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Kanektok River Salmon Monitoring and Assessment, 2010

Annual Report for Project OSM 10-300
USFWS Office of Subsistence Management
Fisheries Resource Monitoring Program

by

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and

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June 2012

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

Symbols and Abbreviations

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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)

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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ABSTRACT

Kanektok River is the primary salmon spawning drainage in the Quinhagak area and supports subsistence, commercial, and sport fisheries. The Alaska Department of Fish and Game, in cooperation with U.S. Fish and Wildlife Service and the Native Village of Kwinhagak, has operated a resistance board weir on Kanektok River since 2001. The project estimates escapement and provides 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. In 2010, the weir was operational from 28 June through 5 August. Total escapement past the weir during the 2010 operational period was estimated at 5,800 Chinook, 202,643 sockeye, 62,567 chum, and 344 coho salmon and 43,292 Dolly Varden. The Chinook salmon escapement was the second lowest recorded, while sockeye salmon had the fourth highest escapement on record and the chum salmon escapement was near average. The Chinook salmon escapement was comprised of 76.3% males and dominated by age-1.3 fish (44%). The sockeye salmon escapement was comprised of 54.2% males and dominated by age-1.3 fish (87.8%). The chum salmon escapement was comprised of 48.5% males and dominated by age-0.3 fish (65.1%). The total 2010 District W-4 commercial harvest was 14,230 Chinook, 138,362 sockeye, 106,610 chum, and 13,690 coho salmon. The total exvessel value was $1,655,321. Samples were also collected from the District W-4 commercial catch for use in estimating age, sex, and length of the 2010 commercial harvest. The aerial survey index for Chinook salmon was below the sustainable escapement goal and within the goal for sockeye salmon.

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

INTRODUCTION

Kanektok River is located in Togiak National Wildlife Refuge in southwestern Alaska (Figure 1). The Kanektok River watershed drains approximately 2,261 km^2 of surface area and empties into Kuskokwim Bay near the village of Quinhagak (Walsh et al. 2006). The upper portion of the river consists primarily of 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. The surrounding riparian vegetation is composed primarily of cottonwood, willow, and alder and uplands are dominated by tundra. Chinook (*Oncorhynchus tshawytscha*), sockeye (*O. nerka*), chum (*O. keta*), coho (*O. kisutch*), and pink *O. gorbuscha* salmon along with several other anadromous and resident species spawn in the Kanektok River drainage.

The Kanektok River provides an important annual fishery for subsistence and commercial harvest of Pacific salmon (*Oncorhynchus* spp.). The Kanektok River weir project estimates the escapement of Chinook, sockeye, chum and coho salmon and was established in 2001 in an effort to develop a long term reliable data set. Escapement estimates combined with commercial catch statistics are used to assess daily run strength and provide escapement information that is critical to the management of subsistence and commercial salmon fishing in District W-4 which has been monitored since 1960.

SALMON FISHERIES

Subsistence Fisheries

Subsistence fishing for salmon occurs in the Kanektok River, in nearby streams, and in Kuskokwim Bay. Salmon caught for subsistence use make an important contribution to annual subsistence harvests of residents from Quinhagak and nearby communities. The Alaska Department of Fish and Game (ADF&G) has quantified subsistence harvests in the Quinhagak area since 1968, and methods have been consistent since 1988 (Bavilla et al. 2010). From 1997

to 2006, annual subsistence harvests have averaged 3,337 Chinook, 1,522 sockeye, 1,238 chum, and 1,442 coho salmon (Appendix A).

Commercial Fishery

Commercial salmon fishing occurred sporadically in the Quinhagak area from 1913 until 1959 (Pennoyer et al. 1965). In 1960, commercial fishing District W-4 was established offshore of Quinhagak in Kuskokwim Bay (Figure 2). 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 Kuskokwim River. In 2004, the Alaska Board of Fish (BOF) extended the northern boundary 3 miles north up the coast from the southern edge of Oyak Creek to the northernmost edge of the mouth of Weelung Creek. The southern boundary is located at the southernmost edge of the mouth of Arolik River. The District W-4 commercial fishery targets Chinook, sockeye, and coho salmon. Chum and pink salmon are harvested incidentally, with pink salmon being the least commercially valuable species (Whitmore et al. 2008).

Since 1960, commercial salmon harvests in District W-4 ranged from 3,918 to 273,553 salmon, with an historic average of 122,699 salmon. Commercial harvest from the W-4 district may include salmon bound for drainages other than the Kanektok River. Total harvests have increased since the low years of 2001 and 2002 when market demands and processing capacity were low. The most recent 10 year average harvest (2000 to 2009) was 168,764 salmon and the most recent 5 year average harvest (2006 to 2010) was 214,965 salmon (Appendix A; Whitmore et al. 2008).

Sport Fisheries

In addition to commercial and subsistence harvest, Kanektok River also supports a popular sport fishery. Sport anglers target salmon, rainbow trout *O. mykiss*, Dolly Varden *Salvelinus malma,* and Arctic grayling *thymallus arcticus* from mid-June to the beginning of September each year. Currently, 3 seasonal sport fishing guide camp operations are located on Kanektok River, along with numerous guided and non-guided anglers that float Kanektok River from its headwaters to the village of Quinhagak (J. Chythlook, Sport Fishery Biologist, ADF&G; personal communication).

ESCAPEMENT MONITORING

In the State of Alaska, the Department of Fish and Game is responsible for managing salmon fisheries in a manner consistent with Sustainable Salmon Fisheries Policy (5 AAC 07.367). This task requires long-term monitoring projects that reliably measure annual escapement to key spawning systems as well as track temporal and spatial patterns in abundance that influence management decisions.

Kanektok River is the primary spawning stream within District W-4. Establishing a viable method for monitoring and assessing salmon escapement in Kanektok River has been problematic (Estensen and Diesigner 2004). The first attempted monitoring project was a counting tower established in 1960 on the lower river near the village of Quinhagak (ADF&G 1960). This tower project was plagued by logistical problems, poor water visibility, and difficulties with species apportionment. In 1961, the tower was relocated to the outlet of Kagati/Pegati Lake (Figure 1) and operated through 1962 (ADF&G 1962). Although successful in providing sockeye salmon escapement information, operation of the tower at this site was discontinued after 1962. Enumeration using hydroacoustic sonar was attempted from 1982

through 1987, however, the use of sonar was deemed unfeasible because of technical obstacles, site limitations, and budget constraints (Huttunen 1988). In 1996, a cooperative effort between the Native Village of Kwinhagak (NVK), United States Fish and Wildlife Service (USFWS), and ADF&G reinitiated a counting tower located 25 km upriver from the mouth of Kanektok River. The counting tower again proved to have limited utility (Fox 1997) despite improvements to the project in 1998 (Menard and Caole 1999). In 1999, resources were redirected toward developing a resistance board weir (Burkey et al. 2001). The weir was operational briefly in 2000, but high water levels, technical limitations, and personnel problems precluded the project from meeting its objectives (Linderman 2000). During operation in 2000, the site was determined unsuitable for a weir because of extensive bank erosion.

In 2001, the weir was relocated approximately 33 km upriver from the original site (Estensen and Diesigner 2003). This relocation required a "Special Use Permit" from the USFWS to operate within the congressionally designated Wilderness Area. 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 of April, before snowmelt and spring precipitation raised water levels beyond a workable point. Installation and optimal operational start time of the weir was determined to be dependent upon early installation in late April, just after ice-out. When feasible, an early installation strategy has been employed annually since 2003. As a result of complications with high water during the coho salmon return, the weir is no longer operated through the coho salmon season. Since 1996, the project has continued as a cooperative venture between ADF&G, USFWS Togiak National Wildlife Refuge, USFWS Office of Subsistence Management (OSM), and NVK. As of 2010, formal escapement goals have not been developed for any species at this weir (Estensen et al. 2009).

Kanektok River salmon escapements have also been monitored by aerial surveys since 1962 (Appendix B). Aerial survey escapement assessment can be variable depending on viewing conditions and observers; however, when observers, timing, and methods are standardized and survey conditions meet acceptable criteria, the resulting counts have been used as an index of escapement. Aerial surveys are conducted for Chinook and sockeye salmon to assess established sustainable escapement goals (SEGs).

Chum salmon have protracted run timing, which requires multiple surveys throughout the run to ensure accuracy of the index. In addition to timing issues, chum salmon can be problematic for observers attempting to get an accurate index of escapement because of the difficulty of seeing mature spawning populations in deep or slightly turbid conditions in the water column. 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.

Aerial survey SEGs have been set at 3,500–8,000 Chinook, 14,000–34,000 sockeye, and >5,200 chum salmon (Appendix B). These goals were established in 2005 and were reviewed without changes in 2009 (Estensen et al. 2009).

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Salmon age, sex, and length (ASL) information has been collected from the weir project since 2001 and from District W-4 commercial harvest since 1969 (Molyneaux et al. 2010). ASL composition estimates are used to develop stock-recruitment models, which can provide information used for projecting future run sizes. Stock-recruitment models cannot yet be developed for the Kanektok drainage because the genetics of the mixed fishery cannot be fully determined. These models also require a better knowledge of spawning activity below the weir site. ASL samples were collected from the 2010 W-4 harvest and Kanektok River escapement.

OBJECTIVES

1. To enumerate the daily passage of Chinook, sockeye and chum salmon through the Kanektok River weir.
2. To estimate run timing of Chinook, sockeye, and chum salmon and Dolly Varden at the Kanektok River weir.
3. To estimate the aerial survey spawning indexes of Chinook and sockeye salmon in the Kanektok River drainage.
4. To estimate the ASL composition of the Chinook salmon escapement proportionally; and sockeye and chum salmon escapements from a minimum of one pulse sample per species collected from each third of the run at the weir, such that 95% simultaneous confidence intervals for the age composition in each pulse have a maximum width of ±10% (α=0.05 and d=0.10).
5. To estimate the ASL composition of the District W-4 commercial harvest, such that 95% simultaneous confidence intervals for the age composition in each pulse have a maximum width of ±10% (α=0.05 and d=0.10).
6. To estimate Dolly Varden passage through the Kanektok River weir; and sample 10% of the observed passage for a cooperative project.
7. To record atmospheric and hydrologic conditions at the weir site.

METHODS

SITE DESCRIPTION

The Kanektok River weir is located approximately 68 km upstream from the mouth at N 59° 46.057, W 161° 03.616. The channel width is approximately 76 m wide. The water depth during weir operations ranges from approximately 0.3 to 1.8 m deep.

RESISTANCE BOARD WEIR

The design, construction, and installation of the Kanektok River resistance board weir largely followed those described in Stewart (2002 and 2003) and Tobin (1994). Additional details concerning the resistance board weir components used on Kanektok River are described in Estensen and Diesinger (2004) and Pawluk and Jones (2007).

Two fish passage chutes were installed on the weir, one approximately 30 m from the left bank and the other approximately 8 m from the right bank (looking downstream). Gates were attached on both chutes to regulate fish passage. A 3 m by 4.6 m live trap installed directly upstream of

the right bank passage chute was used to collect fish for age, sex, and length sampling. Picket spacing (4.3 cm between pickets) allowed smaller fish, such as pink salmon and other non-salmon species, to pass through the weir between pickets. Downstream migrating fish passing over or through the weir were not enumerated.

Boats passed at a designated boat gate as described in Estensen and Diesigner (2004). Boats with jet-drive engines were the most common and could pass over the boat gate panels independent of the crew by reducing 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 being towed upstream across the weir with the assistance of crew members.

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, fish passage chute gates were opened allowing fish through the weir. Crew members identified and enumerated all fish by species as they passed upriver through the chutes. Any fish observed in the live trap, returning downstream through the fish passage chutes were not included in the upstream tally.

For any amount of time in which the weir was breached, but a partial passage count was made that day before or after the breach period, full day's passage, $\hat{n}_d$, was estimated using the following formula:

$$\hat{n}_d = \frac{n_p}{(n_p)_{(d-1)}} \times n_{d-1} \quad (1)$$

Where:

n_p = Partial count, before or after the breach period, on the given day being estimated;

$(n_p)_{d-1}$ = Partial count on the day before the breach occurred, during a time period equivalent to that for n_p; and

$n_{(d-1)}$ = Full day count on the day before the breach occurred.

AERIAL SURVEY ESTIMATES

Aerial surveys are done from fixed wing aircraft flown at an altitude of 500 ft. Chinook and sockeye salmon have similar peak spawning abundance periods (17 July to 5 August) and surveys are flown during this time in order to maximize the number of observable fish on the spawning grounds. Aerial surveys are numerically ranked on a scale of 1 = good, 2 = fair, and 3 = poor, based on survey method, weather and water conditions, time of survey, and spawning stage. Only surveys with rankings of fair and good are used as indices of escapement.

AGE, SEX, AND LENGTH SAMPLING AND ESTIMATES

Salmon were sampled from a trap installed in the weir. To sample sockeye and chum salmon the exit gate was closed allowing fish entering the trap to accumulate inside. All fish of the target species were sampled until the trap was empty. The weir crew conducted active sampling as

needed, to aid in achieving Chinook, sockeye, and chum salmon sample goals. Active sampling consisted of capturing and sampling target species of salmon while actively passing and enumerating all other fish. Crew members used a dip net to capture fish within the holding box. Fish were removed from the dip net and placed on a partially submerged fish measurement board. After sampling, fish were released upstream of the weir.

Escapement samples for Chinook salmon age, sex, and length composition estimates were collected on a daily schedule based on historic run timing. This sample design attempts to collect samples in proportion to the run. The minimum total sample size goal was 210 Chinook salmon. Escapement sampling for sockeye and chum salmon age, sex, and length composition estimates were based on a pulse sampling design (Molyneaux et al. 2008). The term "pulse" is used to describe a sample collected over a few days and applied to a longer period. Pulse sampling was conducted approximately every 7–10 days. The goals for each pulse were 210 sockeye and 200 chum salmon. These sample sizes were selected for simultaneous 95% confidence interval estimates of age composition ±10% for each age category (α=0.05 and d=0.10) and were adjusted from sample sizes recommended by Bromaghin (1993) to account for regenerated and otherwise unreadable scales. The minimum number of pulse samples for sockeye and chum salmon were one for each third of the run to account for temporal dynamics in age, sex, and length composition.

