	811- 893	
		Sample Size	0	7	19	4	0
	F	Mean Length			779	850	
		Std. Error			14	17	
		Range			744- 816	776- 910	
		Sample Size	0	0	5	8	0
7/27-29 (7/26-8/2)	M	Mean Length		578	731	760	
		Std. Error		15	11	29	
		Range		495- 723	633- 780	627- 865	
		Sample Size	0	18	17	7	0
	F	Mean Length			766	831	
		Std. Error			7	13	
		Range			700- 830	740- 904	
		Sample Size	0	0	22	14	0
8/4-6,12,21 (8/3-9/18)	M	Mean Length	370	544	718	853	
		Std. Error	14	18	12	30	
		Range	345-	430- 630	610- 800	777- 930	
		Sample Size	3	12	18	5	0
	F	Mean Length			742	825	893
		Std. Error			18	14	28
		Range			610- 900	700- 891	865- 920
		Sample Size	0	0	14	15	2
Season	M	Mean Length	370	559	716	801	
		Range	345-	430- 723	510- 880	627- 930	
		Sample Size	3	45	72	18	0
	F	Mean Length			772	827	893
		Range			610- 900	700- 910	865- 920
		Sample Size	0	0	43	41	2

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Table 7.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	1.5
	M	Mean Length	410	539	690	823	827
		Range	390-470	412-593	505-815	578-990	759-928
		Sample Size	11	356	196	87	3
						846	882
	F	Mean Length		610	764	722-990	770-980
		Range		480-640	714-798	164	16
Grand Total [a]		Sample Size	0	11	30		

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1997 and 2002–2004.

Table 8.–Age and sex composition of sockeye salmon escapement, Kanektok River weir, 2005.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	0.2 Esc	0.2 %	0.3 Esc	0.3 %	1.2 Esc	1.2 %	1.3 Esc	1.3 %	2.2 Esc	2.2 %	1.4 Esc	1.4 %	2.3 Esc	2.3 %	Total Esc	Total %
6/25-7/8	0	0	M																
			F																
			Subtotal															84,768	
7/12-16	211	142	M	0	0.0	0	0.0	33,125	38.0	20,857	23.9	0	0.0	613	0.7	0	0.0	54,595	62.7
(7/9-18)			F	0	0.0	0	0.0	22,084	25.4	10,428	12.0	0	0.0	0	0.0	0	0.0	32,512	37.3
			Subtotal	0	0.0	0	0.0	55,209	63.4	31,285	35.9	0	0.0	613	0.7	0	0.0	87,107	100.0
7/20-22	215	125	M	0	0.0	0	0.0	14,784	41.6	8,814	24.8	284	0.8	569	1.6	0	0.0	24,451	68.8
(7/19-24)			F	0	0.0	0	0.0	5,971	16.8	4,833	13.6	0	0.0	284	0.8	0	0.0	11,088	31.2
			Subtotal	0	0.0	0	0.0	20,755	58.4	13,647	38.4	284	0.8	853	2.4	0	0.0	35,539	100.0
7/27-30	208	130	M	0	0.0	0	0.0	9,235	43.8	4,861	23.1	648	3.1	0	0.0	0	0.0	14,743	70.0
(7/25-8/1)			F	0	0.0	0	0.0	3,726	17.7	2,106	10.0	324	1.5	0	0.0	162	0.8	6,319	30.0
			Subtotal	0	0.0	0	0.0	12,961	61.5	6,967	33.1	972	4.6	0	0.0	162	0.8	21,062	100.0
8/4-5	210	121	M	0	0.0	0	0.0	3,117	47.1	1,750	26.5	55	0.9	0	0.0	0	0.0	4,922	74.4
(8/2-7)			F	0	0.0	0	0.0	930	14.1	711	10.7	54	0.8	0	0.0	0	0.0	1,696	25.6
			Subtotal	0	0.0	0	0.0	4,047	61.2	2,461	37.2	109	1.7	0	0.0	0	0.0	6,618	100.0
8/10-12	210	108	M	0	0.0	0	0.0	2,334	50.0	1,080	23.2	0	0.0	0	0.0	0	0.0	3,415	73.1
(8/8-14)			F	0	0.0	0	0.0	692	14.8	562	12.0	0	0.0	0	0.0	0	0.0	1,253	26.9
			Subtotal	0	0.0	0	0.0	3,026	64.8	1,642	35.2	0	0.0	0	0.0	0	0.0	4,668	100.0
8/17,19-21	140	62	M	0	0.0	0	0.0	1,223	50.0	552	22.6	0	0.0	0	0.0	0	0.0	1,775	72.6
(8/15-9/18)			F	0	0.0	0	0.0	395	16.1	158	6.4	0	0.0	0	0.0	118	4.8	671	27.4
			Subtotal	0	0.0	0	0.0	1,618	66.1	710	29.0	0	0.0	0	0.0	118	4.8	2,446	100.0
Season	1,194	688	M		0.0		0.0		40.5		24.1		0.6		0.8		0.0		66.0
			F		0.0		0.0		21.5		11.9		0.2		0.2		0.2		34.0
			Total		0.0		0.0		62.0		36.0		0.9		0.9		0.2	242,208	100.0

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Table 8.–Page 2 of 2.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Esc	0.2 %	0.3 Esc	0.3 %	1.2 Esc	1.2 %	1.3 Esc	1.3 %	2.2 Esc	2.2 %	1.4 Esc	1.4 %	2.3 Esc	2.3 %	Total Esc	Total %
		2,231	M	198	0.1	4,448	1.2	62,624	16.4	111,558	29.2	2,379	0.6	4,635	1.2	5,518	1.4	193,192	50.1
			F	207	0.1	1,478	0.4	77,235	20.6	97,388	25.5	2,305	0.6	4,364	1.1	6,120	1.6	192,042	49.9
Grand Total [a]			Total	405	0.1	5,926	1.5	139,859	37.0	208,947	54.7	4,684	1.2	8,999	2.3	11,638	3.0	385,233	100.0

Note: The numbers of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors.

[a] The numbers of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1997, and 2002–2004.

Table 9.–Mean length (mm) of sockeye salmon escapement, Kanektok River weir, 2005.

Sample Dates			Age Class						
(Stratum Dates)	Sex		0.2	0.3	1.2	1.3	2.2	1.4	2.3
7/12-16	M	Mean Length			540	575		547	
(7/9-18)		Std. Error			3	5		-	
		Range			483- 620	514- 688		547- 547	
		Sample Size	0	0	54	34	0	1	0
	F	Mean Length			523	545			
		Std. Error			4	7			
		Range			477- 560	474- 583			
		Sample Size	0	0	36	17	0	0	0
7/20-22	M	Mean Length			540	570	540	604	
(7/19-24)		Std. Error			3	5	-	27	
		Range			489- 631	500- 635	540- 540	577- 631	
		Sample Size	0	0	52	31	1	2	0
	F	Mean Length			521	530		500	
		Std. Error			5	8		-	
		Range			482- 557	452- 581		500- 500	
		Sample Size	0	0	21	17	0	1	0
7/27-30	M	Mean Length			537	570	538		
(7/25-8/1)		Std. Error			3	6	5		
		Range			469- 591	465- 642	523- 549		
		Sample Size	0	0	57	30	4	0	0
	F	Mean Length			515	542	528		550
		Std. Error			6	6	5		-
		Range			475- 575	516- 600	523- 532		550- 550
		Sample Size	0	0	23	13	2	0	1
8/4-5	M	Mean Length			541	565	572		
(8/2-7)		Std. Error			3	5	-		
		Range			501- 585	481- 614	572- 572		
		Sample Size	0	0	57	32	1	0	0
	F	Mean Length			524	548	512		
		Std. Error			5	7	-		
		Range			485- 565	505- 590	512- 512		
		Sample Size	0	0	17	13	1	0	0
8/10-12	M	Mean Length			539	575			
(8/8-14)		Std. Error			4	6			
		Range			470- 587	524- 640			
		Sample Size	0	0	54	25	0	0	0

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Table 9.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	1.2	1.3	2.2	1.4	2.3
8/10-12	F	Mean Length			534	536			
(8/8-14)		Std. Error			3	3			
(cont.)		Range			510- 557	511- 556			
		Sample Size	0	0	16	13	0	0	0
8/17,19-21	M	Mean Length			554	575			
(8/15-9/18)		Std. Error			4	7			
		Range			511- 590	531- 614			
		Sample Size	0	0	31	14	0	0	0
	F	Mean Length			540	554			532
		Std. Error			7	13			15
		Range			514- 582	518- 573			510- 561
		Sample Size	0	0	10	4	0	0	3
Season	M	Mean Length			540	573	540	574	
		Range			469- 631	465- 688	523- 572	547- 631	
		Sample Size	0	0	305	166	6	3	0
	F	Mean Length			522	540	525	500	542
		Range			475- 582	452- 600	512- 532	500- 500	510- 561
		Sample Size	0	0	123	77	3	1	4
	M	Mean Length	589	594	531	584	544	581	584
		Range	589-589	487-666	398-598	498-660	536-540	550-645	515-630
		Sample Size	1	33	406	516	14	26	39
	F	Mean Length	473	555	507	549	498	567.75	556
		Range	473-473	500-582	427-606	495-610	477-517	535-600	495-590
Grand Total [a]		Sample Size	1	18	566	522	16	28	45

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1997 and 2002–2004.

Table 10.–Age and sex composition of chum salmon escapement, Kanektok River weir, 2005.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Esc	0.2 %	0.3 Esc	0.3 %	0.4 Esc	0.4 %	0.5 Esc	0.5 %	Total Esc	Total %
6/25-7/8	0	0	M										
			F										
			Subtotal									3,139	
7/11-12,	220	157	M	0	0.0	8,545	52.9	1,750	10.8	0	0.0	10,295	63.7
14-15			F	0	0.0	4,735	29.3	1,133	7.0	0	0.0	5,868	36.3
(7/9-17)			Subtotal	0	0.0	13,280	82.2	2,883	17.8	0	0.0	16,163	100.0
7/20	210	176	M	70	0.6	7,152	58.5	764	6.2	69	0.6	8,055	65.9
(7/18-23)			F	208	1.7	3,680	30.1	278	2.3	0	0.0	4,166	34.1
			Subtotal	278	2.3	10,832	88.6	1,042	8.5	69	0.6	12,221	100.0
7/27	210	176	M	75	0.6	7,443	56.2	451	3.4	75	0.6	8,044	60.8
(7/24-31)			F	151	1.1	4,812	36.4	150	1.1	75	0.5	5,188	39.2
			Subtotal	226	1.7	12,255	92.6	601	4.5	150	1.1	13,232	100.0
8/4-5	210	172	M	29	0.6	2,830	55.8	413	8.1	0	0.0	3,272	64.5
(8/1-7)			F	118	2.3	1,592	31.4	88	1.8	0	0.0	1,798	35.5
			Subtotal	147	2.9	4,422	87.2	501	9.9	0	0.0	5,070	100.0
8/10-11	210	163	M	95	3.1	1,806	58.3	133	4.3	0	0.0	2,034	65.6
(8/8-14)			F	38	1.2	1,026	33.1	0	0.0	0	0.0	1,064	34.4
			Subtotal	133	4.3	2,832	91.4	133	4.3	0	0.0	3,098	100.0
8/17,19-21	69	50	M	13	2.0	315	48.0	26	4.0	0	0.0	355	54.0
(8/15-9/18)			F	13	2.0	276	42.0	13	2.0	0	0.0	302	46.0
			Subtotal	26	4.0	591	90.0	39	6.0	0	0.0	657	100.0
Season	1,129	894	M		0.6		55.7		7.0		0.3		63.5
			F		1.0		32.0		3.3		0.1		36.5
			Total		1.6		87.7		10.3		0.4	53,580	100.0
			M	1,578	0.9	44,235	24.6	44,805	25.0	1,445	0.8	92,063	51.3
		3,303	F	2,897	1.6	49,434	27.5	34,324	19.1	811	0.5	87,465	48.7
Grand Total [a]			Total	4,475	2.5	93,669	52.2	79,129	44.1	2,256	1.3	179,528	100.0

Note: The numbers of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors.

