Fishery Data Series No. 10-64

Goodnews River Salmon Monitoring and Assessment, 2009

Final Report for Project FIS 07-305
USFWS Office of Subsistence Management
Fisheries Resource Monitoring Program

by

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and

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

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ABSTRACT

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 2009, a total of 1,630 Chinook *Oncorhynchus tshawytscha*, 25,465 sockeye *O. nerka*, 19,715 chum *O. keta*, 714 pink *O. gorbuscha*, and 20,000 coho salmon *O. kisutch*, and 1,608 Dolly Varden *Salvelinus malma* were estimated to have passed through the weir from 28 June through 21 September. Escapements for Chinook, sockeye, chum, and coho salmon were below average. Chinook and sockeye salmon biological escapement goals, and chum and coho salmon sustainable escapement goals were either met or exceeded in 2009. A live trap was used to collect samples from Chinook, sockeye, chum, and coho salmon to estimate the age, sex, and length composition for each stock. The Chinook salmon escapement was comprised of 52.6% males and dominated by age-1.4 (57.9%) fish. The sockeye salmon escapement was comprised of 42.2% males and dominated by age-1.3 (54.7%) fish. The chum salmon escapement was comprised of 41.3% males and dominated by age-0.3 (53.6%) fish. The coho salmon escapement was comprised of 51.8% males and dominated by age-2.1 (87.3%) fish. Aerial surveys for the drainage were not conducted in 2009.

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 community of Goodnews Bay 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 from the communities of Goodnews Bay and Platinum. 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 (Whitmore et al. 2008). Sockeye salmon have been the most utilized subsistence salmon species in the Goodnews Bay area with a 10 year (1998–2007) average harvest of 861 fish, followed by Chinook (730), coho (686), and chum salmon (289) (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.

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 was 48,623 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 a recent 10 year average of 35 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 is currently one commercially operated lodge with a semi-permanent camp in the drainage that offers fishing from powered skiffs. ADF&G has been estimating sport fishery harvests consistently since 1991.

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) targeting counts of 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 which increased the efficiency of collecting age, sex, and length (ASL) information and reduced personnel needs from 3 to 2 crew members. Flood events were problematic if the weir could not be removed early in the season because the weir would rapidly collect debris, damming the flow until it failed and washed downstream; this occurred several times during the early 1990s.

In the mid 1990s, ADF&G began cooperating with USFWS to build a resistance board weir and extend the project's operational period to include the coho salmon run in August and September. In July 1997, the fixed-picket weir was replaced with a resistance board weir, which is designed

to shed debris loads by sinking under high water conditions and has allowed 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 design can remain operational at higher water levels and can regain operations quickly once high water events subside.

Extended operation of the weir has also allowed biologists to monitor the migration of smaller Dolly Varden, believed to be aggregates of mixed stocks overwintering in the drainage (Lisac 2006). Dolly Varden contribute to the overall subsistence harvest of Goodnews Bay area residents (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 2008) and used as a platform for Dolly Varden life history studies since 2001 (Lisac 2003).

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, but also generates data relevant to the Goodnews River drainage as a whole. These data are used to make inseason management decisions, to estimate drainagewide escapement, and to develop 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 2008, 2009).

Salmon escapement objectives for the Middle Fork counting tower were initially established in 1984 as ranges set at 3,000–4,000 Chinook, 35,000–45,000 sockeye, and 13,000–18,000 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 20,000–30,000 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 thresholds, were 2,000–4,500 Chinook, 23,000–58,000 sockeye, and greater than 12,000 chum salmon. An SEG threshold 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). Ricker spawner–recruit models were used to estimate the escapement that produces maximum sustained yield (MSY) (Tables 1 and 2; Molyneaux and Brannian 2006). The BEG for Chinook salmon was set at 1,500–2,900 fish and the BEG for sockeye salmon was set at

18,000–40,000 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, 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.

Aerial surveys are directed at indexing spawning populations of Chinook and sockeye salmon (Figure 3). Chum salmon have protracted run timing requiring multiple surveys throughout their run to ensure an adequate index of escapement and have been discontinued until survey methods can be improved or funding can be secured to allow for multiple aerial surveys. Additionally, Goodnews River coho salmon have been difficult to survey because of recurrent poor weather conditions. Coho salmon aerial surveys have been conducted when funding and weather conditions allow.

North Fork Goodnews River aerial survey escapement goals of 1,600 Chinook, 15,000 sockeye, 17,000 chum, and 15,000 coho salmon were initially established in 1992 (Buklis 1993). Middle Fork Goodnews River aerial survey escapement goals were established in 1992 at 800 Chinook, 5,000 sockeye, 4,000 chum, and 2,000 coho salmon. In 2004, evaluation of AYK Region escapement goals resulted in establishment of revised SEGs for Goodnews River aerial surveys (ADF&G 2004). The revised SEGs represent ranges, or thresholds, and were set at 640–3,300 Chinook and 5,500–19,500 sockeye salmon on North Fork Goodnews River only. North Fork chum and coho salmon aerial survey escapement goals set in 1992 were discontinued because of poor data quality. Aerial survey escapement goals set for Middle Fork Goodnews River in 1992 were discontinued in deference to the revised SEGs set for the Middle Fork Goodnews River weir in 2004. In 2009, evaluation of AYK Region escapement goals did not result in changes to aerial survey escapement goals set for Goodnews River salmon (Estensen et al. 2009).

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. Annual ASL composition estimates of escapement are used to develop brood tables, in turn providing information used for projecting future run sizes. Historical summaries of existing ASL information for salmon returning to the Goodnews River drainage can be found in Molyneaux and Folletti (2008).

OBJECTIVES

Annual project objectives are to:

1. Estimate Chinook, sockeye, chum, and coho salmon, and Dolly Varden escapement at the Middle Fork Goodnews River weir.
2. Estimate run timing of Chinook, sockeye, chum, and coho salmon and Dolly Varden at the Middle Fork Goodnews River weir.

3. Estimate the ASL composition of annual Chinook, sockeye, chum, and coho salmon escapements 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 Middle Fork Goodnews 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 m/s during average water conditions. The river substrate is primarily cobblestone, gravel, and sand. The upstream half of the channel 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 allowed 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 live trap used to collect fish for ASL sampling was installed directly upstream of the passage chute located farthest from the left bank. The near shore fish passage chute was connected to a passage gate that incorporates an underwater video camera that recorded fish passage.

Fish that migrated downstream, such as rainbow trout, Dolly Varden, and whitefish *Coregonus* spp. required an avenue for safe passage over the weir. Downstream passage chutes described in Linderman et al. (2002) were installed to facilitate passage. Downstream fish passage over these chutes was not enumerated.

Boats passed at a designated boat gate 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.

AERIAL SURVEYS

No salmon surveys were flown in 2009 because of poor weather. In previous years, aerial survey flights were conducted from fixed wing aircraft flown at an altitude of 500 ft. Attempts are made to conduct aerial surveys during peak spawning periods for each species in order to maximize the number of observable fish on the spawning grounds. Peak spawning periods were developed from run timing estimates and vary by species. Aerial surveys were numerically ranked on a scale of 1 = good, 2 = fair, and 3 = poor, based on survey method, weather and water conditions, time of survey, and spawning stage. Only surveys with rankings of fair and good were used as indices of escapement.

ESCAPEMENT MONITORING AND ESTIMATES

The target operational period for the Middle Fork Goodnews River weir was 26 June through 15 September. Passage counts occurred regularly throughout the day, typically for 1–2 hour periods, beginning in the morning and continuing as late as light permitted. During counting periods the passage gate was opened to allow fish to pass through the weir. Counts were also conducted using underwater video equipment that allowed for continuous fish passage during periods with adequate lighting. Fish passage captured by video equipment was reviewed by the crew and included in passage counts. Any fish observed traveling downstream through the fish passage gates were subtracted from the tally.

Salmon escapements were estimated for periods when the weir became inoperable. Estimates were assumed to be zero if passage was considered negligible based on historical data and run timing indicators. Inoperable event estimates were calculated with the 'Linear Method' using the following formula:

$$\hat{n}_d = (\alpha + \beta \cdot i) - p \tag{1}$$

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

$$\beta = \frac{\left(n_{d+I} + n_{d+I+1}\right) - \left(n_{d-2}, n_{d-1}\right)}{2\left(I + 1\right)}$$

for (d_1, 2, …, d_i, …d_I)

where:

$\hat{n}_{d_i}$ = passage estimate for the i^{th} day of the period (d_1, 2, …, d_i, …d_I) when the weir was inoperative;

$n_{d+I,} n_{d+I+1}$ = observed passage the first and second day after the weir was reinstalled;

n_{d_1-1} = observed passage of 1 day before the weir was washed out;

n_{d_1-2} = observed passage of the second day before the weir was washed out; and

I = number of inoperative days.

SALMON FISHERIES

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

AGE, SEX, AND LENGTH ESCAPEMENT SAMPLING

Escapement sampling for Chinook, sockeye, chum, and coho salmon ASL composition estimates were conducted based on the pulse sampling design of Molyneaux and Folletti (2008). The goal for each pulse was to collect samples from 210 Chinook, 210 sockeye, 200 chum, and 170 coho salmon. These sample sizes were selected for simultaneous 95% confidence interval estimates of age composition ±10% for each age category (α=0.05 and d=0.10) and were adjusted from sample sizes recommended by Bromaghin (1993) to account for regenerated and otherwise unreadable scales. The minimum number of pulse samples was one per species from each third of the run to account for temporal dynamic in ASL composition.

Salmon were sampled from a fish trap installed in the weir. The exit gate was closed allowing fish entering the holding pen to accumulate inside. The holding pen was typically allowed to fill with fish and sampling was done during scheduled counting periods.

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

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

ADF&G staff in Bethel and Anchorage aged scales, processed the ASL data, and generated data summaries (Molyneaux and Folletti 2008). 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 primarily in a live trap. Sample fish may also be captured by way of hook and line. A sample size of 10% of the Dolly Varden passage was targeted to represent the total Dolly Varden run passing upstream of the weir. Dolly Varden less than 400 mm fork-length were small enough to pass through picket spacing and escape the live trap (Lisac 2003). Fish were sampled for length and genetic information. Maturity indexing of Dolly Varden captured in the weir live box was used to estimate the proportion of mature, pre-spawning fish that passed upstream of the weir and were reported by TNWR under separate reports (Lisac 2003, 2006, 2008, 2009, and *In prep*). Floy® numeric tags are attached to sample fish to monitor fish movement.

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological conditions were recorded at noon each day. Cloud cover was judged in percent 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 gage height was recorded daily and was pegged to a benchmark established in 1997 representing a river stage of 150 cm. The benchmark is a 0.75 in diameter steel length of rebar 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

SALMON FISHERIES

Subsistence harvest estimates for salmon in the Goodnews Bay area for 2009 were not available. However, based on discussions with local subsistence fishermen, it is anticipated the amounts necessary for subsistence were met for all species. In the District W-5 commercial fishery 39 permit holders participated for a total harvest of 1,509 Chinook, 32,544 sockeye, 16,985 chum, and 8,406 coho salmon. Exvessel value by species was $13,333 for Chinook, $134,296 for sockeye, $18,998 for chum, and $25,456 for coho salmon for a total value of $192,056 (Table 3).

PROJECT OPERATIONS

The target operational period of 26 June through 15 September was not fully achieved in 2009 because of high water. The weir began operation on 28 June and remained in place through 21 September. Based on minimal passage during the first day of operation, missed passage during the first two days of the operational period was assumed to be zero. Water levels rose swiftly in

late July submerging the weir and causing a loss of operation from 29 July through 8 August. Operation was restored after the return of workable water levels. The 'Linear Method' was used to estimate Chinook, sockeye, chum, and coho salmon passage during the inoperable period. Estimates were included in the total escapements. The weir crew began weir disassembly and camp closure on 21 September.

AERIAL SURVEYS

Aerial surveys of the Goodnews River drainage were not conducted in 2009 because poor weather conditions prevented flights from occurring.

WEIR ESCAPEMENT

The 2009 Middle Fork Goodnews River Chinook salmon escapement was estimated to be 1,630 fish (Tables 4 and 5). A total of 1,445 Chinook salmon were observed and 185 fish (≈11%) were estimated to have passed upstream during the inoperable period. Chinook salmon escapement exceeded the lower end of the BEG range of 1,500–2,900 fish (Figure 4). The first Chinook salmon was observed on 29 June and the last Chinook salmon was observed on 4 September. Based on the operational period and inclusive of estimates, the median passage date was 19 July and the central 50% of the run occurred between 16 July and 26 July (Table 5).

The 2009 Middle Fork Goodnews River sockeye salmon escapement was estimated to be 25,465 fish (Tables 4 and 5). A total of 24,587 sockeye salmon were observed and 878 fish (≈3%) were estimated to have passed upstream during the inoperable period. Sockeye salmon escapement exceeded the lower end of the BEG range of 18,000–40,000 fish (Figure 4). The first sockeye salmon was observed on 28 June and the last sockeye salmon was observed on 19 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 4 July and 17 July (Table 5).

The 2009 Middle Fork Goodnews River chum salmon escapement was estimated to be 19,715 fish (Tables 4 and 5). A total of 16,441 chum salmon were observed and 3,273 fish (≈17%) were estimated during the inoperable period. Chum salmon escapement exceeded the SEG threshold of 12,000 fish (Figure 4). The first chum salmon was observed on 28 June and the last chum salmon was observed on 21 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 16 July and 30 July (Table 5).

The 2009 Middle Fork Goodnews River coho salmon escapement was estimated to be 20,000 fish (Tables 4 and 5). A total of 19,805 coho salmon were observed passing upstream through the weir and 195 fish (≈1%) were estimated to have passed upstream during the inoperable period. Coho salmon escapement exceeded the SEG threshold of 12,000 fish (Figure 4). The first coho salmon was observed on 29 July and the last coho salmon was observed on 21 September. Based on the operational period and inclusive of estimates, the median passage date was 31 August and the central 50% of the run occurred between 28 August and 10 September (Table 5).

The 2009 Middle Fork Goodnews River total pink salmon count was 714 fish (Table 6). No estimate of missed escapement is made for pink salmon. The first pink salmon was observed on 30 June and the last pink salmon was observed on 15 September. The median passage date was 28 July and the central 50% of the run occurred between 22 July and 17 August.

The 2009 Middle Fork Goodnews River total count of Dolly Varden was 1,608 fish (Table 6). No estimates of missed passage were made for Dolly Varden. The first Dolly Varden was observed on 29 June and the last Dolly Varden was observed on 21 September. The median passage date was 18 July and the central 50% of the run occurred between 9 July and 25 August.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Middle Fork Goodnews River Escapement

Minimum sample objectives were not met for Chinook, sockeye, and chum salmon; however, results were considered adequate for estimating ASL composition of escapement at the weir. Results could not be used to partition the escapement into temporal strata because only one pulse sample was collected for each species. The minimum sample objective for coho salmon was met and samples were considered adequate for estimating ASL composition of the escapement.

Samples were collected from 88 Chinook salmon at the weir in 2009. Age was determined for 57 of the 88 fish sampled (65%). Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±11.6%. Applied to escapement, age-1.4 Chinook salmon were the most abundant age class (57.9%), followed by age-1.2 (28.1%), and age-1.3 (14.0%) fish. Sex composition applied to aged samples was 52.6% males and 47.4% females (Table 7). Mean male length of the samples by age class was 603 mm for age-1.2 fish, 717 mm for age-1.3 fish, and 853 mm for age-1.4 fish. Mean female length of the samples by age class was 643 mm for age-1.2 fish, 802 mm for age-1.3 fish, and 855 mm for age-1.4 fish. Overall, male sample lengths ranged from 518 to 937 mm and female sample lengths ranged from 643 to 934 mm (Table 8).

