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Kanektok River Salmon Monitoring and Assessment, 2006

Annual Report for Project FIS 04-305

USFWS Office of Subsistence Management

Fisheries Information Services Division

by

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and

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June 2007

Alaska Department of Fish and Game **Division of Commercial Fisheries**

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

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

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	log_2, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

Because of extreme high water conditions during the fall of 2005, the Kanektok River weir was unable to be removed and was left in-river through the winter and into the spring of 2006. This resulted in extensive damage to the weir that prevented operations during the 2006 season. A request to modify project objectives was granted in the spring of 2006 allowing the department to redirect project funds towards rebuilding of the damaged weir. Removal of the damaged weir occurred in May, while construction of the new weir occurred from June through September. This report focuses on weir reconstruction timeline and activities, with additional documentation of harvest and salmon run assessment information collected during the 2006 season.

Salmon in the Kanektok River are harvested in subsistence, commercial, and sport fisheries conducted both in-river and in adjacent marine waters of Kuskokwim Bay (District W-4). The Alaska Department of Fish and Game has quantified subsistence harvests in the Quinhagak area of the Kuskokwim Bay since 1968. From 1996 through 2005, annual subsistence harvests have averaged 3,293 Chinook, 1,451 sockeye, 1,144 chum, and 1,486 coho salmon. Subsistence harvest estimates for 2006 were not available at the time of publication. The 2006 District W-4 commercial salmon harvest was 19,184 Chinook, 106,308 sockeye, 39,151 chum, and 26,831 coho salmon, for a total of 191,474 fish. From 1996 through 2005, annual sport harvests have averaged 834 Chinook, 360 sockeye, 179 chum, and 1,193 coho salmon. Sport harvest estimates for 2006 were not available at the time of publication. Samples were collected from the District W-4 commercial catch and used to estimate the age, sex, and length composition of the 2006 Chinook, sockeye, chum, and coho salmon commercial harvest. Aerial surveys were flown on the Kanektok River drainage in 2006 resulting in counts of 8,433 Chinook and 382,800 sockeye salmon.

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

INTRODUCTION

STUDY AREA

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

SALMON FISHERIES

Subsistence fishing for salmon occurs throughout the Kanektok River drainage, in nearby streams of the Quinhagak area, and in the open waters of Kuskokwim Bay. Salmon caught for subsistence use make an important contribution to the annual subsistence harvests of residents from Quinhagak, Goodnews Bay, Eek, and Platinum (Ward et al. 2003). The Alaska Department of Fish and Game (ADF&G) has quantified subsistence harvests in the Quinhagak area since 1968. Chinook salmon *Oncorhynchus tshawytscha* are the most utilized subsistence salmon species in the Quinhagak area followed by coho *O. kisutch*, sockeye *O. nerka*, and chum *O. keta* salmon (Appendix A1). Over the last 10 years, annual subsistence harvests have averaged 3,293 Chinook salmon, 1,486 coho salmon, 1,451 sockeye salmon, and 1,144 chum salmon. Commercial salmon fishing has occurred in the Quinhagak area since before statehood. In 1960, commercial fishing District W-4 was established by ADF&G offshore of Quinhagak in Kuskokwim Bay (Figure 2). In 2004, the Alaska Board of Fisheries moved the northern boundary 3 miles up the coast from the southern edge of Oyak Creek to the southern edge of Weelung Creek. The northern boundary was expanded to address overcrowding of fishermen in the district during commercial openings. Since the inception of District W-4, its northern boundary has been shifted between Weelung Creek and Oyak Creek in response to overcrowding issues and concern over interception of fish bound for the Kuskokwim River.

The commercial fishery is directed towards Chinook, sockeye, and coho salmon. Chum salmon are harvested incidentally. Pink salmon *O. gorbuscha*, are the least valuable species commercially and are not targeted. Historical average commercial salmon harvests in District W-4 are 15,895 Chinook, 25,533 sockeye, 32,672 chum, and 35,861 coho salmon. The average harvests for these species from 1996 through 2005 are 19,085 Chinook, 46,746 sockeye, 34,887 chum, and 49,771 coho salmon (Appendix A1). District W-4 commercial fishery participation has declined since 1999. The decline is likely attributable to the poor market value of salmon since 1995, increasing fuel prices, limited number of tenders, limited capacity of the local processing plant, and other economic opportunity in the area. The fishery rebounded slightly in 2004, which has carried over to 2006. Participation in 2006 decreased compared to 2005, and was still below historical highs seen in the late 1980s and early 1990s. Chinook salmon harvest was approximately equal to the recent 10-year average, while sockeye salmon harvests were 127% (2.27 times more) higher than the recent 10-year average. Chum salmon harvest was similar to the recent 10-year average, and coho salmon harvest was well below the recent 10-year average.

Kanektok River supports a popular sport fishery. Each year, sport anglers from around the world fish the drainage from mid-June to the beginning of September, targeting salmon, rainbow trout *O. mykiss*, and Dolly Varden *Salvelinus malma*. There are currently three seasonal sport fishing guide operations located on Kanektok River and numerous guided and non-guided anglers float the Kanektok River from its headwaters to the village of Quinhagak. From 1996 through 2005, average sport fishing harvests included 834 Chinook, 360 sockeye, 179 chum, and 1,193 coho salmon (Appendix A1).

ESCAPEMENT MONITORING

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

In 2001, the weir was relocated approximately 20 mi upriver from the original site. The weir was successfully installed and operated in 2001; however, installation was delayed until 10 August because of high water. In 2002, an attempt was made to install the weir just after ice-out in early May, but high water still delayed complete installation until late June. In 2003, crews arrived on-site even earlier and successfully installed the weir during the last week in April before snowmelt and spring precipitation raised water levels to an unworkable condition. Installation and successful operation of the weir is contingent upon "early installation" in late April or just after ice-out each year.

The Kanektok River weir was successfully operated in 2005 and the majority of its objectives were achieved. Unfortunately, high water levels persisted from September through river freeze-up in 2005 and prevented complete disassembly and removal of the weir and its components. The weir crew made several attempts into November to remove the remaining weir components from the river without success. Approximately 70% of the weir remained in-river over the winter. Aerial flights in April of 2006 revealed the weir was still in place. A crew arrived via helicopter in early May to assess the weir condition and found the majority of it damaged from ice.

Monitoring escapement for salmon stocks in Kanektok River is in the beginning stages (Appendix B1). The 2005 season represented the fifth year of operation for the Kanektok weir. Five years of coho salmon counts and 4 years of Chinook, sockeye, and chum salmon counts have been collected. Previous escapement information includes partial counts from a counting tower in 1996 and 1997. The project continues as a cooperative venture between the ADF&G, USFWS Togiak National Wildlife Refuge, USFWS OSM, Bering Sea Fisherman's Association (BSFA), and NVK.

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

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

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

Kanektok River aerial survey escapement goals were initially established in 1992 and set at 5,800 for Chinook, 15,000 for sockeye, 30,500 for chum, and 25,000 for coho salmon (Buklis 1993). In 2004, evaluation of Arctic-Yukon-Kuskokwim Region escapement goals resulted in establishment of revised Sustainable Escapement Goals (SEG) for Kanektok River aerial surveys (ADF&G 2004). The revised SEG's represent ranges or thresholds and were set at 3,500–8,000 for Chinook salmon, >5,200 for chum salmon, 14,000–34,000 for sockeye salmon, and 7,700–36,000 for coho salmon. In 2007, the department discontinued the aerial survey SEG for coho salmon because of inaccurate aerial survey data discovered after an evaluation of historical aerial survey datasheets (Molyneaux and Brannian 2006).

Age, Sex, and Length Composition Estimates

Annual escapement age, sex, and length (ASL) composition estimates are used to develop stock-recruitment models, in turn providing information used in establishing more precise escapement goals and for projecting future run sizes. Available escapement ASL information for Chinook, sockeye, chum, and coho salmon is limited. Historical summaries of existing ASL information for salmon returning to Kanektok River can be found in Molyneaux et al. (2006). Historical escapement ASL samples prior to 1997 are not included in these summaries (e.g. Huttunen 1984–1986, 1988).

Chinook salmon age and sex information has been collected from the District W-4 commercial harvest since 1990, and length information has been collected since 1995 (Molyneaux et al. 2006). Since 1990, 66% of commercially harvested Chinook salmon have been male, and have been comprised mostly (39%) of age-1.4 fish. Since 1995, the average seasonal mean lengths of age-1.4 Chinook salmon have been 828 mm for males and 846 mm for females.

Sockeye salmon age and sex information has been collected from the District W-4 commercial fishery since 1990 and length information since 1995 Molyneaux et al. 2006). Since 1990, 52% of the commercially harvested sockeye salmon have been male, and have been comprised mostly (61%) of age-1.3 fish. Since 1995, the average seasonal mean lengths of age-1.3 sockeye salmon have been 581 mm for males and 549 mm for females.

Chum salmon ASL information has been collected from the District W-4 commercial harvest since 1984 Molyneaux et al. 2006). Over this period, commercially harvested chum salmon have been 55% female, and have been comprised mostly (59%) of age-0.3 fish. The average mean seasonal lengths of age-0.3 chum salmon have been 584 mm for males and 561 mm for females.

Coho salmon age and sex information has been collected from the District W-4 commercial harvest since 1990, and length information has been collected since 1996 Molyneaux et al. 2006). Since 1990, commercially harvested coho salmon have been 54% male, and have been comprised mostly (80%) of age-2.1 fish. Since 1996, the average mean seasonal lengths of age-2.1 coho salmon have been 585 mm for males and 588 mm for females.

Objectives

2006 project objectives for the Kanektok River weir were revised to:

1. Redirect the project operations allocation for the 2006 season towards fabrication, purchasing, and shipping of components and raw materials to fabricate and/or repair all damaged weir components;
2. Redirect the personnel allocation for the 2006 season to pay for project crew time fabricating and repairing weir components, and transporting completed weir components to the weir site, and;
3. Use any remaining funds for the 2006 season to attempt weir installation and partial project operations in 2006 if water levels allow; or, if Kanektok River weir installation is not feasible in 2006 redirect project personnel to other Kuskokwim Bay area salmon assessment projects for the remainder of the 2006 season.

Though this report represents an annual report for project FIS 04-305 funded by the USFWS OSM, additional information necessary for sustainable management of fisheries harvesting Kanektok River salmon have been included. These types of data include harvests from subsistence, commercial, and sport fisheries, ASL sampling of the commercial fishery. Given the weir was not operational in 2006, this report will focus on timeline and results of weir reconstruction activities, and will report on run assessment and harvest information collected during the 2006 season.

METHODS

RESISTANCE BOARD WEIR

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

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

Boats pass at a designated boat gate located in the center of the weir and boat operators are able to pass with little or no involvement by the weir crew. The boat gate consists of boat passage panels described in Estensen and Diesigner (2004). Weight of a passing boat temporarily submerges the boat passage panels, allowing boats to pass over the weir.

AERIAL SURVEYS

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

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

Age, Sex, and Length Commercial Harvest Sampling

Commercial catch sampling for Chinook, sockeye, chum, and coho salmon ASL composition estimates was conducted based on the pulse sampling design of Bromaghin (1993). The primary goal was to characterize ASL composition of the entire commercial harvest for each species. Pulse samples were collected from a minimum of 3 commercial openings, each representing a third of the total harvest. The goal for each pulse was to collect samples from 210 Chinook, 210 sockeye, 200 chum, and 170 coho salmon.

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

Scales were removed from the preferred area of the fish (INPFC 1963). A minimum of 3 scales were taken from Chinook and coho were only one scale was removed from chum and sockeye mounted on numbered and labeled gum cards. All sampled fish were sex determined by visual inspection of internal gonads. Length was measured to the nearest millimeter from mid-eye to tail fork. After sampling was concluded, gum cards and data forms that were complete were returned to the Bethel ADF&G offices for data transfer to computer mark-sense forms and sample processing. Further details of sampling procedures can be found in Molyneaux et al (2006).

Age, Sex, and Length Composition Estimates

ADF&G staff in Bethel and Anchorage aged scales, processed the ASL data, and generated data summaries (Molyneaux et al 2006). These procedures generated two types of summary tables for each species; one described the age and sex composition and the other described length statistics. These summaries account for ASL composition changes over the season by first partitioning the season into temporal strata based on pulse sample dates, applying age and sex composition of individual pulse samples to the corresponding temporal strata, and finally summing the strata to generate the estimated age and sex composition for the season. This procedure ensured ASL composition estimates were weighted by fish abundance in the escapement or harvest rather than fish abundance in the samples. Likewise, estimated mean length composition was calculated by weighting sample mean lengths from each stratum by the harvest of salmon during that stratum.

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

RESULTS

SALMON FISHERIES

Subsistence, commercial, and sport fishing activities occurred in both District W-4 and Kanektok River in 2006. At the time of this writing, 2006 subsistence harvest estimates for Quinhagak were not final though discussions with participants in season indicated subsistence needs were met and catches were average to above average. In District W-4, 132 permit holders fished commercially for total harvests of 19,184 Chinook, 106,308 sockeye, 39,151 chum, and 26,831 coho salmon (Table 1). In 2006, no pink salmon were commercially harvested. Exvessel value by species was $147,802 for Chinook, $327,917 for sockeye, $14,030 for chum, and $61,433 for coho for a total exvessel value of $551,182. Sport fish harvest estimates for Kanektok River in 2006 have not yet been determined.

