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Takotna River Salmon Studies, 2004

by

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Symbols and Abbreviations

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

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

Mathematics, statistics

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

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ABSTRACT

The Takotna River is a major tributary of the Kuskokwim River that currently supports modest runs of Pacific salmon *Oncorhynchus spp.* compared to other tributaries in the drainage. In 1995, the Alaska Department of Fish and Game (ADF&G) established an escapement monitoring program on the Takotna River approximately 835 river kilometers (rkm) from the mouth of the Kuskokwim River. A counting tower was used to enumerate fish from 1995 to 1999 with limited success, and the project transitioned to a resistance board weir in 2000. Since its inception, the weir has been jointly operated by ADF&G Division of Commercial Fisheries and the Takotna Tribal Council (TTC). In 2004, the weir was operational for all but the last 2 days of the target operational period of 24 June to 20 September. Total annual escapement for the 2004 target operational period included 461 Chinook *O. tshawytscha*, 1,630 chum *O. keta*, 3,207 coho *O. kisutch*, and 17 sockeye salmon *O. nerka*. Age, sex, and length (ASL) samples were taken from 14.9% of the Chinook escapement, 21.0% of the chum escapement, and 11.8% of the coho escapement. Though the number of Chinook samples was insufficient to estimate the ASL composition of the total escapement, the Chinook sample composition included 42% age-1.2 fish, 33% age-1.4 fish, 23% age-1.3 fish, and 20% females. The chum salmon escapement was composed of 48% age-0.3 fish, 38% age-0.4 fish, 15% age-0.2 fish, and 50% females. The coho salmon escapement was composed of 98% age-2.1 fish and 41% females. In addition to enumerating escapement and estimating ASL composition, the weir served as a platform for several other projects such as *Kuskokwim River Chinook Salmon Stock Assessment Project* (radiotelemetry), *Kuskokwim River salmon tagging project*, *Genetic Stock Identification of Coho Salmon*, and *Kuskokwim River Fall Chum Salmon Study*, and provided personnel support for aerial stream surveys. The objectives relating to these projects were fully achieved in 2004.

Juvenile fish were captured using beach seines, dip nets, minnow traps, and a stationary net deployed in the Takotna River in April through December. Efforts were expanded from previous years to include more capture methods and locations. Captures included 305 juvenile Chinook, 112 juvenile chum, and 464 juvenile coho salmon. Juvenile chum salmon were captured efficiently in the Takotna River drainage for the first time in 2004 due to the introduction of the stationary net and the AYK SSI grant for spring sampling. Most juvenile Chinook salmon captures were in Gold Creek using minnow traps, most juvenile chum salmon captures were in Fourth of July Creek using a stationary net, and most of the juvenile coho salmon captures were in Big Creek (lower) using minnow traps. For juvenile Chinook and coho salmon there was size selectivity between minnow traps and the dip net; fish captured in the minnow traps were generally larger than those captured in the dip net. Juvenile Chinook and coho salmon tended to increase in size during the summer months, but mean lengths for both species decreased in the fall.

Key words: Kuskokwim River, Takotna River, escapement, Chinook salmon, *Oncorhynchus tshawytscha*, chum salmon, *O. keta*, coho salmon, *O. kisutch*, juvenile salmon, resistance board weir, aerial survey, upper Kuskokwim.

GENERAL INTRODUCTION

The Kuskokwim River is the second largest river in Alaska, draining an area approximately 130,000 km^2 (Figure 1; Brown 1983). Each year mature Pacific salmon *Oncorhynchus spp.* return to the river and its tributaries to spawn, supporting an annual average subsistence and commercial harvest of 1,156,958 salmon (Ward et al. 2003). The subsistence salmon fishery in the Kuskokwim Area is one of the largest and most important in the state (ADF&G 2003; Coffing 1991, *Unpublished* a, *Unpublished* b; Coffing et al. 2000; Ward et al. 2003), and remains a fundamental component of local culture. The commercial salmon fishery, though modest in value compared to other areas of Alaska, has been an important component of the market economy of lower Kuskokwim River communities (Buklis 1999; Ward et al. 2003).

Managing for sustainable salmon fisheries in the Kuskokwim River is challenging due in part to the lack of abundance and run-timing information, both for the total run and constituent stocks. Historically, few salmon spawning streams within the Kuskokwim River basin have been the focus of rigorous salmon escapement monitoring, which has limited the ability of managers to assess the adequacy of escapement and the effects of management decisions.

Although salmon production is modest, the Takotna River contributes to sustainable fisheries both by adding to the annual production and by adding to genetic diversity similar to what Hilborn et al. (2003) described for Bristol Bay. Since fishers tend to harvest fish from the early part of the salmon runs and the early part of the runs tend to be dominated by upper river salmon stocks, salmon production from the upper Kuskokwim River may support a disproportionately high fraction of the subsistence harvest, particularly for Chinook salmon. This latter point makes monitoring upper Kuskokwim River salmon escapements, such as on the Takotna River, a particularly important tool for maintaining long-term sustainability of the downriver fisheries (Figure 2) (Burkey et al. 2000a; Kerkvliet et al. 2004; Stuby 2004).

In September 2000 the Alaska Board of Fisheries (BOF) classified both Kuskokwim River Chinook *O. tshawytscha* and chum *O. keta* salmon as “yield concerns” (5 AAC 39.222, 2001) due to the chronic inability of managers to maintain expected harvest levels (Burkey et al. 2000a, 2000b; Ward et al. 2003). This designation was upheld during the January 2004 BOF meeting (Bergstrom and Whitmore 2004). The yield concern designation bolstered escapement-monitoring efforts and gave rise to several main-river and regional projects that depend on the weir infrastructure for data collection. The weir platforms serve as tag recovery locations for tagging projects intended to estimate stock-specific run timing and abundance through marked-to-unmarked ratios (Pawluk et al. *In prep*; Stuby 2004), and serve as collection sites for stock-specific baseline samples for genetic stock identification studies (Crane et al. 2004; Templin et al. 2004). Kuskokwim River weirs are integral to several regional projects.

BACKGROUND

The Takotna River currently supports modest runs of Chinook, chum, and coho salmon, and confluences with the Kuskokwim River at river kilometer (rkm) 752 (Figure 1). Takotna River salmon populations appear to be in a state of recovery following near extirpation in the early twentieth century (Molyneaux et al. 2000; Stokes 1985). Prior to the early 1900s, Native Athabaskans in the area harvested salmon from the Takotna River. This included residents of Tagholjitdochak’, a village located on the Takotna River near the confluence of Fourth of July Creek (Figure 3) (Anderson 1977; BLM 1984; Hosley 1966; Stokes 1985). Hosley (1966) and Stokes (1983) reported that people from the Vinasale and Tatlawiksuk Athabaskan bands also fished in the Takotna River. The numbers of salmon these groups harvested is unknown, but interviews with Nikolai elders recall the existence of fairly strong Chinook and chum runs in the Takotna River until the early 1900s (Stokes 1985).

Historically, Native Athabaskans commonly harvested salmon using weirs fitted with fish traps. At least 4 historical weir sites have been documented on the Takotna River, the last of these abandoned no later than the mid 1920s according to oral history and firsthand knowledge of Nikolai elders (Figure 3; Stokes 1983). One of the weir sites was located on the Nixon Fork of the Takotna River, near the confluence of the West Fork River. The other locations included a site on the main river a short distance above the community of Takotna, one near Big Creek (lower), and another near or within Fourth of July Creek. According to an elder who fished the Nixon Fork weir, these sites were abandoned as a result of the booming mining industry, which inspired a general migration to major village sites, and rapid population decline during several epidemics that ravaged area Native populations in the late nineteenth and early twentieth centuries. In many cases, such as at Tagholjitdochak’ between 1908 and 1910, residents that survived the wave of epidemics, primarily diphtheria, were forced to abandon traditional village sites (BLM 1984).

Gold was discovered in the Innoko mining district in 1906 and the Takotna River became a major access route to the gold fields (Brown 1983). The community of Takotna developed as a supply point and staging area for miners. Dog teams were the primary means of winter transportation and the dried salmon they were fed were likely harvested from the Takotna River and other local streams. Steamboats loaded with tons of mining supplies navigated the Takotna River as far upstream as the current town of Takotna. In the early 1920s small temporary dams were built on the river to facilitate steamboat passage (Kusko Times 1921). At some point, salmon populations became depleted. The timing and cause of the decline are unclear (Stokes 1985), but was likely caused by a combination of overfishing and habitat alteration associated with mining development.

Area residents and local biologists described the Takotna River as being nearly void of salmon during the 1960s and 1970s (Molyneaux et al. 2000). By the 1980s, Takotna residents began to notice adult salmon in the river again. During an aerial survey in 1994, an experienced Alaska Department of Fish and Game (ADF&G) fishery biologist observed several thousand chum and some Chinook salmon in Fourth of July Creek, a clear water tributary of the Takotna River, but few salmon were observed elsewhere in the Takotna drainage (Burkey and Salomone 1999). By about the 1990s, rod and reel fishers began to catch coho salmon while pike fishing (D. Newton, local resident, Takotna; personal communication).

ESCAPEMENT MONITORING

INTRODUCTION

Due to its location, size, and a perceived increase in salmon abundance, an escapement monitoring program was implemented on the Takotna River in 1995. A counting tower was used to enumerate fish from 1995 to 1999, but success was limited because of poor water clarity, periodic high water levels, and organizational difficulties (Molyneaux et al. 2000). As one of several initiatives that were started in the late 1990s to help address the information gaps in the management program, the escapement monitoring program on the Takotna River transitioned from a counting tower to a resistance board weir in 2000 (Clark and Molyneaux 2003; Gilk and Molyneaux 2004; Schwanke et al. 2001; Schwanke and Molyneaux 2002). The Takotna River weir is currently the farthest upstream ground-based salmon escapement-monitoring project in the Kuskokwim River drainage. The use of the weir greatly enhanced the success of the program, and allows for monitoring coho salmon escapement.

The Division of Commercial Fisheries of the Alaska Department of Fish and Game (ADF&G) and the Takotna Tribal Council (TTC) jointly operate the weir. Staff from ADF&G help oversee inseason operations and serve as the principal agent for data management, data analysis, and report writing. The TTC provides most of the field crew and coordinates much of the preseason preparations and inseason operations.

The objectives of the Takotna River escapement monitoring project in 2004 were to:

1. Determine daily and total annual escapements of Chinook, chum, and coho salmon in the Takotna River upstream of the community of Takotna during the target operational period of 24 June to 20 September;
2. Estimate the age, sex, and length (ASL) composition of total annual Chinook, chum, and coho salmon escapements from a minimum of 3 pulse samples, one collected from each third of the run, such that 95 %simultaneous confidence intervals for the age composition in each pulse (Chinook and chum) or over the entire run (coho) are no wider than 0.20 (α = 0.05 and d = 0.10);
3. Monitor habitat variables and determine possible effects of water level and water temperature on salmon migration past the weir; and,
4. Provide for collaborative, efficient research in the Kuskokwim River system by:
    a. Serving as a monitoring location for Chinook salmon equipped with radio transmitters deployed as part of *Kuskokwim River Chinook Salmon Stock Assessment project*;
    b. Serving as a recovery location for tagged chum, and coho salmon in support of *Kuskokwim River Salmon Tagging project*;
    c. Serving as a collection site for salmon GSI samples for *Genetic Stock Identification of Coho Salmon on the Kuskokwim River*;
    d. Serving as a collection site for egg samples and data on morphological dimensions of chum salmon for *Kuskokwim River Fall Chum Study*; and,
    e. Providing personnel support for aerial stream surveys conducted on selected tributaries of the upper Kuskokwim River drainage.

METHODS

Study Area

The Takotna River originates in the central Kuskokwim Mountains of the upper Kuskokwim River basin (Figure 1). Formed by the confluence of Moore Creek and Little Waldren Fork, the river flows northeasterly, passing the community of Takotna at rkm 80, before turning southeasterly near the confluence of the Nixon Fork at rkm 24 (Figure 3; Brown 1983). The Tatalina River joins at rkm 4.8, and then the Takotna River empties into the Kuskokwim River across from McGrath at rkm 752. The Nixon Fork and Tatalina Rivers drain extensive bog flats and swampy lowlands, but the remainder of the basin is mostly upland spruce-hardwood forest (Brown 1983; Selkregg 1976). At normal flow, the river has a nominal load of suspended matter, but the water has a high level of color due to organic leaching.

The weir was installed in 2004 at the same location used in previous years, which is approximately 185 m upstream of the Takotna River bridge (Gilk and Molyneaux 2004). The site was about 3 rkm upstream of the village of Takotna and 83 rkm from the confluence with the Kuskokwim River. The weir is located upstream from nearly all known spawning areas, so the project provides a nearly complete census of salmon escapement in the Takotna River exclusive of the Nixon Fork and Tatalina Rivers.

Weir Design

The design and materials used in the Takotna River weir in 2004 were the same as those used in 2000 (Schwanke et al. 2001), and included modifications incorporated into the design in 2001 (Schwanke and Molyneaux 2002). The weir spanned an 85-m channel and consisted of 87 resistance board panels that covered the central 80 m of the channel. The spacing between the pickets was 40.6 mm, which allowed for a complete census of all but the smallest returning salmon. Two 3-m sections of aluminum fixed panels were placed along the stream margins to accommodate the slope of the bank. Stewart (2002, 2003) describes details of panel construction and installation.

Fish were passed upstream of the weir through two passing gates. One of the gates incorporated a fish trap (the primary means of passing fish) and the other was constructed from modified resistance board weir panels as described by Schwanke et al. (2001). A fish resting area was constructed just upstream of the fish trap as described by Clark and Molyneaux (2003).

Downstream passage chutes were incorporated into the weir design and used as needed to accommodate passage of fish migrating downstream, especially longnose suckers *Catostomus catostomus*. The chutes were constructed by releasing resistance boards on one or two adjacent weir panels, which allowed the distal ends to dip slightly below the water surface. These downstream migration chutes were positioned in areas where higher concentrations of downstream migrating fish typically occur. The chutes were monitored to ensure fish were not passing upstream of the weir.

Weir Operation

Boat Passage

A section of weir contained modified panels to form a "boat gate" that was built to accommodate boat traffic over the weir. The section was constructed as described by Stewart (2003). The resistance boards on these panels were adjusted so that the distal ends of the panels dipped close to the water surface. Jet-driven boats could pass both upstream and downstream over these panels.

An additional boat gate was constructed to facilitate upstream passage by propeller-driven boats; operators had to pull themselves over the weir using a rope that was anchored immediately upstream of the weir. In response to user complaints, this system was modified mid season, and an electric winch was incorporated into the design. The winch was mounted in a small boat, and the cable was fixed to a wooden tripod that was stationed just upstream of the boat gate. When not in use, the winch cable remained fully protracted and the small boat floated just downstream of the boat gate. Operators of propeller-driven boats traveling upstream would dock with the moored boat, activate the winch, and pass over the weir. Once over the weir, the boat operator would anchor to the tripod, restart his engine, and continue upstream. The tethered boat would be pulled back downstream over the weir by a crewmember during the next counting shift. Propeller-driven boats passed downstream by putting the engine in neutral and tilting the motor up just before passing over the weir. Despite the improvements, the utility of the system is limited and further improvements are anticipated for 2005.

Weir Maintenance

The weir was cleaned daily by partially submerging weir panels, which allowed the current to wash debris downstream. Algal growth and debris that accumulated around stringers was periodically removed either with a rake or by hand. The daily cleaning routine included a visual inspection of the weir and substrate rail for signs of substrate scouring, broken pickets, or other conditions that could compromise operations. Periodically, the crew conducted a more thorough inspection by snorkeling along the substrate rail. Any points along the substrate rail showing signs of substrate scouring were immediately addressed with sandbags. Damaged weir pickets were repaired using wooden dowels as described by Stewart (2002).

Fish Passage

Upstream Fish Passage

All fish passing upstream of the weir through the passage gates were counted and recorded by species, excluding fish that were small enough to pass freely between the weir pickets. Standard daily operations consisted of four 2-hour counting periods. This schedule was adjusted as needed to accommodate the migratory behavior and abundance of fish, or operational constraints such as reduced visibility in evening hours late in the season. The daily passage was tallied by species and recorded in the logbook.

The target operational period for the weir is 24 June to 20 September, although actual operational periods may vary. In years when the operational period falls short of the target operational period, estimates of the daily salmon passage are made for missed days in order to provide consistent comparisons of escapements among years. Total annual escapement was determined from the total observed and estimated fish passage. The term “total annual escapement” is used to describe escapements for the target operational period.

Although not necessary in 2004, passage estimates were necessary in years when the weir was not operational for 1 or more days during the target operational period. The passage estimate for a single day was calculated as the average of the observed passage for 2 days before and 2 days after the inoperable period, minus any observed passage from the inoperable day. Daily passage estimates for inoperable periods lasting 2 or more days were calculated by a linear extrapolation of the average observed passage for 2 days before and after the inoperable period using the following formula:

$$\hat{n}_{d_i} = \alpha + \beta \cdot i \tag{1}$$

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

$$\beta = \frac{\left(n_{d_I+1} + n_{d_I+2}\right) - \left(n_{d_1-1} + n_{d_1-2}\right)}{2\left(I+1\right)}$$

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+1} = observed passage the first day after the weir was reinstalled;

n_{d_I+2} = observed passage the 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;

I = number of inoperative days.

Alternatively, when fish passage characteristics of Takotna River were similar to the Kogrukluk River, then daily passage for the Takotna River during an inoperative period could be estimated using the daily passage proportion of Kogrukluk River during the same period:

$$\hat{n}_{d_i} = \left(\frac{\left(n_{Kd_i} \times N_T\right)}{N_K} \right) \tag{2}$$

where

n_{Kd_i} = passage of the Kogrukluk River weir in the i^{th} day (d_1, 2, …, d_i, …d_I) when the Takotna River weir was inoperative;

N_T = total passage of the Takotna River weir during the period the weir was operational;

N_K = total passage of the Kogrukluk River weir during the period the Takotna River weir was operational.

Carcass Counts

Spent and dead salmon (hereafter referred to as carcasses) that accumulated on the weir were counted by species and sex before being passed downstream. The daily carcass count was tallied and recorded in the logbook.

Salmon Age, Sex, and Length Composition

Age, sex, and length (ASL) composition of the total annual Chinook, chum, and coho salmon escapements were estimated by sampling a portion of the fish passage and applying the sample ASL composition to the total escapement (DuBois and Molyneaux 2000).

Age, Sex, and Length Sampling

The crew at the Takotna River weir employed standard sampling techniques as described by DuBois and Molyneaux (2000). A pulse sampling design was used, in which intensive sampling was conducted for 1 to 4 days followed by a few days without sampling. The goal of each pulse was to collect samples from 210 Chinook, 200 chum, and 70 coho salmon. These sample sizes were selected so that the simultaneous 95% confidence interval estimates of age and sex composition proportions would be no wider than 0.20 (Bromaghin 1993) per pulse for Chinook salmon assuming 10 age/sex categories and chum salmon assuming 8 age/sex categories, and for the entire season for coho salmon assuming 10 age/sex categories. Sample sizes were increased by about 10% from that recommended by Bromaghin (1993) to account for scales that could not be aged. The minimum acceptable number of pulse samples was 3 per species, one pulse sample from each third of the run, to account for temporal dynamics in the ASL composition. In 2004, this minimum was achieved for chum and coho salmon, but not for Chinook salmon.

Salmon were sampled from a fish trap installed in the weir as described by Schwanke et al. (2001). The trap included an entrance gate, holding box, and exit gate. On days when sampling was conducted, the entrance gate was opened while the exit gate remained closed, allowing fish to accumulate inside the 1.5 by 2.5 m holding box. The holding box was allowed to fill with fish and sampling was conducted during scheduled counting periods.

Crew members used a dip net to remove fish from the holding pen. Fish were passed to another crew member positioned on the upstream end of the trap platform. The sampler removed the fish from the dip net, and placed it into the sampling box. Three scales were taken from the preferred area according to standard procedures (DuBois and Molyneaux 2000). These scales were later used to determine the age of the fish. Sex was determined through visual examination of the external morphology, keying on the development of the kype, roundness of the belly, and the presence or absence of an ovipositor. Length was measured to the nearest millimeter from mideye to tail fork using a straight-edged meter stick. After sampling, each fish was released into a resting area upstream of the trap. Scales were placed on gum cards and sampling information was recorded. This procedure was repeated until the holding pen was emptied. The information collected was later transferred to computer mark-sense data forms. Completed gum cards and data forms were sent to the Bethel or Anchorage ADF&G office for processing.

Additional samples were collected through active sampling. Active sampling required a technician to be positioned at the downstream end of the trap to observe fish entering the holding pen. When a salmon entered the holding pen, the technician would immediately close both the entrance and exit gates, thereby actively trapping the salmon inside the holding box for sampling. Active sampling was used mostly for Chinook salmon and for tag recoveries.

Estimating Age, Sex, and Length Composition of Escapement

ADF&G staff in Bethel and Anchorage aged scales, processed the ASL data, and generated data summaries. DuBois and Molyneaux (2000) describe details of the processing and summarizing procedures. These procedures generated 2 types of summary tables for each species; one described the age and sex composition and the other described length statistics. These summaries account for changes in the ASL composition throughout the season by first partitioning the season into temporal strata based on pulse sample dates, then applying the ASL composition of individual pulse samples to the corresponding temporal strata, and finally summing the strata to generate the estimated ASL composition for the season. This procedure ensures that the ASL composition of the total annual escapement is weighted by the abundance of fish in the escapement rather than by the abundance of fish in the samples. For example, if samples of coho salmon were collected in 6 pulses, then the season would be partitioned into 6 temporal strata with one pulse sample occurring in each stratum. A sample of 145 coho salmon collected from 22 to 24 August would be used to estimate the ASL composition of the 1,219 coho salmon that passed the weir during the temporal strata that extended from 19 to 29 August. This procedure would be repeated for each stratum, and the estimated age and sex composition for the total annual escapement would be calculated as the sum of chum salmon in each stratum. In similar fashion, the estimated mean length composition for the total annual escapement would be calculated by weighting the mean lengths in each stratum by the escapement of coho salmon that passed the weir during that stratum.

Ages are reported using European notation. European notation is composed of 2 numerals separated by a decimal, where the first numeral indicates the number of winters the juvenile spent in fresh water and the second numeral indicates the number of winters spent in the ocean (Groot and Margolis 1991). Total age of a fish is equal to the sum of both numerals, plus 1 year to account for the winter when the egg was incubating in gravel. For example, a Chinook salmon described as an age-1.4 fish is actually 6 years of age.

Lengths were compared using standard analysis of variance (ANOVA) and a Newman-Keuls multiple range test (MRT) to determine if mean lengths-at-age differed among the 5 years of ASL data. Sampling strata were not considered in this analysis.

Climatological and Hydrological Monitoring

Water and air temperatures were measured at the Takotna River weir each day at approximately 08:00 and 18:00 hours. These times varied slightly with counting schedules. Temperatures were measured using a calibrated thermometer. Water temperature was determined by submerging the thermometer below the water surface until the temperature reading stabilized and air temperature was obtained from a thermometer placed in a shaded location near the weir site. Temperature readings were recorded in the logbook, along with notations about wind direction, estimated wind speed, cloud cover, and precipitation. Daily precipitation was measured using a rain gauge.

Daily operations included monitoring river depth with a standardized staff gauge. The staff gauge consisted of a metal rod driven into the stream channel with a meter stick attached. The height of the water surface, as measured from the meter stick, represented the “stage” of the river above an established datum plane. The staff gauge was calibrated to the datum plane by a semi-permanent benchmark, which was moved in 2004 to a tree located about 6 m from the river bank. The new benchmark consisted of a nail driven into a tree and was thought to be more permanent than the former benchmark which was a steel rod driven several feet into the ground near the shoreline (Schwanke et al. 2001). The height of the nail corresponded to stage measurements of 300 mm relative to the datum plane. Water stage was measured at approximately 08:00 and 18:00 hours.

Related Fisheries Projects

Chinook Radiotelemetry Tagging Project

The Takotna River weir was part of a radiotelemetry project intended to estimate the total abundance of Chinook salmon in the Kuskokwim River (Stuby 2003, 2004, 2005). Radio transmitters were inserted into Chinook salmon caught near lower Kalskag (rkm 259). The Takotna River had one of several radio receiver stations intended to monitor passage of radio equipped fish into tributary streams. The Takotna River receiver station was placed approximately 300 m downstream from the weir. Chinook salmon were also fitted with a spaghetti tag that allowed the weir crew to capture tagged fish in the fish trap and record the date of capture, tag number, tag color, and the general condition of the fish. The known Chinook salmon passage at the weir, coupled with data collected from the receiver station, were used with similar data collected at other weir projects to develop estimates of the total Chinook salmon abundance upstream from the Lower Kalskag tagging site. Stuby (2005) provides details.

Chum, Coho, and Sockeye Tagging Project

Chum, coho, and sockeye salmon were marked using spaghetti tags at fish wheels located near lower Kalskag in an effort to estimate stock specific run timing and travel speed, and to estimate total abundance for coho salmon in the Kuskokwim River (Pawluk et al. *In prep*). The Takotna River weir served as one of several tag recovery locations for collecting information on tagged fish.

The weir crew captured tagged fish in the fish trap and recorded the date of capture, species, and tag number (when recovered). Tagged fish were captured using the active sampling technique described earlier. Visibility was enhanced through the use of clear-bottom viewing boxes that reduced glare and water turbulence. Once the information was collected from the tag, the fish was released upstream of the weir. If a tagged fish passed the weir without being recaptured, the crew recorded the color of the tag and it was added to the daily tallies. Each salmon ASL sampled and actively sampled was examined for a secondary mark (in this case, a hole-punched adipose fin) in order to assess the incidence of tag loss. Pawluk et al. (*In prep*) provides details.

Coho Genetic Sampling

Tissue samples were collected from 100 coho salmon to profile the Takotna River spawning population as part of a genetic stock identification study. Genetic samples were gathered during each of the 3 ASL sampling pulses. After ASL sampling, a thumbnail-sized piece of bony fin (usually the dorsal or caudal fin) was cut from the fish with scissors, wiped clean, and placed in a vial of isopropyl alcohol. Care was taken to prevent cross contamination by cleaning the sampling instruments. Vials were numbered, and the corresponding sex, location, and sampling date were recorded. The tissue samples were sent to a U.S. Fish and Wildlife Service (USFWS) laboratory for analysis. Crane et al. (2004) provides details.

Kuskokwim River Fall Chum Study

The Takotna River weir served as a platform for a study intended to characterize Kuskokwim River fall-run and summer-run chum salmon. The project sought to describe the morphology, behavior, distribution, run-timing, and overall contribution of fall-spawning chum salmon through field collections of summer- and fall-spawning chum at selected sites, including the Takotna River. The Takotna River weir was selected to provide data on upper Kuskokwim River summer-spawning chum salmon. No fall-spawning chum salmon have been observed in the Takotna River and the weir is farther upstream than any other weir in the Kuskokwim River drainage. Maximum height and depth measurements were taken to the nearest millimeter from every chum salmon handled during ASL sampling. In addition, egg skeins were collected from 20 females, with collections temporally distributed throughout the various ASL pulse sampling events.

Aerial Stream Surveys

The Takotna River weir project provided staging and personnel support for aerial stream surveys conducted on several upper Kuskokwim River tributaries. The ADF&G Fishery Biologist stationed in Takotna during the field season conducted the surveys in late July to determine relative abundance and spawning distribution of Chinook and summer-spawning chum salmon. Surveys were flown using a contracted pilot flying a Piper PA 18 Super Cub.

Aerial surveys conducted in the upper portion of the Kuskokwim River drainage are the only means of monitoring escapement in tributaries that confluence upstream from the Takotna River.

In addition, there is interest in gathering paired data sets between the Takotna River and the Salmon River (Pitka Fork) to compare patterns of Chinook salmon abundance in both systems.

Start and stop coordinates for each survey stream were provided to the pilot who entered the coordinates into the plane's onboard navigational system (Appendix A1). Both coordinates were given so that streams could be flown in either direction to compensate for wind, weather, and lighting conditions. The pilot followed the stream to the best of his abilities while the observer used tally counters to record the number of fish spotted. The observer recorded details about the survey in a logbook following each survey including wind direction and speed, weather, lighting conditions, water color, water clarity, bottom type, number of live fish and carcasses by species, fish distribution and movements, time and distance covered, and riparian vegetation cover. Notes were later transferred to an "Escapement Observations–Kuskokwim Area" form, and submitted for entry into the "Kuskokwim Area Salmon Escapement Observation Catalog" database (e.g., Burkey and Salomone 1999).

RESULTS

Weir Operations

Installation of the Takotna River weir began on 19 June and was complete at 15:30 hours on 23 June, 1 day before the target operational date of 24 June. The weir was disassembled on 19 September, 2 days before the scheduled date of 21 September. Few fish were observed passing the weir after 10 September suggesting that the coho run was nearing an end and that continuing operations until the end of the target operational period was unnecessary. Fish passage between 18 and 20 September was estimated to be zero. Otherwise, the weir was operational throughout the entire season, precluding any need for additional passage estimates.

Fish Passage

Chinook Salmon

A total of 462 Chinook salmon were observed passing the weir between 23 June and 18 September (Table 1; Appendix B1). Of those, 461 passed during the target operational period that began on 24 June. The central 50% of passage occurred between 8 and 15 July, and the last Chinook salmon was reported on 26 August. Peak daily passage of 147 Chinook salmon occurred on 9 July, which was also the median passage date. Daily passage estimates were not necessary because the weir was fully operational for the duration of the Chinook salmon run.

Chum Salmon

A total of 1,633 chum salmon were observed passing the weir between 23 June and 18 September, (Table 1; Appendix B2). Of those, 1,630 passed during the target operational period that began on 24 June. The central 50% of passage occurred between 5 and 18 July, and the last chum salmon was reported on 4 September. Peak daily passage of 108 chum salmon occurred on 6 July, and the median passage was 10 July. Since the weir was fully operational for the duration of the chum salmon run, daily passage estimates were not necessary.

Coho Salmon

A total of 3,207 coho salmon were observed passing the weir during the 2004 target operational period (Table 1; Appendix B3). Coho salmon were observed passing from 31 July to 16 September, with 50% passage occurring between 19 August and 1 September. Peak daily passage of 572 coho salmon occurred on 26 August, which was also the median passage date. Since the last day of operations was 18 September, coho salmon passage on 19 and 20 September was estimated, but the estimate for each day was zero.

Other Species

Sockeye *O. nerka* and pink *O. gorbuscha* salmon are uncommon in the Takotna River. In 2004, a total of 17 sockeye were observed passing upstream of the weir between 31 July and 16 September (Table 1; Appendix B4). The central 50% of passage occurred between 16 and 26 August, peak daily passage of 4 sockeye occurred on 16 August, and the median passage date was 17 August. No pink salmon were observed in 2004.

Three resident fish species were observed passing upstream of the weir in 2004. Longnose suckers were the most abundant, with 151 fish passing the weir (Table 1; Appendix B5). Other species included 29 northern pike *Esox lucius*, and 3 whitefish *Coregonus spp*. No estimates of resident fish passage were made for the last 2 days of the target operational period.

Carcass Counts

A total of 3 Chinook, 23 chum, and 4 coho salmon carcasses were recovered at the Takotna River weir in 2004. Chinook carcasses were recovered between 30 July and 14 August. Chum carcasses were recovered between 26 June and 13 September, with 50% cumulative recovery on 21 July. Females accounted for 35% of the recovered chum salmon carcasses. Coho carcasses were first recovered 13 August. Other species recovered included 14 whitefish, 4 northern pike, 1 Arctic grayling *Thymallus arcticus*, and 279 longnose suckers.

Salmon Age, Sex, and Length Composition

Chinook Salmon

Sampling goals for Chinook salmon were not achieved in 2004. Age, sex, and length were determined for 69 Chinook salmon, or 14.9% of the total Chinook escapement in 2004 (Tables 2 and 3). Because an insufficient number of Chinook were sampled, ASL composition of the total annual escapement was not estimated. Of the fish sampled, age 1.2 was the most abundant age class (42.0%), followed by age 1.4 (33.3%), age 1.3 (23.2%), and age 1.5 (1.4%). Females comprised 20.3% of the sample (Appendix C1).

The average length of the sampled fish showed partitioning by age class. Age-1.2, -1.3, and -1.4 male Chinook salmon had average lengths of 577, 675, and 768 mm, respectively. Age-1.2 and -1.4 female Chinook salmon had average lengths of 622, and 857 mm. One age-1.3 female Chinook salmon was sampled, with a length of 707 mm, and one age-1.5 female Chinook salmon was sampled, with a length of 903 mm. Male Chinook salmon lengths ranged from 454 to 936 mm, while female lengths ranged from 602 to 924 mm.

The mean length for male age-1.2 Chinook salmon sampled in 2004 was greater than that observed in 2000, 2001, and 2003 ($P < 0.05$), but similar to that observed in 2002 (Appendix C2). However, the mean length for male age-1.3 Chinook salmon sampled in 2004 was less than in 2003 ($P < 0.05$), but similar to that observed in 2000, 2001, and 2002. Mean lengths for male age-1.4 Chinook salmon have remained similar between 2000 and 2004. The mean length-at-age for female Chinook salmon sampled in 2004 was similar to lengths observed in previous years given the small sample sizes. For both male and female Chinook salmon, length tends to increase as age increases.

Chum Salmon

Age, sex, and length were determined for 343 chum salmon, or 21.0% of the total annual chum salmon escapement in 2004 (Tables 4 and 5). The samples were collected in 6 sessions with sample sizes of 92, 136, 46, 56, 34, and 12 fish, respectively. The chum run was partitioned into 3 temporal strata, or pulses, based on sampling dates. As applied to the total annual chum escapement, age 0.3 was the most abundant age class (47.5%), followed by age 0.4 (31.8%), and age 0.2 (14.5%; Appendix C3). The percentages of older aged (age-0.4 and -0.5) fish tended to decrease as the run progressed, while the percentage of age-0.2 fish tended to increase. Female chum salmon comprised 49.9% of the total annual escapement, or 815 fish. The percentage of females remained fairly steady as the run progressed, with the highest percentage of females occurring between 13 July and 25 July (58.2%).

The length of female chum salmon ranged from 446 to 612 mm, and males ranged from 497 to 694 mm. Average lengths for female age-0.2, -0.3, and -0.4 fish were 510, 538, and 548 mm, respectively. Average lengths for male age-0.2, -0.3, and -0.4 fish were 534, 558, and 584 mm, respectively.

Mean lengths for both age-0.2 male and female chum salmon in 2004 were similar to those seen in past years (Appendix C4). However, mean lengths for ages-0.3 and -0.4 males were significantly less than those observed in 2002 and 2003 ($P < 0.05$), but were similar to those seen in 2000. The mean length of age-0.3 female chum salmon in 2004 was similar to that observed in 2000 and 2003 but was significantly less than that seen in 2002. The mean length of age-0.4 female chum salmon in 2004 was significantly less than those seen in past years ($P < 0.05$). The largest length variation was in age-0.5 male chum, but this age group is represented by the smallest sample size, and age-at-length differences among years are not significant. For both male and female chum, length increased with older age classes.