Samples were collected from 519 sockeye salmon at the weir in 2009. Age was determined for 161 of the 519 fish sampled (31%). Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±7.7%. Applied to escapement, age-1.3 sockeye salmon were the most abundant age class (54.7%), followed by age-1.2 (31.7%), and age-2.3 (5%) fish. Sex composition applied to aged samples was 42.2% males and 57.8% females (Table 9). Mean male length by age class was 547 mm for age-1.2 fish, 574 mm for age-1.3 fish, and 577 mm for age-2.3 fish. Mean female length by age class was 503 mm for age-1.2 fish, 536 mm for age-1.3 fish, and 525 mm for age-2.3 fish. Overall, male lengths ranged from 475 to 623 mm and female lengths ranged from 436 to 589 mm (Table 10).

Samples were collected from 280 chum salmon at the weir in 2009. Age was determined for 196 of the 280 fish sampled (70%). Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±7%. Applied to escapement, age-0.3 chum salmon was the most abundant age class (53.6%), followed by age-0.4 (39.3%) fish. Sex composition applied to aged samples was 41.3% males and 58.7% females (Table 11). Mean male length by age class was 585 mm for age-0.3 fish and 607 mm for age-0.4 fish. Mean female length by age class was 568 mm for age-0.3 fish and 572 mm for age-0.4 fish. Overall, male lengths ranged from 510 to 690 mm and female lengths ranged from 478 to 635 mm (Table 12).

Samples were collected from 448 coho salmon at the weir in 2009. Age was determined for 358 of the 448 fish sampled (79.9%). 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 ±4%. Applied to escapement, age-2.1 coho salmon was the most abundant age class (87.3%), followed by age-1.1 (7.4%) fish. Sex composition applied to aged samples was 51.8% males and 48.2% females (Table 13). Mean male length of the samples by age class was

579 mm for age-1.1 fish and 612 mm for age-2.1 fish. Mean female length of the samples by age class was 573 mm for age-1.1 fish and 605 mm for age-2.1 fish. Overall, male lengths ranged from 353 to 702 mm and female lengths ranged from 400 to 688 mm (Table 14).

District W-5 Commercial Harvest

Chinook and coho salmon sample objectives were not achieved; however, sample sizes were considered adequate for estimating ASL composition of the commercial harvest. Sockeye and chum salmon sample size objectives were achieved. Samples for Chinook, sockeye and chum salmon were partitioned temporally into strata based on sample dates.

Age was determined for 515 of the Chinook salmon sampled. Overall, 95% confidence intervals for age composition of annual harvest were no wider than ±4.1%. Applied to total commercial harvest, age-1.2 Chinook salmon was the most abundant age class (52.9%), followed by age-1.4 (26.1%), and age-1.3 (19.2%) fish (Table 15). Estimated sex composition was 78.7% males and 21.3% females. Mean male length by age class was 561 mm for age-1.2 fish, 660 mm for age-1.3 fish, and 764 mm for age-1.4 fish. Mean female length by age class was 593 mm for age-1.2 fish, 782 mm for age-1.3 fish, and 826 mm for age-1.4 fish. Overall, male lengths ranged from 345 to 939 mm and female lengths ranged from 587 to 1,005 mm (Table 16).

Age was determined for 1,353 of the sockeye salmon sampled. Overall, 95% confidence intervals for age composition of annual harvest were no wider than ±1.9%. Applied to total commercial harvest, age-1.3 sockeye salmon were the most abundant age class (64.2%), followed by age-1.2 (14%), and age-2.3 (10.4%) fish (Table 17). Sex composition was estimated to be 58.1% males and 41.9% females. Mean male length by age class was 532 mm for age-1.2 fish, 572 mm for age-1.3 fish, and 576 mm for age-2.3 fish. Mean female length by age class was 503 mm for age-1.2 fish, 550 mm for age-1.3 fish, and 549 mm for age-2.3 fish. Overall, male lengths ranged from 414 to 647 mm and female lengths ranged from 443 to 617 mm (Table 18).

Age was determined for 1,268 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-0.4 chum salmon was the most abundant age class (55.6%), followed by age-0.3 (40.1%) fish (Table 19). Sex composition was estimated to be 62.1% males and 37.9% females. Mean male length by age class was 579 mm for age-0.3 fish and 589 mm for age-0.4 fish. Mean female length by age class was 565 mm for age-0.3 fish and 573 mm for age-0.4 fish. Overall, male lengths ranged from 449 to 889 mm and female lengths ranged from 499 to 631 mm (Table 20).

Age was determined for 43 coho salmon sampled. Overall, 95% confidence intervals for age composition of annual harvest were no wider than ±10.5%. Applied to aged samples, age-2.1 coho salmon was the most abundant age class (83.7%), followed by age-1.1 (11.6%) fish (Table 21). Sex composition was estimated to contain 51.2% males and 48.8% females. Mean male length by age class was 617 mm for age-1.1 fish and 595 mm for age-2.1 fish. Mean female length by age class was 608 mm for age-1.1 fish and 594 mm for age-2.1 fish. Overall, male lengths ranged from 485 to 656 mm and female lengths ranged from 542 to 640 mm (Table 22).

DOLLY VARDEN TAGGING

Samples were collected randomly between 1 July and 14 September. A total of 1,608 Dolly Varden passed the weir. A total of 304 Dolly Varden were sampled for ASL data and 286 of those were tagged. Further information can be found in Lisac (*In prep*)

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological observations were recorded daily from 21 June through 22 September. Air temperatures ranged from 2˚ to 18˚C. Water temperature ranged from 6.5˚ to 12.5˚C. Several rain events resulted in daily accumulations from trace amounts up to 25.7 mm in a 24 h period. Water level ranged from 29 to 106 cm (Table 23).

DISCUSSION

SALMON FISHERIES

Difficulties with obtaining subsistence results in season prevented the reporting of totals before publication of this report. Results are typically available in the following year's report. Subsistence totals remain relatively consistent allowing the most recent 10 year averages to represent a valid approximation of 2009 subsistence catch results.

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.

PROJECT OPERATIONS

The 2009 weir operation was successful in enumerating the passage of Chinook, sockeye, chum, and coho salmon, as well as Dolly Varden, past the weir. The majority of project objectives were achieved with the exception of Chinook, sockeye and chum salmon escapement ASL sampling goals and Chinook and coho commercial harvest ASL sampling goals. 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 2009 Chinook salmon weir escapement was within the BEG range; however, it is the lowest escapement among recorded years with similar monitoring methods (Figure 4; Appendix B). It should be noted that abundance has shown a steady decline since 2006.

The 2009 sockeye salmon weir escapement exceeded the lower end of the BEG range; however, escapement was far below the recent 10 year average and the fifth lowest overall (Figure 4; Appendix B). This escapement was far below the peak years of 2005 to 2007.

The 2009 chum salmon weir escapement was the lowest escapement since 2001 (Figure 4; Appendix B) and was 39% lower than the recent 10 year average. The general trend of chum salmon escapement into Middle Fork Goodnews River since 1981 suggest, a higher relative abundance since 1991. Fluctuations could be affected by changes in monitoring methodology; however, 2009 shows steep decline from peak abundance in 2006.

The 2009 coho salmon weir escapement was 24% below the recent 10 year average. The weir was in operation until 21 September, the latest date since 2001. Historically, a high abundance of coho salmon occurs in mid September. Coho salmon migration timing has been shown to correspond with rising water levels. Typically, coho salmon move in pulses that coincide with even small increases in water levels (Linderman et al. 2003). The weir escapement estimate reported here should be viewed as an index of coho salmon. As indicated by daily passage, actual

escapement past the weir may have been higher due to coho salmon migrating well after the weir operations ceased.

Dolly Varden counts at the Middle Fork Goodnews River weir date back to 1997 (Figure 5; Appendix B). The 2009 Dolly Varden count was 39% below the recent 10 year average of 2,607. Additional details and analysis of Goodnews River Dolly Varden populations can be found in Lisac (2006, 2008, and *In prep).*

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. Findings from Lisac (2003) suggest that the weir count is size selective for larger (>400 mm) Dolly Varden and it is believed younger and smaller fish pass through the weir unobserved. Dolly Varden counts generated at the weir should continue to be considered an index of Dolly Varden populations in Middle Fork Goodnews River. Lisac (2008) reported an estimate of pre-spawning Dolly Varden based on the maturity proportions observed in the sample from the weir live box. For years with an adequate sample size those estimates have ranged from 735 (SE=20.6; 2001) to 2,292 (SE=29.2; 2004).

Chinook salmon run timing in 2009 was one of the latest runs on record and was 8 days later than the historical median (Table 5; Figure 6). Chum salmon run timing was also late by approximately 4 days compared to the historical median. Sockeye and coho salmon run timing in 2009 was similar to the respective historical median passage dates of 8 July and 1 September.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Achieving Chinook salmon ASL sampling objectives continues to be problematic. Low daily abundance, migration patterns, and behavior at the weir have made sample collection difficult. Minimum Chinook salmon sample objectives were not achieved; however, estimates were made based on the samples collected. 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; an additional live trap was introduced in 2007 to foster increased sampling opportunity.

Although sample objectives were not achieved for both the escapement and commercial Chinook salmon ASL estimates in 2009, some inferences can be made based on the samples that were collected. The relatively low proportion of age-1.3 fish in the escapement and harvests samples was unusual. Age-1.4 Chinook salmon were the dominant age class for escapement while age-1.2 fish were the dominant age class for the commercial harvests (Tables 7 and 15; Figure 7). The disparity between dominate age classes in the commercial and escapement data may be explained by the small mesh gear (6 in or less) used in the District W-5 fishery, which targets smaller fish (Vania et al. 2002). Male to female ratio was near 50–50 for the escapement ASL

estimates in 2009. This is inconsistent with historical trends in Chinook salmon sex ratios which are predominantly male (Molyneaux and Folletti 2008*)*. Commercial samples for 2009 were consistent with historical trends.

Age-1.3 sockeye salmon were the dominant age class in the 2009 escapement and commercial harvest, but the relative proportion was below average (Tables 9 and 17; Figure 7). This was likely caused by the strong return of age-1.2 fish.

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 during the targeted operational period.
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.

ESCAPEMENT AND RUN ABUNDANCE

Salmon escapements at the weir in 2009 met or exceeded all established escapement goals but, Chinook, sockeye, chum, and coho salmon escapements were below the recent 10 year averages. Sockeye and chum salmon escapement data are showing decline and the 2009 escapements are well below the historical averages (Appendix B).

In 2009, a new processing plant was in operation in Platinum, which created more market demand for Kuskokwim Area salmon stocks and resulted in a higher commercial harvest.

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

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.

Active sampling for Chinook salmon should continue in order to meet ASL sample size goals and additional live traps should be deployed when time and funding allows to accommodate additional Chinook salmon ASL sample collection. Sampling goals for Chinook salmon may be unreasonable given the size of the runs at the Goodnews River 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 due to fish being tendered to Quinhagak for processing. The new processing plant located in Platinum was operational in 2009 and helped alleviate some of the problems encountered in the past with obtaining samples from commercially harvested salmon in District 5. In 2010, a dedicated sampling crew will be stationed in Platinum and this is expected to further alleviate logistical problems and workload constraints.

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REFERENCES CITED

ADF&G (Alaska Department of Fish and Game). 2004. Escapement goal review of select AYK Region salmon stocks. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A04-01, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/RIR.3A.2004.01.pdf

Brannian, L. K., M. J. Evenson, and J. R. Hilsinger. 2006. Escapement goal recommendations for select Arctic-Yukon-Kuskokwim region salmon stocks, 2007. Alaska Department of Fish and Game, Fishery Manuscript No. 06-07, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/fms06-07.pdf

Bromaghin, J. F. 1993. Sample size determination for interval estimation of multinomial probabilities. The American Statistician 47(3):203-206.

Buklis, L. 1993. Documentation of Arctic-Yukon-Kuskokwim Region salmon escapement goals in effect as of the 1992 fishing season. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A93-03, Anchorage.

Burkey Jr., C. 1989. Goodnews River fisheries studies, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3B89-19, Bethel.

Burkey Jr., C. 1990. Goodnews River fisheries studies, 1989. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3B90-16, Bethel.

Estensen, J. L., D. B. Molyneux, and D. J. Bergstrom. 2009. Kuskokwim River salmon stock status and Kuskokwim area fisheries, 2009; a report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Special Publication No. 09-21, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/SP09-21.pdf

Groot, C., and L. Margolis, editors. 1991. Pacific salmon life histories. Department of Fisheries and Oceans, Biological Sciences Branch, Canada. UBC Press, Vancouver, British Columbia.

INPFC (International North Pacific Fisheries Commission). 1963. Annual report, 1961. International North Pacific Fisheries Commission, Vancouver, British Columbia.

REFERENCES CITED (Continued)

Linderman, J. C., Jr., D. B. Molyneaux, L. DuBois, and W. Morgan. 2002. Tatlawiksuk River weir salmon studies, 1998–2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A02-11, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/RIR.3A.2002.11.pdf

Linderman, J. C. Jr., D. B. Molyneaux, L. DuBois and D. J. Cannon. 2003. George River salmon studies, 1996–2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A03-17, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/RIR.3A.2003.17.pdf

Lisac, M. J. 2003. Run timing, seasonal distribution and biological characteristics of Dolly Varden *Salvelinus malma* in the Middle Fork Goodnews River, Togiak National Wildlife Refuge, 2001. Final Report. U. S. Fish and Wildlife Service, Dillingham, Alaska.

Lisac, M. J. 2006. Run timing, seasonal distribution and biological characteristics of Dolly Varden *Salvelinus malma* in the Middle Fork Goodnews River, Togiak National Wildlife Refuge, 2002-2003. Final Report. U. S. Fish and Wildlife Service, Alaska Fisheries Technical Report No. 94. Dillingham, Alaska. http://alaska.fws.gov/fisheries/fish/Technical_Reports/t_2006_94.pdf

Lisac, M. J. 2008. Abundance and Run timing of Dolly Varden *Salvelinus malma* in the Middle Fork Goodnews River, 2007, Final Report. U. S. Fish and Wildlife Service, Report No. 2008-7. Dillingham, Alaska. http://alaska.fws.gov/fisheries/fish/Data_Series/d_2008_7.pdf

Lisac, M. J. *In prep*. Abundance and Run timing of Dolly Varden *Salvelinus malma* in the Middle Fork Goodnews River, 2008, Final Report. U. S. Fish and Wildlife Service, Report No. 2008-7, Dillingham, Alaska.

Lisac, M. J. 2009. Seasonal distribution and biological characteristics of Dolly Varden, *Salvelinus malma,* in the Goodnews River (North Fork), 2005–2006. U. S. Fish and Wildlife Service, Report No. 103, Dillingham, Alaska. http://alaska.fws.gov/fisheries/fish/Technical_Reports/t_2008_103.pdf

Menard, J. 1999. Middle Fork Goodnews River fisheries studies, 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A99-13, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/RIR.3A.1999.13.pdf

Molyneaux, D. B., and L. K. Brannian. 2006. Review of escapement and abundance information for Kuskokwim area salmon stocks. Alaska Department of Fish and Game, Fishery Manuscript No. 06-08, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/fms06-08.pdf

Molyneaux, D. B., and D. L. Folletti. 2008. Salmon age, sex, and length catalog for the Kuskokwim area, 2007. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A08-05, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/RIR.3A.2008.05.pdf

Schultz, K. 1982. Goodnews River tower study, 1982. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Escapement Report No. 24, Bethel.

Schultz, K. 1984a. Goodnews River counting tower study, 1983. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Escapement Report No. 33, Bethel.

Schultz, K. 1984b. Goodnews River studies, 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Escapement Report No. 34, Bethel.

Schultz, K. 1985. Goodnews River studies, 1985. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Escapement Report No. 38, Bethel.

