Fishery Data Series No. 11-68

Goodnews River Salmon Monitoring and Assessment, 2010

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

by

Travis B. Elison

and

Davin V. Taylor

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

Symbols and Abbreviations

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

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Travis B. Elison
Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage

and

Davin V. Taylor
Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

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Travis B. Elison (travis.elison@alaska.gov)
Alaska Department of Fish and Game, Division of Commercial Fisheries,
333 Raspberry Road, Anchorage, AK 99518, USA
and
Davin V. Taylor (davin.taylor@alaska.gov)
Alaska Department of Fish and Game, Division of Commercial Fisheries,
333 Raspberry Road, Anchorage, AK 99518, USA

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ABSTRACT

Goodnews River is the primary salmon spawning drainage in the Goodnews Bay area and supports subsistence, commercial, and sport fisheries near the communities of Goodnews Bay and Platinum in Southwest Alaska. The Alaska Department of Fish and Game, in cooperation with the U.S. Fish and Wildlife Service, operates a resistance board weir to enumerate fish returning to Middle Fork Goodnews River. In 2010, a total of 2,244 Chinook *Oncorhynchus tshawytscha*; 35,762 sockeye *O. nerka*; 26,687 chum *O. keta*; 3,444 pink *O. gorbuscha*; 23,839 coho salmon *O. kisutch*; and 3,757 Dolly Varden *Salvelinus malma* were estimated to have passed through the weir from 25 June through 18 September. High water hindered operations and resulted in a total of 20 inoperable days during this period. Chinook and sockeye salmon escapements at the weir were within their respective biological escapement goal ranges and chum and coho salmon escapements were above their respective sustainable escapement goal lower bounds in 2010. However, escapements for Chinook, sockeye, chum, and coho salmon were below average. The 2010 commercial harvest in District W-5 was 1,752 Chinook; 41,074 sockeye; 26,914 chum; and 4,900 coho salmon. The total exvessel value of $473,662 was the highest value since 1994.

Key words: Chinook, *Oncorhynchus tshawytscha*, chum, *O. keta*, coho *O. kisutch*, sockeye *O. nerka* and pink salmon, *O. gorbuscha*, Dolly Varden *Salvelinus malma*, escapement monitoring, Goodnews River, Kuskokwim Area, Kuskokwim Bay.

INTRODUCTION

Salmon returning to Goodnews River support subsistence, commercial, and sport fisheries near the communities of Goodnews Bay and Platinum in Southwest Alaska. The Alaska Department of Fish and Game (ADF&G), in cooperation with the U.S. Fish and Wildlife Service (USFWS) Togiak National Wildlife Refuge (TNWR) and Office of Subsistence Management (OSM) operates a resistance board weir to enumerate returning adult salmon, by species, on Middle Fork Goodnews River (Middle Fork) in an effort to manage the resource sustainably.

The Goodnews River watershed drains an area of nearly 2,589.9 km^2 along the west side of Togiak National Wildlife Refuge (Figure 1). It flows a distance of 96.6 river kilometers (rkm) along its mainstem, from Ahklun Mountains southwest into Goodnews Bay. Two major tributaries, Middle Fork and South Fork Goodnews rivers, join the mainstem a few miles from its mouth and are included within its drainage. In order to differentiate between them, Goodnews River refers to all 3 drainages, and the mainstem Goodnews River upstream of its confluence with Middle Fork will be referred to as North Fork Goodnews River or North Fork.

In the state of Alaska, the Department of Fish and Game is responsible for managing salmon fisheries in a manner consistent with *Sustainable Salmon Fisheries Policy* (5 AAC 39.222). This task requires long-term monitoring projects that reliably measure annual escapement to key spawning systems as well as track temporal and spatial patterns in abundance that influence management decisions. Escapement goals are developed as a means to gauge escapement adequacy. The Goodnews River weir currently has escapement goals for Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, chum *O. keta*, and coho salmon *O. kisutch*.

SALMON FISHERIES

Goodnews River is the primary salmon spawning drainage in the area and provides a vital subsistence fishery resource for residents of Goodnews Bay and Platinum communities. Subsistence fishing is allowed throughout the Goodnews River drainage and in Goodnews Bay, which is primarily performed with drift and set gillnets. ADF&G has quantified subsistence salmon harvests in the communities of Goodnews Bay and Platinum since 1977. Harvest estimates are determined from interviews with subsistence fishermen in October and November (Bavilla et al. 2010). Sockeye salmon have been the most utilized subsistence salmon species in

the Goodnews Bay area with a 10 year (1997–2006) average harvest of 920 fish, followed by Chinook salmon (773), coho salmon (722), and chum salmon (302) (Appendix A).

Commercial salmon fishing occurs in Goodnews Bay within the boundaries of District W-5, the southernmost district in the Kuskokwim Area (Figure 2). Commercial fishing has occurred annually in District W-5 since it was established by the Alaska Board of Fisheries (BOF) in 1968. Permit holders have unrestricted movement between commercial fishing districts within the Kuskokwim Area and fishermen from distant communities often participate in the District W-5 commercial fishery. The commercial fishery is primarily directed toward harvesting sockeye and coho salmon and is conducted from skiffs using hand-pulled gillnets. Pink salmon *O. gorbuscha* are the least valuable species commercially and have not been targeted in recent years. ADF&G has collected harvest data from fish buyers and processors since the district was created.

Commercial harvest information is collected on fish tickets obtained from vessel operators after each opening. Species catch amounts and total pounds are entered into the statewide fish ticket data base by staff in Bethel. Exvessel value of each species is determined by multiplying the average price per pound in the W-5 district by the pounds of catch reported.

Since 1969, commercial salmon harvests in District W-5 have ranged from 2,879 in 1971 to 148,036 in 1994 (Appendix A). Harvest numbers have been relatively stable since the late 1990s, with the exception of the low harvest in 2002 when market demand and processing capacity were low. The recent 10 year average harvest (2000–2009) was 50,684 salmon. Harvests efforts were high through the early 1990s when over 100 permits were fished annually. Harvest efforts have been relatively low in recent years with the recent 10 year average of 32 permits fished annually.

Sport fishing occurs throughout the Goodnews River drainage. Pacific salmon, rainbow trout *O. mykiss*, Dolly Varden *Salvelinus malma*, Arctic char *S. alpinus*, and Arctic grayling *Thymallus arcticus* are targeted. Many sport fishermen take commercially guided or unguided float trips from lakes in the headwaters to the mouth at Goodnews Bay. There are currently two commercially operated lodges with semi-permanent camps in the drainage that offer fishing from powered skiffs. ADF&G has been estimating sport fishery harvests consistently since 1991. From 1999 to 2008 there was an average of 3,711 angler days annually. The average annual harvest for the same 10 year period was 826 salmon (Chythlook 2009).

PROJECT HISTORY

ADF&G, Division of Commercial Fisheries, has operated a salmon escapement monitoring project on Middle Fork Goodnews River since 1981 (Appendix B). The project was initiated as a counting tower in 1981 and operated through 1990 (Burkey 1989, 1990; Schultz 1982, 1984a, b, 1985, 1987; Schultz and Burkey 1989) focusing counts on Chinook, sockeye, and chum salmon. Although successful, the tower was limited by problems with species apportionment and high labor costs (Menard 1999). In 1991, resources were redirected towards a fixed-picket weir to reduce labor costs and improve species identification. The fixed-picket weir was operated from 1991 through mid-season 1997, approximately 229 m downstream from the former tower site. Fish passage could be controlled, eliminating the need for hourly monitoring and increasing the efficiency of collecting age, sex, and length (ASL) information. Flood events were problematic if the weir could not be removed early in the season. The weir would rapidly collect debris, damming the flow until it failed and washed downstream, which occurred several times during the early 1990s.

In the mid 1990s, ADF&G began cooperating with USFWS to build a resistance board (floating) weir that would allow the project's operational period to include the coho salmon run during August and September. In July 1997 the resistance board weir was installed. This weir is designed to shed debris loads by sinking under high water conditions and allows the project to remain operational at higher water levels compared to the fixed-picket weir. The resistance board weir design can be rendered inoperable during extreme high water events; however, the weir can regain operations quickly once high water events subside.

Extended operation of the weir has also allowed biologists to monitor the migration of immature Dolly Varden. Dolly Varden are anadromous and believed to be aggregates of mixed stocks of fish returning to spawn and other immature fish that intend to overwinter in the drainage (Lisac 2007). Dolly Varden contribute to the overall subsistence harvest of the residents of the Goodnews Bay area (Wolfe et al. 1984). However, quantitative information on actual subsistence harvest is not available. The weir has provided run timing and abundance estimates for Dolly Varden since 1996 (Lisac 2010) and used as a platform for Dolly Varden life history studies since 2001 (Lisac 2004).

In 2006, TNWR provided an underwater video monitoring system to the project. This system allows the passage chute to be open for more hours per day. The system is controlled by digital video recorder with motion sensing software which condenses the hours of fish passage into a shorter video stream.

ESCAPEMENT MONITORING AND ESCAPEMENT GOALS

The Middle Fork Goodnews River weir serves primarily as a management tool for commercial and subsistence salmon fisheries in the Goodnews Bay area. These data are used to make inseason management decisions based on both sustainable escapement goals (SEG) and biological escapement goals (BEG). The project also serves as a platform for other studies in the drainage, such as collecting samples for genetic stock identification and tagging Dolly Varden to study run timing and seasonal distribution (Lisac 2004, 2007, 2008, and 2010).

Salmon escapement objectives for the Middle Fork counting tower were initially established in 1984 as ranges set at 3,000 to 4,000 Chinook; 35,000 to 45,000 sockeye; and 13,000 to 18,000 chum salmon (Schultz 1984b). An escapement objective was not established for coho salmon as the project typically ceased operation in mid-August, well before the coho salmon run ends. In 1989, the escapement objective range for sockeye salmon was reduced to 20,000 to 30,000 fish. An evaluation of the sockeye salmon exploitation rate in previous years indicated that historical harvest levels could be maintained with a reduced escapement objective (Burkey 1990). These ranges remained in place when the tower was replaced with the fixed-picket weir in 1991.

In 1992, weir based SEGs were first established for Chinook, sockeye, and chum salmon (Buklis 1993). The respective SEGs were set as the midpoints of tower escapement objective ranges: 3,500 Chinook; 25,000 sockeye; and 15,000 chum salmon. In 2004, evaluation of Arctic-Yukon-Kuskokwim (AYK) Region escapement goals resulted in establishment of revised SEGs for the Middle Fork Goodnews River weir (ADF&G 2004). The revised goals, described as ranges or lower bounds, were 2,000 to 4,500 Chinook salmon; 23,000 to 58,000 sockeye salmon; and greater than 12,000 chum salmon. A lower bound SEG was also established for coho salmon at greater than 12,000 fish. In 2007, evaluation of AYK Region escapement goals resulted in a revision of the Middle Fork Goodnews River weir Chinook and sockeye salmon escapement goals from SEGs to BEGs (Brannian et al. 2006). The BEG for Chinook salmon was set at 1,500

to 2,900 fish and the BEG for sockeye salmon was set at 18,000 to 40,000 fish. In 2009, evaluation of AYK Region escapement goals did not result in changes to escapement goals set for Goodnews River salmon (Estensen et al. 2009).

Goodnews River drainage salmon escapements have also been monitored by aerial survey since 1962 (Appendix C). Aerial survey escapement assessment can be subject to variability depending on conditions and observers; however, when observers, timing, and methods are standardized, to the extent feasible and survey conditions meet acceptable criteria, the resulting counts represent an index of escapement. Procedures established in recent years have increased the annual consistency of Goodnews River aerial surveys through the creation of an aerial survey location database (Figure 3), intensive preflight planning, and establishment of dedicated aerial survey staff. Additionally, variability between observers and methods has been addressed through standardized training and consistency in observers, pilots, and aircraft used. In 2010, aerial surveys could not be conducted on schedule due to weather so no aerial survey results were used.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Salmon ASL information has been collected from the weir project since 1984 and from District W-5 commercial harvest since 1985. Historical summaries of existing ASL information for salmon returning to the Goodnews River drainage can be found in Molyneaux et al. (2010).

OBJECTIVES

Annual project objectives are to:

1. Estimate Chinook, sockeye, chum, coho salmon, and Dolly Varden escapement at the weir.
2. Estimate the run timing of Chinook, sockeye, chum, coho salmon, and Dolly Varden at the weir.
3. Estimate the ASL composition of Chinook salmon proportionally; sockeye, chum, and coho salmon escapements and harvest from a minimum of one pulse per species from each third of the run, such that 95% simultaneous confidence intervals for the age composition in each pulse have a maximum width of ±10% (α=0.05 and d=0.10).
4. Serve as a platform for sampling and tagging Dolly Varden at the weir.
5. Record atmospheric and hydrologic conditions at the weir site.

METHODS

SITE DESCRIPTION

Middle Fork Goodnews River parallels North Fork Goodnews River and flows a distance of approximately 72.4 rkm before joining the mainstem. The weir project is located approximately 16.1 rkm from the village of Goodnews Bay on the Middle Fork at latitude 59° 09.595’ N, longitude 161° 23.287’ W (Figure 1). The channel at the weir location is approximately 61.0 m wide, has a regular profile from 0.3 to 1.2 m deep, which tapers to low cut banks on either side and flows 0.6 to 1.2 ms^{-1} during average water conditions. The river substrate is primarily cobblestone, gravel, and sand. The channel upstream of the weir is characterized by deep water along a steep cut bank approximately 6.1 m in height on the left bank (as looking downstream)

tapering to a gravel bar on the right bank. The project campsite is located on the left bank approximately 45.7 m upstream and 27.4 m inland from the weir location.

RESISTANCE BOARD WEIR

Methods for the design, construction, and installation of the resistance board weir followed Stewart (2002, 2003) and Tobin (1994). The weir used at the Middle Fork Goodnews River site is approximately 60.9 m wide. The picket spacing allows smaller fish, such as pink salmon and other non salmon species, to pass upstream and downstream through the weir. Further details of resistance board weir components used for the Goodnews River weir are described in Stewart (2004).

Two fish passage chutes were installed on the weir, one approximately 15.2 m from the left bank, the other approximately 4.6 m from the left bank. A 3 m by 4.6 m trap used to collect fish for ASL sampling was installed directly upstream of the passage chute located nearest to the left bank. The fish passage chute located farthest from the left bank was connected to a passage gate that incorporated an underwater video camera that recorded fish passage.

Boats passed at a designated boat gate consisting of modified weir panels located near the middle of the weir. Boats with jet-drive engines were common and could pass upstream and downstream over the boat gate easily at reduced speed. Rafts could pass downstream by submerging the boat passage panels and drifting over the weir. Boats with propeller-drive engines were uncommon and required being towed upstream across the weir with assistance from crew members.

ESCAPEMENT MONITORING AND ESTIMATES

The Middle Fork weir operated from 25 June through 18 September. Counting periods occurred regularly throughout the day, typically for 1–2 hour duration, beginning in the morning and continuing as late as light permitted. During counting periods the passage gate was opened to allow fish to pass through the weir. Counts were also conducted using underwater video equipment that allowed for continuous monitoring and was typically operated from 1000 hours to 2200 hours. Fish passage captured by the video equipment was reviewed by the crew and included in passage counts recorded as daily video total passage. Any fish observed traveling downstream through the fish passage chutes were subtracted from the tally.

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

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

Where:

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

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

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

If the weir was inoperable for a full day or more, but later became operational again, passage estimates for the inoperable days ($d_1,\ldots,d_i$) were calculated with linear method using the following formula:

$$\hat{n}_{d_i} = (\alpha + \beta) - n_{oi} \tag{2}$$

$$\alpha = \frac{n_{d_1-1} + n_{d_1-2}}{2}$$

$$\beta = \frac{\left(n_{d_i+1} + n_{d_i+2}\right) - \left(n_{d_1-1} + n_{d_1-2}\right) \cdot d_i}{2(i+1)}$$

where:

n_{d_1-1}, n_{d_1-2} = observed passage for the first and second days before the inoperable period,

n_{d_i+1}, n_{d_i+2} = observed passage the first and second day after the weir was reinstalled,

i = number of days during the inoperable period,

d_i = day of inoperable period,

n_{oi} = observed passage on day of estimate.