Commercially harvested salmon were sampled at the Quinhagak dock and Platinum processing plant. Processor workers supplied sampling crews with totes of iced fish for sampling. 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.

For both escapement and commercial sampling, 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 each chum and sockeye salmon. Scales were mounted on numbered and labeled gum cards. For escapement samples, sex was determined by visually examining external morphology such as the development of the kype, roundness of the belly, and the presence or absence of an ovipositor. Sex was determined for commercially harvested fish by visual inspection of internal gonads. In both cases, length was measured to the nearest millimeter from mideye to tail fork. After sampling was concluded, gum cards and data forms were complete and returned to the Bethel ADF&G offices for processing.

ASL samples were divided into strata based on sample dates and when a change in age composition was detected using Chi-square analysis with a P-value of 0.05. The ASL composition of a stratum was estimated from fish samples taken at some time within that stratum. This postseason stratification allowed the distribution of the samples to be in the context of the overall distribution of the population instead of the distribution of samples.

ADF&G staff in Bethel and Anchorage processed age, sex, and length data and generated data summaries (Molyneaux et al. 2010). Two types of summary tables were compiled for each species; one described the age and sex composition and the other described length characteristics.

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 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. Original age, sex, and length; gum cards, acetates, and mark-sense forms were archived at the ADF&G office in Anchorage. Computer files were archived by ADF&G in the Anchorage and Bethel offices.

DOLLY VARDEN TAGGING

Dolly Varden were captured for sampling in a live trap. A sample size of 10% of the observed Dolly Varden passage was targeted to represent the total Dolly Varden run observed passing upstream of the weir. Dolly Varden less than 400 mm fork length were small enough to pass through picket spacing and escape the live trap (Lisac 2006). Dolly sampling was not restricted to fish > 400 mm. Fish were sampled for length and genetics (left pelvic fin clip). Floy® numeric tags are attached to sample fish to monitor fish movement. These data are reported by TNWR under separate reports (Lisac 2007, 2008, and M. Lisac, Fisheries Biologist, TNWR, personal communication).

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrologic conditions were recorded daily at 1000 and 1700. Cloud cover was estimated by percent covered and elevation; wind speed was estimated 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 gage height was recorded daily and was pegged to a benchmark established in 2001, consisting of a three-fourth inch diameter steel rebar driven into the river bed adjacent to the camp. The top of the benchmark represented a river stage of 100 cm. The river gage was a steel rule installed near shore in the river and the 100 cm mark was pegged level with the top of the benchmark to measure relative water level between years.

RESULTS

WEIR OPERATIONS

There is not a target operational date for the Kanektok weir; however, optimal start time is in late June. In 2010, the weir was operated from 28 June through 5 August. Ice break-up and unfavorable water conditions hindered early installation of the weir. A decision was made to remove the weir in early August, before heavy rainfall raised water levels.

Breach events occurred several times during the season. Five breach events in the weir resulted from broken weir panel pickets: 8 July for 15 hours; 26 July for 10 hours; 29 July for 12 hours; 31 July for 9 hours; and 3 August for 10 hours. One breach event resulted from scouring under the rail on 29 July for 12 hours. Passage estimates based on hours of breach duration were made for missed passage and are included in the total escapement estimates.

SALMON ESCAPEMENT

The total Chinook salmon escapement at the weir in 2010 was estimated to be 5,800 fish. Passage during breach events was estimated to be 97 fish, approximately 1.7% of total passage . Based on the operational period and inclusive of passage estimates the median passage date was 23 July and the central 50% of the run occurred between 17 July and 28 July (Table 1).

The total sockeye salmon escapement was estimated to be 202,643 fish. Passage during breach events was estimated to be 2,167 fish, approximately 1.1% of total passage. Based on the

operational period and inclusive of passage estimates, the median passage date was 15 July and the central 50% of the run occurred between 9 July and 20 July (Table 1).

The total chum salmon escapement was estimated to be 62,567 fish. Passage during breach events was estimated to be 1,927 fish, approximately 3.1% of total passage. Based on the operational period and inclusive of passage estimates, the median passage date was 17 July and the central 50% of the run occurred between 11 July and 26 July (Table 1).

Observed passage of coho salmon, during operational period, was 344 fish (Table 1). The first coho salmon were observed on 24 July. Passage upstream continued well after weir operations ceased on 5 August (Figure 3). The coho salmon count represented only the monitored part of unknown escapement total.

The total count of pink salmon through the weir in was 114,074 fish (Table 2). Passage estimates were not made for pink salmon.

Dolly Varden, whitefish, and rainbow trout were also counted through the weir. Passage estimates were not made for non-salmon species. A total of 43,292 Dolly Varden, 134 whitefish, and 89 rainbow trout were observed passing upstream during project operations (Table 2). The median passage date for Dolly Varden occurred on 19 July (M. Lisac, Fisheries Biologist, TNWR, personal communication). Approximately 50% of the run arrived between 16 and 23 July, and the date of peak passage was 16 July (4,739 fish). Dolly Varden passage through the weir continued through the last day of operation.

AERIAL SURVEYS

An aerial survey of the Kanektok River drainage was conducted on 2 August 2010. The survey was flown with a Maule fixed-wing aircraft and was rated as fair (2). Water clarity encountered by the observer in the upper and middle sections of the drainage was good, but deteriorated in the lower sections of the river. A total of 1,228 Chinook and 16,950 sockeye salmon were counted in the Kanektok River drainage during this survey (Appendix B). The results from the aerial survey were within the SEG range for sockeye salmon (14,000–34,000) and below the SEG range for Chinook salmon (3,500–8,000). No chum or coho salmon aerial surveys were conducted in 2010.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Escapement

Minimum sample objectives were met for Chinook, sockeye, and chum salmon. Observed escapement was partitioned into temporal strata based on sample dates and Chi-square analysis. No scale samples were collected from coho salmon at the weir in 2010.

Age, sex, and length samples were collected from 272 Chinook salmon at the weir in 2010. Age was determined for 224 (82%) of the Chinook salmon sampled. Escapement was partitioned into 3 temporal strata. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±6.5%. Applied to escapement, age-1.3 was the most abundant age class for Chinook salmon (44%), followed by age-1.2 (35.2%), and age-1.4 (19.1%; Table 3). Sex composition estimated from sampled fish was 63.2% male and 23.7% female. Mean male length from sampled fish was 517 mm for age-1.2, 702 mm for age-1.3, and 821 mm for age-1.4 fish. Mean female length from sampled fish was 748 mm for age-1.3 and 817 mm for age-1.4 fish. Overall, male lengths ranged from 360 to 925 mm and female lengths ranged from 550 to 938 mm (Table 4).

Age, sex, and length samples were collected from 943 sockeye salmon at the weir in 2010. Age was determined for 819 (86.9%) of the sockeye salmon sampled. Escapement was partitioned into 4 temporal strata. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±2.3%. Applied to escapement, age-1.3 was the most abundant age class for sockeye salmon (87.8%), followed by age-1.2 (8.5%; Table 5). Sex composition estimated from sampled fish was 54.2% male and 45.8% female. Mean male length from sampled fish was 598 mm for age-1.2 and 587 mm for age-1.3 fish. Mean female length from sampled fish was 572 mm for age-1.2 and 545 mm for age-1.3 fish. Overall, male lengths ranged from 430 to 686 mm and female lengths ranged from 395 to 606 mm (Table 6).

Age, sex, and length samples were collected from 679 chum salmon at the weir in 2010. Age was determined for 663 (97.6%) of the chum salmon sampled. Escapement was partitioned into 3 temporal strata. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±3.6%. Applied to escapement, age-0.3 was the most abundant age class for chum salmon (65.1%), followed by age-0.4 (32.3%; Table 7). Sex composition estimated from sampled fish was 48.5% male and 51.5% female. Mean male length from sampled fish was 581 mm for age-0.3 and 600 mm for age-0.4 fish. Mean female length from sampled fish was 556 mm for age-0.3 and 568 mm for age-0.4 fish. Overall, male lengths ranged from 500 to 670 mm and female lengths ranged from 497 to 688 mm (Table 8).

District W-4 Commercial Harvest

Minimum sample objectives for Chinook and coho salmon were not achieved; however, results were considered adequate for a reasonable estimation for age, sex, and length composition of District W-4 commercial harvest. Minimum sample objectives for sockeye and chum salmon were achieved and adequate for estimating age, sex, and length composition of District W-4 commercial harvest. Samples were partitioned temporally into strata based on sample dates and Chi-square analysis.

Age was determined for 479 (88%) of the 544 Chinook salmon sampled from the 2010 harvest. Overall, 95% confidence intervals for age composition of the harvest were no wider than ±6.1%. Applied to total commercial harvest, age-1.3 was the most abundant age class for Chinook salmon (50.3%), followed by age-1.4 (24.5%), and age-1.2 (22.7%; Table 9). Estimated sex composition was 71.6% male and 28.4% female. Mean male length was 579 mm for age-1.2, 707 mm for age-1.3, and 791 mm for age-1.4 fish. Mean female length was 501 mm for age-1.2, 787 mm for age-1.3, and 831 mm for age-1.4 fish. Overall, male lengths ranged from 300 to 958 mm and female lengths ranged from 445 to 939 mm (Table 10).

Age was determined for 844 (90%) of the 942 sockeye salmon sampled from the 2010 harvest. Overall, 95% confidence intervals for age composition of the harvest were no wider than ±3.2%. Applied to total commercial harvest, age-1.3 was the most abundant age class for sockeye salmon (78.7%), followed by age-1.2 (14.5%; Table 11). Sex composition was estimated to be 51% male and 49% female. Mean male length was 509 mm for age-1.2 and 570 mm for age-1.3 fish. Mean female length was 488 mm for age-1.2 and 542 mm for age-1.3 fish. Overall, male lengths ranged from 402 to 673 mm and female lengths ranged from 438 to 595 mm (Table 12).

Age was determined for 1,174 (99%) of the 1,183 chum salmon sampled from the 2010 harvest. Overall, 95% confidence intervals for age composition of the harvest were no wider than ±2.8%. Applied to total commercial harvest, age-0.3 was the most abundant age class for chum salmon (66.8%), followed by age-0.4 (31%; Table 13). Sex composition was estimated to be 53.1% male

and 46.9% female. Mean male length was 572 mm for age-0.3 and 587 mm for age-0.4 fish. Mean female length was 551 mm for age-0.3 and 563 mm for age-0.4 fish. Overall, male lengths ranged from 488 to 661 mm and female lengths ranged from 506 to 628 mm (Table 14).

Age was determined for 189 (82%) of the 230 coho salmon sampled from the 2010 harvest. Overall, 95% confidence intervals for age composition of the harvest were no wider than ±5.3%. Applied to total commercial harvest, age-2.1 was the most abundant age class for coho salmon (83.9%), followed by age-1.1 (12.1%; Table 15). Sex composition was estimated to contain 51.8% male and 48.2% female. Mean male length was 553 mm for age-1.1 and 567 mm for age-2.1 fish. Mean female length was 566 mm for age-1.1 and 579 mm for age-2.1 fish. Overall, male lengths ranged from 419 to 649 mm and female lengths ranged from 459 to 633 mm (Table 16).

DOLLY VARDEN TAGGING

A total of 43,292 Dolly Varden were observed passing through the weir between 28 June and 05 August. A total of 222 Dolly Varden were sampled, tagged and released (M. Lisac, Fisheries Biologist, TNWR; personal communication).

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological observations were recorded daily from 19 June through 23 August (Table 17). Air temperatures ranged from 7° to 26° C. Water temperature ranged from 5° to 14° C. Approximately 23.88 cm of rain occurred throughout the entire season. The largest single rain event occurred on 29 July and resulted in an accumulation of .8 in (≈ 2.03 cm) during this 24 hour period. The Kanektok River weir experienced heavy rain events in 2010, but water level stayed within operable range. Water levels at the weir site ranged from approximately 4 to 79 cm for the recorded period.

DISCUSSION

SALMON FISHERIES

Subsistence harvest estimates for salmon in the Quinhagak area for 2010 were not available. Subsistence data is available through 2006 (Appendix A), more recent data is under revision and may become available in future reports (H. Carroll, Commercial Fishery Biologist, ADF&G, Anchorage; personal communication). In the District W-4 commercial fishery 241 permit holders participated for a total harvest of 14,230 Chinook, 138,362 sockeye, 106,610 chum, and 13,690 coho salmon (Table 18). Exvessel value by species was $294,163 for Chinook, $1,049,395 for sockeye, $194,105 for chum, and $117,658 for coho salmon, for a total value of $1,655,321.

The District W-4 Chinook and coho salmon commercial harvests were below the most recent 10 year averages. Sockeye and chum salmon commercial harvests were record highs (Appendix A). The last commercial fishing period was about 2 weeks earlier than normal. Commercial fishing ended early to allow for escapement of coho salmon. During the week of 12 July there were 2 additional fishing periods to harvest surplus sockeye and chum salmon (Table 18). The total exvessel value of $1,655,321 is the highest among historically recorded data (Bavilla et al. 2010).

WEIR OPERATIONS

Operation of the weir in 2010 was generally successful and the majority of the Chinook, sockeye, and chum salmon escapement was observed. Total enumeration of coho salmon was not possible because the coho salmon run continued well after the end of operations in 2010.

Reoccurring periods of high water in mid-September has complicated late season removal of the weir in past years. ADF&G, in consultation with NVK and USFWS determined removal of the weir should occur in mid-August; prior to the period that high water normally occurs. Early weir removal was successful, with the exception of the rail and cable, which were left in place for ease of installation the following season. Early removal prevents weir component damage from overwintering in the river, as experienced in 2005 (Jones and Linderman 2006).

ESCAPEMENT MONITORING AND ESTIMATES

The Chinook salmon escapement estimate for 2010 was the second lowest escapement among 8 years of collected data (Figure 4; Appendix C). Low Chinook salmon escapement estimates were also reported for several tributaries in the Kuskokwim Area (C. Brazil, Commercial Fishery Biologist, ADF&G, Anchorage; personal communication). The 2010 Kanektok River Chinook salmon assessment was more complete then it was for 2008 and 2009. Chinook salmon run timing was later then the historical average (Figure 3).