[a] The numbers of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1997 and 2002–2004.

Table 11.–Mean length (mm) of chum salmon escapement, Kanektok River weir, 2005.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
7/11-12,14-15	M	Mean Length		584	610	
(7/9-17)		Std. Error		4	7	
		Range		513- 694	556- 664	
		Sample Size	0	83	17	0
	F	Mean Length		555	584	
		Std. Error		5	15	
		Range		506- 633	500- 684	
		Sample Size	0	46	11	0
7/20	M	Mean Length	539	582	596	619
(7/18-23)		Std. Error	-	3	10	-
		Range	539- 539	521- 644	560- 648	619- 619
		Sample Size	1	103	11	1
	F	Mean Length	531	555	562	
		Std. Error	11	4	17	
		Range	520- 552	489- 600	533- 607	
		Sample Size	3	53	4	0
7/27	M	Mean Length	563	579	600	575
(7/24-31)		Std. Error	-	3	13	-
		Range	563- 563	505- 626	561- 653	575- 575
		Sample Size	1	99	6	1
	F	Mean Length	566	553	560	512
		Std. Error	46	3	-	-
		Range	520- 611	493- 602	560- 560	512- 512
		Sample Size	2	64	2	1
8/4-5	M	Mean Length	494	578	592	
(8/1-7)		Std. Error	-	3	7	
		Range	494- 494	478- 655	540- 625	
		Sample Size	1	96	14	0
	F	Mean Length	524	560	568	
		Std. Error	15	6	12	
		Range	490- 553	514- 840	547- 587	
		Sample Size	4	54	3	0
8/10-11	M	Mean Length	523	564	604	
(8/8-14)		Std. Error	12	3	14	
		Range	500- 569	511- 637	568- 674	
		Sample Size	5	95	7	0

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Table 11.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
8/10-11	F	Mean Length	544	553		
(8/8-14)		Std. Error	18	3		
(cont.)		Range	526- 562	505- 605		
		Sample Size	2	54	0	0
8/17,19-21	M	Mean Length	518	561	609	
(8/15-9/18)		Std. Error	-	5	7	
		Range	518- 518	523- 595	602- 615	
		Sample Size	1	24	2	0
	F	Mean Length	507	553	532	
		Std. Error	-	5	-	
		Range	507- 507	515- 592	532- 532	
		Sample Size	1	21	1	0
Season	M	Mean Length	534	580	603	596
		Range	494- 569	478- 694	540- 674	575- 619
		Sample Size	9	500	57	2
	F	Mean Length	540	555	577	512
		Range	490- 611	489- 840	500- 684	512- 512
		Sample Size	12	292	21	1
	M	Mean Length	552	582	605	618
		Range	485-580	505-670	515-700	562-680
		Sample Size	31	825	807	27
	F	Mean Length	529	553	570	579
		Range	485-623	475-640	490-685	575-610
Grand Total [a]		Sample Size	56	919	621	17

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1997 and 2002–2004.

Table 12.–Age and sex composition of coho salmon escapement, Kanektok River weir, 2005.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	1.1 Esc	1.1 %	2.1 Esc	2.1 %	3.1 Esc	3.1 %	Total Esc	Total %
7/21-8/21	148	108	M	314	4.7	3,766	55.6	125	1.9	4,205	62.0
(6/25-8/23)			F	314	4.6	2,197	32.4	63	0.9	2,574	38.0
			Subtotal	628	9.3	5,963	88.0	188	2.8	6,779	100.0
8/25-26	170	80	M	141	2.5	3,114	55.0	283	5.0	3,539	62.5
(8/24-29)			F	71	1.3	1,769	31.3	283	5.0	2,123	37.5
			Subtotal	212	3.8	4,883	86.3	566	10.0	5,662	100.0
9/7	30	21	M								
(8/30-9/18)			F								
			Subtotal							13,902	
Season	348	209	M		3.7		55.3		3.3		62.2
			F		3.1		31.9		2.8		37.8
			Total		6.8		87.2		6.1	26,343	100.0
		1,324	M	2,605	1.2	97,298	44.1	7,713	3.5	107,615	48.7
			F	1,933	0.9	100,571	45.5	10,690	4.8	113,194	51.3
Grand Total [a]			Total	4,538	2.1	197,869	89.6	18,403	8.3	220,809	100.0

Note: The numbers of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors.

[a] The numbers of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1997 and 2002–2004.

Table 13.–Mean length (mm) of coho salmon escapement, Kanektok River weir, 2005.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
7/21-8/21	M	Mean Length	542	550	559
(6/25-8/23)		Std. Error	20	8	8
		Range	511- 621	431- 650	551- 567
		Sample Size	5	60	2
	F	Mean Length	512	568	616
		Std. Error	15	7	-
		Range	467- 558	499- 742	616- 616
		Sample Size	5	35	1
8/25-26	M	Mean Length	548	594	602
(8/24-29)		Std. Error	30	5	25
		Range	518- 578	500- 655	531- 646
		Sample Size	2	44	4
	F	Mean Length	532	581	575
		Std. Error	-	6	11
		Range	532- 532	507- 628	552- 605
		Sample Size	1	25	4
9/7	M	Mean Length	611	584	
(8/30-9/18)		Std. Error	13	19	
		Range	598- 624	453- 653	
		Sample Size	2	11	0
	F	Mean Length		572	
		Std. Error		12	
		Range		531- 618	
		Sample Size	0	8	0
Season	M	Mean Length	594	577	589
		Range	511- 624	431- 655	531- 646
		Sample Size	9	115	6
	F	Mean Length	515	573	582
		Range	467- 558	499- 742	552- 616
		Sample Size	6	68	5
	M	Mean Length	580	576	584
		Range	465- 657	395- 678	440- 665
		Sample Size	24	600	44
	F	Mean Length	528	581	576
		Range	430- 620	475- 670	545- 649
Grand Total [a]		Sample Size	15	579	62

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1997 and 2002–2004.

Table 14.–Age and sex composition of Chinook salmon from the District W-4 commercial fishery, 2005.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Catch	1.1 %	1.2 Catch	1.2 %	1.3 Catch	1.3 %	1.4 Catch	1.4 %	1.5 Catch	1.5 %	Total Catch	Total %
6/14	210	186	M	0	0.0	1,273	21.5	2,356	39.8	1,019	17.2	32	0.6	4,679	79.0
(6/14,16)			F	0	0.0	0	0.0	509	8.6	700	11.8	32	0.5	1,241	21.0
			Subtotal	0	0.0	1,273	21.5	2,865	48.4	1,719	29.0	64	1.1	5,920	100.0
6/21	196	176	M	55	0.6	2,529	26.1	3,738	38.7	1,264	13.1	0	0.0	7,587	78.4
(6/21,23)			F	0	0.0	0	0.0	990	10.2	1,045	10.8	55	0.6	2,089	21.6
			Subtotal	55	0.6	2,529	26.1	4,728	48.9	2,309	23.9	55	0.6	9,676	100.0
6/28	201	178	M	25	0.6	984	22.5	1,649	37.6	566	12.9	0	0.0	3,224	73.6
(6/28,30)			F	0	0.0	0	0.0	640	14.6	492	11.3	25	0.6	1,157	26.4
			Subtotal	25	0.6	984	22.5	2,289	52.2	1,058	24.2	25	0.6	4,381	100.0
7/5	231	195	M	23	1.0	353	15.9	730	32.8	319	14.3	0	0.0	1,436	64.6
(7/5,7)			F	0	0.0	0	0.0	353	15.9	433	19.5	0	0.0	787	35.4
			Subtotal	23	1.0	353	15.9	1,083	48.7	752	33.8	0	0.0	2,223	100.0
7/12	156	131	M	15	0.8	168	8.4	594	29.8	243	12.2	15	0.8	1,036	51.9
(7/12,14,19,8/1,			F	0	0.0	30	1.5	396	19.8	518	26.0	15	0.7	959	48.1
3,5,8,10,12,15)			Subtotal	15	0.8	198	9.9	990	49.6	761	38.2	30	1.5	1,995	100.0
Season	994	866	M	118	0.5	5,308	22.0	9,066	37.5	3,412	14.1	47	0.2	17,962	74.2
			F	0	0.0	30	0.1	2,888	11.9	3,188	13.2	127	0.5	6,233	25.8
			Total	118	0.5	5,338	22.1	11,954	49.4	6,600	27.3	174	0.7	24,195	100.0
		7,685	M	2,643	0.9	73,797	24.3	68,860	22.7	51,804	17.0	3,160	1.0	200,839	66.1
			F	455	0.1	8,081	2.7	21,883	7.2	67,100	22.1	5,371	1.8	103,127	33.9
Grand Total [a]			Total	3,098	1.0	81,878	26.9	90,743	29.9	118,904	39.1	8,531	2.8	303,966	100.0

Note: The numbers of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors. The numbers of fish in “Season” summaries are the strata sums; "Season" percentages are derived from the sums.

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991-1995 and 1997–2005.

Table 15.–Mean length (mm) of Chinook salmon from the District W-4 commercial fishery, 2005.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	1.5
6/14 (6/14,16)	M	Mean Length		545	700	814	715
		Std. Error		7	6	17	-
		Range		440- 672	576- 835	688-1123	715- 715
		Sample Size	0	40	74	32	1
	F	Mean Length			765	801	735
		Std. Error			11	10	-
		Range			700- 883	695- 889	735- 735
		Sample Size	0	0	16	22	1
6/21 (6/21,23)	M	Mean Length	335	548	697	818	
		Std. Error	-	7	7	13	
		Range	335- 335	420- 632	531- 861	605- 888	
		Sample Size	1	46	68	23	0
	F	Mean Length			769	838	905
		Std. Error			8	17	-
		Range			719- 825	722-1009	905- 905
		Sample Size	0	0	18	19	1
6/28 (6/28,30)	M	Mean Length	336	527	699	837	
		Std. Error	-	9	7	29	
		Range	336- 336	401- 686	573- 838	687-1405	
		Sample Size	1	40	67	23	0
	F	Mean Length			788	842	795
		Std. Error			8	19	-
		Range			696- 847	716-1102	795- 795
		Sample Size	0	0	26	20	1
7/5 (7/5,7)	M	Mean Length	437	566	718	800	
		Std. Error	9	12	10	18	
		Range	428- 446	474- 793	536- 865	562-1005	
		Sample Size	2	31	64	28	0
	F	Mean Length			767	831	
		Std. Error			11	6	
		Range			576- 875	705- 920	
		Sample Size	0	0	31	38	0
7/12 (7/12,14,19,8/1, 3,5,8,10,12,15)	M	Mean Length	381	574	725	895	692
		Std. Error	-	27	8	31	-
		Range	381- 381	463- 774	614- 822	622-1080	692- 692
		Sample Size	1	11	39	16	1
	F	Mean Length		617	794	863	1001
		Std. Error		26	11	14	-
		Range		591- 642	690- 900	734-1045	1001-1001
		Sample Size	0	2	26	34	1

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Table 15.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	1.5
Season	M	Mean Length	361	546	702	824	708
		Range	335- 446	401- 793	531- 865	562-1405	692- 715
		Sample Size	5	168	312	122	2
	F	Mean Length		617	776	833	852
		Range		591- 642	576- 900	695-1102	735-1001
		Sample Size	0	2	117	133	4
	M	Mean Length	385	542	697	828	871
		Range	314-513	390-805	531-878	562-1405	692-996
		Sample Size	70	1316	1467	1012	39
	F	Mean Length	606	574	781	846	878
		Range	365-832	491-799	541-963	599-1102	735-1001
Grand Total [a]		Sample Size	3	60	306	1225	41

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991-1995 and 1997-2005.