Schultz, K. 1987. Goodnews River studies, 1986. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Escapement Report No. 39, Bethel.

Schultz, K., and C. Burkey Jr. 1989. Goodnews River fisheries studies, 1987. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3B89-02, Bethel.

Stewart, R. 2002. Resistance board weir panel construction manual, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A02-21, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/RIR.3A.2002.21.pdf

REFERENCES CITED (Continued)

Stewart, R. 2003. Techniques for installing a resistance board weir, 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A03-26, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/RIR.3A.2003.26.pdf

Tobin, J. H. 1994. Construction and performance of a portable resistance board weir for counting migrating adult salmon in rivers. U. S. Fish and Wildlife Service, Kenai Fishery Resource Office, Alaska Fisheries Technical Report Number 22, Kenai.

Vania, T., V. Golembeski, B. M. Borba, T. L. Lingau, J. S. Hayes, K. R. Boek, and W. H. Busher. 2002. Annual Management Report Yukon and Northern Areas 2000. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A02-29, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/RIR.3A.2002.29.pdf

Wolfe, R. J., J. J. Gross, G. J. Langdon, J. M. Wright, G. K. Sherrod, L. J. Ellanna, V. Sumida, and P. J. Usher. 1984. Subsistence-based economies in coastal communities of southwest Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 89, Anchorage.

Whitmore, C., M. Martz, J. C. Linderman, R. L. Fisher and D. G. Bue. 2008. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area, 2004. Alaska Department of Fish and Game, Fisheries Management Report No. 08-25, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/fmr08-25.pdf

TABLES AND FIGURES

Table 1.–Brood table for Middle Fork Goodnews River Chinook salmon.

Year	MF Escapement	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Total Recruits	Yield	Recruits/ Spawner
1981	3,688	0	7	1,232	1,968	2,370	599	0	6,176	2,488	1.7
1982	1,395	0	30	489	1,306	2,554	228	0	4,609	3,214	3.3
1983	6,027	0	15	495	1,209	2,136	264	9	4,128	-1,899	0.7
1984	3,260	0	16	681	1,615	2,386	271	0	4,969	1,709	1.5
1985	2,831	0	0	242	899	971	109	0	2,221	-610	0.8
1986	2,080	0	14	1,846	984	1,712	207	0	4,762	2,682	2.3
1987	2,272	0	26	578	1,231	1,561	604	0	4,000	1,728	1.8
1988	2,712	0	0	628	964	2,614	49	1	4,256	1,544	1.6
1989	1,915	0	41	949	1,781	3,846	201	0	6,817	4,902	3.6
1990	3,636	0	17	427	1,080	1,722	10	0	3,256	-380	0.9
1991	1,952	0	65	1,643	1,100	1,167	275	0	4,250	2,298	2.2
1992	1,905	0	0	781	358	2,034	93	0	3,267	1,362	1.7
1993	2,349	0	30	2,114	4,044	2,743	65	0	8,997	6,648	3.8
1994	3,856	0	24	786	606	1,048	234	0	2,698	-1,158	0.7
1995	4,836	0	142	1,156	3,073	4,568	145	0	9,084	4,248	1.9
1996	2,931	0	23	813	1,278	1,526	138	0	3,778	847	1.3
1997	2,937	0	28	351	1,021	1,129	42	0	2,571	-366	0.9
1998	4,584	0	51	1,309	1,272	1,024	9	0	3,666	-918	0.8
1999	3,221	0	7	526	1,251	1,285	107	0	3,177	-44	1.0
2000	2,500	0	81	2,886	3,366	1,853	152	0	8,338	5,838	3.3
2001	5,351	0	124	1,084	1,559	2,019	169	0	4,955	-396	0.9
2002	3,085	0	6	1,998	1,404	951	8	0	4,367	1,283	1.4
2003	2,389	0	66	1,945	1,439	1,349	0	0	4,799		
2004	4,388	0	46	703	521	0	0	0	1,271		
2005	4,633	0	173	1,257	0	0	0	0	1,430		
2006	4,559	0	4	0	0	0	0	0	4		
2007	3,852	0	0	0	0	0	0	0	0		
2008	2,158	0	0	0	0	0	0	0	0		
2009	1,630										
Average	3,205										1.7

Note: Data bordered by black line were used in spawner–recruit analysis.

Note: Commercial harvest ASL data was not collected for 2008. Harvest age class was determined using 2008 harvest total and historical age class return percentages.

Table 2.–Brood table for Middle Fork Goodnews River sockeye salmon.

Year	MF Escapement	Age 3	Age 4	Age5	Age 6	Age 7	Total Recruit	Yield	Recruit/Spawner
1981	49,108	41	8,929	64,113	1,155	21	74,258	25,150	1.5
1982	56,255	31	4,111	40,635	1,423	0	46,200	-10,055	0.8
1983	25,816	0	3,114	32,033	2,213	0	37,360	11,544	1.4
1984	32,053	0	2,994	30,857	5,585	0	39,435	7,382	1.2
1985	24,131	21	2,159	34,837	3,806	209	41,032	16,901	1.7
1986	51,069	0	14,232	63,441	4,008	209	81,890	30,821	1.6
1987	28,871	539	6,084	29,112	5,351	57	41,142	12,271	1.4
1988	15,799	265	17,596	38,795	7,039	0	63,695	47,896	4.0
1989	21,186	1,817	20,045	82,777	5,620	36	110,295	89,109	5.2
1990	31,679	353	5,686	49,954	4,387	260	60,640	28,961	1.9
1991	47,397	0	7,390	68,200	8,064	65	83,718	36,321	1.8
1992	27,268	0	5,446	35,537	6,551	145	47,679	20,411	1.7
1993	26,452	82	11,125	51,444	4,729	0	67,378	40,926	2.5
1994	50,801	150	13,136	49,823	2,399	0	65,508	14,707	1.3
1995	39,009	0	9,292	51,716	4,208	78	65,295	26,286	1.7
1996	58,290	0	3,214	23,942	2,537	0	29,694	-28,596	0.5
1997	35,530	0	837	10,369	3,777	0	14,983	-20,547	0.4
1998	49,513	0	13,027	46,901	5,612	0	65,540	16,027	1.3
1999	48,205	0	4,840	40,651	6,118	0	51,609	3,404	1.1
2000	32,341	0	20,946	101,610	11,088	0	133,644	101,303	4.1
2001	21,024	0	17,555	100,679	5,088	42	123,364	102,340	5.9
2002	22,101	0	29,120	52,335	4,921	0	86,376	64,275	3.9
2003	44,387	0	38,211	49,141	6,191	0	93,543	49,156	2.1
2004	55,926	361	8,710	36,787	0	0	45,858		
2005	113,809	99	14,999	0	0	0	15,098		
2006	126,772	34	0	0	0	0	34		
2007	72,282	0	0	0	0	0	0		
2008	51,763	0	0	0	0	0	0		
2009	25,460								
Average	44,286								2.2

Note: Data bordered by black line were used in spawner–recruit analysis.

Note: Commercial Harvest ASL data was not collected for 2008. Harvest age class was determined using 2008 harvest total and historical age class return percentages.

Table 3.–District W-5 Commercial Harvest by period and exvessel value, 2009.

Date	Permits	Chinook		Sockeye		Chum		Coho	
Caught	Fished	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds
6/22	20	511	5,346	736	5,217	658	5,183	0	0
6/25	20	361	4,122	2,243	16,061	1,374	10,975	0	0
6/30	22	221	2,978	3,207	23,346	1,996	16,028	0	0
7/06	26	110	1,728	3,578	25,516	2,466	19,052	0	0
7/08	24	53	932	3,545	24,728	1,680	12,472	0	0
7/10	31	63	941	3,001	21,181	1,506	11,119	0	0
7/13	24	21	388	1,719	11,677	1,477	10,665	1	3
7/15	23	30	467	2,195	15,243	1,654	11,868	0	0
7/16	17	10	137	814	5,353	600	4,126	0	0
7/17	22	31	528	1,413	9,734	1,313	9,444	0	0
7/20	16	20	343	815	5,909	606	4,489	9	71
7/22	13	17	280	1,368	9,193	432	3,027	15	104
7/24	14	6	76	1,120	7,761	309	2,092	13	93
7/25	14	10	158	1,095	7,838	304	1,968	25	185
7/27	12	7	109	583	4,087	125	854	28	201
7/29	6	1	24	79	575	24	165	15	102
7/31	10	4	63	456	3,404	119	800	153	1,144
8/03	11	4	72	481	3,283	86	590	151	1,137
8/05	15	5	66	614	4,222	83	572	376	2,872
8/07	16	9	120	624	4,257	61	397	314	2,418
8/10	15	0	0	693	4,696	43	276	427	3,411
8/12	16	5	59	536	3,430	22	158	796	6,511
8/14	19	1	28	746	4,990	25	170	1,229	10,207
8/19	17	5	39	440	2,896	12	87	1,991	18,055
8/21	20	2	22	303	2,000	3	23	1,840	16,645
8/24	18	2	21	140	978	7	56	1,023	9,572
Total	39	1,509	19,047	32,544	227,575	16,985	126,656	8,406	72,731
Avg. Wt.		12.6		7.0		7.5		8.7	
Avg. Price		$0.70		$0.59		$0.15		$0.35	
Total Exvessel Value		$13,333		$134,269		$18,998		$25,456	
								Total Fish	59,444
								Total Pounds	446,009
							Total Exvessel Value		$192,056

Table 4.–Escapement summary for Goodnews River, 2009.

Middle Fork Goodnews River escapement estimate				
	Chinook	Sockeye	Chum	Coho
2009 weir count	1,630	25,465	19,715	20,000
Weir (BEG)	1,500-2,900	18,000-40,000		
Weir (SEG)			>12,000	>12,000
Goodnews Area harvests				
	Chinook	Sockeye	Chum	Coho
District W-5 Commercial Harvest	1,509	32,544	16,985	8,406
Subsistence Harvest [a]	730	861	289	686
Sport Fishing Harvest [a]	128	123	22	553

[a] Official estimates not available at time of publication, numbers shown are the recent 10 year averages (1998–2007) of Goodnews Bay area subsistence and Goodnews River sport fishing harvest.

Table 5.–Daily, cumulative, cumulative percent passage of Chinook, sockeye, chum, and coho salmon passage, Middle Fork.

	Chinook			Sockeye			Chum			Coho		
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage
6/28	0	0	0	311	311	1	4	4	0	0	0	0
6/29	13	13	1	1,151	1,462	6	49	53	0	0	0	0
6/30	11	24	1	900	2,362	9	43	96	0	0	0	0
7/01	10	34	2	1,185	3,547	14	49	145	1	0	0	0
7/02	11	45	3	495	4,042	16	45	190	1	0	0	0
7/03	1	46	3	314	4,356	17	50	240	1	0	0	0
7/04	3	49	3	2,096	6,452	25	199	439	2	0	0	0
7/05	18	67	4	2,184	8,636	34	276	715	4	0	0	0
7/06	13	80	5	662	9,298	37	58	773	4	0	0	0
7/07	36	116	7	986	10,284	40	671	1,444	7	0	0	0
7/08	20	136	8	1,224	11,508	45	212	1,656	8	0	0	0
7/09	30	166	10	1,411	12,919	51	331	1,987	10	0	0	0
7/10	41	207	13	650	13,569	53	499	2,486	13	0	0	0
7/11	36	243	15	1,347	14,916	59	230	2,716	14	0	0	0
7/12	48	291	18	1,039	15,955	63	706	3,422	17	0	0	0
7/13	15	306	19	595	16,550	65	537	3,959	20	0	0	0
7/14	7	313	19	467	17,017	67	191	4,150	21	0	0	0
7/15	41	354	22	567	17,584	69	208	4,358	22	0	0	0
7/16	73	427	26	1,155	18,739	74	655	5,013	25	0	0	0
7/17	275	702	43	1,220	19,959	78	3,029	8,042	41	0	0	0
7/18	3	705	43	300	20,259	80	410	8,452	43	0	0	0
7/19	111	816	50	492	20,751	82	436	8,888	45	0	0	0
7/20	34	850	52	290	21,041	83	483	9,371	48	0	0	0
7/21	60	910	56	362	21,403	84	385	9,756	49	0	0	0
7/22	90	1,000	61	521	21,924	86	966	10,722	54	0	0	0
7/23	86	1,086	67	578	22,502	88	667	11,389	58	0	0	0
7/24	3	1,089	67	106	22,608	89	230	11,619	59	0	0	0
7/25	91	1,180	72	304	22,912	90	580	12,199	62	0	0	0

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Table 5.–Page 2 of 4.

Date	Chinook			Sockeye			Chum			Coho		
	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage
7/26	90	1,270	78	395	23,307	92	841	13,040	66	0	0	0
7/27	25	1,295	79	132	23,439	92	529	13,569	69	0	0	0
7/28	47	1,342	82	151	23,590	93	579	14,148	72	0	0	0
7/29	34 [a]	1,376	84	133 [a]	23,723	93	524 [a]	14,672	74	4 [a]	4	0
7/30	31 [a]	1,407	86	125 [a]	23,848	94	494 [a]	15,166	77	7 [a]	11	0
7/31	29 [a]	1,435	88	117 [a]	23,965	94	464 [a]	15,631	79	11 [a]	22	0
8/01	26 [a]	1,461	90	109 [a]	24,074	95	435 [a]	16,065	81	15 [a]	37	0
8/02	24 [a]	1,485	91	100 [a]	24,174	95	405 [a]	16,470	84	19 [a]	56	0
8/03	21 [a]	1,506	92	92 [a]	24,266	95	375 [a]	16,845	85	22 [a]	78	0
8/04	19 [a]	1,524	94	84 [a]	24,350	96	345 [a]	17,190	87	26 [a]	104	0
8/05	16 [a]	1,540	95	76 [a]	24,425	96	315 [a]	17,505	89	30 [a]	134	0
8/06	18 [a]	1,558	96	67 [a]	24,492	96	414 [a]	17,919	91	42 [a]	176	1
8/07	11 [a]	1,569	96	59 [a]	24,551	96	255 [a]	18,174	92	37 [a]	213	1
8/08	9 [a]	1,578	97	51 [a]	24,602	97	225 [a]	18,399	93	40 [a]	253	1
8/09	9	1,587	97	43	24,645	97	209	18,608	94	43	296	1
8/10	3	1,590	98	42	24,687	97	182	18,790	95	46	342	2
8/11	2	1,592	98	63	24,750	97	149	18,939	96	107	449	2
8/12	3	1,595	98	30	24,780	97	66	19,005	96	12	461	2
8/13	5	1,600	98	41	24,821	97	44	19,049	97	48	509	3
8/14	2	1,602	98	56	24,877	98	100	19,149	97	65	574	3
8/15	2	1,604	98	31	24,908	98	85	19,234	98	48	622	3
8/16	3	1,607	99	59	24,967	98	150	19,384	98	220	842	4
8/17	1	1,608	99	30	24,997	98	73	19,457	99	88	930	5
8/18	1	1,609	99	55	25,052	98	38	19,495	99	112	1,042	5
8/19	4	1,613	99	26	25,078	98	40	19,535	99	95	1,137	6
8/20	1	1,614	99	33	25,111	99	36	19,571	99	189	1,326	7
8/21	2	1,616	99	19	25,130	99	25	19,596	99	107	1,433	7
8/22	1	1,617	99	21	25,151	99	18	19,614	99	82	1,515	8
8/23	1	1,618	99	39	25,190	99	14	19,628	100	230	1,745	9

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Table 5.–Page 3 of 4.