The sockeye salmon escapement estimate for 2010 was higher than average and the fourth largest among 8 years of collected data (Figure 4; Appendix C). Sockeye salmon run timing was near average (Figure 3).

The estimated chum salmon escapement in 2010 was near the historical average from 2002 through 2010 (Figure 4; Appendix C). Run timing was near average (Figure 3). The weir results do not account for the large number of chum salmon, perhaps in excess of weir escapements, known to spawn downstream of the weir.

The escapement of coho salmon in 2010 represents the portion of the run enumerated during the weir operation period (Figure 4; Appendix C). Removal of the weir was earlier than in previous years and a low escapement count was expected due to counts not being made during peak coho salmon migration in September. Historically, based on data from years with complete coho salmon run assessment (2001 through 2007), cumulative percent passage shows approximately 3% of the run has occurred by 5 August (Figure 3). Median passage date historically occurs in late August and the central 50% of the run occurs between late August and early September.

The observed escapement of Dolly Varden in 2010 was the highest ever recorded at the weir. The previous high count of 26,056 fish occurred in 2009. Prior to 2009 the highest run count was 15,674 in 2002 (M. Lisac, Fisheries Biologist, TNWR; personal communication). The 2009 and 2010 escapement counts have shown a large increase from previous historical high counts. The observed escapement does not include fish small enough to pass between pickets. The proportion of spawning fish to non-spawning fish was not determined. It is important to determine the proportion of spawning fish because Dolly Varden are known to overwinter in aggregates of mixed stocks (DeCicco 1992; Whalen 1992) and comparing total run estimates at the weir can be misleading for long term monitoring efforts. Dolly Varden run timing appeared to be earlier than average and the median passage date occurred 6 days prior to the historical average (25 July). The daily count for the last day of counts (5 August) was approximately 1%

of the total run. The early end to the weir operation likely resulted in missing some late run fish, but it does not appear to have significantly affected the escapement estimate for 2010.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Trapping Chinook salmon for ASL sampling has proven to be problematic. Chinook salmon are generally reluctant to enter the trap when other fish species are present or when the fyke doors on the trap are set. Historically, it has been problematic in most years to successfully achieve ASL sampling goals of 210 Chinook salmon for each third of the run. Sampling goals were changed for 2010 to bring the Kanektok River weir sampling goals in line with other escapement projects in the Kuskokwim Area. The Chinook salmon escapement ASL objective was met in 2010.

Age-1.3 was the dominant age class for both the escapement and District W-4 commercial Chinook salmon age class estimates, 44% and 50.3%, respectively (Tables 3 and 9; Figure 5). Kanektok River weir escapement and commercial samples showed similar trends among age classes. The relatively high percentages of age-1.2 and -1.3 Chinook salmon may be indicative of better returns as fish from these brood years should return in abundance at age-1.3 and -1.4 in 2011.

Sockeye and chum salmon age, sex, and length sampling objectives were met in 2010. Generally, salmon sex and age composition changes slightly over the course of the run. Sockeye and chum salmon sampling goals were also addressed and adjusted in line with sampling objectives from other assessment projects in the Kuskokwim Area. Obtaining the minimum number of pulse samples during the initial third and the tail third of their respective runs can be difficult when weekly counts may be less than the sample objectives for each pulse period; however, adjusting sampling goals to at least one pulse period from each third of the run has alleviated problems encountered from low abundance during their perspective runs.

Sockeye salmon age-1.3 and age-1.2 dominated escapement and District W-4 commercial age class estimates in 2010 (Tables 5 and 11; Figure 6). Age-1.2 fish showed dominance in 2009 and contributed to the above average return of age-1.3 fish in 2010. The low percentage of age-1.2 fish in 2010 could potentially indicate a smaller return of age-1.3 fish in 2011. The brood year for these fish was 2006, when the aerial survey index was over ten times the upper end of the SEG (Appendix B).

Chum salmon age-0.3 was the dominant age class for escapement and commercial age class estimates and comprised approximately 65% of the weir escapement and 67% of the commercial harvest (Tables 7 and 13; Figure 5). Historically the two predominant age classes are age-0.3 and -0.4 fish. Generally age-0.3 has been the dominant age class in odd years; whereas, age-0.4 have dominated the even years (Figure 6). The large escapement recorded in 2007 may result in a high return of age-0.3 fish in 2011. Typically male chum salmon percentages fluctuated throughout project operations and female percentages increased towards the end of the chum salmon run (Table 7).

RECOMMENDATIONS

Establishing long-term funding for the project would help provide long-term escapement, run timing, and age, sex, and length data required to better understand spawning populations and carrying capacity of the Kanektok River.

The current weir project does not account for salmon spawning downstream of the weir. Abundance of salmon spawning below the weir was assessed with aerial survey data, which can

be hindered by environmental conditions. Implementing an inriver Chinook and chum salmon radiotelemetry study could help increase accuracy in determining total abundance of Chinook and chum salmon spawning below the Kanektok River weir, which in turn could increase 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 support aerial survey distribution estimates. Data may be applied to historic aerial survey information to extend the database for the Kanektok system. Such a study could be expanded in the future to examine the number of chum and sockeye salmon spawning below the weir in addition to their spawning distribution within the drainage.

USFWS has used the weir in the past as a platform for Dolly Varden population studies to better understand their spawning populations in Kanektok River. Dolly Varden length, sex and maturity sampling, genetic sampling, and tagging were conducted in 2010. Due to the difficulty in achieving adequate sample size of Dolly Varden and accurately determining their sex and maturity, this objective will be discontinued. A genetic baseline of Dolly Varden throughout southwest Alaska is currently under development. If this proves successful for individual stock identification than an objective to apportion the annual run into Kanektok River origin fish may be added to this project (M. Lisac, Fisheries Biologist, TNWR; personal communication).

Every effort should be made to continue with annual weir installation in late April to early May to ensure the weir is operational by late June. To the extent feasible, aerial monitoring of water level at the weir site should be conducted in mid-April each year to facilitate early installation. Kanektok River has demonstrated high water level and water flow in May and June having the potential to substantially delay installation until July or later depending on the severity and duration of high water conditions. Weir removal should occur in mid to late August to avoid complications caused by late season high water conditions and still capture the Chinook, sockeye and chum salmon, and Dolly Varden run.

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TABLES AND FIGURES

Table 1.–Daily and cumulative Chinook, sockeye, chum, and coho salmon passage estimates, Kanektok River weir, 2010.

	Chinook			Sockeye			Chum			Coho	
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.
06/28	0	0	0	56	56	0	13	13	0	0	0
06/29	4	4	0	1,227	1,283	1	192	205	0	0	0
06/30	3	7	0	1,163	2,446	1	178	383	1	0	0
07/01	9	16	0	2,636	5,082	3	538	921	1	0	0
07/02	14	30	1	2,909	7,991	4	865	1,786	3	0	0
07/03	13	43	1	2,453	10,444	5	702	2,488	4	0	0
07/04	11	54	1	3,302	13,746	7	1,259	3,747	6	0	0
07/05	34	88	2	5,112	18,858	9	1,668	5,415	9	0	0
07/06	47	135	2	5,477	24,335	12	1,730	7,145	11	0	0
07/07	57	192	3	6,409	30,744	15	1,125	8,270	13	0	0
07/08	63 [a]	255	4	7,359 [a]	38,103	19	1,764 [a]	10,034	16	0 [b]	0
07/09	85	340	6	9,211	47,314	23	2,976	13,010	21	0	0
07/10	127	467	8	7,693	55,007	27	1,531	14,541	23	0	0
07/11	79	546	9	8,497	63,504	31	1,351	15,892	25	0	0
07/12	93	639	11	7,932	71,436	35	2,924	18,816	30	0	0
07/13	170	809	14	9,913	81,349	40	2,993	21,809	35	0	0
07/14	162	971	17	15,148	96,497	48	2,253	24,062	38	0	0
07/15	178	1,149	20	16,198	112,695	56	2,310	26,372	42	0	0
07/16	264	1,413	24	9,873	122,568	60	2,427	28,799	46	0	0
07/17	219	1,632	28	9,785	132,353	65	3,336	32,135	51	0	0
07/18	155	1,787	31	7,119	139,472	69	1,929	34,064	54	0	0
07/19	256	2,043	35	7,014	146,486	72	1,485	35,549	57	0	0
07/20	310	2,353	41	5,144	151,630	75	1,268	36,817	59	0	0
07/21	129	2,482	43	5,341	156,971	77	1,762	38,579	62	0	0
07/22	370	2,852	49	5,292	162,263	80	1,251	39,830	64	0	0
07/23	226	3,078	53	4,527	166,790	82	1,698	41,528	66	0	0
07/24	387	3,465	60	5,362	172,152	85	1,371	42,899	69	5	5
07/25	202	3,667	63	4,304	176,456	87	2,923	45,822	73	4	9

-continued-

Table 1.–Page 2 of 2.

	Chinook			Sockeye			Chum			Coho	
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.
07/26	374 [a]	4,041	70	4,121 [a]	180,577	89	1,838 [a]	47,661	76	5 [a]	14
07/27	108	4,149	72	2,728	183,305	90	2,236	49,897	80	2	16
07/28	224 [a]	4,373	75	3,742 [a]	187,047	92	2,127 [a]	52,023	83	2 [a]	18
07/29	412 [a]	4,786	83	3,428 [a]	190,475	94	2,417 [a]	54,440	87	24 [a]	42
07/30	232	5,018	87	2,583	193,058	95	1,537	55,977	89	25	67
07/31	193 [a]	5,210	90	1,672 [a]	194,730	96	1,189 [a]	57,166	91	38 [a]	105
08/01	192	5,402	93	1,671	196,401	97	1,003	58,169	93	57	162
08/02	111	5,513	95	2,139	198,540	98	1,306	59,475	95	29	191
08/03	102 [a]	5,616	97	1,924 [a]	200,465	99	1,538 [a]	61,013	98	17 [a]	208
08/04	117	5,733	99	962	201,427	99	678	61,691	99	64	272
08/05	67	5,800	100	1,216	202,643	100	876	62,567	100	72	344
Total	5,800			202,643			62,567			344	
Observed	5,703			200,476			60,640			330	
Estimated	97			2,167			1,927			14	
% Observed	98.3			98.9			96.9			95.8	

Note: Outside boxes indicate the estimated central 50% of passage. Inside boxes indicate the date that the estimated cumulative 50% passage occurred.

[a] Daily passage was estimated due to the occurrence of a hole in the weir.

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

Table 2.–Daily and cumulative pink salmon, Dolly Varden, whitefish, and rainbow trout observed passage, Kanektok River weir, 2010.

	Pink Salmon		Dolly Varden		Whitefish		Rainbow Trout	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
06/28	0	0	4	4	0	0	4	4
06/29	0	0	5	9	0	0	2	6
06/30	0	0	2	11	1	1	2	8
07/01	7	7	9	20	0	1	1	9
07/02	14	21	1	21	2	3	0	9
07/03	6	27	4	25	0	3	2	11
07/04	17	44	6	31	2	5	2	13
07/05	27	71	16	47	2	7	1	14
07/06	17	88	9	56	0	7	2	16
07/07	33	121	22	78	0	7	4	20
07/08	29 [a]	150	54 [a]	132	0 [a]	7	3 [a]	23
07/09	51	201	125	257	1	8	9	32
07/10	57	258	146	403	1	9	3	35
07/11	62	320	203	606	0	9	6	41
07/12	180	500	644	1,250	0	9	3	44
07/13	404	904	1,325	2,575	1	10	4	48
07/14	762	1,666	2,323	4,898	9	19	5	53
07/15	1,105	2,771	2,668	7,566	22	41	1	54
07/16	1,241	4,012	4,739	12,305	45	86	5	59
07/17	1,681	5,693	4,066	16,371	9	95	7	66
07/18	3,213	8,906	4,598	20,969	6	101	2	68
07/19	2,481	11,387	3,091	24,060	4	105	0	68
07/20	1,618	13,005	1,741	25,801	1	106	1	69
07/21	3,771	16,776	2,728	28,529	8	114	4	73
07/22	3,044	19,820	2,096	30,625	2	116	0	73
07/23	3,185	23,005	1,686	32,311	1	117	0	73
07/24	2,612	25,617	1,189	33,500	1	118	3	76
07/25	4,461	30,078	1,839	35,339	0	118	0	76
07/26	5,103 [a]	35,181	1,374 [a]	36,713	6 [a]	124	6 [a]	82
07/27	5,789	40,970	1,130	37,843	0	124	1	83
07/28	10,926 [a]	51,896	951 [a]	38,794	0 [a]	124	1 [a]	84
07/29	11,203 [a]	63,099	1,309 [a]	40,103	0 [a]	124	1 [a]	85
07/30	8,444	71,543	542	40,645	1	125	1	86
07/31	3,458 [a]	75,001	328 [a]	40,973	0 [a]	125	0 [a]	86
08/01	3,689	78,690	302	41,275	0	125	1	87
08/02	8,178	86,868	556	41,831	0	125	1	88
08/03	8,466 [a]	95,334	624 [a]	42,455	1 [a]	126	0 [a]	88
08/04	6,474	101,808	380	42,835	8	134	0	88
08/05	12,266	114,074	457	43,292	0	134	1	89
Total	114,074		43,292		134		89	

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

Table 3.–Age and sex composition of Chinook salmon escapement, Kanektok River weir, 2010.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Esc	1.1 %	1.2 Esc	1.2 %	2.2 Esc	2.2 %	1.3 Esc	1.3 %	1.4 Esc	1.4 %	1.5 Esc	1.5 %	Total Esc	Total %
7/04-7/19	113	97	M	21	1.0	842	41.2	21	1.0	569	27.8	63	3.1	0	0.0	1,516	74.2
(6/28-7/19)			F	0	0.0	0	0.0	0	0.0	211	10.3	316	15.5	0	0.0	527	25.8
			Subtotal	21	1.0	842	41.2	21	1.0	779	38.1	379	18.6	0	0.0	2,043	100.0
7/20-7/26	82	70	M	29	1.4	799	40.0	0	0.0	885	44.3	86	4.3	0	0.0	1,798	90.0
(7/20-7/26)			F	0	0.0	0	0.0	0	0.0	114	5.7	86	4.3	0	0.0	200	10.0
			Subtotal	29	1.4	799	40.0	0	0.0	999	50.0	171	8.6	0	0.0	1,998	100.0
7/27-8/05	77	57	M	0	0.0	401	22.8	0	0.0	493	28.1	216	12.3	0	0.0	1,110	63.2
(7/27-8/05)			F	0	0.0	0	0.0	0	0.0	278	15.8	339	19.3	31	1.8	648	36.8
			Subtotal	0	0.0	401	22.8	0	0.0	771	43.9	555	31.6	31	1.8	1,758	100.0
Season		224	M	50	0.9	2,043	35.2	21	0.4	1,947	33.6	365	6.3	0	0.0	4,425	76.3
			F	0	0.0	0	0.0	0	0.0	602	10.4	741	12.8	31	0.5	1,374	23.7
			Total	50	0.9	2,043	35.2	21	0.4	2,549	44.0	1,106	19.1	31	0.5	5,799	100.0
			95% C. I.		(± 1.2)		(± 6.1)		(± 0.7)		(± 6.5)		(± 5.0)		(± 1.0)		
Grand Total[a]		2,402	M	911	1.2	29,009	37.9	36	0.0	14,228	18.6	8,444	11.0	327	0.4	52,954	69.2
			F	0	0.0	1,930	2.5	0	0.0	3,177	4.2	17,675	23.1	759	1.0	23,582	30.8
			Total	911	1.2	30,939	40.4	36	0.0	17,405	22.7	26,119	34.1	1,086	1.4	76,536	100

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Historical totals include data for 1997, 2002 through 2004, 2007, 2009 and 2010. Sample data for others years do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 4.–Mean length (mm) of Chinook salmon escapement, Kanektok River weir, 2010.