Table 16.–Age and sex composition of sockeye salmon from the District W-4 commercial fishery, 2005.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.3 Catch	%	1.2 Catch	%	1.3 Catch	%	2.2 Catch	%	1.4 Catch	%	2.3 Catch	%	Total Catch	%
6/23	240	176	M	99	0.6	1,287	7.4	8,514	48.9	0	0.0	99	0.6	99	0.6	10,098	58.0
(6/14,16,21,23,28)			F	495	2.8	693	4.0	6,039	34.6	0	0.0	0	0.0	99	0.5	7,326	42.0
			Subtotal	594	3.4	1,980	11.4	14,553	83.5	0	0.0	99	0.6	198	1.1	17,424	100.0
6/30	240	201	M	89	0.5	2,588	14.4	6,693	37.3	89	0.5	178	1.0	89	0.5	9,727	54.2
(6/30,7/5)			F	179	1.0	3,034	16.9	4,908	27.4	89	0.5	0	0.0	0	0.0	8,210	45.8
			Subtotal	268	1.5	5,622	31.3	11,601	64.7	178	1.0	178	1.0	89	0.5	17,937	100.0
7/7	280	229	M	76	0.4	3,347	19.2	6,162	35.4	0	0.0	76	0.5	0	0.0	9,661	55.5
(7/7,12)			F	304	1.8	2,054	11.8	5,173	29.7	76	0.4	76	0.4	76	0.4	7,760	44.5
			Subtotal	380	2.2	5,401	31.0	11,335	65.1	76	0.4	152	0.9	76	0.4	17,421	100.0
7/14	210	174	M	0	0.0	1,035	16.7	1,570	25.3	36	0.6	35	0.6	285	4.6	2,997	48.3
(7/14)			F	0	0.0	963	15.5	1,998	32.2	71	1.1	143	2.3	36	0.6	3,212	51.7
			Subtotal	0	0.0	1,998	32.2	3,568	57.5	107	1.7	178	2.9	321	5.2	6,209	100.0
7/19	206	157	M	125	1.3	2,124	21.7	2,499	25.5	0	0.0	62	0.6	0	0.0	4,811	49.0
(7/19,8/1,3,5,8,10,			F	0	0.0	2,562	26.1	2,250	22.9	0	0.0	0	0.0	187	1.9	4,999	51.0
12,15,17,19,22,26,30)			Subtotal	125	1.3	4,686	47.8	4,749	48.4	0	0.0	62	0.6	187	1.9	9,810	100.0
Season	1,176	937	M	389	0.6	10,382	15.1	25,438	37.0	125	0.2	452	0.7	474	0.7	37,295	54.2
			F	978	1.4	9,306	13.5	20,368	29.6	237	0.3	219	0.3	398	0.6	31,506	45.8
			Total	1,367	2.0	19,688	28.6	45,806	66.6	362	0.5	671	1.0	872	1.3	68,801	100.0
		7,899	M	16,784	2.2	111,165	14.6	236,576	31.1	6,242	0.8	10,289	1.4	8,052	1.1	393,759	51.8
			F	17,270	2.3	95,266	12.5	229,395	30.2	5,057	0.7	8,077	1.1	8,136	1.1	365,870	48.4
Grand Total [a]			Total	34,054	4.5	206,431	27.2	465,969	61.3	11,296	1.5	18,365	2.4	16,189	2.1	759,660	100.3

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991-1995 and 1997–2005.

Table 17.–Mean length (mm) of sockeye salmon from the District W-4 commercial fishery, 2005.

Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	1.3	2.2	1.4	2.3
6/23 (6/14,16,21,23,28)	M	Mean Length	562	523	566		531	574
		Std. Error	-	8	2		-	-
		Range	562- 562	454- 568	530- 617		531- 531	574- 574
		Sample Size	1	13	86	0	1	1
	F	Mean Length	537	519	534			527
		Std. Error	4	9	2			-
		Range	522- 545	492- 552	486- 580			527- 527
		Sample Size	5	7	61	0	0	1
6/30 (6/30,7/5)	M	Mean Length	547	512	566	527	586	571
		Std. Error	-	5	3	-	13	-
		Range	547- 547	449- 584	493- 663	527- 527	573- 598	571- 571
		Sample Size	1	29	75	1	2	1
	F	Mean Length	527	501	529	498		
		Std. Error	11	4	5	-		
		Range	516- 537	465- 573	300- 565	498- 498		
		Sample Size	2	34	55	1	0	0
7/7 (7/7,12)	M	Mean Length	544	526	563		581	
		Std. Error	-	4	3		-	
		Range	544- 544	447- 588	508- 630		581- 581	
		Sample Size	1	44	81	0	1	0
	F	Mean Length	521	517	543	496	563	519
		Std. Error	16	5	3	-	-	-
		Range	489- 556	444- 560	466- 642	496- 496	563- 563	519- 519
		Sample Size	4	27	68	1	1	1
7/14 (7/14)	M	Mean Length		498	557	519	525	526
		Std. Error		5	4	-	-	11
		Range		421- 552	512- 624	519- 519	525- 525	495- 590
		Sample Size	0	29	44	1	1	8
	F	Mean Length		498	537	514	557	537
		Std. Error		2	3	14	23	-
		Range		478- 522	449- 584	499- 528	489- 589	537- 537
		Sample Size	0	27	56	2	4	1
7/19 (7/19,8/1,3,5,8,10, 12,15,17,19,22,26,30)	M	Mean Length	547	510	558		532	
		Std. Error	22	6	4		-	
		Range	525- 568	357- 552	481- 599		532- 532	
		Sample Size	2	34	40	0	1	0
	F	Mean Length		494	528			509
		Std. Error		6	4			9
		Range		321- 581	469- 585			494- 526
		Sample Size	0	41	36	0	0	3

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Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	1.3	2.2	1.4	2.3
Season	M	Mean Length	550	516	564	525	561	545
		Range	525- 568	357- 588	481- 663	519- 527	525- 598	495- 590
		Sample Size	5	149	326	2	6	10
	F	Mean Length	530	504	535	502	559	518
		Range	489- 556	321- 581	300- 642	496- 528	489- 589	494- 537
		Sample Size	11	136	276	4	5	6
	M	Mean Length	581	523	581	538	593	577
		Range	528-656	377-596	484-700	482-602	540-688	497-664
		Sample Size	56	906	2,163	68	99	129
	F	Mean Length	551	504	549	508	566	550
		Range	474-623	440-590	469-625	463-563	504-631	483-610
Grand Total [a]		Sample Size	82	871	2,099	62	100	105

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991-1995 and 1997-2005.

Table 18.–Age and sex composition of chum salmon from the District W-4 commercial fishery, 2005.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	%	0.3 Catch	%	0.4 Catch	%	0.5 Catch	%	Total Catch	%
6/21	240	167	M	0	0.0	577	49.1	162	13.8	14	1.2	752	64.1
(6/14,16,21,23)			F	0	0.0	323	27.5	91	7.8	7	0.6	422	35.9
			Subtotal	0	0.0	900	76.6	253	21.6	21	1.8	1,174	100.0
6/28	239	132	M	27	0.8	1,470	41.7	374	10.6	27	0.8	1,898	53.8
(6/28,30)			F	26	0.7	1,443	40.9	134	3.8	26	0.7	1,630	46.2
			Subtotal	53	1.5	2,913	82.6	508	14.4	53	1.5	3,528	100.0
7/5,7	289	248	M	14	0.4	1,642	47.2	337	9.7	14	0.4	2,007	57.7
(7/5,7,12)			F	0	0.0	1,305	37.5	168	4.8	0	0.0	1,473	42.3
			Subtotal	14	0.4	2,947	84.7	505	14.5	14	0.4	3,480	100.0
7/14,19,8/1	214	185	M	0	0.0	1,553	48.1	157	4.9	0	0.0	1,710	53.0
(7/12,14,19,8/1)			F	0	0.0	1,362	42.2	157	4.8	0	0.0	1,519	47.0
			Subtotal	0	0.0	2,915	90.3	314	9.7	0	0.0	3,229	100.0
8/3,5,10	276	226	M	0	0.0	619	29.2	56	2.6	0	0.0	675	31.9
(8/3,5,8,10,12,15			F	9	0.4	1,340	63.3	85	4.0	9	0.4	1,443	68.1
17,19,22,26,30)			Subtotal	9	0.4	1,959	92.5	141	6.6	9	0.4	2,118	100.0
Season	1,258	958	M	41	0.3	5,860	43.3	1,086	8.0	55	0.4	7,042	52.0
			F	36	0.3	5,773	42.7	635	4.7	43	0.3	6,487	48.0
			Total	77	0.6	11,633	86.0	1,721	12.7	98	0.7	13,529	100.0
		11,817	M	5,376	0.7	190,955	26.0	129,723	17.7	4,082	0.6	330,138	45.0
			F	6,629	0.9	241,763	33.0	148,924	20.3	5,670	0.8	402,985	55.0
Grand Total [a]			Total	12,005	1.6	432,719	59.0	278,646	38.0	9,752	1.3	733,110	100.0

Note: The numbers of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors. The numbers of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991-1995 and 1997–2005.

Table 19.–Mean length (mm) of chum salmon from the District W-4 commercial fishery, 2005.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
6/21	M	Mean Length		567	575	589
(6/14,16,21,23)		Std. Error		3	6	47
		Range		501- 675	517- 643	542- 636
		Sample Size	0	82	23	2
	F	Mean Length		547	563	594
		Std. Error		3	10	-
		Range		507- 589	497- 608	594- 594
		Sample Size	0	46	13	1
6/28	M	Mean Length	524	579	575	629
(6/28,30)		Std. Error	-	5	6	-
		Range	524- 524	519- 652	523- 610	629- 629
		Sample Size	1	55	14	1
	F	Mean Length	487	551	582	557
		Std. Error	-	5	14	-
		Range	487- 487	489- 672	537- 618	557- 557
		Sample Size	1	54	5	1
7/5,7	M	Mean Length	490	567	584	554
(7/5,7,12)		Std. Error	-	3	6	-
		Range	490- 490	503- 636	529- 646	554- 554
		Sample Size	1	117	24	1
	F	Mean Length		552	567	
		Std. Error		3	11	
		Range		497- 678	504- 632	
		Sample Size	0	93	12	0
7/14,19,8/1	M	Mean Length		567	599	
(7/12,14,19,8/1)		Std. Error		3	12	
		Range		490- 637	560- 646	
		Sample Size	0	89	9	0
	F	Mean Length		544	568	
		Std. Error		3	4	
		Range		476- 611	543- 585	
		Sample Size	0	78	9	0
8/3,5,10	M	Mean Length		564	578	
(8/3,5,8,10,12,15		Std. Error		3	12	
17,19,22,26,30)		Range		511- 625	539- 618	
		Sample Size	0	66	6	0

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Table 19.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
8/3,5,10 (8/3,5,8,10,12,15 17,19,22,26,30) (cont.)	F	Mean Length	511	541	550	544
		Std. Error	-	2	15	-
		Range	511- 511	489- 657	492- 614	544- 544
		Sample Size	1	143	9	1
Season	M	Mean Length	512	570	581	600
		Range	490- 524	490- 675	517- 646	542- 636
		Sample Size	2	409	76	4
	F	Mean Length	493	547	567	560
		Range	487- 511	476- 678	492- 632	544- 594
		Sample Size	2	414	48	3
Grand Total [a]	M	Mean Length	535	584	607	608
		Range	454-675	462-710	492-735	530-694
		Sample Size	85	3176	2059	64
	F	Mean Length	531	561	579	586
		Range	486-578	325-683	492-695	516-651
		Sample Size	105	3970	2281	73

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991-1995 and 1997-2005.