	Chinook			Sockeye			Chum			Coho		
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage
8/24	3	1,621	99	37	25,227	99	12	19,640	100	538	2,283	11
8/25	2	1,623	100	36	25,263	99	23	19,663	100	818	3,101	16
8/26	0	1,623	100	10	25,273	99	4	19,667	100	312	3,413	17
8/27	0	1,623	100	18	25,291	99	5	19,672	100	580	3,993	20
8/28	0	1,623	100	15	25,306	99	11	19,683	100	1450	5,443	27
8/29	3	1,626	100	20	25,326	99	8	19,691	100	984	6,427	32
8/30	2	1,628	100	34	25,360	100	6	19,697	100	2913	9,340	47
8/31	0	1,628	100	10	25,370	100	2	19,699	100	688	10,028	50
9/01	1	1,629	100	11	25,381	100	1	19,700	100	315	10,343	52
9/02	0	1,629	100	3	25,384	100	0	19,700	100	18	10,361	52
9/03	0	1,629	100	13	25,397	100	0	19,700	100	333	10,694	54
9/04	1	1,630	100	19	25,416	100	1	19,701	100	529	11,223	56
9/05	0	1,630	100	17	25,433	100	3	19,704	100	766	11,989	60
9/06	0	1,630	100	3	25,436	100	5	19,709	100	723	12,712	64
9/07	0	1,630	100	3	25,439	100	1	19,710	100	479	13,191	66
9/08	0	1,630	100	1	25,440	100	0	19,710	100	356	13,547	68
9/09	0	1,630	100	2	25,442	100	0	19,710	100	944	14,491	73
9/10	0	1,630	100	1	25,443	100	0	19,710	100	681	15,172	76
9/11	0	1,630	100	4	25,447	100	1	19,711	100	745	15,917	80
9/12	0	1,630	100	2	25,449	100	1	19,712	100	573	16,490	83
9/13	0	1,630	100	7	25,456	100	0	19,712	100	512	17,002	85
9/14	0	1,630	100	0	25,456	100	0	19,712	100	299	17,301	87
9/15	0	1,630	100	2	25,458	100	0	19,712	100	687	17,988	90
9/16	0	1,630	100	3	25,461	100	0	19,712	100	567	18,555	93
9/17	0	1,630	100	2	25,463	100	0	19,712	100	301	18,856	95
9/18	0	1,630	100	1	25,464	100	0	19,712	100	462	19,318	97
9/19	0	1,630	100	1	25,465	100	1	19,713	100	405	19,723	99
9/20	0	1,630	100	0	25,465	100	0	19,713	100	171	19,894	100
9/21	0	1,630	100	0	25,465	100	2	19,715	100	106	20,000	100

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Table 5.–Page 4 of 4.

	Chinook			Sockeye			Chum			Coho		
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage
Total	1,630			25,465			19,715			20,000		
Observed	1,445			24,587			16,441			19,805		
Estimated	185			878			3,273			195		
% Observed	88.65			96.55			83.40			99.03		

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

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

Table 6.–Daily and cumulative pink salmon and Dolly Varden passage, Middle Fork Goodnews River weir, 2009.

	Pink Salmon			Dolly Varden		
Date	Daily	Cum.	% passage	Daily	Cum.	% passage
6/28	0	0	0	0	0	0
6/29	0	0	0	6	6	0
6/30	1	1	0	5	11	1
7/01	0	1	0	10	21	1
7/02	2	3	0	1	22	1
7/03	0	3	0	4	26	2
7/04	0	3	0	15	41	3
7/05	0	3	0	96	137	9
7/06	0	3	0	23	160	10
7/07	0	3	0	56	216	13
7/08	0	3	0	55	271	17
7/09	1	4	1	150	421	26
7/10	9	13	2	34	455	28
7/11	0	13	2	60	515	32
7/12	0	13	2	63	578	36
7/13	12	25	4	22	600	37
7/14	6	31	4	15	615	38
7/15	11	42	6	15	630	39
7/16	4	46	6	39	669	42
7/17	35	81	11	111	780	49
7/18	18	99	14	21	801	50
7/19	8	107	15	16	817	51
7/20	11	118	17	29	846	53
7/21	10	128	18	18	864	54
7/22	61	189	26	83	947	59
7/23	26	215	30	33	980	61
7/24	6	221	31	6	986	61
7/25	52	273	38	16	1,002	62
7/26	38	311	44	24	1,026	64
7/27	38	349	49	18	1,044	65
7/28	27	376	53	20	1,064	66
7/29	10 [a]	386	54	24 [a]	1,088	68
7/30	2 [a]	388	54	0 [a]	1,088	68
7/31	0 [a]	388	54	0 [a]	1,088	68
8/01	3 [a]	391	55	1 [a]	1,089	68
8/02	3 [a]	394	55	1 [a]	1,090	68
8/03	3 [a]	397	56	2 [a]	1,092	68
8/04	1 [a]	398	56	1 [a]	1,093	68
8/05	8 [a]	406	57	3 [a]	1,096	68
8/06	27 [a]	433	61	12 [a]	1,108	69
8/07	23 [a]	456	64	4 [a]	1,112	69
8/08	8 [a]	464	65	4 [a]	1,116	69
8/09	17	481	67	4	1,120	70
8/10	8	489	68	2	1,122	70
8/11	16	505	71	2	1,124	70

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Table 6.–Page 2 of 2.

Date	Pink Salmon			Dolly Varden		
	Daily	Cum.	% passage	Daily	Cum.	% passage
8/12	6	511	72	4	1,128	70
8/13	8	519	73	3	1,131	70
8/14	8	527	74	3	1,134	71
8/15	4	531	74	1	1,135	71
8/16	19	550	77	1	1,136	71
8/17	7	557	78	1	1,137	71
8/18	4	561	79	3	1,140	71
8/19	4	565	79	0	1,140	71
8/20	11	576	81	14	1,154	72
8/21	17	593	83	9	1,163	72
8/22	14	607	85	5	1,168	73
8/23	5	612	86	10	1,178	73
8/24	5	617	86	10	1,188	74
8/25	9	626	88	29	1,217	76
8/26	3	629	88	3	1,220	76
8/27	7	636	89	9	1,229	76
8/28	5	641	90	31	1,260	78
8/29	10	651	91	13	1,273	79
8/30	15	666	93	45	1,318	82
8/31	12	678	95	16	1,334	83
9/01	2	680	95	16	1,350	84
9/02	1	681	95	4	1,354	84
9/03	0	681	95	17	1,371	85
9/04	11	692	97	16	1,387	86
9/05	4	696	97	62	1,449	90
9/06	4	700	98	17	1,466	91
9/07	2	702	98	10	1,476	92
9/08	1	703	98	3	1,479	92
9/09	1	704	99	22	1,501	93
9/10	1	705	99	10	1,511	94
9/11	0	705	99	8	1,519	94
9/12	2	707	99	2	1,521	94
9/13	4	711	100	16	1,537	95
9/14	2	713	100	6	1,543	95
9/15	1	714	100	33	1,576	97
9/16	0	714	100	4	1,580	98
9/17	0	714	100	11	1,591	99
9/18	0	714	100	9	1,600	100
9/19	0	714	100	4	1,604	100
9/20	0	714	100	3	1,607	100
9/21	0	714	100	1	1,608	100
Total	714			1,608		

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

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

Table 7.–Age and sex composition of Chinook salmon escapement, Middle Fork Goodnews River weir, 2009.

Sample Dates (stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Esc.	1.1 %	1.2 Esc.	1.2 %	1.3 Esc.	1.3 %	1.4 Esc.	1.4 %	2.3 Esc.	2.3 %	1.5 Esc.	1.5 %	2.4 Esc.	2.4 %	Total Esc.	Total %
7/2-26	88	57	M	0	0.0	429	26.3	200	12.3	229	14.0	0	0.0	0	0.0	0	0.0	858	52.6
(6/28-9/20)			F	0	0.0	29	1.8	29	1.7	715	43.9	0	0.0	0	0.0	0	0.0	772	47.4
			Subtotal	0	0.0	458	28.1	229	14.0	944	57.9	0	0.0	0	0.0	0	0.0	1,630	100.0
Season	88	57	M	0	0.0	429	26.3	200	12.3	229	14.0	0	0.0	0	0.0	0	0.0	858	52.6
			F	0	0.0	29	1.8	29	1.7	715	43.9	0	0.0	0	0.0	0	0.0	772	47.4
			Subtotal	0	0.0	458	28.1	229	14.0	944	57.9	0	0.0	0	0.0	0	0.0	1,630	100.0
			95% C. I.				(± 11.6)		(± 8.9)		(± 1.3)								
Grand Total [a]		1,415	M	339	1.6	5,812	26.7	4,406	20.2	2,923	13.4	12	0.1	190	0.9	0	0.0	13,691	62.9
			F	0	0.0	56	0.3	2,054	9.4	5,616	25.8	0	0.0	304	1.4	60	0.3	8,078	37.1
			Total	339	0.0	5,868	27.0	6,459	29.7	8,539	39.2	12	0.1	494	2.3	60	0.3	21,770	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 number of fish in "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1991, 1995, 1997, 2000, 2002–2003, and 2007–2009.

Table 8.–Mean length (mm) of Chinook salmon escapement, Middle Fork Goodnews River weir, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	1.3	1.4	1.5	2.4
7/2-26 (6/28-9/20)	M	Mean Length	-	603	717	853	-	-
		Std. Error	-	10	35	27	-	-
		Range	-	518-674	606-820	696-937	-	-
		Sample Size	0	15	7	8	0	0
	F	Mean Length	-	643	802	855	-	-
		Std. Error	-	-	-	9	-	-
		Range	-	643-643	802-802	745-934	-	-
		Sample Size	0	1	1	25	0	0
Season	M	Mean Length	-	603	717	853	-	-
		Std. Error	-	10	35	27	-	-
		Range	-	518-674	606-820	696-937	-	-
		Sample Size	0	15	7	8	0	0
	F	Mean Length	-	643	802	855	-	-
		Std. Error	-	-	-	9	-	-
		Range	-	643-643	802-802	745-934	-	-
		Sample Size	0	1	1	25	0	0
Grand Total [a]	M	Mean Length	373	542	711	847	904	-
		Range	240-550	360-850	550-910	680-1,035	700-990	-
		Sample Size	18	315	321	192	8	0
	F	Mean Length	-	610	776	852	892	822
		Range	-	540-670	560-880	470-1,005	705-990	732-872
		Sample Size	0	3	142	386	23	4

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1991, 1995, 1997, 2000, 2002–2003 and 2007–2009.

Table 9.–Age and sex composition of sockeye salmon escapement, Middle Fork Goodnews River weir, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Esc.	%	0.3 Esc.	%	1.2 Esc.	%	0.4 Esc.	%	1.3 Esc.	%	2.2 Esc.	%	1.4 Esc.	%	2.3 Esc.	%	Total Esc.	%
7/12-8/18	519	161	M	0	0.0	474	1.8	2,847	11.2	0	0.0	6,643	26.1	0	0.0	317	1.3	474	1.9	10,755	42.2
			F	0	0.0	633	2.5	5,220	20.5	0	0.0	7,276	28.6	475	1.9	316	1.2	791	3.1	14,710	57.8
			Subtotal	0	0.0	1,107	4.3	8,067	31.7	0	0.0	13,919	54.7	475	1.9	633	2.5	1,265	5.0	25,465	100.0
Season	519	161	M	0	0.0	474	1.8	2,847	11.2	0	0.0	6,643	26.1	0	0.0	317	1.3	474	1.9	10,755	42.2
			F	0	0.0	633	2.5	5,220	20.5	0	0.0	7,276	28.6	475	1.9	316	1.2	791	3.1	14,710	57.8
			Subtotal	0	0.0	1,107	4.3	8,067	31.7	0	0.0	13,919	54.7	475	1.9	633	2.5	1,265	5.0	25,465	100.0
			95% C. I.				(± 7.4)		(± 7.4)				(± 7.7)		(± 7.7)		(± 4.1)		(± 4.1)		
Grand Total [a]		8,428	M	414	0.1	11,166	1.6	37,802	5.3	275	0.0	252,425	35.6	5,520	0.8	11,547	1.6	15,783	2.2	335,389	47.4
			F	376	0.1	8,551	1.2	72,519	10.2	487	0.1	260,746	36.8	7,653	1.1	8,450	1.2	13,847	2.0	372,810	52.6
			Total	790	0.1	19,717	2.8	110,321	15.6	762	0.1	513,171	72.5	13,173	1.9	19,997	2.8	29,630	4.2	708,196	100.0

Note: The numbers of fish in each stratum category are derived from sample percentages; sum discrepancies are attributed to rounding errors. The numbers 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 years 1987, 1990, 1995, 1997, and 1999 through 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 10.–Mean length (mm) of sockeye salmon escapement, Middle Fork Goodnews River weir, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/12-8/18	M	Mean Length	565	547	-	574	-	537	577
		Range	530-611	497-578	-	475-623	-	493-580	565-584
		Sample Size	3	18	0	42	0	2	3
	F	Mean Length	517	503	-	536	494	546	525
		Range	479-543	436-586	-	463-589	463-511	527-564	465-558
		Sample Size	4	33	0	46	3	2	5
Season	M	Mean Length	565	547	-	574	-	537	577
		Range	530-611	497-578	-	475-623	-	493-580	565-584
		Sample Size	3	18	0	42	0	2	3
	F	Mean Length	517	503	-	536	494	546	525
		Range	479-543	436-586	-	463-589	463-511	527-564	465-558
		Sample Size	4	33	0	46	3	2	5
Grand Total [a]	M	Mean Length	578	527	580	578	534	600	576
		Range	568-622	455-625	465-625	425-630	495-645	470-700	499-611
		Sample Size	79	500	7	2901	76	135	188
	F	Mean Length	543	494	566	543	488	553	533
		Range	470-595	429-597	490- 595	415-687	453-595	438-635	450-566
		Sample Size	90	1,036	8	2,995	133	104	149

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

Table 11.–Age and sex composition of chum salmon escapement, Middle Fork Goodnews River weir, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Esc.	0.2 %	0.3 Esc.	0.3 %	0.4 Esc.	0.4 %	0.5 Esc.	0.5 %	Total Esc.	Total %
7/10-26	280	196	M	101	0.5	4,225	21.4	3,319	16.8	503	2.6	8,148	41.3
(6/28-9/21)			F	402	2.1	6,337	32.2	4,426	22.5	402	2.0	11,567	58.7
			Subtotal	503	2.6	10,562	53.6	7,745	39.3	905	4.6	19,715	100.0
Season	280	196	M	101	0.5	4,225	21.4	3,319	16.8	503	2.6	8,148	41.3
			F	402	2.1	6,337	32.2	4,426	22.5	402	2.0	11,567	58.7
			Total	503	2.6	10,562	53.6	7,745	39.3	905	4.6	19,715	100.0
			95% C. I.		(± 2.2)		(± 7.0)		(± 6.8)		(± 2.9)		
Grand		7,169	M	1,458	0.4	111,873	29.1	69,202	18.0	2,783	0.7	185,312	48.2
Total [a]			F	2,901	0.8	129,563	33.7	65,168	16.9	1,691	0.4	199,326	51.8
			Total	4,359	1.1	241,436	62.8	134,369	34.9	4,474	1.2	384,638	100.0

Note: The numbers of fish in each stratum category are derived from sample percentages; sum discrepancies are attributed to rounding errors. The numbers 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. Years included are 1990 through 1991, 1997 through 1999, and 2001 through 2009.

Table 12.–Mean length (mm) of chum salmon escapement through the Middle Fork Goodnews River weir, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
7/10-26 (6/28-9/21)	M	Mean Length	550	585	607	632
		Std. Error	-	4	6	18
		Range	550-550	510-648	513-677	596-690
		Sample Size	1	42	33	5
	F	Mean Length	546	568	572	566
		Std. Error	16	3	4	10
		Range	500-573	510-635	478-625	542-590
		Sample Size	4	63	44	4
Season	M	Mean Length	550	585	607	632
		Range	550-550	510-648	513-677	596-690
		Sample Size	1	42	33	5
	F	Mean Length	546	568	572	566
		Range	500-573	510-635	478-625	542-590
		Sample Size	4	63	44	4
Grand Total [a]	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	3159	1569	36

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1990 through 1991, 1997 through 1999, and 2001–2009.