Sample Dates			Age Class					
(Stratum Dates)	Sex		1.1	1.2	2.2	1.3	1.4	1.5
7/04-7/19	M	Mean Length	360	524	583	678	819	-
(6/28-7/19)		Std. Error	-	8	-	15	61	-
		Range	-	419-640	-	454-852	697-883	-
		Sample Size	1	40	1	27	3	0
	F	Mean Length	-	-	-	727	816	-
		Std. Error	-	-	-	34	11	-
		Range	-	-	-	550-871	720-868	-
		Sample Size	0	0	0	10	15	0
7/20-7/26	M	Mean Length	394	529	-	712	815	-
(7/20-7/26)		Std. Error	-	10	-	15	54	-
		Range	-	430-671	-	554-860	708-878	-
		Sample Size	1	28	0	31	3	0
	F	Mean Length	-	-	-	738	806	-
		Std. Error	-	-	-	48	21	-
		Range	-	-	-	604-825	772-843	-
		Sample Size	0	0	0	4	3	0
7/27-8/05	M	Mean Length	-	496	-	718	830	-
(7/27-8/05)		Std. Error	-	13	-	19	22	-
		Range	-	431-573	-	562-832	763-925	-
		Sample Size	0	13	0	16	7	0
	F	Mean Length	-	-	-	783	831	810
		Std. Error	-	-	-	11	17	-
		Range	-	-	-	746-838	738-938	-
		Sample Size	0	0	0	9	11	1

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Table 4.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	2.2	1.3	1.4	1.5
Season	M	Mean Length	377	517	583	702	821	-
		Std. Error	-	6	-	9	29	-
		Range	360-394	419-671	-	454-860	697-925	-
		Sample Size	2	81	1	74	13	0
	F	Mean Length	-	-	-	748	817	810
		Std. Error	-	-	-	21	10	-
		Range	-	-	-	550-871	720-938	-
		Sample Size	0	0	0	23	29	1
Grand Total [a]	M	Mean Length	411	538	579	692	810	736
		Range	370-491	411-760	-	505-861	591-1,004	759- 945
		Sample Size	18	705	2	419	21	8
	F	Mean Length	-	-	-	669	752	774
		Range	-	-	-	714-890	710-1,040	770-980
		Sample Size	0	0	0	70	52	24

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Averages are derived with data for 1997, 2002 through 2004, 2007, 2009, and 2010. Sample data for other years do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 5.–Age and sex composition of sockeye salmon escapement, Kanektok River weir, 2010.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Esc	%	0.3 Esc	%	1.2 Esc	%	0.4 Esc	%	1.3 Esc	%	2.2 Esc	%	1.4 Esc	%	2.3 Esc	%	Total Esc	%
7/04-7/10	240	206	M	0	0.0	347	0.5	2,081	2.9	0	0.0	34,678	48.5	0	0.0	1,040	1.5	0	0.0	38,145	53.4
(6/28-7/12)			F	0	0.0	0	0.0	1,387	1.9	0	0.0	31,210	43.7	0	0.0	694	1.0	0	0.0	33,291	46.6
			Subtotal	0	0.0	347	0.5	3,468	4.9	0	0.0	65,888	92.2	0	0.0	1,734	2.4	0	0.0	71,436	100.0
7/15 - 7/18	235	210	M	0	0.0	715	1.0	2,859	3.8	0	0.0	38,955	51.9	0	0.0	715	1.0	0	0.0	43,243	57.6
(7/13-7/19)			F	0	0.0	0	0.0	3,216	4.3	357	0.5	27,518	36.7	0	0.0	715	1.0	0	0.0	31,807	42.4
			Subtotal	0	0.0	715	1.0	6,075	8.1	357	0.5	66,473	88.6	0	0.0	1,430	1.9	0	0.0	75,050	100.0
7/20 - 7/24	231	197	M	0	0.0	0	0.0	1,826	6.1	152	0.5	12,779	42.6	0	0.0	456	1.5	0	0.0	15,213	50.8
(7/20-7/25)			F	0	0.0	152	0.5	1,978	6.6	152	0.5	12,018	40.1	152	0.5	304	1.0	0	0.0	14,757	49.2
			Subtotal	0	0.0	152	0.5	3,803	12.7	304	1.0	24,798	82.7	152	0.5	761	2.5	0	0.0	29,970	100.0
7/26 - 7/31	237	206	M	0	0.0	127	0.5	1,525	5.8	127	0.5	11,187	42.7	127	0.5	127	0.5	0	0.0	13,221	50.5
(7/26-8/05)			F	0	0.0	381	1.5	2,288	8.7	0	0.0	9,661	36.9	127	0.5	381	1.5	127	0.5	12,966	49.5
			Subtotal	0	0.0	508	1.9	3,814	14.6	127	0.5	20,848	79.6	254	1.0	508	1.9	127	0.5	26,187	100.0
Season		819	M	0	0.0	1,189	0.6	8,291	4.1	279	0.1	97,598	48.2	127	0.1	2,339	1.2	0	0.0	109,822	54.2
			F	0	0.0	533	0.3	8,869	4.4	510	0.3	80,408	39.7	279	0.1	2,094	1.0	127	0.1	92,821	45.8
			Total	0	0.0	1,722	0.8	17,160	8.5	789	0.4	178,006	87.8	406	0.2	4,433	2.2	127	0.1	202,643	100.0
			95% C. I.				(± 0.7)		(± 1.9)		(± 0.4)		(± 2.3)		(± 0.2)		(± 1.1)		(± 0.1)		
Grand		4,473	M	541	0.0	13,355	1.1	223,433	19.1	1,963	0.2	368,627	31.6	3,676	0.3	12,197	1.0	7,603	0.7	631,540	54.1
Total [a]			F	1,290	0.1	8,422	0.7	242,102	20.7	2,843	0.2	262,139	22.4	2,583	0.2	8,425	0.7	7,963	0.7	536,378	45.9
			Total	1,831	0.2	21,777	1.9	465,535	39.9	4,806	0.4	630,766	54.0	6,259	0.5	20,622	1.8	15,566	1.3	1,167,918	100.0

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Historical totals include data for 1997, and 2002 through 2004, 2007, 2009, and 2010. Sample data for others years do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 6.–Mean length (mm) of sockeye salmon escapement, Kanektok River weir, 2010.

Sample Dates			Age Class						
(Stratum Dates)	Sex		0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/04-7/10	M	Mean Length	590	527	-	588	-	598	-
(6/28-7/12)		Std. Error	-	12	-	2	-	17	-
		Range	590-590	487-560	-	520-637	-	498-630	-
		Sample Size	1	6	0	100	0	3	0
	F	Mean Length	-	509	-	547	-	528	-
		Std. Error	-	13	-	2	-	40	-
		Range	-	495-547	-	467-600	-	488-568	-
		Sample Size	0	4	0	90	0	2	0
7/15 - 7/18	M	Mean Length	583	563	-	590	-	570	-
(7/13-7/19)		Std. Error	26	11	-	2	-	30	-
		Range	557-608	538-625	-	526-634	-	540-600	-
		Sample Size	2	8	-	109	0	2	0
	F	Mean Length	-	523	573	544	-	540	-
		Std. Error	-	11	-	3	-	11	-
		Range	-	460-576	573-573	395-606	-	529-550	-
		Sample Size	0	9	1	77	0	2	0
7/20 - 7/24	M	Mean Length	-	542	569	582	-	592	-
(7/20-7/25)		Std. Error	-	11	-	3	-	4	-
		Range	-	480-610	569-569	477-634	-	587-600	-
		Sample Size	-	12	1	84	0	3	0
	F	Mean Length	538	500	570	547	576	554	-
		Std. Error	-	6	-	3	-	16	-
		Range	538-538	479-543	570-570	466-592	576-576	538-569	-
		Sample Size	1	13	1	79	1	2	0

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Table 6.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/26 - 7/31	M	Mean Length	626	538	632	584	536	544	-
(7/26-8/05)		Std. Error	-	13	-	3	-	-	-
		Range	626-626	430-602	632-632	518-686	536-536	544-544	-
		Sample Size	1	12	1	88	1	1	0
	F	Mean Length	524	499	-	537	498	565	467
		Std. Error	14	6	-	3	-	16	-
		Range	496-544	439-531	-	441-582	498-498	534-590	467-467
		Sample Size	3	18	0	76	1	3	1
Season	M	Mean Length	592	544	598	587	536	580	-
		Std. Error	26	6	-	1	-	15	-
		Range	557-626	430-625	569-632	477-686	536-536	540-630	-
		Sample Size	4	38	2	381	1	9	-
	F	Mean Length	531	512	572	545	540	541	467
		Std. Error	14	6	-	2	-	15	-
		Range	496-544	439-576	570-573	395-606	498-576	488-590	467-467
		Sample Size	4	44	2	322	2	9	1
Grand	M	Mean Length	591	531	611	581	539	593	564
Total [a]		Range	487-666	398-600	572-675	445-660	536-540	501-645	515-630
		Sample Size	48	776	13	902	16	39	44
	F	Mean Length	541	503	576	545	503	563	524
		Range	500-582	424-606	553-678	455-616	477-517	520-600	494-590
		Sample Size	27	965	15	704	16	31	44

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Averages are derived with data for 1997, and 2002 through 2004, 2007, 2009, and 2010. Sample data for other years do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 7.–Age and sex composition of chum salmon escapement, Kanektok River weir, 2010.

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 %
7/04-7/08	220	217	M	0	0.0	6,330	33.6	4,075	21.7	260	1.4	10,665	56.7
(6/28-7/12)			F	87	0.5	5,636	30.0	2,428	12.9	0	0.0	8,151	43.3
			Subtotal	87	0.5	11,966	63.6	6,503	34.6	260	1.4	18,816	100.0
7/15-7/23	239	230	M	0	0.0	7,434	30.9	4,293	17.8	209	0.9	11,937	49.6
(7/13-7/24)			F	105	0.4	7,958	33.0	3,874	16.1	209	0.9	12,146	50.4
			Subtotal	105	0.4	15,392	63.9	8,167	33.9	419	1.7	24,083	100.0
7/27-8/05	220	216	M	91	0.5	5,099	25.9	2,459	12.5	91	0.5	7,740	39.4
(7/25-8/05)			F	455	2.3	8,286	42.1	3,096	15.7	91	0.5	11,928	60.6
			Subtotal	546	2.8	13,385	68.1	5,554	28.2	182	0.9	19,668	100.0
Season		663	M	91	0.1	18,863	30.1	10,827	17.3	561	0.9	30,342	48.5
			F	647	1.0	21,880	35.0	9,398	15.0	300	0.5	32,225	51.5
			Total	738	1.2	40,743	65.1	20,225	32.3	861	1.4	62,567	100.0
			95% C. I.		(± 0.8)		(± 3.6)		(± 3.6)		(± 0.9)		
		8,957	M	1,918	0.4	129,752	30.4	88,046	20.6	4,507	1.1	224,223	52.5
Grand			F	3,750	0.9	124,040	29.1	72,633	17.0	2,316	0.5	202,739	47.5
Total [a]			Total	5,668	1.3	253,792	59.4	160,679	37.6	6,823	1.6	426,962	100.0

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Historical totals include data for 1997, 2002 through 2004, 2007, 2009, and 20010. Sample data for 2005, 2006, and 2008 do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 8.–Mean length (mm) of chum salmon escapement Kanektok River weir, 2010.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
7/04-7/08 (6/28-7/12)	M	Mean Length	-	587	598	625
		Std. Error	-	3	4	14
		Range	-	503-637	500-670	603-652
		Sample Size	0	73	47	3
	F	Mean Length	550	563	575	-
		Std. Error	-	4	5	-
		Range	-	505-688	525-634	-
		Sample Size	1	65	28	0
7/15-7/23 (7/13-7/24)	M	Mean Length	-	580	603	607
		Std. Error	-	3	5	1
		Range	-	518-635	522-660	606-607
		Sample Size	0	71	41	2
	F	Mean Length	506	554	567	586
		Std. Error	-	3	5	4
		Range	-	504-608	518-662	582-590
		Sample Size	1	76	37	2
7/27-8/05 (7/25-8/05)	M	Mean Length	582	577	596	627
		Std. Error	-	4	6	-
		Range	-	507-639	532-650	-
		Sample Size	1	56	27	1
	F	Mean Length	533	552	563	526
		Std. Error	11	3	4	-
		Range	511-574	498-612	497-594	-
		Sample Size	5	91	34	1
Season	M	Mean Length	582	581	600	618
		Std. Error	-	2	3	6
		Range	-	503-639	500-670	603-652
		Sample Size	1	200	115	6
	F	Mean Length	528	556	568	559
		Std. Error	11	2	3	4
		Range	506-574	498-688	497-662	526-590
		Sample Size	7	232	99	3
Grand Total [a]	M	Mean Length	557	583	604	612
		Range	496-593	449-889	498-725	519-703
		Sample Size	35	1,670	1,245	56
	F	Mean Length	532	554	569	569
		Range	522-598	430-700	491-680	565-658
		Sample Size	58	1,411	876	26

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Averages are derived with data for 1997, 2002 through 2004, 2007, 2009, and 2010. Sample data for 2005, 2006, and 2008 do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 9.–Age and sex composition of Chinook salmon from the District W-4 commercial fishery, 2010.