PROJECT OPERATIONS

The Kanektok River weir was not operational in 2006. A new weir was constructed in 2006 following construction procedures outlined in Stewart (2002). All project costs were used to purchase the materials, tooling, and equipment necessary to construct the weir and transport weir materials to the project site. All personnel costs were used for removal of damaged weir components, construction, repair and modification of weir components, and transportation of new weir components to the project site The following results outline weir evaluation, reconstruction, and timeline of the rebuild. Additional details can be found in Appendices D1 and E1.

Weir removal and damage assessment was completed by mid-May. In consultation with OSM, project staff developed a budget and operational plan to toward rebuilding of the weir. A Major Development Request (MDR) was submitted to the OSM Fisheries Monitoring Program in late May requesting re-direction of project funding towards rebuilding of the weir (Appendix D1). The MDR was approved and purchasing and logistics began in early June. The project crew began weir component salvage and reconstruction activities by mid-June.

Logistical difficulties resulted in transportation delays of the PVC conduit needed for panel construction into late August. The project crew focused on reconstruction and repair of weir components as availability of materials allowed; primarily weir rail, salvage and modification of existing components, and fabrication of new materials such as panel stingers, resistance boards, and hardware assemblies.

A period of low water level during early August presented a window of opportunity to install the newly rebuilt weir rail. Crew redirected efforts towards transporting and installing the weir rail which was completed by mid-August. Having received all remaining weir component materials on site in Quinhagak by early September, the project crew completed weir panel and fish passage chute assembly by mid-September. The crew finished up the season by transporting all rebuilt or repaired weir component materials to the project site by late September.

Approximately 60% of the weir panels were fabricated new, and the remaining 40% were repaired or rebuilt to usable condition. Approximately 40% of the weir rail was rebuilt new, and the remaining 60% was repaired and modified to accept improvements to the weir rail design. Two new fish passage chutes were also constructed, one of which was constructed incorporating improvements from its original design.

AERIAL SURVEYS

An aerial survey of the Kanektok River drainage was conducted on 31 July 2006. The survey was flown with a Piper PA-18 aircraft and was rated as good (1) with excellent survey conditions throughout the drainage. A total of 8,433 Chinook and 382,800 sockeye salmon were counted in the Kanektok River drainage (Table 2; Appendix C1). Chinook and sockeye salmon aerial survey results exceeded the upper end of their respective SEG ranges. Of the 8,433 Chinook salmon observed, 3,405 (40.4%) were observed downstream of the weir and 5,028 (59.6%) were observed upstream of the weir. Of the 382,800 sockeye salmon observed, 15,500 (4.1%) were observed downstream of the weir and 367,300 (95.9%) were observed upstream of the weir. No chum or coho salmon aerial surveys were conducted in 2006.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

District W-4 Commercial Harvest

Scale samples, sex, and length were collected from 824 Chinook salmon harvested in the 2006 District W-4 commercial fishery. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-4 commercial harvest. Age was determined for 658 of the 824 fish sampled (79.8%). The harvest was partitioned into 4 temporal strata based on sample dates. Applied to total harvest, age-1.4 Chinook salmon was the most abundant age class (33.4%), followed by age-1.2 (32.9%), age-1.3 (30.9%), age-1.5 (2.3%), and age-1.1 (0.2%) fish (Table 3). Sex composition was estimated to include 14,024 males (73.1%) and 5,160 females (26.9%). Mean male length by age class was 362 mm for age-1.1, 542 mm for age-1.2 fish, 677 mm for age-1.3 fish, 820 mm for age-1.4 fish, and 859 mm for age-1.5 fish (Table 4). Mean female length by age class was 664 mm for age-1.2 fish, 768 mm for age-1.3 fish, 835 mm for age-1.4 fish, and 856 mm for age-1.5 fish. There were no age-1.1 female fish in the sample. Overall, male lengths ranged from 355 to 1,040 mm and female lengths ranged from 560 to 965 mm.

Scale samples, sex, and length were collected from 1,189 sockeye salmon harvested in the 2006 District W-4 commercial fishery. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-4 commercial harvest. Age was determined for 807 of the 1,189 fish sampled (67.9%). The harvest was partitioned into 6 temporal strata based on sample dates. Applied to total harvest, age-1.3 sockeye salmon was the most abundant age class (73.2%), followed by age-1.2 (22.9%), age-1.4 (2.0%), age-0.3 (0.9%), age-2.3 (0.4%), and age-2.2 (0.2%) fish (Table 5). Sex composition was estimated to include 71,136 males (66.9%) and 35,172 females (33.1%). Mean male length by age class was 531 mm for age-0.3 fish, 506 mm for age-1.2 fish, 543 mm for age-1.3 fish, 533 mm for age-2.2 fish, 575 mm for age-1.4 fish, and 511 mm for age-2.3 fish (Table 6). Mean female length by age class was 512 mm for age-0.3 fish, 501 mm for age-1.2 fish, 523 mm for age-1.3 fish, 540 mm for age-1.4 fish, and 541 mm for age-2.3 fish. Overall, male lengths ranged from 301 to 630 mm and female lengths ranged from 323 to 607 mm.

Scale samples, sex, and length were collected from 1,566 chum salmon harvested in the 2006 District W-4 commercial fishery. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-4 commercial harvest. Age was determined for 1,320 of the 1,566 fish sampled (84.3%). The harvest was partitioned into 8 temporal strata based on sample dates. Applied to total harvest, age-0.4 chum salmon was the most abundant age class (51.4%), followed by age-0.3 (43.7%), age-0.2 (4.6%), and age-0.5 (0.4%) fish (Table 7). Sex composition was estimated to include 19,384 males (49.5%) and 19,767 females (50.5%). Mean male length by age class was 529 mm for age-0.2 fish, 563 mm for age-0.3 fish, 580 mm for age-0.4 fish, and 602 mm for age-0.5 fish (Table 8). Mean female length by age class was 518 mm for age-0.2 fish, 545 mm for age-0.3 fish, and 558 mm for age-0.4 fish. Overall, male lengths ranged from 465 to 665 mm and female lengths ranged from 475 to 650 mm.

Scale samples, sex, and length were collected from 689 coho salmon harvested in the 2006 District W-4 commercial fishery. The samples achieved the minimum sample objectives and were adequate for estimating ASL composition of District W-4 commercial harvest. Age was determined for 377 of the 689 fish sampled (54.7%). The harvest was partitioned into 4 temporal strata based on sample dates. Applied to total harvest, age-2.1 coho salmon was the most abundant age class (84.8%), followed by age-1.1 (13.3%), and age-3.1 (1.9%) fish (Table 9). Sex composition was estimated at 13,726 males (51.2%) and 13,105 females (48.8%). Mean male length by age class was 515 mm for age-1.1 fish, 536 mm for age-2.1 fish, and 563 mm for age-3.1 fish (Table 10). Mean female length by age class was 533 mm for age-1.1 fish, 545 mm for age-2.1 fish, and 529 mm for age-3.1 fish. Overall, male lengths ranged from 401 to 644 mm and female lengths ranged from 447 to 610 mm.

DISCUSSION

PROJECT OPERATIONS

Although many delays in ordering and delivery of weir materials were encountered, the weir was successfully rebuilt and on-site by the end of September. Additionally, a new weir rail was fabricated and installed on-site by mid August which will allow for timely early season weir instillation and project operations in 2007. The project crew is to be commended for successfully completing the weir rebuild in the face of several scheduling delays and incomplete materials availability.

Additional modifications were incorporated into the weir rail design to aid in maintenance, installation, and longevity of the weir. Given the need for early season installation of the Kanektok River weir, the weir rail remains in-river over the winter to speed early season installation of the weir panels. This has resulted in some minor damage to weir rail components on an annual basis that require repair or replacement before the weir panels can be installed. The primary damage incurred has been to the rail cable guide eyes which are permanently welded to the rail and align the cable with the rail assembly. Ice that forms over the rail during the winter can sometimes come into contact with the guide eyes and bend them or break them off of the rail. If too many guide eyes are broken off of an individual rail section, the rail cable will not align with the rail properly and the entire rail section has to be replaced. This can cause delays in panel installation at a time of year when a small window of time is available to successfully complete early season weir installation. Additionally, compounded damage to the guide eyes over time will result in escalating costs for replacement of weir rail sections.

In an effort to alleviate this issue, a removable rail cable guide eye design was developed. The removable guide eyes will serve the same function as the original design. Because they are not permanently welded to the rail sections, they can be easily removed at the end of the season to prevent ice damage over the winter. If high water levels preclude removal of the guide eyes, they can be easily and more cost effectively replaced during early season weir installation.

Additional improvements incorporated into the Kanektok River weir rebuild included replacement of all older 4-foot wide hanging yoke panels described in Tobin (1994) with the newer 3-foot wide fixed yoke design described in Stewart (2002). The newer 3-foot design is much preferred for ease of installation and repair compared to the older 4-foot design. Additionally, both fish passage chutes were rebuilt incorporating a more streamlined and stronger design compared to the existing chutes that were damaged beyond repair.

Although the damage sustained by the Kanektok River weir was an unfortunate event that would have been better left unrealized, rebuilding of the Kanektok River weir has allowed for replacement of components that were close to the end of their useful life. This should allow the weir to operate for several more years unfettered by worn-out components or damage compounded by years of use and repair. Additionally, the weir rebuild resulted in improvements and advances in weir design that will allow for more consistent and efficient installation and operations, with the added bonus of cost savings towards future maintenance and repair of the weir rail.

ESCAPEMENT MONITORING AND ESTIMATES

Because the weir was not operational in 2006, the only escapement information gathered for Kanektok River Chinook and sockeye salmon comes from aerial surveys. The Chinook salmon aerial survey count of 8,433 fish was the ninth highest aerial survey count on record and exceeded the upper end of the SEG range by 5.4% (Appendix C1). The sockeye salmon aerial survey count of 382,800 fish was the highest aerial survey count on record and was over ten times higher than the upper end of the SEG range. These aerial surveys indicate Chinook and sockeye salmon run strength in 2006 was adequate to support subsistence, commercial, and sport harvests. Additionally, 2006 aerial surveys in concert with paired aerial survey and weir based escapement estimates in recent years allows for some speculation on total run of Chinook and sockeye salmon to the Kanektok River drainage in 2006.

A speculative estimate of Chinook salmon drainage escapement can be derived based on aerial survey data from 2006 and historical aerial and escapement estimate data. This was calculated using the proportional relationship between observed weir counts to aerial survey estimates upstream of the weir from 2003 through 2005. Chinook salmon total drainage escapement for 2006 was estimated to be 18,748 fish, of which 7,570 (40.4%) were estimated to have spawned downstream of the weir (Table 2). Keeping in mind this estimate is speculative, exploitation of Kanektok River Chinook salmon in 2006 would have been approximately 55.1% based on District W-4 commercial harvest, and estimates of subsistence and sport fishing harvest. Subsistence and sport fish harvest estimates were not available at the time of publication so the most recent 5-year average (2001 through 2005) of Quinhagak subsistence and Kanektok River sport fish harvest was used in determining total run and exploitation.

Using a similar run reconstruction method used for Chinook salmon, a speculative estimate of sockeye salmon total drainage escapement was 978,559 fish, of which 39,623 (4.1%) were estimated to have spawned downstream of the weir. Based on this speculative total escapement estimate, exploitation of Kanektok River sockeye salmon in 2006 would have been approximately 9.9% based on District W-4 commercial harvest, and estimates of subsistence and sport fishing harvest. Subsistence and sport fish harvest estimates were not available at the time of publication so the most recent 5-year average (2001 through 2005) of Quinhagak subsistence and Kanektok River sport fish harvest was used to determine total run and exploitation. Although the total escapement reconstruction is speculative, it indicated a total run of 1,086,366 sockeye salmon returned to the Kanektok River in 2006. This would be by far the largest run on record for Kanektok River sockeye salmon.

Additional supporting evidence for such a large run of sockeye salmon in 2006 comes from the District W-4 commercial harvest. A total of 106,308 sockeye salmon were harvested from District W-4 in 2006 (Table 1). This was a record commercial harvest that exceeds the previous record of 83,681 sockeye salmon in 1990 by 22,627 fish (Appendix A1). When taking into account the lower overall number of permit holders participating in recent years compared to historical high commercial participation from the late 1980's through the early 1990's, a very large run of sockeye salmon in 2006 was needed to achieve a record harvest.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

In 2006, ADF&G continued its partnership with CVRF to collect District W-4 and W-5 (Goodnews Bay) commercial ASL samples. ADF&G staff trained and maintained oversight of Quinhagak-based CVRF staff and student interns that collected ASL and genetics samples from Chinook, sockeye, chum and coho salmon harvested in the District W-4 and W-5 commercial fisheries. All sample goals were achieved for District W-4 commercial harvest; however, collecting an adequate number of samples from District W-5 commercial harvest remained problematic. Overall, this sampling program in partnership with CVRF was very successful in the 2006 season for collecting District W-4 commercial samples with all sample goals achieved or exceeded. CVRF staff and student intern performance exceeded expectations. The ability of a local sampling crew to achieve annual ASL sample objectives outweighs the ability of ADF&G staff alone to successfully achieve sample goals as had been done in the past. CVRF crew samples were well collected and organized which helped to streamline ASL sample processing and data analysis. This program will be further refined in the coming season to address remaining difficulties in achieving District W-5 commercial ASL sample goals.