Table 13.–Age and sex composition of coho salmon escapement, Middle Fork Goodnews River weir, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Esc.	1.1 %	2.1 Esc.	2.1 %	3.1 Esc.	3.1 %	Total Esc.	Total %
8/13-26	116	90	M	222	5.6	1,775	44.4	178	4.5	2,174	54.4
(6/28-8/27)			F	177	4.4	1,464	36.7	177	4.4	1,819	45.6
			Subtotal	399	10.0	3,239	81.1	355	8.9	3,993	100.0
8/29-9/3	139	111	M	391	5.4	3,322	46.0	65	0.9	3,778	52.3
(8/28-9/4)			F	195	2.7	3,192	44.1	65	0.9	3,452	47.7
			Subtotal	586	8.1	6,514	90.1	130	1.8	7,230	100.0
9/6-11	193	157	M	335	3.8	3,634	41.4	447	5.1	4,416	50.3
(9/5-21)			F	168	1.9	4,081	46.5	112	1.3	4,361	49.7
			Subtotal	503	5.7	7,715	87.9	559	6.4	8,777	100.0
Season	448	358	M	948	4.7	8,730	43.6	690	3.4	10,368	51.8
			F	541	2.7	8,737	43.7	354	1.8	9,632	48.2
			Subtotal	1,489	7.4	17,467	87.3	1,044	5.2	20,000	100.0
			95% C. I.		(± 2.8)		(± 4.0)		(± 3.1)		
Grand Total [a]		4,742	M	14,192	4.5	136,167	43.2	6,916	2.2	157,275	50.8
			F	11,427	3.6	139,812	44.3	6,864	2.2	158,102	49.2
			Total	25,619	8.1	275,799	87.5	13,780	4.4	315,377	100.0

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

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

Table 14.–Mean length (mm) of coho salmon escapement, Middle Fork Goodnews River weir, 2009.

Sample Dates (stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/13-26 (6/28-8/27)	M	Mean Length	552	595	520
		Std. Error	10	8	57
		Range	520-581	436-668	353-600
		Sample Size	5	40	4
	F	Mean Length	596	601	608
		Std. Error	7	6	10
		Range	581-608	500-661	582-628
		Sample Size	4	33	4
8/29-9/3 (8/28-9/4)	M	Mean Length	602	609	647
		Std. Error	11	7	-
		Range	558-627	445-683	647-647
		Sample Size	6	51	1
	F	Mean Length	566	607	628
		Std. Error	6	4	-
		Range	553-574	545-688	628-628
		Sample Size	3	49	1
9/6-11 (9/5-21)	M	Mean Length	570	623	625
		Std. Error	12	5	10
		Range	542-610	500-702	578-672
		Sample Size	6	65	8
	F	Mean Length	559	606	602
		Std. Error	8	3	10
		Range	547-573	552-664	592-611
		Sample Size	3	73	2
Season	M	Mean Length	579	612	600
		Range	520-627	436-702	353-672
		Sample Size	17	156	13
	F	Mean Length	573	605	610
		Range	547-608	500-688	582-628
		Sample Size	10	155	7

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Sample Dates (stratum Dates)	Sex		Age Class 1.1	2.1	3.1
Grand Total [a]	M	Mean Length	557	582	584
		Range	455-658	405-707	353-675
		Sample Size	188	2,037	147
	F	Mean Length	583	588	587
		Range	497-677	400-688	420-628
		Sample Size	127	1,920	173

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1998–2004, and 2006–2009.

Table 15.–Age and sex composition of Chinook salmon harvest, District W-5 commercial fishery, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Catch	%	1.2 Catch	%	2.2 Catch	%	1.3 Catch	%	1.4 Catch	%	2.3 Catch	%	1.5 Catch	%	2.4 Catch	%	Total	
6/22		122	M	4	0.8	335	65.6	0	0.0	67	13.1	33	6.6	4	0.8	0	0.0	0	0.0	444	86.9
(6/22)			F	0	0.0	0	0.0	0	0.0	0	0.0	63	12.3	0	0.0	4	0.8	0	0.0	67	13.1
			Subtotal	4	0.8	335	65.6	0	0.0	67	13.1	96	18.9	4	0.8	4	0.8	0	0.0	511	100.0
6/25		213	M	0	0.0	208	57.7	3	0.9	88	24.4	15	4.2	0	0.0	3	0.9	0	0.0	319	88.3
(6/25)			F	0	0.0	2	0.5	0	0.0	4	1.0	38	10.4	0	0.0	0	0.0	0	0.0	42	11.7
			Subtotal	0	0.0	210	58.2	3	0.9	92	25.4	53	14.6	0	0.0	3	0.9	0	0.0	361	100.0
6/30		113	M	0	0.0	92	41.6	0	0.0	51	23.0	20	8.8	2	0.9	0	0.0	0	0.0	164	74.3
(6/30)			F	0	0.0	0	0.0	0	0.0	12	5.3	45	20.4	0	0.0	0	0.0	0	0.0	57	25.7
			Subtotal	0	0.0	92	41.6	0	0.0	63	28.3	65	29.2	2	0.9	0	0.0	0	0.0	221	100.0
7/6		67	M	0	0.0	155	37.3	0	0.0	50	11.9	50	11.9	6	1.5	0	0.0	0	0.0	261	62.7
(7/6-8/24)			F	0	0.0	6	1.5	0	0.0	18	4.5	130	31.4	0	0.0	0	0.0	0	0.0	155	37.3
			Subtotal	0	0.0	161	38.8	0	0.0	68	16.4	180	43.3	6	1.5	0	0.0	0	0.0	416	100.0
Season		515	M	4	0.3	791	52.4	3	0.2	255	17.0	118	7.8	12	0.8	4	0.2	0	0.0	1,188	78.7
			F	0	0.0	8	0.5	0	0.0	34	2.2	275	18.3	0	0.0	4	0.3	0	0.0	321	21.3
			Subtotal	4	0.3	799	52.9	3	0.2	289	19.2	393	26.1	12	0.8	8	0.5	0	0.0	1,509	100.0
			95% C. I.		(± 0.5)		(± 4.1)		(± 3.1)		(± 3.1)		(± 3.8)		(± 0.9)		(± 0.5)				
Grand		3,597	M	111	0.4	6,975	25.2	43	0.2	6,567	23.7	2,717	9.8	31	0.1	162	0.6	57	0.2	16,669	60.2
Total [a]			F	0	0.0	489	1.8	0	0.0	4,573	16.5	5,587	20.2	0	0.0	284	1.0	72	0.3	11,008	39.8
			Total	111	0.4	7,464	27.0	43	0.2	11,140	40.3	8,305	30.0	31	0.1	446	1.6	129	0.5	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.

Table 16.–Mean length (mm) of Chinook salmon harvest, District W-5 commercial fishery, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	2.2	1.3	1.4	2.3	1.5
6/22	M	Mean Length	345	549	-	636	763	598	-
(6/22)		Std. Error	-	5	-	16	36	-	-
		Range	345-345	407-635	-	531-729	602-939	598-598	-
		Sample Size	1	80	0	16	8	1	0
	F	Mean Length	-	-	-	-	820	-	803
		Std. Error	-	-	-	-	19	-	-
		Range	-	-	-	-	655-949	-	803- 803
		Sample Size	0	0	0	0	15	0	1
6/25	M	Mean Length	-	567	610	671	772	-	911
(6/25)		Std. Error	-	4	110	10	24	-	13
		Range	-	419-660	500-719	519-828	706-920	-	898- 923
		Sample Size	0	123	2	52	9	0	2
	F	Mean Length	-	613	-	808	832	-	-
		Std. Error	-	-	-	45	13	-	-
		Range	-	613- 613	-	763- 852	726-1005	-	-
		Sample Size	0	1	0	2	22	0	0
6/30	M	Mean Length	-	578	-	700	773	632	-
(6/30)		Std. Error	-	7	-	14	16	-	-
		Range	-	499-696	-	570-879	708-878	632-632	-
		Sample Size	0	47	0	26	10	1	0
	F	Mean Length	-	-	-	752	813	-	-
		Std. Error	-	-	-	20	11	-	-
		Range	-	-	-	692-819	719-937	-	-
		Sample Size	0	0	0	6	23	0	0

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Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	2.2	1.3	1.4	2.3	1.5
7/6	M	Mean Length	-	569	-	630	760	681	-
(7/6-8/24)		Std. Error	-	11	-	16	24	-	-
		Range	-	482-694	-	568-723	636-834	681-681	-
		Sample Size	0	25	0	8	8	1	0
	F	Mean Length	-	587	-	796	831	-	-
		Std. Error	-	-	-	17	10	-	-
		Range	-	587-587	-	766-823	756-922	-	-
		Sample Size	0	1	0	3	21	0	0
Season	M	Mean Length	345	561	610	660	764	645	910
		Range	345-345	407-696	500-719	519-879	602-939	598-681	898-923
		Sample Size	1	275	2	102	35	3	2
	F	Mean Length	-	593	-	782	826	-	803
		Range	-	587-613	-	692-852	655-1,005	-	803-803
		Sample Size	0	2	0	11	81	0	1
Grand	M	Mean Length	392	545	610	688	826	683	906
Total [a]		Range	325-464	450-774	500-719	539-876	570-1,030	690-755	865-1,000
		Sample Size	11	849	2	609	247	5	11
	F	Mean Length	-	614	-	764	847	-	893
		Range	-	505-650	-	568-995	620-1,012	-	819-1,042
		Sample Size	0	16	0	222	530	0	17

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Table 17.–Age and sex composition of sockeye salmon harvest, District W-5 commercial fishery, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	%	0.3 Catch	%	1.2 Catch	%	0.4 Catch	%	1.3 Catch	%	2.2 Catch	%	1.4 Catch	%	2.3 Catch	%	Total	
6/22		208	M	0	0	29	1.0	229	7.7	29	0.9	1,045	35.1	15	0.5	115	3.9	172	5.8	1,633	54.8
(6/22-25)			F	0	0	114	3.8	14	0.5	14	0.5	1,017	34.1	14	0.5	43	1.4	129	4.3	1,346	45.2
			Subtotal	0	0	143	4.8	243	8.2	43	1.4	2,062	69.2	29	1.0	158	5.3	301	10.1	2,979	100
6/30		213	M	0	0	60	1.9	482	15	45	1.4	1,054	32.9	0	0.0	30	1.0	105	3.3	1,777	55.4
(6/30)			F	0	0	91	2.8	45	1.4	30	0.9	1,054	32.8	0	0.0	30	0.9	181	5.6	1,430	44.6
			Subtotal	0	0	151	4.7	527	16.4	75	2.3	2,108	65.7	0	0.0	60	1.9	286	8.9	3,207	100
7/6		192	M	0	0	93	2.6	559	15.6	0	0.0	1,342	37.5	37	1.0	75	2.1	261	7.3	2,367	66.1
(7/6)			F	0	0	112	3.1	75	2.1	0	0.0	801	22.4	0	0.0	93	2.6	130	3.6	1,211	33.9
			Subtotal	0	0	205	5.7	634	17.7	0	0.0	2,143	59.9	37	1.0	168	4.7	391	10.9	3,578	100.0
(7/8)		187	M	0	0	76	2.1	341	9.6	0	0.0	1,365	38.5	19	0.5	114	3.2	246	6.9	2,161	61.0
			F	0	0	0	0.0	114	3.2	38	1.1	1,024	28.9	0	0.0	57	1.6	152	4.3	1,384	39.0
			Subtotal	0	0	76	2.1	455	12.8	38	1.1	2,389	67.4	19	0.5	171	4.8	398	11.2	3,545	100.0
7/10																					
(7/10)		184	M	0	0	82	2.7	310	10.3	49	1.6	1,011	33.7	17	0.6	65	2.2	228	7.6	1,761	58.7
			F	0	0	114	3.8	65	2.2	16	0.6	897	29.9	16	0.5	49	1.6	82	2.7	1,240	41.3
			Subtotal	0	0	196	6.5	375	12.5	65	2.2	1,908	63.6	33	1.1	114	3.8	310	10.3	3,001	100.0
7/13																					
(7/13-17)		180	M	34	0.6	205	3.4	375	6.1	0	0.0	2,047	33.3	137	2.2	136	2.2	444	7.2	3,378	55.0
			F	0	0	136	2.2	341	5.6	136	2.2	1,706	27.8	102	1.7	0	0.0	341	5.6	2,763	45.0
			Subtotal	34	0.6	341	5.6	716	11.7	136	2.2	3,753	61.1	239	3.9	136	2.2	785	12.8	6,141	100.0
7/20																					
(7/20-8/24)		189	M	0	0	53	0.5	1068	10.6	53	0.5	3,364	33.4	534	5.3	107	1.1	641	6.4	5,821	57.7
			F	0	0	107	1.1	534	5.3	0	0.0	3,151	31.2	214	2.1	0	0.0	267	2.6	4,272	42.3
			Subtotal	0	0	160	1.6	1602	15.9	53	0.5	6,515	64.6	748	7.4	107	1.1	908	9.0	10,093	100.0

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Table 17.–Page 2 of 2.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	0.2 %	0.3 Catch	0.3 %	1.2 Catch	1.2 %	0.4 Catch	0.4 %	1.3 Catch	1.3 %	2.2 Catch	2.2 %	1.4 Catch	1.4 %	2.3 Catch	2.3 %	Total	Total %
Season	0	1,353	M	34	0.1	598	1.8	3,365	10.3	176	0.6	11,229	34.5	757	2.3	642	2.0	2,097	6.5	18,897	58.1
			F	0	0.0	674	2.1	1,188	3.7	235	0.7	9,649	29.7	347	1.1	272	0.8	1,282	3.9	13,647	41.9
			Subtotal	34	0.1	1,272	3.9	4,553	14.0	411	1.3	20,878	64.2	1,104	3.4	914	2.8	3,379	10.4	32,544	100.0
			95% C. I.		(± 0.2)		(± 1.6)		(± 1.6)		(± 1.9)		(± 1.9)		(± 1.9)		(± 1.4)		(± 1.4)		
Grand Total [a]		8,010	M	63	0.0	11,262	1.0	33,708	2.9	2,077	0.2	396,473	34.3	20,282	1.8	15,342	1.3	67,132	5.8	548,244	47.4
			F	410	0.0	15,391	1.3	43,143	3.7	2,814	0.2	436,805	37.8	26,576	2.3	13,130	1.1	69,755	6.0	608,929	52.6
			Total	474	0.0	22,255	1.9	75,361	6.5	5,918	0.5	822,966	71.1	54,990	4.8	29,104	2.5	143,204	12.4	1,157,074	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.