Estimates were assumed to be zero if passage was considered negligible based on historical data and run timing indicators.

AGE, SEX, AND LENGTH SAMPLING AND ESTIMATES

Escapement sampling for sockeye, chum, and coho salmon ASL composition estimates were conducted based on a pulse sampling design (e.g. Molyneaux and Brannian 2006). The goal for each pulse was to collect samples from 210 sockeye, 200 chum, and 170 coho salmon. The minimum number of pulse samples was one per species from each third of the run to account for temporal dynamics in ASL composition. Escapement samples for Chinook salmon ASL composition estimates were collected on a daily schedule based on historic run timing. This sample design attempts to collect samples in proportion to the run and does not require three pulse samples. The sample size goal for Chinook salmon was 210 fish. These sample sizes were selected for simultaneous 95% confidence interval estimates of age composition ±10% for each age category (α=0.05 and d=0.10) and were increased by 10% from sample sizes recommended by Bromaghin (1993) to account for regenerated and otherwise unreadable scales.

Salmon were sampled from a trap installed in the weir. To sample sockeye, chum, and coho salmon the exit gate was closed allowing fish entering the trap to accumulate inside. The trap was typically allowed to fill with fish and sampling was done during scheduled counting periods. Because of the relatively low proportion of Chinook salmon to other species, they would be captured in the trap while allowing other species to pass during typical passage counts (active sampling).

Commercially harvested salmon were sampled at the Platinum processing plant. Processor workers supplied sampling crews with totes of iced fish for sampling. Pulse samples were collected from a minimum of 3 commercial openings, each representing a third of the total

harvest. The goal for each pulse was to collect samples from 210 Chinook, 210 sockeye, 200 chum, and 170 coho salmon.

For both escapement and commercial sampling, scales were removed from the preferred area of the fish (INPFC 1963). A minimum of 3 scales were removed from each Chinook and coho salmon, and one scale was removed from each chum and sockeye salmon. Scales were mounted on numbered and labeled gum cards. For escapement samples, sex was determined by visually examining external morphology such as the development of the kype, roundness of the belly and the presence or absence of an ovipositor. Sex was determined for commercially harvested fish by visual inspection of internal gonads. In both cases, length was measured to the nearest millimeter from mideye to tail fork. After sampling was concluded, gum cards and data forms were completed and returned to the Bethel ADF&G offices for processing.

ADF&G staff in Bethel and Anchorage aged scales, processed the ASL data, and generated data summaries (Molyneaux et al. 2010). These procedures generated two types of summary tables for each species; one described the age and sex composition and the other described length statistics. These summaries account for ASL composition changes over the season by first partitioning the season into temporal strata based on pulse sample dates, applying age and sex composition of individual pulse samples to the corresponding temporal strata, and finally summing the strata to generate the estimated age and sex composition for the season. This procedure ensured ASL composition estimates were weighted by fish abundance in the escapement or harvest rather than fish abundance in the samples. Likewise, estimated mean length composition was calculated by weighting sample mean lengths from each stratum by the escapement or harvest of salmon during that stratum.

Ages are reported in the tables using European notation. European notation is composed of two numerals separated by a decimal, where the first numeral indicates the number of winters spent in fresh water and the second numeral indicates the number of winters spent in the ocean (Groot and Margolis 1991). Total age is equal to the sum of these two numerals plus one to account for the single winter of egg incubation in the gravel. Original ASL gum cards, acetates, and mark–sense forms are archived at the ADF&G office in Anchorage. Computer files were archived by ADF&G in the Anchorage and Bethel offices.

DOLLY VARDEN TAGGING

Dolly Varden were captured for sampling in a trap. A sample size of 10% of the Dolly Varden passage was targeted to represent Dolly Varden, greater than 400 mm fork-length, passing upstream of the weir. Dolly Varden less than 400 mm fork-length were small enough to pass through picket spacing and escape the trap (Lisac 2004).

Sampling included a length measurement, collection of a genetic sample (left pelvic fin), attachment of a numeric Floy® tag for monitoring movement, and state of maturity was noted to estimate the proportion of mature and immature fish.

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological conditions were recorded at 10:00 each day. Cloud cover was judged in percent of total sky covered; wind speed was estimated in miles per hour and direction was noted; precipitation was measured in mm per 24 hours. Daily air and water temperatures were recorded in degrees Celsius. The river level was recorded daily and was referenced to a

benchmark established in 1997 representing a river stage of 150 cm. The benchmark is an aluminum I-beam driven into the bank along a steep grade downstream of the field camp. The river gauge is a steel rule installed near shore in the river and is set level with the top of the benchmark at 150 cm.

RESULTS

WEIR OPERATIONS

The weir began operation on 25 June and remained in place through 18 September. A small hole in the weir occurred for approximately 10 hours on 7 July. Water levels rose swiftly mid-season submerging the weir and causing a loss of operation from 29 July through 4 August and again from 14 August through 26 August. Operation was restored after the return of workable water levels. Chinook, sockeye, chum, and coho salmon passage were estimated during the inoperable periods and the estimates were included in the total escapements. The weir crew began weir disassembly and camp closure on 18 September.

SALMON ESCAPEMENT

The 2010 Chinook salmon escapement through the Middle Fork weir was estimated to be 2,244 (Table 1). A total of 1,824 Chinook salmon were observed and 420 (19%) were estimated to have passed upstream during the inoperable periods. The first Chinook salmon was observed on 26 June and the last Chinook salmon was observed on 16 September. Based on the operational period and inclusive of estimates, the median passage date was 22 July and the central 50% of the run occurred between 14 July and 28 July (Table 1).

Sockeye salmon escapement was estimated to be 35,762 fish. A total of 34,667 sockeye salmon were observed and 1,095 (3%) were estimated to have passed upstream during the inoperable periods. The first sockeye salmon was observed on 25 June and the last sockeye salmon was observed on 18 September. Based on the operational period and inclusive of estimates, the median passage date was 9 July and the central 50% of the run occurred between 3 July and 14 July (Table 1).

Chum salmon escapement was estimated to be 26,687 fish. A total of 22,876 chum salmon were observed and 3,811 fish (14% of the total) were estimated during the inoperable period. The first chum salmon was observed on 26 June and the last chum salmon was observed on 15 September. Based on the operational period and inclusive of estimates, the median passage date was 17 July and the central 50% of the run occurred between 12 July and 26 July (Table 1).

Coho salmon escapement was estimated to be 23,840 fish. A total of 12,769 coho salmon were observed passing upstream through the weir and 11,070 fish (46% of the total) were estimated to have passed upstream during the inoperable periods. The first coho salmon was observed on 29 July and the last coho salmon was observed on 18 September. Based on the operational period and inclusive of estimates, the median passage date was 26 August and the central 50% of the run occurred between 22 August and 31 August (Table 1).

The total observed passage of pink salmon was 3,444 fish. No estimate of missed escapement was made for pink salmon. The first pink salmon was observed on 1 July and the last pink salmon was observed on 18 September. The median passage date was 27 July and the central 50% of the run occurred between 16 July and 9 August (Table 2).

The total observed passage of Dolly Varden was 3,627 fish (Table 2). This is the second highest run abundance recorded at the Middle Fork weir (M. Lisac, Fisheries Biologist, TNWR, personal communication). No estimates of missed passage were made for Dolly Varden. The first Dolly Varden was observed on 26 June and the last Dolly Varden was observed on 12 September. The median passage date was 17 July and the central 50% of the run occurred between 14 July and 20 August.

Observed passage of resident species in 2010 was 78 rainbow trout, 121 whitefish, and 12 Arctic grayling. Missed passage was not estimated for these species.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Escapement

Minimum sample objectives were not met for Chinook, sockeye, chum, and coho salmon; however, the samples collected were still used for estimating ASL composition of escapement at the weir. In most cases, samples could not be used to partition the escapement into temporal strata because of insufficient sample sizes.

Age was determined for 65 of the 81 Chinook salmon sampled (80%) in 2010. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±11.8%. Age-1.3 Chinook salmon were the most abundant age class (40.0%), followed by age-1.2 (29.2%), age-1.4 (13.8%), and 1.1 (13.8%). Females comprised 32.3% of the aged samples (Table 3). Mean male length of the samples was 532 mm for age-1.2 fish, 722 mm for age-1.3, and 792 mm for age-1.4. Mean female length of the samples was 784 mm for age-1.3 fish, and 853 mm for age-1.4 (Table 4).

Age was determined for 307 of the 332 sockeye salmon sampled (92%) in 2010. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±3.9%. Age-1.3 sockeye salmon were the most abundant age class (85.8%), followed by age-1.2 (4.6%), and age-2.3 (3.9%). Females comprised 54.6% of the aged samples (Table 5). Mean male length was 526 mm for age-1.2 fish, 572 mm for age-1.3, and 569 mm for age-2.3. Mean female length was 483 mm for age-1.2 fish, 532 mm for age-1.3, and 550 mm for age-2.3 (Table 6).

Age was determined for 189 of the 202 chum salmon sampled (83%) in 2010. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±6.4%. Age-0.3 chum salmon was the most abundant age class (74.5%), followed by age-0.4 (22.7%). Females comprised 59.7% of the aged samples (Table 7). Mean male length was 574 mm for age-0.3 fish and 581 mm for age-0.4. Mean female length was 553 mm for age-0.3 fish and 563 mm for age-0.4 (Table 8).

Age was determined for 438 of the 529 coho salmon sampled (79.9%) in 2010. Escapement was partitioned into 3 temporal strata based on sample dates. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±3.7%. Age-2.1 coho salmon was the most abundant age class (83.4%), followed by age-1.1 (13.1%). Females comprised 53.6% of aged samples (Table 9). Mean male length of the samples was 592 mm for age-1.1 fish and 601 mm for age-2.1. Mean female length of the samples was 598 mm for age-1.1 fish and 596 mm for age-2.1 (Table 10).

District W-5 Commercial Harvest

Chinook, sockeye, chum, and coho salmon sample objectives were achieved in 2010 and were considered adequate for estimating ASL composition of the commercial harvest in W-5. Samples for each species were partitioned temporally into strata based on sample dates and chi-square distributions.

Age was determined for 621 of the Chinook salmon sampled. Overall, 95% confidence intervals for age composition of annual harvest were no wider than ±3.6%. Applied to total commercial harvest, age-1.3 Chinook salmon were the most abundant age class (50.8%), followed by age-1.2 (32.3%), and age-1.4 (13.7%). Sex composition was estimated to be 23.6% females (Table 11). Mean male length was 527 mm for age-1.2 fish, 705 mm for age-1.3, and 818 mm for age-1.4. Mean female length was 782 mm for age-1.3 fish and 813 mm for age-1.4 (Table 12).

Age was determined for 684 of the sockeye salmon sampled. Overall, 95% confidence intervals for age composition of annual harvest were no wider than ±2.9%. Applied to total commercial harvest, age-1.3 sockeye salmon were the most abundant age class (79.6%), followed by age-1.2 (13.2%). Sex composition was estimated to be 36.9% females (Table 13). Mean male length was 520 mm for age-1.2 fish and 565 mm for age-1.3. Mean female length was 526 mm for age-1.2 fish and 539 mm for age-1.3 (Table 14).

Age was determined for 752 of the chum salmon sampled. Overall, 95% confidence intervals for age composition of annual harvest were no wider than ±3.3%. Applied to total commercial harvest, age-0.3 fish were the most abundant age class (74.5%), followed by age-0.4 (21.0%) fish. Sex composition was estimated to be 36.2% females (Table 15). Mean male length was 569 mm for age-0.3 fish and 584 mm for age-0.4. Mean female length was 551 mm for age-0.3 fish and 556 mm for age-0.4 (Table 16).

Age was determined for 600 coho salmon sampled. Overall, 95% confidence intervals for age composition of annual harvest were no wider than ±2.9%. Applied to total commercial harvest, age-2.1 coho salmon were the most abundant age class (87.3%), followed by age-1.1 (10.6%). Sex composition was estimated to be 40.7% females (Table 17). Mean male length was 546 mm for age-1.1 fish and 570 mm for age-2.1. Mean female length was 609 mm for age-1.1 fish and 604 mm for age-2.1 (Table 18).

DOLLY VARDEN TAGGING

A total of 3,627 Dolly Varden were observed passing the weir between 26 June and 12 September. A total of 435 Dolly Varden were sampled, of which, 395 were tagged with green anchor tags and released; one was released without tagging; 5 fish tagged in a previous year were recaptured; and there were 34 mortalities. These included: 3 found dead on the weir, 16 were sacrificed for sampling, and 15 died likely due to handling stress. More detailed analysis of this sample and Dolly Varden run timing will be provided in a separate report (M. Lisac, Fisheries Biologist, TNWR, personal communication).

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological observations were recorded daily from 27 June through 20 September. Air temperatures ranged from 0˚ to 13˚C. Water temperature ranged from 7˚ to 11˚C. Several rain events resulted in daily accumulations from trace amounts up to 47 mm for a

24 h period. Total rainfall during this period was 360 mm. Water levels ranged from 31 to 120 cm (Table 19).

DISCUSSION

SALMON FISHERIES

Subsistence harvest estimates for salmon in the Goodnews Bay area for 2010 were not available. In the District W-5 commercial fishery 48 permit holders participated for a total harvest of 1,752 Chinook; 41,074 sockeye; 26,914 chum; and 4,900 coho salmon. Exvessel value by species was $44,910 for Chinook; $334,366 for sockeye; $49,679 for chum; and $44,706 for coho salmon for a total value of $473,662 (Table 20).

The District W-5 Chinook and coho salmon commercial harvests were below the most recent 10 year averages. Sockeye and chum salmon commercial harvests were above the 10 year averages (Appendix A). The first commercial fishing period was about one week later than normal and the last period was about two weeks earlier than normal. The late start and early closure of the commercial fishing season allowed for needed escapement of Chinook and coho salmon. During the week of 12 July there were two additional fishing periods to harvest surplus sockeye and chum salmon (Table 20). The total exvessel value of $473,662 was the highest since 1994 (Bavilla et al. 2010).

WEIR OPERATIONS

The 2010 weir operation was successful in enumerating the passage and run timing of Chinook, sockeye, chum salmon, and Dolly Varden past the weir. The majority of project objectives were achieved with the exception of coho salmon enumeration and escapement ASL sampling objectives at the weir. Falling short on these objectives can be attributed to uncharacteristically high water that resulted in two inoperable periods for a total of 4 partially and 17 completely inoperable days. The project continues to add to the long-term escapement, run timing, and ASL database for salmon returning to Goodnews River and serves as a platform to study other anadromous and resident freshwater species.

ESCAPEMENT MONITORING AND ESTIMATES

The 2010 Chinook salmon escapement at the weir was within the BEG range of 1,500 to 2,900; however, it was below the recent 10 year average and third lowest among recorded years with similar monitoring methods (Figure 4; Appendix B).

The 2010 sockeye salmon escapement at the weir was within the BEG range of 18,000 to 40,000 and above the escapement in 2009. However, the escapement was below the recent 10 year average and far below the record escapements from 2005 to 2007 (Figure 4; Appendix B). Smaller runs and increased processing capacity in the last two years has improved the managers' ability to harvest surpluses and keep escapements within the upper end of the BEG range.

The 2010 chum salmon escapement at the weir was well above the SEG lower bound of 12,000 fish (Figure 4; Appendix B). This was an increase from 2009, but it was still below the recent 10 year average. The relatively lower escapements in 2009 and 2010 are the result of relatively higher incidental harvests that are associated with the sockeye salmon management-directed fishery.

High water in 2010 rendered the weir inoperable for 20 days during the coho salmon run. The estimate of 23,839 is likely an overestimate because the linear method used to estimate passage during a 13 day inoperable period (14 to 26 August) incorporated the highest day of observed passage (August 27). The passage estimated for this time period in 2010 was 2 to 50% of the return (Table 1). It is unlikely that daily passage would have been sustained at that magnitude that early in the return as the historical median passage during this time period is 3 to 21% of the return. This likely also resulted in skewed run timing that appears early (Figure 6).

Although 46% of the coho salmon passage was estimated, the escapement needed to meet the SEG lower bound of 12,000 was observed. This is important for management purposes. While, the 2010 estimate should not be used for calculating historical data, it is useful for giving managers insight to the relative overall escapement. The weir operated until 18 September, which is before the end of the coho salmon migration, but considered to be a reasonable time period for an index of total passage in years with normal operations.