Table 20.–Age and sex of coho salmon from the District W-4 commercial fishery, 2005.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Catch	1.1 %	2.1 Catch	2.1 %	3.1 Catch	3.1 %	Total Catch	Total %
8/1	94	50	M	268	28.0	555	58.0	0	0.0	823	86.0
(8/1)			F	19	2.0	96	10.0	19	2.0	134	14.0
			Subtotal	287	30.0	651	68.0	19	2.0	957	100.0
8/3	278	167	M	249	13.2	882	46.7	0	0.0	1,131	59.9
(8/3)			F	79	4.2	667	35.3	11	0.6	757	40.1
			Subtotal	328	17.4	1,549	82.0	11	0.6	1,888	100.0
8/5	170	138	M	1,119	13.7	4,006	49.3	412	5.1	5,538	68.1
(8/5,8)			F	177	2.2	2,416	29.7	0	0.0	2,592	31.9
			Subtotal	1,296	15.9	6,422	79.0	412	5.1	8,130	100.0
8/10	253	189	M	1,962	8.4	10,545	45.5	736	3.2	13,243	57.1
(8/10,12,15,17)			F	1,594	6.9	7,603	32.8	735	3.1	9,932	42.9
			Subtotal	3,556	15.3	18,148	78.3	1,471	6.3	23,175	100.0
8/26	170	122	M	1,296	7.4	7,052	40.1	144	0.8	8,491	48.4
(8/19,22,26,30)			F	1,295	7.4	7,196	41.0	576	3.3	9,067	51.6
			Subtotal	2,591	14.8	14,248	81.1	720	4.1	17,558	100.0
Season	965	666	M	4,893	9.5	23,040	44.5	1,292	2.5	29,225	56.5
			F	3,165	6.1	17,977	34.8	1,342	2.6	22,483	43.5
			Total	8,058	15.6	41,017	79.3	2,634	5.1	51,708	100.0
		6,999	M	31,792	4.0	340,233	43.3	16,511	2.1	421,528	53.6
			F	27,287	3.5	289,547	36.8	15,250	1.9	362,894	46.4
Grand Total [a]			Total	59,079	7.5	629,780	80.1	31,761	4.0	784,422	100.0

Note: The numbers of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors. The numbers of fish in “Season” summaries are the strata sums; "Season" percentages are derived from the sums.

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991-1995 and 1997–2005.

Table 21.–Mean length (mm) of coho salmon from the District W-4 commercial fishery, 2005.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/1 (8/1)	M	Mean Length	543	541	
		Std. Error	14	9	
		Range	436- 600	439- 620	
		Sample Size	14	29	0
	F	Mean Length	558	551	556
		Std. Error	-	18	-
		Range	558- 558	484- 586	556- 556
		Sample Size	1	5	1
8/3 (8/3)	M	Mean Length	531	551	
		Std. Error	11	6	
		Range	450- 613	369- 628	
		Sample Size	22	78	0
	F	Mean Length	565	566	578
		Std. Error	15	6	-
		Range	530- 636	405- 631	578- 578
		Sample Size	7	59	1
8/5 (8/5,8)	M	Mean Length	548	545	545
		Std. Error	13	6	18
		Range	450- 641	429- 636	483- 602
		Sample Size	19	68	7
	F	Mean Length	529	567	
		Std. Error	12	5	
		Range	515- 552	485- 622	
		Sample Size	3	41	0
8/10 (8/10,12,15,17)	M	Mean Length	522	558	558
		Std. Error	13	5	28
		Range	436- 615	462- 644	492- 645
		Sample Size	16	86	6
	F	Mean Length	567	576	574
		Std. Error	9	4	19
		Range	507- 622	516- 669	484- 617
		Sample Size	13	62	6
8/26 (8/19,22,26,30)	M	Mean Length	547	575	625
		Std. Error	14	7	-
		Range	490- 604	440- 671	625- 625
		Sample Size	9	49	1
	F	Mean Length	599	580	620
		Std. Error	7	3	15
		Range	560- 635	530- 628	586- 660
		Sample Size	9	50	4

-continued-

Table 21-Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
Season	M	Mean Length	536	560	561
		Range	436- 641	369- 671	483- 645
		Sample Size	80	310	14
	F	Mean Length	578	576	594
		Range	507- 636	405- 669	484- 660
		Sample Size	33	217	12
	M	Mean Length	563	585	586
		Range	472-653	419-704	489-660
		Sample Size	137	1518	71
	F	Mean Length	587	588	578
		Range	441-661	412-676	528-594
Grand Total [a]		Sample Size	78	1129	53

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991-1995 and 1997-2005.

Table 22.–Daily weather and hydrological observations from the Kanektok River weir site, 2005.

Date	Wind (Dir/Speed)	Air Temp. (˚C)	Water Temp. (˚C)	Cloud Cover %/altitude ft	Water level (cm)	Precip. (in)
6/29	Calm	23	12	Fog	45	0
6/30	S/10	10	9.5	Fog	45	0
7/01	Calm	12	8.5	100/800	49	0.05
7/02	S/5	9	9	100/1,100	47	1.5
7/03	Calm	8	9	5/NA	45	0.01
7/04	Calm	9	9	Fog	45	0.1
7/05	Calm	11	9	95/1500	45	0.37
7/06	Calm	14	11	100/1000	44	0.05
7/07	Calm	5	9	5/NA	42	0
7/08	Calm	24	14	100/1100	40	0
7/09	Calm	19	11	100/1000	41	0
7/10	NW2-5	6	9	40/3000	39	0
7/11	Calm	8	10	100/900	38	0
7/12	SE/5	6.5	8	95/1500	38	Trace
7/13	Calm	6	9	5/3,000	35	0.15
7/14	Calm	5	11	5/8,000	34	0
7/15	Calm	9	12	100/NA	32	0
7/16	Calm	13	17	70/NA	32	0.13
7/17	Calm	10.5	15.5	100/NA	33.5	0.46
7/18	W/5	7	17	100/6,000	33.5	0.01
7/19	Calm	7	17	100/5,000	31.5	0
7/20	Calm	6	16	Fog	30	0
7/21	Calm	10	17	90/10,000	28	0
7/22	W/5	11	17	100/4,000	29	0.22
7/23	NW/5	15	17.5	100/7,000	32	0.62
7/24	W/5	15	15	75/NA	32	0
7/25	Calm	7	17	80/NA	28	0
7/26	Calm	7	17	70/1,500	27	0.01
7/27	Calm	7	16	100/NA	27	0.02
7/28	Calm	12	17	Fog	25	0
7/29	Calm	10	16	100/7,000	24	0.01
7/30	Calm	11	16	100/900	23	0
7/31	Calm	11	17	Fog	23	0
8/01	Calm	4	15	20/NA	28	0.2
8/02	Calm	4	15	Fog	27	0
8/03	Calm	10	14	Fog	27	0.05
8/04	Calm	10	11	Fog	24	0
8/05	Calm	11	10	100/700	23	0
8/06	Calm	14	12	85/900	22	0
8/07	SSE 5-10	11	12	100/VAR	22	0
8/08	SE 5-10	5	9	5/2,000	21	0
8/09	E 5-10	7	11	Clear	20	0
8/10	SW 5-10	11	11	Clear	19.5	0
8/11	Calm	13	11	90/800	19	0
8/12	Calm	6	11	Fog	18	0
8/13	S 5	15	11	Clear	18	0
8/14	Calm	12	12	Fog	17	0
8/15	Calm	10	12	Fog	16.5	0

-continued-

Table 22.–Page 2 of 2.

Date	Wind (Dir/Speed)	Air Temp. (˚C)	Water Temp. (˚C)	Cloud Cover %/altitude ft	Water level (cm)	Precip. (in)
8/16	Calm	NO OBS	NO OBS	NO OBS	NO OBS	NO OBS
8/17	Calm	10	12	100/1,500	18	0.02
8/18	SE 2	6	12	60/2,000	18	0.07
8/19	Calm	13	13	Fog/Smoke	17	0
8/20	Calm	9	10	100/900	16	0.1
8/21	N 2-5	10	10	100/800	19	0.22
8/22	NO OBS	NO OBS	NO OBS	NO OBS	NO OBS	NO OBS
8/23	NE 5-10	10	9	100/1,000	34	0.33
8/24	NE 5-10	8	10	100/700	42	0.6
8/25	Calm	7	9	100/600	47	0.2
8/26	SE 5	5	9	100/300	44	0.03
8/27	N 5	9	9	100/700	41	Trace
8/28	S 10	11	9	100/500	46	0.31
8/29	W 10-15	9	9	100/400	53	0.5
8/30	W 0-5	9	9	100/400	81	0.7
8/31	Calm	7	9	100/400	84	0.2
9/01	Calm	4	8	Fog	78	Trace
9/02	E 10-15	8	9	100/NA	75	0.7
9/03	E 10-15	9	8	100/NA	75	0.15
9/04	E 10-15	14	8	100/600	65	0.15
9/05	Calm	9	9	100/800	66	0.03
9/06	Calm	7	9	100/500	63	0.1
9/07	NE 5-10	7	8	100/600	60	0.05
9/08	Calm	-2	7	Clear	58	0
9/09	NE 5-15	10	8	100/500	64	0.4
9/10	Calm	10	10	100/500	66	0.15

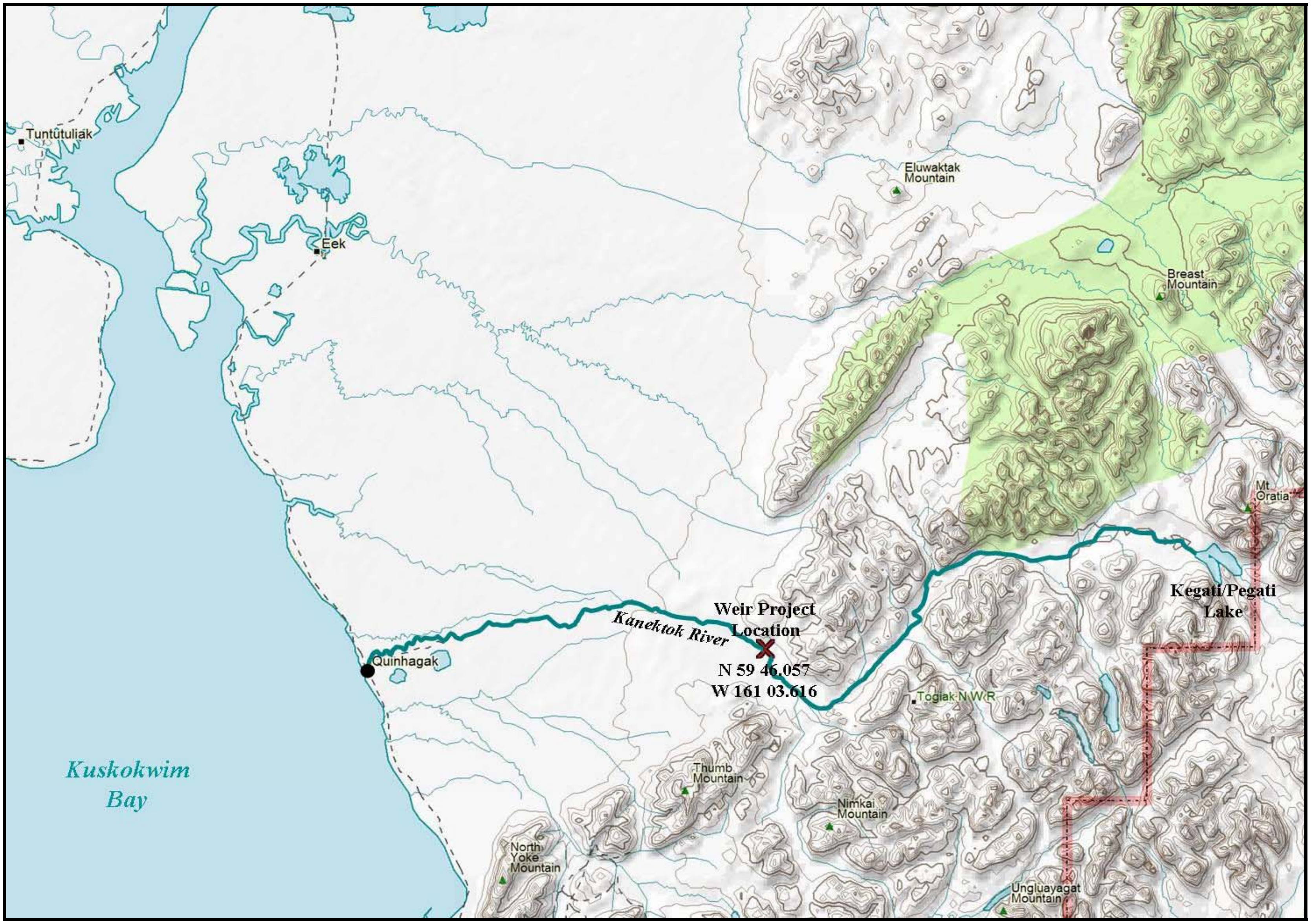


Figure 1.–Kanektok River, Kuskokwim Bay, Alaska.