Table 18.–Mean length (mm) of sockeye salmon harvest, District W-5 commercial fishery, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class							
			0.2	0.3	1.2	0.4	1.3	2.2	1.4	2.3
6/22	M	Mean Length	-	571	524	610	569	549	590	574
(6/22-25)		Std. Error	-	21	7	17	2	-	4	7
		Range	-	550-592	487-595	593-626	524-621	549-549	574-602	520-602
		Sample Size	0	2	16	2	73	1	8	12
	F	Mean Length	-	536	536	519	543	550	543	549
		Std. Error	-	6	-	-	2	-	15	7
		Range	-	510-562	536-536	519-519	505-590	550-550	514-565	516-584
		Sample Size	0	8	1	1	71	1	3	9
6/30	M	Mean Length	-	570	531	589	572	-	605	578
(6/30)		Std. Error	-	13	4	13	3	-	9	2
		Range	-	546-596	496-577	563-605	504-626	-	596-613	567-585
		Sample Size	0	4	32	3	70	0	2	7
	F	Mean Length	-	542	497	562	551	-	570	545
		Std. Error	-	7	4	1	2	-	3	9
		Range	-	516-569	490-504	560-563	507-591	-	567-572	499-599
		Sample Size	0	6	3	2	70	0	2	12
7/6	M	Mean Length	-	579	538	-	570	513	581	576
(7/6)		Std. Error	-	2	5	-	3	4	7	7
		Range	-	574-587	469-598	-	504-610	509-517	562-593	524-614
		Sample Size	0	5	30	0	72	2	4	14
	F	Mean Length	-	548	500	-	554	-	570	544
		Std. Error	-	7	11	-	3	-	12	11
		Range	-	526-571	477-520	-	510-592	-	539-593	503-583
		Sample Size	0	6	4	0	43	0	5	7

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Table 18.–Page 2 of 3.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/8	M	Mean Length	-	547	535	-	566	543	576	577
(7/8)		Std. Error	-	22	8	-	3	-	12	8
		Range	-	486-594	483-613	-	439-628	543-543	526-603	504-609
		Sample Size	0	4	18	0	72	1	6	13
	F	Mean Length	-	-	502	556	549	-	587	551
		Std. Error	-	-	13	18	3	-	11	7
		Range	-	-	465-548	538-573	506-589	-	569-607	529-584
		Sample Size	0	0	6	2	54	0	3	8
7/10	M	Mean Length	-	571	529	575	566	523	594	563
(7/10)		Std. Error	-	8	6	18	3	-	6	7
		Range	-	547-598	482-587	554-612	503-647	523-523	576-604	501-621
		Sample Size	0	5	19	3	62	1	4	14
	F	Mean Length	-	533	515	554	548	503	559	544
		Std. Error	-	6	17	-	2	-	16	9
		Range	-	497-544	481-545	554-554	503-584	503-503	538-590	513-564
		Sample Size	0	7	4	1	55	1	3	5
7/13	M	Mean Length	414	566	529	-	573	554	585	575
(7/13-17)		Std. Error	-	4	12	-	3	10	15	6
		Range	414-414	552-574	426-578	-	523-638	528-575	549-619	533-620
		Sample Size	1	6	11	0	60	4	4	13
	F	Mean Length	-	529	502	559	554	515	-	552
		Std. Error	-	14	6	11	3	12	-	7
		Range	-	490-552	470-534	528-574	502-605	494-535	-	503-587
		Sample Size	0	4	10	4	50	3	0	10

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Table 18.–Page 3 of 3.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/20	M	Mean Length	-	546	533	638	576	540	594	581
(7/20-8/24)		Std. Error	-	-	6	-	3	8	20	5
		Range	-	546-546	472-578	638-638	522-632	508-581	574-613	552-602
		Sample Size	0	1	20	1	63	10	2	12
	F	Mean Length	-	520	502	-	550	532	-	551
		Std. Error	-	1	10	-	4	13	-	7
		Range	-	518-521	443-540	-	449-617	493-553	-	530-566
		Sample Size	0	2	10	0	59	4	0	5
Season	M	Mean Length	414	565	532	603	572	541	587	576
		Range	414-414	486-598	426-613	554-638	439-647	508-581	526-619	501-621
		Sample Size	1	27	146	9	472	19	30	85
	F	Mean Length	-	534	503	556	550	526	567	549
		Range	-	490-571	443-548	519-574	449-617	493-553	514-607	499-599
		Sample Size	0	33	38	10	402	9	16	56
Grand Total [a]	M	Mean Length	595	568	534	593	586	557	608	600
		Range	595-595	516-604	390-656	566-614	435-696	492-652	526-680	532-675
		Sample Size	1	44	168	7	1,669	71	96	265
	F	Mean Length	-	542	523	567	553	530	572	563
		Range	-	482-575	393-645	544-579	436-646	483-638	525-614	505-680
		Sample Size	0	77	169	6	1,729	90	97	252

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Table 19.–Age and sex composition of chum salmon harvest from the District W-5 commercial fishery, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	0.2 %	0.3 Catch	0.3 %	0.4 Catch	0.4 %	0.5 Catch	0.5 %	Total Catch	Total %
6/22		97	M	0	0.0	503	24.7	1,006	49.5	42	2.1	1,550	76.3
(6/22-25)			F	0	0.0	105	5.2	377	18.5	0	0.0	482	23.7
			Subtotal	0	0.0	608	29.9	1,383	68.0	42	2.1	2,032	100.0
6/30		282	M	7	0.4	651	32.6	679	34.0	36	1.8	1,373	68.8
(6/30)			F	0	0.0	248	12.4	361	18.1	14	0.7	623	31.2
			Subtotal	7	0.4	899	45.0	1,040	52.1	50	2.5	1,996	100.0
7/6		244	M	61	2.5	556	22.5	889	36.1	41	1.7	1,546	62.7
(7/6)			F	20	0.8	253	10.3	617	25.0	30	1.2	920	37.3
			Subtotal	81	3.3	809	32.8	1,506	61.1	71	2.9	2,466	100.0
7/8		213	M	63	3.7	410	24.4	489	29.1	71	4.2	1,033	61.5
(7/8)			F	8	0.5	308	18.3	331	19.7	0	0.0	647	38.5
			Subtotal	71	4.2	718	42.7	820	48.8	71	4.2	1,680	100.0
7/10		217	M	14	0.9	395	26.3	479	31.8	42	2.8	930	61.8
(7/10)			F	7	0.5	250	16.6	305	20.3	14	0.9	576	38.2
			Subtotal	21	1.4	645	42.9	784	52.1	56	3.7	1,506	100.0
7/13		215	M	170	2.3	1,937	26.5	1,937	26.5	68	0.9	4,111	56.3
(7/13-8/24)			F	0	0.0	1,189	16.3	1,970	27.0	34	0.5	3,194	43.7
			Subtotal	170	2.3	3,126	42.8	3,907	53.5	102	1.4	7,305	100.0
Season	0	1,268	M	315	1.9	4,452	26.2	5,479	32.3	298	1.8	10,544	62.1
			F	35	0.2	2,352	13.9	3,962	23.3	93	0.5	6,441	37.9
			Subtotal	350	2.1	6,804	40.1	9,441	55.6	391	2.3	16,985	100.0
			95% C. I.		(± 1.0)		(± 3.3)		(± 3.3)		(± 0.9)		

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Table 19.–Page 2 of 2.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	0.2 %	0.3 Catch	0.3 %	0.4 Catch	0.4 %	0.5 Catch	0.5 %	Total Catch	Total %
Grand		8,452	M	785	0.4	54,554	26.4	46,993	22.7	1,431	0.7	103,760	50.2
Total [a]			F	311	0.2	51,035	24.7	50,870	24.6	789	0.4	103,004	49.8
			Total	1,097	0.5	105,589	51.1	97,864	47.3	2,220	1.1	206,759	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.

Table 20.–Mean length (mm) of chum salmon harvest, the District W-5 commercial fishery, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
6/22	M	Mean Length	-	584	604	595
(6/22-25)		Std. Error	-	7	5	9
		Range	-	520-664	545-725	586-603
		Sample Size	0	24	48	2
	F	Mean Length	-	571	582	-
		Std. Error	-	11	6	-
		Range	-	533-598	526-631	-
		Sample Size	0	5	18	0
6/30	M	Mean Length	567	584	596	586
(6/30)		Std. Error	-	5	3	8
		Range	567-567	449-889	532-682	570-617
		Sample Size	1	92	96	5
	F	Mean Length	-	580	577	567
		Std. Error	-	4	3	8
		Range	-	539-616	499-616	559-575
		Sample Size	0	35	51	2
7/6	M	Mean Length	551	579	590	607
(7/6)		Std. Error	7	3	3	3
		Range	525-569	538-629	504-656	599-615
		Sample Size	6	55	88	4
	F	Mean Length	549	559	573	609
		Std. Error	7	3	3	7
		Range	542-555	529-588	515-622	595-616
		Sample Size	2	25	61	3
7/8	M	Mean Length	560	577	578	577
(7/8)		Std. Error	8	4	4	11
		Range	528-588	516-632	499-643	519-614
		Sample Size	8	52	62	9
	F	Mean Length	598	570	569	-
		Std. Error	-	3	3	-
		Range	598-598	531-613	522-614	-
		Sample Size	1	39	42	0
7/10	M	Mean Length	557	573	580	586
(7/10)		Std. Error	18	4	4	12
		Range	539-575	503-666	531-693	541-621
		Sample Size	2	57	69	6
	F	Mean Length	535	561	571	601
		Std. Error	-	3	3	9
		Range	535-535	531-603	519-629	592-609
		Sample Size	1	36	44	2

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Table 20.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
7/13	M	Mean Length	543	577	585	612
(7/13-8/24)		Std. Error	19	4	4	12
		Range	496-592	507-671	524-675	600-623
		Sample Size	5	57	57	2
	F	Mean Length		562	572	583
		Std. Error		3	3	-
		Range		533-609	522-615	583-583
		Sample Size	0	35	58	1
Season	M	Mean Length	549	579	589	594
		Range	496-592	449-889	499-725	519-623
		Sample Size	22	337	420	28
	F	Mean Length	557	565	573	592
		Range	535-598	529-616	499-631	559-616
		Sample Size	4	175	274	8
Grand	M	Mean Length	541	588	607	616
Total [a]		Range	496-593	449-889	498-725	519-703
		Sample Size	43	2329	1835	59
	F	Mean Length	547	565	580	601
		Range	522-598	430-700	491-680	565-658
		Sample Size	15	2250	1878	34

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Table 21.–Age and sex composition of coho salmon harvest from the District W-5 commercial fishery, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Catch	1.1 %	2.1 Catch	2.1 %	3.1 Catch	3.1 %	Total Catch	Total %
8/21		43	M		7.0		41.9		2.4		51.2
(6/22-8/24)			F		4.6		41.8		2.3		48.8
			Subtotal		11.6		83.7		4.7	8,406	100.0
Season	0	43	M		7.0		41.9		2.4		51.2
			F		4.6		41.8		2.3		48.8
			Subtotal		11.6		83.7		4.7	8,406	100.0
			95% C. I.		(± 6.0)		(± 10.5)		(± 9.1)		
Grand		4,220	M	10,684	4.4	112,282	46.3	5,274	2.2	128,241	52.9
Total [a]			F	7,147	2.9	102,992	42.5	4,056	1.7	114,193	47.1
			Total	17,831	7.4	215,273	88.8	9,330	3.8	242,434	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.

Table 22.–Mean length (mm) of coho salmon harvest, the District W-5 commercial fishery, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/21 (6/22-8/24)	M	Mean Length	617	595	644
		Range	585-636	485-656	644-644
		Sample Size	3	18	1
	F	Mean Length	608	594	594
		Range	597-618	542-640	594-594
		Sample Size	2	18	1
Season	M	Mean Length	617	595	644
		Range	585-636	485-656	644-644
		Sample Size	3	18	1
	F	Mean Length	608	594	594
		Range	597-618	542-640	594-594
		Sample Size	2	18	1
Grand Total [a]	M	Mean Length	582	609	610
		Range	511-695	471-705	570-652
		Sample Size	57	829	31
	F	Mean Length	612	606	619
		Range	549-650	471-680	555-646
		Sample Size	45	799	27

[a] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Table 23.–Daily weather and hydrological observations, Middle Fork Goodnews River weir site, 2009.

Date	Wind (Dir./Speed)	Precipitation mm/24hr	Air Temp. °C	Water Temp °C	Cloud Cover %/altitude	Water Level (cm)
6/21	E/5	4.3	7	8	100/1500	60.0
6/22	E/5	2.5	7.5	7.5	100/1000	60.0
6/23	Calm	0.0	7.5	7.5	100/1500	58.0
6/24	Calm	0.0	10	8	100/2500	56.0
6/25	E/5	0.0	10.5	8	90/2500	54.0
6/26	Calm	0.0	11	8	20/2500	53.0
6/27	E/5	0.0	13	9	40/2500	52.0
6/28	E/5	0.0	10	9	80/2500	51.0
6/29	Calm	0.0	13	9	20/3000	49.0
6/30	E/5	0.0	13.5	10	20/3000	47.0
7/01	Calm	0.0	13	10	0	46.0
7/02	Calm	0.0	14	10	0	45.0
7/03	E/15	2.5	12	10	100/2000	45.0
7/04	Calm	0.0	12	10	90/2000	44.0
7/05	E/5	0.0	14	11	100/3000	42.0
7/06	Calm	0.0	15	11	80/3000	40.0
7/07	W/10	0.0	11	11	100/1000	39.0
7/08	Calm	0.0	12	11	100/1500	38.0
7/09	Calm	0.0	14	12	0	36.0
7/10	Calm	0.0	5	11	25/3000	35.0
7/11	Calm	0.0	11	12	Fog	33.0
7/12	E/5	0.0	17	12	0	32.0
7/13	E/5	0.0	13	13	100/1500	32.0
7/14	E/5	5.1	11	12	Fog	35.0
7/15	E/5	0.0	12	11	100/2500	34.0
7/16	E/5	0.0	14	10.5	100/3500	33.0
7/17	SE/5	10.4	15	12.5	100/2000	34.0
7/18	Calm	0.0	11	11	100/1000	35.0
7/19	E/5	0.5	11	12	60/1500	3.0
7/20	E/5	0.0	10	11	100/1000	35.0
7/21	E/15	3.0	10	11	100/2000	34.0
7/22	E/5	0.3	15	11	90/3000	35.0
7/23	Calm	0.0	11	11	100/800	32.0
7/24	E/5	0.0	10	11	100/800	32.0
7/25	Calm	15.7	11	11	100/500	39.0
7/26	E/5	7.9	12	10	100/1500	49.0
7/27	SE/5	0.5	10	10	100/800	54.0
7/28	E/5	0.5	12	10	100/1000	69.0
7/29	E/5	25.7	10	10	100/800	84.0
7/30	Calm	0.0	12	9	80/800	106.0
7/31	Calm	1.3	9	9	100/800	103.0
8/01	Calm	1.8	10	9	100/500	93.0
8/02	S/10	7.9	10	10	100/300	85.0

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Table 23.–Page 2 of 3.

Date	Wind (Dir./Speed)	Precipitation mm/24hr	Air Temp. °C	Water Temp °C	Cloud Cover %/altitude	Water Level (cm)
8/03	E/15	5.8	14	9	50/3000	95.0
8/04	Calm	4.1	13	10	100/1000	88.0
8/05	E/5	5.1	11	10	100/1000	89.0
8/06	E/10	Trace	11	10	85/2000	80.0
8/07	Calm	0.0	8	10	70/4000	77.0
8/08	Calm	0.0	11	10	0	73.0
8/09	Calm	0.0	12	11	30/4000	67.0
8/10	Calm	0.0	14	11	20/5000	63.0
8/11	Calm	0.0	18	11	0	59.0
8/12	S/10	0.0	10	11	100/1000	57.0
8/13	E/10	0.8	10	10	100/1000	55.0
8/14	Calm	4.6	12	10	100/800	55.0
8/15	Calm	0.8	11	10	100/500	53.0
8/16	Calm	1.3	16	11	50/3000	52.0
8/17	Calm	2.5	14	11	80/3000	53.0
8/18	Calm	0.0	10	10	75/2000	50.0
8/19	Calm	0.0	10	10	1/5000	48.0
8/20	W/5	0.3	10	11	100/500	45.0
8/21	Calm	0.0	11	10	100/2000	44.0
8/22	Calm	4.3	10	10	100/2000	43.0
8/23	Calm	0.3	10	10	100/3000	42.0
8/24	Calm	0.0	10	10	100/1000	41.0
8/25	Calm	0.0	10	10	60/4000	40.0
8/26	Calm	0.0	6	9	30/5000	38.0
8/27	E/5	0.0	10	10	90/3000	36.0
8/28	NE/20	0.8	10	10	0	35.0
8/29	Calm	0.0	8	10	20/4000	N/A
8/30	W/5	0.0	10	10	100/1000	N/A
8/31	Calm	1.0	9	10	100/500	31.0
9/01	SE/10	9.9	9	10	100/1000	34.0
9/02	Calm	1.8	8	9	100/1000	36.0
9/03	Calm	5.8	7	9	90/3000	42.0
9/04	Calm	0.3	7	9	0	38.0
9/05	Calm	0.0	5	10	0	35.0
9/06	Calm	0.0	5	10	100/3000	34.0
9/07	Calm	0.0	8	10	90/4000	32.0
9/08	Calm	5.1	9	10	90/3000	32.0
9/09	Calm	2.5	10	10	100/3000	33.0
9/10	Calm	0.5	10	10	60/3000	32.0
9/11	Calm	0.0	10	10	100/800	31.0
9/12	E/5	0.5	8	10	100/500	29.0
9/13	Calm	Trace	8.5	9	100/3000	32.0
9/14	E/5	0.0	6	9	90/3000	30.0

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Table 23.–Page 3 of 3.