Dolly Varden counts generated by the weir project represent an unknown proportion of the overall Dolly Varden migration within Middle Fork Goodnews River. The current spacing between weir panel pickets was chosen for optimal weir operations during high water events and for generating escapement counts of Chinook, sockeye, chum, and coho salmon. Therefore, the weir count is must be considered to be size selective for larger (>400 mm) Dolly Varden and younger and smaller fish pass through the weir unobserved (Lisac 2004). Dolly Varden counts generated at the weir should continue to be considered an index of Dolly Varden populations in Middle Fork Goodnews River. Dolly Varden counts at the Middle Fork weir date back to 1996 (Figure 5; Appendix B). The 2010 Dolly Varden count was above the recent 10 year average and the second highest count recorded since 1996. No estimate was generated of the Dolly Varden missed during the 20 days that the weir was inoperable as this time occurred after the historical end of the Dolly Varden run (Appendix B). Additional details and analysis of Goodnews River Dolly Varden populations can be found in Lisac (2007, 2010, and personal communication).

Chinook salmon run timing in 2010 was one of the latest runs on record and was 11 days later than the historical median (Table 1; Figure 6). Sockeye and chum salmon run timing in 2010 is similar to the respective historical median passage dates of 8 July and 18 July.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Achieving Chinook salmon ASL sampling objectives continues to be problematic. Low daily passage, migration patterns, and behavior at the weir have made sample collection difficult. Chinook salmon tend to migrate in large pulses so that their passage may be slow for a period of days and then suddenly peak. Coordinating ASL sampling to coincide with these pulses is difficult because timing of the pulses cannot be accurately predicted. An active sampling strategy of capturing Chinook salmon individually or in small groups as other species are allowed to pass freely through the trap has improved sample sizes, but the fish trap used at the weir does not present the best platform for active sampling. This strategy can work well, but is time intensive and Chinook salmon are often hesitant to approach the trap in its current fixed location and when there is increased activity around the trap. In an effort to achieve Chinook salmon sample objectives, active sampling will continue to be conducted at the weir.

Although sample objectives were not achieved for the Chinook salmon ASL escapement estimates in 2010, some inferences can be made based on the samples that were collected in combination with the ASL harvest estimates. There was a greater percentage of age-1.1 fish in

the escapement sample and a greater percentage of age-1.3 fish in the harvest sample. These differences could be attributed to net selectivity, poor sample size of the escapement, or a combination of both. Assuming these percentages are representative of the true population and based on sibling relationships, the relatively high proportion of age-1.1, -1.2, and -1.3 Chinook salmon in the escapement and harvests samples is indicative of a stronger run in 2011 (Tables 3 and 11, Figure 7).

Age-1.3 sockeye salmon are typically the most abundance age class regardless of changes in relative proportion from year to year (Tables 5 and 13; Figure 7). The above average proportion of age-1.2 sockeye salmon observed in 2009 materialized into an above average proportion of age-1.3 fish in 2010. This was associated with an increased run size in 2009 and 2010. Age-sex composition from 2010 is indicative of a slightly smaller total run in 2011.

There was a record high escapement of chum salmon in 2006 followed by similarly large runs in 2007 and 2008 (Figure 4). The 2006 escapement resulted in a strong return of age-0.3 fish in 2010 (Tables 7 and 15) that could likely return in above average numbers as age-0.4 fish in 2011. Combine this with an expected high return of age-0.3 fish from the 2007 brood year and there is potential for a well above average run in 2011.

CONCLUSIONS

WEIR OPERATIONS

Since the extension of project operations into the coho salmon season in 1997 the project has:

1. Demonstrated the ability to successfully install and operate a weir in Middle Fork Goodnews River.
2. Demonstrated the ability to achieve its annual objectives with the exception of ASL sample goals for some species in specific years.
3. Provided escapement and run timing information for Middle Fork Goodnews River salmon and Dolly Varden populations.
4. Provided a platform for the collection of ASL information from the salmon escapement and Dolly Varden migration at the weir.

OVERALL ABUNDANCE ASSESSMENT

The escapements at the Middle Fork Goodnews weir in 2010 were within the respective BEG ranges for Chinook and sockeye salmon and above the respective SEG lower bounds for chum and coho salmon. Due to the inability to collect aerial surveys in 2010, the salmon escapements on the North Fork Goodnews River are unknown. The commercial harvests of Chinook and coho salmon were below average. The commercial harvests of sockeye and chum salmon were well above average. Overall, the salmon stocks in the Goodnews drainage are considered healthy and sustainable.

RECOMMENDATIONS

Annual operation of the Middle Fork Goodnews River weir should continue indefinitely. As the only ground-based monitoring project in District W-5, the project provides valuable, reliable inseason and postseason information about Chinook, sockeye, chum, and coho salmon that are critical for sustainable salmon management.

Continued effort is recommended to obtain aerial survey information on Middle Fork and North Fork Rivers of the Goodnews drainage to estimate total escapement of Chinook and sockeye salmon.

WEIR OPERATIONS AND ASL SAMPLING

Active sampling for Chinook salmon should continue in order to meet ASL sample size goals and a better designed trap should be fabricated when time and funding allows improving the active sampling technique. Sampling goals for Chinook salmon may be unreasonable given the size of the run at the Middle Fork weir and should be re-evaluated to better represent the irregular passage and lower abundance of Chinook salmon through the weir. Current sampling goals at the Goodnews River weir have not been met and are anticipated to remain difficult to achieve in subsequent years.

Collection of commercial samples from the District 5 has been problematic in the past. With all the fish from W-5 going to Platinum for processing and a dedicated sample crew at that location in 2010, the majority of problems have been resolved. A dedicated commercial sampling crew should continue to be stationed in Platinum to collect samples from W-5 and other Kuskokwim area districts as well.

After the season, the substrate rail should be left in the deeper portion of the channel to speed spring installation and startup and be removed from the shallower portion to avoid scouring over the winter. The shallow portion currently extends 80 ft from the north bank. This portion of the river goes dry in winter and is subject to frost heaving, which displaces the rail and causes scouring during the spring flood.

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TABLES AND FIGURES

Table 1.–Daily, cumulative, cumulative percent passage of Chinook, sockeye, chum, and coho salmon passage, Middle Fork Goodnews River weir, 2010.

	Chinook			Sockeye			Chum			Coho		
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage
6/25	0	0	0	261	261	1	0	0	0	0	0	0
6/26	3	3	0	680	941	3	7	7	0	0	0	0
6/27	3	6	0	1,061	2,002	6	39	46	0	0	0	0
6/28	3	9	0	1,478	3,480	10	101	147	1	0	0	0
6/29	1	10	0	797	4,277	12	28	175	1	0	0	0
6/30	0	10	0	1,252	5,529	15	106	281	1	0	0	0
7/01	7	17	1	1,075	6,604	18	71	352	1	0	0	0
7/02	1	18	1	712	7,316	20	64	416	2	0	0	0
7/03	6	24	1	1,500	8,816	25	165	581	2	0	0	0
7/04	17	41	2	1,881	10,697	30	339	920	3	0	0	0
7/05	10	51	2	1,227	11,924	33	440	1,360	5	0	0	0
7/06	11	62	3	2,052	13,976	39	471	1,831	7	0	0	0
7/07	11 [a]	73	3	883 [a]	14,859	42	403 [a]	2,234	8	0	0	0
7/08	22	95	4	1,099	15,958	45	722	2,956	11	0	0	0
7/09	152	247	11	1,942	17,900	50	1,271	4,227	16	0	0	0
7/10	65	312	14	3,379	21,279	60	854	5,081	19	0	0	0
7/11	19	331	15	916	22,195	62	822	5,903	22	0	0	0
7/12	45	376	17	2,130	24,325	68	950	6,853	26	0	0	0
7/13	140	516	23	2,130	26,455	74	2,234	9,087	34	0	0	0
7/14	112	628	28	1,447	27,902	78	1,136	10,223	38	0	0	0
7/15	60	688	31	1,175	29,077	81	642	10,865	41	0	0	0
7/16	39	727	32	920	29,997	84	1,569	12,434	47	0	0	0
7/17	68	795	35	788	30,785	86	1,456	13,890	52	0	0	0
7/18	46	841	37	764	31,549	88	555	14,445	54	0	0	0
7/19	61	902	40	653	32,202	90	653	15,098	57	0	0	0
7/20	87	989	44	369	32,571	91	1,258	16,356	61	0	0	0
7/21	49	1,038	46	125	32,696	91	410	16,766	63	0	0	0
7/22	134	1,172	52	213	32,909	92	895	17,661	66	0	0	0
7/23	26	1,198	53	162	33,071	92	391	18,052	68	0	0	0
7/24	104	1,302	58	376	33,447	94	1,205	19,257	72	0	0	0

-continued-

Table 1.–Page 2 of 3.

Date	Chinook			Sockeye			Chum			Coho		
	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage
7/25	144	1,446	64	202	33,649	94	500	19,757	74	0	0	0
7/26	76	1,522	68	244	33,893	95	462	20,219	76	0	0	0
7/27	74	1,596	71	154	34,047	95	493	20,712	78	0	0	0
7/28	96	1,692	75	129	34,176	96	297	21,009	79	0	0	0
7/29	176 [a]	1,868	83	300 [a]	34,476	96	980 [a]	21,988	82	17 [a]	17	0
7/30	114 [b]	1,981	88	186 [b]	34,662	97	593 [b]	22,581	85	9 [b]	26	0
7/31	92 [b]	2,073	92	158 [b]	34,820	97	548 [b]	23,129	87	9 [b]	35	0
8/01	69 [b]	2,142	95	130 [b]	34,951	98	503 [b]	23,633	89	9 [b]	44	0
8/02	47 [b]	2,189	98	102 [b]	35,053	98	458 [b]	24,091	90	10 [b]	54	0
8/03	25 [b]	2,214	99	74 [b]	35,127	98	413 [b]	24,504	92	10 [b]	64	0
8/04	4 [a]	2,218	99	54 [a]	35,181	98	528 [a]	25,032	94	8 [a]	72	0
8/05	2	2,220	99	38	35,219	98	208	25,240	95	13	85	0
8/06	0	2,220	99	25	35,244	99	193	25,433	95	31	116	0
8/07	0	2,220	99	11	35,255	99	116	25,549	96	25	141	1
8/08	1	2,221	99	6	35,261	99	63	25,612	96	15	156	1
8/09	0	2,221	99	6	35,267	99	64	25,676	96	35	191	1
8/10	2	2,223	99	3	35,270	99	89	25,765	97	48	239	1
8/11	4	2,227	99	4	35,274	99	52	25,817	97	43	282	1
8/12	0	2,227	99	13	35,287	99	142	25,959	97	12	294	1
8/13	1	2,228	99	7	35,294	99	24	25,983	97	29	323	1
8/14	1 [b]	2,229	99	11 [b]	35,305	99	78 [b]	26,061	98	148 [b]	471	2
8/15	1 [b]	2,230	99	12 [b]	35,317	99	73 [b]	26,134	98	275 [b]	746	3
8/16	1 [b]	2,230	99	14 [b]	35,331	99	69 [b]	26,203	98	402 [b]	1,148	5
8/17	1 [b]	2,231	99	15 [b]	35,346	99	64 [b]	26,267	98	529 [b]	1,677	7
8/18	1 [b]	2,232	99	16 [b]	35,362	99	59 [b]	26,326	99	656 [b]	2,333	10
8/19	1 [b]	2,233	99	17 [b]	35,380	99	54 [b]	26,381	99	784 [b]	3,117	13
8/20	1 [b]	2,234	100	19 [b]	35,398	99	50 [b]	26,430	99	911 [b]	4,028	17
8/21	1 [b]	2,235	100	20 [b]	35,418	99	45 [b]	26,475	99	1,038 [b]	5,066	21
8/22	1 [b]	2,236	100	21 [b]	35,439	99	40 [b]	26,516	99	1,165 [b]	6,231	26
8/23	1 [b]	2,237	100	22 [b]	35,461	99	35 [b]	26,551	99	1,292 [b]	7,523	32
8/24	1 [b]	2,238	100	24 [b]	35,485	99	31 [b]	26,582	100	1,419 [b]	8,942	38
8/25	1 [b]	2,239	100	25 [b]	35,510	99	26 [b]	26,608	100	1,547 [b]	10,489	44
8/26	3 [a]	2,242	100	32 [a]	35,542	99	29 [a]	26,637	100	1,357 [a]	11,846	50
8/27	0	2,242	100	20	35,562	99	13	26,650	100	1,990	13,836	58

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Table 1.–Page 3 of 3.

Date	Chinook			Sockeye			Chum			Coho		
	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage
8/28	0	2,242	100	46	35,608	100	12	26,662	100	1,537	15,373	64
8/29	0	2,242	100	30	35,638	100	4	26,666	100	1,295	16,668	70
8/30	0	2,242	100	10	35,648	100	0	26,666	100	804	17,472	73
8/31	0	2,242	100	19	35,667	100	0	26,666	100	521	17,993	75
9/01	1	2,243	100	3	35,670	100	2	26,668	100	1,224	19,217	81
9/02	0	2,243	100	2	35,672	100	0	26,668	100	784	20,001	84
9/03	0	2,243	100	1	35,673	100	0	26,668	100	326	20,327	85
9/04	0	2,243	100	3	35,676	100	0	26,668	100	349	20,676	87
9/05	0	2,243	100	20	35,696	100	4	26,672	100	279	20,955	88
9/06	0	2,243	100	12	35,708	100	1	26,673	100	261	21,216	89
9/07	0	2,243	100	12	35,720	100	3	26,676	100	442	21,658	91
9/08	0	2,243	100	1	35,721	100	0	26,676	100	249	21,907	92
9/09	0	2,243	100	8	35,729	100	0	26,676	100	562	22,469	94
9/10	0	2,243	100	14	35,743	100	2	26,678	100	172	22,641	95
9/11	0	2,243	100	7	35,750	100	2	26,680	100	193	22,834	96
9/12	0	2,243	100	1	35,751	100	3	26,683	100	115	22,949	96
9/13	0	2,243	100	4	35,755	100	2	26,685	100	136	23,085	97
9/14	0	2,243	100	1	35,756	100	1	26,686	100	190	23,275	98
9/15	0	2,243	100	0	35,756	100	1	26,687	100	194	23,469	98
9/16	1	2,244	100	5	35,761	100	0	26,687	100	197	23,666	99
9/17	0	2,244	100	0	35,761	100	0	26,687	100	62	23,728	100
9/18	0	2,244	100	1	35,762	100	0	26,687	100	112	23,840	100
Total	2,244			35,762			26,687			23,840		
Observed	1,824			34,667			22,876			12,769		
Estimated	420			1,095			3,811			11,070		
% Observed	81			97			86			54		

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

[a] The weir was operational for part of the day. Daily passage includes observed and estimated passage.

[b] The weir was not operational; daily passage was estimated.

Table 2.–Daily and cumulative pink salmon, and Dolly Varden passage, Middle Fork Goodnews 2010.