Since the weir was not operated in 2006, the following discussion focuses on describing ASL trends seen within the District W-4 commercial harvest in 2006. Probably the greatest value in collecting ASL information is for future development of spawner-recruit models used for establishing escapement goals (e.g., Clark and Sandone 2001). The information can also be used for forecasting future runs, and to illustrate long-term trends in ASL composition (e.g., Bigler et al. 1996).

Chinook Salmon

Age 1.4 was the dominant age class for District W-4 commercial ASL estimates (Table 3; Figure 3). The majority percentage of age-1.4 fish is consistent with 2005 ASL estimates when age-1.3 fish were dominant in both escapement and commercial samples. Additionally, there was a similar, if slightly lower, percentage of age-1.2 fish in the District W-4 commercial samples. These trends are encouraging for future returns as such high percentages of age-1.2 and -1.4 fish in combination with above average abundance indicates a good return of age-1.3 and -1.5 fish in 2007. However, it should be noted that the high percentage of age-1.2 fish may be an artifact of the 6-inch mesh size restriction in the District W-4 commercial fishery. Males were dominant in the commercial estimates at 73% compared to 27% females. The high male percentage was likely a function of the combined high percentage of age-1.2 and -1.3 fish, which were predominantly male with 0.6% age-1.2 females and 5.8% age-1.3 females. Males and females exhibited mean length partitioning by age class for al age classes (Figures 4 and 5).

Sockeye Salmon

Age 1.3 was the dominant age class for commercial ASL estimates (Table 5; Figure 3). This is consistent with commercial ASL estimates each year since 2003. In 2005, there was a discrepancy between the dominant age class in escapement (age-1.2) and the dominant age class in the commercial harvest (age-1.3). It is unknown whether this discrepancy carried over to 2006 given the lack of escapement ASL samples. It should be possible to derive further information on sockeye salmon ASL structure and trends given successful operation of the Kanektok River weir in 2007 and resulting ASL composition of escapement estimates. Male to female ratios of the commercial harvest was 67% males and 33% females. It is of note that similar male to female percentages were observed in the 2005 escapement ASL composition, while male to female ratios in the 2005 commercial ASL samples was at an approximate 50 – 50 split. Given the lack of escapement ASL estimates in 2006, it is again unclear what the higher male percentage in the 2006 commercial harvest represents. Males and females did not exhibit length partitioning by age class in the commercial ASL estimates (Figures 4 and 5). This is consistent with trends in District W-4 sockeye salmon lengths from previous years.

Chum Salmon

Age-0.4 was the dominant age class for commercial ASL estimates in 2006 (Table 7; Figure 3). This is consistent with age-0.3 dominance in 2005 commercial and escapement ASL composition. Male-to-female percentages were approximately a one to one ratio, with males at 49.5% and females at 50.5%. This is consistent with previous year District W-4 chum salmon ASL composition and among chum salmon populations elsewhere in the Kuskokwim area where chum salmon typically exhibit a 50-50 split between males and females (Folletti *Unpublished)*. It is also notable that male percentages declined as the chum salmon harvest progressed while female percentages increased (Table 7). This is also consistent with prior years in District W-4 chum salmon harvest and among other Kuskokwim Area chum salmon populations where male chum salmon abundance decreases while female chum salmon abundance increases as runs progress. Males and females exhibited minor mean length partitioning by age class in the commercial ASL estimates, although females spanned fewer age classes compared to males (Figures 4 and 5).

Coho Salmon

Age-2.1 was the dominant age class for commercial ASL estimates which is consistent with Kuskokwim Area coho salmon populations (Table 9; Figure 3; Folletti *Unpublished*). The commercial ASL estimate indicated an approximate one to one ratio between males and females with males at 51% and females at 49%. This is again consistent with Kuskokwim Area coho salmon populations. Males exhibited minor mean length partitioning by age class which is not common for coho salmon populations as they typically have similar lengths across all age classes (Figure 4). Mean male female lengths by age class were similar and did not exhibit length partitioning. It is unknown why males exhibited length partitioning while females did not; however, District W-4 commercial harvest and harvest from other districts in the Kuskokwim Area indicated below average to record low average commercial weights in 2006 (Figure 6). This may have had an enhanced effect on younger male coho salmon in 2006, although no conclusions can be drawn at this time.

CONCLUSIONS

In 2006, funds were successfully redirected to aid in removing and replacing damaged weir parts at the Kanektok River weir. Construction of resistance board weir components to replace those left in the water and damaged during the spring of 2006 was successful. All new panels and other replacement parts were delivered to the weir site in the fall of 2006, ready for spring installation in 2007.

RECOMMENDATIONS

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

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

Continue the cooperative effort between NVK, USFWS, and ADF&G, with ADF&G maintaining its proactive role in the mentoring of NVK technicians, the development of the project, and the oversight of seasonal operation and reporting results. Regular consultations between ADF&G, NVK, and USFWS occurred throughout the field season, coordinating logistics, discussing results, and exchanging ideas. NVK provided 3 technicians for the 2006 season. The project can be used in future years as a platform for the study of other anadromous and resident freshwater species in Kanektok River.

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

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TABLES AND FIGURES

Table 1.–District W-4 commercial harvest by period and exvessel value, 2006.

	Date	Permits	Chinook		Sockeye		Chum		Coho	
Period	Caught	Fished	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds
1	06/15	69	2,940	40,836	188	1,300	2,192	16,403	0	0
2	06/20	87	4,246	53,928	993	6,489	5,091	36,598	0	0
3	06/22	87	3,947	53,016	2,038	13,706	4,261	31,445	0	0
4	06/27	59	1,381	19,148	4,838	33,085	3,039	22,282	0	0
5	06/30	80	1,796	25,935	17,074	111,665	4,507	31,346	0	0
6	07/03	77	1,162	18,334	10,445	67,927	2,063	14,608	0	0
7	07/05	80	791	12,676	10,202	65,309	1,681	11,831	0	0
8	07/07	90	855	14,417	14,061	90,299	1,514	10,690	23	174
9	07/10	99	722	11,670	12,537	78,373	2,348	16,587	26	178
10	07/17	73	286	4,629	8,012	47,327	1,983	13,374	48	363
11	07/19	80	327	5,664	8,043	47,750	2,089	14,186	29	236
12	07/21	67	236	4,224	7,508	44,053	2,041	13,017	47	335
13	07/24	63	175	2,794	3,886	22,369	2,438	15,792	146	1,016
14	07/26	37	82	1,400	1,979	11,287	1,243	7,951	323	2,012
15	07/31	36	59	983	1,189	6,798	940	5,775	965	6,001
16	08/02	30	29	440	737	4,040	435	2,673	452	2,814
17	08/04	27	21	406	684	3,711	296	1,834	522	3,140
18	08/07	34	19	335	447	2,521	283	1,773	1,631	10,577
19	08/09	30	23	315	168	1,029	114	711	1,968	12,788
20	08/11	43	25	438	334	1,940	206	1,269	4,208	27,973
21	08/14	57	20	298	207	1,218	102	611	3,323	22,410
22	08/16	36	7	88	188	1,002	48	304	1,628	10,899
23	08/18	32	8	139	136	820	60	391	2,881	19,715
24	08/21	36	9	130	98	585	64	405	1,804	12,159
25	08/23	34	7	84	75	414	36	225	1,646	11,220
26	08/25	30	2	30	96	542	32	187	2,027	13,971
27	08/28	30	3	39	55	333	25	150	1,342	9,155
28	08/30	19	1	6	38	226	11	68	823	5,680
29	09/01	16	5	47	52	294	9	54	969	6,581
Total		132	19,184	272,449	106,308	666,412	39,151	272,540	26,831	179,397
Average Weight				14.20		6.27		6.96		6.69
Average Price				0.54		0.49		0.05		0.34
Exvessel Value				$147,802		$327,917		$14,030		$61,433

Total Number of Fish	191,474
Total Pounds	1,390,798
Total Exvessel Value	$551,182

Table 2.–Escapement summary for the Kanektok River drainage, 2006.

Escapement estimate upstream of the weir

	Chinook	Sockeye	Chum	Coho
Escapement Estimate	11,178	938,936	[a]	[a]
Aerial Survey Count	5,028	367,300	[a]	[a]
Percentage Upstream of Weir	59.6	96.0	[a]	[a]

Escapement estimate downstream of the weir

	Chinook	Sockeye	Chum	Coho
Escapement Estimate	7,570	39,623	[a]	[a]
Aerial Survey Count	3,405	15,500	[a]	[a]
Percentage Downstream of Weir	40.4	4.0	[a]	[a]

Total drainage escapement estimate

	Chinook	Sockeye	Chum	Coho
Drainage Escapement	18,748	978,559	[a]	[a]
Drainage Aerial Survey	8,433	382,800	[a]	[a]
Aerial Survey (SEG)	3,500–8,000	14,000–34,000	>5,200	7,700–36,000

Total Run and Exploitation

	Chinook	Sockeye	Chum	Coho
District W-4 Commercial Harvest	19,184	106,308	39,151	26,831
Subsistence Harvest	3,221 [b]	1,393 [b]	[b]	[b]
Sport Fishing Harvest	571 [b]	106 [b]	[b]	[b]
Total Run Estimate [c]	41,724	1,086,366	[a]	[a]
Harvest Exploitation (%) [d]	55.1	9.9	[a]	[a]

[a] No estimate made in 2006.

[b] Unavailable at time of publication.

[c] Total Run estimate based on drainage escapement estimate, District W-4 commercial harvest, and 10-year averages (1996–2005) of Quinhagak subsistence and Kanektok River sport harvest.

[d] Exploitation rate based on District W-4 commercial harvest and 10-year averages (1996–2005) of Quinhagak subsistence and Kanektok River sport harvest.

Table 3.–Age and sex composition of Chinook salmon from the District W-4 commercial fishery, 2006.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Catch	1.1 %	1.2 Catch	1.2 %	1.3 Catch	1.3 %	1.4 Catch	1.4 %	1.5 Catch	1.5 %	Total Catch	Total %
6/15	210	192	M	31	1.0	750	25.5	1,072	36.5	413	14.1	46	1.6	2,312	78.6
(6/15)			F	0	0.0	0	0.0	92	3.1	521	17.7	15	0.5	628	21.4
			Subtotal	31	1.0	750	25.5	1,164	39.6	934	31.8	61	2.1	2,940	100.0
6/22	194	164	M	0	0.0	3,097	37.8	2,198	26.8	1,049	12.8	100	1.2	6,494	79.3
(6/20-22)			F	0	0.0	0	0.0	450	5.5	1,099	13.4	150	1.8	1,699	20.7
			Subtotal	0	0.0	3,097	37.8	2,648	32.3	2,148	26.2	250	3.0	8,193	100.0
6/30	210	147	M	0	0.0	929	29.3	627	19.8	454	14.3	0	0.0	2,010	63.3
(6/27-30)			F	0	0.0	65	2.0	194	6.1	864	27.2	43	1.4	1,167	36.7
			Subtotal	0	0.0	994	31.3	821	25.9	1,318	41.5	43	1.4	3,177	100.0
7/5	210	155	M	0	0.0	1,415	29.0	912	18.7	817	16.8	63	1.3	3,207	65.8
(7/3,5,7,10,17,19,21,24,			F	0	0.0	63	1.3	377	7.8	1,195	24.5	31	0.6	1,667	34.2
26,31,8/2,4,7,9,11,14,16,			Subtotal	0	0.0	1,478	30.3	1,289	26.5	2,012	41.3	94	1.9	4,874	100.0
18,21,23,25,28,30,9/1)															
Season	824	658	M	31	0.2	6,192	32.3	4,809	25.1	2,734	14.2	209	1.1	14,024	73.1
			F	0	0.0	128	0.6	1,113	5.8	3,679	19.2	240	1.2	5,160	26.9
			Subtotal	31	0.2	6,320	32.9	5,922	30.9	6,413	33.4	449	2.3	19,184	100.0
Grand		15,489	M	4,665	0.7	145,031	21.9	147,519.9	22.3	122,542	18.5	10,818	1.6	431,969	65.3
Total [a]			F	524	0.1	19,234	2.9	38,332.9	5.8	153,205	23.2	17,493	2.6	229,413	34.7
			Total	5,189	0.8	164,265	24.8	185,852.8	28.1	275,747	41.7	28,311	4.3	661,382	100.0

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

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991-1995 and 1997–2006.