Date	Wind (Dir./Speed)	Precipitation mm/24hr	Air Temp. °C	Water Temp °C	Cloud Cover %/altitude	Water Level (cm)
9/15	E/10	3.8	10	10	100/1000	30.0
9/16	Calm	1.3	4	9	60/3000	32.0
9/17	Calm	1.8	5	8	100/3000	31.0
9/18	Calm	0.3	9.5	9	80/2000	31.0
9/19	E/5	0.0	9	9	40/3000	32.0
9/20	Calm	0.3	2	8	90/4000	32.0
9/21	W/5	0.0	6	9	40/4000	29.0
9/22	SW/2	Trace	2	6.5	90/1500	29.0

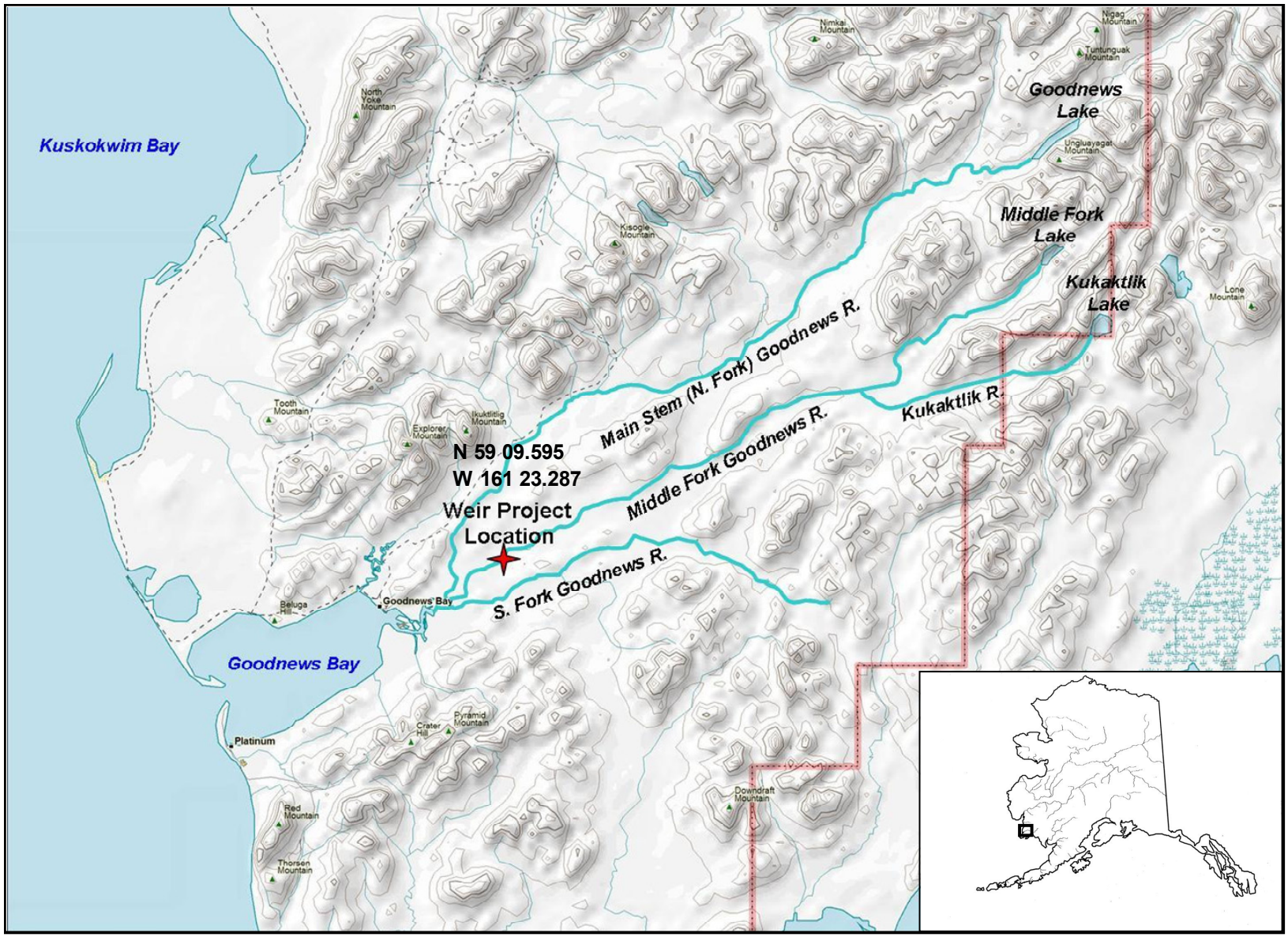


Figure 1.–Goodnews River drainage, Kuskokwim Bay, Alaska.

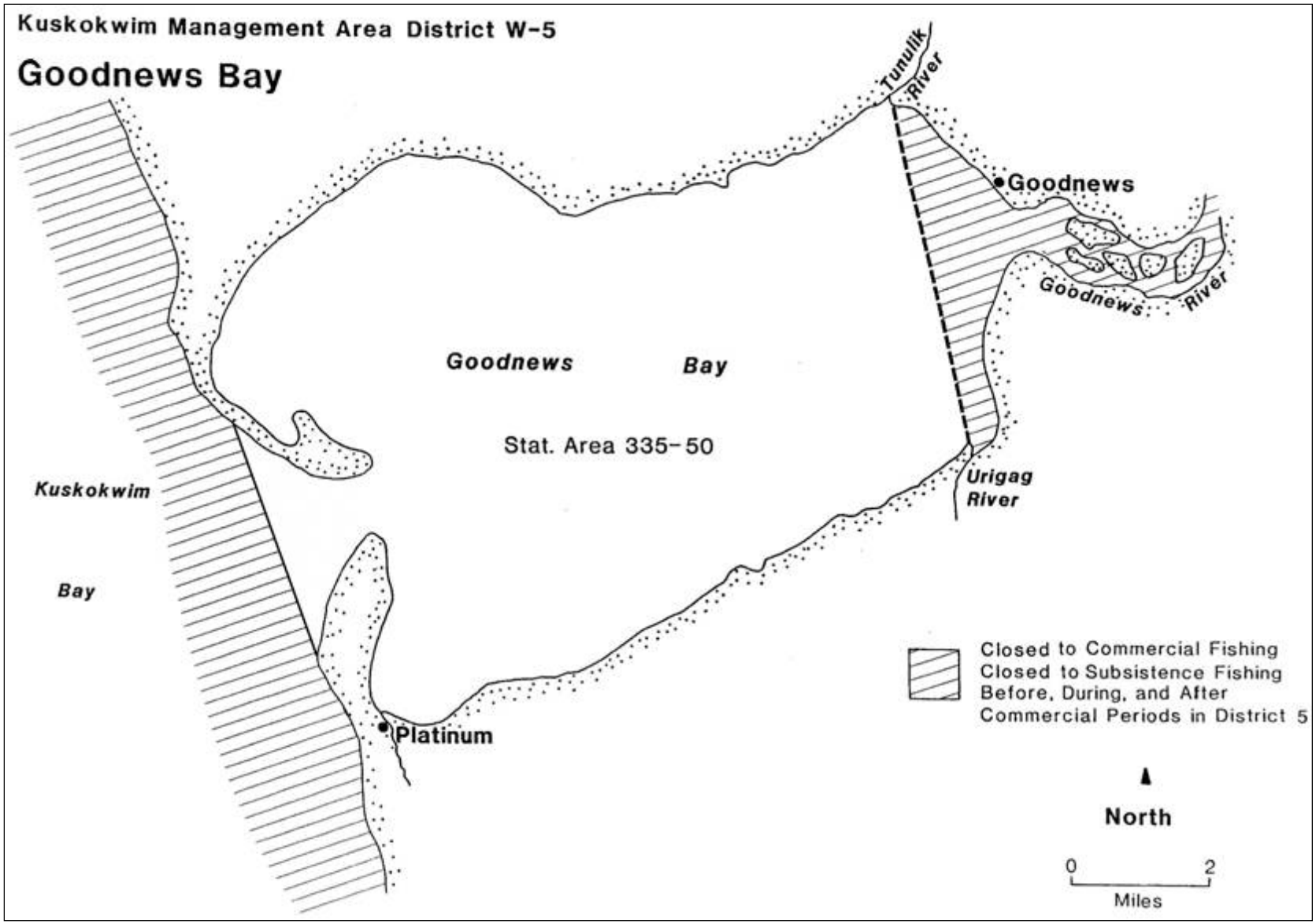


Figure 2.–Commercial fishing District W-5 (Goodnews Bay), Kuskokwim Bay, Alaska, 2008.

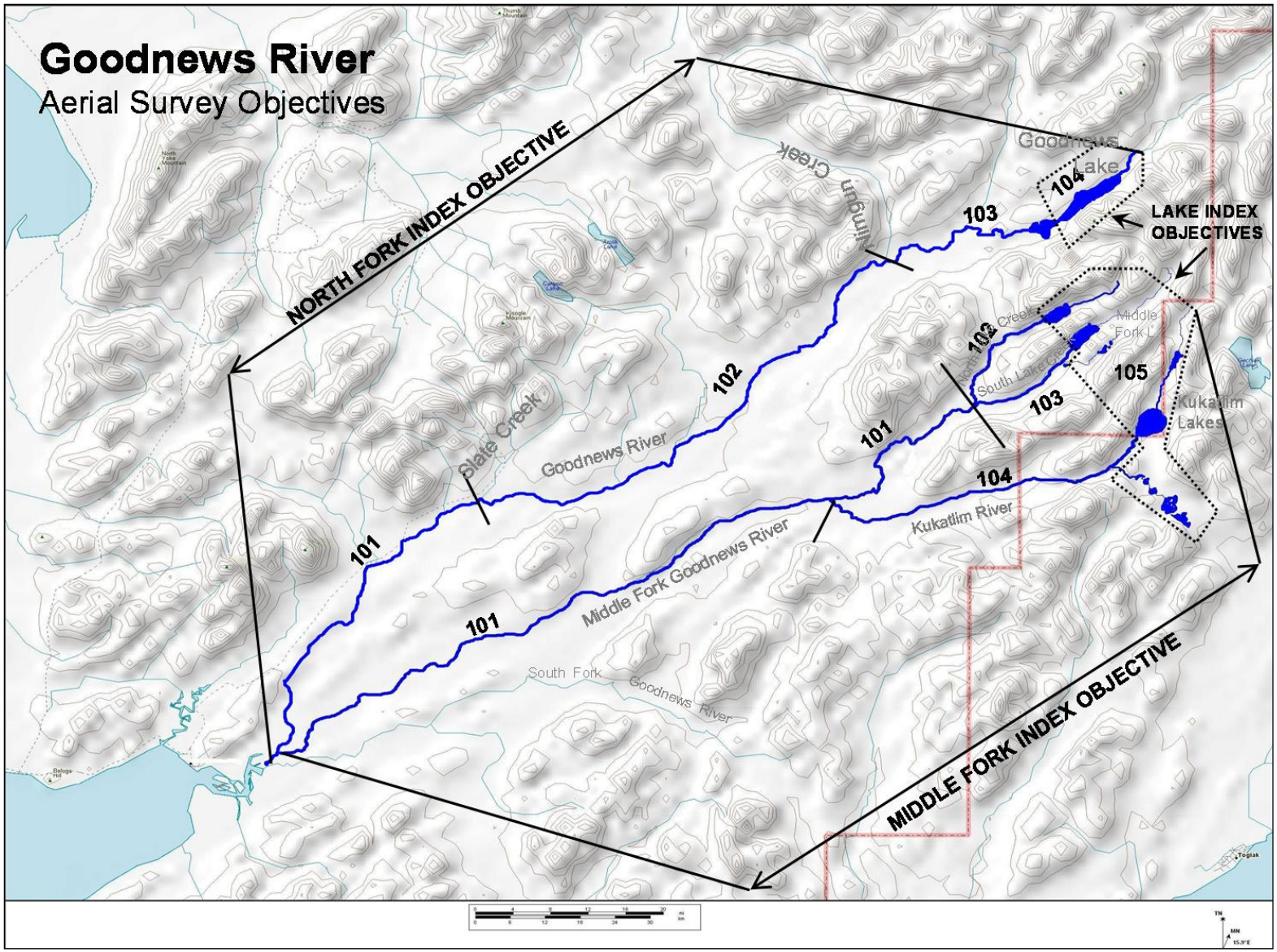


Figure 3.–Map of index areas used for aerial surveys on the Goodnews River drainage.

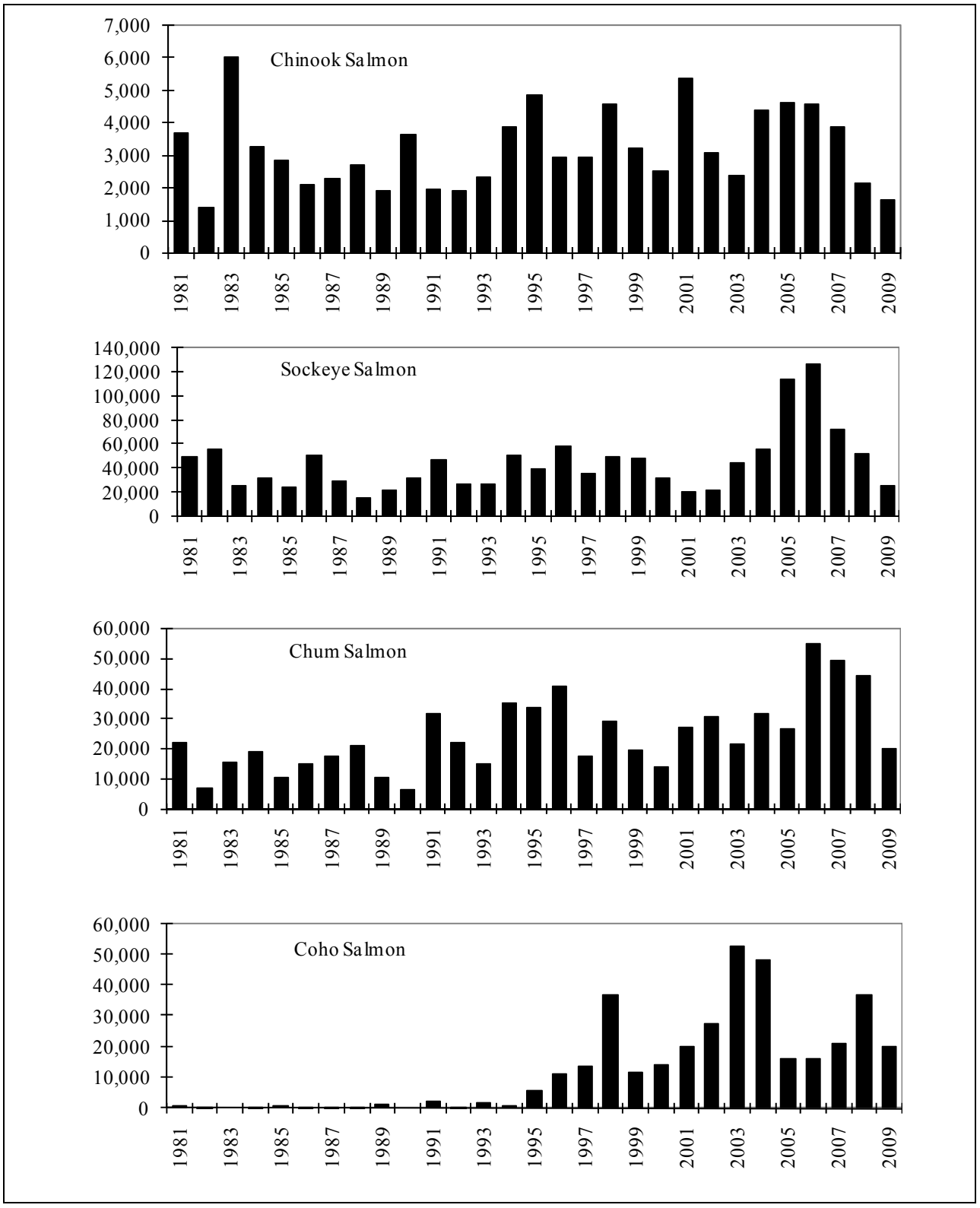


Figure 4.–Historical Chinook, sockeye, chum, and coho salmon escapement estimates, Middle Fork Goodnews River weir, 1981 through 2009.