	Pink Salmon			Dolly Varden		
Date	Daily	Cum.	% passage	Daily	Cum.	% passage
6/25	0	0	0	0	0	0
6/26	0	0	0	1	1	0
6/27	0	0	0	1	2	0
6/28	0	0	0	4	6	0
6/29	0	0	0	0	6	0
6/30	0	0	0	0	6	0
7/01	4	4	0	1	7	0
7/02	3	7	0	0	7	0
7/03	8	15	0	2	9	0
7/04	21	36	1	5	14	0
7/05	22	58	2	14	28	1
7/06	20	78	2	20	48	1
7/07	2	80	2	11	59	2
7/08	12	92	3	12	71	2
7/09	43	135	4	25	96	3
7/10	50	185	5	36	132	4
7/11	49	234	7	77	209	6
7/12	80	314	9	129	338	9
7/13	253	567	16	315	653	17
7/14	140	707	21	277	930	25
7/15	78	785	23	313	1,243	33
7/16	73	858	25	384	1,627	43
7/17	211	1,069	31	497	2,124	57
7/18	59	1,128	33	216	2,340	62
7/19	136	1,264	37	281	2,621	70
7/20	81	1,345	39	190	2,811	75
7/21	49	1,394	40	164	2,975	79
7/22	48	1,442	42	102	3,077	82
7/23	26	1,468	43	98	3,175	85
7/24	50	1,518	44	139	3,314	88
7/25	60	1,578	46	87	3,401	91
7/26	20	1,598	46	64	3,465	92
7/27	111	1,709	50	77	3,542	94
7/28	57	1,766	51	91	3,633	97
7/29	117 [a]	1,883	55	71 [a]	3,704	99
7/30	[b]	1,883	55	[b]	3,704	99
7/31	[b]	1,883	55	[b]	3,704	99
8/01	[b]	1,883	55	[b]	3,704	99
8/02	[b]	1,883	55	[b]	3,704	99
8/03	[b]	1,883	55	[b]	3,704	99
8/04	41 [a]	1,924	56	5 [a]	3,709	99
8/05	131	2,055	60	5	3,714	99
8/06	188	2,243	65	6	3,720	99
8/07	206	2,449	71	3	3,723	99
8/08	78	2,527	73	0	3,723	99
8/09	109	2,636	77	1	3,724	99
8/10	178	2,814	82	0	3,724	99
8/11	75	2,889	84	0	3,724	99

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Date	Pink Salmon Daily		Pink Salmon Cum.		Dolly Varden Daily		Dolly Varden Cum.	
8/12	86		2,975	86	0		3,724	99
8/13	71		3,046	88	2		3,726	99
8/14		[b]	3,046	88			3,726	[b] 99
8/15		[b]	3,046	88			3,726	[b] 99
8/16		[b]	3,046	88			3,726	[b] 99
8/17		[b]	3,046	88			3,726	[b] 99
8/18		[b]	3,046	88			3,726	[b] 99
8/19		[b]	3,046	88			3,726	[b] 99
8/20		[b]	3,046	88			3,726	[b] 99
8/21		[b]	3,046	88			3,726	[b] 99
8/22		[b]	3,046	88			3,726	[b] 99
8/23		[b]	3,046	88			3,726	[b] 99
8/24		[b]	3,046	88			3,726	[b] 99
8/25		[b]	3,046	88			3,726	[b] 99
8/26	65	[a]	3,111	90	2		3,728	[a] 99
8/27	79		3,190	93	2		3,730	99
8/28	56		3,246	94	7		3,737	99
8/29	60		3,306	96	5		3,742	100
8/30	17		3,323	96	1		3,743	100
8/31	19		3,342	97	3		3,746	100
9/01	24		3,366	98	0		3,746	100
9/02	11		3,377	98	0		3,746	100
9/03	12		3,389	98	0		3,746	100
9/04	7		3,396	99	1		3,747	100
9/05	27		3,423	99	7		3,754	100
9/06	8		3,431	100	0		3,754	100
9/07	3		3,434	100	1		3,755	100
9/08	0		3,434	100	0		3,755	100
9/09	2		3,436	100	0		3,755	100
9/10	3		3,439	100	0		3,755	100
9/11	0		3,439	100	0		3,755	100
9/12	1		3,440	100	2		3,757	100
9/13	0		3,440	100	0		3,757	100
9/14	2		3,442	100	0		3,757	100
9/15	1		3,443	100	0		3,757	100
9/16	1		3,444	100	0		3,757	100
9/17	0		3,444	100	0		3,757	100
9/18	0		3,444	100	0		3,757	100
Total	3,444				3,757			

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

[a] Partial day counts because of a breach in weir, no estimates were made.

[b] The weir was not operational; daily passage was not estimated.

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

Sample Dates (stratum)	Aged Sample Size	Sex	Age Class 1.1 Esc.	1.1 %	1.2 Esc.	1.2 %	1.3 Esc.	1.3 %	1.4 Esc.	1.4 %	2.3 Esc.	2.3 %	1.5 Esc.	1.5 %	Total Esc.	Total %
6/29-7/26	65	M		13.8		29.2		21.5		3.1		0.0		0.0		67.7
Season [a]		F		0.0		0.0		18.5		10.8		1.5		1.5		32.3
		Subtotal		13.8		29.2		40.0		13.8		1.5		1.5	2,244	100.0
		95% C. I.		(± 8.3)		(± 11.0)		(± 11.8)		(± 8.3)		(± 3.0)		(± 3.0)		
Grand	1,450	M	154	0.8	4,051	21.7	4,401	23.6	2,715	14.6	12	0.1	74	0.4	11,415	61.3
Total [b]		F	0	0.0	5	0.0	1,508	8.1	5,144	27.6	0	0.0	494	2.7	7,212	38.7
		Total	154	0.8	4,056	21.8	5,909	31.7	7,859	42.2	12	0.1	569	3.1	18,627	100.0

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

[a] Samples did not achieve minimum sample objectives and were not applied to the escapement.

[b] The number of fish in "Grand total" are the sums of historical "Season" totals; percentages are derived from those sums. Years included are 1991, 1995, 2000, 2002, 2003, and 2007.

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

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	2.3	1.5
6/29-7/26 Season	M	Mean Length	387	532	722	792	-	-
		Std. Error	10	17	14	26	-	-
		Range	333-427	386-677	635-786	766-818	-	-
		Sample Size	9	19	14	2	0	0
	F	Mean Length	-	-	784	853	800	862
		Std. Error	-	-	17	19	-	-
		Range	-	-	690-875	775-911	800-800	862-862
		Sample Size	0	0	12	7	1	1
Grand Total [a]	M	Mean Length	354	538	706	841	725	886
		Range	240-550	385-850	550-910	680-1035	725-725	700-900
		Sample Size	13	231	287	167	1	6
	F	Mean Length	-	-	792	851	-	888
		Range	-	-	560-953	470-1070	-	705-990
		Sample Size	0	0	106	333	0	21

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1995, 2000, 2003, and 2007.

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

Sample Dates (Stratum)	Aged Sample Size	Sex	Age Class 0.3 Esc.	0.3 %	1.2 Esc.	1.2 %	1.3 Esc.	1.3 %	2.2 Esc.	2.2 %	1.4 Esc.	1.4 %	2.3 Esc.	2.3 %	Total Esc.	Total %
7/7-11	174	M	139.7988506	0.6	419	1.7	9,786	40.2	140	0.6	140	0.6	699	2.9	11,324	46.6
(6/25-7/11)		F	419.3965517	1.7	280	1.1	11,603	47.7	140	0.6	280	1.1	280	1.1	13,001	53.4
		Subtotal	559.1954023	2.3	699	2.9	21,389	87.9	280	1.1	419	1.7	979	4.0	24,325	100.0
7/14-26	133	M	86	0.8	258	2.3	4,042	35.3	0	0.0	344	3.0	172	1.5	4,902	42.9
(7/12-9/18)		F	86	0.8	688	6.0	5,246	45.9	86	0.8	172	1.5	258	2.3	6,535	57.1
		Subtotal	172	1.5	946	8.3	9,287	81.2	86	0.8	516	4.5	430	3.8	11,437	100.0
Season	307	M	226	0.6	677	1.9	13,828	38.7	140	0.4	484	1.4	871	2.4	16,225	45.4
		F	505	1.4	968	2.7	16,849	47.1	226	0.6	452	1.3	538	1.5	19,537	54.6
		Subtotal	731	2.0	1,645	4.6	30,676	85.8	366	1.0	935	2.6	1,409	3.9	35,762	100.0
		95% C. I.		(±1.7)		(± 2.3)		(± 3.9)		(±1.2)		(± 1.7)		(± 2.2)		
Grand Total [a]	7,742	M	6,115	0.9	33,457	5.2	235,591	36.4	4,848	0.7	11,156	1.7	13,063	2.0	304,864	47.1
		F	7,055	1.1	66,898	10.3	241,310	37.3	7,173	1.1	7,910	1.2	10,812	1.7	341,789	52.9
			13,170	2.0	100,356	15.5	476,901	73.7	12,021	1.9	19,066	2.9	23,875	3.7	646,652	100.0

Note: The number of fish in each stratum category are derived from sample percentages; sum discrepancies are attributed to rounding errors. The number of fish in "Season" 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 and include the years 1987, 1990, 1995, 1997, and 1999 through 2007–2009. Minor age classes not presented above are included in the "Grand Total" summations; however, those minor age classes are not presented in the Age Class columns.

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

Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	1.3	2.2	1.4	2.3
7/7-11 (6/25-7/11)	M	Mean Length	569	526	572	548	583	554
		Std. Error	-	19	2	-	-	11
		Range	533-586	471-581	483-630	-	-	523-580
		Sample Size	2	6	117	1	1	5
	F	Mean Length	540	469	532	497	572	548
		Std. Error	9	11	2	-	10	8
		Range	527-556	458-479	484-580	-	562-582	540-555
		Sample Size	3	2	83	1	2	2
7/14-26 (7/12-9/18)	M	Mean Length	533	544	572		596	601
		Std. Error	-	24	5		19	23
		Range	-	500-581	483-630		541-625	578-624
		Sample Size	1	3	47		4	2
	F	Mean Length	568	513	531	494	537	556
		Std. Error	-	7	3	-	29	12
		Range	-	493-540	428-580	-	508-566	540-580
		Sample Size	1	8	61	1	2	3
Season	M	Mean Length	569	526	572	548	587	569
		Std. Error	-	19	2	-	19	10
		Range	533-586	471-581	483-630	-	541-625	523-624
		Sample Size	2	6	117	1	5	7
	F	Mean Length	549	483	532	496	561	550
		Std. Error	9	7	2	-	12	6
		Range	527-568	458-540	428-580	494-497	508-582	540-580
		Sample Size	4	10	144	2	4	5
Grand Total [a]	M	Mean Length	579	524	578	535	599	576
		Range	495-750	410-630	430-685	480-619	505-679	450-640
		Sample Size	71	479	2,878	73	134	185
	F	Mean Length	545	492	543	492	558	537
		Range	490- 595	400- 597	420- 687	405-590	480-625	469-617
		Sample Size	86	1,024	2,967	132	103	146

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1987, 1990, 1995, 1997, and 1999–2009.

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

Sample Dates (Stratum)	Aged Sample Size	Sex	Age Class 0.2 Esc.	0.2 %	0.3 Esc.	0.3 %	0.4 Esc.	0.4 %	0.5 Esc.	0.5 %	Total Esc.	Total %
7/7-11	95	M	0	0.0	2,391	26.3	1,435	15.8	0	0.0	3,826	42.1
(6/25-7/13)		F	0	0.0	3,635	40.0	1,626	17.9	0	0.0	5,261	57.9
		Subtotal	0	0.0	6,026	66.3	3,061	33.7	0	0.0	9,087	100.0
7/14-17	94	M	374	2.1	4,868	27.7	1,498	8.5	187	1.1	6,928	39.4
(7/14-9/18)		F	187	1.1	8,987	51.1	1,498	8.5	0	0.0	10,672	60.6
		Subtotal	562	3.2	13,855	78.7	2,996	17.0	187	1.1	17,600	100.0
Season [a]	189	M		1.4		27.2		11.0		0.7		40.3
		F		0.7		47.3		11.7		0.0		59.7
		Total		2.1		74.5		22.7		0.7	26,687	100.0
		95% C. I.		(± 2.0)		(± 6.4)		(± 6.0)		(± 1.4)		
Grand Total [b]	9,401	M	1,458	0.4	111,873	29.1	69,202	18.0	2,783	0.7	185,312	48.2
		F	2,901	0.8	129,563	33.7	65,168	16.9	1,691	0.4	199,326	51.8
			4,359	1.1	241,436	62.8	134,370	34.9	4,474	1.2	384,638	100.0

Note: The number of fish in each stratum category are derived from sample percentages; sum discrepancies are attributed to rounding errors.

[a] Sampling dates do not meet criteria for estimating escapement percentages for some or all of the strata; "Season" is not included in the "Grand Total".

[b] The number of fish in the "Grand total" are the sums of historical "Season" totals; percentages are derived from those sums. Years included are 1990–1991, 1997–1999, and 2001–2008.

Table 8.–Mean length (mm) of chum salmon escapement through the Middle Fork Goodnews River weir, 2010.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
7/7-11 (6/25-7/13)	M	Mean Length	-	573	585	-
		Std. Error	-	5	5	-
		Range	-	517-612	550-613	-
		Sample Size	0	25	15	0
	F	Mean Length	-	557	576	-
		Std. Error	-	5	8	-
		Range	-	509-659	527-661	-
		Sample Size	0	38	17	0
7/14-17 (7/14-9/18)	M	Mean Length	563	575	579	673
		Std. Error	10	5	8	-
		Range	553-572	532-628	530-602	-
		Sample Size	2	26	8	1
	F	Mean Length	525	551	556	-
		Std. Error	-	4	7	-
		Range	-	491-637	521-585	-
		Sample Size	1	48	8	0
Season [a]	M	Mean Length	563	574	581	673
		Std. Error	10	4	6	-
		Range	553-572	517-628	530-613	-
		Sample Size	2	51	23	1
	F	Mean Length	525	553	563	-
		Std. Error	-	3	5	-
		Range	-	491-659	521-661	-
		Sample Size	1	86	25	0
Grand Total [b]	M	Mean Length	556	589	611	624
		Range	495-592	480-685	503-710	522-692
		Sample Size	47	2575	1639	71
	F	Mean Length	531	557	574	580
		Range	485-560	475-640	469-675	500-645
		Sample Size	102	3,159	1,569	36

[a] Sampling dates do not meet criteria for estimating escapement percentages for some or all of the strata; "Season" is not included in the "Grand Total".

[b] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1990 through 1991, 1997 through 1999, and 2001–2008.

Table 9.–Age and sex composition of coho salmon escapement, Middle Fork Goodnews River weir, 2010.

Sample Dates (Stratum)	Aged Sample Size	Sex	Age Class 1.1 Esc.	1.1 %	2.1 Esc.	2.1 %	3.1 Esc.	3.1 %	Total Esc.	Total %
8/27-9/6	343	M	1,405	6.4	8,430	38.5	383	1.7	10,219	46.6
(7/29-9/8)		F	1,533	7.0	9,835	44.9	319	1.5	11,687	53.4
		Subtotal	2,938	13.4	18,266	83.4	703	3.2	21,906	100.0
9/9	32	M	0	0.0	246	43.8	18	3.1	263	46.9
(9/9)		F	18	3.1	246	43.8	35	6.3	299	53.1
		Subtotal	18	3.1	492	87.5	53	9.4	562	100.0
9/11-9/13	63	M	131	9.5	457	33.3	0	0.0	588	42.9
(9/10-9/18)		F	44	3.2	675	49.2	65	4.8	783	57.1
		Subtotal	174	12.7	1,132	82.5	65	4.8	1,371	100.0
Season [a]	438	M		6.4		38.3		1.7		46.4
		F		6.7		45.1		1.8		53.6
		Subtotal		13.1		83.4		3.4	23,839	100.0
		95% C. I.		(± 3.3)		(± 3.7)		(± 1.8)		
Grand Total [b]	4,369	M	14,002	4.5	131,869	42.8	6,684	2.2	152,556	49.5
		F	11,402	3.7	137,310	44.6	6,718	2.2	155,428	50.5
		Total	25,404	8.2	269,179	87.4	13,402	4.4	307,984	100.0

Note: The number of fish in each stratum category are derived from sample percentages; sum discrepancies are attributed to rounding errors.

[a] Sampling dates do not meet criteria for estimating escapement percentages for some or all of the strata; "Season" is not included in the "Grand Total".

[b] The number of fish in "Grand total" are the sums of historical "Season" totals; percentages are derived from those sums. Years included are 1998 - 2004, and 2006–2009.

Table 10.–Mean length (mm) of coho salmon escapement, Middle Fork Goodnews River weir, 2010.