Table 4.–Mean length (mm) of Chinook salmon from the District W-4 commercial fishery, 2006.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	1.5
6/14 (6/14,16)	M	Mean Length	362	545	686	871	882
		Std. Error	7	4	10	16	60
		Range	355- 368	465- 605	504- 840	683-1000	790- 995
		Sample Size	2	49	70	27	3
	F	Mean Length			782	861	910
		Std. Error			18	8	-
		Range			738- 857	770- 943	910- 910
		Sample Size	0	0	6	34	1
6/21 (6/21,23)	M	Mean Length		537	650	808	865
		Std. Error		5	9	21	28
		Range		448- 646	517- 840	641- 992	837- 892
		Sample Size	0	62	44	21	2
	F	Mean Length			768	820	866
		Std. Error			18	13	20
		Range			696- 835	679- 965	827- 890
		Sample Size	0	0	9	22	3
6/28 (6/28,30)	M	Mean Length		543	688	821	
		Std. Error		9	13	23	
		Range		433- 755	552- 805	633-1040	
		Sample Size	0	43	29	21	0
	F	Mean Length		693	787	838	825
		Std. Error		67	10	7	40
		Range		560- 776	746- 836	752- 939	785- 865
		Sample Size	0	3	9	40	2
7/5 (7/5,7)	M	Mean Length		552	722	807	833
		Std. Error		7	11	16	35
		Range		453- 671	611- 823	642- 970	798- 868
		Sample Size	0	45	29	26	2
	F	Mean Length		634	756	835	824
		Std. Error		26	10	9	-
		Range		608- 659	705- 816	697- 950	824- 824
		Sample Size	0	2	12	38	1

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Table 4.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	1.5
Season	M	Mean Length	362	542	677	820	859
		Range	355- 368	433- 755	504- 840	633-1040	790- 995
		Sample Size	2	199	172	95	7
	F	Mean Length		664	768	835	856
		Range		560- 776	696- 857	679- 965	785- 910
		Sample Size	0	5	36	134	7
Grand Total [a]	M	Mean Length	396	544	698	843	912
		Range	314- 560	315-1018	454-971	375-1405	525-1082
		Sample Size	126	3087	3361	2498	192
	F	Mean Length	561	622	767	860	904
		Range	365- 832	445-970	531- 963	599- 1102	591-1066
		Sample Size	6	366	857	3152	324

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991–1995 and 1997–2006.

Table 5.–Age and sex composition of sockeye salmon from the District W-4 commercial fishery, 2006.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.3 Catch	%	1.2 Catch	%	1.3 Catch	%	2.2 Catch	%	1.4 Catch	%	2.3 Catch	%	Total Catch	%
6/20	139		M	40	1.2	159	4.9	1,908	59.2	0	0.0	80	2.5	0	0.0	2,265	70.4
(6/15,20,22)			F	0	0.0	0	0.0	874	27.2	0	0.0	79	2.4	0	0.0	954	29.6
			Subtotal	40	1.2	159	4.9	2,782	86.4	0	0.0	159	4.9	0	0.0	3,219	100.0
6/27	210		M	0	0.0	609	2.8	15,014	68.5	0	0.0	0	0.0	0	0.0	15,622	71.3
(6/27,30)			F	0	0.0	608	2.8	5,478	25.0	0	0.0	203	0.9	0	0.0	6,290	28.7
			Subtotal	0	0.0	1,217	5.6	20,492	93.5	0	0.0	203	0.9	0	0.0	21,912	100.0
7/3	210		M	225	0.6	3,606	10.4	17,128	49.4	0	0.0	676	1.9	0	0.0	21,636	62.3
(7/3,5,7)			F	0	0.0	1,803	5.2	10,593	30.5	0	0.0	451	1.3	225	0.6	13,072	37.7
			Subtotal	225	0.6	5,409	15.6	27,721	79.9	0	0.0	1,127	3.2	225	0.6	34,708	100.0
7/17	210		M	321	1.6	6,261	30.5	7,385	35.9	0	0.0	321	1.5	0	0.0	14,288	69.5
(7/10,17)			F	0	0.0	1,605	7.8	4,334	21.1	0	0.0	161	0.8	161	0.8	6,261	30.5
			Subtotal	321	1.6	7,866	38.3	11,719	57.0	0	0.0	482	2.3	161	0.8	20,549	100.0
7/19	210		M	92	0.6	4,141	26.6	5,429	34.9	92	0.6	184	1.2	92	0.6	10,122	65.1
(7/19,21)			F	0	0.0	1,748	11.3	3,589	23.1	0	0.0	0	0.0	0	0.0	5,429	34.9
			Subtotal	92	1	5,889	38	9,018	58	92	1	184	1	92	1	15,551	100.0
7/24	210		M	186	1.8	2,981	28.7	3,912	37.7	124	1.2	0	0.0	0	0.0	7,202	69.5
(7/24,26,31,8/2,4,			F	124	1.2	869	8.4	2,173	21.0	0	0.0	0	0.0	0	0.0	3,167	30.5
7,9,11,14,16,18,21,			Total	310	3.0	3,850	37.1	6,085	58.7	124	1.2	0	0.0	0	0.0	10,369	100.0
23,25,28,30,9/1)																	
Season	1,189	807	M	865	0.8	17,756	16.7	50,776	47.8	216	0.2	1,261	1.2	92	0.1	71,136	66.9
			F	124	0.1	6,634	6.2	27,041	25.4	0	0.0	893	0.8	386	0.3	35,172	33.1
			Total	989	0.9	24,390	22.9	77,817	73.2	216	0.2	2,154	2.0	478	0.4	106,308	100.0
Grand		7,899	M	17,649	2.0	128,921	14.9	287,352	33.2	6,458	0.7	11,550	1.3	8,144	0.9	464,895	53.7
Total [a]			F	17,394	2.0	101,900	11.8	256,438	29.6	5,057	0.6	8,970	1.0	8,522	1.0	401,042	46.6
			Total	35,043	4.0	230,821	26.7	543,786	62.8	11,512	1.3	20,519	2.4	16,667	1.9	865,968	100.3

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991–1995 and 1997–2006.

Table 6.–Mean length (mm) of sockeye salmon from the District W-4 commercial fishery, 2006.

Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	1.3	2.2	1.4	2.3
6/20	M	Mean Length	568	456	550		592	
(6/15,20,22)		Std. Error	-	52	6		5	
		Range	568- 568	321- 567	330- 630		587- 596	
		Sample Size	1	4	48	0	2	0
	F	Mean Length			523		544	
		Std. Error			4		8	
		Range			495- 567		536- 552	
		Sample Size	0	0	22	0	2	0
6/27	M	Mean Length		559	545			
(6/27,30)		Std. Error		13	3			
		Range		539- 582	485- 591			
		Sample Size	0	3	74	0	0	0
	F	Mean Length		522	513		526	
		Std. Error		4	8		-	
		Range		517- 529	334- 548		526- 526	
		Sample Size	0	3	27	0	1	0
7/3	M	Mean Length	511	512	550		601	
(7/3,5,7)		Std. Error	-	5	3		12	
		Range	511- 511	470- 559	490- 605		585- 624	
		Sample Size	1	16	76	0	3	0
	F	Mean Length		491	527		532	540
		Std. Error		7	5		11	-
		Range		471- 530	416- 607		521- 543	540- 540
		Sample Size	0	8	47	0	2	1
7/17	M	Mean Length	537	498	543		519	
(7/10,17)		Std. Error	26	5	4		35	
		Range	511- 563	402- 554	466- 604		484- 554	
		Sample Size	2	39	46	0	2	0
	F	Mean Length		490	531		577	543
		Std. Error		9	4		-	-
		Range		449- 545	500- 573		577- 577	543- 543
		Sample Size	0	10	27	0	1	1
7/19	M	Mean Length	554	517	530	552	573	511
(7/19,21)		Std. Error	-	5	6	-	14	-
		Range	554- 554	404- 566	305- 587	552- 552	558- 587	511- 511
		Sample Size	1	45	59	1	2	1
	F	Mean Length		517	519			
		Std. Error		7	8			
		Range		460- 567	323- 588			
		Sample Size	0	19	39	0	0	0

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Table 6.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	1.3	2.2	1.4	2.3
7/24 (7/24,26,31,8/2,4, 7,9,11,14,16,18,21, 23,25,28,30,9/1)	M	Mean Length	524	494	523	520		
		Std. Error	3	5	6	34		
		Range	518- 530	403- 555	401- 605	486- 553		
		Sample Size	3	48	63	2	0	0
	F	Mean Length	512	494	521			
		Std. Error	1	10	5			
		Range	510- 513	407- 541	453- 590			
		Sample Size	2	14	35	0	0	0
Season	M	Mean Length	531	506	543	533	575	511
		Range	511- 568	321- 582	305- 630	486- 553	484- 624	511- 511
		Sample Size	8	155	366	3	9	1
	F	Mean Length	512	501	523		540	541
		Range	510- 513	407- 567	323- 607		521- 577	540- 543
		Sample Size	2	54	197	0	6	2
Grand Total [a]	M	Mean Length	575	521	577	537	591	571
		Range	511- 656	321- 596	305- 700	482- 602	484- 688	497- 664
		Sample Size	64	1,061	2,529	71	108	130
	F	Mean Length	547	504	546	508	564	549
		Range	474- 623	407- 590	323- 625	463- 563	504- 631	483- 610
		Sample Size	84	925	2,296	62	106	107

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991–1995 and 1997–2006.

Table 7.–Age and sex composition of chum salmon from the District W-4 commercial fishery, 2006.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	0.2 Catch	0.2 %	0.3 Catch	0.3 %	0.4 Catch	0.4 %	0.5 Catch	0.5 %	Total Catch	Total %
6/20	210	184	M	0	0.0	1,306	17.9	2,573	35.3	40	0.5	3,919	53.8
(6/15,20)			F	0	0.0	1,148	15.8	2,216	30.5	0	0.0	3,364	46.2
			Subtotal	0	0.0	2,454	33.7	4,789	65.8	40	0.5	7,283	100.0
6/22	170	142	M	0	0.0	1,020	23.9	1,351	31.7	30	0.7	2,401	56.3
(6/22)			F	0	0.0	570	13.4	1,290	30.3	0	0.0	1,860	43.7
			Subtotal	0	0.0	1,590	37.3	2,641	62.0	30	0.7	4,261	100.0
6/27	210	163	M	93	1.2	1,852	24.5	2,407	31.9	46	0.6	4,398	58.3
(6/27,30)			F	0	0.0	1,018	13.5	2,130	28.2	0	0.0	3,148	41.7
			Subtotal	93	1.2	2,870	38.0	4,537	60.1	46	0.6	7,546	100.0
7/3	210	188	M	40	1.1	617	16.5	1,175	31.4	0	0.0	1,832	48.9
(7/3,5)			F	60	1.6	757	20.2	1,095	29.2	0	0.0	1,912	51.1
			Subtotal	100	2.7	1,374	36.7	2,270	60.6	0	0.0	3,744	100.0
7/10	210	189	M	102	2.6	1,124	29.1	817	21.2	20	0.5	2,064	53.4
(7/7,10)			F	61	1.6	1,083	28.0	654	16.9	0	0.0	1,798	46.6
			Subtotal	163	4.2	2,207	57.1	1,471	38.1	20	0.5	3,862	100.0
7/17	160	147	M	166	2.7	1,123	18.3	1,039	17.0	0	0.0	2,329	38.1
(7/17,19,21)			F	291	4.8	1,954	32.0	1,539	25.2	0	0.0	3,784	61.9
			Subtotal	457	7.5	3,077	50.3	2,578	42.2	0	0.0	6,113	100.0
7/26	186	130	M	255	6.9	1,019	27.7	283	7.7	28	0.8	1,586	43.1
(7/24,26)			F	226	6.2	1,161	31.5	708	19.2	0	0.0	2,095	56.9
			Subtotal	481	13.1	2,180	59.2	991	26.9	28	0.8	3,681	100.0
7/31	210	177	M	150	5.6	451	17.0	256	9.6	0	0.0	857	32.2
(7/31,8/2,4,7,9,11,			F	346	13.0	887	33.3	571	21.5	0	0.0	1,804	67.8
14,16,18,21,23,25,			Subtotal	496	18.6	1,338	50.3	827	31.1	0	0.0	2,661	100.0
28,30,9/1)													
Season		1,320	M	806	2.1	8,512	21.8	9,901	25.3	165	0.4	19,384	49.5
			F	985	2.5	8,579	21.9	10,204	26.1	0	0.0	19,767	50.5
			Total	1,791	4.6	17,091	43.7	20,105	51.4	165	0.4	39,151	100.0
Grand		13,137	M	6,182	0.8	199,467	25.8	139,624	18.1	4,247	0.5	349,522	45.3
Total [a]			F	7,614	1.0	250,342	32.4	159,128	20.6	5,670	0.7	422,752	54.7
			Total	13,796	1.8	449,810	58.2	298,751	38.7	9,917	1.3	772,261	100.0

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

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991–1995 and 1997–2006.