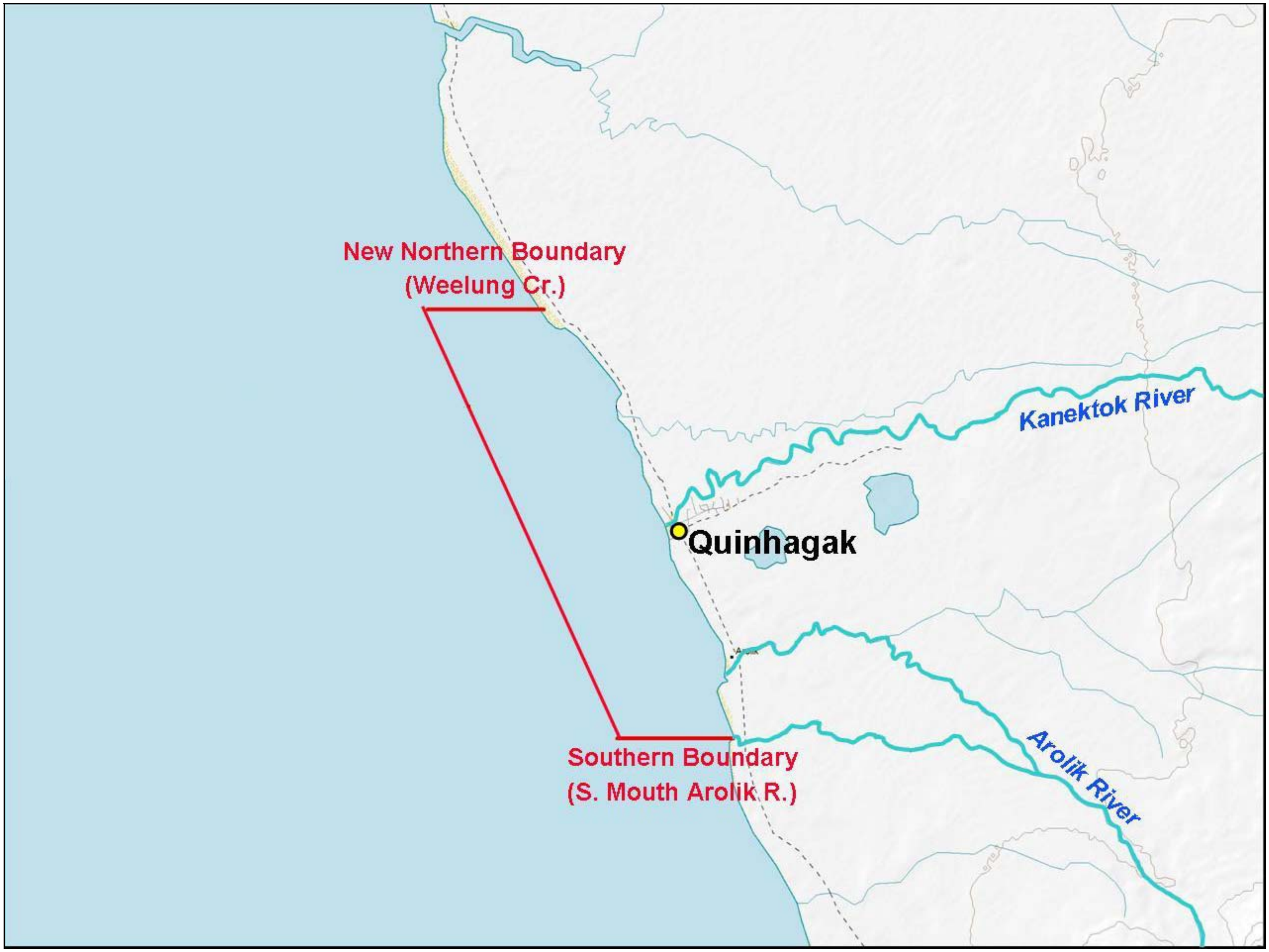


Figure 2.–Commercial Fishing District W-4, Kuskokwim Bay, Alaska, 2005.

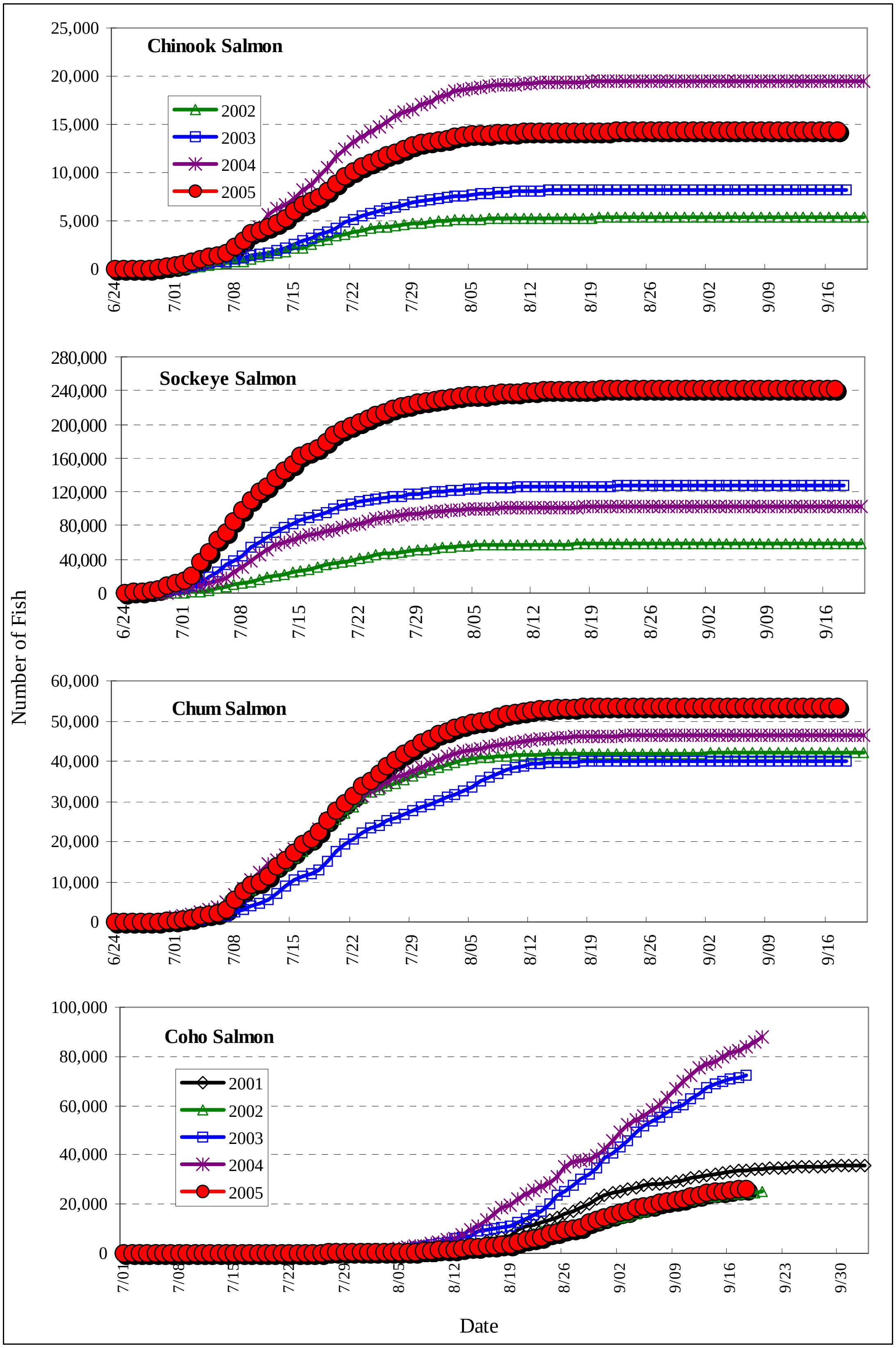


Figure 3.–Historical escapement of Chinook, sockeye, chum, and coho salmon, Kanektok River weir.