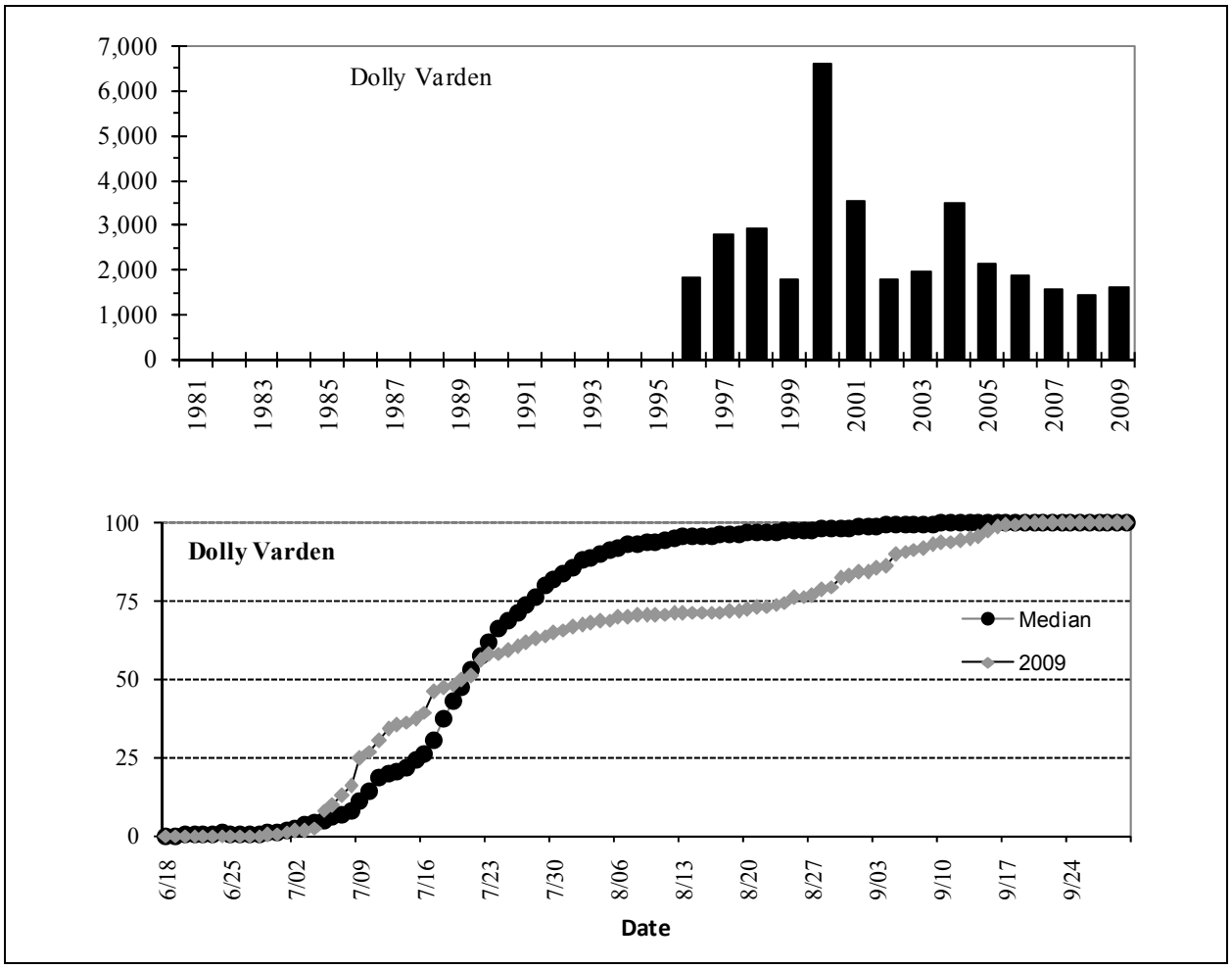
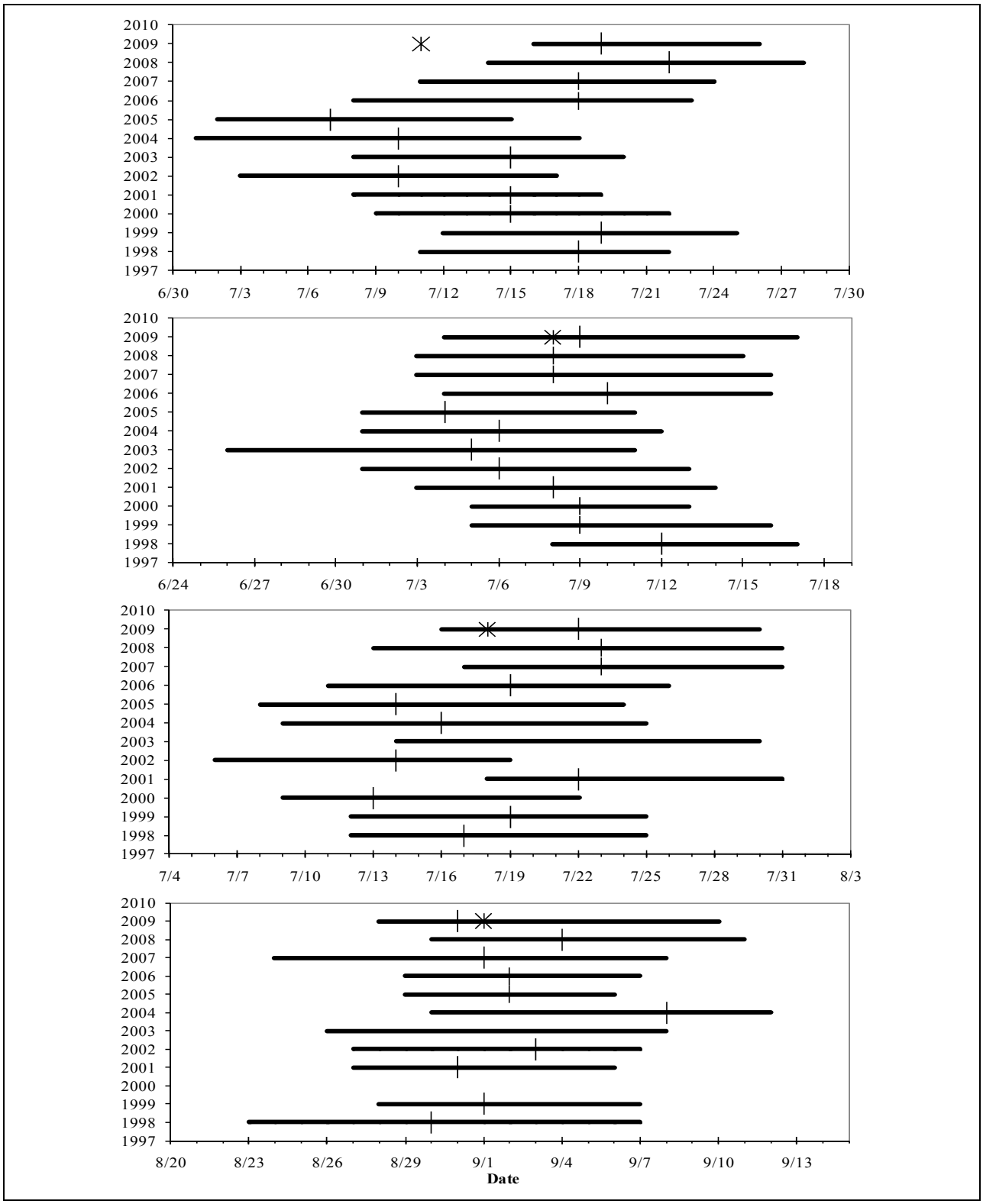


Figure 5.–Historical Dolly Varden escapement estimate, 1981–2009, and cumulative percent passage of Dolly Varden, 2009 and historical median, at Middle Fork Goodnews River weir.



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, 1998–2009.

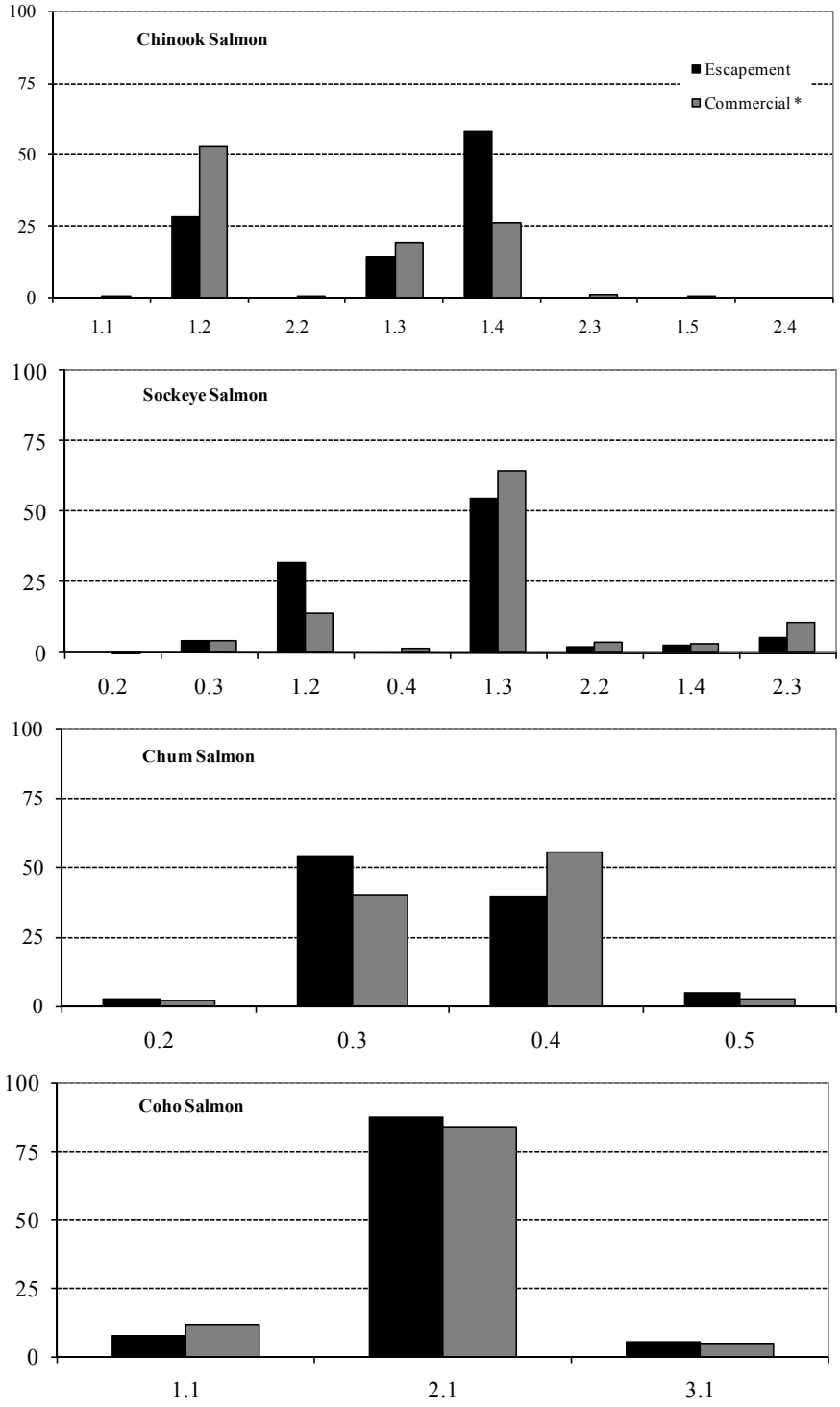


Figure 7.–Estimated age class percentages for Chinook, sockeye, chum and coho salmon from MiddleFork Goodnews River weir escapement and District W-5 commercial harvest, 2009.

APPENDIX A.
SALMON HARVESTS OF GOODNEWS BAY AREA

Appendix A.–Historical commercial, subsistence, and sport fishing harvest of Chinook, sockeye, coho, and chum salmon, Goodnews Bay area, 1968–2009.

	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

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Appendix A.–Page 2 of 2.

	Chinook			Sockeye			Chum			Coho		
Year	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
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
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[a]	3,112	24	177	43,716	20	84	7,519	7	0	13,689	36	211
2008	1,281	[c]	78	27,236	[c]	104	10,340	[c]	26	22,547	[c]	220
2009	1,509	[c]	[c]	32,544	[c]	[c]	16,985	[c]	[c]	8,406	[c]	[c]
10-Year Average [d]	2,213	730	128	26,721	861	123	6,983	289	22	12,708	686	553
Historical Average[e]	2,377	658	124	32,841	833	119	11,350	339	34	17,668	827	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 and 2007 were for Goodnews Bay only.

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

[c] Not available at time of publication.

[d] Ten year average ranging from 1998 to 2007.

[e] Historical average of harvest from 1988 to 2007.

APPENDIX B. GOODNEWS ESCAPEMENT

Appendix B.–Historical escapement, Middle Fork Goodnews River escapement projects, 1981–2009.

Year	Method	Dates of Operation	Chinook	Sockeye	Chum	Pink[a]	Coho	Dolly Varden
1981	Counting Tower[b]	6/13-8/09	3,688	49,108	21,827	[e]	356	[d] [e]
1982	Counting Tower[b]	6/23-8/03	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]	6/21-8/04	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]	6/23-8/09	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	7/04-9/17	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	7/02-8/27	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	6/26-9/08	4,633	113,809	26,690	5,926	15,683	2,128
2006	R. Board Weir	6/26-9/07	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
10-year average (1999–2008)			3,614	58,861	31,866	6,886	26,225	2,607
Historical Average			3,261	44,958	24,495	9,092	11,959	2,587

[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. These years not included in the historical average.

[e] Species not enumerated during project operations.

APPENDIX C. GOODNEWS AERIAL SURVEYS

Appendix C.–Historical aerial survey counts by species, Goodnews River drainage, 1980–2009.

	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	1,440	650	1,277	8,044	2,922	300
1990	626	27,689	644	30	38	1,292	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	1,465	[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]
			[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.