Table 8.–Mean length (mm) of chum salmon from the District W-4 commercial fishery, 2006.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
6/20 (6/15,20)	M	Mean Length		573	585	641
		Std. Error		5	4	-
		Range		525- 637	524- 662	641- 641
		Sample Size	0	33	65	1
	F	Mean Length		557	566	
		Std. Error		5	3	
		Range		510- 604	510- 615	
		Sample Size	0	29	56	0
6/22 (6/22)	M	Mean Length		573	579	610
		Std. Error		4	4	.
		Range		528- 638	508- 637	610- 610
		Sample Size	0	34	45	1
	F	Mean Length		548	563	
		Std. Error		6	4	
		Range		494- 594	527- 642	
		Sample Size	0	19	43	0
6/27 (6/27,30)	M	Mean Length	542	564	578	589
		Std. Error	4	4	4	-
		Range	538- 545	511- 652	536- 650	589- 589
		Sample Size	2	40	52	1
	F	Mean Length		546	557	
		Std. Error		5	3	
		Range		497- 590	519- 595	
		Sample Size	0	22	46	0
7/3 (7/3,5)	M	Mean Length	543	573	583	
		Std. Error	35	4	4	
		Range	508- 577	532- 622	528- 664	
		Sample Size	2	31	59	0
	F	Mean Length	534	542	562	
		Std. Error	12	4	4	
		Range	511- 552	501- 595	500- 650	
		Sample Size	3	38	55	0
7/10 (7/7,10)	M	Mean Length	530	566	589	582
		Std. Error	15	4	6	-
		Range	496- 564	465- 652	523- 661	582- 582
		Sample Size	5	55	40	1
	F	Mean Length	557	552	566	
		Std. Error	11	3	4	
		Range	535- 570	500- 610	522- 631	
		Sample Size	3	53	32	0

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Table 8.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
7/17 (7/17,19,21)	M	Mean Length	524	548	575	
		Std. Error	8	5	8	
		Range	506- 546	474- 597	518- 665	
		Sample Size	4	27	25	0
	F	Mean Length	521	539	545	
		Std. Error	9	4	4	
		Range	482- 554	482- 600	506- 592	
		Sample Size	7	47	37	0
7/26 (7/24,26)	M	Mean Length	540	558	564	576
		Std. Error	6	5	11	-
		Range	500- 564	501- 616	502- 622	576- 576
		Sample Size	9	36	10	1
	F	Mean Length	515	544	549	
		Std. Error	11	5	5	
		Range	476- 579	490- 621	510- 595	
		Sample Size	8	41	25	0
7/31 (7/31,8/2,4,7,9,11, 14,16,18,21,23,25, 28,30,9/1)	M	Mean Length	507	539	553	
		Std. Error	11	5	11	
		Range	469- 578	479- 620	500- 647	
		Sample Size	10	30	17	0
	F	Mean Length	507	531	541	
		Std. Error	5	4	4	
		Range	475- 567	478- 642	483- 620	
		Sample Size	23	59	38	0
Season	M	Mean Length	529	563	580	602
		Range	469- 578	465- 652	500- 665	576- 641
		Sample Size	32	286	313	5
	F	Mean Length	518	545	558	
		Range	475- 579	478- 642	483- 650	
		Sample Size	44	308	332	0
Grand Total [a]	M	Mean Length	534	583	605	607
		Range	454- 675	462- 710	492- 735	530- 694
		Sample Size	117	3462	2372	69
	F	Mean Length	530	561	578	586
		Range	486- 578	325- 683	492- 695	516-651
		Sample Size	149	4278	2613	73

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991-1995 and 1997–2006.

Table 9.–Age and sex of coho salmon from the District W-4 commercial fishery, 2006.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Catch	1.1 %	2.1 Catch	2.1 %	3.1 Catch	3.1 %	Total Catch	Total %
8/1	169	76	M	271	13.1	1,192	57.9	54	2.6	1,517	73.7
(8/1)			F	108	5.3	434	21.0	0	0.0	542	26.3
			Subtotal	379	18.4	1,626	78.9	54	2.6	2,059	100.0
8/3	180	108	M	540	4.6	4,963	42.6	216	1.9	5,718	49.1
(8/3)			F	755	6.5	5,179	44.4	0	0.0	5,934	50.9
			Subtotal	1,295	11.1	10,142	87.0	216	1.9	11,652	100.0
8/5	180	132	M	99	6.1	703	43.2	37	2.3	839	51.5
(8/5,8)			F	98	6.0	678	41.6	12	0.7	789	48.5
			Subtotal	197	12.1	1,381	84.8	49	3.0	1,628	100.0
8/10	160	61	M	1,131	9.9	4,521	39.3	0	0.0	5,652	49.2
(8/10,12,15,17)			F	565	4.9	5,087	44.3	188	1.6	5,840	50.8
			Subtotal	1,696	14.8	9,608	83.6	188	1.6	11,492	100.0
Season		377	M	2,039	7.6	11,379	42.4	307	1.1	13,726	51.2
			F	1,528	5.7	11,377	42.4	201	0.8	13,105	48.8
			Subtotal	3,567	13.3	22,756	84.8	508	1.9	26,831	100.0
Grand		7,376	M	33,831	4.2	351,612	43.2	16,818	2.1	435,274	53.5
Total [a]			F	28,915	3.6	300,924	37.0	15,451	1.9	377,997	46.5
			Total	62,745	7.7	652,536	80.2	32,268	4.0	813,282	100.0

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

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991–1995 and 1997–2006.

Table 10.–Mean length (mm) of coho salmon from the District W-4 commercial fishery, 2006.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	Age Class 2.1	Age Class 3.1
8/2	M	Mean Length	499	512	544
(7/7,10,17,19,21,		Std. Error	9	6	22
24,26,31,8/2)		Range	458- 553	444- 605	522- 565
		Sample Size	10	44	2
	F	Mean Length	497	541	
		Std. Error	19	6	
		Range	447- 530	505- 579	
		Sample Size	4	16	0
8/14	M	Mean Length	548	544	573
(8/14)		Std. Error	21	6	24
		Range	492- 624	448- 612	549- 596
		Sample Size	5	46	2
	F	Mean Length	549	544	
		Std. Error	11	4	
		Range	513- 599	455- 610	
		Sample Size	7	48	0
8/16	M	Mean Length	524	543	536
(8/16)		Std. Error	7	5	26
		Range	483- 553	449- 644	485- 565
		Sample Size	8	57	3
	F	Mean Length	530	547	538
		Std. Error	6	3	-
		Range	495- 551	493- 594	538- 538
		Sample Size	8	55	1
8/18	M	Mean Length	501	533	
(8/18,21,23,25,		Std. Error	23	8	
28,30,9/1)		Range	401- 552	404- 579	
		Sample Size	6	24	0
	F	Mean Length	520	546	528
		Std. Error	15	5	-
		Range	500- 549	505- 589	528- 528
		Sample Size	3	27	1

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Table 10.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
Season	M	Mean Length	515	536	563
		Range	401- 624	404- 644	485- 596
		Sample Size	29	171	7
	F	Mean Length	533	545	529
		Range	447- 599	455- 610	528- 538
		Sample Size	22	146	2
Grand Total [a]	M	Mean Length	558	580	583
		Range	472- 653	419- 704	489- 660
		Sample Size	166	1689	78
	F	Mean Length	582	584	576
		Range	441- 661	412- 676	528- 594
		Sample Size	115	1429	67

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991–1995 and 1997–2006.

Figure 1–Kanektok River, Kuskokwim Bay, Alaska.

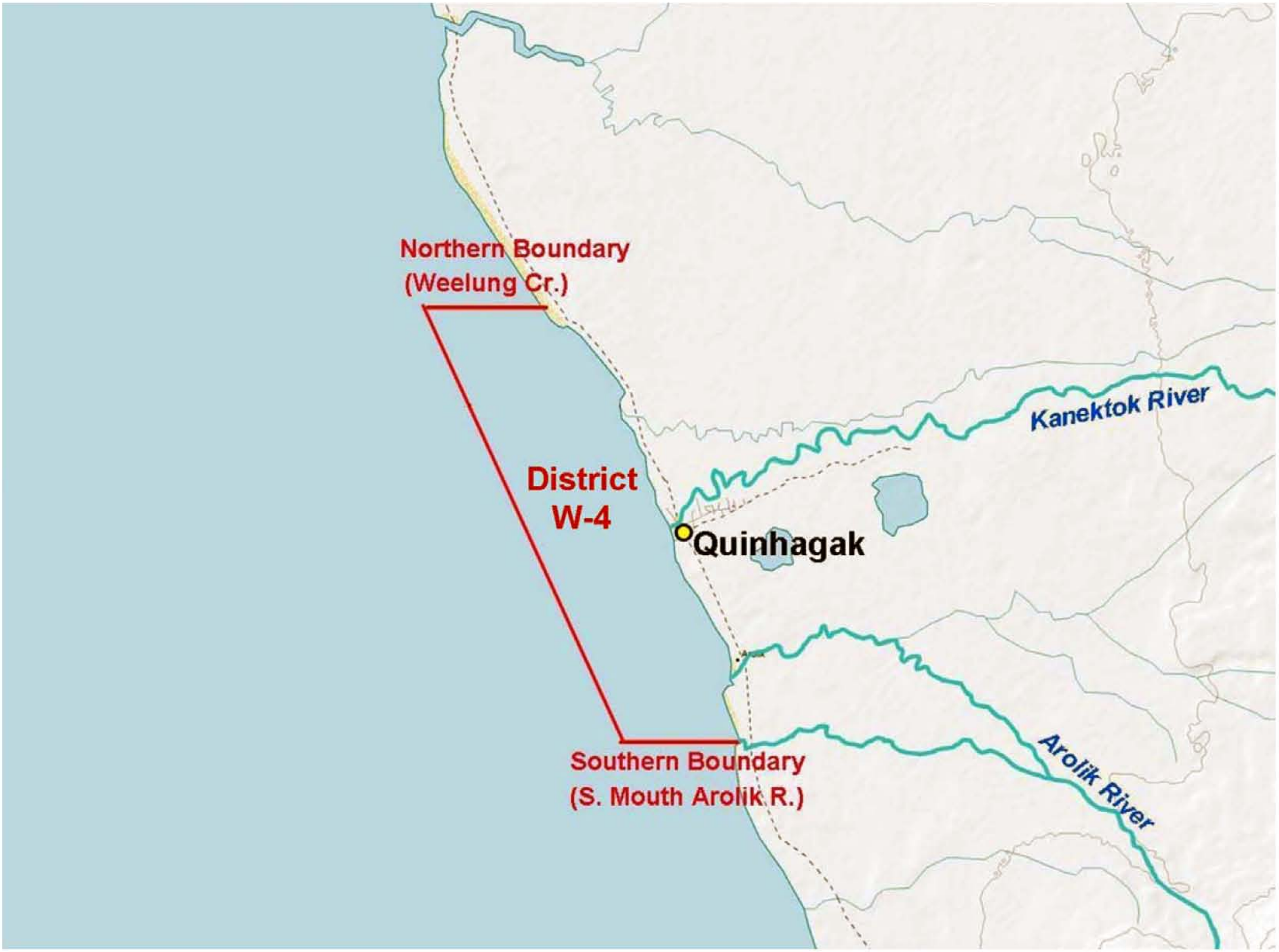

Figure 2.–Commercial Fishing District W-4, Kuskokwim Bay, Alaska, 2006.