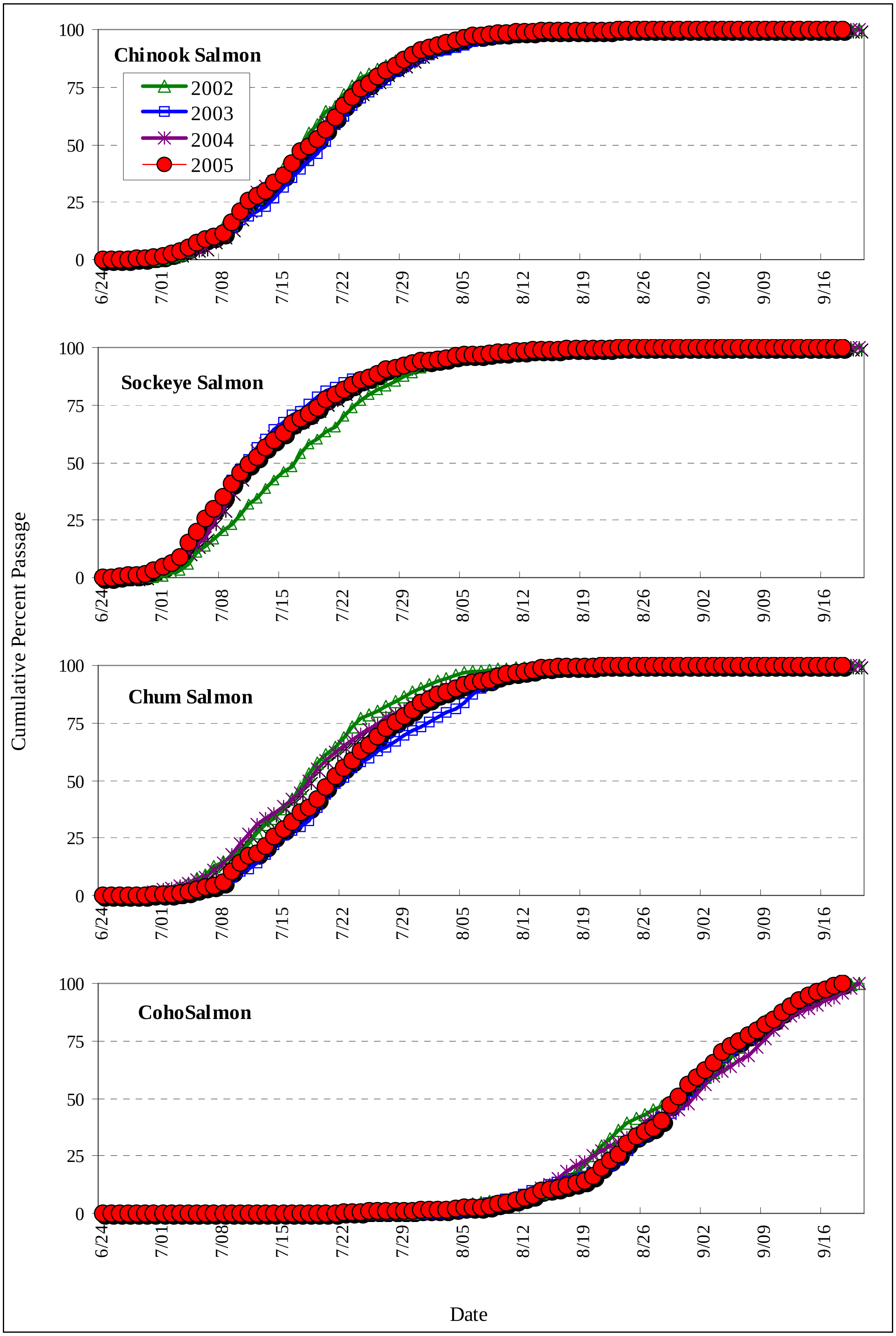
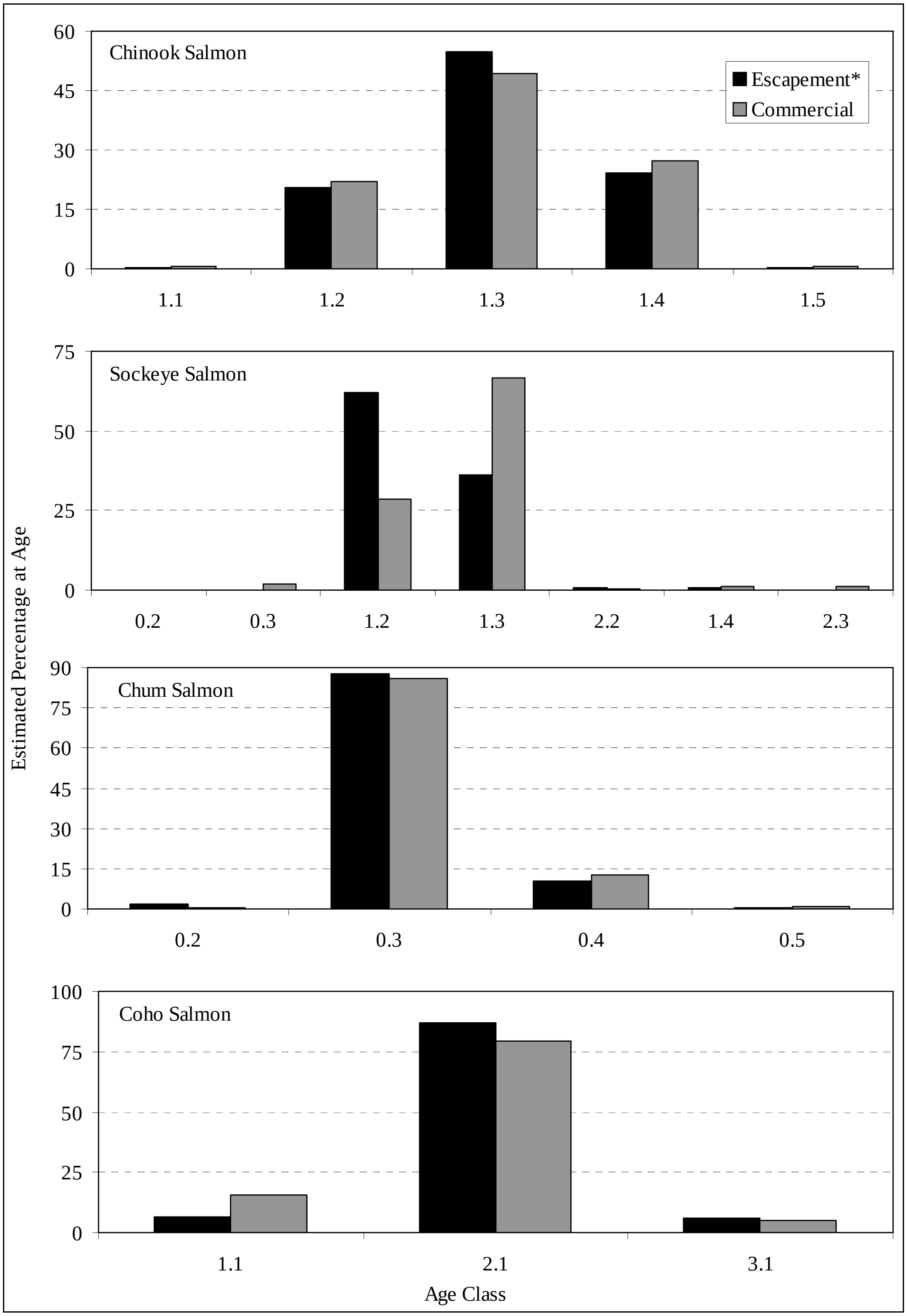
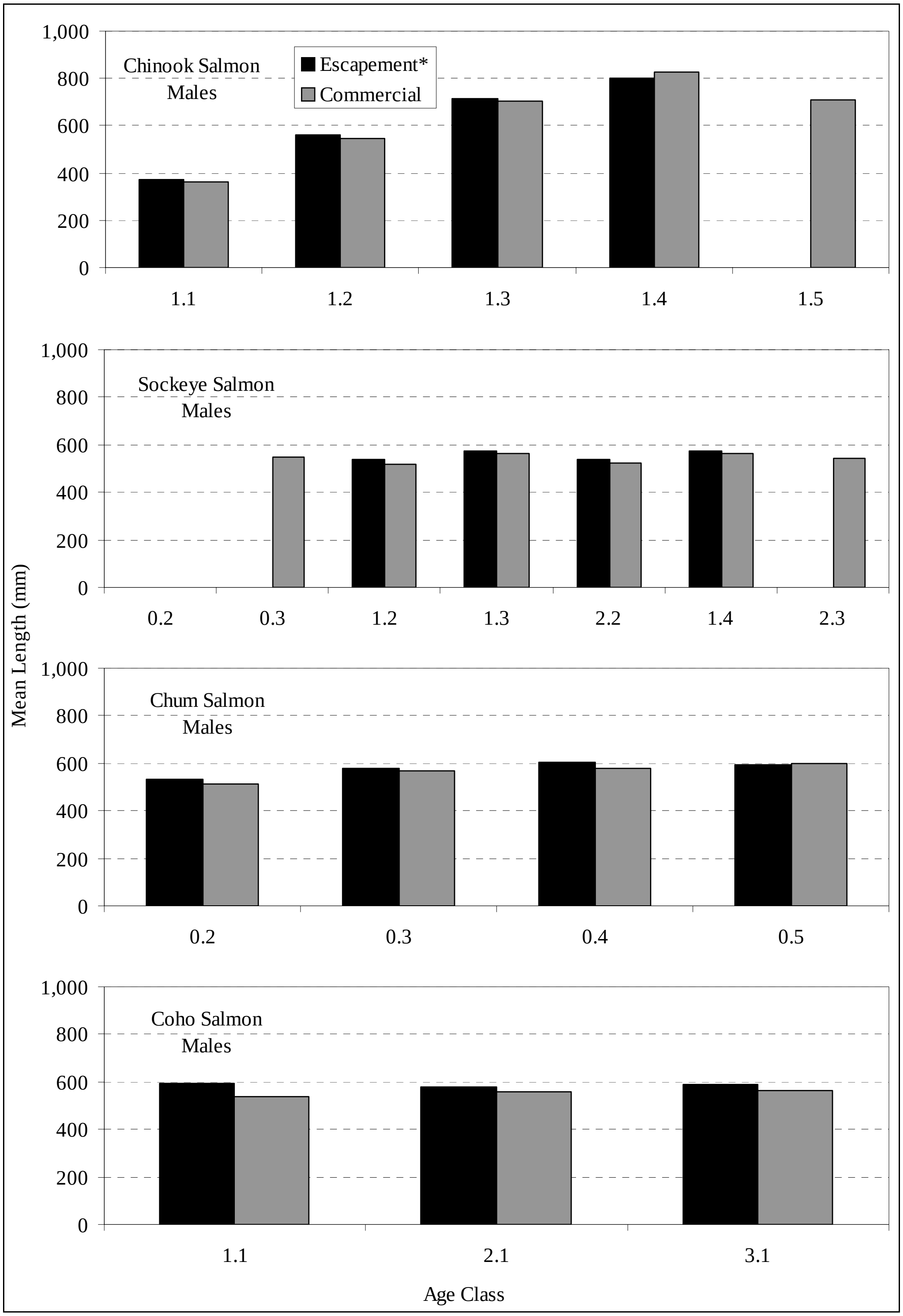


Figure 4.–Historical run timing of Chinook, sockeye, chum, and coho salmon, Kanektok River weir.



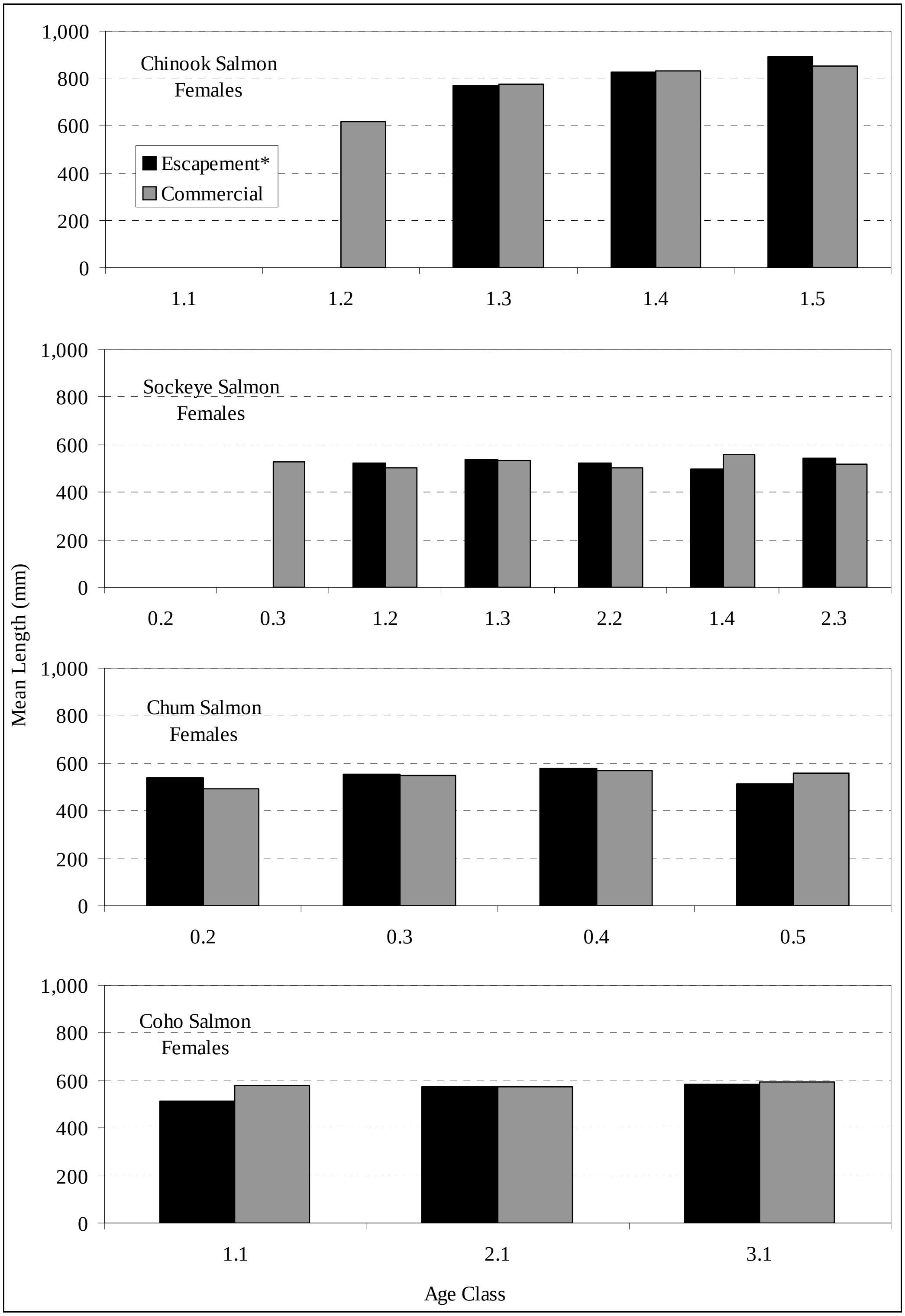
Note: Percentages do not represent estimated escapement as they are based on escapement observed and samples collected during weir operations only.