Coho Salmon

Age, sex, and length were determined for 380 coho salmon, or 11.8% of the total annual coho salmon escapement in 2004 (Tables 6 and 7). The samples were collected in 3 pulses with sample sizes of 187, 175, and 87 fish to account for variability through time. Age-2.1 fish accounted for 98.1% of the total annual escapement, and age-3.1 and -1.1 fish accounted for 1.6% and 0.3% of the escapement (Appendix C5). Female coho salmon comprised 40.9% of the total annual escapement, or 1,311 fish.

The lengths of female coho salmon ranged from 415 to 592 mm, and males ranged from 400 to 605 mm. Average length for female age-2.1 fish was 530 mm (Appendix C6). One female age-3.1 coho was sampled, with a length of 552 mm. Average lengths for male age-2.1, and -3.1 fish were 518 and 533 mm. The one age-1.1 male coho that was sampled had a length of 418 mm. The mean length of age-2.1 male and female coho salmon in 2004 was significantly less than that seen in past years ($P < 0.05$).

Climatological and Hydrological Conditions

Water temperature in the Takotna River ranged from 3.0 to 18.0°C, with an average water temperature of 13.2°C (Appendix D1). River stages ranged from 31.0 to 65.0 cm, with an average of 40.9 cm for the overall operational period. Morning air temperature at the weir ranged from -7.5 to 17.5°C, with an average morning air temperature of 9.2°C for the operational period.

Related Fisheries Projects

Detailed results from the fall chum study and the coho genetic sampling can be found in Gilk et al. (2005), and Crane et al. (2004), respectively.

Chinook Radiotelemetry Tag Recovery

One Chinook salmon with a radio transmitter passed through the weir in 2004 on 8 July, 1 day after being detected by a radio receiver located approximately 300 m downstream from the weir (Stuby 2005). The tagged Chinook salmon was later detected upstream of the Takotna River weir during aerial survey flights in July and August.

Chum, Coho, and Sockeye Tag Recovery

No spaghetti tagged chum salmon were observed passing the Takotna River weir in 2004. Of the 376 fish examined for secondary marks (23.0% of the total annual escapement), no untagged chum salmon had a secondary mark that would have indicated spaghetti tag loss.

Five spaghetti tagged coho salmon (0.2% of the total annual escapement) were observed passing the weir and tag information was recovered for all 5 (Pawluk et al. *In prep*). Of 449 fish examined for secondary marks (14.0% of the total annual escapement), no untagged coho salmon had a secondary mark.

One spaghetti tagged sockeye salmon (5.9% of the total annual escapement) was observed passing upstream of the weir. Tag information was collected (Pawluk et al. *In prep*).

Aerial Stream Surveys

Aerial surveys were conducted in selected tributaries of the upper Kuskokwim River drainage basin from 19 to 21 July to assess the relative abundance and distribution of spawning Chinook and summer chum. A detailed log of the surveys is provided in Appendix A2.

Salmon River index areas were surveyed on 20 July under fair water conditions and good weather (Figures 4, 5, 6). The Salmon River survey area is actually a compilation of 4 smaller tributaries, designated Index Areas 101–104. Water conditions in most portions of the system were adequate for surveying in 2004, but visibility was poor throughout Index Area 101. No salmon were seen in this portion of the drainage in 2004. Of those Index Areas with favorable water conditions in 2004, the majority of the fish were found in Index Area 104, with a total of 960 Chinook salmon. Index Areas 102 and 103 had 118 Chinook and 60 Chinook, respectively. Six summer chum salmon were also observed.

The upper Pitka Fork River was surveyed under fair water conditions and good weather on 19 July (Figures 4, 5, 6; Appendix A). A total of 289 Chinook salmon were counted in the mainstem Pitka Fork River above the confluence with Sheep Creek. One Chinook salmon carcass was spotted. No summer chum salmon were seen.

Bear Creek, a tributary of the upper Pitka Fork River, was surveyed on 20 July under fair water conditions and good weather (Figure 6). A total of 204 live Chinook salmon and 2 Chinook salmon carcasses were observed.

Also on the afternoon of 20 July, an attempt was made to survey the Little Tonzona River. Water visibility was extremely poor, and an accurate survey was not possible.

Fourth of July Creek, a tributary of the Takotna River, was surveyed on 21 July under fair weather and water conditions (Figure 7). A total of 73 Chinook salmon, and 53 summer chum salmon were seen. Observed carcasses included 2 Chinook and 4 chum salmon.

DISCUSSION

Weir Operations

Operation of the Takotna River weir in 2004 was a success. The weir was operational all but the last 2 days of the target operational period of 24 June to 20 September. Since few salmon passed the weir after 10 September, it was considered unnecessary to continue operations through 20 September. Daily fish passage was estimated the last 2 days of the target operational period. No major damage was incurred to the weir during the season.

Fish Passage

Chinook Salmon Abundance

Reported escapement of 461 Chinook salmon past the Takotna River weir during the target operational period of 24 June through 20 September is considered a reliable estimate of the 2004 total annual escapement upstream of the weir (Table 1). The 2 inoperable days at the end of the target operational period were well outside the date range for normal Chinook salmon passage. The weir was operational for part of the day before the 24 June target period, and only 1 Chinook salmon was observed passing the weir on that day.

No formal escapement goals have been established for the Takotna River, which precludes assessment of the adequacy of the escapement. However, observed Chinook salmon escapement in 2004 was higher than escapements in 1996, 2000, 2002, and 2003, but less than in 1997 and 2001 (Figure 8; Appendix B1). Observed annual escapement at the Takotna River weir has increased modestly, but steadily, since 2001, a trend consistent with but less dramatic than most other escapement monitoring locations in the Kuskokwim River (e.g. Figure 9; Stewart and Molyneaux 2005, *In prep*; Shelden et al. 2005; Roettiger et al. 2005; Zabkar et al. 2005). All weir projects in the drainage reported an increase in Chinook salmon escapement from 2003 to 2004, as did many aerial stream surveys; however, the magnitude of increased abundance seen in the Takotna River was generally less than that observed in lower and middle Kuskokwim River tributaries.

In 2001, the BOF identified Kuskokwim River Chinook salmon as a stock of concern (Burkey et al. 2000b). In response, ADF&G initiated 3 conservation measures in June and July to increase Chinook salmon escapements: subsistence fishers were required to follow a fishing schedule that included 3 consecutive days each week when the fishery was closed, commercial fishing was closed in Districts W-1 and W-2 in June and July or until managers had sufficient evidence that escapement goals would be achieved, and the northern boundary of District W-4 was moved south by about 5 km to make it more distant from the Kuskokwim River. The stock of concern finding was continued by the BOF following their January 2004 meeting (Bergstrom and Whitmore 2004); however, conservation measures were largely rescinded in 2004 because most run assessment tools indicated strong runs of Chinook and chum salmon.

The subsistence fishing schedule was rescinded on 20 June, before it had gone into effect for the entire drainage, because most run assessment tools indicated that the measure was no longer needed. After 20 June, subsistence fishing was allowed 7 days a week. The Takotna River and other Kuskokwim River tributaries likely benefited from the schedule because June closures provided windows when fish could pass through the lower Kuskokwim River where the subsistence fishery is most intense. Evidence from a tagging study suggests that fish bound for the Takotna River pass through the lower river during the earlier part of the Chinook salmon run, which supports the idea that conservation measures, especially in June, may benefit Takotna River and other upper Kuskokwim River stocks (Figure 10; Stuby 2003, 2004, 2005).

For the first time since 2000, ADF&G permitted commercial fishing in District W-1 during late June and early July. District W-2 remained closed, however, due to the lack of a commercial market. The 4 chum and sockeye directed commercial openings occurred between 30 June and 7 July, after most run assessment tools indicated strong runs of Chinook and chum salmon to the Kuskokwim River (Whitmore et al. *In prep*). The effect of the 4 commercial fishing openings in late June and early July on Takotna River and other upper Kuskokwim River Chinook salmon escapements is likely negligible because of the limited Chinook salmon harvest, and because of the early run timing of upper river stocks as reported by Stuby (2005). Though the total harvest of 2,300 Chinook salmon in 2004 was significantly higher than the 150, 72, and 90 fish harvested in 2003, 2002, and 2001, respectively, it was well below the recent 10-year average of 8,449 fish. Furthermore, the date of the first commercial opening in District W-1 of 30 June probably occurred after the bulk of the fish bound for the Takotna River had moved through the lower portions of the Kuskokwim River drainage. Results from a radiotelemetry study indicate that Chinook salmon bound for upper river tributaries are among the first captured and tagged at the tagging sites, which are located approximately 46 to 91 km upriver from the upstream boundary of District W-1 (Figure 10; Stuby 2003, 2004, 2005).

Chinook Salmon Run Timing

Chinook salmon run timing at the weir in 2004 was earlier than in most other years (Figure 11). The median passage date in 2004 was 9 days earlier than in 2003 and 2000, 2 days earlier than in 2002, and 4 days earlier than in 2001 (Appendix B1). At other Kuskokwim River escapement projects, the run timing of Chinook salmon was variable in 2004; for example, at Kogrukluk (rkm 710) and George (rkm 453) river weirs the Chinook salmon run timings were similar to past years (Shelden et al. 2005; Stewart and Molyneaux *In prep*), whereas at Kwethluk (rkm 190) and Tuluksak (rkm 222) River weirs it was among the earliest on record (Zabkar et al. 2005; Roettiger et al. 2005).

In regard to run timing of Takotna River Chinook salmon through the lower Kuskokwim River, results from a radiotelemetry study conducted on the mainstem Kuskokwim River from 2002 to 2004 suggest that upper river populations, such as that bound for the Takotna River, migrate past the Lower Kalskag tagging sites earlier than lower and middle river populations (Figure 10; Stuby 2005). In 2004, the run timing of discreet Chinook salmon spawning aggregates past the tagging sites was more protracted than in 2003 and similar to what was observed in 2002. Details of the 2004 Kuskokwim River Chinook radiotelemetry project are described by Stuby (2005).

Chinook Salmon Carcasses

Less than 1% of the 2004 Chinook salmon escapement was later found as carcasses at the weir. The remainder of the spawned-out fish were likely retained in or near the river upstream of the weir for a protracted period of time (Figure 12), thereby contributing to the productivity of the system through the injection of marine derived nutrients as described by Cederholm et al. (1999). Retention of spawned-out salmon carcasses within the Takotna River is particularly important given that salmon runs appear to be in recovery following decades of near absence. Nutrient retention within a system is essential for reestablishment of strong salmon runs.

Chinook Salmon Index Value

One of the arguments supporting operation of the Takotna River weir is that it provides a measure of escapement that can be applied as an index for the upper Kuskokwim River drainage. The only other escapement monitoring regularly done in the upper Kuskokwim River is aerial surveys of the Salmon River (Pitka Fork drainage), a formal escapement index stream (Burkey et al. 2002). The Salmon River surveys, however, focus only on Chinook salmon and are not conducted every year. To date, there are 5 years of paired Chinook escapement measures for both tributaries, but they do not correlate well (R^2 = 0.0018; Figure 13). Both abundance measures showed an increase from 2000 to 2001, but in 2002 and 2003 more Chinook salmon were seen in the Salmon River survey than would have been suggested based on the Takotna River weir escapement data. In 2004 fewer Chinook salmon were seen in the Salmon River survey than would have been predicted based on the observed escapement to the Takotna River weir. The discrepancy observed in 2004 may be the result of poor aerial survey conditions in one portion of the Salmon River (Index Area 101). The authors recommend that managers continue to expand this paired data set so that the relationship can be better assessed.

Chum Salmon Abundance

Reported escapement of 1,630 chum salmon past the Takotna River weir during the target operational period of 24 June through 20 September is considered a reliable estimate of the 2004 total annual escapement (Table 1). The 2 inoperable days at the end of the target operational period were well outside the date range for normal chum salmon passage, so no chum salmon are believed to have passed during this time. The weir was operational for part of the day before the 24 June target period, and only 3 chum salmon were observed passing the weir.

No formal escapement goals have been established for the Takotna River, which precludes assessment of the adequacy of the escapement. However, chum salmon escapement in 2004 was the lowest escapement recorded for the Takotna River since 2000, which was one of the years that contributed to the “stock of concern” designation by the BOF (Burkey et al. 2000b). Unlike other weir projects in the Kuskokwim River, escapement at the Takotna River weir has declined each year since 2001 (Figures 8, 14; Appendix B2). The 2004 chum salmon escapement was half that reported for 2003, and less than one-third of the escapement reported for 2001, the highest escapement on record. Most other escapement monitoring projects in the Kuskokwim River drainage reported average or above average chum salmon escapement in 2004, escapements much larger than those observed in 2000, and/or similar to 2001. Tuluksak River weir, however, also reported a decrease in chum salmon escapement in 2004, although not to the degree that was observed in the Takotna River (Zabkar et al. 2005). The continuous decline in chum salmon escapement from 2001 to 2004 at the Takotna River weir was not observed at any other escapement-monitoring project, and the reason for this trend is not known (e.g. Figure 14; Stewart and Molyneaux 2005, *In prep*; Shelden et al. 2005; Roettiger et al. 2005; Zabkar et al. 2005).

In 2001, the BOF identified Kuskokwim River chum salmon as a stock of concern (Burkey et al. 2000b). In response, ADF&G initiated 3 conservation measures in June and July to increase chum salmon escapements: subsistence fishers were required to follow a fishing schedule that included 3 consecutive days each week when the fishery was closed, commercial fishing was closed in Districts W-1 and W-2 in June and July or until managers had sufficient evidence that escapement goals would be achieved, and the northern boundary of District W-4 was moved south by about 5 km to make it more distant from the Kuskokwim River. The stock of concern finding was continued by the BOF following their January 2004 meeting (Bergstrom and Whitmore 2004); however, conservation measures were largely rescinded in 2004 because most run assessment tools indicated strong runs of Chinook and chum salmon. The subsistence schedule was rescinded on 20 June, before it had gone into effect for the entire drainage, because most run assessment tools indicated that the measure was no longer needed. After 20 June, subsistence fishing was allowed 7 days a week. The Takotna River and other Kuskokwim River tributaries may have still benefited from the schedule because June closures provided windows when fish could pass through the lower Kuskokwim River where the subsistence fishery is most intense. Evidence from a tagging study suggests that fish bound for the Takotna River pass through the lower river during the earlier part of the chum salmon run, which supports the idea that conservation measures, especially in June, may benefit Takotna River stocks (Figure 15) (Kerkvliet 2003; 2004; Pawluk et al. *In prep*).

For the first time since 2000, ADF&G permitted commercial fishing in District W-1 during late June and early July. District W-2 remained closed, however, due to the lack of a commercial market. Four chum and sockeye directed commercial openings occurred between 30 June and 7 July, after most run assessment tools indicated strong runs of Chinook and chum salmon to the Kuskokwim River (Whitmore et al. *In prep*). The effect of the 4 commercial fishing openings in late June and early July on Takotna River and other upper Kuskokwim River salmon escapements is likely modest because of the limited chum salmon harvest, and because of the early run timing of upper river stocks as reported. The total harvest of 20,429 chum salmon in 2004 was significantly higher than the 2,760, 1,900, and 1,272 fish harvested in 2003, 2002, and 2001, respectively, but was well below the recent 10-year average of 139,083 chum salmon. Furthermore, the date of the first commercial opening in District W-1 on 30 June probably occurred after the bulk of the fish bound for the Takotna River had moved through the lower portions of the Kuskokwim River drainage. Historical tagging data suggest that Takotna River chum salmon migrate through the lower Kuskokwim River early in the season (Kerkvliet et al. 2003; 2004; Pawluk et al. *In prep*). In each year of the Kuskokwim River tagging study, tag numbers recovered from chum salmon at the Takotna River weir reveal that the bulk of chum salmon bound for the Takotna River pass the Kalskag/Aniak tagging sites before 30 June, the date of the first commercial fishing opening of the 2004 season (Figure 15). Furthermore, the tagging sites are located about 46 to 91 km upriver from the upstream boundary of District W-1, a distance that would require additional time to transgress. If travel speed remains relatively constant along the chum salmon migration path from the lower river to the upper river, results from the tagging study conducted in 2003 suggest that it would take about 3 days for chum salmon to migrate from District W-1 to the tagging sites (Gilk and Molyneaux 2004). These results indicate that chum salmon bound for the Takotna River migrate through the lower river well before the bulk of the overall chum salmon run and that the commercial fishing openings probably had little to no impact on Takotna River chum salmon.

Chum Salmon Run Timing

Chum salmon run timing at the weir in 2004 was similar to 2002, which was the earliest yet recorded for the weir (Figure 11). The median passage date was 8 days earlier than in 2003, 7 days earlier than in 2001, and 4 days earlier than in 2000 (Appendix B2). Timing of the chum salmon run was early at most Kuskokwim River escapement-monitoring projects in 2004 (e.g. Stewart and Molyneaux 2005, *In prep*; Roettiger et al. 2005; Zabkar et al. 2005). Only the Aniak River (ADF&G unpublished data) and Kogrukluk River (Shelden et al. 2005) were reported as having late chum salmon run timing in 2004.

In regard to run timing of Takotna River chum salmon through the lower Kuskokwim River, no tagged chum salmon were recovered at the Takotna River weir in 2004; however, results from previous years suggest that Takotna River chum salmon migrate past the Lower Kalskag tagging sites earlier than lower river and middle river populations (Figure 15; Pawluk et al. *In prep*). Details of the 2004 Kuskokwim River tagging project are described by Pawluk et al. (*In prep*).

Chum Salmon Carcasses

Only 1.4% of the 2004 chum salmon escapement was later found as carcasses at the weir. The remainder of spawned-out fish were likely retained in or near the river upstream of the weir for a protracted period of time (Figure 12), thereby contributing to the productivity of the system through the injection of marine derived nutrients as described by Cederholm et al. (1999). Retention of spawned-out salmon carcasses within the Takotna River is particularly important given that salmon runs appear to be in recovery following decades of near absence. Nutrient retention is essential for the reestablishment of strong salmon runs.

Females comprised 35.3% of the carcass count, compared to 49.9% of the upstream migrants. This reinforces that sex composition derived from weir carcass counts is biased low for females (DuBois and Molyneaux 2000).

Coho Salmon Abundance

Reported escapement of 3,207 coho salmon past the Takotna River weir during the target operational period of 24 June through 20 September is considered a reliable estimate of the 2004 total annual escapement (Table 1). The weir was operational well before the first coho salmon passed and continued operations for all but the last 2 days of the target operational period. Few coho salmon were observed passing the weir after 10 September, and the daily passage estimates of zero fish for 19 and 20 September is considered a reasonable approximation.

No formal escapement goals have been established for the Takotna River, which precludes assessment of the adequacy of the escapement. However, the total annual coho salmon escapement at the Takotna River weir in 2004 was the second lowest on record, lower than all years except for 2001 (Figure 8; Appendix B3). In contrast, escapements elsewhere in the Kuskokwim River drainage were above average (Figure 16; Stewart and Molyneaux 2005, *In prep*; Shelden et al. 2005; Roettiger et al. 2005; Zabkar et al. 2005).

Kuskokwim River coho salmon have not been identified as a stock of concern, even though harvests, and sometimes escapements, have generally been below average since 1996 (Ward et al. 2003). As in past years, a directed commercial coho salmon fishery was implemented in the District W-1 of the lower Kuskokwim River in 2004. A total of 22 commercial fishing periods occurred between 30 July and 8 September, but most of the periods were half district openings alternating between the upper and lower half of District W-1. The 2004 commercial harvest was

433,809 coho salmon, which is the largest harvest since 1996 despite low fishing effort in 2004 (Whitmore et al. *In prep*). A total of 390 individual permit holders recorded landings during the 2004 season, 28% below the recent 10-year average of 539 fishers. The bulk of coho salmon bound for the Takotna River tend to pass the tagging sites in August, the month of greatest commercial fishing effort and harvest in 2004 (Figure 17; Pawluk et al. *In prep*).

Coho Salmon Run Timing

Coho salmon run timing at the weir in 2004 was similar to previous years (Figure 11; Appendix B3). Annual median passage dates have varied little, ranging between 25 and 27 August. Similar to 2003, the central 50% passage occurred over a period of 14 days in 2004, compared to 10, 9, and 10 days in 2000, 2001, and 2002, respectively. The overall pattern of daily passage was markedly similar among the 5 years of enumeration data. Run timing at other Kuskokwim River escapement projects was also average, except at Tuluksak River weir, which had the earliest run timing on record in 2004 (Roettiger et al. 2005; Shelden et al. 2005; Stewart and Molyneaux 2005, *In prep*; Zabkar et al. 2005).

In regard to run timing of Takotna River coho salmon through the lower Kuskokwim River, information from recovered tags indicate that they pass the Lower Kalskag tagging site during the early part of the overall Kuskokwim River coho run. Compared to other salmon species, the timing between coho stocks tends to be more compacted (Figures 17, 18; Pawluk et al. *In prep*). The midpoint of the coho salmon captures at the tagging sites was 15 August, but by that date all 5 of the tagged coho salmon bound for the Takotna River had been tagged. As in 2002 and 2003, these findings indicate that coho salmon migrating to the Takotna River occur early in the overall Kuskokwim River coho run (Kerkvliet et al. 2003; 2004). This pattern may be typical of upper Kuskokwim River tributaries. Details of the 2004 Kuskokwim River tagging project are described by Pawluk et al. (*In prep*).

Coho Salmon Carcasses

Only 4 coho salmon carcasses were found on the weir, but the weir was removed before the majority of the fish had completed spawning, so no conclusions have been made about the occurrence or retention of coho carcasses.

Other Species

No pink salmon were seen passing upstream of the Takotna River weir in 2004, but more sockeye salmon passed the weir than in any previous year (Appendix B4). The 17 sockeye salmon that passed the weir in 2004 was unexpected given the 1, 1, 1, and 4 fish observed in 2000, 2001, 2002, and 2003, respectively. Similar anomalies were observed in most other monitored tributaries in the Kuskokwim River drainage (Roettiger et al. 2005; Stewart and Molyneaux 2005, *In prep*). Exceptions were Kogrukluk River, which had a below average sockeye run, and Tuluksak River, which had a near average sockeye salmon escapement (Shelden et. al 2005; Zabkar et al. 2005).

The number of longnose suckers that passed the weir in 2004 was by far the lowest on record. Only 151 longnose suckers were observed in 2004, compared to 609 in 2003, 604 in 2002, 13,458 in 2001, and 3,798 in 2000 (Table 1; Appendix B5). Fewer longnose suckers were also reported at the Tatlawiksuk River weir, one of only two other monitored tributaries where longnose suckers were a prominent species in 2004 (Stewart and Molyneaux 2005). Reported longnose sucker passage at George River weir was average given the late start date and that daily longnose sucker passage was not estimated during the inoperable period. In the case of all 3 weirs, a significant number of longnose suckers may have passed upstream before operations began. Migratory timing of longnose suckers is highly variable at the Takotna River weir, as it is in other monitored tributaries in the Kuskokwim River drainage. The median passage date for Takotna River longnose suckers has ranged from 26 June to 23 July even though the weir was installed by 24 June nearly every year. Variable median passage dates have also been observed at both George and Tatlawiksuk river weirs. Information on longnose sucker passage is likely incomplete because much of their upstream migration probably occurs before the beginning of weir operations (Morrow 1980).

Salmon Age, Sex, and Length Composition

Chinook Salmon

Despite active sampling efforts, Chinook ASL samples were below the objective sample size. The need for achieving the target sample size for each ASL pulse sample was weighed against the need for collecting the samples over a brief period of time, the abundance of the species at the time the samples were collected, and the need to avoid undue delay to the salmon migration. As in 2001 and 2003, the ASL data collected from Chinook salmon in 2004 were not adequate for describing the age composition for the total annual escapement because of insufficient samples; therefore, only general comparisons can be made from fish sampled during the same time frames in previous years (Clark and Molyneaux 2003; Gilk and Molyneaux 2004).

The most conspicuous finding was the dominance of age-1.2 Chinook salmon in 2004, which is unlike previous years when age-1.4 fish dominated (Figure 19; Appendix C1). Chinook salmon tend to have a strong sibling relationship, so the large number of age-1.2 fish occurring in 2004 hints to a strong return of age-1.3 fish in 2005, and a strong return of age-1.4 fish in 2006. The small number of Chinook sampled at Takotna River makes such prediction speculative, however, unusually high numbers of age-1.2 Chinook salmon were also observed in nearly all other Kuskokwim River projects in 2004, which reinforces the dominance of age-1.2 fish as a wide ranging phenomenon in 2004 (Roettiger et al. 2005; Shelden et al. 2005; Stewart and Molyneaux 2005, *In prep*; Zabkar et al. 2005).

The high number of age-1.2 Chinook salmon observed at Takotna and other locations in the Kuskokwim River drainage were unexpected because escapements in the 2000 parent year were generally low (Harper and Watry 2001; Linderman et al. 2002; 2003; Schwanke et al. 2001; Ward et al. 2003). Since few smolt studies are currently conducted on the Kuskokwim River, it is impossible to determine whether the strong return of age-1.2 Chinook salmon resulted from favorable ocean conditions or favorable river conditions. However, the wide range of the phenomenon indicates that favorable ocean conditions were probably the driving force. Furthermore, results from juvenile surveys conducted in the Takotna River drainage in 2001 do not suggest high survivability among juveniles during the 2000–2001 winter because juvenile Chinook salmon were found in relatively low concentrations (Appendix E1), suggesting that the abundance of age-1.2 fish in 2004 was probably the result of favorable ocean conditions in recent years.

Though the ASL data were insufficient in 2004 for determining trends over the Chinook run, information in 2000 and 2002 indicated that the percentage of age-1.4 fish increases as the season progresses (Figure 20; Appendix C1).

The percentage of female Chinook salmon in 2004 was lower than in 2001, 2002, and 2003, but similar to 2000, and the percentage of females tends to increase as the season progressed (Figure 21; Appendix C1). A lower percentage of females are expected given the prominence of male dominated younger age classes; still, the low Chinook escapement at Takotna coupled with the low percentage of females suggests low numbers of spawning females, which is a concern (DuBois and Molyneaux 2000).

Chum Salmon

The ASL data collected from chum salmon in 2004 were adequate for describing the age composition for the total annual escapement. The most striking finding was the abundance of age-0.2 fish (Table 4). Age-0.2 chum salmon are typically found in trace numbers in the Kuskokwim River (DuBois and Molyneaux 2000), but they were unusually abundant in the Takotna River and all other Kuskokwim River locations in 2004 (Roettiger et al. 2005; Shelden et al. 2005; Stewart and Molyneaux 2005, *In prep*; Zabkar et al. 2005). The significance of this abundance is that it may foretell a strong return of age-0.3 chum salmon in 2005, and age-0.4 fish in 2006. Still, the predictive value of sibling relationships for chum salmon is not as reliable as with Chinook salmon. Also, missing from this assessment is the number of Takotna River chum salmon that may have been removed through harvest.

Most typically the proportion of age-0.3 chum salmon increases as the run progresses, while the proportion of age-0.4 fish diminishes (Figure 22; Appendix C3; DuBois and Molyneaux 2000). This common pattern, however, was masked in 2004 by the unusual abundance of age-0.2 fish, whose proportion increased as the season progressed (Table 4).

Nearly half the total annual chum salmon escapement at Takotna River was female in 2004, which is similar to past years (Appendix C3). These percentages are also similar to what has been found historically at most other escapement projects (DuBois and Molyneaux 2000). DuBois and Molyneaux (2000) reported that within-season percentage of females generally increases over the duration of the run; however, in 2004 the percentage of females at Takotna River weir remained relatively consistent, similar to what was observed in 2000 and 2002 (Figure 21). The reason for the inconsistency among years is unknown, but similar and more exaggerated inconsistencies have been observed at Kogrukluk River weir, where the pattern is attributed to the influence of extensive spawning areas downstream of the weir (DuBois and Molyneaux 2000). Very limited chum salmon spawning, however, is known to occur downstream of the Takotna River weir.

Coho Salmon

The ASL data collected from coho salmon in 2004 were adequate for describing the composition of the total annual escapement. As in past years, age-2.1 coho salmon dominated the 2004 coho salmon run (Table 7; Appendix C5), which is typical of Kuskokwim Area coho runs (DuBois and Molyneaux 2000). Sample sizes of age-1.1 and -3.1 coho salmon in 2004 were not large enough to assess length difference among age classes, but in years with larger sample sizes length vary little among age classes (Appendix C6).

The percentage of female coho salmon in the total annual escapement at Takotna River was 40.9%, which is near the lower end of the historic range (Appendix C5). In past years, there have been questions about the crew misidentifying the sex of fish. DuBois and Molyneaux (2000) identified erroneous sex identification as being a persistent problem with coho salmon, and this necessitates continued diligence in sexing fish at the Takotna River weir project, otherwise, no irregularities were observed in the estimated coho salmon ASL composition.

Climatological and Hydrological Monitoring

Water levels in the Takotna River were below average for the entire operational period and the mean water level was the lowest on record (Figure 23). The reported range in water level in 2004 paralleled that of 2002 for most of the operational period, slowly dropping as the season progressed with few exceptions. Unlike 2002, the weir experienced no high water event. The observed pattern in 2004 was much different from that observed in 2000, 2001, and 2003 in which water levels fluctuated dramatically throughout the season. There did not appear to be a strong correlation between daily water level and salmon passage (Figure 24). However, given that fish passage methods changed during the season, and that sampling events interfere with daily fish passage, it is uncertain whether daily water level influenced fish migration through the weir in 2004.

Reported water temperature of the Takotna River ranged from 3 to 18°C during the 2004 project operations; however, average daily water temperatures were the highest on record for most of the season (Schwanke et al. 2001). There did not appear to be a strong correlation between daily water temperatures and salmon passage (Figure 25).

Related Fisheries Projects

Aerial Surveys

The largest number of spawning Chinook salmon found in the upper Kuskokwim drainage during 2004 was in the Salmon River (Pitka Fork drainage) where 1,138 fish were observed. No salmon, however, were observed in Index Area 101 because of high water turbidity, so the count is probably an underestimate since historically aerial survey counts from Index Area 101 comprise a relatively large percentage of the total count for the entire Salmon River system. Thus, when comparing aerial survey counts from the Salmon River to annual escapement at the Takotna River weir it should be recognized that the Salmon River aerial survey conducted in 2004 was incomplete. Still, the final index count was within the formal sustainable escapement goal (SEG) range of 470 to 1,600 fish. The Salmon River index area has been surveyed 24 times since 1975, and counts ranged from 272 to 2,555 Chinook salmon (Burkey and Salomone 1999). ADF&G first established a formal Chinook salmon escapement goal for the Salmon River in 1984 (Buklis 1993). The initial escapement goal of 1,300 Chinook salmon was revised in 2004 and is now described as a SEG range, rather than a minimum (ADF&G 2004).

There has been interest in developing a weir project on the Salmon River, though the project may be of limited utility compared to other weirs in the area. Aerial survey data indicate that the Salmon River is an important upper Kuskokwim River spawning area for Chinook salmon, but use by other salmon species is negligible. A weir was operated on the South Fork Salmon River in 1981 and 1982, but the passage was mostly limited to Chinook salmon (Schneiderhan 1982a, 1982b). A ground survey for a potential weir installation site was conducted in 2000 (L. DuBois, Commercial Fisheries Biologist, ADF&G, Anchorage; personal communication), but the most promising locations may conflict with subsistence fishers that operate in the immediate area. An open weir design incorporating videography for enumeration may be a viable alternative.

Elsewhere in the Pitka Fork drainage, the mainstem Pitka Fork upstream of Sheep Creek had the next highest concentrations of Chinook salmon. This is similar to observations in 2002 and 2003

(Clark and Molyneaux 2003; Gilk and Molyneaux 2004). A survey was not conducted in the mainstem downstream of Sheep Creek, but 204 Chinook salmon were observed in Bear Creek, a tributary of the upper Pitka Fork River that confluences just upstream of the Salmon River. Bear Creek has been surveyed 11 times since 1975, with Chinook salmon counts ranging from 3 to 242 fish (Burkey and Salomone 1999).

Historically, 49 aerial surveys have been conducted collectively on the mainstem Pitka Fork, Salmon River, Bear Creek, Sullivan Creek, and Sheep Creek to assess Chinook and early-spawning chum salmon escapements (Burkey and Salomone 1999; Gilk and Molyneaux 2004). Since the first survey in July 1975, summer chum salmon have been observed in only 6 surveys in the mainstem Pitka Fork and in the Salmon River with a number ranging from 4 to 50 fish (Burkey and Salomone 1999). However, the primary objective of aerial surveys is to enumerate Chinook salmon, and observers are generally focused on Chinook salmon and are not looking for chum salmon. Results from the weir operated on the Salmon River in 1981 and 1982 documented counts of 8 and 39 chum salmon respectively (Schneiderhan 1982a, 1982b). Aerial surveys conducted in those years reported no chum salmon, although the 1981 survey was rated as poor (Burkey and Salomone 1999). In the Salmon River there was a single report of 997 summer chum salmon in 1997; however, speciation in this survey is suspect due to the poor surveying conditions and inexperience of the observer. Aerial survey data indicate that the Pitka Fork and its tributaries are not utilized by summer chum salmon, although summer chum salmon may remain undetected due to poor water clarity in the Pitka Fork downstream from its confluence with Sullivan Creek.

In addition to the aerial surveys conducted on the Pitka Fork River and its tributaries, an attempt was made to survey the Little Tonzona River, a tributary of the South Fork Kuskokwim River, but water clarity was marginal due to high turbidity.

Fourth of July Creek of the Takotna River drainage was surveyed in 2004, with a focus on enumerating Chinook salmon. By the time Fourth of July Creek was surveyed on 21 July, over 80% of the total annual escapement of Chinook and chum salmon had passed upstream of the Takotna River weir, so the timing of the survey corresponded well to the period of peak spawning ground abundance. Still, the fish observed during the survey only accounted for 19.0% and 4.0% of the cumulative Chinook and chum salmon escapement through that date. Historical aerial surveys suggest Fourth of July Creek is the dominant spawning area for salmon in the Takotna River drainage (Clark and Molyneaux 2003; Gilk and Molyneaux 2004; Schwanke et al. 2001; Schwanke and Molyneaux 2002).

CONCLUSIONS

Weir Operations

- The weir was installed by 24 June and was operational until 19 September.

Fish Passage

- Total annual Chinook salmon escapement in 2004 showed a modest increase over 2000, 2002, and 2003, but the increase is proportionately lower than the increases seen in most other Kuskokwim River tributaries.
- Total annual chum salmon escapement in 2004 was the second lowest on record and the third consecutive year in a pattern of diminishing escapement, which is contrary to the pattern seen at most other tributaries in the Kuskokwim River drainage.
- Total annual coho salmon escapement in 2004 was the second largest on record, which is consistent with trends seen elsewhere in the Kuskokwim River.

Salmon Age, Sex, and Length Composition

- Sampling for Chinook salmon was limited in 2004, but the exceptionally high abundance of age-1.2 fish is consistent with findings at most other Kuskokwim Area projects and suggests a strong return of age-1.3 cohort to the Kuskokwim River in 2005.
- The number of age-0.2 chum salmon in the Takotna River escapement was unusually high in 2004, consistent with most other Kuskokwim River projects, and may foretell an abundant return of the more dominant age-0.3 cohort to the Kuskokwim River in 2005.
- Despite relatively low parent year escapements, the prevalence of younger age classes in both Chinook and chum salmon in 2004 suggests continued favorable ocean survivability over the conditions that led to the low runs to the Kuskokwim River in 1998, 1999, and 2000.