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 %	2.3 Catch	2.3 %	1.5 Catch	1.5 %	2.4 Catch	2.4 %	Total Catch	Total %
6/15	230	207	M	3	1.0	86	26.6	155	47.8	24	7.2	0	0.0	0	0.0	0	0.0	268	82.6
Period 1			F	0	0.0	9	2.9	22	6.8	25	7.7	0	0.0	0	0.0	0	0.0	57	17.4
			Subtotal	3	1.0	96	29.5	177	54.6	49	15.0	0	0.0	0	0.0	0	0.0	325	100.0
6/25	226	194	M	289	3.6	2,807	35.1	2,807	35.1	495	6.2	0	0.0	0	0.0	0	0.0	6,397	79.9
Periods 2-4			F	0	0.0	0	0.0	825	10.3	784	9.8	0	0.0	0	0.0	0	0.0	1,610	20.1
			Subtotal	289	3.6	2,807	35.1	3,632	45.4	1,279	16.0	0	0.0	0	0.0	0	0.0	8,007	100.0
7/02	88	78	M	0	0.0	399	6.4	2,393	38.5	957	15.4	0	0.0	0	0.0	0	0.0	3,750	60.3
Periods 5-24			F	0	0.0	0	0.0	1,117	17.9	1,277	20.5	0	0.0	80	1.3	0	0.0	2,473	39.7
			Subtotal	0	0.0	399	6.4	3,510	56.4	2,234	35.9	0	0.0	80	1.3	0	0.0	6,223	100.0
Season		479	M	292	2.0	3,292	22.6	5,355	36.8	1,476	10.1	0	0.0	0	0.0	0	0.0	10,416	71.6
			F	0	0.0	9	0.1	1,964	13.5	2,086	14.3	0	0.0	80	0.5	0	0.0	4,139	28.4
			Total	292	2.0	3,301	22.7	7,320	50.3	3,562	24.5	0	0.0	80	0.5	0	0.0	14,555	100.0
			95% C. I.		(± 1.4)		(± 4.3)		(± 6.1)				(± 5.4)				(± 1.1)		
Grand Total [a]		17,679	M	5,251	0.7	165,561	22.9	164,692	22.8	130,522	18.0	542	0.1	11,094	1.5	499	0.1	478,657	66.2
			F	524	0.1	19,426	2.7	42,623	5.9	163,387	22.6	296	0.0	17,829	2.5	314	0.0	244,579	33.8
			Total	5,775	0.8	184,987	25.6	207,316	28.7	293,909	40.6	838	0.1	28,922	4.0	813	0.1	723,237	100.0

Note: The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors. The number 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. Historical totals include data for 1969 through 2010. Sample data for 1971, 1972, 1974, 1975, 1979, 1982, 1992, and 1996 do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 10.–Mean length (mm) of Chinook salmon from the District W-4 commercial fishery, 2010.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	2.2	1.3	1.4	2.3	1.5	2.4
6/15	M	Mean Length	362	519	-	662	815	-	-	-
Period 1		Std. Error	1	6	-	7	17	-	-	-
		Range	361-363	406-592	-	543-832	685-958	-	-	-
		Sample Size	2	55	0	99	15	0	0	0
	F	Mean Length	-	501	-	756	838	-	-	-
		Std. Error	-	20	-	17	15	-	-	-
		Range	-	445-552	-	647-859	685-936	-	-	-
		Sample Size	0	6	0	14	16	0	0	0
6/25	M	Mean Length	371	542	-	692	800	-	-	-
Periods 2-4		Std. Error	15	6	-	8	22	-	-	-
		Range	300-424	442-659	-	526-843	685-910	-	-	-
		Sample Size	7	68	0	68	12	0	0	0
	F	Mean Length	-	-	-	778	818	-	-	-
		Std. Error	-	-	-	9	8	-	-	-
		Range	-	-	-	670-819	756-881	-	-	-
		Sample Size	0	0	0	20	19	0	0	0
7/2	M	Mean Length	-	630	-	730	780	-	-	-
Periods 5-24		Std. Error	-	17	-	12	20	-	-	-
		Range	-	566-665	-	597-844	667-881	-	-	-
		Sample Size	0	5	0	30	12	0	0	0
	F	Mean Length	-	-	-	802	847	-	886	-
		Std. Error	-	-	-	9	12	-	-	-
		Range	-	-	-	738-860	782-939	-	-	-
		Sample Size	0	0	0	14	16	0	1	0
Season	M	Mean Length	371	579	-	707	791	-	-	-
		Std. Error	15	8	-	7	15	-	-	-
		Range	300-424	406-665	-	526-844	667-958	-	-	-
		Sample Size	9	128	0	197	39	0	0	0
	F	Mean Length	-	501	-	787	831	-	886	-
		Std. Error	-	20	-	6	7	-	-	-
		Range	-	445-552	-	647-860	685-939	-	-	-
		Sample Size	0	6	0	48	51	0	1	0
Grand Total [a]	M	Mean Length	394	543	540	697	838	690	878	810
		Range	314-560	305-1,018	493-640	454-971	375-1,405	520-780	525-1,082	736-1,001
		Sample Size	145	3,520	8	3,813	2,715	10	199	10
	F	Mean Length	544	608	518	768	856	773	900	809
		Range	365-832	445-970	-	531-963	599-1,102	690-893	591-1,066	870-892
		Sample Size	6	377	1	952	3,433	6	332	6

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Averages are derived with data for 1969 through 2010. Sample data for 1971, 1972, 1974, 1975, 1979, 1982, 1992, and 1996 do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 11.–Age and sex composition of sockeye salmon from the District W-4 commercial fishery, 2010.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	%	0.3 Catch	%	1.2 Catch	%	0.4 Catch	%	1.3 Catch	%	2.2 Catch	%	1.4 Catch	%	2.3 Catch	%	Total Catch	%
6/25	242	212	M	45	0.5	135	1.4	314	3.3	45	0.5	3,455	36.3	0	0.0	179	1.9	0	0.0	4,173	43.9
Periods 1-4			F	0	0.0	0	0.0	269	2.8	90	0.9	4,846	50.9	0	0.0	45	0.5	90	0.9	5,339	56.1
			Subtotal	45	0.5	135	1.4	583	6.1	135	1.4	8,301	87.3	0	0.0	224	2.4	90	0.9	9,512	100.0
7/07	240	208	M	0	0.0	0	0.0	7,956	13.0	589	1.0	22,100	36.1	0	0.0	295	0.5	295	0.5	31,234	51.0
Periods 5-8			F	0	0.0	1,473	2.4	2,652	4.3	589	1.0	24,457	39.9	0	0.0	589	1.0	295	0.5	30,056	49.0
			Subtotal	0	0.0	1,473	2.4	10,608	17.3	1,179	1.9	46,557	76.0	0	0.0	884	1.4	589	1.0	61,290	100.0
7/12	230	212	M	0	0.0	657	1.9	2,954	8.5	328	0.9	13,623	39.2	0	0.0	657	1.9	0	0.0	18,219	52.4
Period 9-10			F	0	0.0	492	1.4	2,462	7.1	0	0.0	12,803	36.8	0	0.0	821	2.4	0	0.0	16,578	47.6
			Subtotal	0	0.0	1,149	3.3	5,417	15.6	328	0.9	26,426	75.9	0	0.0	1477.2	4.2	0	0.0	34,797	100.0
7/19	230	212	M	0	0.0	309	0.9	1,082	3.3	0	0.0	15,145	46.2	309	0.9	0	0.0	155	0.5	17,000	51.9
Periods 11-24			F	0	0.0	773	2.4	2,318	7.1	0	0.0	12,518	38.2	0	0.0	155	0.5	0	0.0	15,763	48.1
			Subtotal	0	0.0	1,082	3.3	3,400	10.4	0	0.0	27,663	84.4	309	0.9	155	0.5	155	0.5	32,763	100.0
Season		844	M	45	0.0	1,100	0.8	12,306	8.9	962	0.7	54,323	39.3	309	0.2	1,131	0.8	449	0.3	70,626	51.0
			F	0	0.0	2,738	2.0	7,701	5.6	679	0.5	54,623	39.5	0	0.0	1,609	1.2	384	0.3	67,736	49.0
			Total	45	0.0	3,839	2.8	20,008	14.5	1,642	1.2	108,947	78.7	309	0.2	2,740	2.0	834	0.6	138,362	100.0
			95% C. I.		(± 0.1)				(± 1.2)		(± 2.8)		(± 0.9)		(± 3.2)		(± 0.1)		(± 1.0)		(± 0.6)
Grand Total [a]		12,219	M	2,350	0.2	21,429	1.7	198,521	16.2	3,533	0.3	361,351	29.4	7,589	0.6	15,334	1.2	10,602	0.9	620,882	50.5
			F	383	0.0	26,178	2.1	164,541	13.4	3,099	0.3	384,752	31.3	5,320	0.4	13,212	1.1	10,612	0.9	608,348	49.5
			Total	2,734	0.2	47,607	3.9	363,062	29.5	6,632	0.5	746,104	60.7	12,909	1.1	28,546	2.3	21,214	1.7	1,229,229	100.0

Note: The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors. The number 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. Historical totals include data for 1995 through 2010. Sample data for 1992 does not meet criteria for estimating escapement percentages and is not included in the "Grand Total".

Table 12.–Mean length (mm) of sockeye salmon from the District W-4 commercial fishery, 2010.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	1.2	0.4	1.3	2.2	1.4	2.3
6/25	M	Mean Length	402	568	489	599	568	-	592	-
Periods 1-4		Std. Error	-	8	18	-	3	-	14	-
		Range	-	554-583	389-526	-	488-611	-	569-634	-
		Sample Size	1	3	7	1	77	0	4	0
	F	Mean Length	-	-	490	555	535	-	524	542
		Std. Error	-	-	12	8	2	-	-	1
		Range	-	-	458-539	547-562	489-587	-	-	541-542
		Sample Size	0	-	6	2	108	0	1	2
7/07	M	Mean Length	-	-	503	602	569	-	571	580
Periods 5-8		Std. Error	-	-	7	9	3	-	-	-
		Range	-	-	408-566	593-611	459-617	-	-	-
		Sample Size	0	0	27	2	75	0	1	1
	F	Mean Length	-	539	485	556	543	-	566	534
		Std. Error	-	5	10	4	2	-	6	-
		Range	-	527-553	438-520	552-559	486-582	-	560-572	-
		Sample Size	0	5	9	2	83	0	2	1
7/12	M	Mean Length	-	563	517	591	577	-	587	-
Period 9-10		Std. Error	-	9	8	2	3	-	7	-
		Range	-	540-579	432-581	589-593	529-673	-	570-606	-
		Sample Size	0	4	18	2	83	0	4	0
	F	Mean Length	-	555	482	-	543	-	555	-
		Std. Error	-	3	7	-	2	-	4	-
		Range	-	552-560	447-549	-	500-595	-	541-565	-
		Sample Size	0	3	15	-	78	0	5	0

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Table 12.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/19 Periods 11-24	M	Mean Length		583	519		567	517	-	555
		Std. Error		23	9		3	10	-	-
		Range		560-606	469-539		493-614	507-526	-	-
		Sample Size		2	7		98	2	0	1
	F	Mean Length		539	500		543	-	556	-
		Std. Error		4	6		2	-	-	-
		Range		527-552	457-535		493-589	-	-	-
		Sample Size		5	15		81	-	1	0
Season	M	Mean Length	402	572	509	598	570	517	578	571
		Std. Error	-	11	4	6	2	10	7	-
		Range	402-402	540-606	389-581	589-611	459-673	507-526	569-634	555-580
		Sample Size	1	9	59	5	333	2	9	2
	F	Mean Length	-	544	488	555	542	-	558	535
		Std. Error	-	3	5	3	1	-	4	1
		Range	-	527-560	438-549	547-562	486-595	-	524-572	534-542
		Sample Size	-	13	45	4	350	-	9	3
Grand Total [a]	M	Mean Length	458	568	520	591	575	533	591	570
		Range	402- 595	474- 604	390- 656	566- 614	435- 696	492- 652	526- 680	532- 675
		Sample Size	13	110	1,696	20	3563	79	145	151
	F	Mean Length	468	545	502	567	544	474	561	545
		Range	-	482- 575	393- 645	535- 600	436- 646	483- 638	525- 614	505- 680
		Sample Size	4	156	1,451	38	3347	65	146	129

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Averages are derived with data for 1995 through 2010. Sample data for 1992 does not meet criteria for estimating escapement percentages and is not included in the "Grand Total".