Figure 5.–Age class percentages for Chinook, sockeye, chum, and coho salmon from observed Kanektok River weir escapement and District W-4 commercial fishery, 2005.



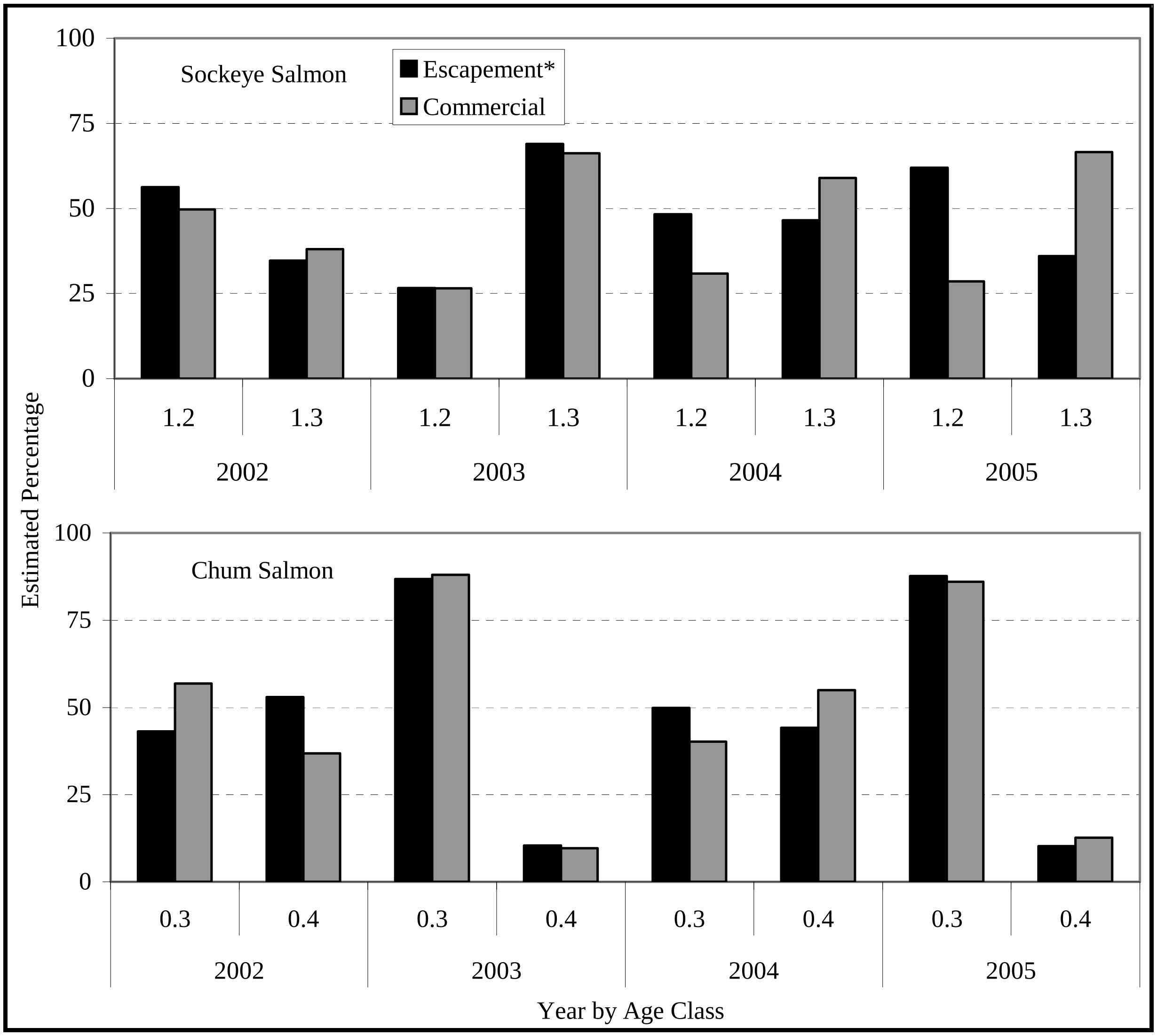
Note: Mean lengths do not represent estimated escapement as they are based on escapement observed and samples collected during weir operations only.

Figure 6.–Mean length by age class for male Chinook, sockeye, chum, and coho salmon from observed Kanektok River weir escapement and District W-4 commercial fishery, 2005.



Note: Mean lengths do not represent estimated escapement as they are based on escapement observed and samples collected during weir operations only.

Figure 7.–Mean length by age class for female Chinook, sockeye, chum, and coho salmon from observed Kanektok River weir escapement and District W-4 commercial fishery, 2005.



Note: 2005 escapement ASL data does not represent estimated escapement as it is based on escapement observed and samples collected during weir operations only.

Figure 8.–Percentage of age-1.2 and -1.3 sockeye salmon and age-0.3 and -0.4 chum salmon from Kanektok River weir escapement and District W-4 commercial ASL estimates, 2002–2005.

APPENDIX A.

Appendix A1.–Historical commercial, subsistence, and sport fishing harvests of Chinook, sockeye, coho and chum salmon, Quinhagak area, 1960–2005.

	Chinook			Sockeye			Chum			Coho		
Year	**Commercial**	**Subsistence**	**Sport**	**Commercial**	**Subsistence**	**Sport**	**Commercial**	**Subsistence**	**Sport**	**Commercial**	**Subsistence**	**Sport**
1960	0			5,649			0			3,000		
1961	4,328			2,308			18,864			46		
1962	5,526			10,313			45,707			0		
1963	6,555			0			0			0		
1964	4,081			13,422			707			379		
1965	2,976			1,886			4,242			0		
1966	278			1,030			2,610			0		
1967	0	1,349		652			8,087			1,926		
1968	8,879	2,756		5,884			19,497			21,511		
1969	16,802			3,784			38,206			15,077		
1970	18,269			5,393			46,556			16,850		
1971	4,185			3,118			30,208			2,982		
1972	15,880			3,286			17,247			376		
1973	14,993			2,783			19,680			16,515		
1974	8,704			19,510			15,298			10,979		
1975	3,928			8,584			35,233			10,742		
1976	14,110			6,090			43,659			13,777		
1977	19,090	2,012		5,519			43,707			9,028		
1978	12,335	2,328		7,589			24,798			20,114		
1979	11,144	1,420		18,828			25,995			47,525		
1980	10,387	1,940		13,221			65,984			62,610		
1981	24,524	2,562		17,292			53,334			47,551		
1982	22,106	2,402		25,685			34,346			73,652		
1983	46,385	2,542	1,511	10,263		0	23,090		315	32,442		367
1984	33,663	3,109	922	17,255		143	50,422		376	132,151		1,895
1985	30,401	2,341	672	7,876	106	12	20,418	901	149	29,992	67	622
1986	22,835	2,682	938	21,484	423	200	29,700	808	777	57,544	41	2,010
1987	26,022	3,663	508	6,489	1,067	153	8,557	1,084	111	50,070	125	2,300
1988	13,883	3,690	1,910	21,556	1,261	109	29,220	1,065	618	68,605	4,317	1,837
1989	20,820	3,542	884	20,582	633	101	39,395	1,568	537	44,607	3,787	1,096
1990	27,644	6,013	503	83,681	1,951	462	47,717	3,234	202	26,926	4,174	644
1991	9,480	3,693	316	53,657	1,772	88	54,493	1,593	80	42,571	3,232	358

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Appendix A1.–Page 2 of 2.

	Chinook			Sockeye			Chum			Coho		
Year	**Commercial**	**Subsistence**	**Sport**	**Commercial**	**Subsistence**	**Sport**	**Commercial**	**Subsistence**	**Sport**	**Commercial**	**Subsistence**	**Sport**
1992	17,197	3,447	656	60,929	1,264	66	73,383	1,833	251	86,404	2,958	275
1993	15,784	3,368	1,006	80,934	1,082	331	40,943	1,008	183	55,817	2,152	734
1994	8,564	3,995	751	72,314	1,000	313	61,301	1,452	156	83,912	2,739	675
1995	38,584	2,746	739	68,194	573	148	81,462	686	213	66,203	2,561	970
1996	14,165	3,075	689	57,665	1,467	335	83,005	930	200	118,718	1,467	875
1997	35,510	3,433	1,632	69,562	1,264	607	38,445	600	212	32,862	1,264	1,220
1998	23,158	4,041	1,475	41,382	1,702	942	45,095	1,448	213	80,183	1,702	751
1999	18,426	3,167	854	41,315	2,021	496	38,091	1,810	293	6,184	2,021	1,091
2000	21,229	3,106	833	68,557	1,088	684	30,553	912	231	30,529	1,088	799
2001	12,775	2,923	947	33,807	1,525	83	17,209	747	43	18,531	1,525	2,448
2002	11,480	2,475	779	17,802	1,099	73	29,252	1,839	446	26,695	1,099	1,784
2003	14,444	3,898	323	33,941	1,622	107	27,868	1,129	14	49,833	2,047	1,076
2004	25,465	3726	288	34,627	1086	112	25,820	1112	33	82,398	1209	1362
2005	14,195	[a]	[a]	68,801	[a]	[a]	13,529	[a]	[a]	51,780	[a]	[a]
10-Year Average[b]	20,857	3,259	856	48,696	1,345	359	39,121	1,121	190	51,265	1,598	1,238
Historical Average[c]	15,895	3,048	870	25,533	1,200	253	32,672	1,288	257	35,861	1,979	1,145

Note: Commercial harvest from District W-4 (Quinhagak), subsistence harvest by the community of Quinhagak, subsistence harvest estimates prior to 1988 are based on a different formula and are not comparable with estimates from 1988 to present.

[a] Not available at time of publication.

[b] 10-year average from 1995–2004.

[c] Historical average of subsistence harvest from 1988–2004.

APPENDIX B.

Appendix B1.–Historical escapement, Kanektok River escapement projects, 1996–2005.

Year	Method	Dates of Operation	Chinook	Sockeye	Chum	Pink	Coho
1996	Counting Tower [b]	2–13, 20–25 July	6,827 [e]	71,637 [e]	70,617 [e]	[e]	[e]
1997	Counting Tower [b]	11 June–21 August	16,731	96,348	51,180	7,872	23,172 [e]
1998	Counting Tower [b]	23 July–17 August	[e]	[e]	[e]	[e]	
1999	Tower/Weir [b]	Not Operational					
2000	Resistance Board Weir [c]	Not Operational					
2001	Resistance Board Weir [d]	10 August–3 October	132 [e]	735 [e]	1,058 [e]	19 [e]	35,677
2002	Resistance Board Weir [d]	1 July–20 September	5,343	58,367	42,014	87,036	24,883
2003	Resistance Board Weir [d]	24 June–18 September	8,221	127,471	40,071	2,443	72,448
2004	Resistance Board Weir [d]	29 June–20 September	19,528	102,867	46,444	98,060	87,828
2005	Resistance Board Weir [d]	8 July-8 September	14,331	242,208	53,580	3,530	26,343

[a] Picket spacing of the weir panels allows pink salmon to freely pass through the weir unobserved.
[b] Project located approximately 15 river miles from the mouth of the Kanektok River.
[c] Project located approximately 20 river miles from the mouth of the Kanektok River.
[d] Project located approximately 42 river miles from the mouth of the Kanektok River.
[e] No counts or incomplete counts as the project was not operational during a large portion of species migration.

APPENDIX C.

Appendix C1.–Aerial survey escapement indices of the Kanektok River drainage by species, 1965–2005.