Climatological and Hydrological Monitoring

- For most of the 2004 season, daily water levels were at or near the lowest levels yet recorded at Takotna River weir.
- Daily water temperatures at Takotna River weir in 2004 were generally highest yet recorded at the project.

Aerial Stream Surveys

- The largest concentration of spawning Chinook salmon found in the upper Kuskokwim River was in the Salmon River (Pitka Fork drainage), which is consistent with past findings.
- The index count of 1,138 Chinook salmon for the Salmon River (Pitka Fork drainage) in 2004 is within the sustainable escapement goal range of 470 to 1,600 fish.

JUVENILE SALMON INVESTIGATIONS

INTRODUCTION

Takotna River salmon populations appear to be recovering after near extirpation in the early twentieth century. The perceived increase in salmon abundance in recent decades prompted the establishment of the escapement monitoring program on the Takotna River in 1995 (D. Newton, local resident, Takotna; personal communication). The project started with a counting tower, but transitioned to a resistance board weir in 2000. With the transition to a weir came an increase in ADF&G participation, including interest in investigating the distribution of juvenile salmon in the Takotna River drainage. Since 2000, the Takotna River weir project has served as a platform for conducting juvenile salmon investigations.

Currently, the Takotna River supports only modest runs of Chinook, chum, and coho salmon, which are thought to be vestiges of much stronger runs. Even within a species, salmon show remarkable variability in the freshwater stage of their lifecycle. Chinook and coho salmon spend a significant portion of their lifecycle in freshwater, whereas chum salmon migrate seaward shortly after emergence in the spring (Groot and Margolis 1991). ASL data indicate that Takotna River Chinook salmon usually spend one winter in freshwater, and coho salmon usually spend 2 winters in freshwater. Factors that prompt emergence and initiate migration are not fully understood, but it is likely that river flow, water temperature, water clarity, and food availability all interact to induce or restrain juvenile migration (Groot and Margolis 1991).

Investigating juvenile salmon is useful for management purposes. Capturing and measuring juvenile salmon for length allows investigators to identify ages and approximate growth rate. Since juvenile salmon grow rapidly during the summer months and slowly during the winter, modes in juvenile length data will indicate the presence of different age classes. The relative abundance of certain age classes will indicate survivability when compared to the number of spawners of the parent year. For example, large numbers of age-1 Chinook salmon despite low adult returns the previous year indicate high alevin survival. This information, when taken with climatological observations the previous winter, can indicate which weather patterns are most influential for juvenile survival. When paired with estimated weir escapement data, climatic conditions may forecast alevin survival.

Initially, the juvenile salmon component of the project focused on distribution patterns within the Takotna River drainage, but in 2004 the project was expanded to initiate the beginnings of a more rigorous experimental design. More gear types were used and more locations were surveyed than in past years. The juvenile sampling conducted in 2004 provided additional preliminary information on juvenile salmon and will likely be a precursor for more rigorous investigations in future years.

The research objectives of the juvenile salmon component in 2004 were to:

1. Investigate the geographic distribution of juvenile salmon in the Takotna River drainage;
2. Investigate Gold Creek for possible inclusion as an Index Area.
3. Determine which of 4 gear types (minnow traps, beach seines, dip net, or stationary net) is most efficient for the capture of juvenile Chinook, chum, and coho salmon; and,
4. Determine whether gear types are size-selective.

METHODS

Sampling Protocol

Unlike in previous years, 4 gear types were used to capture juvenile salmon: minnow traps, beach seines, a dip net, and a stationary net. Minnow traps remained the primary means of capturing juvenile Chinook and chum salmon. In 2004, efforts focused primarily on 10 of 13 geographic zones, referred to as Index Areas, in the mainstem of the Takotna River and major tributaries (Figure 26). One minor tributary, Gold Creek, was investigated for the first time in 2004 for possible inclusion as an Index Area. Captured juvenile salmon were identified to species and measured to the nearest millimeter (fork length) before being released. All other species were identified and their abundances recorded. In each sampling event, the number of fish caught, global positioning system (GPS) coordinates, bank designation, and a brief habitat description was recorded.

Capture Methods

Minnow traps

Minnow traps had 1/4-in mesh and were baited with salmon roe placed loosely in the trap. Traps were set along one or both banks of a segment of the river, and were fished between 1 and 28 hours, but most typically overnight. Soak time was recorded.

Catch per unit effort (CPUE) was calculated following the guidelines set forth by Murphy and Willis (1996). In this case, minnow trap CPUE was calculated using the following formula:

$$\hat{R}_2 = \frac{\sum_{i=1}^{n} c_i}{\sum_{i=1}^{n} e_i} \qquad (3)$$

Where

$\sum_{i=1}^{n} c_i$ = sum fish captured per trap (c_i) over all traps (n),

$\sum_{i=1}^{n} e_i$ = sum hours fished per trap (e_i) over all traps (n), and

$\hat{R}_2$ = catch per unit effort (CPUE).

This method of calculating CPUE is different from that used in previous years; thus, any discrepancies between CPUE values in this report and those of previous reports are attributed to the new methodology.

Beach Seine

The beach seine used most often measured 30 ft in length by 4 ft in depth with a 1/4-in mesh size. On rare occasions, a seine net with 1/8-in web was used. A 5-ft section of PVC pipe was attached to each end, which allowed the seine to be pulled through the water. A typical sampling event included several seine hauls in a given segment of stream with each haul moving progressively downstream. Beach seine CPUE was defined as the number of salmon captured per seine attempt, which is consistent with past practices.

Stationary Net

The stationary net was similar to a fyke net in that it was positioned in an area of significant current and fished passively. Although designed to target outmigrating juvenile chum salmon, other species were captured incidentally. It was essentially a beach seine (1/4-in mesh size) that was held stationary perpendicular to the current by a log or logjam. When deployed, the net inflated like a windsock in the stream channel. Juvenile fish would drift or swim into the net and the current would force them into the downstream end. The net was fished from 1 to 8 hours. The method for calculating CPUE was similar to that described for minnow traps; in the formula outlined above, replace "trap" with "stationary net."

Dip Net

A dip net was used when juvenile salmon were easily spotted along the shoreline. A member of the crew could approach a group of juveniles and attempt to capture them with the dip net. Dip net CPUE was defined as the number of salmon captured per dip netting attempt.

Statistical Analysis

Size Selectivity

Potential size selectivity from gear type was examined as a precursor for exploring seasonal growth differences between tributaries. Size selectivity analysis was only performed when 2 or more gear types were used in the same tributary (Index Area) during the same month; consequently, comparisons were only made between minnow trap and dip net catches for juvenile Chinook and coho salmon. The data sets were compared using a standard t-test ($\alpha = 0.05$), assuming unequal variance. If length differences among gear types were not found, then all gear types would have been combined for examining temporal and spatial length distribution (Objective 1).

Temporal and Spatial Length Distribution

In comparing length distributions, month was the temporal constant and Index Area was the spatial constant. When 3 months or more of fish length data were available for a given gear type and tributary, then differences between months were compared using standard analysis of variance (ANOVA; $\alpha = 0.05$), followed by a Newman-Keuls multiple range test (MRT). If only 2 months of data were available, then investigators compared mean lengths using a standard t-test ($\alpha = 0.05$, assuming unequal variance). When data were available from 3 or more Index Areas, the differences in mean length between Index Areas were compared using a standard ANOVA ($\alpha = 0.05$), followed by a Newman-Keuls MRT. If the data allowed only a comparison between 2 Index Areas, then investigators used a standard t-test ($\alpha = 0.05$, assuming unequal variance) to compare mean lengths.

RESULTS

This was the fifth consecutive year of juvenile salmon investigations in the Takotna River basin. Changes for 2004 included the addition of 2 capture methods (dip nets and stationary nets) to the minnow traps and beach seines that have been used annually since 2000. In addition, Gold

Creek, a minor tributary that flows through the village of Takotna, was added as Index Area 14 (Figure 26).

Sampling for juvenile salmon was done periodically from 29 April to 31 December, as time and river conditions allowed. Low water levels during the summer months made upstream access difficult, so most sampling occurred downstream of Fourth of July Creek. Still, 11 of 14 Index Areas were surveyed at least once in 2004. A total of 197 minnow traps were set in the Takotna River drainage from early June to late December with an average soak time of 17 hours. Most trapping occurred in Index Areas 2, 3, 4, 9, and 14, but occasionally trapping also occurred in Index Areas 1, 5, 6, 10, and 11 (Figure 26). A total of 56 beach seines were made from June through September in Index Areas 1, 2, 5, 13, and 14. Dip netting was conducted 7 times from May through August in Index Areas 3, 4, and 9. The stationary net was deployed 4 times between April and June, twice in Index Areas 3 and twice in Index Area 4, with an average soak time of 5 hours.

Juvenile Chinook Salmon

Total catch of juvenile Chinook salmon was 305 fish, and they were caught between July and December 2004 (Table 8). Juvenile Chinook salmon were caught with all 4 gear types; most were captured in baited minnow traps (n = 264), followed by dip net (n = 22), beach seine (n = 18), and then stationary nets (n = 1).

Geographic Distribution

Combining all gear types, Gold Creek (Index Area 14) accounted for 75% of the juvenile Chinook salmon captured, and Fourth of July Creek (Index Area 4) accounted for 15%; however, both locations also received a disproportionate amount of sampling effort (Table 8). Juvenile Chinook salmon were also found in the mainstem between the weir and Fourth of July Creek (4%, Index Area 2), in Big Creek (lower; 2%, Index Area 3), in the mainstem between the Big Waldren Fork and the confluence of Moore Creek (2%, Index Area 9), and downstream of the weir (1%, Index Area 1). No juvenile Chinook salmon were caught in sampling attempts made in the mainstem between Fourth of July Creek and Big Waldren Fork (Index Area 5), Little Waldren Fork (Index Area 10), Moore Creek (Index Area 11), or Tatalina Creek (Index Areas 13). It is noteworthy that the greatest amount of sampling effort occurred in the mainstem between the Big Waldren Fork and the confluence of Moore Creek (Index Area 9), but efforts yielded only 7 juvenile Chinook salmon.

Size Selectivity of Gear Types

Sampling in Fourth of July Creek in August revealed a difference in the mean length between juvenile Chinook salmon captured with minnow traps compared to fish captured with dip nets. Average length was significantly greater for trap-caught juvenile Chinook salmon than for fish caught with dip nets that same month and location ($P < 0.01$; Table 9).

Spatial Length Distribution

The mean lengths of trap-caught juvenile Chinook salmon during August from Fourth of July Creek (Index Area 4; n = 24), Big Creek (lower; Index Area 3; n = 7), and Gold Creek (Index Area 14; n = 146) were 77.8 mm, 74.6 mm, and 73.3 mm, respectively (Table 10). Fish from Fourth of July Creek were significantly longer than fish from Gold Creek ($P < 0.05$); however, fish from Big Creek (lower) were not significantly different from either Fourth of July Creek or Big Creek (lower).

Temporal Length Distribution

Combining all gear types and Index Areas, the lengths of juvenile Chinook salmon ranged from 44 to 84 mm in July (n = 19), 50 to 99 mm in August (n = 202), 69 to 92 mm in October (n = 39), 73 to 95 mm in November (n = 23), and 58 to 90 mm in December (n = 23; Figure 27).

Lengths of trap-caught juvenile Chinook salmon averaged 73.3 mm in August (n = 177), 79.5 mm in October (n = 39), 83.6 mm in November (n = 23), and 79.8 mm in December (n = 23, Figure 27; Appendix F1). In July, 2 juvenile Chinook salmon were captured in traps with lengths of 53 and 55 mm. Juvenile Chinook salmon captured in Gold Creek (Index Area 14) in October were significantly longer than those captured in August ($P < 0.001$; Table 11). No length differences were evident, however, among trap-caught juvenile Chinook salmon captured in Gold Creek during October, November, and December.

The mean length of beach-seine caught juvenile Chinook salmon averaged 63.4 mm in July (n = 17) and the one captured in August had a length of 67 mm (Figure 27, Appendix F2). In August, the lengths of dip net caught juvenile Chinook salmon ranged from 54 to 84 mm with a mean length of 70 mm (Figure 27; Appendix F3).

Juvenile Chum Salmon

Total catch of juvenile chum salmon was 112 fish, and they were caught between May and July 2004 (Table 12). The stationary net and dip nets were added to the capture methods in 2004 in order to target chum salmon, and indeed most were caught in the stationary net (n = 102) and dip nets (n = 7). Three juvenile chum salmon were caught in the beach seine and none were caught in the baited minnow traps.

Geographic Distribution

Combining all gear types, Fourth of July Creek (Index Area 4) accounted for 97% of the juvenile chum salmon catches, and the mainstem between the Big Waldren Fork and the confluence of Moore Creek (Index Area 9) accounted for 3% of the fish. No juvenile chum salmon were caught in Big Creek (lower; Index Area 3), which was the only other location that received any appreciable effort with stationary nets and dip nets.

Length Distribution

Juvenile chum salmon captured in Fourth of July Creek (Index Area 4) during May (n = 43) ranged in length from 33 to 42 mm (average = 36 mm), and were all caught with a stationary net (Figure 28; Appendix F4–F6). Those captured in Fourth of July Creek (Index Area 4) during June (n = 6) ranged in length from 34 to 40 mm (average = 37 mm), and were all caught with dip nets. Those captured in the mainstem between the Big Waldren Fork and the confluence of Moore Creek (Index Area 9) during July (n = 3) had lengths of 55, 55, and 62 mm, and were all captured using a beach seine. Not every juvenile chum salmon captured was measured for length.

Juvenile Coho Salmon

Total catch of juvenile coho salmon was 464 fish, and they were caught between June and December 2004 (Table 13). Most juvenile coho salmon were captured in baited minnow traps (n = 282), beach seine (n = 100), and dip net (n = 82). No juvenile coho salmon were caught with the stationary net.

Geographic Distribution

Combining all gear types, Big Creek (lower; Index Area 3) accounted for 60% of the juvenile coho salmon captured, Fourth of July Creek (Index Area 4) accounted for 14%, the mainstem downstream of the weir (Index Area 1) accounted for another 14%, the mainstem between the weir and Fourth of July Creek (Index Area 2) accounted for 8%, Gold Creek (Index Area 14) accounted for 3%, the mainstem between Big Waldren Fork and the confluence of Moore Creek (Index Area 9) accounted for less than 1%, and Moore Creek (Index Area 11) accounted for less than 1% (Table 13). Juvenile coho salmon were not found in the portions of the mainstem between Fourth of July Creek and Big Waldren Fork (Index Area 5), in Little Waldren Fork (Index Area 10), or in Tatalina Creek (Index Area 13). It is noteworthy that the greatest amount of sampling effort occurred in the mainstem between the Big Waldren Fork and the confluence of Moore Creek (Index Area 9), but efforts here yielded only 2 juvenile coho salmon. It is also noteworthy that the farthest upstream occurrence was one juvenile coho salmon caught in Moore Creek (Index Area 11).

In June and August, all of the beach seine-caught juvenile coho salmon were captured in the mainstem Takotna River downstream of the weir (n = 59, Index Area 1; Appendix F7–F9). In September, all of the beach seine-caught juvenile coho salmon were captured in the mainstem between the weir and Fourth of July Creek (n = 32, Index Area 2). Smaller percentages were captured in July, mostly in the mainstem between the weir and Fourth of July Creek (n = 7, Index Area 2), with a smaller number caught in the mainstem between Big Waldren Fork and the confluence of Moore Creek (n = 2, Index Area 9).

Size Selectivity of Gear Types

Most trap-caught juvenile coho salmon were captured late in the summer; 89% were caught in August alone. However, most beach seine-caught juvenile coho salmon were captured in June (47%), August (12%), and September (32%). Nearly all of the dip net-caught juvenile coho salmon were captured in August, with only 2 captured in other months.

The mean length of trap-caught juvenile coho salmon from Big Creek (lower) in August was significantly greater than the mean length of dip net caught juvenile coho salmon from the same month and location ($P < 0.001$; t-test, Table 14). In Fourth of July Creek, however, mean lengths were about equal for trap-caught and dip net caught juvenile coho salmon (Table 15).

Spatial Length Distribution

In August, the mean lengths of trap-caught juvenile coho salmon from Fourth of July Creek (Index Area 4; n = 14) and Big Creek (lower; Index Area 3; n = 238) were 64.1 mm and 60.0 mm, respectively, and were not significantly different (Table 16). However, sampling that same month using dip nets revealed a significant length difference between juvenile coho salmon captured in Fourth of July Creek (Index Area 4) and those captured in Big Creek (lower; Index Area 3; $P < 0.001$; Table 17). Juvenile coho salmon captured using dip nets in August averaged 57.2 mm in Fourth of July Creek and 41.8 mm in Big Creek.

Temporal Length Distribution

Combining all gear types and Index Areas, the lengths of juvenile coho salmon ranged from 20 to 83 mm in June (n = 58), 42 to 125 mm in July (n = 9), 32 to 137 mm in August (n = 345), 37 to 88 mm in September (n = 32), 67 to 77 mm in November (n = 3), and 65 to 115 mm in December (n = 13; Figure 29). Two fish were captured in May with lengths of 60 and 62 mm, and 2 were captured in October with lengths of 70 and 77 mm.

Lengths of trap-caught juvenile coho salmon averaged 73.8 mm in June (n = 11), 57.4 mm in August (n = 252), 72.3 mm in November (n = 3), and 94.2 mm in December (n = 13, Figure 29; Appendix F7). The 2 juvenile coho salmon captured in May and the 2 captured in October were caught using minnow traps. Lengths of beach-seine caught juvenile coho salmon averaged 31.5 mm in June (n = 47), 69.0 mm in July (n = 9), 63.0 mm in August (n = 12), and 49.5 mm in September (n = 32, Figure 29; Appendix F8).

Sampling with a beach seine in Takotna River Index Areas 1 and 2 revealed a definite length progression from June through August; the mean length of juvenile coho salmon was largest in August and smallest in June ($P < 0.001$). However, the mean length of beach seine-caught juvenile coho salmon caught in September was significantly less than the mean length from August ($P < 0.001$), but similar to the mean length of those caught in July (Table 18). Lengths of juvenile coho salmon captured using a dip net averaged 51.2 mm in August (n = 80, Figure 29; Appendix F9), and the 2 captured using a dip net in May had lengths of 60 and 62 mm. Trap-caught juvenile coho salmon caught in Big Creek (lower) in June were significantly longer, on average, than those caught in August ($P < 0.001$; t-test, Table 19).

Other Species

Other captured species include 1,188 Arctic grayling *Thymallus arcticus*, 407 slimy sculpin *Cottus cognatus*, 246 whitefish, 47 longnose suckers, 4 burbot *Lota lota*, and 3 Dolly Varden *Salvelinus malma*.

DISCUSSION

Juvenile Chinook Salmon Geographic Distribution

As in previous years, most of the 305 juvenile Chinook salmon caught in 2004 were from Fourth of July Creek (Index Area 4) and locations downstream of Fourth of July Creek (Table 8; Appendix F1–F3). Seven fish were, however, captured in the mainstem Takotna River between the Big Waldren Fork and the confluence of Moore Creek (Index Area 9). Despite annual sampling efforts, there has been only one documented capture of a juvenile Chinook salmon upstream of the Fourth of July Creek confluence prior to 2004 (Schwanke and Molyneaux 2002). However, in past years sampling above the Fourth of July Creek confluence was limited mostly to beach seining, whereas in 2004 minnow traps and a dip net were used concurrently with beach seines in this area. As was reported by Schwanke and Molyneaux (2002), efforts should be made to sample for juvenile salmon in the upper Takotna River basin as early as possible to investigate juvenile emigration.

The inclusion of Gold Creek (Index Area 14) in 2004 offered some insight in the seasonal distribution of juvenile Chinook salmon. Chinook salmon are not known to spawn in Gold Creek; still, during the summer heat of August water temperatures in the densely vegetated Gold Creek were lower than the more exposed mainstem Takotna River. Crew members speculated that the juvenile Chinook salmon moved into Gold Creek in response to a preference for cooler temperatures. Crew did, however, continue to find juvenile Chinook salmon in Gold Creek when temperatures cooled in the fall and winter. Future juvenile sampling should include trapping in other small tributary stream, especially in the upper Takotna River basin where the occurrence of juvenile salmon is of particular interest.

Juvenile Chinook Salmon Size Selectivity of Gear Types

For juvenile Chinook salmon captured in Fourth of July Creek in August, those caught using minnow traps were significantly longer, on average, than those caught in the dip net ($P < 0.01$). The cause is unknown, but intra-specific competition may play a role; smaller juveniles may be kept from the entrance by larger, more aggressive, siblings. Another possibility might be that the length difference is the result of location. Traps are typically placed in areas of still water around logjams and debris, areas that may be dominated by larger juveniles, whereas the dip net is typically used in a variety of habitats. This conclusion is not well supported in literature, however. Groot and Margolis (1991) explain that smaller Chinook salmon fry typically inhabit marginal areas of the river, particularly back eddies, behind fallen trees, undercut tree roots, and other areas of bank cover, and that juvenile Chinook move away from the shore into midstream and higher velocity areas as they grow larger. According to Groot and Margolis (1991), we would expect to find smaller fish where minnow traps were set, and larger fish where dip nets and beach seines were used.

Juvenile Chum Salmon Geographic Distribution

This was the first year in which sampling efforts were specifically focused on juvenile chum salmon, so little is known of their distribution in the Takotna River drainage. The samples were acquired through an independent research initiative to investigate the energetics of chum salmon in the Kuskokwim River drainage (J. Meka and C. Zimmerman, USGS, Alaska Science Center, Anchorage; personal communication). Prior to 2004, only one juvenile chum salmon was captured in the drainage during annual juvenile surveys. The deployment of stationary nets and dip nets in 2004 proved an effective means of capturing juvenile chum salmon. Nearly all of the juvenile chum salmon were captured in a stationary net, but deployment only occurred in Fourth of July Creek (Index Area 4) where 102 fish were caught, and Big Creek (lower, Index Area 3) were no juvenile chum salmon were caught (Table 12). Three juvenile chum salmon, however, were caught in the mainstem between Big Waldren Fork and the confluence of Moore Creek (Index Area 9) using the beach seine. Future deployment of the stationary net should include Index Areas upstream of Fourth of July Creek in order to document the occurrence and timing of juvenile chum salmon in that portions of the drainage.

As expected nearly all juvenile chum salmon were caught in May and early June; however, 3 fish were caught during July (Figure 28). Since chum salmon typically emigrate from the rivers shortly following their emergence in the spring (Groot and Margolis 1991), the occurrence of juveniles in July was unexpected.

Juvenile Chum Salmon Gear Effectiveness

The stationary net was the most effective method for the capture of juvenile chum salmon, both in terms of total number captured and CPUE. Chum salmon fry typically migrate downstream from the spawning areas to the ocean in late spring, so juvenile chum salmon are often smaller and more difficult to capture than other species. The stationary net proved an effective means for capturing juvenile chum salmon and should be used in future investigations.

Juvenile Coho Salmon Geographic Distribution

As in previous years, most of the 464 juvenile coho salmon caught in 2004 were from Fourth of July Creek (Index Area 4) and locations downstream of Fourth of July Creek (Table 13; Appendix F7–F9). Two juvenile coho salmon were, however, captured in the mainstem Takotna River between Big Waldren Fork and the confluence of Moore Creek (Index Area 9), and one fish was captured in Moore Creek (Index Area 11). Juvenile coho salmon have rarely been captured upstream of the Fourth of July Creek confluence, but in 2001 rigorous beach-seining efforts in Moore Creek (Index Area 11) yielded 86 juvenile coho salmon. In past years sampling upstream of Fourth of July Creek was limited mostly to beach seining, whereas in 2004 minnow traps and a dip net were used concurrently with beach seines. As was reported by Schwanke and Molyneaux (2002), sampling efforts should be made in the upper Takotna River basin as early as possible to investigate juvenile salmon emigration.

Juvenile Coho Salmon Size Selectivity of Gear Types

Minnow traps seemed to select for larger fish than the dip nets in Big Creek (lower), but not in Fourth of July Creek. The smaller sample size from Fourth of July Creek (n = 16 from traps and 51 from dip nets), compared to Big Creek (n = 246 from traps and 31 from dip nets), may have affected the significance of the data. In Fourth of July Creek, the mean length of trap-caught juvenile coho salmon was larger than for dip net-caught, but the difference is not significant. Similar to Chinook salmon, size selectivity in Big Creek (lower) is probably due to feeding constraints and competition. The size selectivity is probably not a result of trap site selection because juvenile coho salmon found in marginal areas of the stream are typically smaller than those found in midstream, higher velocity areas (Groot and Margolis 1991).

CONCLUSIONS

Geographic Distribution

- Relatively few juvenile salmon appear to rear in the upper Takotna River drainage, upstream of the Fourth of July Creek confluence.
- Juvenile Chinook salmon were relatively abundant in Gold Creek, suggesting future distribution surveys should incorporate sampling in small tributaries that have previously not been investigated.

Temporal Distribution

- Juvenile chum salmon were found in the Takotna River in July, much latter than had been expected.

Gear Effectiveness

- Minnow traps were the most successful method for capturing juvenile Chinook and coho salmon, but the stationary net was the most successful for capturing juvenile chum salmon.

Size Selectivity of Gear Types

- There is evidence for differences in size selectivity between gear types.

RECOMMENDATIONS

ESCAPEMENT MONITORING

- Annual operation of the Takotna River weir should continue indefinitely because this project provides the only monitoring of chum and coho salmon escapements in the upper Kuskokwim River basin, and it is the only ground-based monitoring for Chinook salmon in the upper Kuskokwim River basin. Further, salmon from Takotna River weir have consistently had the earliest run timing through the subsistence and commercial fisheries of the lower Kuskokwim River (Kalskag and Aniak) as determined through drainage-wide tagging programs. The timing of Takotna River salmon appears to apply more broadly to upper Kuskokwim River Chinook, summer chum, and coho salmon spawning populations. These early running populations are subject to intensive harvest in lower Kuskokwim River subsistence and commercial fisheries at a time when fisheries managers have the least information to assess run abundance; consequently, these early running populations are at greatest risk of management error. The Takotna River weir provides the only basis for assessing the impacts of harvest patterns and the adequacy of upper Kuskokwim River escapements.

- The Takotna River weir should continue to be operated jointly by the TTC and ADF&G. The TTC crew is fully capable at operating the weir, but TTC lacks capacity for conducting post-season data analysis and report writing. The mutually dependent partnership has created a level of dialogue and synergy that benefits both organizations, as well as the public. Formal and informal discussions that have arisen through the presence of ADF&G staff at Takotna and McGrath has created a level of public awareness about salmon management and stock status that did not previously exist. The interaction has also created a heightened level of trust between the public and ADF&G that should not be dismissed.

- As opportunity allows, crew members should consider installing the substrate railing late in the spring to take advantage of low water levels in the Takotna River, thereby hopefully avoiding the delay in operation experienced in 2003. All members of the TTC crew are resident at Takotna, making the likelihood of effective timing of an early installation highly plausible.

- Investigate the use of findings from the main river Chinook salmon radio telemetry project to estimate the numbers of Takotna River Chinook salmon spawning downstream of the weir by comparing the ratio of tagged to untagged Chinook above the weir to the number of radio tagged Chinook salmon found only downstream of the weir. If tag recovery numbers for a given year are too low, consider pooling results from multiple years.

- Sample size objectives for Chinook salmon ASL sampling should be re-evaluated for the Takotna River weir because the target sample size of three 210-fish samples typically exceeds the total annual escapement at the weir.

- Visually determine fish sex of all upstream spawners to allow comparison with ASL sex ratios, similar to what has been done at the Kogrukluk River weir.

JUVENILE SALMON INVESTIGATIONS

- Continue to survey for juvenile salmon in the upper Takotna River basin to document occurrence, especially during the spring prior to any possible downstream emigration.
- The effectiveness of beach seines, traps, stationary nets, and dip nets vary by species, so future surveys should incorporate all 4 of the methods, especially when sampling in the upper Takotna River basin.
- Considering the abundance of juvenile Chinook salmon found in Gold Creek, future surveys should give additional attention to sampling in small tributaries.
- Currently the primary objective of the juvenile salmon investigations is to document geographic distribution. If incorporation of additional objectives is desired, such as documenting relative abundance or condition factor, then a more rigorous sampling design will be required that standardizes variables such as sampling location, timing, and methodology.

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REFERENCES CITED

ADF&G (Alaska Department of Fish and Game). 2003. Alaska Subsistence Fisheries, 2002 Annual Report. Alaska Department of Fish and Game, Division of Subsistence, Juneau.

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 No. 3A04-01, Anchorage.

Anderson, E. F. 1977. Report on the cultural resources of the Doyon Region, central Alaska, volume 1. Anthropology and Historic Preservation Cooperative Park Studies Unit, University of Alaska Fairbanks, Occasional Paper No. 5. Fairbanks.

Bergstrom, D. J. and C. Whitmore. 2004. Kuskokwim River chinook and chum salmon stock status and action plan, a report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A04-02, Anchorage.

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

Brown, C. M. 1983. Alaska's Kuskokwim River region: a history. Bureau of Land Management, Anchorage.

Buklis, L. S. 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 No. 3A93-03, Anchorage.

REFERENCES CITED (Continued)

Buklis, L. S. 1999. A description of economic changes in commercial salmon fisheries in a region of mixed subsistence and market economies. Arctic. 52 (1): 40-48.

Bureau of Land Management (BLM). 1984. Mouth of Fourth of July Creek, Doyon, Limited. BLM#AA-12368. (site selection for registry as a historical place).

Burkey, C. Jr., and P. Salomone. 1999. Kuskokwim Area salmon escapement observation catalog, 1984 through 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A99-11, Anchorage.

Burkey, C. Jr., M. Coffing, D. B. Molyneaux, and P. Salomone. 2000a. Kuskokwim River Chinook salmon stock status and development of management/action plan options. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A00-40, Anchorage.

Burkey, C. Jr., M. Coffing, D. B. Molyneaux, and P. Salomone. 2000b. Kuskokwim River chum salmon stock status and development of management/action plan options. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A00-41, Anchorage.

Burkey, C. Jr., M. Coffing, J. Estensen, R. L. Fisher, and D. B. Molyneaux. 2002. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area, 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A02-53, Anchorage.

Cederholm, C. J., M. D. Kunze, T. Murota, and A. Sibatani. 1999. Pacific salmon carcasses: essential contributions of nutrients and energy for aquatic and terrestrial ecosystems. Fisheries 24: 6-15.

Clark, K. J. and D. B. Molyneaux. 2003. Takotna River salmon studies and upper Kuskokwim River aerial surveys, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A03-10, Anchorage.

Coffing, M. 1991. Kwethluk subsistence: contemporary land use patterns, wild resource harvest and use, and the subsistence economy of a lower Kuskokwim River area community. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 157, Juneau.

Coffing, M. *Unpublished* a. Kuskokwim area subsistence salmon harvest summary, 1996; prepared for the Alaska Board of Fisheries, Fairbanks, Alaska, December 2, 1997. Alaska Department of Fish and Game, Division of Subsistence, Bethel.

Coffing, M. *Unpublished* b. Kuskokwim area subsistence salmon fishery; prepared for the Alaska Board of Fisheries, Fairbanks, Alaska, December 2, 1997. Alaska Department of Fish and Game, Division of Subsistence, Bethel.

Coffing, M., L. Brown, G. Jennings, and C. Utermohle. 2000. The subsistence harvest and use of wild resources in Akiachak, Alaska, 1998. Alaska Department of Fish and Game, Division of Subsistence, Final Project Report to USFWS, Office of Subsistence Management, FIS 00-009, Juneau.

Crane, P., D. Molyneaux, S. Miller, K. Harper, and J. Wenburg. 2004. Genetic variation among coho salmon populations from the Kuskokwim River region and application to stock-specific harvest estimation. U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program, Final Report for Study 03-041, Anchorage, Alaska.

DuBois, L. and D. B. Molyneaux. 2000. Salmon age, sex and length catalog for the Kuskokwim area, 1999 Progress Report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Informational Report No. 3A00-18, Anchorage.

Gilk, S. E. and D. B. Molyneaux. 2004. Takotna river salmon studies and upper Kuskokwim River aerial surveys, 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A04-25, Anchorage.

Gilk, S. E., W. D. Templin, D. B. Molyneaux, T. Hamazaki, and J. A. Pawluk. 2005. Characteristics of fall chum salmon *Oncorhynchus keta* in the Kuskokwim River drainage. Alaska Department of Fish and Game, Fishery Data Series No. 05-56, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/fds05-56.pdf

REFERENCES CITED (Continued)

Groot, C. and L. Margolis, editors. 1991. Pacific salmon life histories. University of British Columbia Press, Vancouver, British Columbia.

Harper, K. C., and C. B. Watry. 2001. Abundance and run timing of adult salmon in the Kwethluk River, Yukon Delta National Wildlife Refuge, Alaska, 2000. U.S. Fish and Wildlife Service, Kenai Fishery Resource Office, Alaska Fisheries Data Series Number 2001-4, Kenai, Alaska.

Hilborn, R., T. P. Quinn, D. E. Schindler, and D. E. Rogers. 2003. Biocomplexity and fisheries sustainability. Proceedings of the National Academy of Sciences. 100 (11): 6564–6568.

Hosley, E. 1966. The Kolchan: Athabaskans of the Upper Kuskokwim. Manuscript. University of Alaska, Fairbanks.

Kerkvliet, C. M., T. Hamazaki, K. E. Hyer and D. Cannon. 2003. A mark–recapture experiment to estimate the abundance of Kuskokwim River sockeye, chum, and coho salmon, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A03-25, Anchorage.

Kerkvliet, C. M., J. Pawluk, T. Hamazaki, K. E. Hyer and D. Cannon. 2004. A mark–recapture experiment to estimate the abundance of Kuskokwim River sockeye, chum and coho salmon, 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A04-14, Anchorage.

Kusko Times. 1921. (no title) August 13, 1921, volume 1, No. 58.

Linderman, J. C., 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 No. 3A02-11, Anchorage.

Linderman, J. C., D. B. Molyneaux, L. DuBois, and D. J. Cannon. 2003. George River salmon studies, 1998-2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A03-17, Anchorage.

Molyneaux, D. B., L. DuBois, B. Mwarey, and J. Newton. 2000. Takotna River counting tower, project summary, 1995-1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A00-13, Anchorage.

Morrow, J. E. 1980. The Freshwater Fishes of Alaska. Alaska Northwest Publishing Company, Anchorage.

Murphy, B. R. and D. W. Willis, editors. 1996. Fisheries techniques, *second edition*. American Fisheries Society, Bethesda, Maryland.

Pawluk, J., T. Hamazaki, K. E. Hyer and D. Cannon. *In prep*. Kuskokwim River sockeye, chum, and coho salmon tagging study, 2004. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.

Roettiger, T., F. G. Harris, and K. C. Harper. 2005. Abundance and run timing of adult Pacific salmon in the Kwethluk River, Yukon Delta National Wildlife Refuge, Alaska, 2004. U.S. Fish and Wildlife Service, Kenai Fish and Wildlife Field Office. Alaska Fisheries Data Series Number 2005-7, Kenai, Alaska.

Schneiderhan, D. J. 1982a. 1981 Salmon River weir studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report Number 21, Anchorage.