Table 13.–Age and sex composition of chum salmon from the District W-4 commercial fishery, 2010.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	0.2 %	0.3 Catch	0.3 %	0.4 Catch	0.4 %	0.5 Catch	0.5 %	Total Catch	Total %
6/25	301	299	M	0	0.0	12,019	34.4	10,036	28.8	350	1.0	22,405	64.2
Periods 1-5			F	0	0.0	6,068	17.4	6,068	17.4	350	1.0	12,486	35.7
			Subtotal	0	0.0	18,087	51.8	16,104	46.2	700	2.0	34,891	100.0
7/07, 7/09, 7/12	652	648	M	231	0.5	17,865	35.8	6,391	12.8	462	0.9	24,949	50.0
Periods 6-10			F	462	0.9	17,480	35.0	6,930	13.9	77	0.2	24,949	50.0
			Subtotal	693	1.4	35,344	70.8	13,322	26.7	539	1.1	49,898	100.0
7/19	230	227	M	192	0.9	6,633	30.4	2,403	11.0	0	0.0	9,228	42.2
Periods 11-24			F	192	0.9	11,151	51.1	1,250	5.7	0	0.0	12,593	57.7
			Subtotal	385	1.8	17,784	81.5	3,653	16.7	0	0.0	21,821	100.0
Season		1,174	M	423	0.4	36,517	34.3	18,830	17.7	812	0.8	56,582	53.1
			F	654	0.6	34,699	32.5	14,248	13.4	427	0.4	50,028	46.9
			Total	1,078	1.0	71,215	66.8	33,078	31.0	1,239	1.2	106,610	100.0
			95% C. I.		(± 0.5)		(± 2.8)		(± 2.7)		(± 1.0)		
Grand Total [a]		32,616	M	8,334	0.8	291,916	26.8	196,331	18.0	7,471	0.7	504,052	46.3
			F	9,339	0.9	360,411	33.1	206,399	19.0	8,103	0.7	584,251	53.6
			Total	17,673	1.62	652,327	59.9	402,729	37	15,574	1.43	1,088,304	100.0

Note: The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors. The number 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" include data for 1984 through 2010. Sample data for 1987, 1994 and 1996 do not meet criteria for estimating percentages and are not included in the "Grand Total".

Table 14.–Mean length (mm) of chum salmon from the District W-4 commercial fishery, 2010.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
6/25 Periods 1-5	M	Mean Length	-	573	590	625
		Std. Error	-	3	3	9
		Range	-	514-660	527-655	607-635
		Sample Size	0	103	86	3
	F	Mean Length	-	555	569	567
		Std. Error	-	3	3	9
		Range	-	513-602	509-618	552-583
		Sample Size	0	52	52	3
7/07, 7/09, 7/12 Periods 6-10	M	Mean Length	549	575	589	588
		Std. Error	26	2	3	11
		Range	504-594	488-657	518-661	547-621
		Sample Size	3	232	83	6
	F	Mean Length	542	553	566	542
		Std. Error	11	1	3	-
		Range	508-567	486-608	518-628	542-542
		Sample Size	6	227	90	1
7/19 Periods 11-24	M	Mean Length	558	562	579	-
		Std. Error	12	4	6	-
		Range	546-570	501-625	528-630	-
		Sample Size	2	69	25	0
	F	Mean Length	544	542	549	-
		Std. Error	38	2	6	-
		Range	506-582	485-582	518-583	-
		Sample Size	2	116	13	0
Season	M	Mean Length	552	572	587	603
		Std. Error	18	1	2	7
		Range	504-594	488-660	518-661	547-635
		Sample Size	5	404	194	9
	F	Mean Length	543	551	563	552
		Std. Error	14	1	2	9
		Range	506-582	485-608	509-628	542-583
		Sample Size	8	395	155	4
Grand Total [a]	M	Mean Length	535	582	602	604
		Range	454-675	462-710	492-735	527-694
		Sample Size	138	4,698	3,104	118
	F	Mean Length	533	559	575	581
		Range	486-717	325-683	492-695	516-651
		Sample Size	172	5,564	3,223	109

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Averages are derived with data for 1984 through 2010. Sample data for 1987, 1994, and 1996 do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 15.–Age and sex of coho salmon from the District W-4 commercial fishery, 2010.

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 %
8/02, 8/16	230	189	M	688	5.0	6,191	45.2	206	1.5	7,086	51.8
Periods 1-24			F	963	7.0	5,297	38.7	344	2.5	6,604	48.2
			Subtotal	1,651	12.1	11,489	83.9	550	4.0	13,690	100.0
Season		189	M	688	5.0	6,191	45.2	206	1.5	7,086	51.8
			F	963	7.0	5,297	38.7	344	2.5	6,604	48.2
			Total	1,651	12.1	11,489	83.9	550	4.0	13,690	100.0
			95% C. I.		(± 4.6)		(± 5.3)		(± 2.9)		
Grand		19,152	M	11,032	4.5	114,751	46.4	5,360	2.2	131,144	53.0
Total [a]			F	7,317	3.0	104,798	42.4	4,076	1.6	116,191	47.0
			Total	18,350	7.4	219,549	88.8	9,436	3.8	247,334	100.0

Note: The number of fish in each stratum age and sex category are derived from sample percentages; discrepancies are attributed to rounding errors. The number 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. Historical totals include data for 1996 through 2010. Sample data for 1997, 1999, 2007, and 2009 do not meet criteria for estimating percentages and are not included in the "Grand Total".

Table 16.–Mean length (mm) of coho salmon from the District W-4 commercial fishery, 2010.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/02, 8/16 Periods 1-24	M	Mean Length	553	567	566
		Std. Error	14	5	19
		Range	488-614	419-649	533-598
		Sample Size	10	84	3
	F	Mean Length	566	579	551
		Std. Error	12	3	6
		Range	459-626	491-633	534-564
		Sample Size	13	74	5
Season	M	Mean Length	553	567	566
		Std. Error	14	5	19
		Range	488-614	419-649	533-598
		Sample Size	10	84	3
	F	Mean Length	566	579	551
		Std. Error	12	3	6
		Range	459-626	491-633	534-564
		Sample Size	13	74	5
Grand Total [a]	M	Mean Length	580	607	605
		Range	407-645	399-697	461-640
		Sample Size	96	1,160	40
	F	Mean Length	609	604	616
		Range	473-645	430-697	438-621
		Sample Size	63	998	31

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Averages are derived with data for 1996 through 2010. Sample data for 1997, 1999, 2007, and 2009 do not meet criteria for estimating escapement percentages and are not included in the "Grand Total".

Table 17.–Daily weather and hydrological observations from the Kanektok River weir site, 2010.

Date	Wind (Dir/ Speed)	Precip (in)	Air Temp. (C)	Water Temp. (C)	Cloud Cover % / altitude	Water level (cm)
19 Jun	calm	0.02	8	5	100/na	42
20 Jun	N/5	trace	22	6	70/3000	37
21 Jun	SE/5	0.00	26	10	5\3000	34
22 Jun	E/5.5	0.00	19	9	80/2500	34
23 Jun	calm	0.03	14	9	100/900	32
24 Jun	calm	0.26	14	8	100/800	32
25 Jun	calm	0.04	15	6	100/400	27
26 Jun	calm	0.03	16	6	100/400	27
27 Jun	N/3	0.01	11	6	100/400	25
28 Jun	NW/3	0.00	20	10	100/2000	24
29 Jun	calm	0.02	12.5	9	100/500	22
30 Jun	NE/3	0.04	15	9	100/1500	20
1 Jul	SE/3	0.01	14	9	100/900	20
2 Jul	NE/5	0.06	13	9	100/1000	17
3 Jul	E/5	0.15	13	9.5	100/500	17
4 Jul	NE/3	0.04	15	8	99/900	17
5 Jul	E/10	0.35	12	8	100/500	22
6 Jul	S/1	0.50	9	8	100/800	23
7 Jul	E/1	0.02	13.5	9.5	100/1000	22
8 Jul	W/2	0.24	23	11	50/1500	18
9 Jul	calm	0.05	14	10	100/1800	17.5
10 Jul	W/10	0.06	16.5	10	90/900	17
11 Jul	NW/5	0.01	21	12	30/1500	14
12 Jul	W/5	0.00	15	10.5	90/900	12
13 Jul	NW/5	0.00	15.5	10.5	100/900	11
14 Jul	NW/5	0.03	20	13	10\3000	9.5
15 Jul	W/5	trace	23	13.5	10\3000	7
16 Jul	S/10	0.00	22	14	3\3000	6
17 Jul	W/1	trace	12	11	100/500	5
18 Jul	SE/1	0.33	13	11	100/900	7
19 Jul	E/5	0.16	10	9.5	100/900	7
20 Jul	SE/5	0.06	8	9	100/600	10
21 Jul	E/5	0.48	8	8.5	100/800	10
22 Jul	NW/5	0.13	8.5	8	100/700	10
23 Jul	SW/5	0.08	8	8	100/600	9
24 Jul	SW/1	0.06	15	10	100/1000	8.5
25 Jul	NE/3	0.08	11	8.5	100/900	7
26 Jul	NW/10	0.03	15	11	85/1000	6

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Table 17.–Page 2 of 2.

Date	Wind (Dir/ Speed)	Precip (in)	Air Temp. (C)	Water Temp. (C)	Cloud Cover % / altitude	Water level (cm)
27 Jul	SE/5	0.01	12	9	100/2000	4
28 Jul	S/10	0.60	9	9	100/500	11
29 Jul	E/5	0.80	14	9	100/900	24
30 Jul	SE/5	0.28	13	9	100/800	25
31 Jul	E/2	0.32	12	10	100/900	31
1 Aug	E/5	0.01	16	10	100/1000	30
2 Aug	E/7	trace	17	11	90/1200	28
3 Aug	SE/3	0.00	16	10	99/1000	25
4 Aug	SE/5	0.05	20	11.5	70/1200	25
5 Aug	E/5	0.06	10	10	100/800	25
6 Aug	SE/5	0.44	9	9	100/900	29
7 Aug	calm	0.50	11	9	100/500	27
8 Aug	NE/20	0.40	10	9	99/1000	25
9 Aug	NE/5	0.06	10	9	100/800	27
10 Aug	SE/3	0.04	7	9	100/800	30
11 Aug	SE/5	0.07	12	8.5	99/900	30
12 Aug	calm	0.07	12	9	100/500	30
13 Aug	NE/7	0.02	18	10	100/1300	30
14 Aug	E/25	0.32	14.5	12	100/800	34
15 Aug	SE/5	0.23	13	10	85/1200	68
16 Aug	NE/5	0.08	10.5	8.5	97/1000	75
17 Aug	SE/3	0.67	8.5	8.5	100/700	79
18 Aug	SE/3	0.04	10	8	100/500	70
19 Aug	calm	0.3	11	8.5	100/400	65
20 Aug	NE/2	0.03	19	8	100/900	56
21 Aug	E/1	0.44	12	8	100/1000	52
22 Aug	NW/5	0.05	14	9.5	99/1200	48
23 Aug	W/3	0.12	15.5	10.5	20\2000	41

Table 18.–District W-4 commercial harvest by period and exvessel value, 2010.

Period	Date Caught	Permits Fished	Chinook		Sockeye		Chum		Coho	
			Harvest	Pounds	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds
1	15 Jun	33	325	3,945	28	187	80	574	0	0
2	21 Jun	122	2,620	33,120	1,280	9,149	5,157	36,973	0	0
3	25 Jun	125	3,404	42,276	2,566	16,623	7,051	50,304	0	0
4	29 Jun	137	1,983	24,487	5,638	35,654	10,472	75,482	0	0
5	2 Jul	128	1,318	18,798	11,308	74,974	12,131	83,511	0	0
6	5 Jul	141	1,128	13,430	17,975	118,997	8,661	62,868	0	0
7	7–8 Jul	168	1,085	14,994	16,367	107,700	14,734	102,792	0	0
8	9 Jul	118	443	5,914	15,640	106,418	9,043	64,253	0	0
9	12 Jul	156	433	6,149	13,387	89,287	5,531	38,188	0	0
10	14–15 Jul	172	658	9,437	21,410	148,203	11,929	81,678	3	23
11	16 Jul	152	206	2,979	10,038	70,329	6,146	41,827	0	0
12	17 Jul	103	198	2,526	6,932	44,877	4,070	27,575	3	11
13	19 Jul	63	86	1,310	4,644	32,044	2,248	15,873	16	114
14	21 Jul	70	119	1,703	4,658	31,663	3,337	22,289	102	684
15	23 Jul	68	55	1,019	3,731	25,251	2,446	16,193	105	694
16	26 Jul	53	54	717	1,114	7,457	1,408	9,351	157	1,019
17	28 Jul	25	17	236	333	2,213	677	4,599	115	780
18	30 Jul	30	30	446	351	2,415	533	3,853	198	1,385
19	2 Aug	34	27	371	316	2,111	318	1,997	994	7,064
20	6 Aug	43	23	244	251	1,786	380	2,211	2,056	14,861
21	9 Aug	27	5	59	68	477	43	303	770	5,800
22	13 Aug	83	8	118	130	906	99	610	2,733	20,492
23	16 Aug	66	5	42	108	717	67	414	3,800	27,496
24	18 Aug	82	0	0	89	616	49	320	2,638	20,285
Total		241	14,230	184,320	138,362	930,054	106,610	744,038	13,690	100,708
Average Weight				12.95		6.72		6.98		7.36
Average Price				1.60		1.13		0.26		1.17
Exvessel Value				$294,163		$1,049,395		$194,105		$117,658

Total Number of Fish	272,892
Total Pounds	1,959,120
Total Exvessel Value	$1,655,321