Sample Dates (stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/27-9/6 (7/29-9/8)	M	Mean Length	592	600	600
		Std. Error	10	4	15
		Range	440-655	428-697	556-641
		Sample Size	22	132	6
	F	Mean Length	595	595	596
		Std. Error	7	3	18
		Range	511-640	444-690	559-652
		Sample Size	24	154	5
9/9 (9/9)	M	Mean Length	-	619	630
		Std. Error	-	10	-
		Range	-	555-676	-
		Sample Size	0	14	1
	F	Mean Length	621	604	562
		Std. Error	-	8	14
		Range	-	534-645	548-576
		Sample Size	1	14	2
9/11-9/13 (9/10-9/18)	M	Mean Length	597	594	-
		Std. Error	15	9	-
		Range	561-638	505-651	-
		Sample Size	6	21	0
	F	Mean Length	640	599	596
		Std. Error	2	8	37
		Range	638-642	514-675	522-635
		Sample Size	2	31	3
Season [a]	M	Mean Length	592	601	601
		Std. Error	10	4	15
		Range	440-655	428-697	556-641
		Sample Size	28	167	7
	F	Mean Length	598	596	595
		Std. Error	6	3	16
		Range	511-642	444-690	522-652
		Sample Size	27	199	10
Grand Total [b]	M	Mean Length	571	590	596
		Range	400-660	387-720	353-710
		Sample Size	179	1,812	132
	F	Mean Length	581	594	592
		Range	480- 677	440-705	444-665
		Sample Size	125	1,807	164

[a] Sampling dates do not meet criteria for estimating escapement percentages for some or all of the strata; "Season" is not included in the "Grand Total".

[b] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1998–2004, and 2007–2009.

Table 11.–Age and sex composition of Chinook salmon harvest, District W-5 commercial fishery, 2010.

Sample Dates (Stratum)	Aged Sample Size	Sex	Age Class 1.1 Catch	1.1 %	1.2 Catch	1.2 %	1.3 Catch	1.3 %	2.2 Catch	2.2 %	1.4 Catch	1.4 %	1.5 Catch	1.5 %	Total	Total %
6/28	212	M	3	0.9	113	40.6	103	36.8	3	0.9	16	5.7	1	0.5	238	85.4
(6/28)		F	0	0.0	0	0.0	32	11.3	0	0.0	8	2.8	1	0.5	41	14.6
		Subtotal	3	0.9	113	40.6	134	48.1	3	0.9	24	8.5	3	0.9	279	100.0
7/1	194	M	0	0.0	107	21.1	261	51.5	0	0.0	29	5.7	3	0.5	399	78.9
(7/1)		F	0	0.0	0	0.0	68	13.4	0	0.0	34	6.7	5	1.0	107	21.1
		Subtotal	0	0.0	107	21.1	329	64.9	0	0.0	63	12.4	8	1.5	506	100.0
7/5	215	M	36	3.7	346	35.8	274	28.4	0	0.0	45	4.7	0	0.0	702	72.6
(7/5-8/18)		F	0	0.0	0	0.0	153	15.8	0	0.0	108	11.2	4	0.5	265	27.4
		Subtotal	36	3.7	346	35.8	427	44.2	0	0.0	153	15.8	4	0.5	967	100.0
Season	621	M	39	2.2	566	32.3	638	36.4	3	0.2	89	5.1	4	0.2	1,339	76.4
		F	0	0.0	0	0.0	252	14.4	0	0.0	150	8.5	11	0.6	1,752	23.6
		Subtotal	39	2.2	566	32.3	890	50.8	3	0.2	239	13.7	15	0.9	1,752	100.0
		95% C. I.		(± 1.2)		(±3.4)		(± 3.6)		(± 0.1)		(± 2.3)		(± 0.6)		
Grand Total [a]	3,597	M	111	0.4	6,975	25.2	6,567	23.7	43	0.2	2,717	9.8	162	0.6	16,669	60.2
		F	0	0.0	489	1.8	4,573	16.5	0	0.0	5,587	20.2	284	1.0	11,008	39.8
		Total	111	0.4	7,464	27.0	11,140	40.3	43	0.2	8,305	30.0	446	1.6	27,676	100.0

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

[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, 1992, 1997, 1998, 2000–2002, 2007, and 2009.

Table 12.–Mean length (mm) of Chinook salmon harvest, District W-5 commercial fishery, 2010.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	2.2	1.3	1.4	1.5
6/28	M	Mean Length	406	529	470	713	811	914
(6/28)		Std. Error	11	5	32	7	20	-
		Range	395-417	420-627	438-502	541-842	710-910	-
		Sample Size	2	86	2	78	12	1
	F	Mean Length	-	-	-	774	777	803
		Std. Error	-	-	-	9	21	-
		Range	-	-	-	649-824	729-864	-
		Sample Size	0	0	0	24	6	1
7/1	M	Mean Length	-	544	-	703	781	846
(7/1)		Std. Error	-	8	-	6	25	-
		Range	-	436-668	-	527-831	654-906	-
		Sample Size	0	41	0	100	11	1
	F	Mean Length	-	-	-	776	809	889
		Std. Error	-	-	-	9	11	3
		Range	-	-	-	672-857	729-883	886-892
		Sample Size	0	-	0	26	13	2
7/5	M	Mean Length	386	517	-	704	840	-
(7/5-8/18)		Std. Error	9	5	-	10	16	-
		Range	341-426	416-645	-	543-836	745-889	-
		Sample Size	8	77	0	61	10	0
	F	Mean Length	-	-	-	788	826	881
		Std. Error	-	-	-	8	10	-
		Range	-	-	-	701-930	728-908	-
		Sample Size	0	-	0	34	24	1
Season	M	Mean Length	390	527	470	705	818	870
		Std. Error	7	4	32	6	12	-
		Range	341-426	416-668	438-502	527-842	654-910	846-914
		Sample Size	10	204	2	239	33	2
	F	Mean Length	-	-	-	782	813	871
		Std. Error	-	-	-	5	7	3
		Range	-	-	-	649-930	728-908	803-892
		Sample Size	0	0	0	84	43	4
Grand Total [a]	M	Mean Length	392	545	610	688	826	906
		Range	325- 464	450- 774	500- 719	539- 876	570-1030	865-1000
		Sample Size	11	849	2	609	247	11
	F	Mean Length		614		764	847	893
		Range		505- 650		568- 995	620- 1012	819- 1042
		Sample Size	0	16	0	222	530	17

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Years included are 1991, 1992, 1997, 1998, 2000–2002, 2007, and 2009.

Table 13.–Age and sex composition of sockeye salmon harvest, District W-5 commercial fishery, 2010.

Sample Dates (Stratum)	Aged Sample Size	Sex	Age Class 0.3 Catch	%	1.2 Catch	%	0.4 Catch	%	1.3 Catch	%	2.2 Catch	%	1.4 Catch	%	2.3 Catch	%	Total	
7/7	181	M	203	1.1	1,014	5.5	0	0.0	8,824	48.1	0	0.0	406	2.2	101	0.6	10,549	57.5
(6/28-7/7)		F	0	0.0	0	0.0	203	1.1	7,506	40.9	0	0.0	0	0.0	101	0.6	7,810	42.5
		Subtotal	203	1.1	1,014	5.5	203	1.1	16,330	89.0	0	0.0	406	2.2	203	1.1	18,359	100.0
7/9	101	M	36	1.0	394	10.9	0	0.0	1,933	53.5	0	0.0	72	2.0	0	0.0	2,435	67.3
(7/9)		F	36	1.0	72	2.0	0	0.0	1,038	28.7	0	0.0	0	0.0	36	1.0	1,181	32.7
		Subtotal	72	2.0	465	12.9	0	0.0	2,972	82.2	0	0.0	72	2.0	36	1.0	3,616	100.0
7/12	196	M	140	1.5	420	4.6	140	1.5	4,854	53.1	0	0.0	93	1.0	47	0.5	5,694	62.2
(7/12-7/14)		F	327	3.6	0	0.0	47	0.5	2,987	32.7	0	0.0	93	1.0	0	0.0	3,453	37.8
		Subtotal	467	5.1	420	4.6	187	2.0	7,840	85.7	0	0.0	187	2.0	47	0.5	9,147	100.0
7/19	206	M	145	1.5	3,044	30.6	48	0.5	3,430	34.5	290	2.9	242	2.4	48	0.5	7,247	72.8
(7/16-8/18)		F	0	0.0	483	4.9	0	0.0	2,126	21.4	48	0.5	48	0.5	0	0.0	2,705	27.2
		Subtotal	145	1.5	3,527	35.4	48	0.5	5,556	55.8	338	3.4	290	2.9	48	0.5	9,952	100.0
Season	684	M	524	1.3	4,872	11.9	188	0.5	19,041	46.4	290	0.7	812	2.0	196	0.5	25,923	63.1
		F	362	0.9	555	1.4	250	0.6	13,657	33.2	48	0.1	142	0.3	137	0.3	15,151	36.9
		Subtotal	886	2.2	5,426	13.2	438	1.1	32,698	79.6	338	0.8	954	2.3	334	0.8	41,074	100.0
		95% C. I.		(± 1.2)		(±2.3)		(± 0.9)		(± 2.9)		(± 0.6)		(± 1.2)		(± 0.6)		
Grand Total [a]	8,695	M	10,725	1.7	47,664	7.3	1,405	0.2	256,376	39.5	10,566	1.6	9,142	1.4	26,949	4.1	365,104	56.2
		F	10,186	1.6	26,965	4.2	1,763	0.3	214,885	33.1	6,188	1.0	5,873	0.9	17,476	2.7	284,361	43.8
		Total	20,910	3.2	74,629	11.5	3,168	0.5	471,261	72.6	16,754	2.6	15,015	2.3	44,425	6.8	649,465	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. Minor age classes present in the historical data, but not observed in the 2007 harvest are not presented in the "Grand Total".

[a] The numbers of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1985, 1986, 1988–1994, 1997–2004, 2007, 2009, 2010.

Table 14.–Mean length (mm) of sockeye salmon harvest, District W-5 commercial fishery, 2010.

Sample Dates			Age Class											
(Stratum Dates)	Sex		0.3		1.2		0.4	1.3		2.2		1.4		2.3
7/7	M	Mean Length	561		514		-	569		-		569		554
(6/28-7/7)		Std. Error	10		9		-	2		-		5		-
		Range	551-570	0-335	447-553	0-335	-	523-606	0-335	-		559-580		-
		Sample Size	2		10		0	87		0		4		1
	F	Mean Length	-		-		575	540		-		-		537
		Std. Error	-		-		16	2		-		-		-
		Range	-		-		559-591	491-594		-		-		-
		Sample Size	0		0		2	74		0		0		1
7/9	M	Mean Length	537		533		-	571		-		583		-
(7/9)		Std. Error	-		8		-	2		-		24		-
		Range	-		500-597		-	533-605		-		559-607		-
		Sample Size	1		11		0	54		0		2		0
	F	Mean Length	553		543		-	543		-		-		565
		Std. Error	-		16		-	3		-		-		-
		Range	-		527-559		-	507-581		-		-		-
		Sample Size	1		2		0	29		0		0		1
7/12	M	Mean Length	542		515		610	562		-		576		583
(7/12-7/14)		Std. Error	5		18		8	2		-		9		-
		Range	532-549		382-567		598-624	507-622		-		567-584		-
		Sample Size	3		9		3	104		0		2		1
		8695												
	F	Mean Length	527		-		552	540		-		549		-
		Std. Error	8		-		-	3		-		23		-
		Range	492-546		-		-	499-606		-		526-571		-
		Sample Size	7		0		1	64		0		2		0

-continued-

Table 14.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/19 (7/16-8/18)	M	Mean Length	588	531	595	559	534	556	546
		Std. Error	8	4	-	4	4	18	-
		Range	573-599	459-609	-	459-616	518-549	496-603	-
		Sample Size	3	63	1	71	6	5	1
	F	Mean Length	-	520	-	536	516	551	-
		Std. Error	-	11	-	3	-	-	-
		Range	-	469-567	-	490-575	-	-	-
		Sample Size	0	10	0	44	1	1	0
Season	M	Mean Length	561	520	602	565	534	569	559
		Std. Error	5	6	8	1	4	6	-
		Range	532-599	382-609	595-624	459-622	518-549	496-607	546-583
		Sample Size	9	93	4	316	6	13	4
	F	Mean Length	535	526	567.3514506	539	516	550	542
		Std. Error	8	9	16	1	-	23	-
		Range	492-553	469-567	552-591	490-606	-	526-571	537-565
		Sample Size	8	12	3	211	1	3	2
Grand Total [a]	M	Mean Length	580	539	599	587	554	596	589
		Range	474- 604	382- 656	566- 614	435- 696	492- 652	526- 680	532- 675
		Sample Size	158	928	55	4,603	185	179	466
	F	Mean Length	548	517	567	557	518	568	557
		Range	482- 575	393- 645	535- 600	436- 646	483- 638	525- 614	505- 680
		Sample Size	150	524	39	3,789	96	140	315

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Years included are 1985, 1986, 1988-1994, 1997-2004, 2007, 2009, 2010.

Table 15.–Age and sex composition of chum salmon harvest from the District W-5 commercial fishery, 2010.

Sample Dates (Stratum)	Aged Sample Size	Sex	Age Class 0.2 Catch	0.2 %	0.3 Catch	0.3 %	0.4 Catch	0.4 %	0.5 Catch	0.5 %	Total Catch	Total %
7/7-7/9	314	M	254	1.6	7,274	45.5	2,696	16.9	458	2.9	10,682	66.9
(6/28-7/9)		F	0	0.0	4,018	25.2	1,119	7.0	153	1.0	5,290	33.1
		Subtotal	254	1.6	11,292	70.7	3,815	23.9	610	3.8	15,972	100.0
7/16-7/19	438	M	200	1.8	5,071	46.3	1,174	10.7	50	0.5	6,495	59.4
(7/12-8/18)		F	25	0.2	3,697	33.8	675	6.2	50	0.5	4,447	40.6
		Subtotal	225	2.1	8,769	80.1	1,849	16.9	100	0.9	10,942	100.0
Season	752	M	454	1.7	12,345	45.9	3,870	14.4	508	1.9	17,177	63.8
		F	25	0.1	7,716	28.7	1,794	6.7	203	0.8	9,737	36.2
		Subtotal	479	1.8	20,061	74.5	5,664	21.0	710	2.6	26,914	100.0
		95% C. I.		(± 1.0)		(± 3.3)		(± 3.1)		(± 1.3)		
Grand	9,204	M	1,239	0.5	66,899	28.6	50,864	21.8	1,938	0.8	120,941	51.8
Total [a]		F	336	0.1	58,751	25.1	52,664	22.5	992	0.4	112,743	48.2
		Total	1,576	0.7	125,650	53.8	103,527	44.3	2,930	1.3	233,683	100.0

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

[a] The numbers of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1986–1992, 1997–2003, 2007, 2009, and 2010.

Table 16.–Mean length (mm) of chum salmon harvest, the District W-5 commercial fishery 2010.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
7/7-7/9 (6/28-7/9)	M	Mean Length	536	571	584	576
		Std. Error	13	2	4	14
		Range	499-575	494-627	521-649	529-639
		Sample Size	5	143	53	9
	F	Mean Length	-	553	556	558
		Std. Error	-	2	6	15
		Range	-	486-600	512-626	536-586
		Sample Size	0	79	22	3
7/16-7/19 (7/12-8/18)	M	Mean Length	534	567	586	574
		Std. Error	11	2	4	2
		Range	475-574	490-645	519-674	572-575
		Sample Size	8	203	47	2
	F	Mean Length	505	549	555	562
		Std. Error	-	2	5	5
		Range	505-505	502-606	482-586	557-566
		Sample Size	1	148	27	2
Season	M	Mean Length	535	569	585	575
		Std. Error	9	1	3	8
		Range	475-575	490-645	519-674	529-639
		Sample Size	13	346	100	11
	F	Mean Length	505	551	556	559
		Std. Error	-	2	4	9
		Range	505-505	486-606	482-626	536-586
		Sample Size	1	227	49	5
Grand Total [a]	M	Mean Length	541	587	607	615
		Range	496- 593	449- 889	498- 725	519- 703
		Sample Size	56	2,675	1,935	70
	F	Mean Length	546	565	579	600
		Range	522- 598	430- 700	491- 680	565- 658
		Sample Size	16	2,477	1,927	39

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Years included are 1986–1992, 1997–2003, 2007, 2009, and 2010.

Table 17.–Age and sex composition of coho salmon harvest from the District W-5 commercial fishery, 2010.