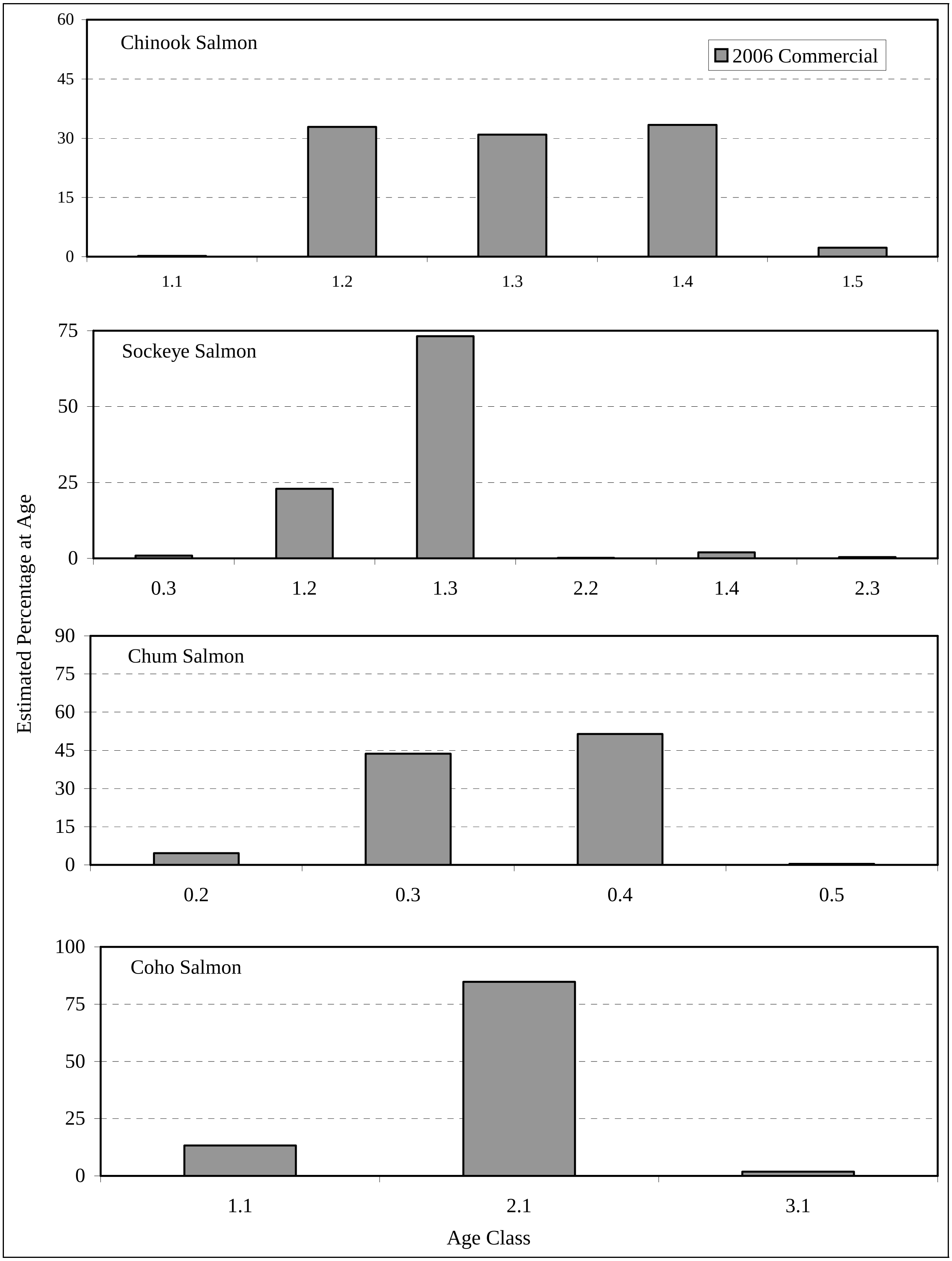

Figure 3.–Age class percentages for Chinook, sockeye, chum, and coho salmon from the District W-4 commercial fishery, 2006.

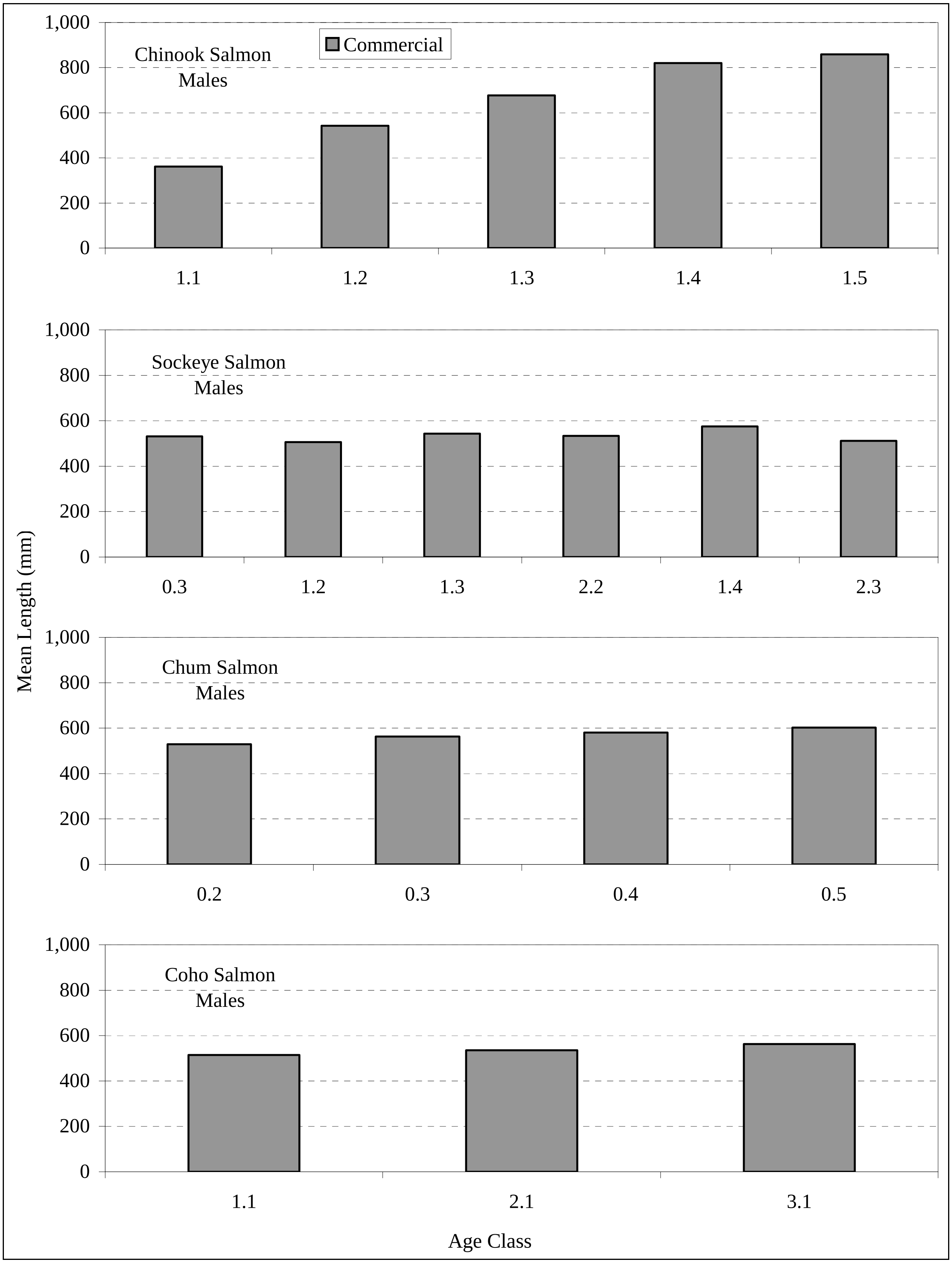

Figure 4.–Mean length by age class for male Chinook, sockeye, chum, and coho salmon from the District W-4 commercial fishery, 2006.

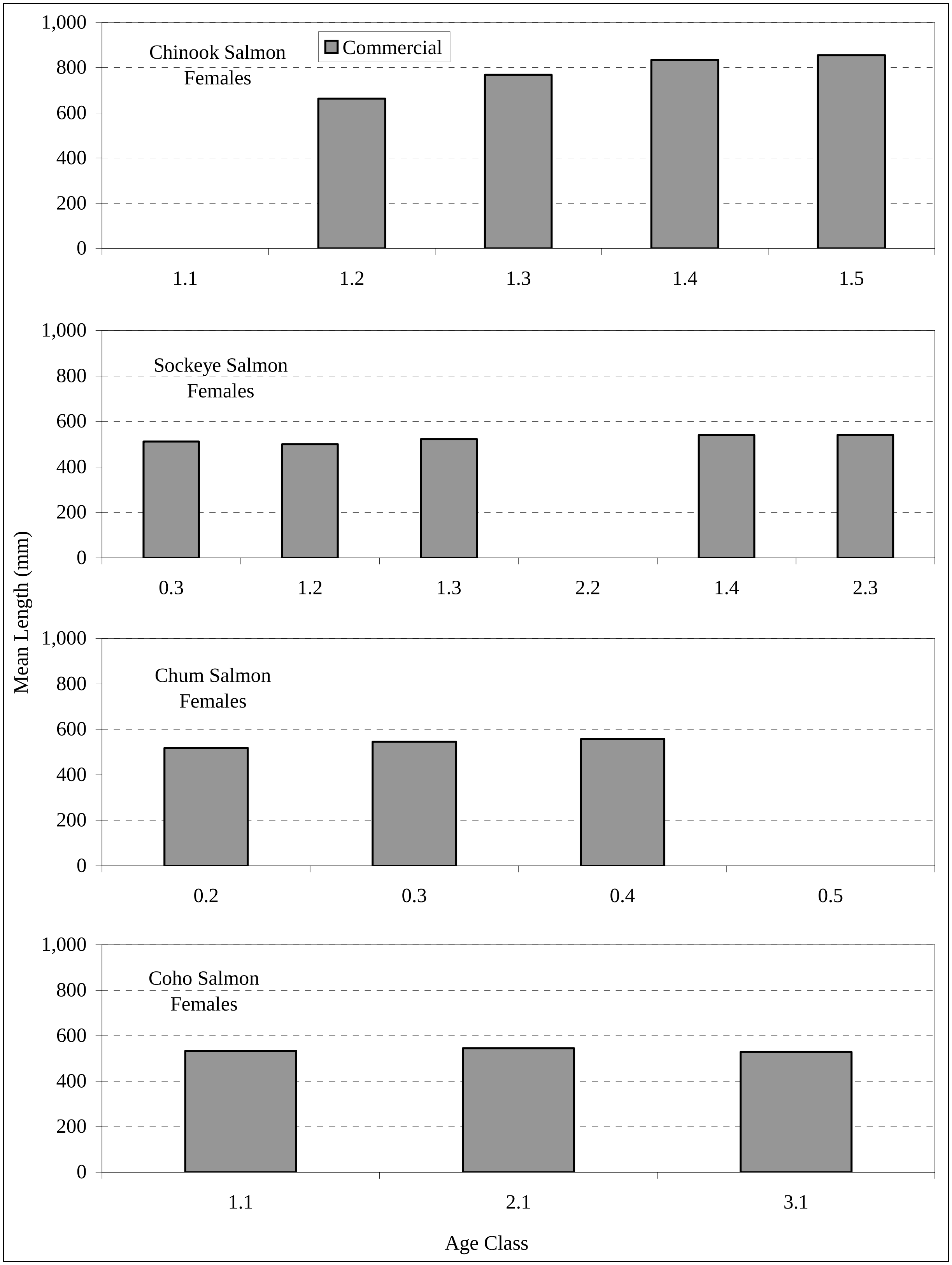

Figure 5.–Mean length by age class for female Chinook, sockeye, chum, and coho salmon from the District W-4 commercial fishery, 2006.

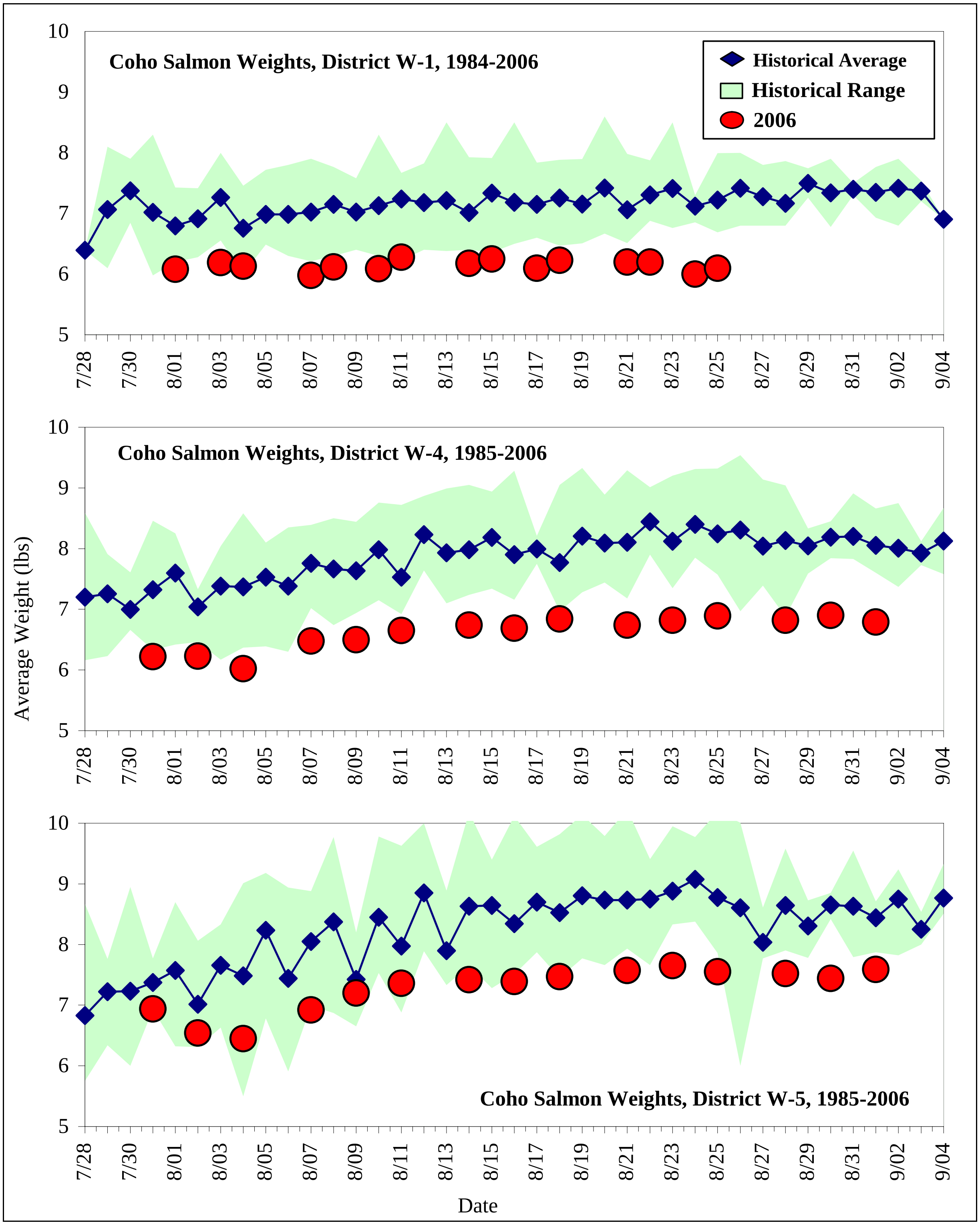

Figure 6.–Coho salmon weights from the District W-1, District W-4, and District W-5 commercial harvest; 2006, historical average, and historical range.