Year	Chinook	Sockeye	Chum	Coho
1962	935	43,108	[a]	[a]
1965	[a]	[a]	[a]	[a]
1966	3,718	[a]	28,800	[a]
1967	[a]	[a]	[a]	[a]
1968	4,170	8,000	14,000	[a]
1969	[a]	[a]	[a]	[a]
1970	3,112	11,375	[a]	[a]
1971	[a]	[a]	[a]	[a]
1972	[a]	[a]	[a]	[a]
1973	814	[a]	[a]	[a]
1974	[a]	[a]	[a]	[a]
1975	[a]	6,018	[a]	[a]
1976	[a]	22,936	8,697	[a]
1977	5,787	7,244	32,157	[a]
1978	19,180	44,215	229,290 [b]	[a]
1979	[a]	[a]	[a]	[a]
1980	[a]	[a]	[a]	[a]
1981	[a]	[a]	[a]	69,325
1982	15,900	49,175	71,840	[a]
1983	8,142	55,940	[a]	[a]
1984	8,890	2,340	9,360	[a]
1985	12,182	30,840	53,060	46,830
1986	13,465	16,270	14,385	[a]
1987	3,643	14,940	16,790	[a]
1988	4,223	51,753	9,420	20,056
1989	11,180	30,440	20,583	[a]
1990	7,914	14,735	6,270	[a]
1991	[a]	[a]	2,475	[a]
1992	2,100	44,436	19,052 [c]	4,330
1993	3,856	14,955	25,675	[a]
1994	4,670	23,128	1,285	[a]
1995	7,386	30,090	10,000	[a]
1996	[a]	[a]	[a]	[a]
1997	[a]	[a]	[a]	[a]
1998	6,107	22,020	7,040	23,656
1999	[a]	[a]	[a]	5,192
2000	1,118	11,670	10,000	10,120
2001	6,483	38,610	11,440	[a]
2002	[a]	[a]	[a]	[a]
2003	6,206	21,335	2,700	[a]
2004	28,375	78,380	[a]	[a]
2005	14,202	110,730	[a]	[a]
SEG[d]	3,500–8,000	14,000–34,000	>5,200	7,700–36,000

Note: Aerial surveys are those rated as fair to good obtained between 20 July and 5 August for Chinook and sockeye salmon, 20 and 31 July for chum salmon, and 20 August and 5 September for coho salmon.

[a] Survey either not flown or did not meet acceptable survey criteria.

[b] Chum salmon count excluded from escapement objective because of exceptional magnitude.

[c] Some chum salmon may have been incorrectly speciated as sockeye salmon.

[d] Current Kanektok River drainage aerial survey Sustainable Escapement Goals (ADF&G 2004).

APPENDIX D.

Appendix D1.–Historical Chinook, sockeye, chum, and coho salmon cumulative percent passage, Kanektok River weir.

	Chinook Salmon				Sockeye Salmon				Chum Salmon				Coho Salmon				
Date	2002	2003	2004	2005[a]	2002	2003	2004	2005[a]	2002	2003	2004	2005[a]	2001	2002	2003	2004	2005[a]
06/24	0	0			0	0			0	0			0	0	0		
06/25	0	0		0	0	0		0	0	0		0	0	0	0		0
06/26	0	0		0	0	1		0	0	0		0	0	0	0		0
06/27	0	0		0	0	1		1	0	0		0	0	0	0		0
06/28	0	0		0	0	1		1	0	0		0	0	0	0		0
06/29	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0
06/30	0	1	1	1	0	3	2	3	0	0	1	0	0	0	0	0	0
07/01	1	1	2	1	0	5	5	5	0	0	3	0	0	0	0	0	0
07/02	2	2	2	3	2	6	7	6	2	1	3	1	0	0	0	0	0
07/03	2	3	3	4	3	9	9	9	4	1	4	1	0	0	0	0	0
07/04	4	5	3	5	6	15	11	15	5	2	5	2	0	0	0	0	0
07/05	7	7	5	7	11	20	14	20	8	3	7	3	0	0	0	0	0
07/06	9	9	5	9	14	26	17	26	9	4	8	4	0	0	0	0	0
07/07	11	10	8	10	17	30	24	30	12	4	11	4	0	0	0	0	0
07/08	14	12	11	12	20	35	30	35	15	6	14	6	0	0	0	0	0
07/09	15	14	14	16	23	42	37	41	17	8	18	10	0	0	0	0	0
07/10	20	17	18	21	27	47	44	46	19	10	22	14	0	0	0	0	0
07/11	24	19	22	26	32	52	49	49	23	11	26	17	0	0	0	0	0
07/12	27	21	29	28	35	57	55	52	27	14	31	18	0	0	0	0	0
07/13	32	23	32	30	38	60	58	57	31	18	33	21	0	0	0	0	0
07/14	34	27	34	33	42	65	61	60	33	22	36	26	0	0	0	0	0
07/15	40	31	37	37	46	68	64	63	38	26	39	29	0	0	0	0	0
07/16	42	36	42	42	48	71	66	67	42	28	42	32	0	0	0	0	0
07/17	48	39	45	47	54	72	69	69	47	30	45	36	0	0	0	0	0
07/18	55	43	49	49	58	75	71	71	53	33	50	38	0	0	0	0	0
07/19	59	46	54	52	60	78	73	74	58	38	55	42	0	0	0	0	0
07/20	64	51	60	57	63	81	76	78	61	44	58	47	0	0	0	0	0
07/21	66	59	64	62	65	83	78	80	64	49	62	52	0	0	0	0	0
07/22	72	62	67	67	70	85	80	82	68	52	65	55	0	0	0	0	0
07/23	75	67	71	71	74	86	83	84	73	56	68	59	0	0	0	0	0
07/24	79	70	73	74	77	87	85	86	77	58	70	63	0	0	0	0	1
07/25	80	73	76	77	80	88	87	87	79	60	72	66	0	0	0	0	1
07/26	83	77	78	79	82	89	89	89	80	63	75	69	0	0	0	0	1
07/27	84	78	81	82	83	90	90	90	82	64	77	73	0	0	0	0	1
07/28	86	82	83	84	86	91	91	91	85	67	79	75	0	0	0	0	1
07/29	88	84	85	87	87	92	92	92	86	69	81	78	0	0	0	0	1

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	Chinook Salmon				Sockeye Salmon				Chum Salmon				Coho Salmon				
Date	**2002**	**2003**	**2004**	**2005[a]**	**2002**	**2003**	**2004**	**2005[a]**	**2002**	**2003**	**2004**	**2005[a]**	**2001**	**2002**	**2003**	**2004**	**2005[a]**
07/30	89	86	87	89	89	93	93	93	88	72	83	81	0	0	0	0	1
07/31	91	87	89	91	91	94	94	94	90	73	85	84	0	0	0	1	1
08/01	93	89	91	92	93	95	94	94	92	75	87	85	0	1	1	1	1
08/02	93	91	93	93	94	95	95	95	93	77	89	87	0	1	1	1	2
08/03	95	91	95	94	95	96	96	95	94	79	90	88	0	2	1	2	2
08/04	96	92	95	95	96	96	96	96	96	81	91	90	0	3	1	2	2
08/05	96	93	96	97	97	97	97	97	97	84	92	91	0	4	2	2	2
08/06	97	95	96	97	97	97	97	97	97	87	93	93	0	4	2	3	3
08/07	97	96	97	98	98	98	97	97	98	90	94	93	0	5	3	3	3
08/08	98	96	98	98	98	98	98	97	98	92	95	94	0	5	4	4	3
08/09	98	97	98	98	98	98	98	98	98	94	96	95	0	5	5	5	4
08/10	98	98	98	99	98	98	98	98	99	96	96	96	0	6	6	5	5
08/11	98	98	98	99	98	99	98	98	99	97	97	97	1	6	6	6	6
08/12	98	98	99	99	99	99	98	98	99	98	98	98	2	7	8	7	7
08/13	99	99	99	99	99	99	99	99	99	98	98	98	3	8	9	9	8
08/14	99	99	99	99	99	99	99	99	99	99	98	99	6	9	10	11	10
08/15	99	99	99	99	99	99	99	99	99	99	99	99	8	10	12	13	10
08/16	99	99	99	99	99	99	99	99	100	99	99	99	14	12	13	15	11
08/17	99	99	99	99	99	99	99	99	100	99	99	99	16	16	14	18	12
08/18	99	99	99	100	99	99	99	99	100	100	99	100	18	18	14	21	13
08/19	100	99	99	100	100	99	99	99	100	100	99	100	20	21	15	22	14
08/20	100	99	100	100	100	99	99	100	100	100	99	100	27	25	18	25	16
08/21	100	99	100	100	100	99	99	100	100	100	100	100	30	29	19	27	20
08/22	100	99	100	100	100	99	99	100	100	100	100	100	33	33	22	29	23
08/23	100	100	100	100	100	100	99	100	100	100	100	100	35	36	23	31	26
08/24	100	100	100	100	100	100	99	100	100	100	100	100	38	39	28	33	30
08/25	100	100	100	100	100	100	99	100	100	100	100	100	41	42	32	35	33
08/26	100	100	100	100	100	100	100	100	100	100	100	100	45	43	34	40	36
08/27	100	100	100	100	100	100	100	100	100	100	100	100	48	45	38	42	37
08/28	100	100	100	100	100	100	100	100	100	100	100	100	52	46	42	43	40
08/29	100	100	100	100	100	100	100	100	100	100	100	100	57	48	44	44	47
08/30	100	100	100	100	100	100	100	100	100	100	100	100	62	49	48	45	51
08/31	100	100	100	100	100	100	100	100	100	100	100	100	66	53	53	48	56
09/01	100	100	100	100	100	100	100	100	100	100	100	100	69	57	56	52	59
09/02	100	100	100	100	100	100	100	100	100	100	100	100	71	59	60	56	63
09/03	100	100	100	100	100	100	100	100	100	100	100	100	73	61	63	60	66

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	Chinook Salmon				Sockeye Salmon				Chum Salmon				Coho Salmon				
Date	**2002**	**2003**	**2004**	**2005[a]**	**2002**	**2003**	**2004**	**2005[a]**	**2002**	**2003**	**2004**	**2005[a]**	**2001**	**2002**	**2003**	**2004**	**2005[a]**
09/04	100	100	100	100	100	100	100	100	100	100	100	100	75	65	68	62	70
09/05	100	100	100	100	100	100	100	100	100	100	100	100	77	68	72	64	73
09/06	100	100	100	100	100	100	100	100	100	100	100	100	78	72	74	66	75
09/07	100	100	100	100	100	100	100	100	100	100	100	100	79	78	77	69	77
09/08	100	100	100	100	100	100	100	100	100	100	100	100	80	81	79	72	80
09/09	100	100	100	100	100	100	100	100	100	100	100	100	81	84	82	76	82
09/10	100	100	100	100	100	100	100	100	100	100	100	100	84	85	84	79	84
09/11	100	100	100	100	100	100	100	100	100	100	100	100	85	87	87	83	87
09/12	100	100	100	100	100	100	100	100	100	100	100	100	87	90	90	86	90
09/13	100	100	100	100	100	100	100	100	100	100	100	100	89	92	93	87	93
09/14	100	100	100	100	100	100	100	100	100	100	100	100	90	94	95	89	95
09/15	100	100	100	100	100	100	100	100	100	100	100	100	92	95	96	91	96
09/16	100	100	100	100	100	100	100	100	100	100	100	100	93	97	98	92	98
09/17	100	100	100	100	100	100	100	100	100	100	100	100	94	98	99	94	99
09/18	100	100	100	100	100	100	100	100	100	100	100	100	95	99	100	96	100

Note: Boxes represent the central 50% of the run and median date of passage. Shaded areas represent the central 80% of the run.

[a] Cumulative percent passage is inclusive of estimated passage for periods when a breach occurred in the weir and when the weir was inoperable.