Schneiderhan, D. J. 1982b. 1982 Salmon River weir studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report Number 29, Anchorage.

Schwanke, C. J., D. B. Molyneaux, L. DuBois, and C. Goods. 2001. Takotna River salmon studies and upper Kuskokwim River aerial surveys, 2000. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A01-02, Anchorage.

Schwanke, C. J., and D. B. Molyneaux. 2002. Takotna River salmon studies and upper Kuskokwim River aerial surveys, 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A02-09, Anchorage.

REFERENCES CITED (Continued)

Selkregg, L. L., editor. 1976. Alaska regional profiles, southwest region. University of Alaska, Arctic Environmental Information and Data Center, Anchorage, Alaska.

Shelden, C. A., D. J. Costello, and D. B. Molyneaux. 2005. Kogrukluk River salmon studies, 2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-58, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/fds05-58.pdf

Stewart, R. 2002. Resistance board weir panel construction manual 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A02-21, Anchorage.

Stewart, R. 2003. Techniques for installing a resistance board weir. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A03-26, Anchorage.

Stewart, R., and D. B. Molyneaux. 2005. Tatlawiksuk River salmon studies, 2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-47, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/fds05-47.pdf

Stewart, R., and D. B. Molyneaux. *In prep*. George River Salmon Studies, 2004. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.

Stokes, J. 1983. Subsistence salmon fishing in the upper Kuskokwim River system, 1981 and 1982. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 23, Juneau.

Stokes, J. 1985. Natural resource utilization of four upper Kuskokwim communities. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 86, Juneau.

Stuby, L. 2003. Inriver abundance of chinook salmon in the Kuskokwim River, 2002. Annual Report for Study 02-015, USFWS Office of Subsistence Management, Fishery Information Service Division. Alaska Department of Fish and Game, Fishery Data Series No. 03-22, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/fds03-22.pdf

Stuby, L. 2004. Inriver abundance of Chinook salmon in the Kuskokwim River, 2003. Alaska Department of Fish and Game, Fishery Data Series No. 04-30, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/fds04-30.pdf

Stuby, L. 2005. Inriver abundance of Chinook salmon in the Kuskokwim River, 2002-2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-39, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/Fds05-39.pdf

Templin, W., C. Smith, D. Molyneaux, J. Wenburg, K. Harper and L. Seeb. 2004. Genetic diversity of Chinook salmon from the Kuskokwim River. USFWS, Office of Subsistence Management, Fisheries Resource Monitoring Program, Final Report No. 01-070, Anchorage.

Ward, T. C., M. Coffing, J. L. Estensen, R. L. Fisher, and D. B. Molyneaux. 2003. Annual management report for the subsistence and commercial fisheries of the Kuskokwim Area, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A03-27, Anchorage.

Whitmore, C., M. Martz, D. G. Bue and J.C. Linderman. *In prep*. Annual management report for the subsistence and commercial fisheries of the Kuskokwim Area, 2004. Alaska Department of Fish and Game, Fisheries Management Report, Anchorage.

Zabkar, L. M., F. G. Harris, and K. C. Harper. 2005. Abundance and run timing of adult Pacific salmon in the Tuluksak River, Yukon Delta National Wildlife Refuge, Alaska, 2004. U.S. Fish and Wildlife Service, Kenai Fish and Wildlife Field Office, Alaska Fisheries Data Series Number 2005-6, Kenai, Alaska.

TABLES AND FIGURES

Table 1.–Daily, cumulative, and percent passage for Chinook, chum, and coho salmon and longnose suckers at the Takotna River weir, 2004.

	Chinook Salmon			Chum Salmon			Coho Salmon			Sockeye Salmon			Longnose Sucker		
Date	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage
23-Jun	1 [a]			3 [a]			0 [a]			0			6 [a]		
24-Jun	1	1	0	4	4	0	0	0	0	0	0	0	3	3	2
25-Jun	2	3	1	8	12	1	0	0	0	0	0	0	9	12	8
26-Jun	3	6	1	31	43	3	0	0	0	0	0	0	13	25	17
27-Jun	7	13	3	28	71	4	0	0	0	0	0	0	14	39	27
28-Jun	16	29	6	32	103	6	0	0	0	0	0	0	9	48	33
29-Jun	4	33	7	29	132	8	0	0	0	0	0	0	2	50	34
30-Jun	16	49	11	34	166	10	0	0	0	0	0	0	4	54	37
1-Jul	2	51	11	54	220	13	0	0	0	0	0	0	2	56	39
2-Jul	1	52	11	41	261	16	0	0	0	0	0	0	1	57	39
3-Jul	4	56	12	59	320	20	0	0	0	0	0	0	0	57	39
4-Jul	23	79	17	58	378	23	0	0	0	0	0	0	1	58	40
5-Jul	6	85	18	48	426	26	0	0	0	0	0	0	0	58	40
6-Jul	17	102	22	108	534	33	0	0	0	0	0	0	2	60	41
7-Jul	6	108	23	66	600	37	0	0	0	0	0	0	0	60	41
8-Jul	19	127	28	65	665	41	0	0	0	0	0	0	0	60	41
9-Jul	147	274	59	92	757	46	0	0	0	0	0	0	1	61	42
10-Jul	16	290	63	87	844	52	0	0	0	0	0	0	1	62	43
11-Jul	15	305	66	74	918	56	0	0	0	0	0	0	0	62	43
12-Jul	14	319	69	73	991	61	0	0	0	0	0	0	11	73	50
13-Jul	3	322	70	23	1014	62	0	0	0	0	0	0	1	74	51
14-Jul	16	338	73	33	1047	64	0	0	0	0	0	0	9	83	57
15-Jul	12	350	76	22	1069	66	0	0	0	0	0	0	0	83	57
16-Jul	9	359	78	31	1100	67	0	0	0	0	0	0	0	83	57
17-Jul	4	363	79	57	1157	71	0	0	0	0	0	0	0	83	57
18-Jul	9	372	81	92	1249	77	0	0	0	0	0	0	1	84	58
19-Jul	1	373	81	29	1278	78	0	0	0	0	0	0	9	93	64
20-Jul	3	376	82	36	1314	81	0	0	0	0	0	0	0	93	64
21-Jul	6	382	83	15	1329	82	0	0	0	0	0	0	0	93	64
22-Jul	2	384	83	25	1354	83	0	0	0	0	0	0	1	94	65
23-Jul	26	410	89	58	1412	87	0	0	0	0	0	0	3	97	67
24-Jul	1	411	89	33	1445	89	0	0	0	0	0	0	6	103	71
25-Jul	0	411	89	15	1460	90	0	0	0	0	0	0	0	103	71

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Table 1.–Page 2 of 3.

	Chinook Salmon			Chum Salmon			Coho Salmon			Sockeye Salmon			Longnose Sucker		
Date	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage
26-Jul	9	420	91	24	1484	91	0	0	0	0	0	0	7	110	76
27-Jul	2	422	92	13	1497	92	0	0	0	0	0	0	0	110	76
28-Jul	3	425	92	13	1510	93	0	0	0	0	0	0	0	110	76
29-Jul	2	427	93	17	1527	94	0	0	0	0	0	0	0	110	76
30-Jul	12	439	95	26	1553	95	0	0	0	0	0	0	0	110	76
31-Jul	0	439	95	17	1570	96	1	1	0	1	1	6	0	110	76
1-Aug	0	439	95	12	1582	97	1	2	0	0	1	6	1	111	77
2-Aug	1	440	95	8	1590	98	1	3	0	0	1	6	0	111	77
3-Aug	0	440	95	3	1593	98	0	3	0	0	1	6	0	111	77
4-Aug	1	441	96	5	1598	98	3	6	0	0	1	6	0	111	77
5-Aug	6	447	97	4	1602	98	4	10	0	0	1	6	6	117	81
6-Aug	2	449	97	5	1607	99	16	26	1	0	1	6	14	131	90
7-Aug	1	450	98	4	1611	99	14	40	1	0	1	6	0	131	90
8-Aug	0	450	98	2	1613	99	19	59	2	0	1	6	1	132	91
9-Aug	2	452	98	3	1616	99	24	83	3	0	1	6	0	132	91
10-Aug	1	453	98	1	1617	99	18	101	3	1	2	12	0	132	91
11-Aug	0	453	98	2	1619	99	28	129	4	0	2	12	0	132	91
12-Aug	0	453	98	4	1623	100	78	207	6	0	2	12	3	135	93
13-Aug	2	455	99	2	1625	100	20	227	7	0	2	12	2	137	94
14-Aug	0	455	99	1	1626	100	61	288	9	1	3	18	0	137	94
15-Aug	1	456	99	0	1626	100	60	348	11	0	3	18	0	137	94
16-Aug	0	456	99	0	1626	100	92	440	14	4	7	41	0	137	94
17-Aug	0	456	99	1	1627	100	182	622	19	2	9	53	1	138	95
18-Aug	1	457	99	1	1,628	100	124	746	23	0	9	53	0	138	95
19-Aug	1	458	99	1	1,629	100	56	802	25	0	9	53	0	138	95
20-Aug	1	459	100	0	1,629	100	74	876	27	1	10	59	0	138	95
21-Aug	0	459	100	0	1,629	100	57	933	29	0	10	59	0	138	95
22-Aug	0	459	100	0	1,629	100	61	994	31	1	11	65	0	138	95
23-Aug	0	459	100	0	1,629	100	88	1,082	34	0	11	65	0	138	95
24-Aug	1	460	100	0	1,629	100	57	1,139	36	0	11	65	0	138	95
25-Aug	0	460	100	0	1,629	100	137	1,276	40	1	12	71	0	138	95
26-Aug	1	461	100	0	1,629	100	572	1,848	58	2	14	82	0	138	95
27-Aug	0	461	100	0	1,629	100	73	1,921	60	0	14	82	0	138	95

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Table 1.–Page 3 of 3.

	Chinook Salmon			Chum Salmon			Coho Salmon			Sockeye Salmon			Longnose Sucker		
Date	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage	Daily	Cumul.	Percent Passage
28-Aug	0	461	100	0	1,629	100	44	1,965	61	0	14	82	0	138	95
29-Aug	0	461	100	0	1,629	100	74	2,039	64	0	14	82	0	138	95
30-Aug	0	461	100	0	1,629	100	46	2,085	65	1	15	88	0	138	95
31-Aug	0	461	100	0	1,629	100	37	2,122	66	0	15	88	0	138	95
1-Sep	0	461	100	0	1,629	100	398	2,520	79	0	15	88	0	138	95
2-Sep	0	461	100	0	1,629	100	330	2,850	89	0	15	88	0	138	95
3-Sep	0	461	100	0	1,629	100	70	2,920	91	0	15	88	0	138	95
4-Sep	0	461	100	1	1,630	100	11	2,931	91	1	16	94	1	139	96
5-Sep	0	461	100	0	1,630	100	20	2,951	92	0	16	94	4	143	99
6-Sep	0	461	100	0	1,630	100	3	2,954	92	0	16	94	0	143	99
7-Sep	0	461	100	0	1,630	100	6	2,960	92	0	16	94	0	143	99
8-Sep	0	461	100	0	1,630	100	23	2,983	93	0	16	94	0	143	99
9-Sep	0	461	100	0	1,630	100	18	3,001	94	0	16	94	0	143	99
10-Sep	0	461	100	0	1,630	100	192	3,193	100	0	16	94	0	143	99
11-Sep	0	461	100	0	1,630	100	0	3,193	100	0	16	94	0	143	99
12-Sep	0	461	100	0	1,630	100	0	3,193	100	0	16	94	0	143	99
13-Sep	0	461	100	0	1,630	100	0	3,193	100	0	16	94	0	143	99
14-Sep	0	461	100	0	1,630	100	9	3,202	100	0	16	94	2	145	100
15-Sep	0	461	100	0	1,630	100	3	3,205	100	0	16	94	0	145	100
16-Sep	0	461	100	0	1,630	100	2	3,207	100	1	17	100	0	145	100
17-Sep	0	461	100	0	1,630	100	0	3,207	100	0	17	100	0	145	100
18-Sep	0	461	100	0	1,630	100	0	3,207	100	0	17	100	0	145	100
19-Sep	0 [b]	461	100	0 [b]	1,630	100	0 [b]	3,207	100	0 [b]	17	100	[c]	145	100
20-Sep	0 [b]	461	100	0 [b]	1,630	100	0 [b]	3,207	100	0 [b]	17	100	[c]	145	100

Note: The boxes represent the median passage date and central 50% of the run.

[a] Daily passage not included in cumulative escapement; date outside of target operational period.

[b] Estimated salmon passage (whole day).

[c] No estimation for missed longnose sucker counts.

Table 2.–Age and sex composition of Chinook salmon sampled at the Takotna River weir in 2004, using escapement samples collected with a live trap.

				Age Class													
		Sample		1.1		1.2		1.3		2.2		1.4		1.5		Total	
Year	Sample Dates	Size	Sex	Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%
2004 [a]	6/29 - 7/1, 6 - 8	69	M		0.0		39.1		21.7		0.0		18.8		0.0		79.7
	15- 17, 21 - 22,		F		0.0		2.9		1.5		0.0		14.5		1.4		20.3
	28 - 29, 8/4 - 5		Subtotal		0.0		42.0		23.2		0.0		33.3		1.4	462	100.0

[a] Sampling dates do not meet criteria for estimating escapement percentages for all of the strata.

Table 3.–Mean length (mm) of Chinook salmon sampled at the Takotna River weir in 2004 using escapement samples collected with a live trap.

				Age Class					
Year	Sample Dates	Sex		1.1	1.2	1.3	2.2	1.4	1.5
2004 [a]	6/29 - 7/1, 6 - 8	M	Mean Length		577	675		768	
	15- 17, 21 - 22,		Range		454-650	618-818		613-936	
	28 - 29, 8/4 - 5		Sample Size	0	27	15	0	13	0
		F	Mean Length		622	707		857	903
			Range		602-641	707-707		744-924	903-903
			Sample Size	0	2	1	0	10	1

[a] Sampling dates do not meet criteria for estimating escapement percentages for all of the strata.

Table 4.–Age and sex composition of chum salmon at the Takotna River weir in 2004 based on escapement samples collected with a live trap.

				Age Class									
	Sample Dates	Sample		0.2		0.3		0.4		0.5		Total	
Year	(Stratum Dates)	Size	Sex	Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%
2004	6/30 - 7/3, 6 - 8	210	M	24	2.4	227	22.9	274	27.6	0	0.0	525	52.9
	(6/23 - 7/12)		F	38	3.8	251	25.2	180	18.1	0	0.0	469	47.1
			Subtotal	62	6.2	478	48.1	454	45.7	0	0.0	994	100.0
	7/15 - 17, 20 - 22	91	M	31	6.6	103	22.0	62	13.2	0	0.0	196	41.8
	(7/13 - 7/25)		F	46	9.9	150	31.8	77	16.5	0	0.0	273	58.2
			Subtotal	77	16.5	253	53.8	139	29.7	0	0.0	469	100.0
	7/27 - 29, 8/3 - 5	42	M	44	26.2	29	16.7	24	14.3	0	0.0	97	57.1
	(7/26 - 9/20)		F	53	30.9	16	9.5	4	2.4	0	0.0	73	42.9
			Subtotal	97	57.1	45	26.2	28	16.7	0	0.0	170	100.0
	Season	343	M	99	6.1	359	22.0	361	22.1	0	0.0	818	50.1
			F	137	8.4	416	25.5	261	16.0	0	0.0	815	49.9
			Total	236	14.5	775	47.5	622	38.1	0	0.0	1,633	100.0

Table 5.–Mean length (mm) of chum salmon at the Takotna River weir in 2004 based on escapement samples collected with a live trap.

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
2004	6/30 - 7/3, 6 - 8	M	Mean Length	550	558	584	
	(6/23 - 7/12)		Std. Error	9	5	4	
			Range	530- 571	485- 672	504- 694	
			Sample Size	5	48	58	0
		F	Mean Length	523	544	552	
			Std. Error	4	3	4	
			Range	506- 537	476- 606	508- 612	
			Sample Size	8	53	38	0
	7/15 - 17, 20 - 22	M	Mean Length	526	560	584	
	(7/13 - 7/25)		Std. Error	10	6	10	
			Range	502- 566	502- 604	506- 619	
			Sample Size	6	20	12	0
		F	Mean Length	506	528	541	
			Std. Error	6	6	6	
			Range	484- 536	451- 574	514- 587	
			Sample Size	9	29	15	0
	7/27 - 29, 8/3 - 5	M	Mean Length	530	550	582	
	(7/26 - 9/20)		Std. Error	6	7	15	
			Range	497- 566	532- 577	530- 626	
			Sample Size	11	7	6	0
		F	Mean Length	505	531	538	
			Std. Error	7	10	N/A	
			Range	446- 534	514- 550	538- 538	
			Sample Size	13	4	1	0
	Season	M	Mean Length	534	558	584	
			Range	497- 571	485- 672	504- 694	
			Sample Size	22	75	76	0
		F	Mean Length	510	538	548	
			Range	446- 537	451- 606	508- 612	
			Sample Size	30	86	54	0

Table 6.–Age and sex composition of coho salmon at the Takotna River weir in 2004 based on escapement samples collected with a live trap.

				Age Class							
				1.1		2.1		3.1		Total	
Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Esc.	%	Esc.	%	Esc.	%	Esc.	%
2004	8/4 - 5, 14 - 16	162	M	0	0.0	433	58.0	18	2.5	451	60.5
	(7/20 - 8/18)		F	0	0.0	295	39.5	0	0.0	295	39.5
			Subtotal	0	0.0	728	97.5	18	2.5	746	100.0
	8/22 - 24	145	M	8	0.7	782	64.1	9	0.7	799	65.5
	(8/19 - 8/29)		F	0	0.0	412	33.8	8	0.7	420	34.5
			Subtotal	8	0.7	1,194	97.9	17	1.4	1,219	100.0
	8/30 - 9/1, 5 - 7	73	M	0	0.0	630	50.7	17	1.4	647	52.1
	(9/1 - 20)		F	0	0.0	595	47.9	0	0.0	595	47.9
			Subtotal	0	0.0	1,225	98.6	17	1.4	1,242	100.0
	Season	380	M	8	0.3	1,844	57.5	44	1.4	1,896	59.1
			F	0	0.0	1,302	40.6	8	0.2	1,311	40.9
			Total	8	0.3	3,146	98.1	52	1.6	3,207	100.0

Table 7.–Mean length (mm) of coho salmon at the Takotna River weir in 2004 based on escapement samples collected with a live trap.

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
2004	8/4 - 5, 14 - 16	M	Mean Length		515	581
	(7/20 - 8/18)		Std. Error		5	9
			Range		400- 605	566- 600
			Sample Size	0	94	4
		F	Mean Length		533	
			Std. Error		4	
			Range		422- 586	
			Sample Size	0	64	0
	8/22 - 24	M	Mean Length	418	521	499
	(8/19 - 8/29)		Std. Error	N/A	4	N/A
			Range	418- 418	426- 593	499- 499
			Sample Size	1	93	1
		F	Mean Length		528	552
			Std. Error		4	N/A
			Range		415- 582	552- 552
			Sample Size	0	49	1
	8/30 - 9/1, 5 - 7	M	Mean Length		515	498
	(8/29 - 20)		Std. Error		7	N/A
			Range		412- 602	498- 498
			Sample Size	0	37	1
		F	Mean Length		531	
			Std. Error		5	
			Range		468- 592	
			Sample Size	0	35	0
	Season	M	Mean Length	418	518	533
			Range	418- 418	400- 605	498- 600
			Sample Size	1	224	6
		F	Mean Length		530	552
			Range		415- 592	552- 552
			Sample Size	0	148	1

Table 8.–Juvenile Chinook salmon data collected in the Takotna River drainage, 2004.

	Beach Seine			Dip Net			Stationary Net				Trap					
Area[e]	No. of Sets	No. of Fish	CPUE[a]	No. of Events	No. of Fish	CPUE[b]	No. of Sets	Total Soak Time (hrs)	No. of Fish	CPUE[c]	No. of Sets	Total Soak Time (hrs)	No. of Fish	CPUE[d]	Totals by Index Area	Percent by Index Area
1	3	1	0.33	0	-	-	0	-	-	-	1	25	1	0.04	2	1
2	10	12	1.20	0	-	-	0	-	-	-	17	320	0	0	12	4
3	0	-	-	1	0	0	2	4	0		23	396	7	0.02	7	2
4	0	-	-	5	22	4.40	2	15	1	0.07	28	370	24	0.06	47	15
5	5	0	0	0	-	-	0	-	-	-	12	230	0	0	0	0
6	0	-	-	0	-	-	0	-	-	-	6	138	0	0	0	0
7	0	-	-	0	-	-	0	-	-	-	0	-	-	-	0	-
8	0	-	-	0	-	-	0	-	-	-	0	-	-	-	0	-
9	32	5	0.16	1	0	0	0	-	-	-	62	1,085	2	0.00	7	2
10	0	-	-	0	-	-	0	-	-	-	12	216	0	0	0	0
11	0	-	-	0	-	-	0	-	-	-	8	144	0	0	0	0
12	0	-	-	0	-	-	0	-	-	-	0	-	-	-	0	-
13	6	0	0	0	-	-	0	-	-	-	0	-	-	-	0	0
14	0	-	-	0	-	-	0	-	-	-	28	447	230	0.51	230	75
Totals	56	18	0.32	7	22	3.14	4	19	1	0.05	197	3,371	264	0.08	305	100

Note : A dash (-) is used to indicate that the number of fish and CPUE could not be calculated because no sampling was conducted in that Index Area.

[a] CPUE is defined as the number of salmon captured per seine attempt.

[b] CPUE is defined as the number of salmon captured per netting attempt.

[c] CPUE is defined as the number of salmon captured per net-hour.

[d] CPUE is defined as the number of salmon captured per trap-hour.

[e] Area

1 below weir
2 above weir to Fourth of July Creek
3 Big Creek (lower)
4 Fourth of July Creek
5 Fourth of July Creek to Big Waldren Fork
6 Bonnie Creek
7 Minnie Creek
8 Big Waldren Fork
9 Big Waldren Fork to Moore Creek/Little Waldren Confluence
10 Little Waldren Fork
11 Moore Creek
12 Big Creek (upper)
13 Tatalina Creek
14 Gold Creek

Table 9.–Mean lengths of juvenile Chinook salmon caught in Fourth of July Creek using a dip net compared to those caught using minnow traps in August 2004.

Gear Type	Sample Size	Mean Length (mm)	SD	Range (mm)
Dip Net	22	69.6	10.0	54 - 84
Trap	24	77.8	10.3	62 - 99

Note: The mean length of the fish caught in minnow traps was significantly different from the mean length of the fish caught with dip nets ($P < 0.01$).

Table 10.–Mean lengths of trap-caught juvenile Chinook salmon caught in Fourth of July Creek, Big Creek (lower), and Gold Creek, August 2004.

Tributary	Sample Size	Mean Length (mm)	SD	Range (mm)
Gold Creek	146	73.3	7.0	50 - 93
Big Creek	7	74.6	14.3	51 - 92
Fourth of July Creek	24	77.8	10.3	62 - 99

Note: The mean length of the fish caught in Fourth of July Creek was significantly different from the mean length of the fish caught in Gold Creek ($P = 0.05$).

Table 11.–Mean lengths of trap-caught juvenile Chinook salmon caught in Gold Creek in August, October, November, and December, 2004.

Month	Sample Size	Mean Length (mm)	SD	Range (mm)
August	146	73.3	7.0	50 - 93
October	39	79.5	5.6	69 - 91
November	23	83.6	5.4	73 - 95
December	22	79.8	7.5	58 - 90

Note: The mean length of the fish caught in August was significantly different from the mean length of the fish caught in October, November, and December ($P < 0.001$).

Table 12.–Juvenile chum salmon data collected in the Takotna River drainage, 2004.

	Beach Seine			Dip Net			Stationary Net				Trap					
Area[e]	No. of Sets	No. of Fish	CPUE[a]	No. of Events	No. of Fish	CPUE[b]	No. of Sets	Total Soak Time (hrs)	No. of Fish	CPUE[c]	No. of Sets	Total Soak Time (hrs)	No. of Fish	CPUE[d]	Totals by Index Area	Percent by Index Area
1	3	0	0	0	-	-	0	-	-	-	0	-	-	-	0	0
2	10	0	0	0	-	-	0	-	-	-	17	320	0	0	0	0
3	0	-	-	1	0	0	2	4	0	0	23	396	0	0	0	0
4	0	-	-	5	7	1.40	2	15	102	6.80	28	370	0	0	109	97
5	5	0	0	0	-	-	0	-	-	-	12	230	0	0	0	0
6	0	-	-	0	-	-	0	-	-	-	6	138	0	0	0	0
7	0	-	-	0	-	-	0	-	-	-	0	-	-	-	0	-
8	0	-	-	0	-	-	0	-	-	-	0	-	-	-	0	-
9	32	3	0.09	1	0	0	0	-	-	-	62	1,085	0	0	3	3
10	0	-	-	0	-	-	0	-	-	-	12	216	0	0	0	0
11	0	-	-	0	-	-	0	-	-	-	8	144	0	0	0	0
12	0	-	-	0	-	-	0	-	-	-	0	-	-	-	0	-
13	6	0	0	0	-	-	0	-	-	-	0	-	-	-	0	0
14	0	-	-	0	-	-	0	-	-	-	28	447	0	0	0	0
Totals	56	3	0	7	7	1.00	4	19	102	5.37	196	3,346	0	0	112	100

Note : A dash (-) is used to indicate that the number of fish and CPUE could not be calculated because no sampling was conducted in that Index Area.

[a] CPUE is defined as the number of salmon captured per seine attempt.

[b] CPUE is defined as the number of salmon captured per netting event.

[c] CPUE is defined as the number of salmon captured per net-hour.

[d] CPUE is defined as the number of salmon captured per trap-hour.

[e] Area

1	below weir
2	above weir to Fourth of July Creek
3	Big Creek (lower)
4	Fourth of July Creek
5	Fourth of July Creek to Big Waldren Fork
6	Bonnie Creek
7	Minnie Creek
8	Big Waldren Fork
9	Big Waldren Fork to Moore Creek/Little Waldren Confluence
10	Little Waldren Fork
11	Moore Creek
12	Big Creek (upper)
13	Tatalina Creek
14	Gold Creek

Table 13.–Juvenile coho salmon data collected in the Takotna River drainage, 2004.

	Beach Seine			Dip Net			Stationary Net				Trap					
Area[e]	No. of Sets	No. of Fish	CPUE[a]	No. of Events	No. of Fish	CPUE[b]	No. of Sets	Total Soak Time (hrs)	No. of Fish	CPUE[c]	No. of Sets	Total Soak Time (hrs)	No. of Fish	CPUE[d]	Totals by Index Area	Percent by Index Area
1	3	59	19.67	0	-	-	0	-	-	-	1	25	7	0.28	66	14
2	10	39	3.90	0	-	-	0	-	-	-	17	320	0	0	39	8
3	0	-	-	1	31	31.00	2	4	0	0	23	396	246	0.62	277	60
4	0	-	-	5	51	10.20	2	15	0	0	28	370	16	0.04	67	14
5	5	0	0	0	-	-	0	-	-	-	12	230	0	0	0	0
6	0	-	-	0	-	-	0	-	-	-	6	138	0	0	0	0
7	0	-	-	0	-	-	0	-	-	-	0	-	-	-	0	-
8	0	-	-	0	-	-	0	-	-	-	0	-	-	-	0	-
9	32	2	0.06	1	0	0	0	-	-	-	62	1,085	0	0	2	0
10	0	-	-	0	-	-	0	-	-	-	12	216	0	0	0	0
11	0	-	-	0	-	-	0	-	-	-	8	144	1	0.01	1	0
12	0	-	-	0	-	-	0	-	-	-	0	-	-	-	0	-
13	6	0	0	0	-	-	0	-	-	-	0	-	-	-	0	0
14	0	-	-	0	-	-	0	-	-	-	28	447	12	0.03	12	3
Totals	56	100	1.79	7	82	11.71	4	19	0	0	197	3,371	282	0.08	464	100

Note : A dash (-) is used to indicate that the number of fish and CPUE could not be calculated because no sampling was conducted in that Index Area.

[a] CPUE is defined as the number of salmon captured per seine attempt.

[b] CPUE is defined as the number of salmon captured per netting event.

[c] CPUE is defined as the number of salmon captured per net-hour.

[d] CPUE is defined as the number of salmon captured per trap-hour.

[e] Area

1 below weir
2 above weir to Fourth of July Creek
3 Big Creek (lower)
4 Fourth of July Creek
5 Fourth of July Creek to Big Waldren Fork
6 Bonnie Creek
7 Minnie Creek
8 Big Waldren Fork
9 Big Waldren Fork to Moore Creek/Little Waldren Confluence
10 Little Waldren Fork
11 Moore Creek
12 Big Creek (upper)
13 Tatalina Creek
14 Gold Creek

Table 14.–Mean lengths of juvenile coho salmon caught in Big Creek (lower) using minnow traps compared to those caught using a dip net in August 2004.

Gear Type	Sample Size	Mean Length (mm)	SD	Range (mm)
Dip Nets	31	41.8	5.9	32 - 53
Traps	238	60.0	16.6	33 - 137

Note: The mean length of the fish caught in minnow traps was significantly different from the mean length of the fish caught with dip nets ($P < 0.001$).

Table 15.–Mean lengths of juvenile coho salmon caught in Fourth of July Creek using minnow traps compared to those caught using a dip net in August 2004.

Gear Type	Sample Size	Mean Length (mm)	SD	Range (mm)
Dip Nets	49	57.2	12.2	42 - 109
Traps	14	64.1	13.7	44 - 105

Note: The difference in mean lengths is not significant.

Table 16.–Mean lengths of juvenile coho salmon caught in Big Creek (lower) and Fourth of July Creek using minnow traps in August 2004.

Location	Sample Size	Mean Length (mm)	SD	Range (mm)
Big Creek, lower	238	60.0	16.6	33 - 137
Fourth of July Creek	14	64.1	13.7	44 - 105

Note: The difference in mean lengths is not significant.

Table 17.–Mean lengths of juvenile coho salmon caught in Big Creek (lower) and Fourth of July Creek using dip nets in August 2004.

Location	Sample Size	Mean Length (mm)	SD	Range (mm)
Big Creek, lower	31	41.8	5.9	32 - 53
Fourth of July Creek	49	57.2	12.2	42 - 109

Note: The mean length of the fish caught in Fourth of July Creek was significantly different from the mean length of the fish caught in Big Creek (lower; $P < 0.001$).

Table 18.–Mean lengths of juvenile coho salmon caught in Takotna River Index Areas 1 and 2 using a beach seine in June through September 2004.

Month	Sample Size	Mean Length (mm)	SD	Range (mm)
June	47	31.5	3.4	20 - 40
July	7	55.1	10.0	42 - 64
August	12	63.0	6.8	50 - 72
September	32	49.5	10.5	37 - 88

Note: The mean length of the fish caught in June was significantly different from the mean length of the fish caught in July, August, and September, but the mean length of the fish caught in July and September were not significantly different ($P < 0.001$).

Table 19.–Mean lengths of juvenile coho salmon caught using minnow traps in Big Creek (lower) in June and August 2004.

Month	Sample Size	Mean Length (mm)	SD	Range (mm)
June	8	73.3	6.6	65 - 82
August	238	57.0	16.6	33 - 137

Note: The mean length of the fish caught in August was significantly different from the mean length of the fish caught in June ($P < 0.001$).

Figure 1.–Kuskokwim Area salmon management districts and escapement monitoring projects.

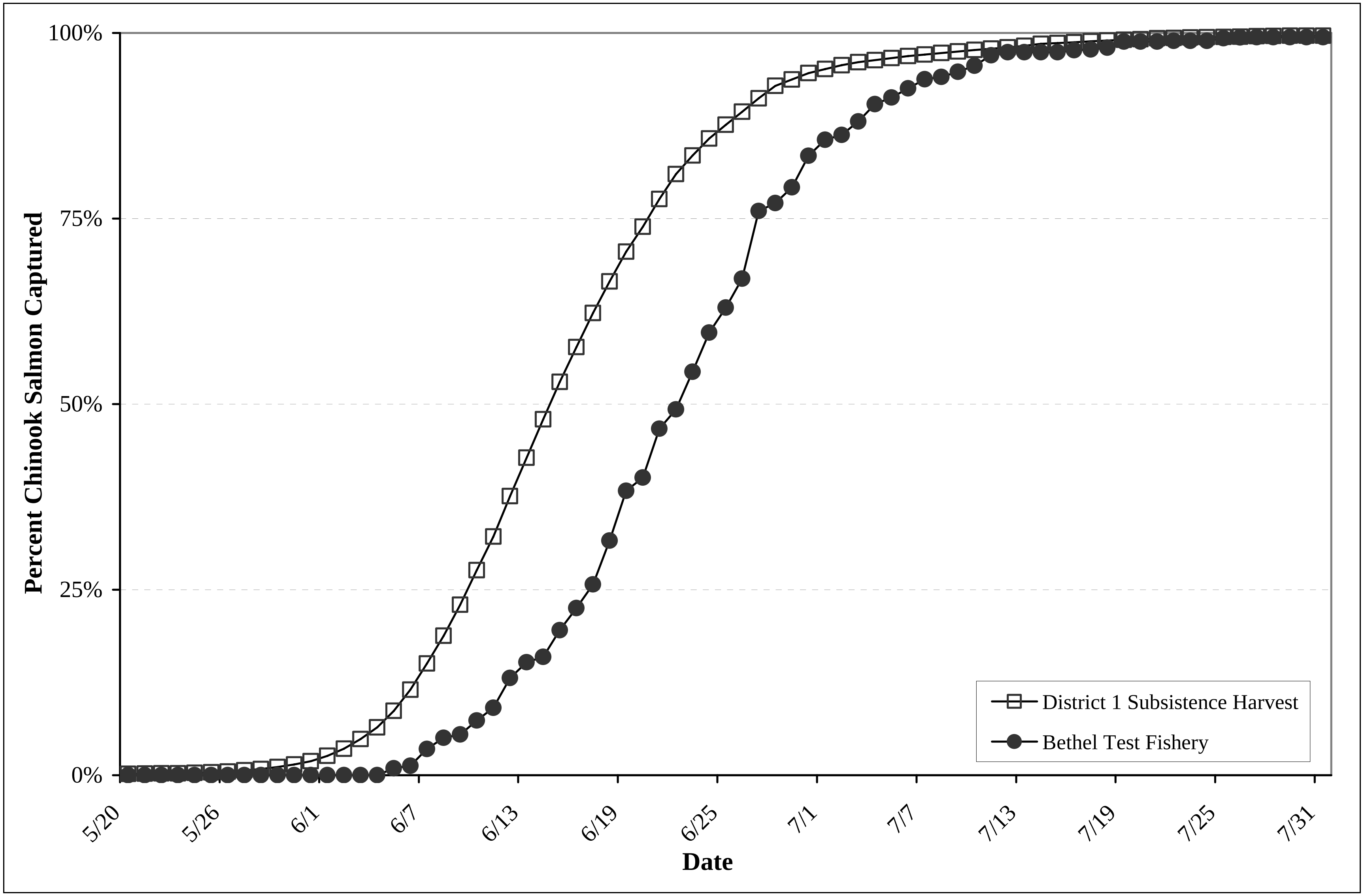


Figure 2.–Average timing of the subsistence Chinook salmon harvest in District 1 compared with the average run timing observed in the Bethel Test fishery, 1984 through 1999.