APPENDIX A.

Appendix A1.–Historical commercial, subsistence, and sport fishing harvests of Chinook, sockeye, coho and chum salmon, Quinhagak area, 1960–2006.

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

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Appendix A1.–Page 2 of 2.

	Chinook			Sockeye			Chum			Coho		
Year	**Commercial**	**Subsistence**	**Sport**	**Commercial**	**Subsistence**	**Sport**	**Commercial**	**Subsistence**	**Sport**	**Commercial**	**Subsistence**	**Sport**
1992	17,197	3,447	656	60,929	1,264	66	73,383	1,833	251	86,404	2,958	275
1993	15,784	3,368	1,006	80,934	1,082	331	40,943	1,008	183	55,817	2,152	734
1994	8,564	3,995	751	72,314	1,000	313	61,301	1,452	156	83,912	2,739	675
1995	38,584	2,746	739	68,194	573	148	81,462	686	213	66,203	2,561	970
1996	14,165	3,075	689	57,665	1,467	335	83,005	930	200	118,718	1,467	875
1997	35,510	3,433	1,632	69,562	1,264	607	38,445	600	212	32,862	1,264	1,220
1998	23,158	4,041	1,475	41,382	1,702	942	45,095	1,448	213	80,183	1,702	751
1999	18,426	3,167	854	41,315	2,021	496	38,091	1,810	293	6,184	2,021	1,091
2000	21,229	3,106	833	68,557	1,088	684	30,553	912	231	30,529	1,088	799
2001	12,775	2,923	947	33,807	1,525	83	17,209	747	43	18,531	1,525	2,448
2002	11,480	2,475	779	17,802	1,099	73	29,252	1,839	446	26,695	1,099	1,784
2003	14,444	3,898	323	33,941	1,622	107	27,868	1,129	14	49,833	2,047	1,076
2004	25,465	3,726	288	34,627	1,086	112	25,820	1,112	33	82,398	1,209	1,362
2005	14,195	3,083	520	68,801	1,633	156	13,529	915	108	51,780	1,443	520
2006	19,184	[a]	[a]	106,308	[a]	[a]	39,151	[a]	[a]	26,831	[a]	[a]
10-Year Average[b]	19,085	3,293	834	46,746	1,451	360	34,887	1,144	179	49,771	1,486	1,193
Historical Average[c]	15,895	3,049	855	25,533	1,221	249	32,672	1,270	250	35,861	1,953	1,118

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. Years with no harvest indicate unavailable data.

[a] Not available at time of publication.

[b] 10-year average from 1996–2005.

[c] Historical average of subsistence harvest from 1988–2005.

APPENDIX B.

Appendix B1.–Historical escapement, Kanektok River escapement projects, 1996–2006.

Year	Method	Dates of Operation	Chinook	Sockeye	Chum	Pink [a]	Coho
1996	Counting Tower [b]	2–13, 20–25 July	6,827 [e]	71,637 [e]	70,617 [e]	[e]	[e]
1997	Counting Tower [b]	11 June–21 August	16,731	96,348	51,180	7,872	23,172 [e]
1998	Counting Tower [b]	23 July–17 August	[e]	[e]	[e]	[e]	
1999	Tower/Weir [b]	Not Operational					
2000	Resistance Board Weir [c]	Not Operational					
2001	Resistance Board Weir [d]	10 August–3 October	132 [e]	735 [e]	1,058 [e]	19 [e]	35,677
2002	Resistance Board Weir [d]	1 July–20 September	5,343	58,367	42,014	87,036	24,883
2003	Resistance Board Weir [d]	24 June–18 September	8,221	127,471	40,071	2,443	72,448
2004	Resistance Board Weir [d]	29 June–20 September	19,528	102,867	46,444	98,060	87,828
2005	Resistance Board Weir [d]	8 July-8 September	14,331	242,208	53,580	3,530	26,343
2006	Resistance Board Weir [d]	Not Operational					

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

APPENDIX C.

Appendix C1.–Aerial survey escapement indices of the Kanektok River drainage by species, 1965–2006.

Year	Chinook	Sockeye	Chum	Coho
1962	935	43,108	[a]	[a]
1965	[a]	[a]	[a]	[a]
1966	3,718	[a]	28,800	[a]
1967	[a]	[a]	[a]	[a]
1968	4,170	8,000	14,000	[a]
1969	[a]	[a]	[a]	[a]
1970	3,112	11,375	[a]	[a]
1971	[a]	[a]	[a]	[a]
1972	[a]	[a]	[a]	[a]
1973	814	[a]	[a]	[a]
1974	[a]	[a]	[a]	[a]
1975	[a]	6,018	[a]	[a]
1976	[a]	22,936	8,697	[a]
1977	5,787	7,244	32,157	[a]
1978	19,180	44,215	229,290 [b]	[a]
1979	[a]	[a]	[a]	[a]
1980	[a]	[a]	[a]	[a]
1981	[a]	[a]	[a]	69,325
1982	15,900	49,175	71,840	[a]
1983	8,142	55,940	[a]	[a]
1984	8,890	2,340	9,360	[a]
1985	12,182	30,840	53,060	46,830
1986	13,465	16,270	14,385	[a]
1987	3,643	14,940	16,790	[a]
1988	4,223	51,753	9,420	20,056
1989	11,180	30,440	20,583	[a]
1990	7,914	14,735	6,270	[a]
1991	[a]	[a]	2,475	[a]
1992	2,100	44,436	19,052 [c]	4,330
1993	3,856	14,955	25,675	[a]
1994	4,670	23,128	1,285	[a]
1995	7,386	30,090	10,000	[a]
1996	[a]	[a]	[a]	[a]
1997	[a]	[a]	[a]	[a]
1998	6,107	22,020	7,040	23,656
1999	[a]	[a]	[a]	5,192
2000	1,118	11,670	10,000	10,120
2001	6,483	38,610	11,440	[a]
2002	[a]	[a]	[a]	[a]
2003	6,206	21,335	2,700	[a]
2004	28,375	78,380	[a]	[a]
2005	14,202	110,730	[a]	[a]
2006	8,433	382,800	[a]	[a]
SEG[d]	3,500–8,000	14,000–34,000	>5,200	7,700–36,000

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

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

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

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

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

APPENDIX D.

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

COMMERCIAL FISHERIES DIVISION

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Co-Investigators: Edward Mark, Native Village of Kwinhagak; Mark Lisac, U.S. Fish and Wildlife Service, Togiak National Wildlife Refuge

This document is being submitted to the U.S. Fish and Wildlife Service (USFWS), Office of Subsistence Management (OSM) regarding proposed changes to the objectives and funding allocation for the Kanektok River Weir Project (FIS 04-305) during the 2006 field season. The weir has sustained substantial damage because it was not feasible to disassemble and remove the weir after operations in 2005 and as a result, the weir remained in-river over the winter of 2005-2006. In consultation with project co-investigators, the Native Village of Kwinhagak (NVK), USFWS, Togiak National Wildlife Refuge (TNWR), and project funding partner Coastal Villages Region Fund (CVRF); the lead investigating agency, the Alaska Department of Fish and Game (ADF&G), proposes the following amendments to FIS 04-305 for the 2006 season and period of performance.

Background: The Kanektok River weir was successfully operated in 2005 and the majority of its objectives were achieved. Unfortunately, high water levels persisted from September through river freeze-up in 2005 and prevented complete disassembly and removal of the weir and its components. The weir crew made several attempts into November to remove the remaining weir components from the river without success. Approximately 70% of the weir remained in-river over the winter.

In late April of 2006, ADF&G staff in Bethel began coordinating with NVK staff in Quinhagak to gain access to the weir site, begin weir removal, and evaluate the extent of any weir damage as soon as possible. An aerial survey of the weir site on 24 April revealed the river was ice free at the weir site, the weir appeared intact, and water levels appeared low enough to allow for weir removal. Sections of the Kanektok River downstream of the weir site contained long stretches of bank to bank ice and was deemed un-navigable by boat. A five person crew was assembled and

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began making the necessary arrangements to gain access to the weir site and initiate weir disassembly and removal. Because the river remained un-navigable by boat, a chartered helicopter was used to transport the crew and sling-load supplies to the weir site on 3 May. The crew set-up a partial camp and began weir panel removal the following day. Some panels appeared to be in good condition while others had sustained significant damage. In the process of weir panel removal, it was recognized that the weir rail had also sustained substantial damage. It was decided that the entire rail should be removed to facilitate a complete evaluation of overall weir component damage. Water levels remained low and the entire weir had been removed from the river by 7 May. The crew spent the following day conducting a detailed inventory of all weir components to determine the extent of overall damage. The detailed inventory indicated component damage was beyond the crew's ability to make repairs onsite and that a substantial number of components were beyond repair. All weir components remained onsite and the crew returned to Quinhagak and Bethel by helicopter on 9 May.

The extent of weir component damage was considerable and nearly all removed components sustained damage to some degree. Both counting chutes sustained considerable damage and would require a complete rebuild. They were dismantled and all usable parts were salvaged for rebuilding. Approximately 30% of the panels were in usable condition, 13% were damaged but repairable, and the remaining 57% were damaged beyond repair requiring a complete rebuild. Eight weir rail sections (36%) sustained considerable damage and would have to be completely rebuilt. Ten weir rail sections (45%) sustained damage to the welded-on cable guide-eyes and/or rail splices and would require repair and/or modification. The remaining four rail sections were buried too deeply in the substrate to be retrieved.

2006 Proposed Amendments: ADF&G and project cooperator's proposed amendments to the objectives of FIS 04-305 for the 2006 season are as follows:

4. Redirect the project operations allocation for the 2006 season towards fabrication, purchasing, and shipping of components and raw materials to fabricate and/or repair all damaged weir components;
5. Redirect the personnel allocation for the 2006 season to pay for project crew time fabricating and repairing weir components, and transporting completed weir components to the weir site, and;
6. use any remaining funds for the 2006 season to attempt weir installation and partial project operations in 2006 if water levels allow; or, if Kanektok River weir installation is not feasible in 2006 redirect project personnel to other Kuskokwim Bay area salmon assessment projects for the remainder of the 2006 season.

Weir Component Fabrication and Repair: A total of 40 new panels will have to be fabricated and the remaining panels will have to undergo picket repairs to varying degrees. Additional picket materials are needed to facilitate panel repairs and for fabricating new counting chutes. Both counting chutes will have to be completely rebuilt utilizing salvaged parts such as stringers; however, new counting chute frames will have to be fabricated under contract with a welding vendor. Weir panels that were damaged beyond repair will be disassembled and all stringers, base covers, and panel hooks will be salvaged for use in new panel fabrication. All new panels

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will be rebuilt as the narrower 3ft design which will require some modification to components salvaged from the older 4ft design. Utilizing existing weir components allows for a substantial cost savings and rebuilding all panels as the newer 3ft design will allow for consistency of panels used and will aid in annual installation and removal.

A total of 15 new rail sections will have to be fabricated and the remaining sections will need to be modified to accept a new cable guide-eye design. Although some rail sections sustained damage to the rail splices and cable guide-eyes only, several of the damaged rail splices utilized a welded-on design that is not repairable. As a result, these rail sections will have to be completely rebuilt and will utilize the newer bolt-on rail splice design to mitigate any damage and repair costs in the future. New rail sections will be fabricated under contract with a welding vendor and transported to Quinhagak for temporary storage and eventual transport to the weir site. The remaining repairable rail sections will be transported from the weir site to Quinhagak and be modified to accept the removable cable guide-eye design. The cable guide-eyes have presented a recurring problem at the Kanektok River weir as the weir rail remains installed over the winter to facilitate timely weir panel installation each year. In past years some cable guide-eyes have been damaged by ice to the point of breakage. If enough cable guide-eyes break on a given rail section, the entire section has to be removed and replaced which increases operational costs and delays annual installation. The cable guide-eye modification to be used incorporates a removable design so guide-eyes can be easily replaced each year without having to replace an entire rail section. This guide-eye design presents a negligible cost and will be a marked improvement over the current rail design, especially for systems like the Kanektok River where it is standard procedure to leave the weir rail installed throughout the year.