Sample Dates (Stratum)	Aged Sample Size	Sex	Age Class 1.1 Catch	1.1 %	2.1 Catch	2.1 %	3.1 Catch	3.1 %	Total Catch	Total %
8/2	205	M	24	4.4	382	69.3	5	1.0	412	74.6
(6/28-8/18)		F	8	1.5	124	22.4	8	1.5	140	25.4
		Subtotal	32	5.9	506	91.7	13	2.4	552	100.0
8/9	193	M	116	5.2	1,141	50.8	70	3.1	1,327	59.1
(8/6-13)		F	58	2.6	850	37.8	12	0.5	920	40.9
		Subtotal	175	7.8	1,991	88.6	81	3.6	2,247	100.0
8/16	202	M	208	9.9	946	45.0	10	0.5	1,165	55.4
(8/16-18)		F	104	5.0	832	39.6	0	0.0	936	44.6
		Subtotal	312	14.9	1,779	84.7	10	0.5	2,101	100.0
Season	600	M	349	7.1	2,470	50.4	86	1.7	2,904	59.3
		F	170	3.5	1,806	36.9	20	0.4	1,996	40.7
		Subtotal	519	10.6	4,276	87.3	105	2.2	4,900	100.0
		95% C. I.		(± 2.6)		(± 2.9)		(± 1.2)		
Grand	4,820	M	11,032	4.5	114,751	46.4	5,360	2.2	131,144	53.0
Total [a]		F	7,317	3.0	104,798	42.4	4,076	1.6	116,191	47.0
		Total	18,350	7.4	219,549	88.8	9,436	3.8	247,334	100.0

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

[a] The numbers of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1990–1996, 1998–2001, 2004, and 2010.

Table 18.–Mean length (mm) of coho salmon harvest, the District W-5 commercial fishery, 2010.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/2 (6/28-8/18)	M	Mean Length	557	553	556
		Std. Error	14	4	1
		Range	503-620	448-644	555-556
		Sample Size	9	142	2
	F	Mean Length	592	580	586
		Std. Error	11	4	30
		Range	580-615	507-646	540-642
		Sample Size	3	46	3
8/9 (8/6-13)	M	Mean Length	521	569	577
		Std. Error	14	5	25
		Range	455-595	409-650	502-667
		Sample Size	10	98	6
	F	Mean Length	566	586	571
		Std. Error	25	3	-
		Range	473-614	517-660	-
		Sample Size	5	73	1
8/16 (8/16-18)	M	Mean Length	569	576	454
		Std. Error	8	4	-
		Range	495-621	491-671	-
		Sample Size	20	91	1
	F	Mean Length	564	583	-
		Std. Error	11	3	-
		Range	520-625	481-652	-
		Sample Size	10	80	0
Season	M	Mean Length	546	570	522
		Std. Error	7	3	20
		Range	455-621	409-671	454-667
		Sample Size	39	331	9
	F	Mean Length	568	584	574
		Std. Error	12	2	30
		Range	473-625	481-660	540-642
		Sample Size	18	199	4
Grand Total [a]	M	Mean Length	580	607	605
		Range	407- 645	399- 697	461- 640
		Sample Size	96	1,160	40
	F	Mean Length	609	604	616
		Range	473- 645	430- 697	438- 621
		Sample Size	63	998	31

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths. Years included are 1990–1996, 1998–2001, 2004, and 2010.

Table 19.–Daily weather and hydrological observations taken at approximately 10:00 a.m., Middle Fork Goodnews River weir site, 2010.

Date	Wind (Dir./Speed)	Precipitation mm/24hr	Air Temp. °C	Water Temp °C	Cloud Cover %/altitude (ft)	Water Level (cm)
6/27	W/5	0.0	9	10	50/2000	49
6/28	Calm	0.0	8	10	100/1000	45
6/29	Calm	1.3	9	10	100/1000	44
6/30	Calm	0.0	9	10	100/1000	42
7/01	E/5	7.6	10	10	100/1000	40
7/02	Calm	0.5	9	10	100/1000	40
7/03	Calm	3.8	9	9	100/1000	40
7/04	Calm	0.0	9	10	100/1500	40
7/05	Calm	2.5	9	9	100/500	40
7/06	S/5	7.9	9	9	100/1000	45
7/07	Calm	2.5	9	10	90/2000	42
7/08	Calm	1.3	11	9	50/2000	41
7/09	Calm	0.0	10	9	80/2000	38
7/10	E/5	2.5	10	9	100/1000	39
7/11	Calm	0.0	10	9	100/1000	38
7/12	Calm	0.0	10	10	100/500	37
7/13	N/5	0.0	12	11	20/2000	36
7/14	S/10	0.0	10	10	100/300	36
7/15	Calm	0.0	10	10	100/1000	35
7/16	Calm	0.0	12	11	100/1000	36
7/17	Calm	0.0	10	11	100/1000	32
7/18	S/5	5.6	10	10	100/500	31
7/19	SW/5	3.8	9	10	100/500	32
7/20	W/10	12.7	9	10	100/1000	33
7/21	S/5	5.1	9	10	100/1000	38
7/22	Calm	5.3	11	10	100/1000	39
7/23	SW/10	6.4	8	9	100/500	38
7/24	Calm	0.8	8	10	100/1500	37
7/25	W/5	0.0	8	9	100/500	36
7/26	Calm	2.5	9	10	100/500	36
7/27	E/5	0.0	9	10	100/500	36
7/28	Calm	10.7	9	10	100/500	37
7/29	Calm	46.5	9	8	100/500	64
7/30	E/5	10.2	12	8	100/1000	85
7/31	E/5	2.8	11	9	100/1000	100
8/01	Calm	0.5	11	9	100/1500	96
8/02	E/10	0.5	11	8	90/1000	87
8/03	E/5	0.5	11	8	100/1000	79
8/04	W/5	0.0	12	8	90/1000	75
8/05	S/5	0.5	9	9	100/1000	68
8/06	E/5	16.8	10	9	100/500	66
8/07	W/5	13.7	10	9	100/500	67
8/08	E/5	10.2	10	9	100/1000	65
8/09	SW/5	10.9	9	8	100/500	72
8/10	Calm	4.1	9	9	100/500	69
8/11	W/5	3.0	9	8	100/300	75
8/12	Calm	5.1	9	8	100/500	75
8/13	Calm	1.5	5	8	80/2000	73

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Table 19.–Page 2 of 2.

Date	Wind (Dir./Speed)	Precipitation mm/24hr	Air Temp. °C	Water Temp °C	Cloud Cover %/altitude (ft)	Water Level (cm)
8/14	E/40	31.8	13	10	100/300	76
8/15	SE/5	13.2	9	8	100/1000	110
8/16	W/15	2.5	9	8	100/500	120
8/17	W/10	12.2	9	8	100/1000	118
8/18	W/5	1.3	10	8	100/1000	115
8/19	W/5	2.5	10	8	100/1000	120
8/20	Calm	0.0	7	8	80/1500	118
8/21	E/5	7.4	10	8	100/500	117
8/22	N/5	5.3	10	8	95/1000	110
8/23	Calm	0.0	11	8	100/1500	95
8/24	Calm	0.0	9	8	100/300	81
8/25	Calm	0.0	7	8	fog	74
8/26	Calm	5.3	9	8	100/500	72
8/27	W/10	7.1	10	8	100/300	70
8/28	Calm	5.1	9	8	100/500	69
8/29	Calm	1.0	9	8	100/500	65
8/30	W/5	0.8	10	8	100/1000	61
8/31	Calm	1.5	11	8	90/1500	60
9/01	Calm	0.0	9	9	100/1500	59
9/02	E/5	1.0	9	9	100/400	57
9/03	SE/5	0.0	10	8	100/1000	55
9/04	Calm	5.1	9	8	100/500	54
9/05	W/5	10.4	10	8	100/300	58
9/06	Calm	20.8	10	8	100/500	61
9/07	SE/5	8.9	10	8	100/500	65
9/08	W/5	3.8	9	8	100/500	66
9/09	E/5	2.0	7	8	80/1000	70
9/10	Calm	0.0	4	7	fog	68
9/11	Calm	0.0	8	8	0	67
9/12	Calm	0.0	5	8	0	64
9/13	Calm	0.0	4	8	20/2500	62
9/14	Calm	0.0	3	7	100/3000	58
9/15	S/5	0.0	5	8	50/2000	57
9/16	Calm	0.0	6	8	80/2000	56
9/17	Calm	0.0	0	7	10/2000	55
9/18	E/5	0.0	8	7	40/3000	51
9/19	E/5	0.0	10	8	40/2000	50
9/20	E/10	1.3	11	9	90/1000	42
Min		0.0	0	7		31
Max		46.5	13	11		120
Average		4.2	9	9		61

Table 20.–District W-5 Commercial harvest by period and exvessel value, 2010.

Date	Permits	Chinook		Sockeye		Chum		Coho	
Caught	Fished	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds
6/28	24	279	4,055	2,615	18,194	2,054	15,113	0	0
7/1	30	506	6,014	5,060	35,050	3,516	26,055	0	0
7/5	37	269	3,950	4,771	34,207	2,143	15,489	0	0
7/7	33	183	2,676	5,913	42,110	3,452	24,951	0	0
7/9	30	100	1,775	3,616	25,964	4,807	34,399	0	0
7/12	26	103	1,650	4,387	30,802	2,945	20,753	0	0
7/13	23	38	571	2,228	16,375	1,141	8,120	0	0
7/14	26	68	1,111	2,532	17,888	1,867	13,057	0	0
7/16	27	37	648	2,138	15,005	1,387	9,541	0	0
7/17	14	13	205	1,052	7,521	700	4,685	0	0
7/19	19	59	886	1,264	8,650	909	6,143	0	0
7/21	18	24	406	873	5,960	763	5,044	16	117
7/23	8	16	264	343	2,413	350	2,288	10	70
7/26	14	6	92	850	5,768	365	2,402	83	580
7/28	13	12	255	642	4,286	167	1,096	51	370
7/30	15	15	174	719	4,766	114	730	108	749
8/2	10	4	74	546	3,691	107	725	284	2,180
8/6	10	4	95	403	2,580	43	266	497	3,628
8/9	10	4	77	296	1,785	25	163	460	3,515
8/13	19	8	157	496	3,099	36	243	1,290	9,687
8/16	12	2	26	111	670	9	62	723	5,607
8/18	14	2	20	219	1,366	14	86	1,378	11,484
Total	48	1,752	25,181	41,074	288,150	26,914	191,411	4,900	37,987
Avg. Wt.		14.4		7.0		7.1		7.8	
Avg. Price		$1.78		$1.16		$0.26		$1.18	
Total Exvessel Value		$44,910		$334,366		$49,679		$44,706	

Total Fish	74,640
Total Pounds	542,729
Total Exvessel Value	$473,662

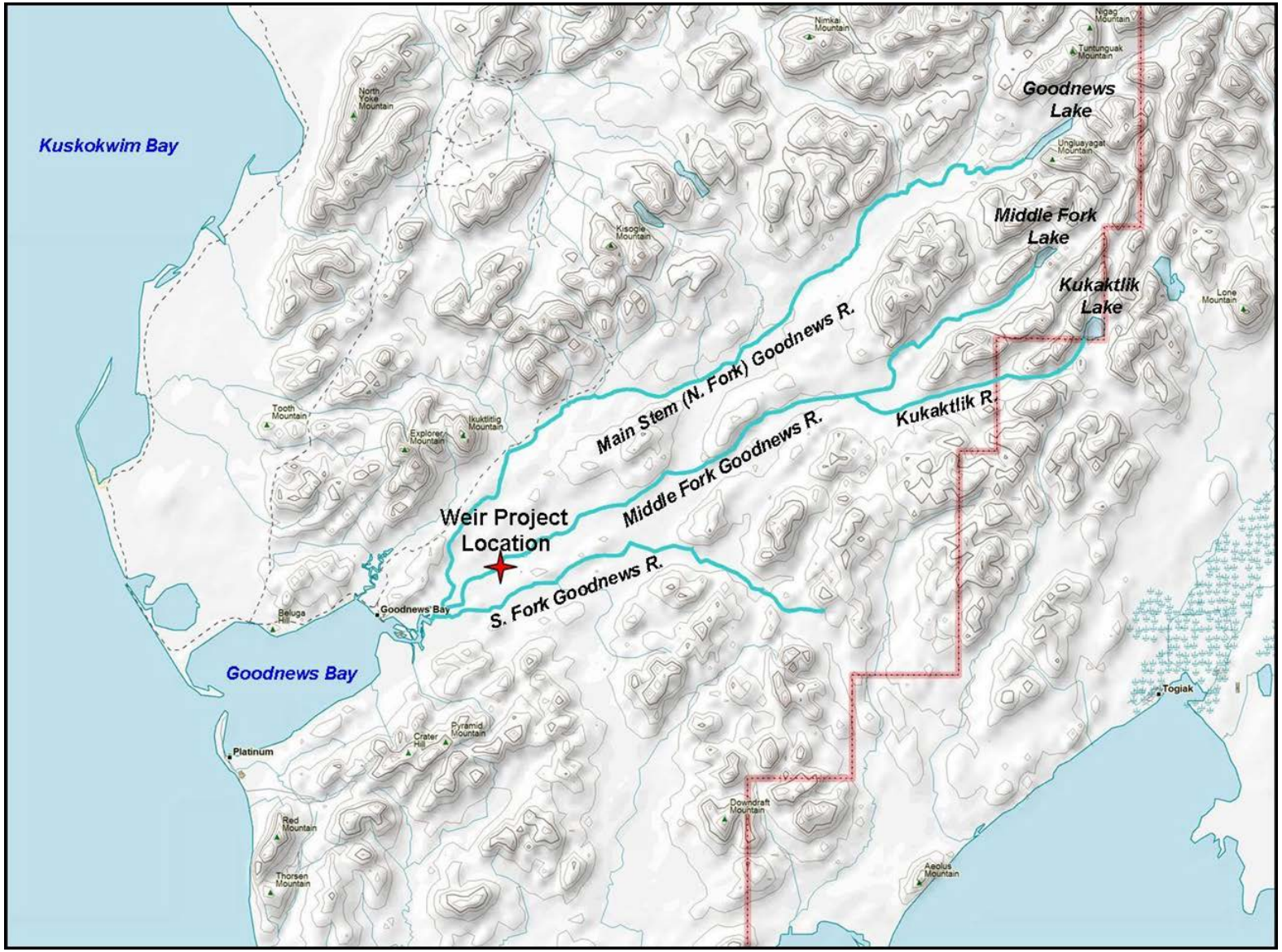


Figure 1.–Goodnews River drainage, Kuskokwim Bay, Alaska.