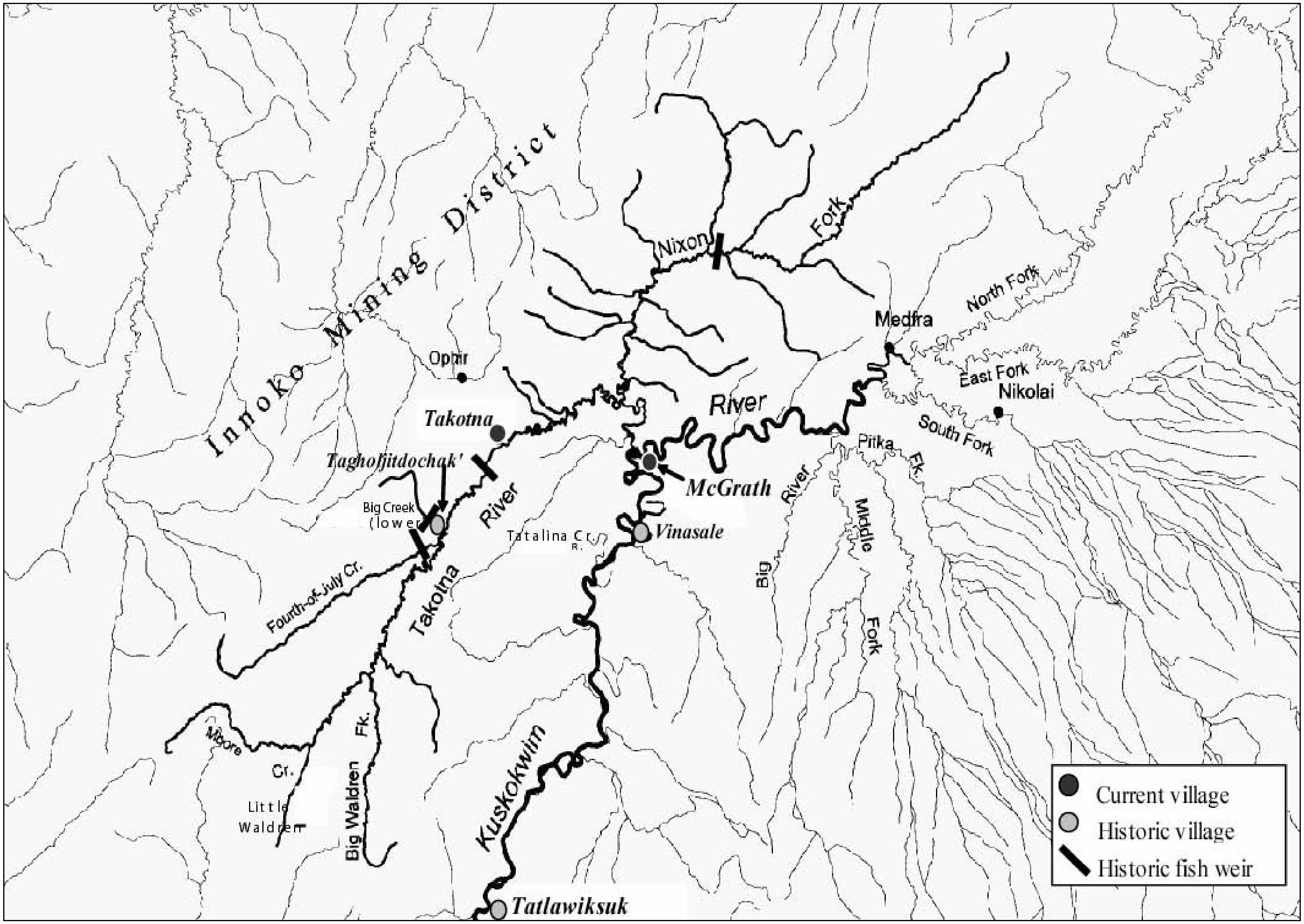


Figure 3.–Takotna River drainage and location of historic native communities and fish weirs.

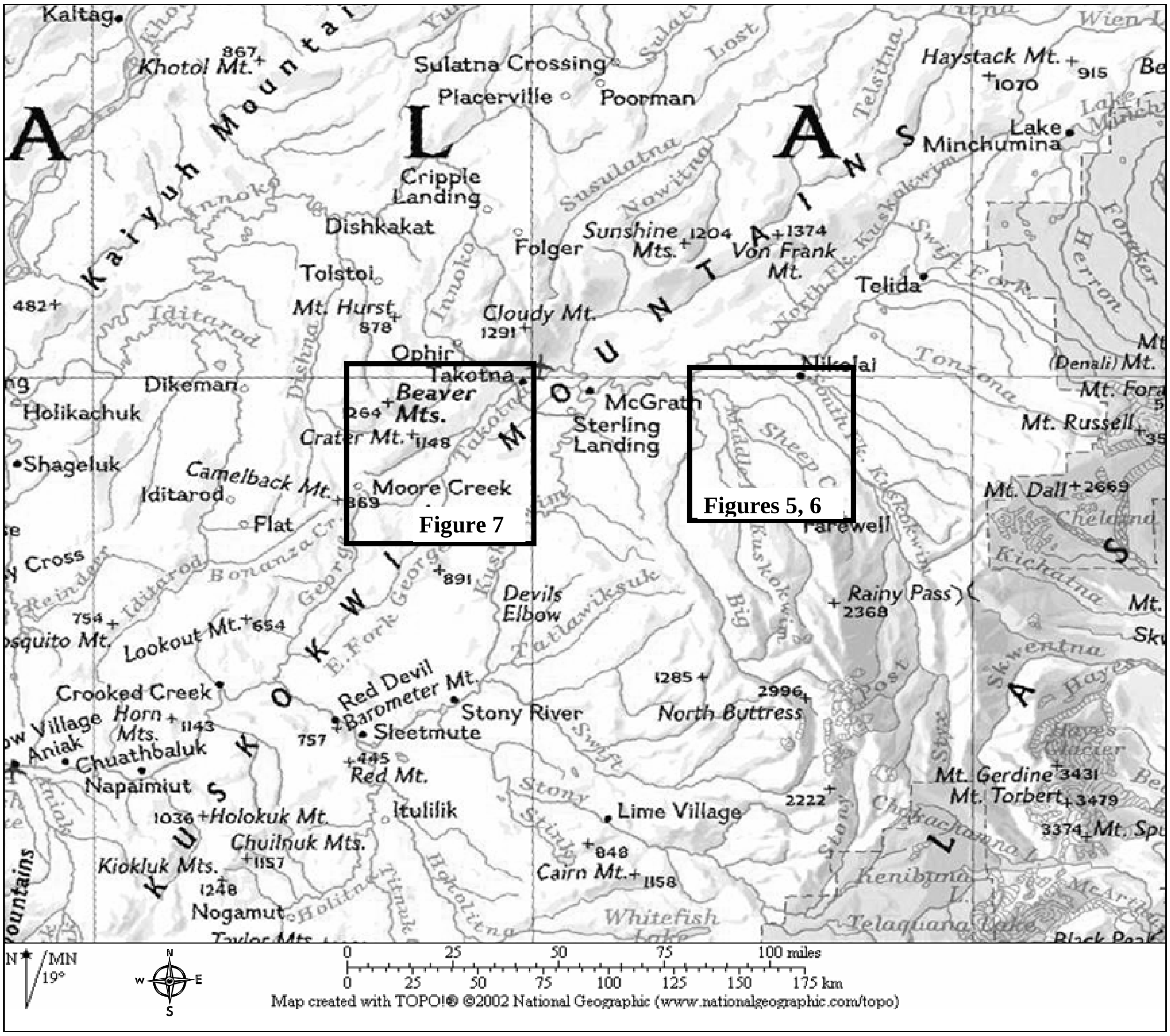


Figure 4.–Reference map of the upper Kuskokwim River for Figures 5 through 7.

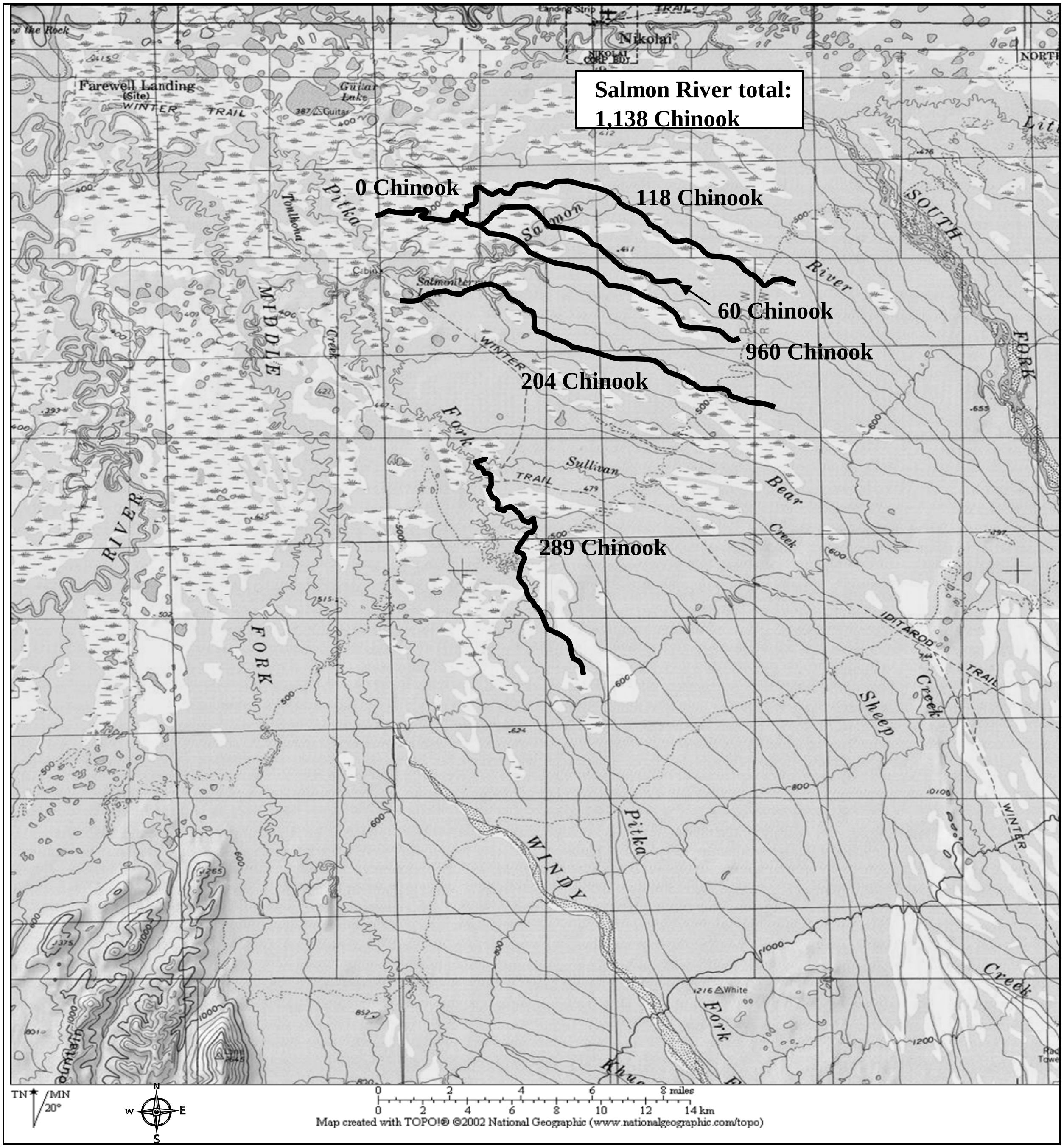


Figure 5.–Aerial stream surveys conducted in the Pitka Fork drainage, July 2004.

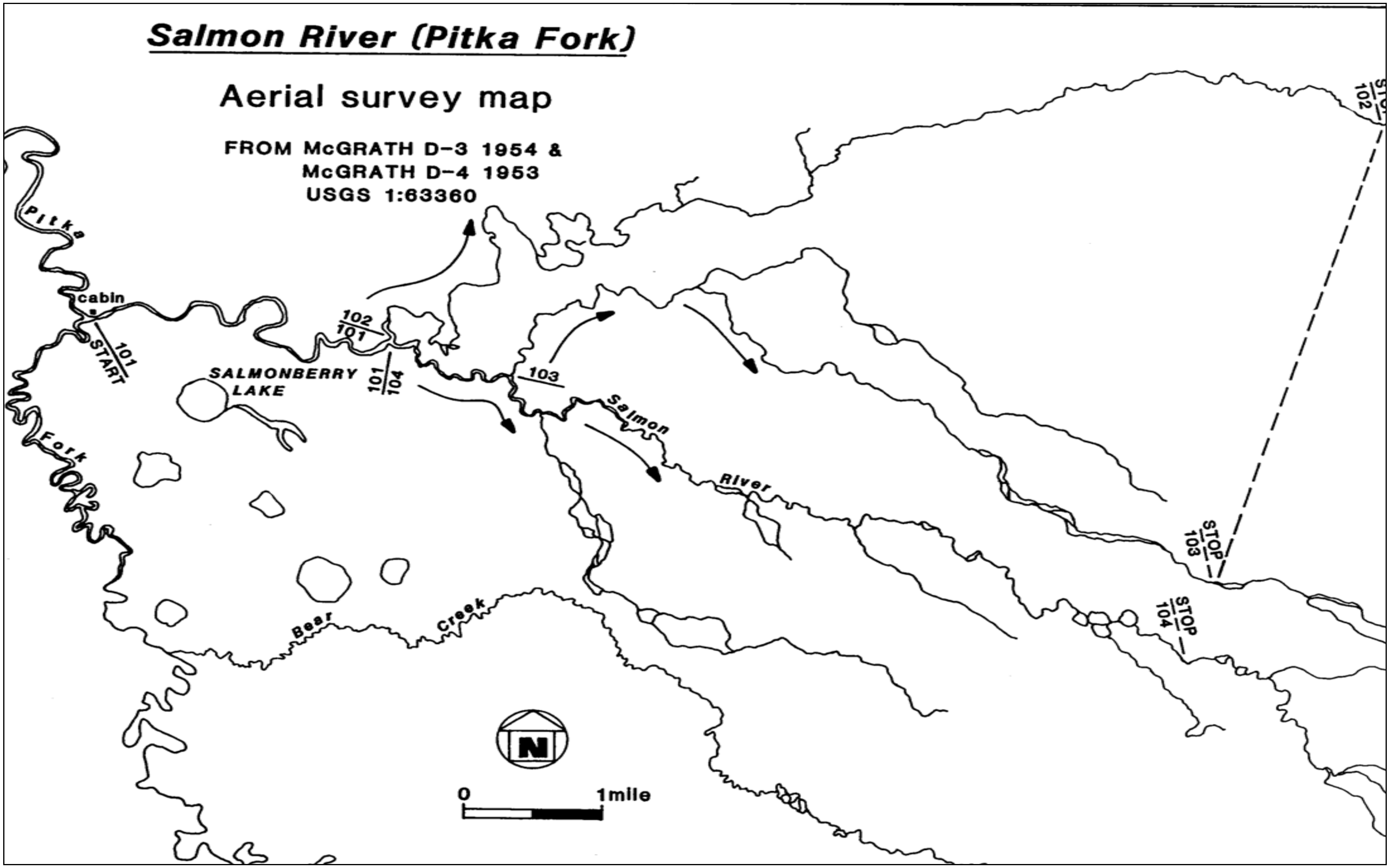


Figure 6.–Salmon River Index Areas used for aerial stream surveys.

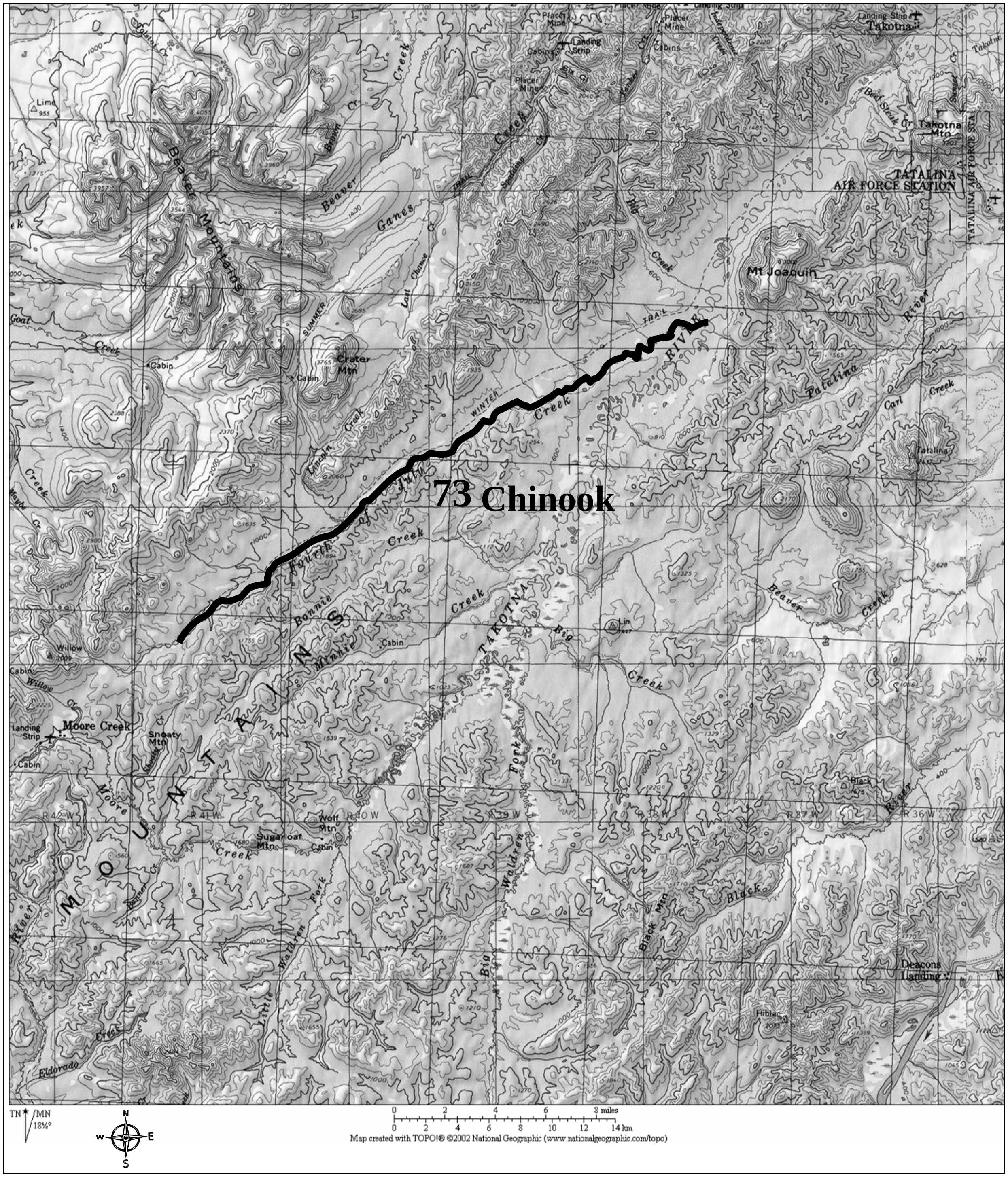


Figure 7.–Aerial steam surveys conducted in the Takotna River drainage, July 2004.

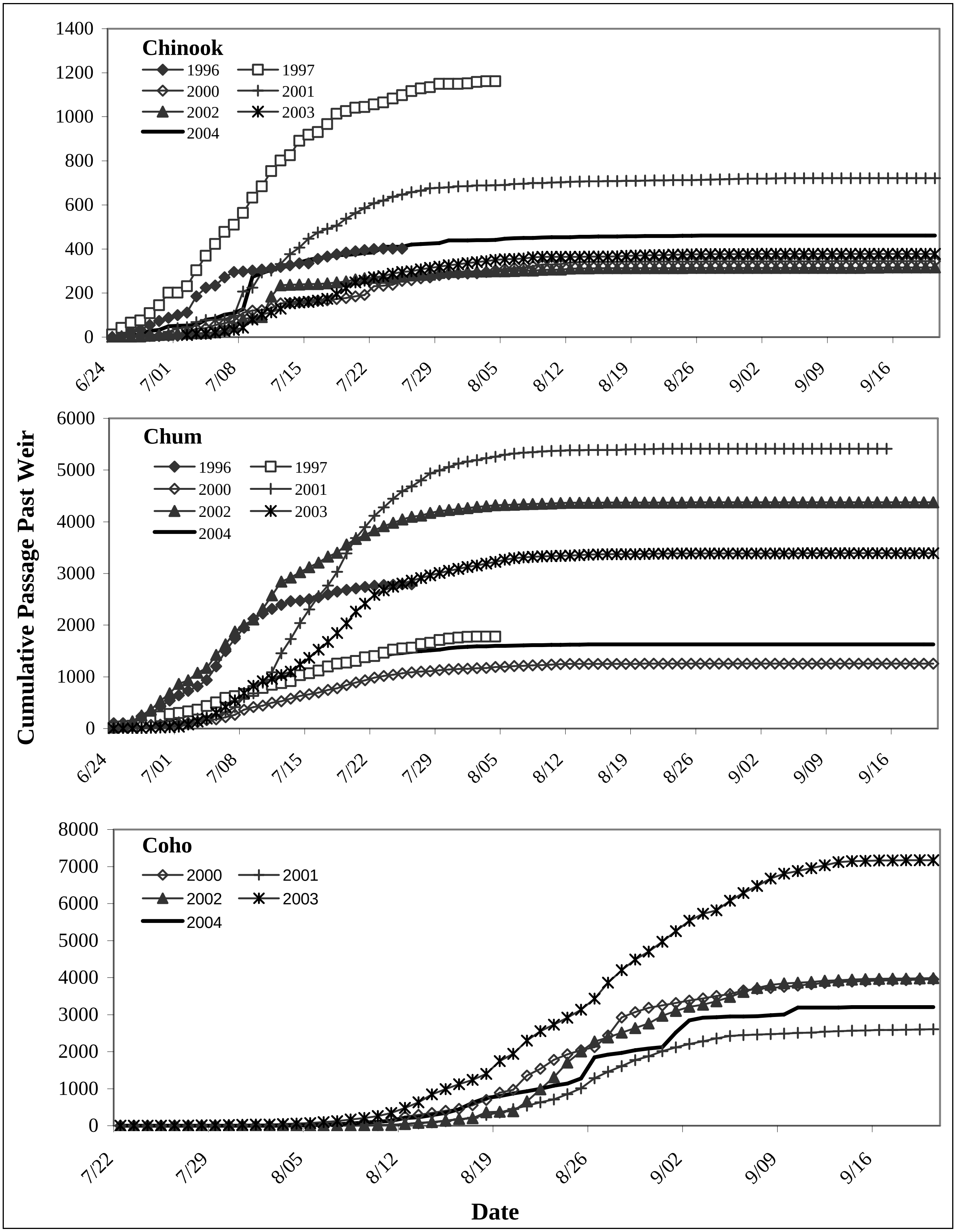
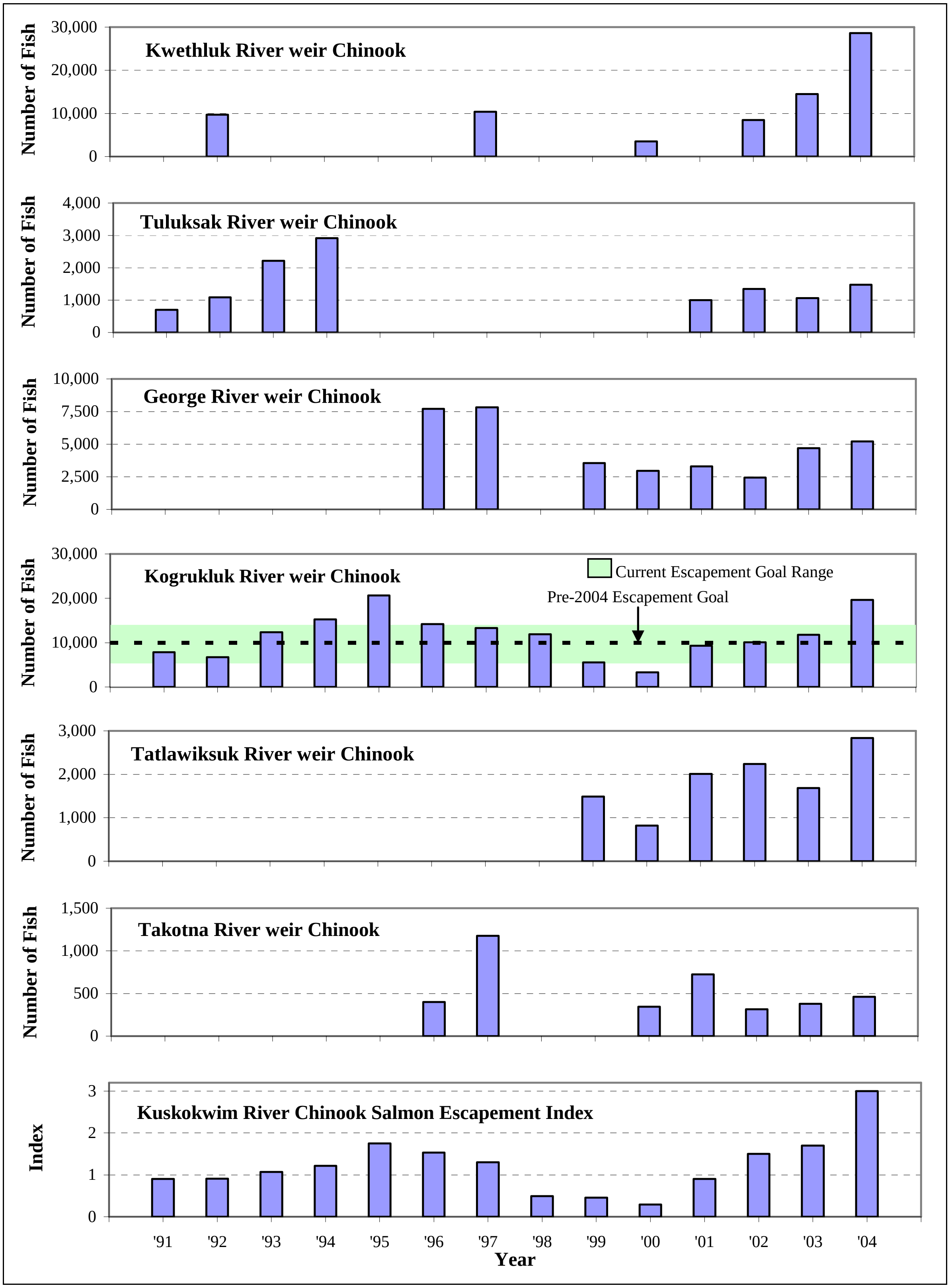
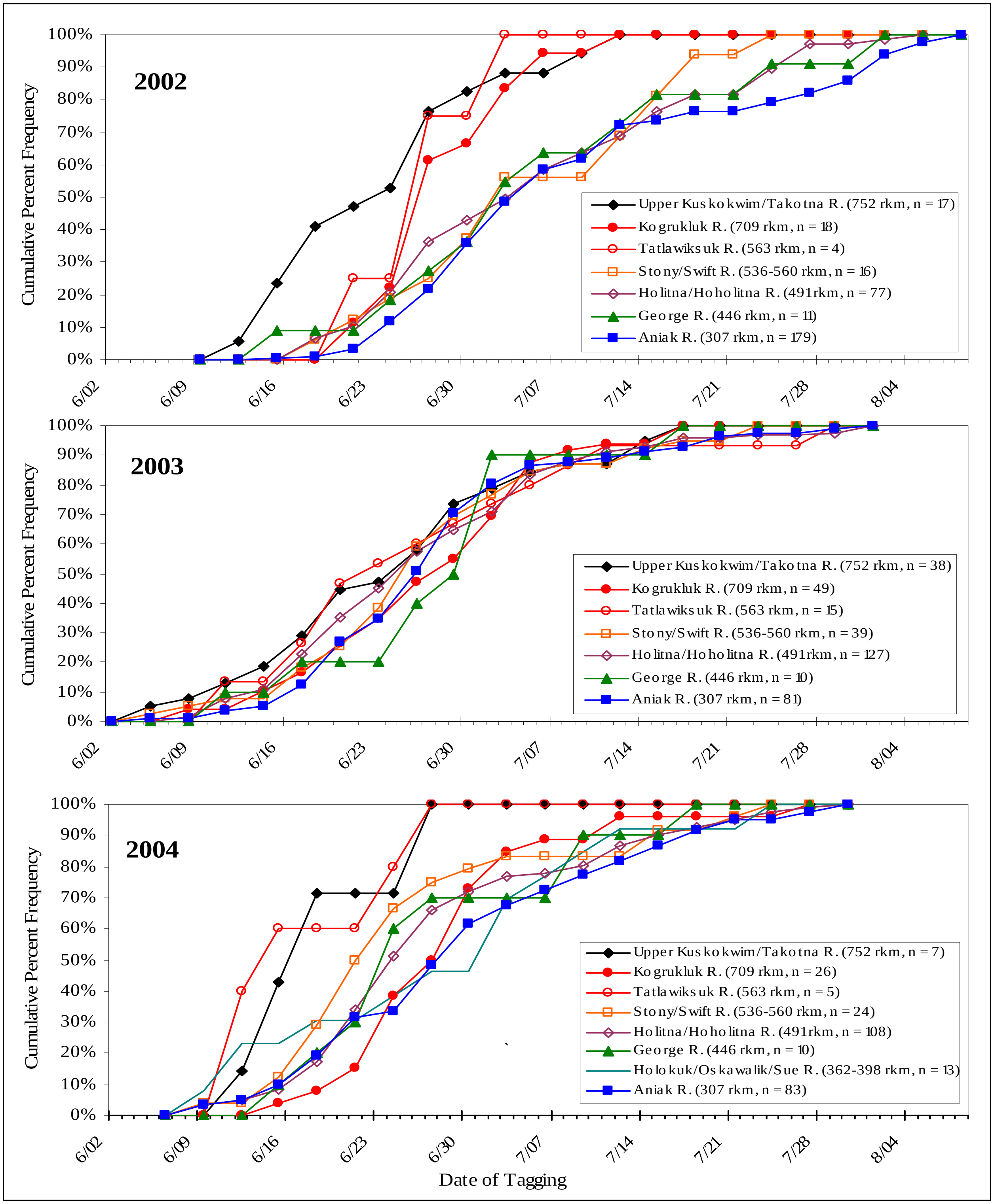


Figure 8.–Historic cumulative passage of Chinook, chum, and coho salmon past the Takotna River tower (1996 and 1997) and weir (2000 to 2004).



Source: Whitmore et al. *In prep*.

Figure 9.–Chinook salmon escapement into 6 Kuskokwim River tributaries, and Kuskokwim River Chinook salmon aerial survey indices, 1991 to 2004.



Note: Data for this analysis were collected as part of *Kuskokwim River Chinook Salmon Stock Assessment Project* (Stuby 2003, 2004, 2005). Sample size is in parentheses.

Figure 10.–Preliminary cumulative percent frequency of Chinook salmon of known final destination with respective dates of initial radio tagging in 2002, 2003, and 2004.

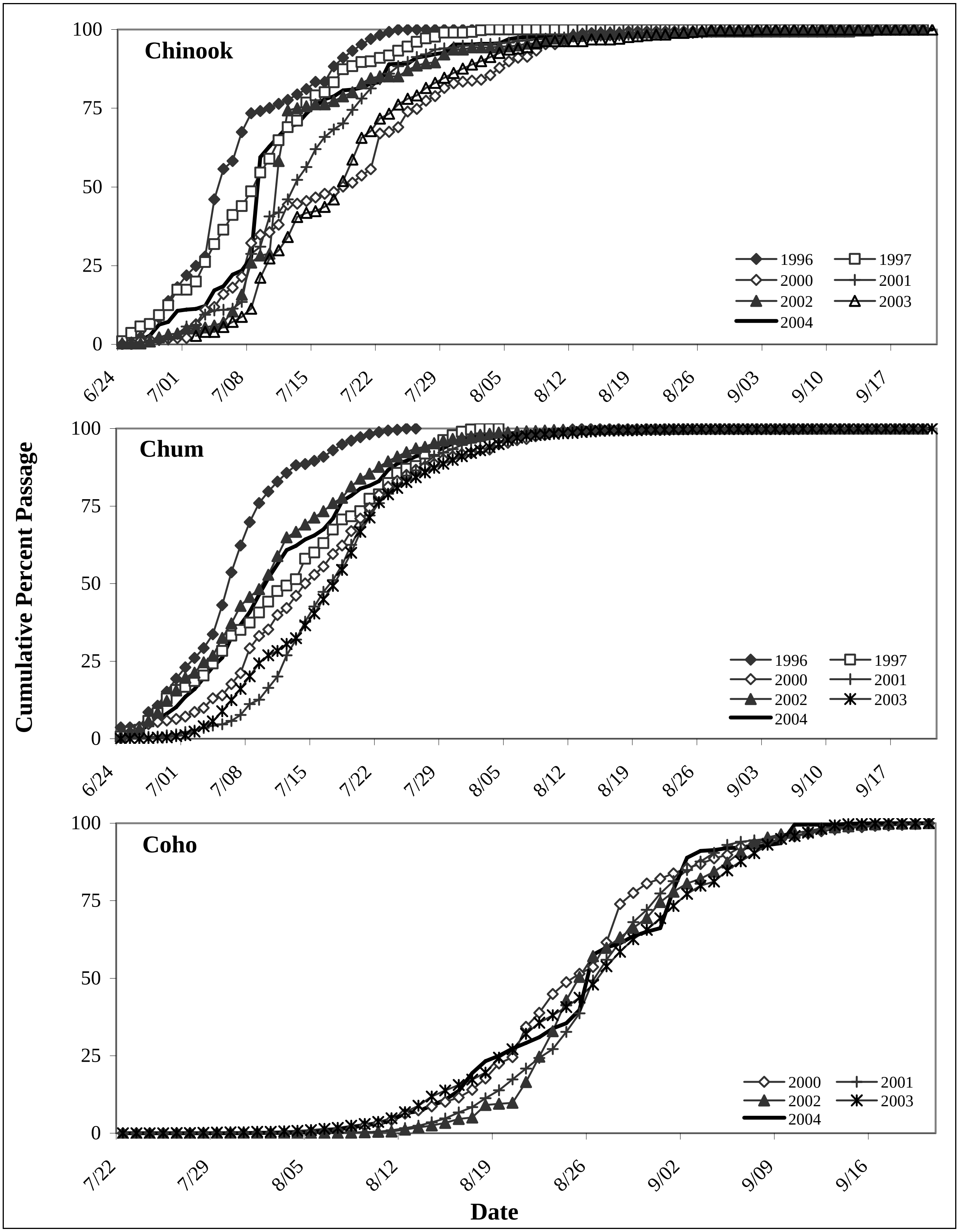


Figure 11.–Historic cumulative percent passage of Chinook, chum, and coho salmon past the Takotna River tower (1996 and 1997) and weir (2000 to 2004).