With the exception of components to be fabricated by welding vendors, all fabrication will be done in Quinhagak by a three person crew consisting of the ADF&G biologist crew leader and two NVK crew technicians. Adequate facilities exist in Quinhagak for component fabrication. Although problems occurred when fabricating weir components in Quinhagak in the past, these problems were attributed to working in an inadequately heated facility during the winter. This will not be an issue this year as all fabrication will occur during the summer.

Once new component assembly and modification is complete, the three person crew will transport completed components and remaining repair materials from Quinhagak to the weir site by boat. All new components will be stored onsite as is done during normal project operations. The minority of panels that were damaged but repairable will then be repaired onsite, completing the weir rebuild.

Project Timeline and Budget. The timeline for completion of weir rebuilding and repair will be dictated initially by the timeliness in which this proposal and associated amendments can be agreed on by all parties, or at a minimum, the time it takes ADF&G to receive authorization to initiate materials purchases. This timeline is critical both for the weir rebuild and from a budgetary standpoint.

CVRF, through their processor subsidiary Coastal Villages Seafoods (CVS), has presented an opportunity to substantially reduce materials shipping costs by allowing the use of their Kuskokwim Area fish tenders to transport materials from Seattle and Bethel to their final

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destination in Quinhagak. Utilizing CVS tenders to transport weir materials will generate a savings of up to $11,500 in shipping costs, but the timeline to take advantage of the full savings under the most efficient schedule is tight.

A CVS tender and barge are currently in Seattle after undergoing repairs and improvements over the winter. The CVS tender is scheduled to depart Seattle destined for Quinhagak and Bethel on or around Friday, June 2. The CVS barge is scheduled to depart Seattle destined for Bethel on or around Thursday, June 15. ADF&G staff has been in contact with a PVC conduit and materials wholesaler out of Tacoma, WA that has all PVC conduit and materials needed in stock. This vendor can deliver FOB to the Seattle dock the day after the order is placed. Ideally, getting all PVC conduit and materials on the CVS tender departing Seattle on June 2 would allow for completion of the weir rebuild under the most efficient schedule while incurring the maximum cost savings. The timeline for getting all PVC conduit and materials on the CVS barge departing Seattle June 15 is much broader and incurs the same savings; however, initiation of weir panel fabrication will be delayed until late June utilizing this option. Whichever option is most feasible, CVRF has presented an opportunity for substantial cost savings and every effort should be made to meet the earliest possible timeline. Substantial savings will also be incurred by utilizing CVS tenders to transport all Bethel based materials and components to Quinhagak.

ADF&G and NVK crew will transport all salvaged materials and components to Quinhagak by boat and begin facility preparation, panel jig fabrication, and materials modifications in early June. Once all materials are onsite in Quinhagak, it will take approximately two weeks to fabricate all panels and modify all components, and an additional week to transport all completed components from Quinhagak to the weir site. An additional two to three days will be needed to finalize the remaining panel repairs at the weir site. Depending on which option can be utilized to transport PVC conduit and materials from Seattle to Quinhagak, the entire weir should be rebuilt, repaired, and onsite between mid July to early August.

The estimated budget for weir materials costs and proposed project budget reallocation is outlined in the following tables. It should be noted that Table 2 represents 2006 OSM project funding and allocations only. CVRF will be providing additional NVK technician funding similar to last year, allowing NVK technicians to work full time instead of on a two week on, two week off schedule as in prior years.

Table 1. Estimated weir materials and shipping costs.

Component	Description	Materials/ Fabrication	Shipping	Total
Weir Rail	15 10' weir rail sections and all associated components	$4,686	$1,127	$5,813
Rail Apron	mesh and rebar (shipping included)	$647	$0	$647
Chute Frame	chute frame materials and fabrication (Bethel Vendor)	$170	$0	$170
Panels	PVC conduit, materials, & associated hardware	$8,525	$100	$8,625
Tools	mitre saw, miscellaneous hand tools, and materials	$1,075	$250	$1,325
TOTAL		**$15,102**	**$1,477**	**$16,579**

Note: Above cost is based on utilizing CVS tenders for shipping, total cost utilizing standard shipping and air freight is up to $28,000.

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Table 2. Proposed Reallocation of 2006 ADF&G and NVK Kanektok River Weir Budget.

Line Item	ADFG Allocation	NVK Allocation	2006 Expended	Weir Rebuild Projected	Remaining Projected	Balance
Personnel	$42,319	$26,527	$12,205	$22,774	$33,867	$0
Travel	$2,800	$0	$0	$500	$2,300	$0
Contractual	$13,000	$0	$10,384	$6,333	$0	-$3,717
Materials	$13,000	$12,626	$7,710	$10,246	$3,952	$3,717
Total	**$71,119**	**$39,153**	**$30,299**	**$39,853**	**$40,119**	**$0**

Note: Remaining projected expenditures will be utilized for fuel and supplies to transport components to the weir site, operational costs if the weir can be installed, and for personnel and materials costs through completion of the 2006 period of performance.

Project Operations and Personnel Utilization. Once a complete weir is onsite, water level will be the primary factor determining whether weir installation and project operations will proceed in 2006. Water level will need to be below what is feasible for panel installation alone as a complete rail installation will be required. This level of water typically only exists during the early installation window in late April and early May each year. Given the deep snow pack and late spring this area of the state has experienced this year; the chances of water levels being low enough for a rail installation are not good. Once a complete weir is rebuilt and onsite, project crew will evaluate water levels and determine if weir installation is feasible. If a low water level window presents itself in a manner which will allow for weir installation and partial enumeration of salmon escapements, weir installation will proceed in 2006. If such a water level window does not present itself, weir operations are highly unlikely in 2006.

If Kanektok River weir installation is not feasible in 2006, it is also proposed that remaining personnel and project operational funds be redirected to another Kuskokwim Bay salmon assessment project partially funded by OSM (FIS 04-312). During this past winter, ADF&G and USFWS, TNWR entered into a Challenge Cost Share agreement that secured funding to initiate a pilot underwater video project to enumerate salmon and resident species passing through the Middle Fork Goodnews River weir. The first year of this pilot project was to be used as an initiation and evaluation year to ensure the video system would be a dependable stand alone method for counting fish passage and to address any unforeseen obstacles to dependable operation of the video system. Unforeseen personnel and scheduling constraints for TNWR staff involved have precluded initiation the pilot video project in 2006. As a contingency plan for the likely event that Kanektok River weir cannot be installed this season, the weir crew could be sent to the Middle Fork Goodnews River weir to initiate and evaluate the video system during the remainder of the 2006 season. This would result in a cross training and capacity building opportunity for both NVK and ADF&G staff utilizing a developing technology for enumerating salmon and resident species escapements. Implementation and evaluation of the video system this year may also allow for complete implementation of the video system on the Middle Fork Goodnews River weir in 2007. Given OSM's current involvement in the Middle Fork Goodnews River weir and the cross training and capacity building opportunity it represents for NVK and ADF&G staff, it is felt that this would be a reasonable redirection of Kanektok River weir project funding if installation of the Kanektok River weir is not feasible in 2006.

APPENDIX E.

Appendix E1.–Timeline of the Kanektok River weir removal and repair, 2006.

- 04-28-06

  Patrick Jones (Fisheries Biologist I) flew over the weir sight on the Kanektok River in a 172 Cessna. The water level appeared to be very low and workable for a crew to remove the remaining portion of the weir. The river was open upstream of the weir sight and mostly closed downstream of the weir. This meant that boating up from the village of Quinhagak would not be possible and that a helicopter would be needed for transporting crew and materials.

- 05-02-06

  Brian Latham and P. Jones flew to the village of Quinhagak where they got supplies ready and prepared the Native Village of Kwinhagak (NVK) crew of Karl Jones, Thaddeus Foster, and Peter Foster.

- 05-03-06

  Both the NVK crew and the Alaska Dept. of Fish and Game (ADFG) personnel were flown from the village to the weir sight by helicopter. It took four sling loads of gear and two loads with crewmembers. After arriving on site with all materials the crew set up two weather ports and a canvas tent. The weir sight was still covered in a foot of snow and the ground had a solid foot of ice, which incased all the gear that had been stored at the camp over the winter.

- 05-04-06

  The crew was able to remove one fish passage chute and 32 panels from the water. It was noted that about half of these panels were completely destroyed, while the rest looked like they would only need minor repairs. It was also observed that several rail sections on both the nearside and the far side of the river had been bent and twisted and would need to be replaced. There was a large hole that had been scoured out on the left bank as looking down river.

- 05-05-06

  The crew finished pulling out the last 15 panels, and assessed that a total of 10 new rail sections would be needed to replace damaged ones.

- 05-06-06

  The crew pulled out the old cable and 11 sections of rail. It was decided that the entire rail would be pulled out for a full assessment. This was desirable because it would also allow the river bottom to fill in and level out.

- 05-07-06

  The last of the rail was removed from the river bottom.

- 05-09-06 to 06-01-06

  The NVK crew flew back to Quinhagak, and the ADFG personnel flew back to Bethel via helicopter. The Camp was left assembled in hopes that the river would soon be open and the NVK crew would be able to return by boat and pick up the good pieces of rail, and strip all the usable parts off the destroyed panels. It was decided that the Kanektok River weir would not be operational during the 2006 season. Staff worked on developing a budget and operational plan for rebuilding the Kanektok River weir. The crew would also modify the rail design to allow cable eyes to be attached or removed as needed, instead of the eyes that were welded on and could not be replaced in the field when they failed. A Major Development Request (MDR) was developed and submitted to OSM for approval.

- 06-05-06 to 06-15-06

  Upon approval of the MDR, staff began purchasing and logistics for deliver of weir component materials to Quinhagak. Staff worked closely with CVRF to coordinate shipping and transport of larger components in an effort to save of transportation costs.

- 06-16-06 to 06-17-06

  P. Jones and NVK crew boated up to the weir and started to disassemble all four foot panels and other destroyed panels.

- 06-18-06

  The crew boated down to the village and prepared to go to the Goodnews River weir to assist in weir installation.

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- 06-19-06 to 06-26-06

  P. Jones and NVK crew flew to Goodnews and started to set up the Goodnews River weir camp and install the weir.

- 06-27-06 to 07-04-06

  T. Foster and P. Foster returned to Quinhagak and continued existing component disassembly.

- 06-30-06

  P. Jones returned to Bethel to continue coordinating transport of weir materials and develop new weir component designs.

- 07-05-06 to 07-06-06

  P. Jones flew to Quinhagak where he and the NVK crew boated up to the Kanektok River weir site. Crew worked on cleaning up old panel debris and materials. Crew retuned to Quinhagak with debris and trash loads and deposited them in local dump.

- 07-07-06

  A complete inventory of all project supplies and materials was completed in Quinhagak.

- 07-10-06 to 07-13-06

  P. Jones and the NVK crew went up to the weir site and brought down the old rail sections.

- 07-15-06 to 07-31-06

  P. Jones and the NVK crew worked in Quinhagak cutting material and drilling holes, and generally prepping material for assembly of new 3-foot weir panels and modifying rail assemblies.

- 08-01-06

  P. Jones flew aerial surveys of the Kanektok, Arolik and Goodnews Rivers for Chinook and sockeye salmon. T. Foster continued to work in the village on materials manufacturing.

- 08-03-06

  P. Jones and T. Foster worked on material manufacturing and driving the modified rail up to the weir site.

- 08-07-06

  Brian Latham flew to Quinhagak. P. Jones, B. Latham and the two NVK crewmembers boated to the weir site, in anticipation for installing the modified rail and new skirting.

- 08-08-06 to 8-13-06

  The crew successfully installed the new skirting and rail across the river for a total of 330 feet of rail. They came back down to the village where B. Latham returned to Bethel.

- 08-14-06

  The NVK crew put up a weather port in Quinhagak and continued prepping the material for panel assembly. The crew was still awaiting PVC pickets to arrive in Quinhagak.

- 08-15-06 to 08-27-06

  The NVK crew continued to work on material preparation. P. Jones took personal leave.

- 08-30-06

  P. Jones flew to Quinhagak. The PVC pickets arrived in Bethel via barge.

- 08-31-06 to 09-05-06

  The crew worked in Quinhagak finishing all prep work for panel assembly.

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- 09-06-06

  The PVC pickets arrived in Quinhagak via air freight. Coastal Villages Region Fund helped to deliver them from the airport to the worksite in town.

- 09-07-06 to 09-13-06

  The crew assembled 49 three foot panels built two fish passage chutes for three foot panel spacing.

- 09-14-06 to 09-18-06

  All chutes and panels were transported via boat from the village to the weir site.

- 09-19-06 to 09-24-06

  The crew finished other panel repairs onsite and disassembled the Kanektok River weir camp site for the winter.

- 09-25-06

  The NVK crew put boats away for the winter and did a final inventory of material that will be stored in Quinhagak over the winter.