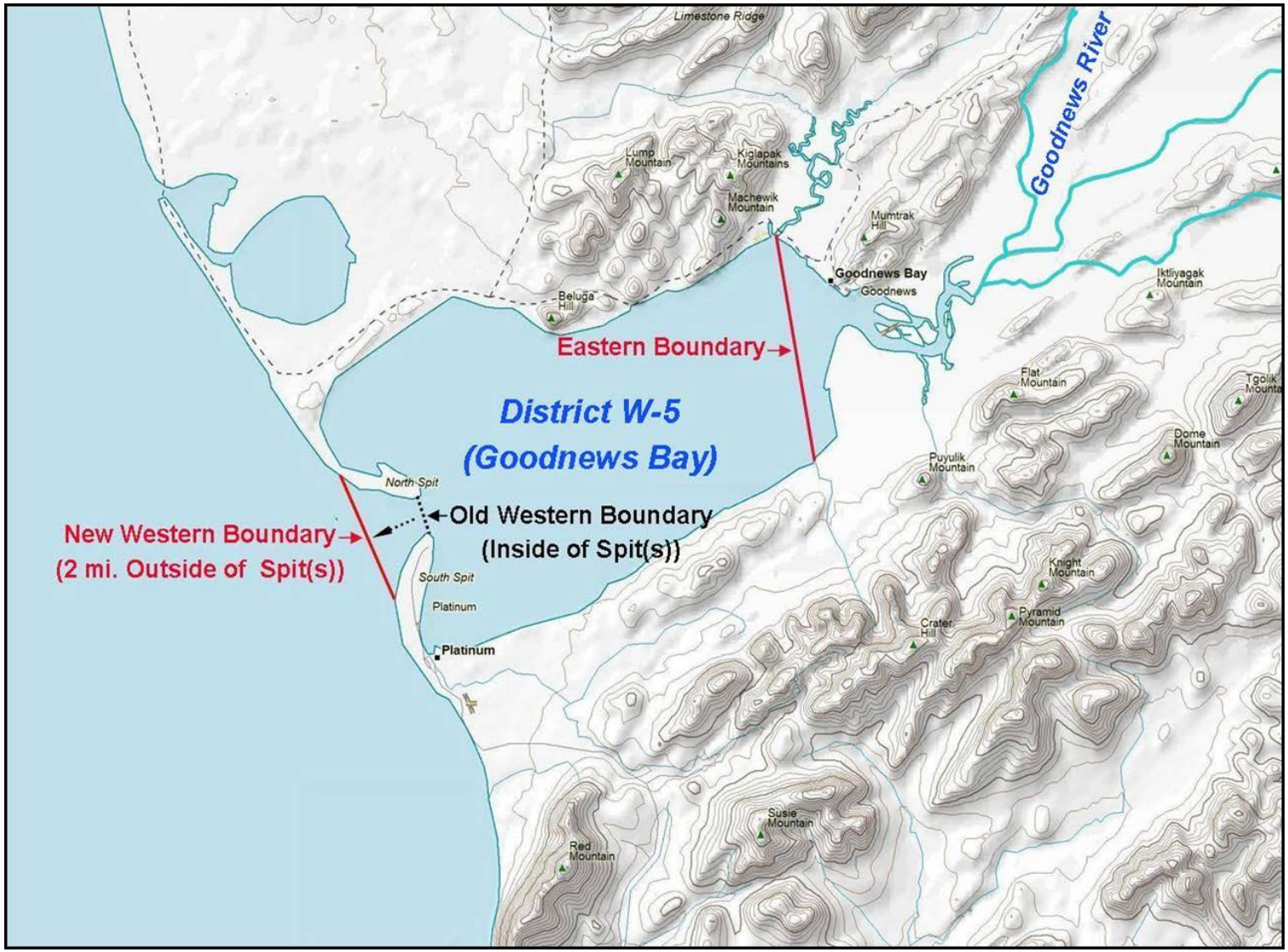


Figure 2.–Commercial fishing District W-5 (Goodnews Bay), Kuskokwim Bay, Alaska.

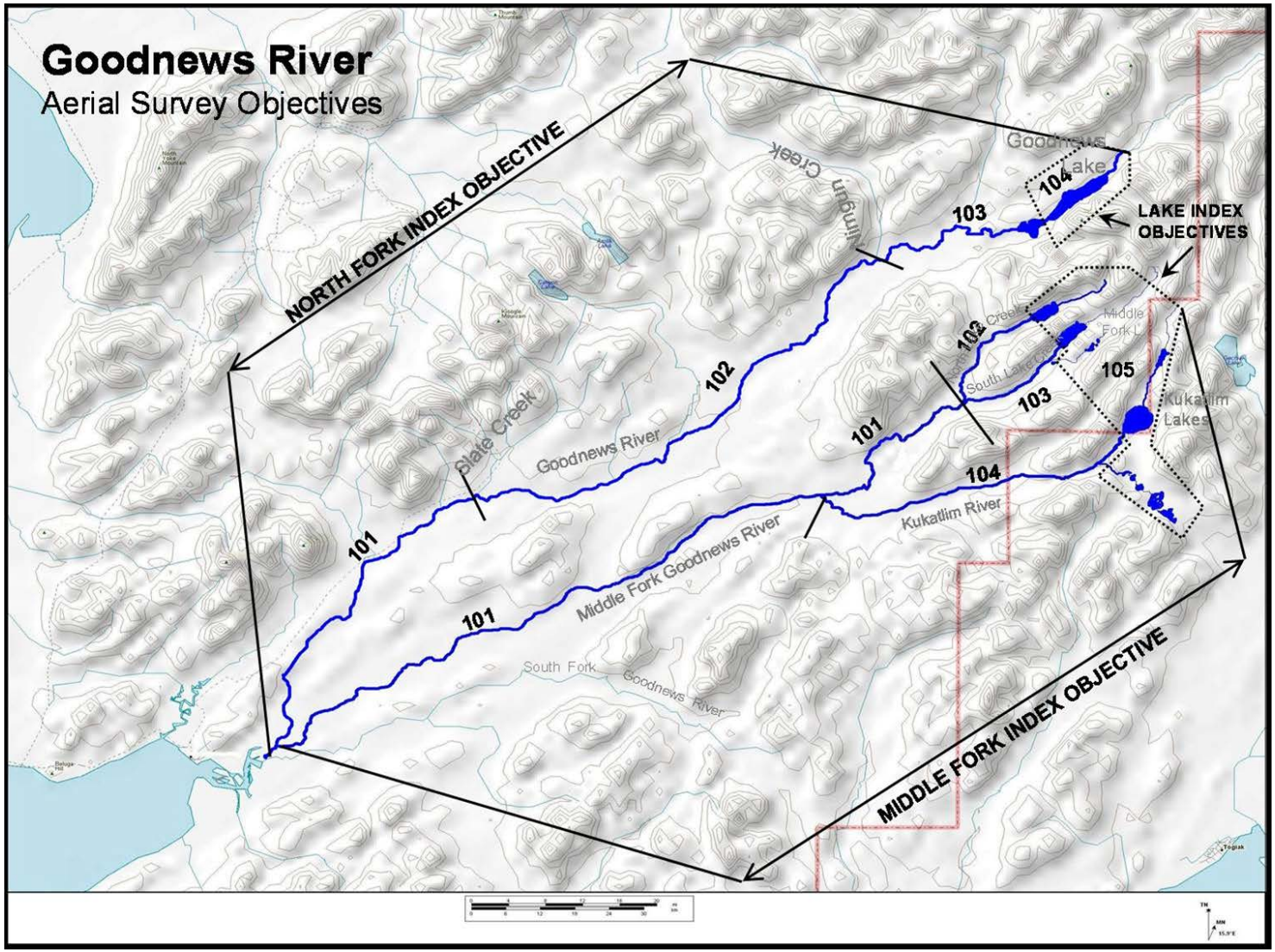


Figure 3.–Map of index areas used for aerial surveys on the Goodnews River drainage.

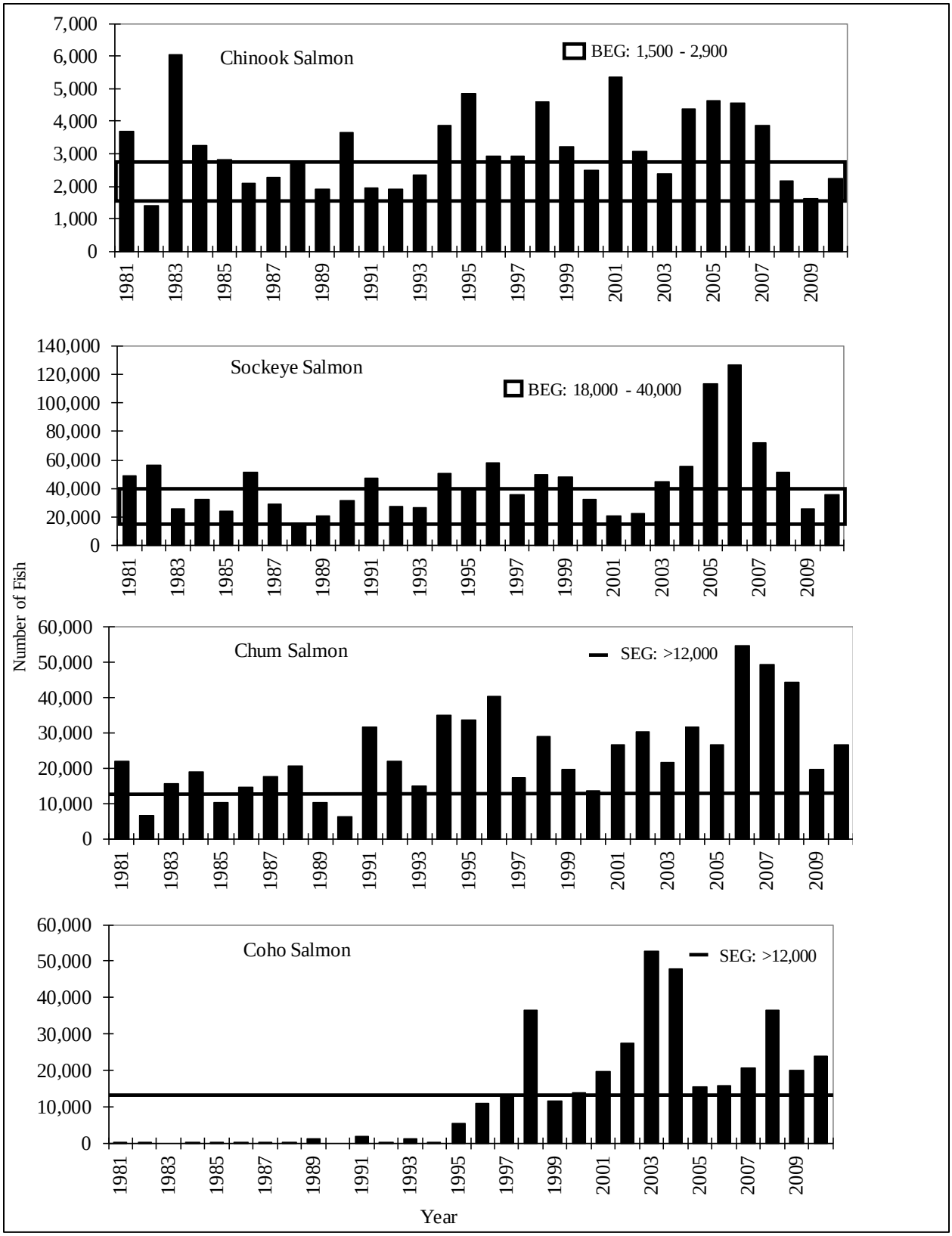


Figure 4.–Historical Chinook, sockeye, chum, and coho salmon escapement estimates, Middle Fork Goodnews River weir, 1981–2010.

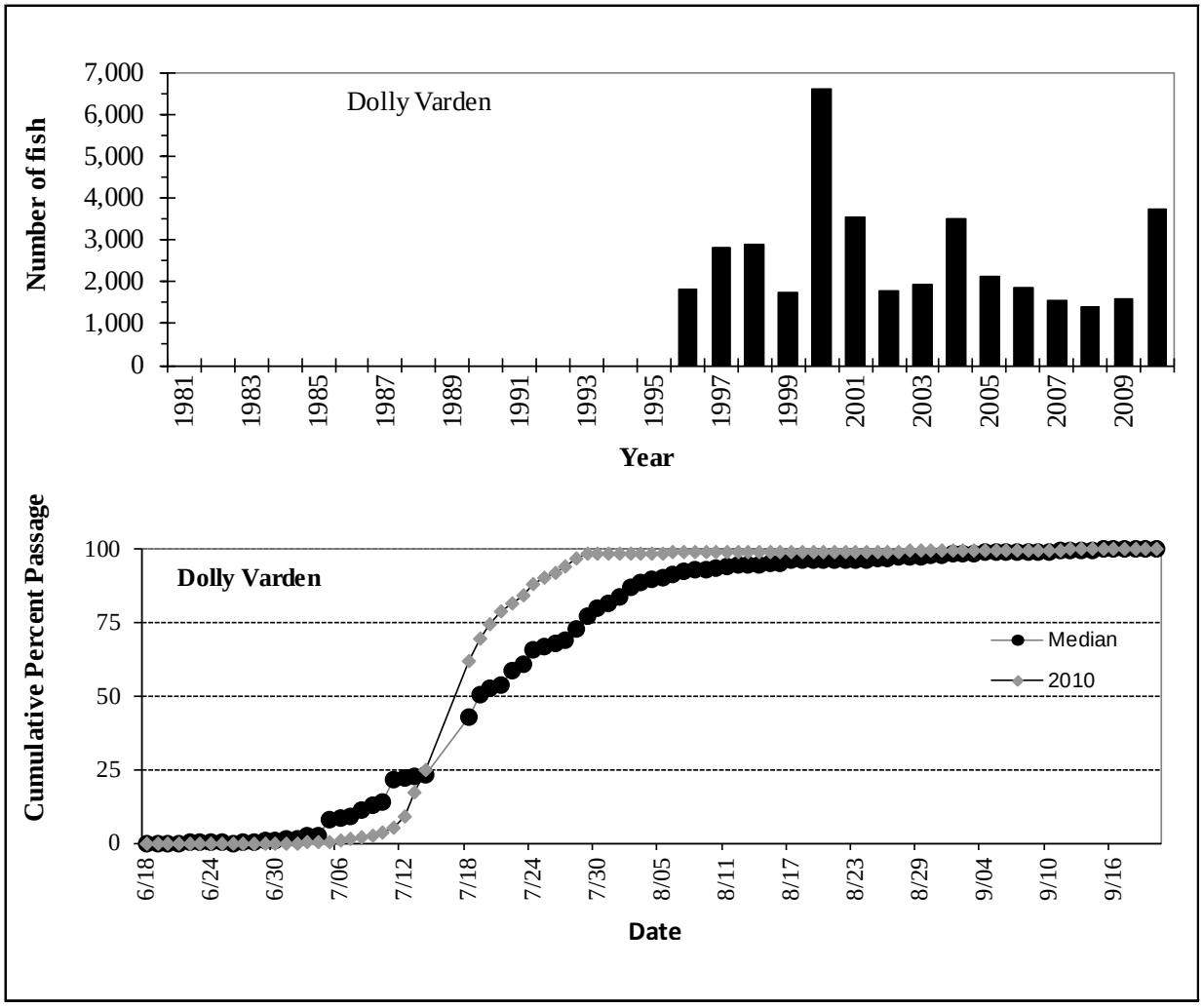
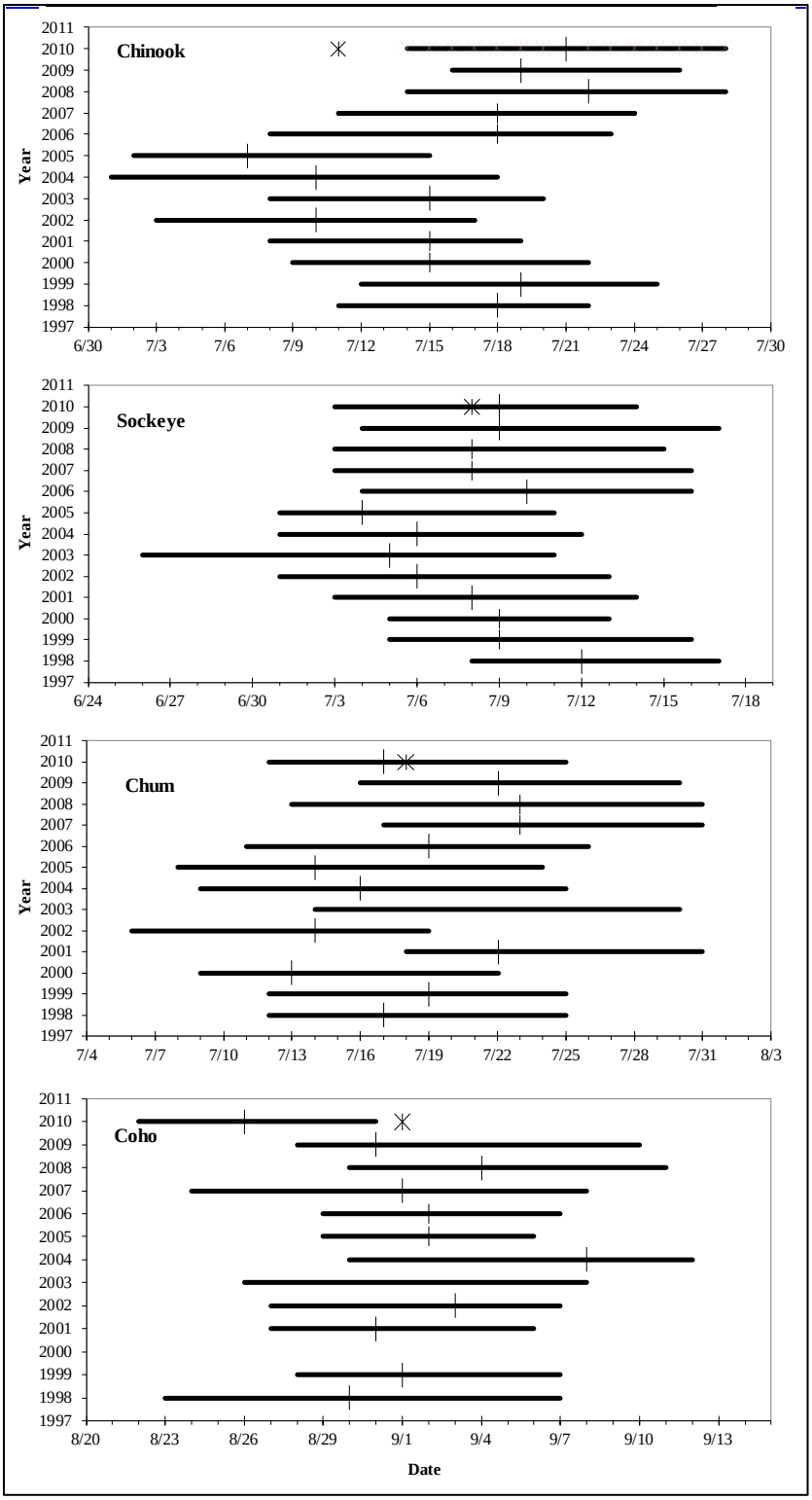


Figure 5.–Historical Dolly Varden escapement estimate, 1981–2010, and cumulative percent passage of Dolly Varden, 2010 and historical median, at Middle Fork Goodnews River weir.