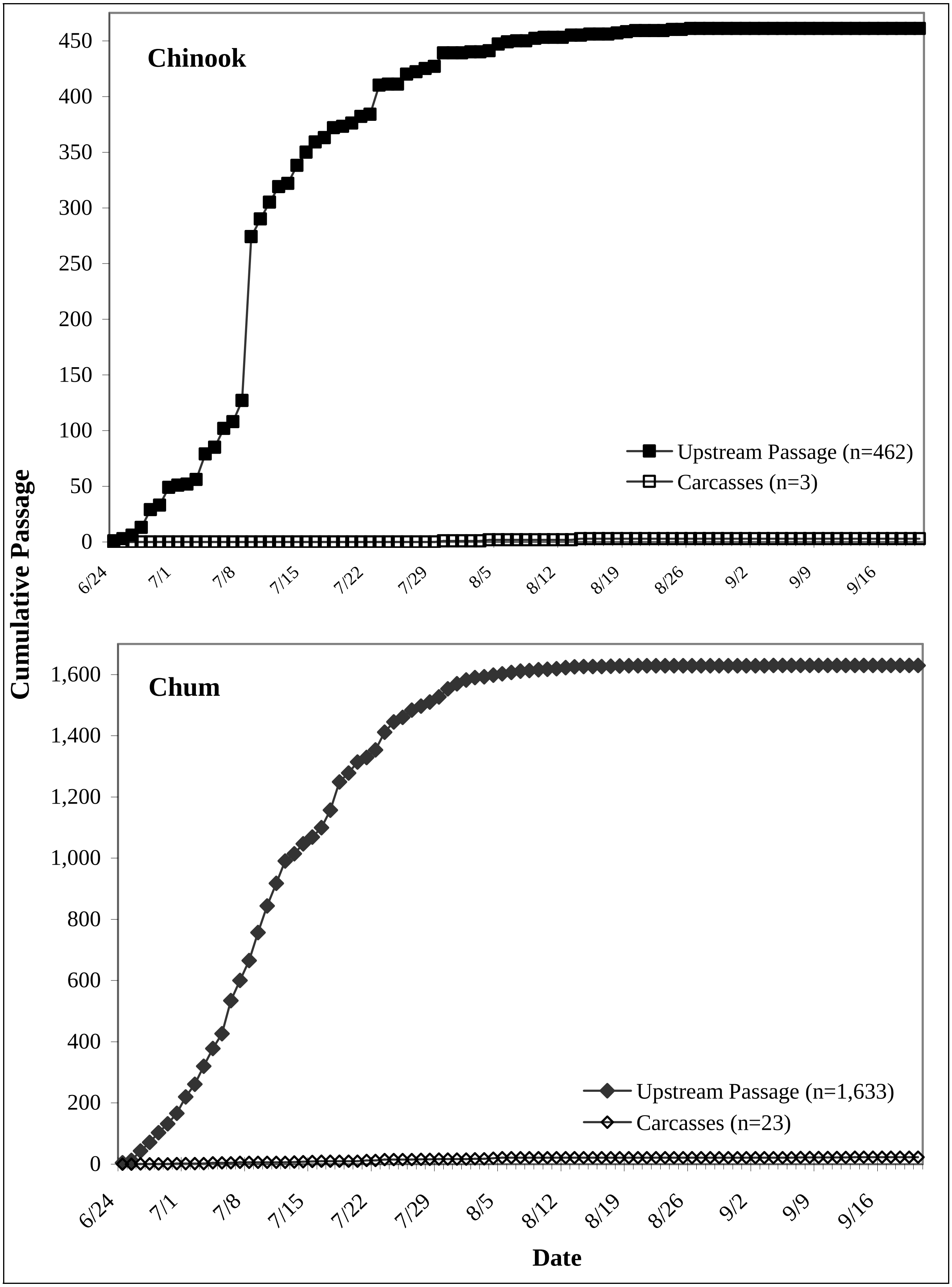
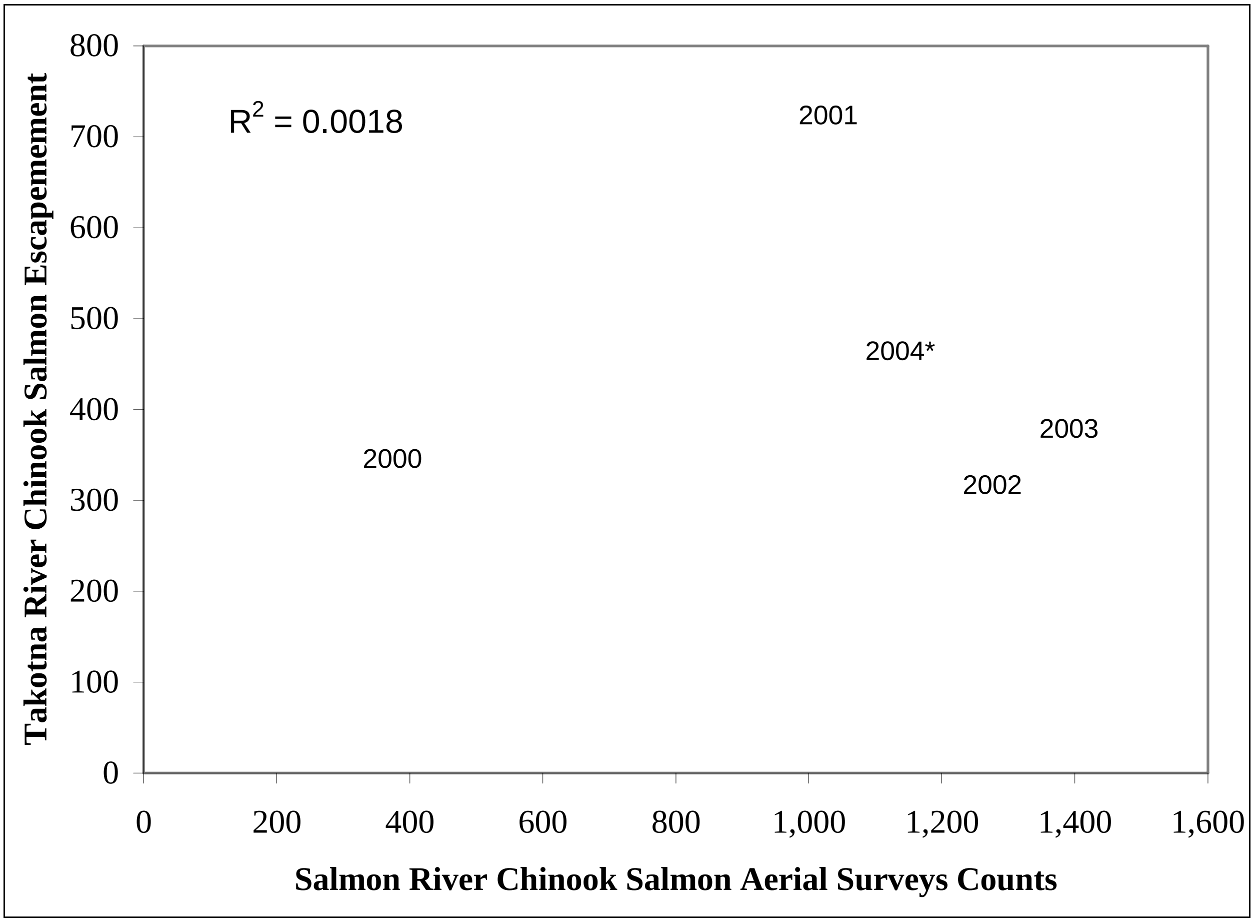
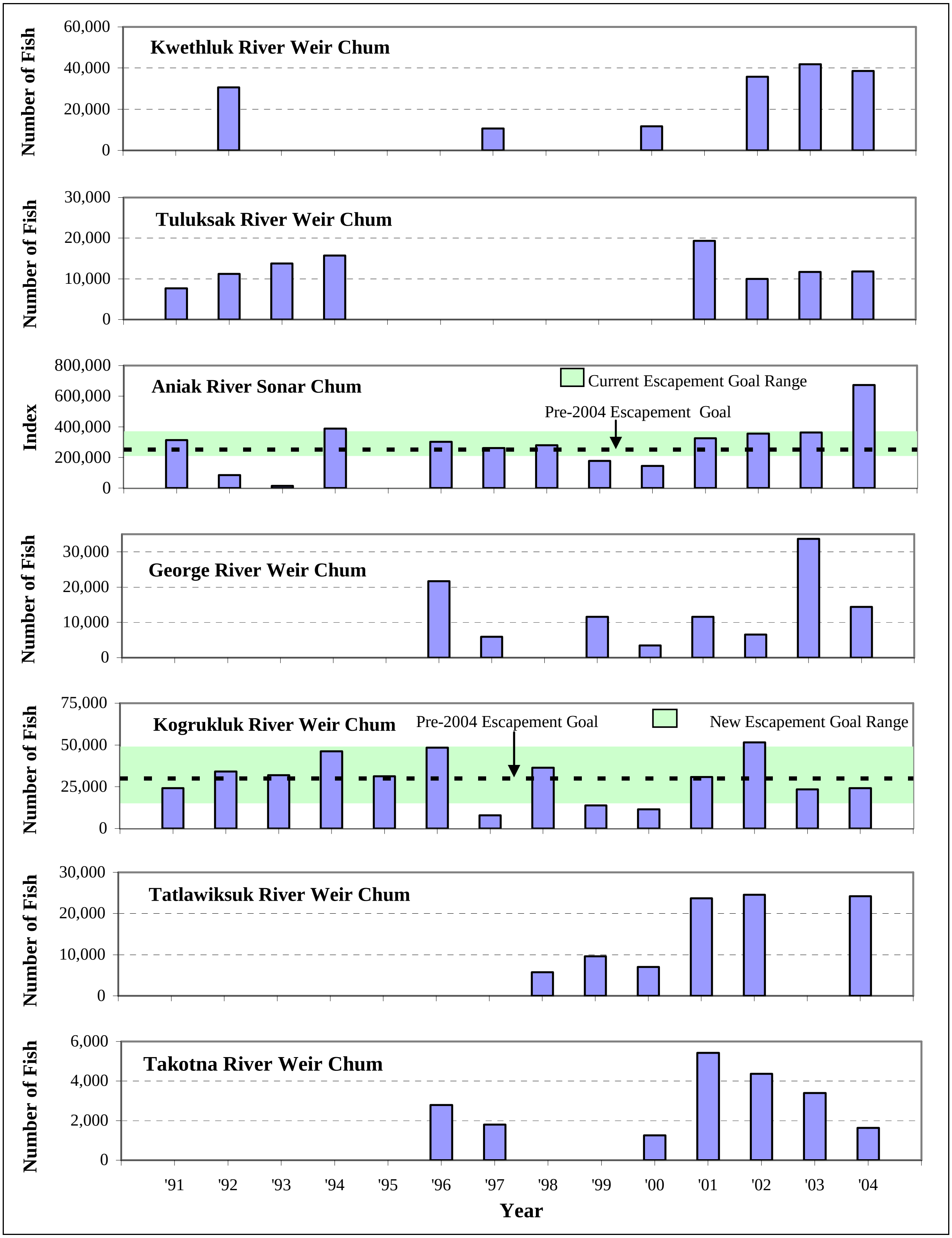


Figure 12.–Comparison of cumulative upstream salmon passage and downstream carcass passage by species at the Takotna River weir, 2004.



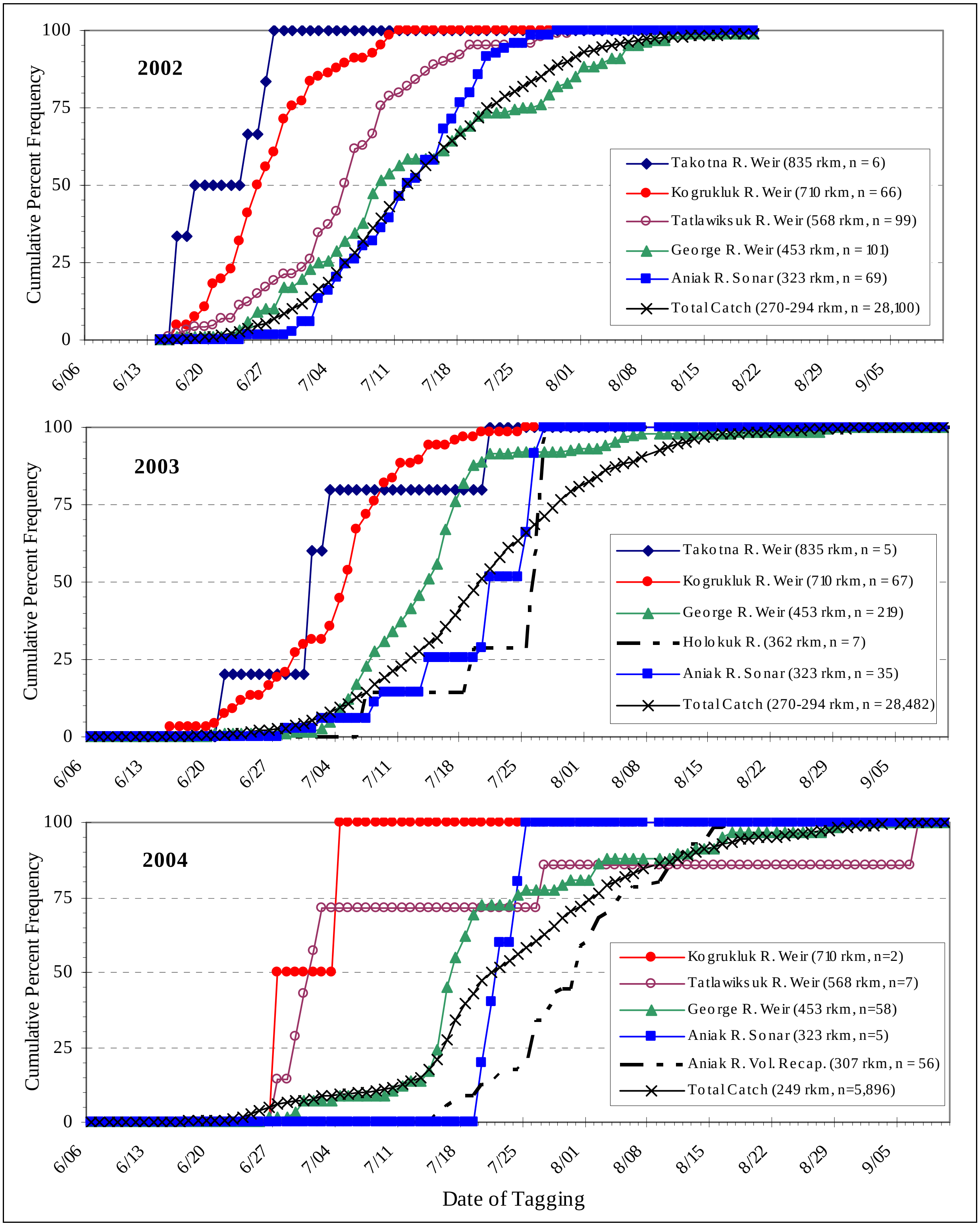
Note: An asterisk (*) denotes an incomplete survey.

Figure 13.–Comparison of Salmon River aerial survey counts and Takotna River escapement counts for Chinook salmon, 2000 through 2004.



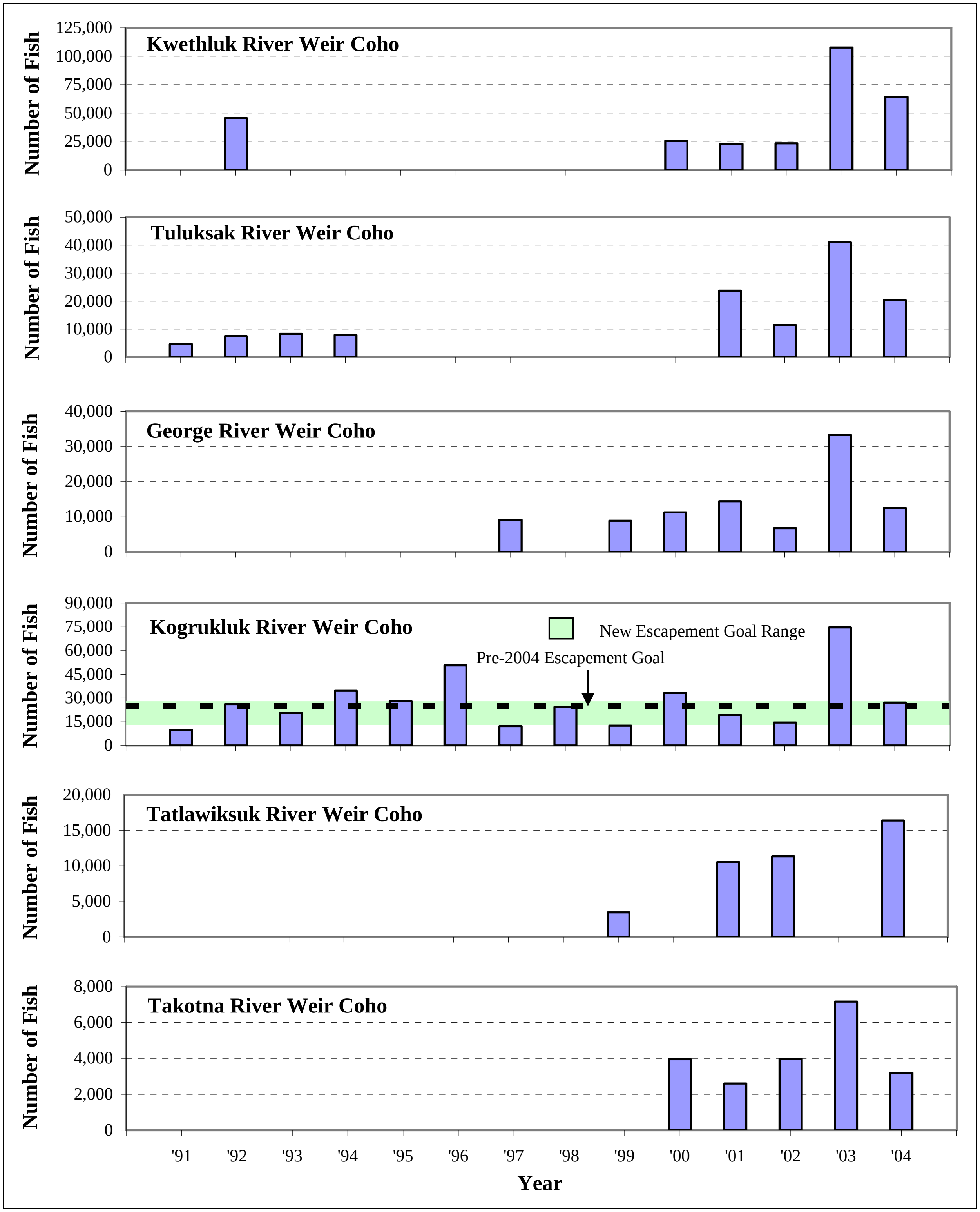
Source: Whitmore et al. *In prep*.

Figure 14.–Chum salmon escapement into 7 Kuskokwim River tributaries, 1991 through 2004.



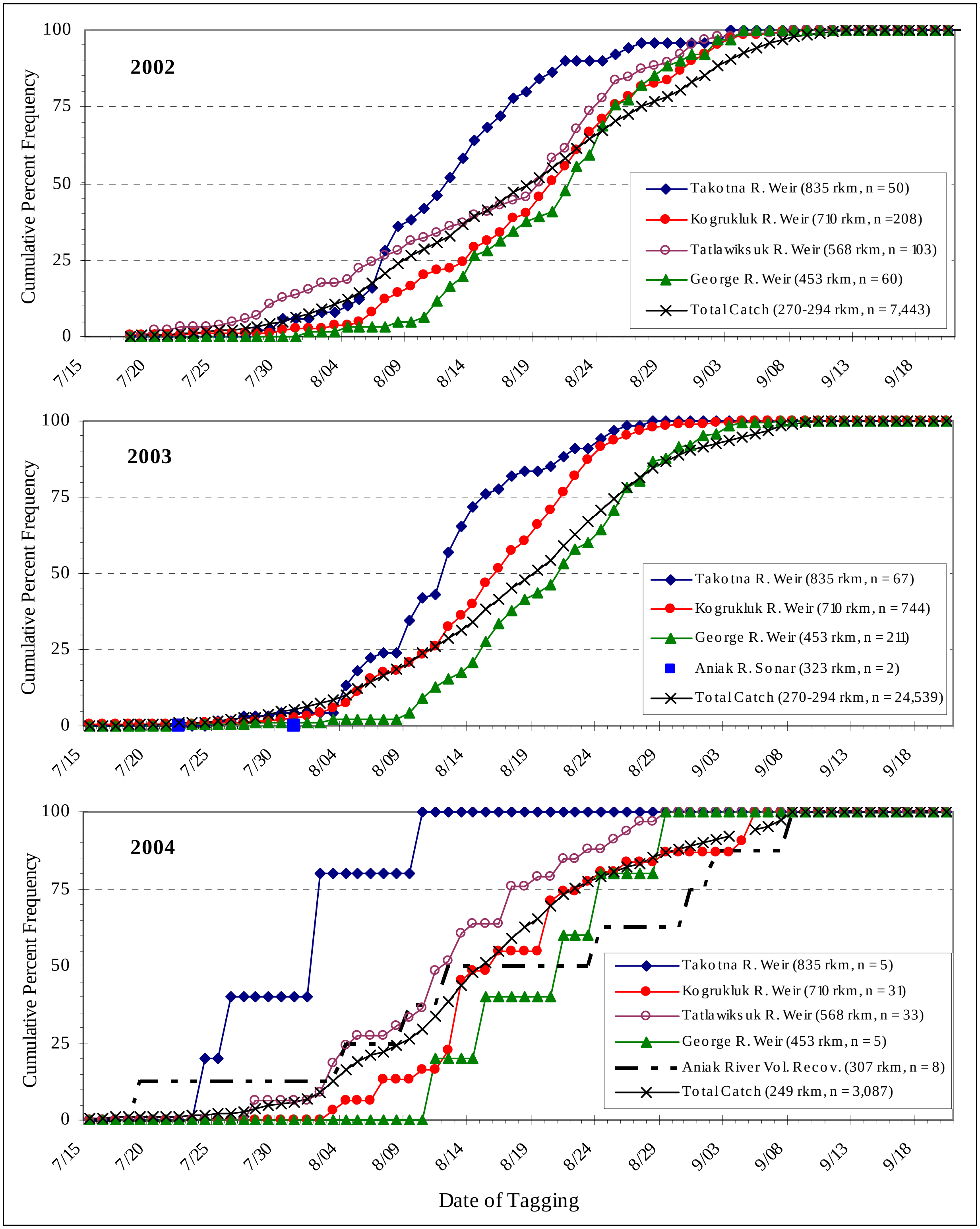
Source: Kerkvliet et al. 2003; 2004; Pawluk et al. *In prep*. *Note*: River distance (rkm) and sample size are in parentheses.

Figure 15.–Cumulative percentage by date tagged of chum salmon tags recovered at the Takotna, Kogrukluk, Tatlawiksuk, and George river weirs, Aniak River sonar project, and by voluntary recaptures from the Aniak and Holokuk rivers, including cumulative percent passage of chum salmon catch at the tagging sites in 2002, 2003, and 2004.



Source: Whitmore et al. *In prep.*

Figure 16.–Coho salmon escapement into 6 Kuskokwim River tributaries, 1991 through 2004.



Source: Kerkvliet et al. 2003; 2004; Pawluk et al. *In prep*. *Note*: River distance (rkm) and sample size are in parentheses.

Figure 17.–Cumulative percentage by date tagged of coho salmon tags recovered at the Takotna, Kogrukluk, Tatlawiksuk, and George river weirs, Aniak River sonar project, and by voluntary recaptures from the Aniak River, including cumulative percent passage of coho salmon catch at the tagging sites in 2002, 2003, and 2004.

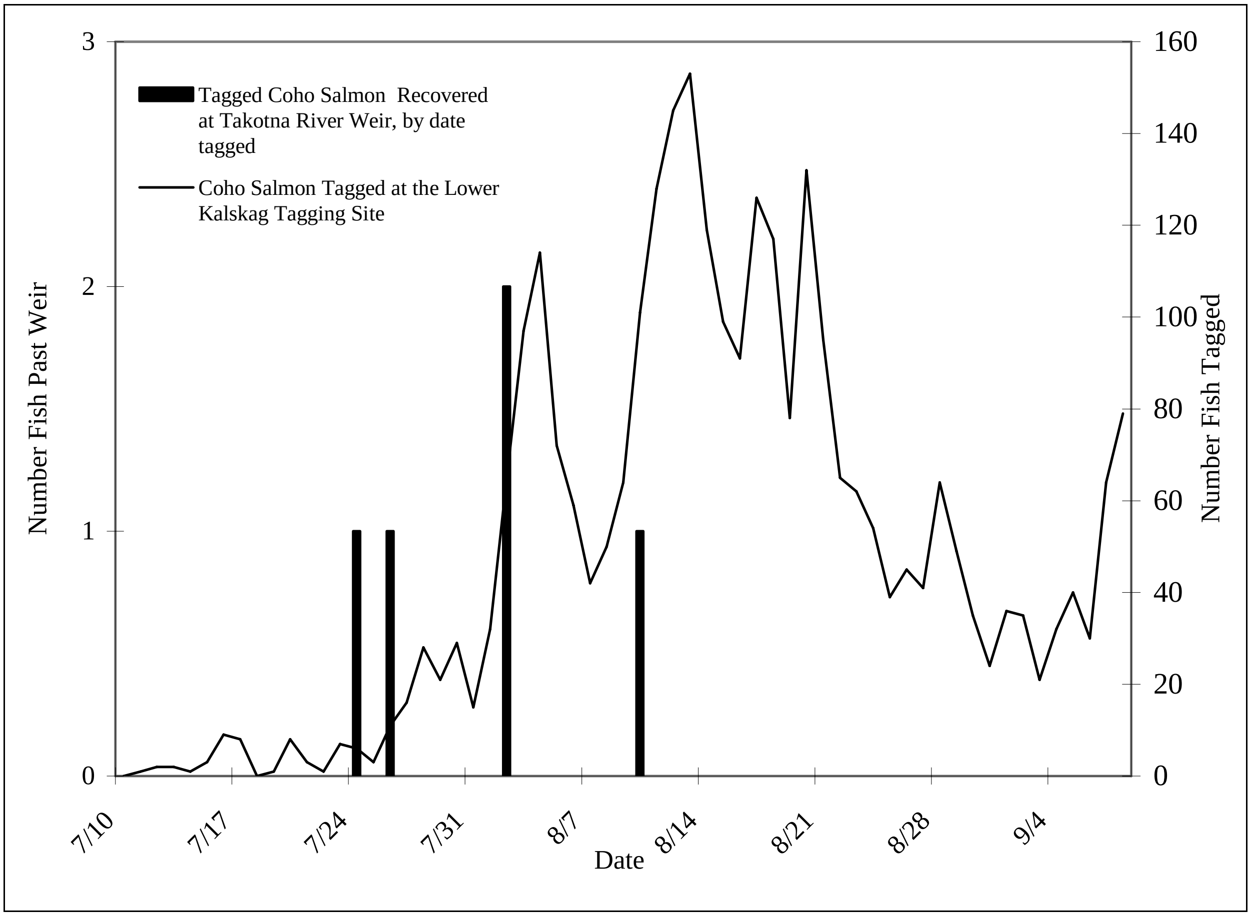
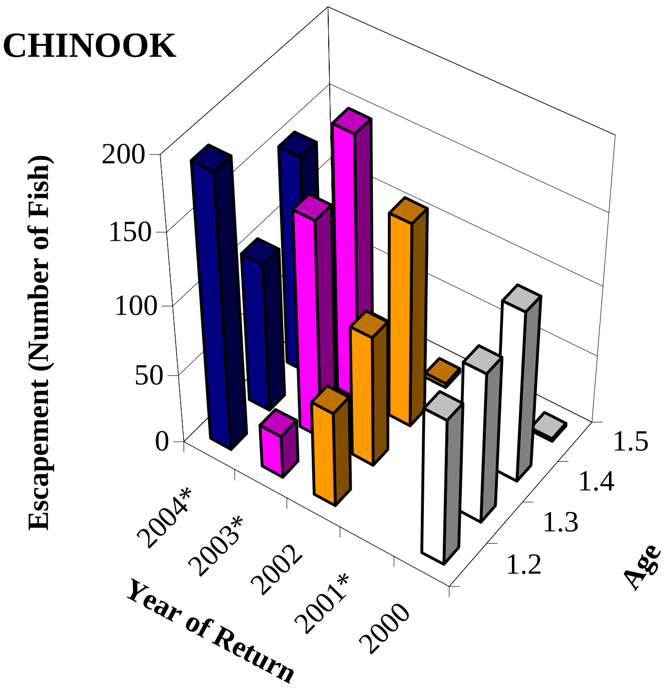
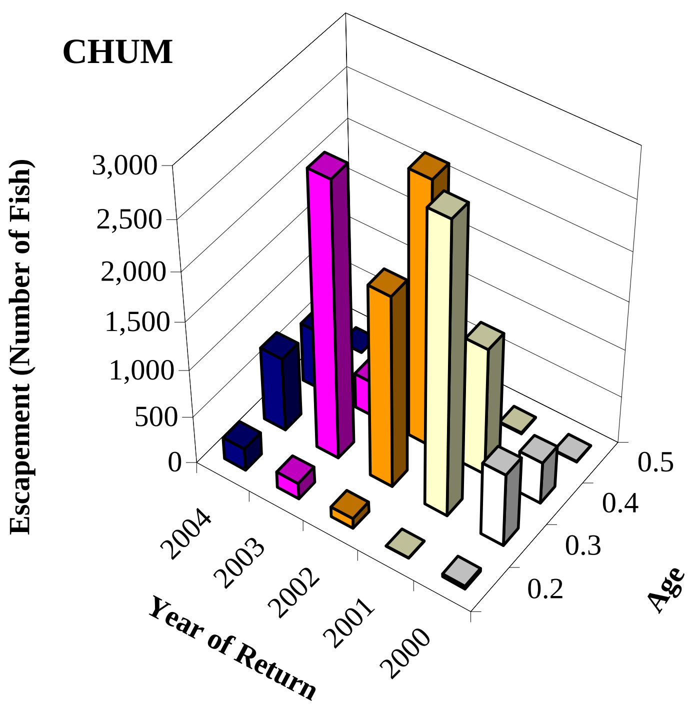


Figure 18.–Coho salmon captured at the lower Kalskag tagging site, by date, compared to coho salmon recovered at the Takotna River weir, by date tagged, 2004.





Source: D. Folletti, ADF&G; personal communication. *Note*: An asterisk (*) denotes incomplete sampling or escapement estimates.

Figure 19.–Chinook and chum salmon age distribution over time at the Takotna River weir.

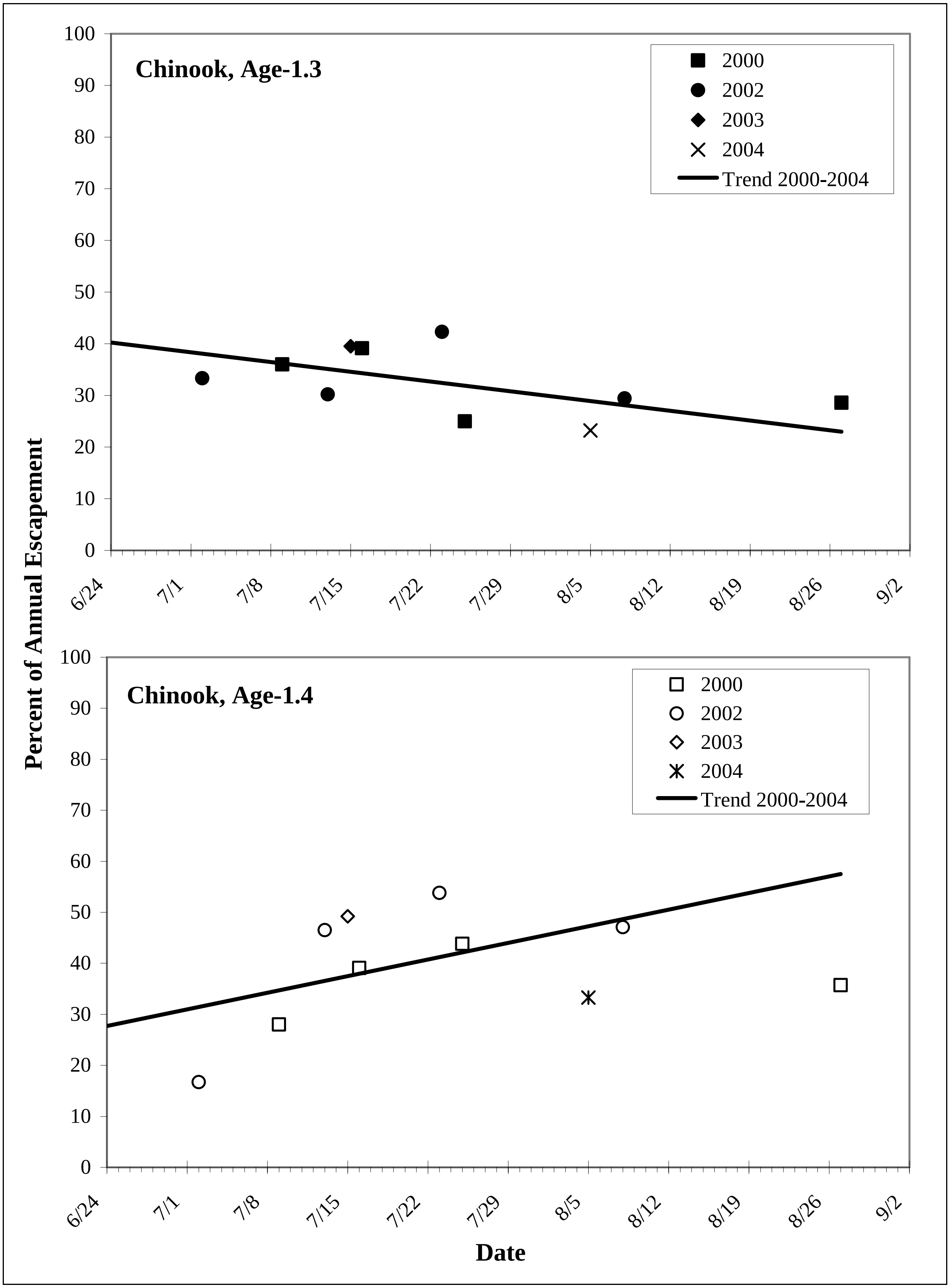


Figure 20.–Historic age composition by sample date for Chinook salmon at the Takotna River weir.