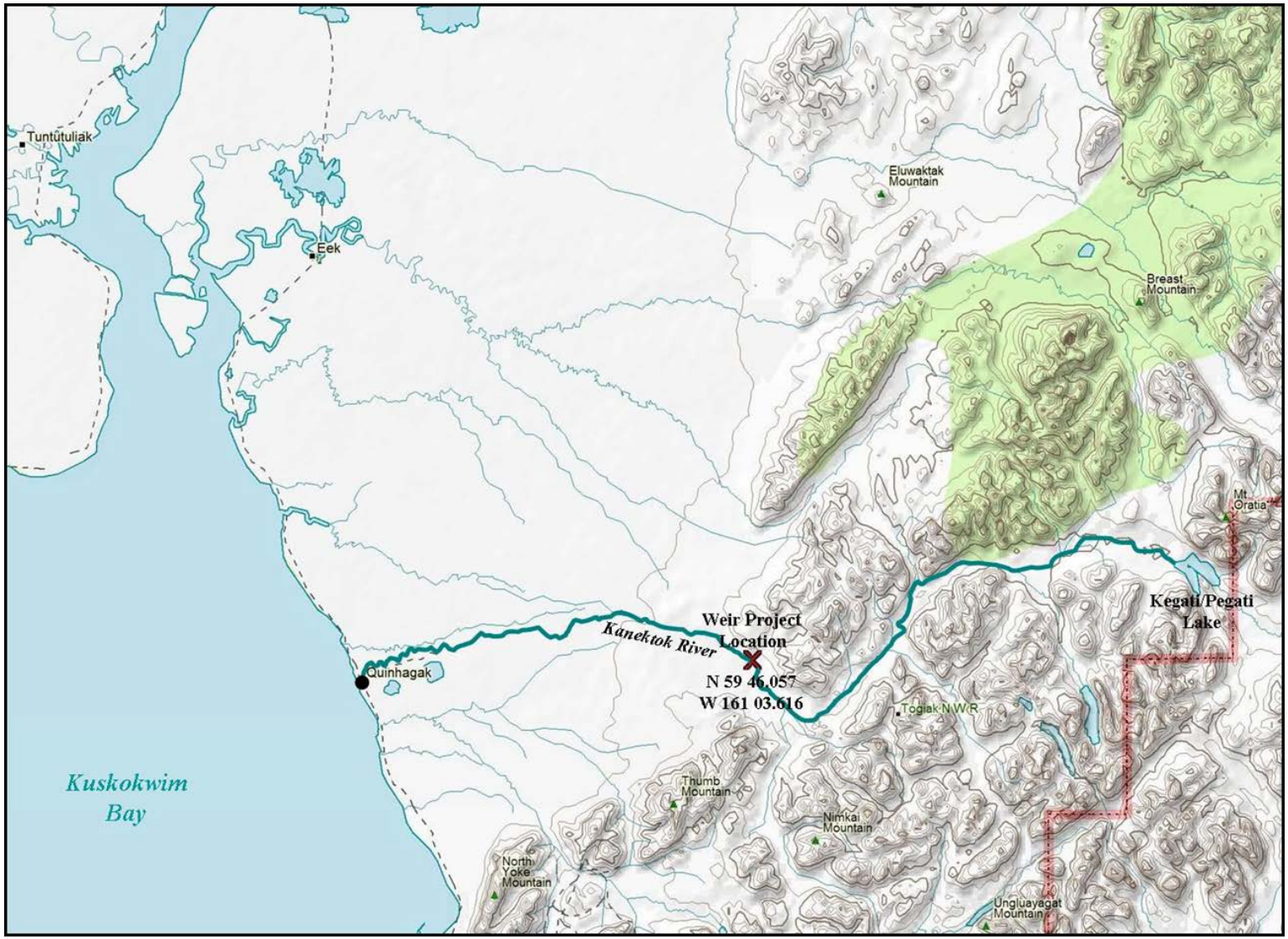


Figure 1.–Kanektok River, Kuskokwim Bay, Alaska.

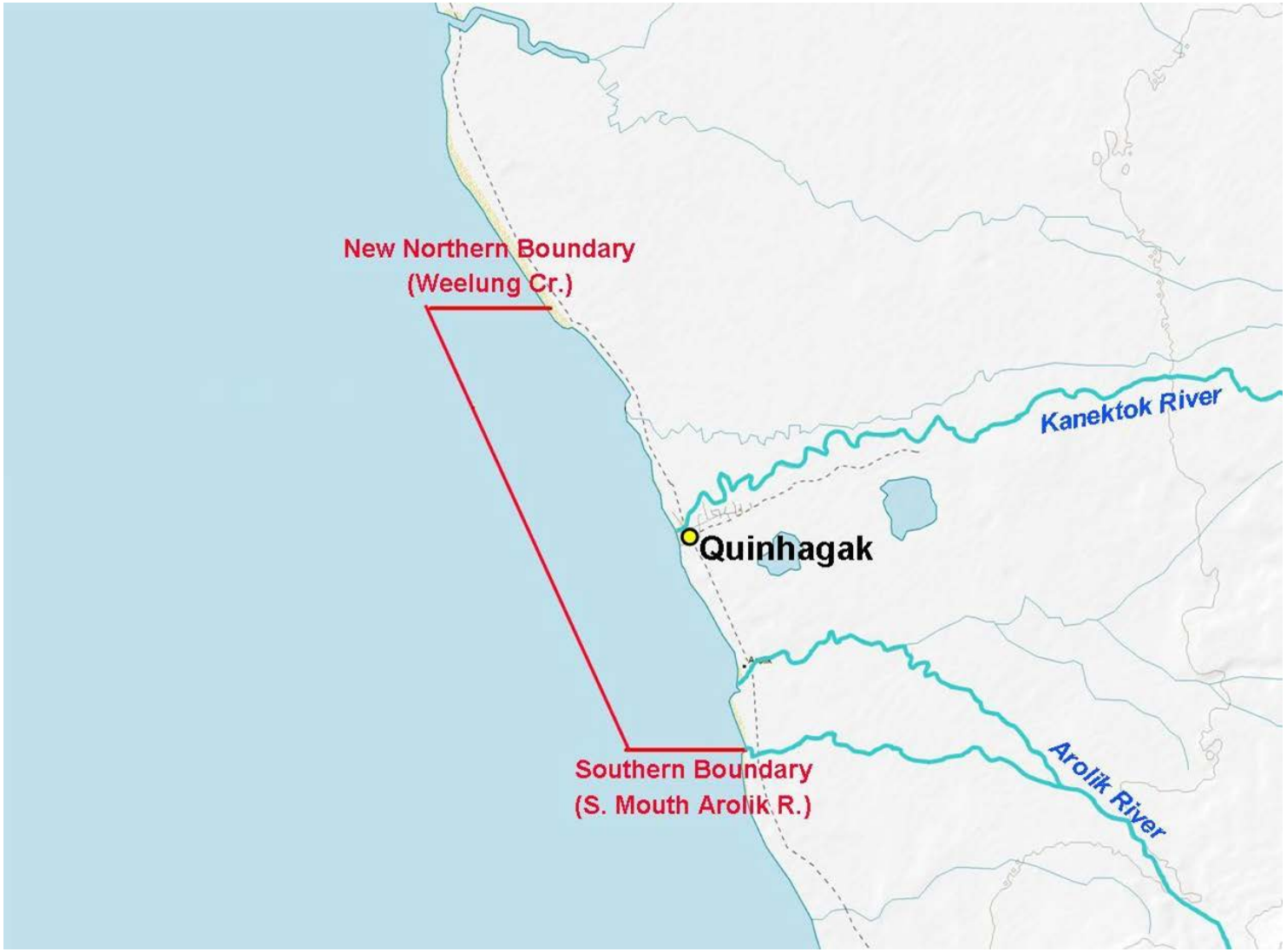
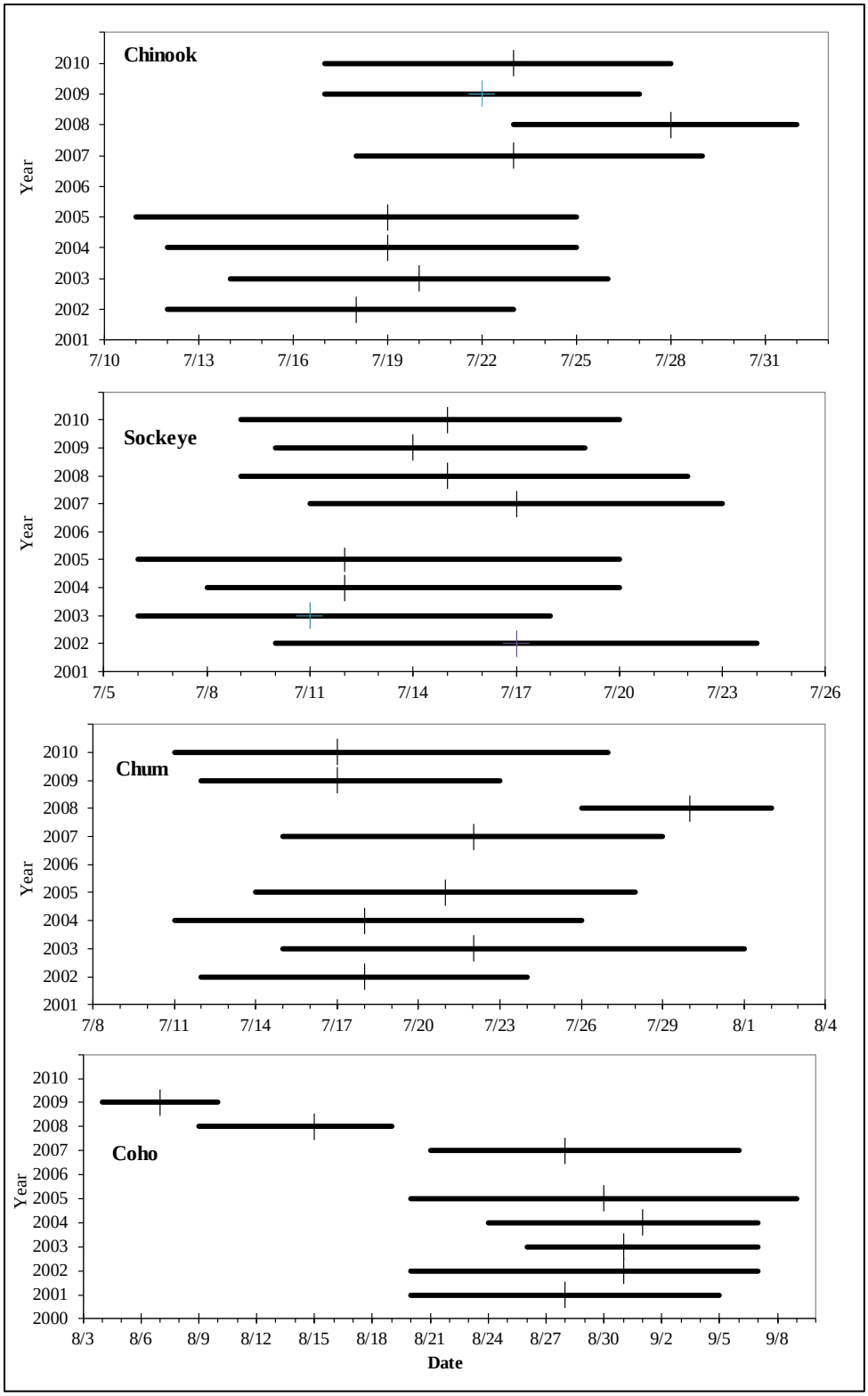


Figure 2.–Commercial Fishing District W-4, Kuskokwim Bay, Alaska, 2010.



Note: Solid lines represent the dates when the central 50% of the run passed, cross-bars represent the median passage date.

Figure 3.–Annual run timing of Chinook, sockeye, chum, and coho salmon based on cumulative percent passage at the Kanektok River weir, 2001–2010.

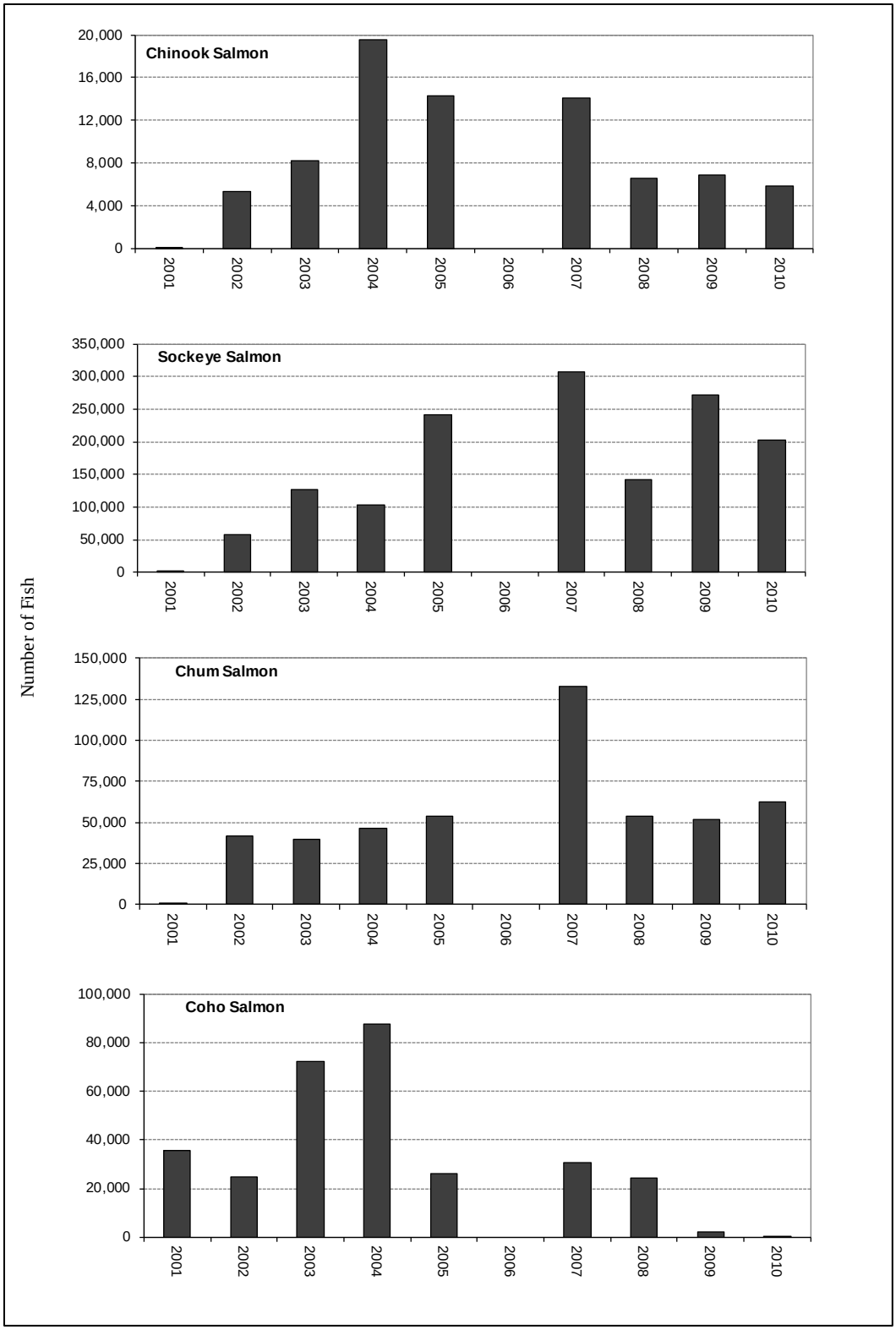


Figure 4.–Historical escapement of Chinook, sockeye, chum, and coho salmon at the Kanektok River weir.