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

Figure 6.–Annual run timing of Chinook, sockeye, chum, and coho salmon based on cumulative percent passage at the Middle Fork Goodnews River weir, 1998–2010.

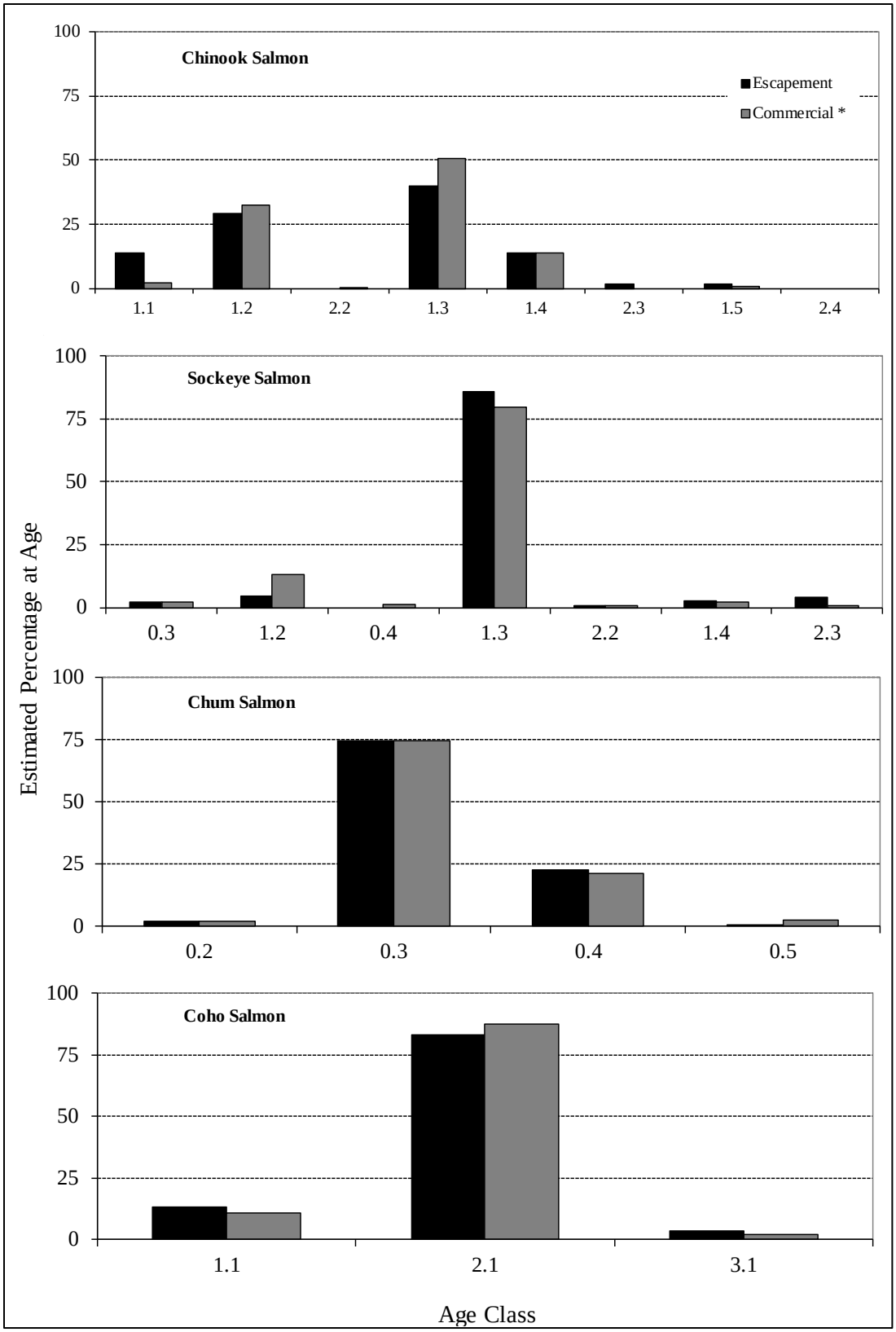


Figure 7.–Estimated age class percentages for Chinook, sockeye, chum and coho salmon from Middle Fork Goodnews River weir escapement and District W-5 commercial harvest, 2010.

APPENDICES

Appendix A1.–Historical commercial, subsistence, and sport fishing harvest of Chinook, sockeye, coho, and chum salmon, Goodnews Bay area, 1968–2010.

	Chinook			Sockeye			Chum			Coho		
Year	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
1968										5,458		
1969	3,978			6,256			5,006			11,631		
1970	7,163			7,144			12,346			6,794		
1971	477			330			301			1,771		
1972	264			924			1,331			925		
1973	3,543			2,072			15,781			5,017		
1974	3,302			9,357			8,942			21,340		
1975	2,156			9,098			5,904			17,889		
1976	4,417			5,575			10,354			9,852		
1977	3,336	574[a]		3,723			6,531			13,335		
1978	5,218			5,412			8,590			13,764		
1979	3,204	338		19,581			9,298			42,098		
1980	2,331	690		28,632			11,748			43,256		
1981	7,190	1,409		40,273			13,642			19,749		
1982	9,476	1,236		38,877			13,829			46,683		
1983	14,117	1,066	31	11,716		14	6,766		10	19,660		168
1984	8,612	629		15,474			14,340			71,176		
1985	5,793	426	323	6,698	704	75	4,784	348	124	16,498	221	386
1986	2,723	555		25,112	943	122	10,355	191		19,378	8[b]	
1987	3,357	816		27,758	955	266	20,381	578		29,057	43[b]	
1988	4,964	310		36,368	1,065		33,059	448		30,832	1,162	
1989	2,966	468	68	19,299	861	146	13,622	784	0	31,849	907	224
1990	3,303	539		35,823	1,123		13,194	332		7,804	1,646	
1991	912	917	26	39,838	1,282	63	15,892	149	189	13,312	1,828	297
1992	3,528	374	23	39,194	826	8	18,520	1,006	0	19,875	1,353	138
1993	2,117	708	81	59,293	836	53	10,657	188	156	20,014	1,226	189
1994	2,570	784	163	69,490	770	70	28,477	470	15	47,499	512	170
1995	2,922	883	41	37,351	253	34	19,832	156	0	17,875	305	114
1996	1,375	415	157	30,717	418	87	11,093	219	0	43,836	352	466
1997	2,039	449	86	31,451	609	61	11,729	133	24	2,983	397	855
1998	3,675	718	431	27,161	508	502	14,155	316	50	21,246	331	574
1999	1,888	871	223	22,910	872	561	11,562	281	47	2,474	582	789

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Appendix A1.–Page 2 of 2.

Year	Chinook			Sockeye			Chum			Coho		
	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
2000	4,442	703	243	37,252	1,205	82	7,450	364	12	15,531	517	795
2001	1,519	895	147	25,654	974	108	3,412	226	21	9,275	616	822
2002	979	857	224	6,304	1,050	149	3,799	407	99	3,041	297	429
2003	1,412	737	10	29,423	783	42	5,593	176	14	12,658	1,319	42
2004	2,565	954	100	20,922	960	0	6,014	257	0	23,690	1,617	622
2005	2,035	868	0	23,933	1,233	0	2,568	209	0	11,735	839	1,046
2006	2,892	676	79	29,857	1,007	98	11,568	648	0	12,436	704	553
2007	3,112	[c]	177	43,716	[c]	84	7,519	[c]	0	13,689	[c]	211
2008	1,281	[c]	78	27,236	[c]	104	10,340	[c]	26	22,547	[c]	220
2009	1,509	[c]	31	32,544	[c]	11	16,985	[c]	22	8,406	[c]	284
2010	1,752	[c]	[c]	41,074	[c]	[c]	26,914	[c]	[c]	4,900	[c]	[c]
10-Year Average [d]	2,175	773	109	27,684	920	68	7,525	302	19	13,301	722	502
Historical Average[e]	2,335	691	124	32,827	876	119	11,618	356	34	17,227	869	450

Note: Commercial harvest from District W-5, combined subsistence harvest by the communities of Goodnews Bay and Platinum, subsistence harvest estimates prior to 1988 are based on a different formula and are not comparable with estimates from 1988 to present.

[a] Subsistence harvest estimates in 1977 were for Goodnews Bay only.

[b] Subsistence harvest estimates are for the community of Platinum only.

[c] Not available at time of publication.

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

[e] Historical average of harvest from 1988 to 2009.

Appendix B1.–Historical escapement, Middle Fork Goodnews River escapement projects, 1981–2010.

Year	Method	Dates of Operation	Chinook	Sockeye	Chum	Pink[a]	Coho	Dolly Varden
1981	Counting Tower[b]	6/13 - 8/9	3,688	49,108	21,827	[e]	356 [d]	[e]
1982	Counting Tower[b]	6/23 - 8/3	1,395	56,255	6,767	[e]	91 [d]	[e]
1983	Counting Tower[b]	6/11 - 7/28	6,027	25,816	15,548	[e]	0 [d]	[e]
1984	Counting Tower[b]	6/15 - 7/31	3,260	32,053	19,003	[e]	249 [d]	[e]
1985	Counting Tower[b]	6/27 - 7/31	2,831	24,131	10,367	[e]	282 [d]	[e]
1986	Counting Tower[b]	6/16 - 7/24	2,080	51,069	14,764	[e]	163 [d]	[e]
1987	Counting Tower[b]	6/22 - 7/30	2,272	28,871	17,517	[e]	62 [d]	[e]
1988	Counting Tower[b]	6/23 - 7/30	2,712	15,799	20,799	[e]	6 [d]	[e]
1989	Counting Tower[b]	6/27 - 7/31	1,915	21,186	10,380	[e]	1,212 [d]	[e]
1990	Counting Tower[b]	6/20 - 7/31	3,636	31,679	6,410	[e]	0 [d]	[e]
1991	Fixed Picket Weir[c]	6/29 - 8/23	1,952	47,397	31,644	1,428	1,978 [d]	[e]
1992	Fixed Picket Weir[c]	6/21 - 8/4	1,905	27,268	22,023	22,601	150 [d]	[e]
1993	Fixed Picket Weir[c]	6/23 - 8/18	2,349	26,452	14,952	318	1,451 [d]	[e]
1994	Fixed Picket Weir[c]	6/23 - 8/9	3,856	50,801	34,849	38,705	309 [d]	[e]
1995	Fixed Picket Weir[c]	6/19 - 8/28	4,836	39,009	33,699	330	5,415 [d]	[e]
1996	Fixed Picket Weir[c]	6/19 - 8/23	2,931	58,290	40,450	20,105	10,869 [d]	1,829 [d]
1997	Fixed/R. Board Weir	6/12 - 9/17	2,937	35,530	17,369	940	13,413	2,808
1998	R. Board Weir	7/4 - 9/17	4,584 [d]	49,513 [d]	28,832 [d]	10,376	36,596	2,915
1999	R. Board Weir	6/25 - 9/26	3,221	48,205	19,513	914	11,545	1,761
2000	R. Board Weir	7/2 - 8/27	2,500 [d]	32,341 [d]	13,791 [d]	0	13,907	6,616
2001	R. Board Weir	6/26 - 9/30	5,351	21,024	26,820	5,405	19,626	3,535
2002	R. Board Weir	6/25 - 9/18	3,085	22,101	30,300	0	27,364	1,770
2003	R. Board Weir	6/18 - 9/18	2,389	44,387	21,637	1,921	52,810	1,949
2004	R. Board Weir	6/21 - 9/20	4,388	55,926	31,616	21,633	47,917	3,492
2005	R. Board Weir	6/26 - 9/8	4,633	113,809	26,690	5,926	15,683	2,128
2006	R. Board Weir	6/26 - 9/7	4,559	126,772	54,699	18,432	15,969	1,858
2007	R. Board Weir	6/25 - 9/10	3,852	72,282	49,285	4,819	20,767	1,549
2008	R. Board Weir	7/02-9/15	2,158	51,763	44,310	9,807	36,663	1,416
2009	R. Board Weir	6/28-9/21	1,630	25,465	19,715	714	20,000	1,608
2010	R. Board Weir	6/25-9/18	2,244	35,762	26,687	3,444	23,839	3,757
10 year average (2000-2009)			3,454	56,587	31,886	6,866	27,071	2,592
Historical Average			3,205	44,286	24,330	8,651	12,236	2,517

[a] Picket spacing of the weir panels allows pink salmon to freely pass through the weir unobserved.

[b] Project located approximately 500 yd upriver from the current weir location.

[c] Fixed picket weir operated in the same location as the current weir.

[d] No counts or incomplete counts as the project was not operational during a large portion of species migration.

[e] Species not enumerated during project operations.

Appendix C1.–Historical aerial survey counts by species, Goodnews River drainage, 1980–2010.

	North Fork Goodnews River and Lakes				Middle Fork Goodnews River and Lakes			
Year	Chinook	Sockeye	Chum	Coho	Chinook	Sockeye	Chum	Coho
1980	[a]	[a]	1,975	[a]	1,164	18,926	3,782	[a]
1981	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1982	1,990	19,160	9,700	[a]	1,546	2,327	6,300	[a]
1983	2,600	13,850	[a]	[a]	120	4,350	a	[a]
1984	2,002	12,807	28,124	[a]	1,930	12,897	9,172	[a]
1985	3,535	1,420	4,415	70	2,050	5,470	3,593	112
1986	1,068	8,960	11,850	6300	1,249	16,990	7,645	4,400
1987	2,234	19,786	12,103	3,715	2,207	34,532	9,696	2,420
1988	484	5,820	2,890	[a]	1,024	5,831	5,814	[a]
1989	651	3,605	1440	650	1,277	8,044	2,922	300
1990	626	27,689	644	30	38	1292	311	[a]
1991	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	875	3,232	1,950	a	1,012	7,200	3,270	[a]
1993	[a]	[a]	[a]	[a]	[a]	[a]	[a]	10,376
1994	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1995	3,314	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1996	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1997	3,611	12,610	[a]	[a]	1,425	17,843	1465	[a]
1998	578	3,497	2,743	[a]	731	11,632	3,619	[a]
1999	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2000	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2001	3,561	29,340	7,330	[a]	2,799	12,383	6,945	[a]
2002	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2003	2,015	27,380	3,370	[a]	1,210	21,760	2,310	[a]
2004	7,358	31,695	[a]	[a]	2,474	33,670	[a]	[a]
2005	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2006	4,159	78,100	[a]	[a]	1,342	[a]	[a]	[a]
2007	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2008	2,371	32,500			1,940	13,935		[a]
2009	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
2010		[a]	[a]	[a]	[a]	[a]	[a]	[a]
			[b]	[b]	[b]	[b]	[b]	[b]
SEG	640 – 3,300	5,500 – 19,500						
10-Year Average [c]	2,847	24,965	4,874		1,425	13,359	4,400	

[a] Survey was either not flown or not rated as acceptable.

[b] Aerial survey SEG was discontinued in 2004.

[c] Most recent 10 year average from years with acceptable data.