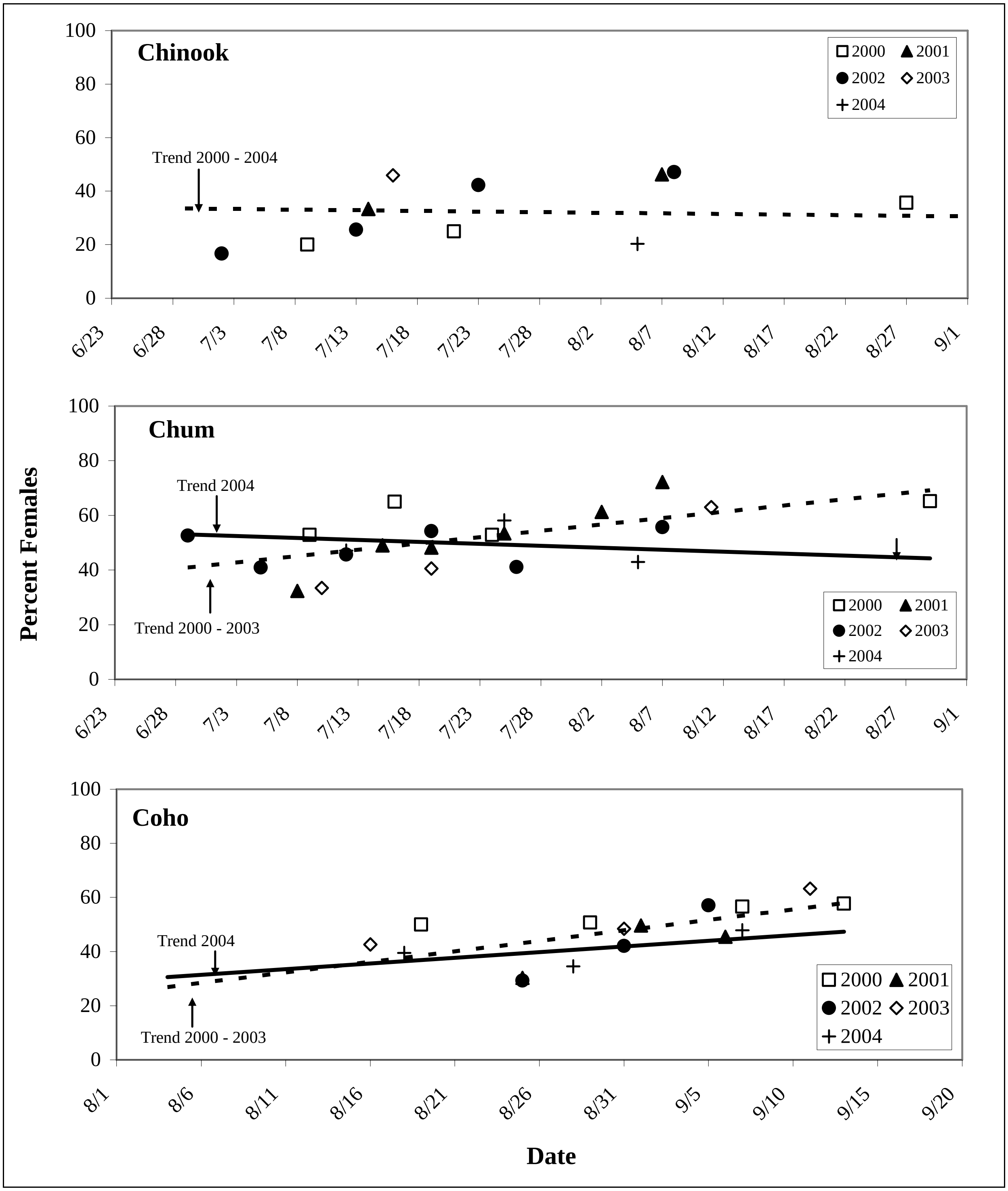


Figure 21.–Historic percentage of female Chinook, chum, and coho salmon by sample date at the Takotna River weir.

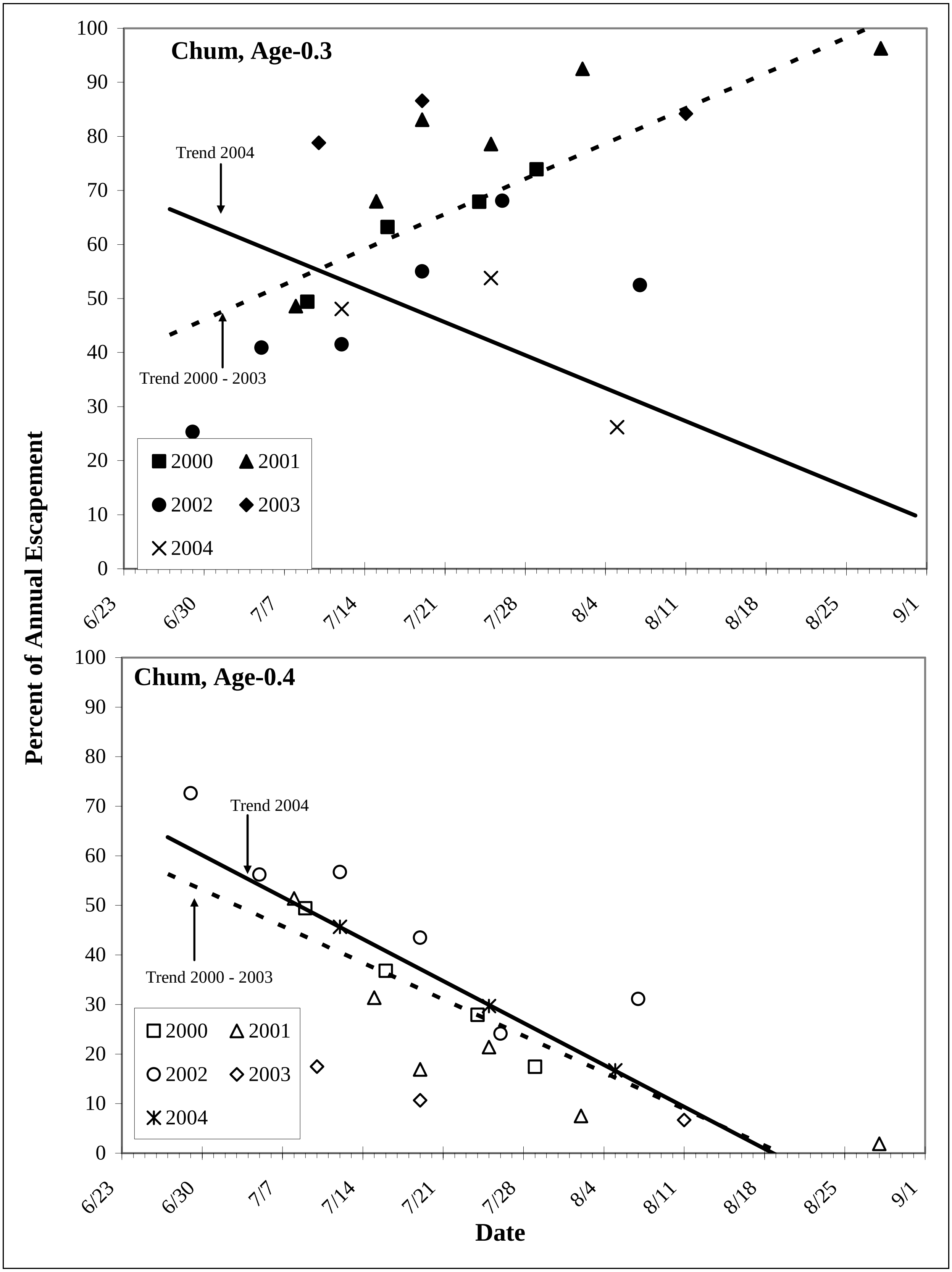


Figure 22.–Historic age composition by sample date for chum salmon at the Takotna River weir.

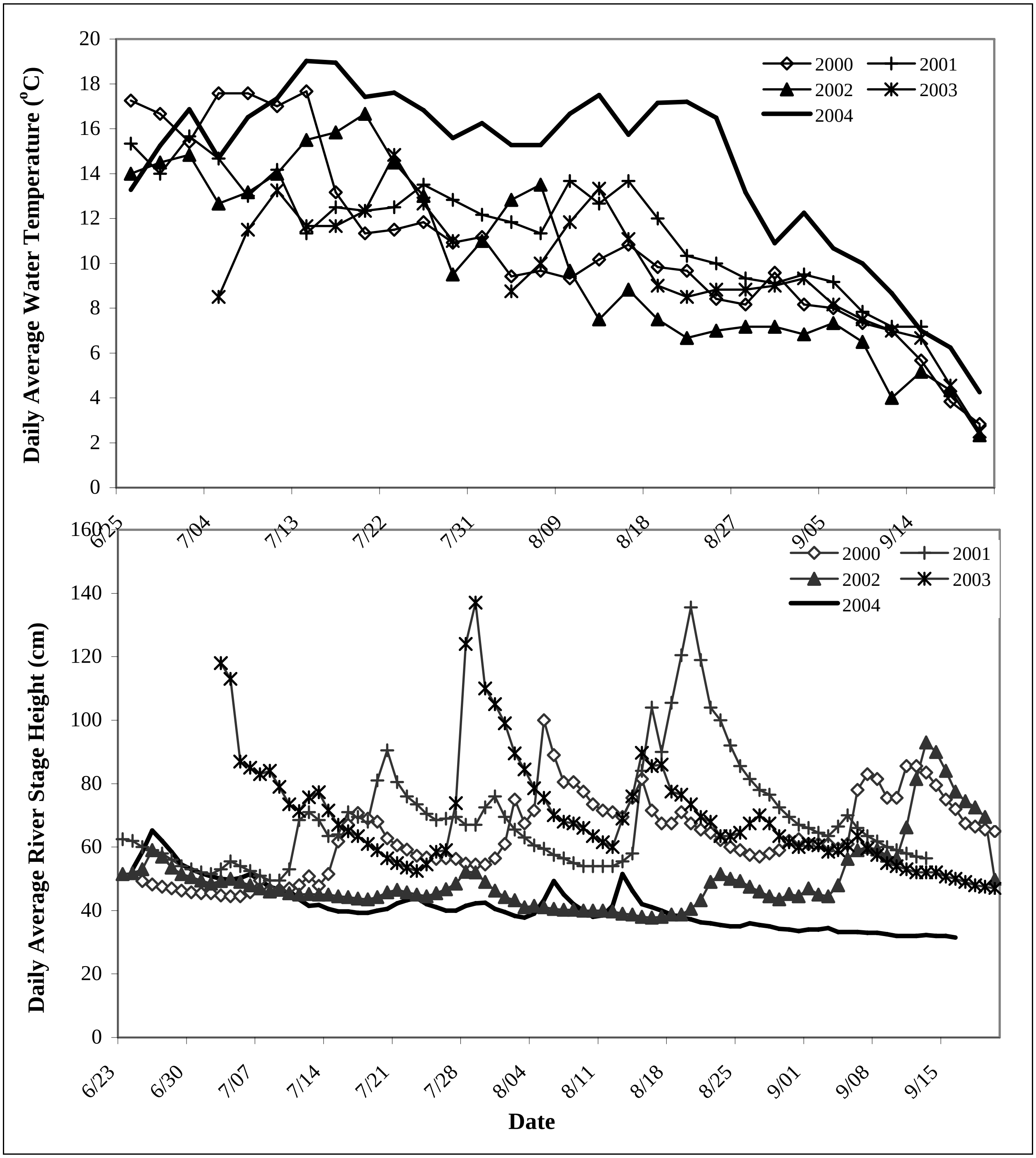


Figure 23.–Daily average water temperature and river stage at the Takotna River weir from 2000 to 2004.

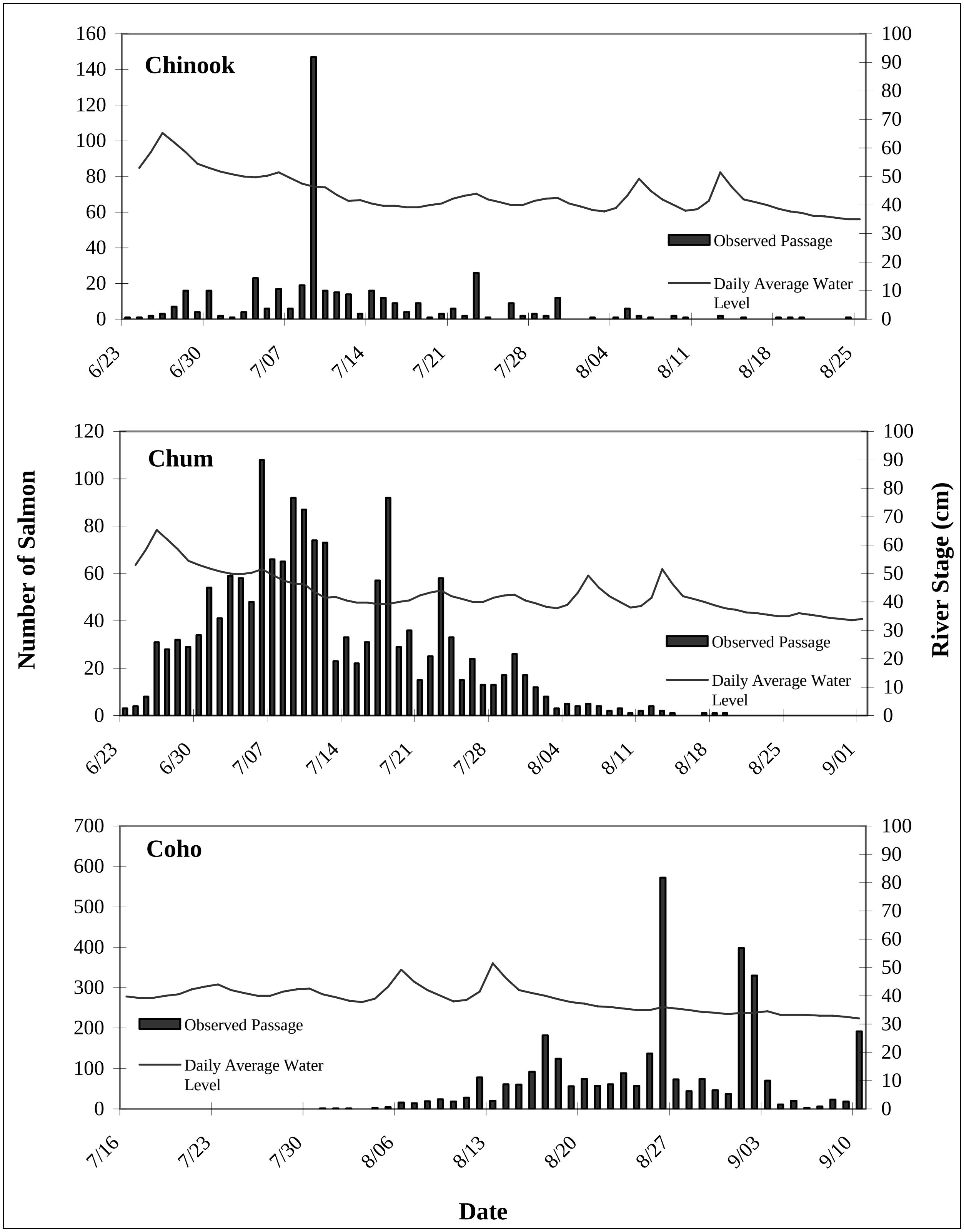


Figure 24.–Daily Chinook, chum, and coho salmon passage at the Takotna River weir relative to average river stage height, 2004.

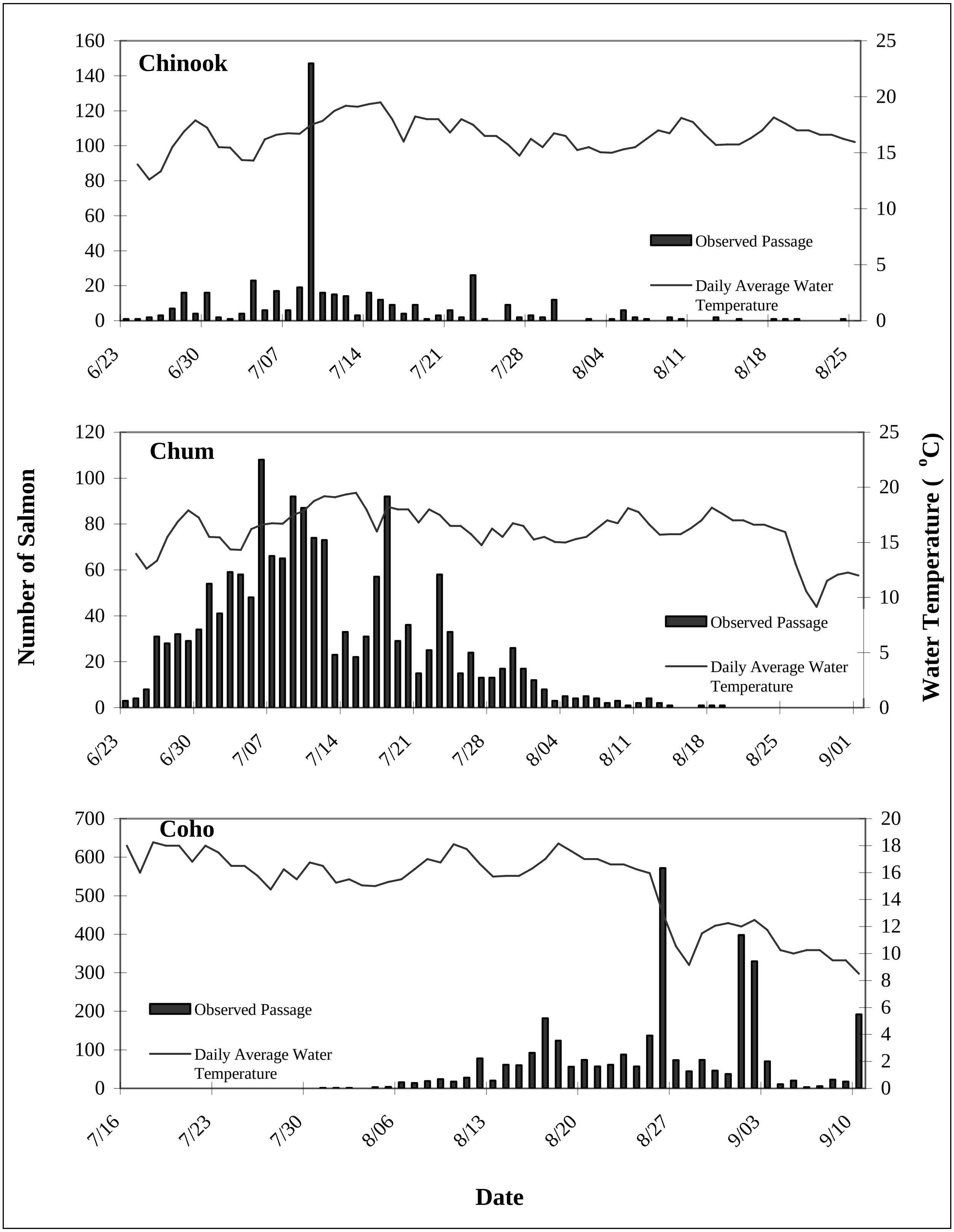


Figure 25.–Daily Chinook, chum, and coho salmon passage at the Takotna River weir relative to average water temperature, 2004.

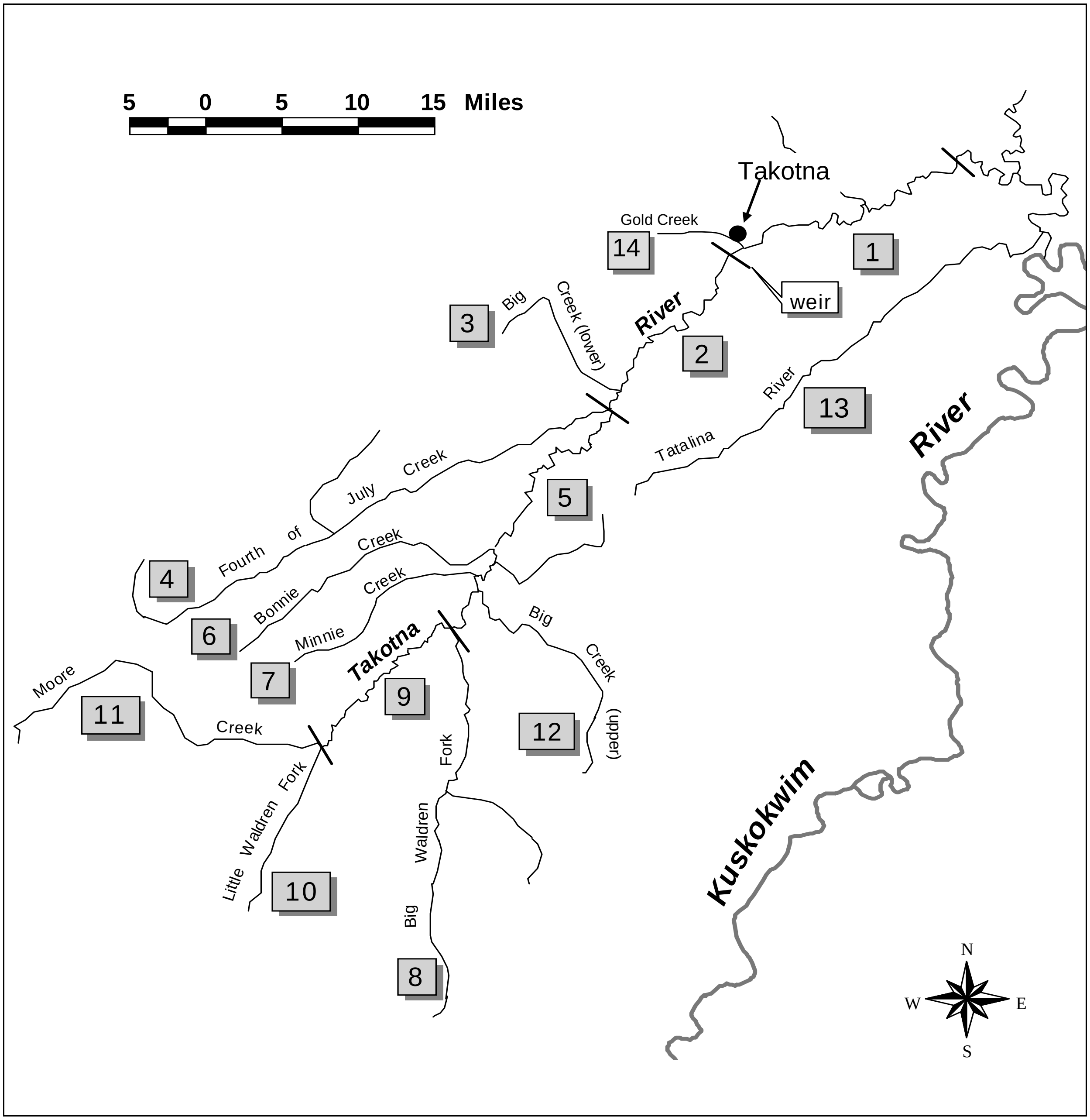


Figure 26.–Index areas used for juvenile salmon investigations in the Takotna River drainage.

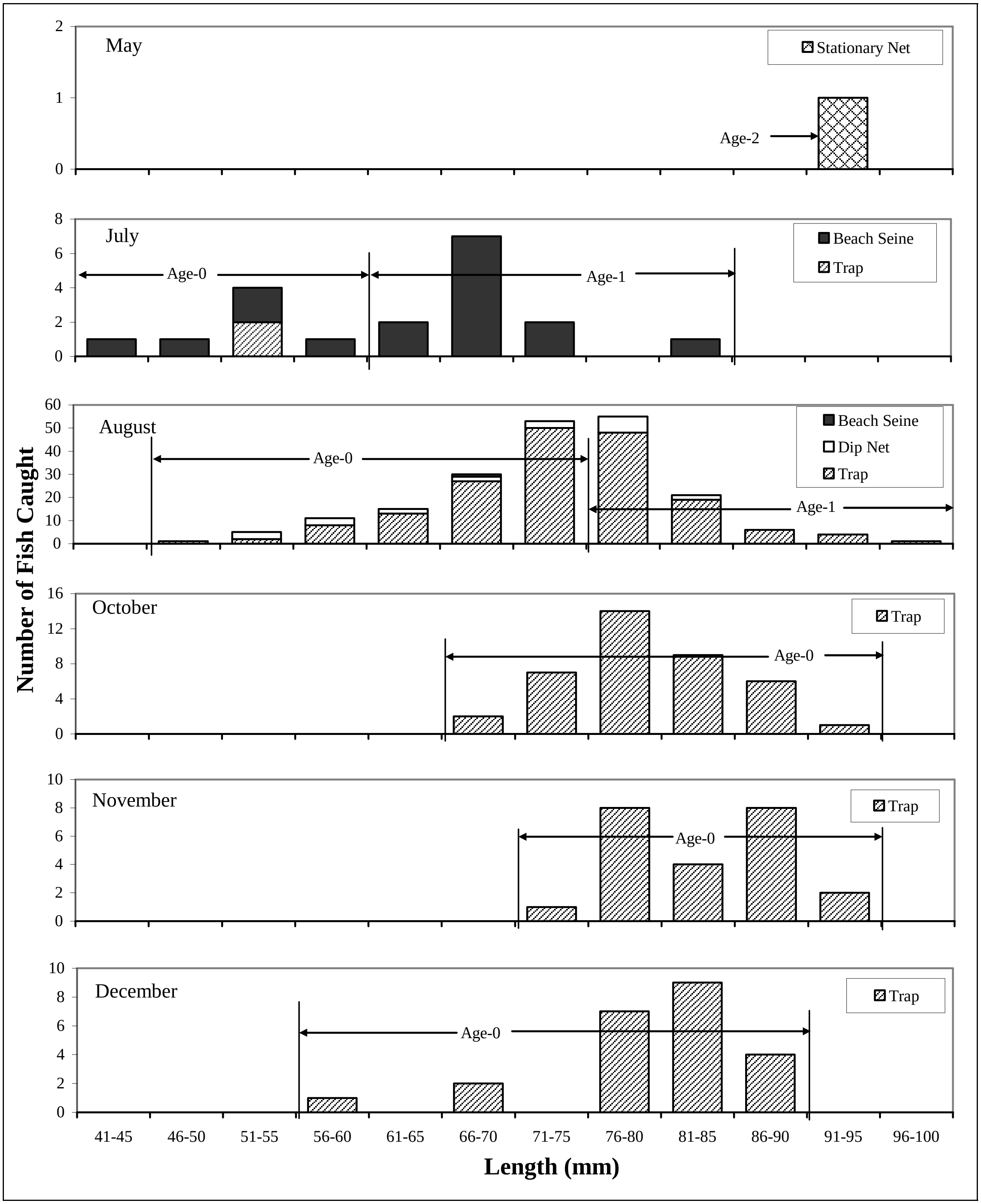


Figure 27.–Lengths of juvenile Chinook salmon caught in Index Areas 1-14 of the Takotna River drainage, 2004, with speculation of age class.

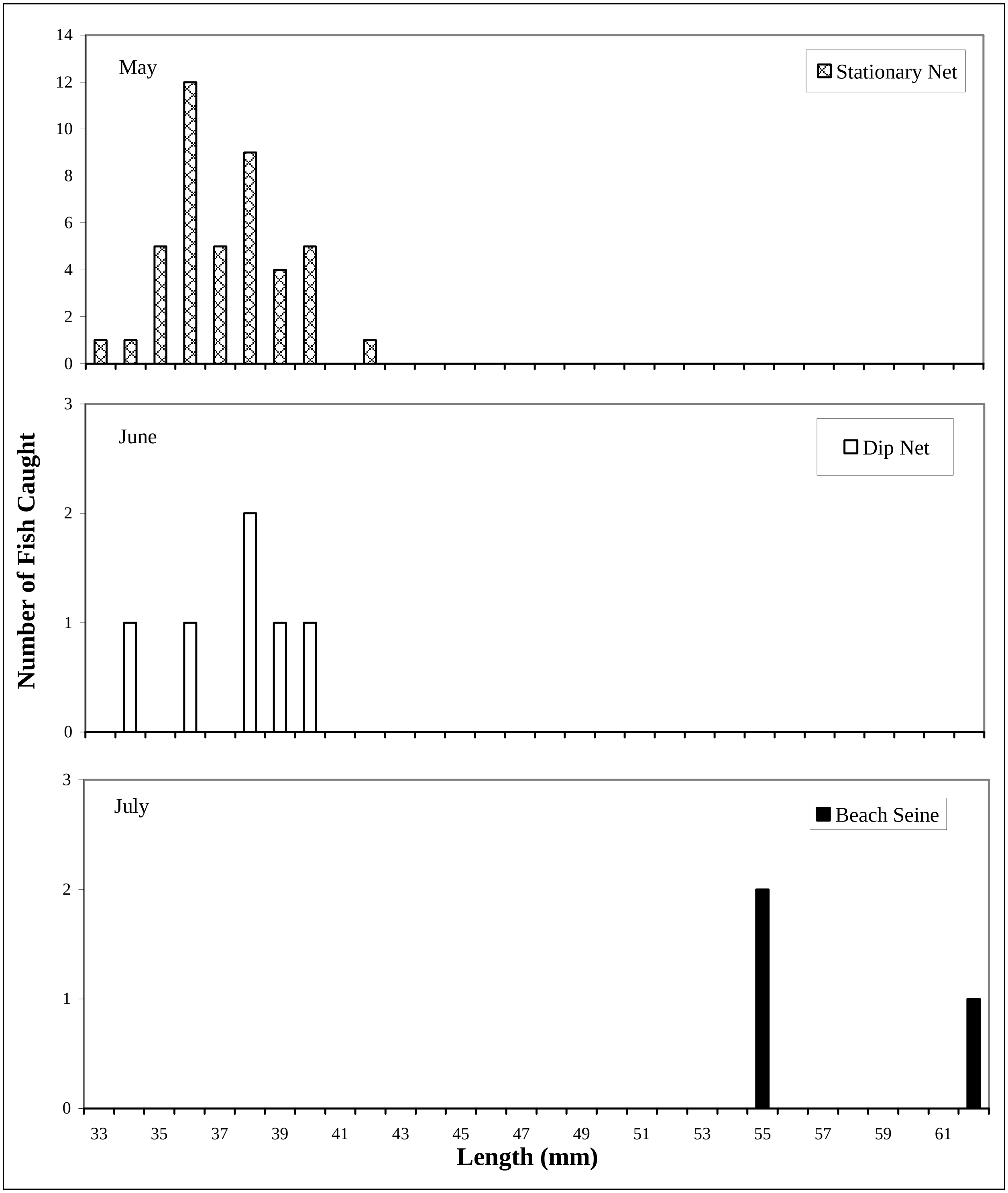


Figure 28.–Lengths of juvenile chum salmon caught in Index Areas 1-14 of the Takotna River drainage, 2004.

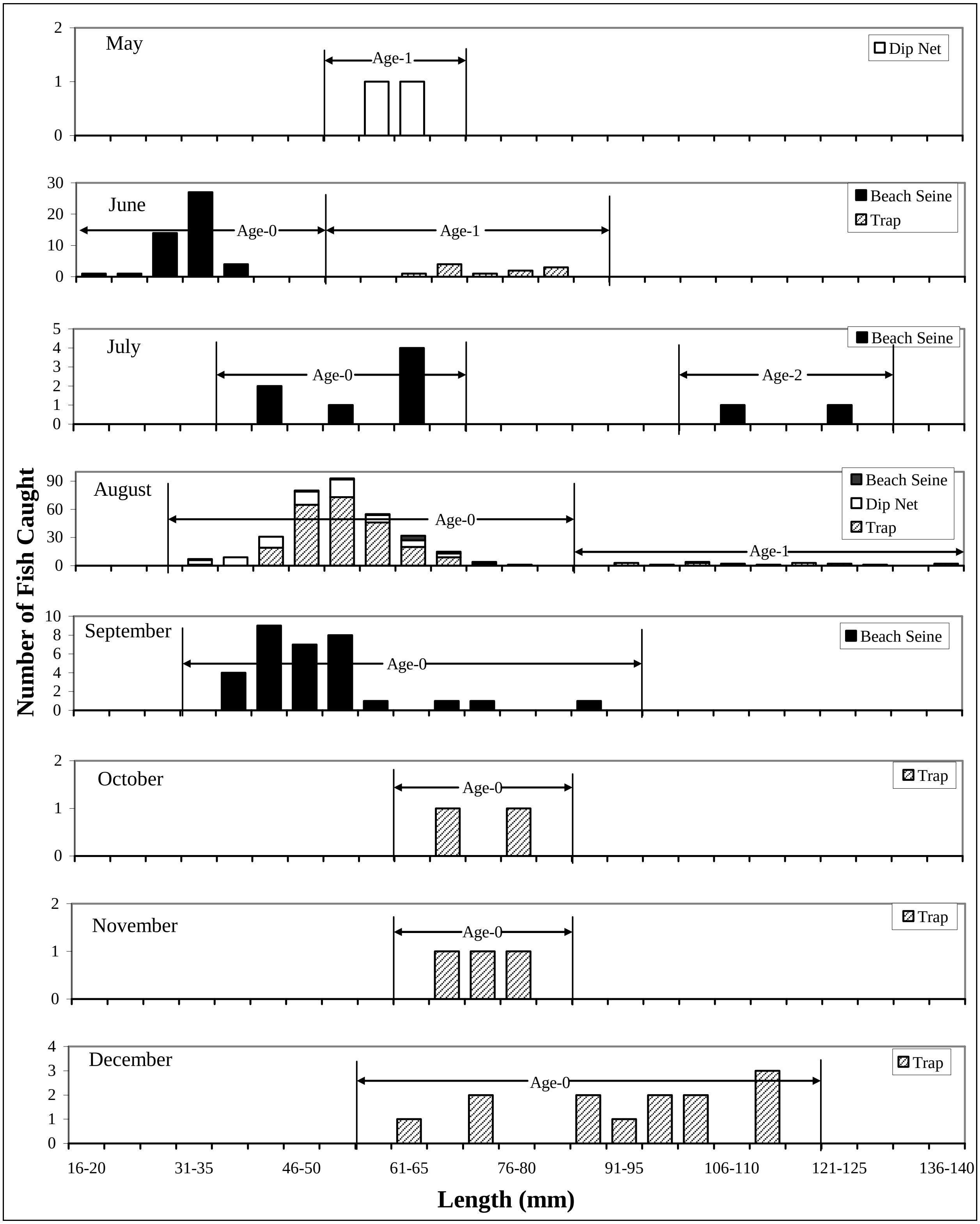


Figure 29.–Lengths of juvenile coho salmon caught in Index Areas 1-14 of the Takotna River drainage, 2004, with speculation of age class.

APPENDIX A. AERIAL SURVEY INFORMATION FOR THE UPPER KUSKOKWIM DRAINAGE, 2004

Appendix A1.–Aerial survey coordinates for selected upper Kuskokwim River tributaries.

Lat.	Long.	Code	River and System
62 48 24	154 13 66	Brc 1	Bear Creek headwaters (Pitka)
62 51 08	154 32 94	Brc 2	Bear Creek mouth (Pitka)
62 40 35	154 23 28	Pit 1	Upper Pitka Fork headwaters (Pitka)
62 46 28	154 28 66	Pit 2	Upper Pitka Fork mouth (Pitka)
62 52 03	154 30 27	Sr 1a	Salmon River Index Area 101 End
62 53 45	154 34 86	Sr 1b	Salmon River Index Area 101 Start
62 52 30	154 52 30	Sr 2a	Salmon River Index Area 102 End
62 52 03	154 30 27	Sr 2b	Salmon River Index Area 102 Start
62 51 62	154 19 82	Sr 3a	Salmon River Index Area 103 End
62 53 11	154 28 93	Sr 3b	Salmon River Index Area 103 Start
62 52 66	154 28 84	Sr 4a	Salmon River Index Area 104 End
62 52 03	154 30 27	Sr 4b	Salmon River Index Area 104 Start
62 39 00	157 00 00	Jul 1	Fourth of July Creek headwaters (Takotna)
62 50 11	156 20 64	Jul 2	Fourth of July Creek mouth (Takotna)
62 56 62	153 40 69	Lt 1	Little Tonzona headwaters
62 57 20	154 10 37	Lt 2	Little Tonzona mouth

Appendix A2.–Aerial survey notes, Takotna River drainage and selected upper Kuskokwim River tributaries.