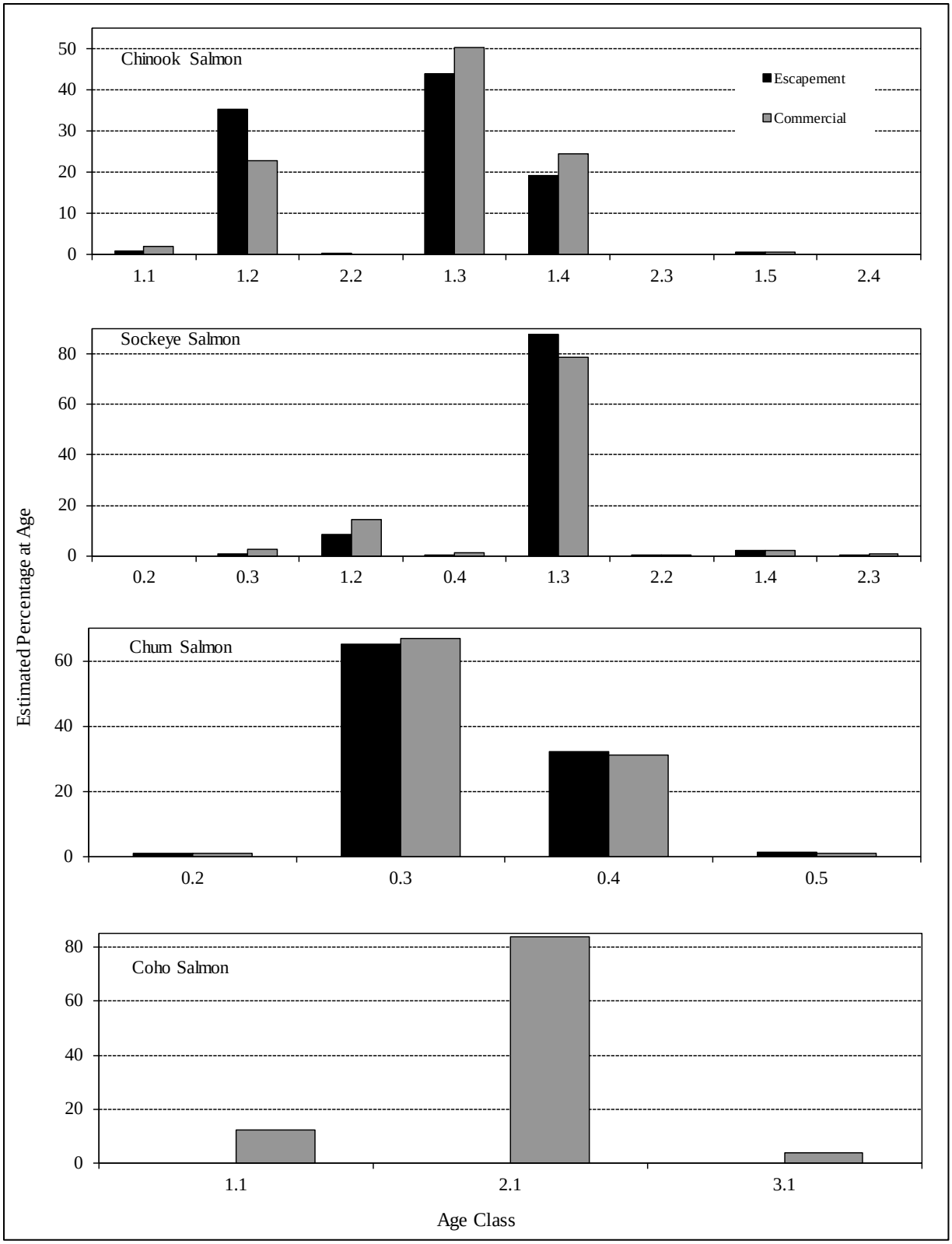
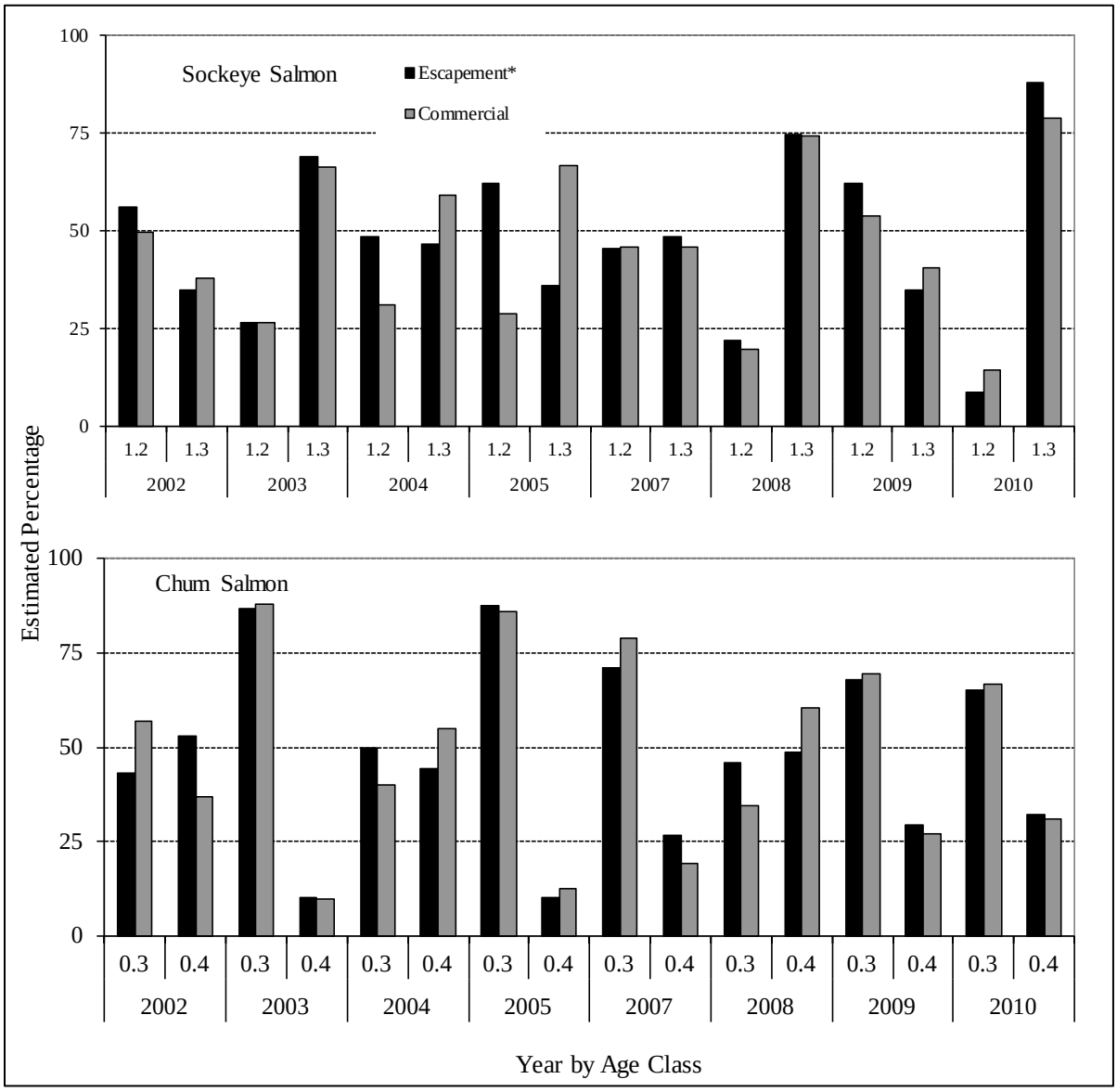


Figure 5.–Age class percentages for Chinook, sockeye, chum, and coho salmon from observed Kanektok River weir escapement and District W-4 commercial fishery, 2010.



Note: 2005 escapement ASL data does not represent estimated escapement as it is based on escapement observed and samples collected during weir operations only. 2008 escapement percentages are based on actual samples collected and do not represent total escapement.

Figure 6.–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, 2002–2010.

APPENDICES

Appendix A1.–Historical commercial, subsistence, and sport fishing harvests of Chinook, sockeye, coho and chum salmon, Quinhagak area, 1960 through 2010.

	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			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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	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	3,726	288	34,627	1,086	112	25,820	1,112	33	82,398	1209	1362
2005	24,195	3,083	520	68,801	1,633	156	13,529	915	108	51,780	1,443	1,006
2006	19,184	3,521	754	106,308	2,177	523	39,151	1,865	145	26,831	1,019	1,742
2007	19,573	[a]	633	109,343	[a]	385	61,228	[a]	15	34,710	[a]	1,087
2008	13,812	[a]	220	69,743	[a]	654	57,033	[a]	48	94,257	[a]	1,541
2009	13,920	[a]	400	112,153	[a]	75	91,158	[a]	44	48,115	[a]	876
2010	14,230	[a]	[a]	138,362	[a]	[a]	106,610	[a]	[a]	13,690	[a]	[a]
10-Year Average[b]	17,608	3,337	570	65,508	1,522	285	39,280	1,238	113	46,368	1,442	1,372
Historical Average	16,154	3,131	802	31,441	1,264	283	35,030	1,297	223	37,070	1,911	1,164

Source: Bavilla et al. 2010.

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.

[b] 10-year average commercial and sport from 2000 to 2009; subsistence from 1997 to 2006.

Appendix B1.–Aerial survey escapement indices of the Kanektok River drainage by species, 1962 through 2010.

Year	Chinook	Sockeye	Chum	Coho
1962	935	43,108	[a]	[a]
1965	[a]	[a]	[a]	[a]
1966		[a]	28,800	[a]
1967	3,718 [a]	[a]	[a]	[a]
1968			14,000	[a]
1969	4,170 [a]	8,000 [a]	[a]	[a]
1970	3,112	1,128	[a]	[a]
1971	[a]	[a]	[a]	[a]
1972	[a]	[a]	[a]	[a]
1973	814	[a]	[a]	[a]
1974	197 [a]	532 [a]	[a]	[a]
1975	1,278 [a]	6,018	[a]	[a]
1976	3,079 [a]	2,936	8,697	[a]
1977	5,787	7,244	32,157	[a]
1978	9,999	44,215	229,290 [b]	[a]
1979	[a]	[a]	[a]	[a]
1980	6,172 [a]	113,931 [a]	[a]	[a]
1981	[a]	[a]	[a]	69,325
1982	7,740	55,940	71,840	[a]
1983	8,890	2,340	[a]	[a]
1984	11,282	30,840	9,360	[a]
1985	13,465	16,270	53,060	46,830
1986	3,643	12,090	14,385	[a]
1987	1,647	20,798	16,790	[a]
1988	11,140	30,440	9,420	20,056
1989	7,914	14,735	20,583	[a]
1990	338	5,507	6,270	[a]
1991	[a]	[a]	2,475	[a]
1992	3,856	14,955	19,052 [c]	4,330
1993	4,670	23,128	25,675	[a]
1994	7,386	30,090	1,285	[a]
1995		2,250	10,000	[a]
1996	6,107 [a]	22,020 [a]	[a]	[a]
1997	7,990 [a]	27,100 [a]	[a]	[a]
1998		6,420	7,040	23,656
1999	202 [a]	6,054 [a]	[a]	5,192

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Year	Chinook	Sockeye	Chum	Coho
2000	1,744	6,045	10,000	10,120
2001	6,483	38,610	11,440	[a]
2002	[a]	[a]	[a]	[a]
2003	5,430	18,010	2,700	[a]
2004	28,375	78,380	[a]	[a]
2005	14,202	110,730	[a]	[a]
2006	8,433	382,800	[a]	[a]
2007	[a]	[a]	[a]	[a]
2008	3,808	38,900	[a]	[a]
2009	[a]	[a]	[a]	[a]
2010	1,228	16,950	[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 critera.

[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 goal (ADF&G 2004).

Appendix C1.–Historical escapement, Kanektok River escapement projects, 1996 through 2010.

Year	Method	Dates of Operation	Chinook	Sockeye	Chum	Pink [a]	Coho
1996	Counting Tower [b]	2–13, 20–25 July	6,827 [c]	71,637 [c]	70,617 [c]	[c]	[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	[c]	[c]	[c]	[c]	
1999	Tower/Weir [b]	Not Operational					
2000	Resistance Board Weir [d]	Not Operational					
2001	Resistance Board Weir [e]	10 August–3 October	132 [c]	739 [c]	1,056 [c]	19 [e]	35,650
2002	Resistance Board Weir [e]	1 July–20 September	5,343	58,326	42,009	87,036	24,840
2003	Resistance Board Weir [e]	24 June–18 September	8,231	127,471	40,066	2,443	72,448
2004	Resistance Board Weir [e]	29 June–20 September	19,528	102,867	46,444	98,060	87,828
2005	Resistance Board Weir [e]	8 July-8 September	14,331	242,208	53,580	3,530	26,343
2006	Resistance Board Weir [e]	Not Operational					
2007	Resistance Board Weir [e]	19 June- 11 September	14,120	307,750	133,215	3,075	30,471
2008	Resistance Board Weir [e]	17 July- 21 August	6,578	141,388	54,024	142,430	24,490
2009	Resistance Board Weir [e]	5 July- 11 August	6,841	272,483	51,652	1,246	2,336 [c]
2010	Resistance Board Weir [e]	28 June- 5 August	5,800	202,634	62,567	114,074	330 [c]

[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.