Aerial surveys were conducted in the upper Kuskokwim River drainage to assess the relative abundance and spawning distribution of Chinook and early spawning chum salmon. Surveys were conducted from 19 to 21 July.

Each stream survey was assigned a rating number to represent the overall effectiveness of the survey. Conditions determining this rating included wind, weather, water turbidity, water visibility, bottom type, time of day, and spawning stage. The rating was on a scale of 1 to 3, with 1 representing "good", 2 representing "fair", and 3 representing "poor".

Chinook and Chum Aerial Surveys

Daniel Costello (Alaska Department of Fish and Game)—observer

Larry Nicholson (Gull Cape Air)—pilot

Piper PA-18 Super Cub

19 July. We departed McGrath at 15:30 under mostly cloudy skies. We arrived at the confluence of the upper Pitka Fork River and Sheep Creek (62°46.28 N, 154°28.66 W) at 16:00 and began surveying the upper Pitka Fork River, heading 6.8 mi upstream to the headwaters (62°40.35 N, 154°23.28 W). The water was slightly turbid and the bottom was comprised of silt, sand, and gravel. A total of 289 Chinook salmon were observed, most in spawning aggregates of 5 to 10 fish. The upper Pitka Fork River survey was rated a 2 due to fair water visibility.

Weather conditions worsened during the survey. Cloud cover increased and rainsqualls and lightning were visible in the distance. We decided that additional surveys that day would be ineffective, and we left the area at 16:40, arriving in McGrath at 17:10.

20 July. We departed McGrath at 08:15 under partly cloudy skies. We arrived at the confluence of the Salmon River and the Pitka Fork River at 08:45 and circled over the area confirming the coordinates. Some of the coordinates we had on file appeared incorrect, and we spent some time searching for the stop point of Index Area 101 (also the start point of Index Areas 102 and 104). Using a USGS topographic map of the area and the Salmon River Aerial Survey map (Figure 6) we found the start point, corrected the coordinates (62°52.03 N, 154°30.27 W), and headed to the headwaters of index area 102 (62°52.30 N, 154°52.30 W) to begin surveying.

We surveyed Index Area 102 first, heading downstream to Index Area 101. We observed 118 Chinook salmon in Index Area 102. After tallying the counts we continued downstream, surveying Index Area 101. Water visibility in this portion of the drainage was poor, and no fish were seen. Next, we surveyed Index Area 103 beginning at the stop point (62°51.62 N, 154°19.82 W). We saw 60 Chinook salmon in this portion of the drainage. Lastly, we surveyed Index Area 104, again starting at the stop point (62°52.66 N, 154°28.84 W). It was in Index Area 104 that we found the highest concentrations of Chinook salmon; we spotted 960 Chinook salmon, most in aggregates of 10-30 fish. The survey was given an overall rating of 1.

After surveying Salmon River Index Areas 101-104, we headed back to McGrath to refuel. After refueling and lunch, we headed to the headwaters of Bear Creek (62°48.24 N, 154°13.66 W) and began surveying. We flew the length of Bear Creek to its confluence with the upper Pitka Fork River, a distance of 9.5 miles. Visibility in the upper two-thirds was excellent, but in the lower one-third visibility was marginal. In the lower portion of the river visibility was marred by turbid water, and the river bottom was littered with algae, grass, and terrestrial plant debris. The survey was given an overall rating of 1.

From Bear Creek we headed to Nikolai for a short break before continuing to the Little Tonzona River. However, the Little Tonzona River was too heavily wooded and the water too turbid for an accurate survey. We flew the length of the river without spotting a single fish. We rated the survey a 3.

21 July. Inclement weather kept us grounded until late morning. At 09:45 we departed McGrath for Fourth of July Creek. However, weather conditions worsened in flight and the attempt to survey was aborted. We returned to McGrath to wait for better weather.

The weather improved late-morning and we departed McGrath again at 11:45 for Fourth of July Creek. This time the weather remained cooperative and we arrived at the confluence of Fourth of July Creek and the Takotna River (62°50.11 N, 156°20.64 W) at about 12:30. Although weather conditions were not optimal, we surveyed Fourth of July Creek and found 73 Chinook and 53 chum salmon, all within the first 10 miles of the 20-mile survey. No spawning activity was observed in the upper 9 miles of the creek. Carcasses included 2 Chinook and 4 chum salmon.

Surveying Fourth of July Creek was extremely difficult for the first few miles upstream from the Takotna River. The lower portion of the river was shrouded by trees and had many meanders. Significant spawning activity was observed throughout the tributary. A large log jam comprised of probably 50 to 100 logs obstructed the river channel about 1.5 mi upstream from the Takotna River. The survey was rated a 2 due to marginal visibility.

APPENDIX B. FISH PASSAGE AT THE TAKOTNA RIVER WEIR, 2004

Appendix B1.–Historic Chinook salmon passage at the Takotna River weir.

	Daily Passage					Cumulative Passage					Percent Passage				
Date	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004
6/15															
6/16															
6/17															
6/18															
6/19															
6/20															
6/21[a]															
6/22															
6/23[a]		0	0		1										
6/24	0	1	1	[b]	1	0	1	1		1	0	0	0		0
6/25	2	3	0	[b]	2	2	4	1		3	1	1	0		1
6/26	2	1	0	[b]	3	4	5	1		6	1	1	0		1
6/27	1	4	2	[b]	7	5	9	3		13	1	1	1		3
6/28	0	1	4	[b]	16	5	10	7		29	1	1	2		6
6/29	1	1	3	[b]	4	6	11	10		33	2	2	3		7
6/30	1	13	1	[b]	16	7	24	11		49	2	3	3		11
7/01	0	17	5	[b]	2	7	41	16		51	2	6	5		11
7/02	15	4	0	10 [b]	1	22	45	16	10	52	6	6	5	3	11
7/03	16	23	1	5 [b]	4	38	68	17	15	56	11	9	5	4	12
7/04	3	10	2	[b]	23	41	78	19	15	79	12	11	6	4	17
7/05	14	1	3	6	6	55	79	22	21	85	16	11	7	6	18
7/06	7	3	11	6	17	62	82	33	27	102	18	11	10	7	22
7/07	12	15	17	6	6	74	97	50	33	108	21	13	16	9	23
7/08	37	110	32	10	19	111	207	82	43	127	32	29	26	11	28
7/09	9	17	7	37	147	120	224	89	80	274	35	31	28	21	59
7/10	3	69	2	23	16	123	293	91	103	290	36	41	29	27	63
7/11	8	9	93	10	15	131	302	184	113	305	38	42	58	30	66
7/12	22	30	51	16	14	153	332	235	129	319	44	46	74	34	69
7/13	1	45	2	24	3	154	377	237	153	322	45	52	75	40	70
7/14	3	29	2	5	16	157	406	239	158	338	46	56	76	42	73
7/15	4	41	2 [b]	2	12	161	447	241	160	350	47	62	76	42	76
7/16	4	28	0	5	9	165	475	241	165	359	48	66	76	44	78
7/17	2	17	3	9	4	167	492	244	174	363	48	68	77	46	79
7/18	6	14	5	22	9	173	506	249	196	372	50	70	79	52	81
7/19	4	31	4	26	1	177	537	253	222	373	51	74	80	59	81

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	Daily Passage					Cumulative Passage					Percent Passage				
Date	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
7/20	8	26	9	26	3	185	563	262	248	376	54	78	83	66	82
7/21	7	23	5	8	6	192	586	267	256	382	56	81	84	68	83
7/22	39	21	2	15	2	231	607	269	271	384	67	84	85	72	83
7/23	2	13	0	6	26	233	620	269	277	410	68	86	85	73	89
7/24	5	17	0	11	1	238	637	269	288	411	69	88	85	76	89
7/25	17	10	6	7	0	255	647	275	295	411	74	90	87	78	89
7/26	3	11	5	4	9	258	658	280	299	420	75	91	89	79	91
7/27	9	6	2	9	2	267	664	282	308	422	77	92	89	81	92
7/28	5	11	1	6 [c]	3	272	675	283	314	425	79	94	90	83	92
7/29	9	3	8	6 [d]	2	281	678	291	320	427	81	94	92	85	93
7/30	5	2	5	6 [d]	12	286	680	296	326	439	83	94	94	86	95
7/31	2	4	0	5 [d]	0	288	684	296	331	439	83	95	94	88	95
8/01	1	1	2	5 [c]	0	289	685	298	336	439	84	95	94	89	95
8/02	1	3	0	4	1	290	688	298	340	440	84	95	94	90	95
8/03	5	0	0	5	0	295	688	298	345	440	86	95	94	91	95
8/04	8	2	1	5	1	303	690	299	350	441	88	96	95	93	96
8/05	7	1	0	4	6	310	691	299	354	447	90	96	95	94	97
8/06	4	4	1	1	2	314	695	300	355	449	91	96	95	94	97
8/07	1	1	2	2	1	315	696	302	357	450	91	97	96	94	98
8/08	7	3	0	5	0	322	699	302	362	450	93	97	96	96	98
8/09	7	1	3	2	2	329	700	305	364	452	95	97	97	96	98
8/10	0	2	2	0	1	329	702	307	364	453	95	97	97	96	98
8/11	3	1	0	0	0	332	703	307	364	453	96	98	97	96	98
8/12	6	2	4	0	0	338	705	311	364	453	98	98	98	96	98
8/13	2	1	1	0	2	340	706	312	364	455	99	98	99	96	99
8/14	1	1	0	2	0	341	707	312	366	455	99	98	99	97	99
8/15	0	0	1	0	1	341	707	313	366	456	99	98	99	97	99
8/16	0	1	0	0	0	341	708	313	366	456	99	98	99	97	99
8/17	0	0	0	1	0	341	708	313	367	456	99	98	99	97	99
8/18	2	1	0	2	1	343	709	313	369	457	99	98	99	98	99
8/19	0	0	0	1	1	343	709	313	370	458	99	98	99	98	99
8/20	0	1 [c]	0	1	1	343	710	313	371	459	99	98	99	98	100
8/21	0	1 [d]	0	1	0	343	711	313	372	459	99	99	99	98	100
8/22	0	1 [d]	0	0	0	343	712	313	372	459	99	99	99	98	100
8/23	0	1	0	2	0	343	713	313	374	459	99	99	99	99	100

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	Daily Passage					Cumulative Passage					Percent Passage				
Date	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
8/24	0	0	0	0	1	343	713	313	374	460	99	99	99	99	100
8/25	0	0	1	1	0	343	713	314	375	460	99	99	99	99	100
8/26	0	1	0	1	1	343	714	314	376	461	99	99	99	99	100
8/27	1	1	0	1	0	344	715	314	377	461	100	99	99	100	100
8/28	0	1	0	0	0	344	716	314	377	461	100	99	99	100	100
8/29	0	1	0	0	0	344	717	314	377	461	100	99	99	100	100
8/30	0	1	0	0	0	344	718	314	377	461	100	100	99	100	100
8/31	0	1	0	0	0	344	719	314	377	461	100	100	99	100	100
9/01	0	0	0	1	0	344	719	314	378	461	100	100	99	100	100
9/02	0	0	0	0	0	344	719	314	378	461	100	100	99	100	100
9/03	0	1	0	0	0	344	720	314	378	461	100	100	99	100	100
9/04	0	1	0	0	0	344	721	314	378	461	100	100	99	100	100
9/05	0	0	0	0	0	344	721	314	378	461	100	100	99	100	100
9/06	0	0	0	0	0	344	721	314	378	461	100	100	99	100	100
9/07	0	0	0 [b]	0	0	344	721	314	378	461	100	100	99	100	100
9/08	0	0	0	0	0	344	721	314	378	461	100	100	99	100	100
9/09	1	0	0	0	0	345	721	314	378	461	100	100	99	100	100
9/10	0	0	0	0	0	345	721	314	378	461	100	100	99	100	100
9/11	0	0	0	0	0	345	721	314	378	461	100	100	99	100	100
9/12	0	0	0	0	0	345	721	314	378	461	100	100	99	100	100
9/13	0	0	1	0	0	345	721	315	378	461	100	100	100	100	100
9/14	0	0	0	0	0	345	721	315	378	461	100	100	100	100	100
9/15	0	0 [b]	1	0	0	345	721	316	378	461	100	100	100	100	100
9/16	0	0 [b]	0	0	0	345	721	316	378	461	100	100	100	100	100
9/17	0	0 [b]	0	0	0	345	721	316	378	461	100	100	100	100	100
9/18	0	0 [b]	0	0	0	345	721	316	378	461	100	100	100	100	100
9/19	0	0 [b]	0	0	0 [d]	345	721	316	378	461	100	100	100	100	100
9/20	0	0 [b]	0	0	0 [d]	345	721	316	378	461	100	100	100	100	100

Note: The boxes represent the median passage date and central 50% of the run. Days with no data are days when the project was not operational.

[a] Date outside of target operational period (not included in accumulative totals).

[b] No estimates for inoperable period.

[c] Estimated salmon passage (partial day).

[d] Estimated salmon passage (whole day).

Appendix B2.–Historic chum salmon passage at the Takotna River weir.

	Daily Passage					Cumulative Passage					Percent Passage				
Date	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004
6/15															
6/16															
6/17															
6/18															
6/19															
6/20															
6/21[a]															
6/22															
6/23[a]		6	9		3										
6/24	1	3	29	0 [b]	4	1	3	29	0	4	0	0	1	0	0
6/25	24	9	55	0 [b]	8	25	12	84	0	12	2	0	2	0	1
6/26	23	10	55	1 [b]	31	48	22	139	1	43	4	0	3	0	3
6/27	11	12	111	5 [b]	28	59	34	250	6	71	5	1	6	0	4
6/28	9	4	116	7 [b]	32	68	38	366	13	103	5	1	8	0	6
6/29	6	19	168	4 [b]	29	74	57	534	17	132	6	1	12	1	8
6/30	6	20	147	12 [b]	34	80	77	681	29	166	6	1	16	1	10
7/01	10	42	180	10 [b]	54	90	119	861	39	220	7	2	20	1	13
7/02	18	24	72	40 [c]	41	108	143	933	79	261	9	3	21	2	16
7/03	17	47	145	57 [c]	59	125	190	1,078	136	320	10	4	25	4	20
7/04	39	40	94	54 [b]	58	164	230	1,172	190	378	13	4	27	6	23
7/05	12	21	250	111	48	176	251	1,422	301	426	14	5	32	9	26
7/06	45	60	204	120	108	221	311	1,626	421	534	18	6	37	12	33
7/07	44	106	251	126	66	265	417	1,877	547	600	21	8	43	16	37
7/08	101	188	124	137	65	366	605	2,001	684	665	29	11	46	20	41
7/09	49	78	110	142	92	415	683	2,111	826	757	33	13	48	24	46
7/10	27	204	205	88	87	442	887	2,316	914	844	35	16	53	27	52
7/11	58	198	259	47	74	500	1,085	2,575	961	918	40	20	59	28	56
7/12	29	372	266	77	73	529	1,457	2,841	1,038	991	42	27	65	31	61
7/13	49	275	80	62	23	578	1,732	2,921	1,100	1,014	46	32	67	32	62
7/14	50	309	103	140	33	628	2,041	3,024	1,240	1,047	50	38	69	37	64
7/15	35	265	97 [c]	129	22	663	2,306	3,121	1,369	1,069	53	43	71	40	66
7/16	33	257	88	155	31	696	2,563	3,209	1,524	1,100	56	47	73	45	67
7/17	51	206	117	150	57	747	2,769	3,326	1,674	1,157	60	51	76	49	71
7/18	34	264	73	172	92	781	3,033	3,399	1,846	1,249	62	56	78	54	77
7/19	59	352	161	187	29	840	3,385	3,560	2,033	1,278	67	63	81	60	78

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	Daily Passage					Cumulative Passage					Percent Passage				
Date	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
7/20	50	301	109	231	36	890	3,686	3,669	2,264	1,314	71	68	84	67	81
7/21	43	212	72	155	15	933	3,898	3,741	2,419	1,329	74	72	85	71	82
7/22	53	215	95	168	25	986	4,113	3,836	2,587	1,354	79	76	88	76	83
7/23	33	165	79	87	58	1,019	4,278	3,915	2,674	1,412	81	79	89	79	87
7/24	23	168	67	69	33	1,042	4,446	3,982	2,743	1,445	83	82	91	81	89
7/25	25	145	62	63	15	1,067	4,591	4,044	2,806	1,460	85	85	92	83	90
7/26	20	93	53	53	24	1,087	4,684	4,097	2,859	1,484	87	87	94	84	91
7/27	14	117	23	53	13	1,101	4,801	4,120	2,912	1,497	88	89	94	86	92
7/28	11	135	49	50 [c]	13	1,112	4,936	4,169	2,962	1,510	89	91	95	87	93
7/29	18	58	39	46 [b]	17	1,130	4,994	4,208	3,008	1,527	90	92	96	89	94
7/30	12	64	21	43 [b]	26	1,142	5,058	4,229	3,051	1,553	91	93	97	90	95
7/31	10	68	15	39 [b]	17	1,152	5,126	4,244	3,090	1,570	92	95	97	91	96
8/01	3	38	21	36 [c]	12	1,155	5,164	4,265	3,126	1,582	92	95	97	92	97
8/02	12	30	22	29	8	1,167	5,194	4,287	3,155	1,590	93	96	98	93	98
8/03	2	34	15	35	3	1,169	5,228	4,302	3,190	1,593	93	97	98	94	98
8/04	22	30	17	32	5	1,191	5,258	4,319	3,222	1,598	95	97	99	95	98
8/05	5	38	5	44	4	1,196	5,296	4,324	3,266	1,602	95	98	99	96	98
8/06	11	25	4	28	5	1,207	5,321	4,328	3,294	1,607	96	98	99	97	99
8/07	5	16	13	18	4	1,212	5,337	4,341	3,312	1,611	97	99	99	98	99
8/08	11	11	3	11	2	1,223	5,348	4,344	3,323	1,613	98	99	99	98	99
8/09	5	13	5	6	3	1,228	5,361	4,349	3,329	1,616	98	99	99	98	99
8/10	10	8	6	6	1	1,238	5,369	4,355	3,335	1,617	99	99	99	98	99
8/11	6	8	6	6	2	1,244	5,377	4,361	3,341	1,619	99	99	100	98	99
8/12	6	5	4	4	4	1,250	5,382	4,365	3,345	1,623	100	99	100	99	100
8/13	2	2	2	10	2	1,252	5,384	4,367	3,355	1,625	100	99	100	99	100
8/14	0	3	0	7	1	1,252	5,387	4,367	3,362	1,626	100	100	100	99	100
8/15	0	2	0	6	0	1,252	5,389	4,367	3,368	1,626	100	100	100	99	100
8/16	0	1	3	5	0	1,252	5,390	4,370	3,373	1,626	100	100	100	99	100
8/17	0	0	1	0	1	1,252	5,390	4,371	3,373	1,627	100	100	100	99	100
8/18	0	7	0	2	1	1,252	5,397	4,371	3,375	1,628	100	100	100	99	100
8/19	0	4	0	0	1	1,252	5,401	4,371	3,375	1,629	100	100	100	99	100
8/20	1	3 [c]	1	4	0	1,253	5,404 [b]	4,372	3,379	1,629	100	100	100	100	100
8/21	0	3 [b]	0	2	0	1,253	5,407 [b]	4,372	3,381	1,629	100	100	100	100	100
8/22	0	3 [b]	0	0	0	1,253	5,410 [b]	4,372	3,381	1,629	100	100	100	100	100
8/23	0	0	1	5	0	1,253	5,410	4,373	3,386	1,629	100	100	100	100	100

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Date	Daily Passage 2000	2001	2002	2003	2004	Cumulative Passage 2000	2001	2002	2003	2004	Percent Passage 2000	2001	2002	2003	2004
8/24	0	1	1	0	0	1,253	5,411	4,374	3,386	1,629	100	100	100	100	100
8/25	0	2	2	1	0	1,253	5,413	4,376	3,387	1,629	100	100	100	100	100
8/26	0	0	0	0	0	1,253	5,413	4,376	3,387	1,629	100	100	100	100	100
8/27	0	0	0	0	0	1,253	5,413	4,376	3,387	1,629	100	100	100	100	100
8/28	0	1	0	1	0	1,253	5,414	4,376	3,388	1,629	100	100	100	100	100
8/29	1	0	0	0	0	1,254	5,414	4,376	3,388	1,629	100	100	100	100	100
8/30	0	0	0	0	0	1,254	5,414	4,376	3,388	1,629	100	100	100	100	100
8/31	0	0	1	1	0	1,254	5,414	4,377	3,389	1,629	100	100	100	100	100
9/01	0	0	0	0	0	1,254	5,414	4,377	3,389	1,629	100	100	100	100	100
9/02	0	0	0	0	0	1,254	5,414	4,377	3,389	1,629	100	100	100	100	100
9/03	0	0	0	0	0	1,254	5,414	4,377	3,389	1,629	100	100	100	100	100
9/04	0	0	0	0	1	1,254	5,414	4,377	3,389	1,630	100	100	100	100	100
9/05	0	0	0	0	0	1,254	5,414	4,377	3,389	1,630	100	100	100	100	100
9/06	0	0	0	1	0	1,254	5,414	4,377	3,390	1,630	100	100	100	100	100
9/07	0	0	0	1 [d]	0	1,254	5,414	4,377	3,391	1,630	100	100	100	100	100
9/08	0	0	0	1	0	1,254	5,414	4,377	3,392	1,630	100	100	100	100	100
9/09	0	0	0	1	0	1,254	5,414	4,377	3,393	1,630	100	100	100	100	100
9/10	0	0	0	0	0	1,254	5,414	4,377	3,393	1,630	100	100	100	100	100
9/11	0	0	0	0	0	1,254	5,414	4,377	3,393	1,630	100	100	100	100	100
9/12	0	0	0	0	0	1,254	5,414	4,377	3,393	1,630	100	100	100	100	100
9/13	0	0	0	0	0	1,254	5,414	4,377	3,393	1,630	100	100	100	100	100
9/14	0	0	0	0	0	1,254	5,414	4,377	3,393	1,630	100	100	100	100	100
9/15	0	0 [d]	0	0	0	1,254	5,414	4,377	3,393	1,630	100	100	100	100	100
9/16	0	0 [d]	0	0	0	1,254		4,377	3,393	1,630	100	100	100	100	100
9/17	0	0 [d]	0	0	0	1,254		4,377	3,393	1,630	100	100	100	100	100
9/18	0	0 [d]	0	0	0	1,254		4,377	3,393	1,630	100	100	100	100	100
9/19	0	0 [d]	0	0	0 [b]	1,254		4,377	3,393	1,630	100	100	100	100	100
9/20	0	0 [d]	0	0	0 [b]	1,254		4,377	3,393	1,630	100	100	100	100	100

Note: The boxes represent the median passage date and central 50% of the run. Days with no data are days when the project was not operational.

[a] Date outside of target operational period (not included in accumulative totals).

[b] Estimated salmon passage (whole day).

[c] Estimated salmon passage (partial day).

[d] No estimates for inoperable period.

Appendix B3.–Historic coho salmon passage at the Takotna River weir.

	Daily Passage					Cumulative Passage					Percent Passage				
Date	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
6/15															
6/16															
6/17															
6/18															
6/19															
6/20															
6/21															
6/22															
6/23		0	0		0										
6/24	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/25	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/26	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/27	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/28	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/29	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/30	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/01	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/02	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/03	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/04	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/15	0	0	0 [a]	0	0	0	0	0	0	0	0	0	0	0	0
7/16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	Daily Passage					Cumulative Passage					Percent Passage				
Date	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
7/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/26	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0
7/27	0	0	0	3	0	0	0	0	7	0	0	0	0	0	0
7/28	0	0	0	4 [b]	0	0	0	0	11 [b]	0	0	0	0	0	0
7/29	0	0	0	4 [c]	0	0	0	0	15 [c]	0	0	0	0	0	0
7/30	0	1	1	5 [c]	0	0	1	1	20 [c]	0	0	0	0	0	0
7/31	0	0	1	5 [c]	1	0	1	2	25 [c]	1	0	0	0	0	0
8/01		0	0	6 [b]	1	0	1	2	31 [b]	2	0	0	0	0	0
8/02		0	0	4	1	0	1	2	35	3	0	0	0	0	0
8/03		1	0	8	0	0	2	2	43	3	0	0	0	1	0
8/04	3	0	0	13	3	3	2	2	56	6	0	0	0	1	0
8/05	11	0	0	15	4	14	2	2	71	10	0	0	0	1	0
8/06	8	3	2	27	16	22	5	4	98	26	1	0	0	1	1
8/07	14	1	0	25	14	36	6	4	123	40	1	0	0	2	1
8/08	19	1	2	48	19	55	7	6	171	59	1	0	0	2	2
8/09	40	2	6	40	24	95	9	12	211	83	2	0	0	3	3
8/10	31	3	6	50	18	126	12	18	261	101	3	0	0	4	3
8/11	44	12	4	85	28	170	24	22	346	129	4	1	1	5	4
8/12	80	19	26	139	78	250	43	48	485	207	6	2	1	7	6
8/13	42	20	27	150	20	292	63	75	635	227	7	2	2	9	7
8/14	51	29	23	212	61	343	92	98	847	288	9	4	2	12	9
8/15	58	31	36	140	60	401	123	134	987	348	10	5	3	14	11
8/16	54	51	49	131	92	455	174	183	1,118	440	11	7	5	16	14
8/17	98	44	20	121	182	553	218	203	1,239	622	14	8	5	17	19
8/18	146	77	159	160	124	699	295	362	1,399	746	18	11	9	20	23
8/19	192	66	17	348	56	891	361	379	1,747	802	23	14	10	24	25
8/20	80	91 [b]	11	197	74	971	452	390 [c]	1,944	876	25	17	10	27	27
8/21	387	91 [c]	266	356	57	1,358	543	656 [c]	2,300	933	34	21	16	32	29
8/22	178	91 [c]	326	254	61	1,536	634	982 [c]	2,554	994	39	24	25	36	31
8/23	241	74	328	176	88	1,777	708	1,310	2,730	1,082	45	27	33	38	34
8/24	152	145	397	189	57	1,929	853	1,707	2,919	1,139	49	33	43	41	36

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	Daily Passage					Cumulative Passage					Percent Passage				
Date	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
8/25	107	156	301	217	137	2,036	1,009	2,008	3,136	1,276	51	39	50	44	40
8/26	86	275	267	299	572	2,122	1,284	2,275	3,435	1,848	54	49	57	48	58
8/27	314	175	107	429	73	2,436	1,459	2,382	3,864	1,921	62	56	60	54	60
8/28	490	151	134	335	44	2,926	1,610	2,516	4,199	1,965	74	62	63	59	61
8/29	140	164	121	288	74	3,066	1,774	2,637	4,487	2,039	77	68	66	63	64
8/30	120	104	127	219	46	3,186	1,878	2,764	4,706	2,085	81	72	69	66	65
8/31	62	137	205	267	37	3,248	2,015	2,969	4,973	2,122	82	77	75	69	66
9/01	70	105	133	285	398	3,318	2,120	3,102	5,258	2,520	84	81	78	73	79
9/02	66	92	107	277	330	3,384	2,212	3,209	5,535	2,850	86	85	81	77	89
9/03	54	71	63	192	70	3,438	2,283	3,272	5,727	2,920	87	88	82	80	91
9/04	70	73	90	91	11	3,508	2,356	3,362	5,818	2,931	89	90	84	81	91
9/05	46	68	118	262	20	3,554	2,424	3,480	6,080	2,951	90	93	87	85	92
9/06	100	26	134	209	3	3,654	2,450	3,614	6,289	2,954	92	94	91	88	92
9/07	42	13	109 [a]	188	6	3,696	2,463	3,723	6,477	2,960	93	95	93	90	92
9/08	25	14	79	200	23	3,721	2,477	3,802	6,677	2,983	94	95	95	93	93
9/09	30	14	39	131	18	3,751	2,491	3,841	6,808	3,001	95	96	96	95	94
9/10	36	15	19	70	192	3,787	2,506	3,860	6,878	3,193	96	96	97	96	100
9/11	40	11	21	78	0	3,827	2,517	3,881	6,956	3,193	97	97	97	97	100
9/12	27	24	37	83	0	3,854	2,541	3,918	7,039	3,193	97	98	98	98	100
9/13	29	12	13	79	0	3,883	2,553	3,931	7,118	3,193	98	98	99	99	100
9/14	16	15	14	28	9	3,899	2,568	3,945	7,146	3,202	99	99	99	100	100
9/15	9	6 [c]	16	10	3	3,908	2,574	3,961	7,156	3,205	99	99	99	100	100
9/16	15	11 [c]	7	9	2	3,923	2,585	3,968	7,165	3,207	99	99	100	100	100
9/17	5	3 [c]	7	4	0	3,928	2,588	3,975	7,169	3,207	99	99	100	100	100
9/18	8	5 [c]	2	1	0	3,936	2,593	3,977	7,170	3,207	99	100	100	100	100
9/19	10	6 [c]	2	1	0 [c]	3,946	2,599	3,979	7,171	3,207	100	100	100	100	100
9/20	11	7 [c]	5	0	0 [c]	3,957	2,606	3,984	7,171	3,207	100	100	100	100	100

Note: The boxes represent the median passage date and central 50% of the run. Days with no data are days when the project was not operational.

[a] No estimates for inoperable period.

[b] Estimated salmon passage (partial day).

[c] Estimated salmon passage (whole day).

Appendix B4.–Historic sockeye salmon passage at the Takotna River weir.

	Daily Passage					Cumulative Passage					Percent Passage				
Date	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
6/15															
6/16															
6/17															
6/18															
6/19															
6/20															
6/21															
6/22															
6/23		0	0		0										
6/24	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/25	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/26	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/27	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/28	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/29	0	0	0	[a]	0	0	0	0		0	0	0	0		0
6/30	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/1	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/2	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/3	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/4	0	0	0	[a]	0	0	0	0		0	0	0	0		0
7/5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/15	0	0	0 [a]	0	0	0	0	0	0	0	0	0	0	0	0
7/16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	Daily Passage					Cumulative Passage					Percent Passage				
Date	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**	**2000**	**2001**	**2002**	**2003**	**2004**
7/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/28	0	0	0	0 [a]	0	0	0	0	0	0	0	0	0	0	0
7/29	0	0	0	[a]	0	0	0	0	0	0	0	0	0	0	0
7/30	0	0	0	[a]	0	0	0	0	0	0	0	0	0	0	0
7/31	0	0	0	[a]	1	0	0	0	0	1	0	0	0	0	6
8/1	0	0	0	0 [a]	0	0	0	0	0	1	0	0	0	0	6
8/2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	6
8/3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	6
8/4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	6
8/5	1	0	0	0	0	1	0	0	0	1	100	0	0	0	6
8/6	0	0	0	0	0	1	0	0	0	1	100	0	0	0	6
8/7	0	0	0	0	0	1	0	0	0	1	100	0	0	0	6
8/8	0	0	0	1	0	1	0	0	1	1	100	0	0	25	6
8/9	0	0	0	1	0	1	0	0	2	1	100	0	0	50	6
8/10	0	1	0	0	1	1	1	0	2	2	100	100	0	50	12
8/11	0	0	0	0	0	1	1	0	2	2	100	100	0	50	12
8/12	0	0	0	0	0	1	1	0	2	2	100	100	0	50	12
8/13	0	0	0	0	0	1	1	0	2	2	100	100	0	50	12
8/14	0	0	0	0	1	1	1	0	2	3	100	100	0	50	18
8/15	0	0	0	0	0	1	1	0	2	3	100	100	0	50	18
8/16	0	0	0	0	4	1	1	0	2	7	100	100	0	50	41
8/17	0	0	0	0	2	1	1	0	2	9	100	100	0	50	53
8/18	0	0	0	0	0	1	1	0	2	9	100	100	0	50	53
8/19	0	0	0	0	0	1	1	0	2	9	100	100	0	50	53
8/20	0	0 [a]	0	0	1	1	1	0	2	10	100	100	0	50	59
8/21	0	0 [a]	1	0	0	1	1	1	2	10	100	100	100	50	59
8/22	0	0 [a]	0	0	1	1	1	1	2	11	100	100	100	50	65
8/23	0	0	0	0	0	1	1	1	2	11	100	100	100	50	65
8/24	0	0	0	0	0	1	1	1	2	11	100	100	100	50	65

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Date	Daily Passage					Cumulative Passage					Percent Passage				
	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004
8/25	0	0	0	0	1	1	1	1	2	12	100	100	100	50	71
8/26	0	0	0	0	2	1	1	1	2	14	100	100	100	50	82
8/27	0	0	0	0	0	1	1	1	2	14	100	100	100	50	82
8/28	0	0	0	1	0	1	1	1	3	14	100	100	100	75	82
8/29	0	0	0	0	0	1	1	1	3	14	100	100	100	75	82
8/30	0	0	0	0	1	1	1	1	3	15	100	100	100	75	88
8/31	0	0	0	0	0	1	1	1	3	15	100	100	100	75	88
9/1	0	0	0	0	0	1	1	1	3	15	100	100	100	75	88
9/2	0	0	0	0	0	1	1	1	3	15	100	100	100	75	88
9/3	0	0	0	0	0	1	1	1	3	15	100	100	100	75	88
9/4	0	0	0	0	1	1	1	1	3	16	100	100	100	75	94
9/5	0	0	0	0	0	1	1	1	3	16	100	100	100	75	94
9/6	0	0	0	0	0	1	1	1	3	16	100	100	100	75	94
9/7	0	0	0 [a]	0	0	1	1	1	3	16	100	100	100	75	94
9/8	0	0	0	0	0	1	1	1	3	16	100	100	100	75	94
9/9	0	0	0	1	0	1	1	1	4	16	100	100	100	100	94
9/10	0	0	0	0	0	1	1	1	4	16	100	100	100	100	94
9/11	0	0	0	0	0	1	1	1	4	16	100	100	100	100	94
9/12	0	0	0	0	0	1	1	1	4	16	100	100	100	100	94
9/13	0	0	0	0	0	1	1	1	4	16	100	100	100	100	94
9/14	0	0	0	0	0	1	1	1	4	16	100	100	100	100	94
9/15	0	[a]	0	0	0	1	1	1	4	16	100	100	100	100	94
9/16	0	[a]	0	0	1	1	1	1	4	17	100	100	100	100	100
9/17	0	[a]	0	0	0	1	1	1	4	17	100	100	100	100	100
9/18	0	[a]	0	0	0	1	1	1	4	17	100	100	100	100	100
9/19	0	[a]	0	0	0	1	1	1	4	17	100	100	100	100	100
9/20	0	[a]	0	0	0	1	1	1	4	17	100	100	100	100	100

Note: The boxes represent the median passage date and central 50% of the run. Days with no data are days when the project was not operational.

[a] No estimates for inoperable period.

Appendix B5.–Historic longnose sucker passage at the Takotna River weir.

Date	Daily Passage 2000	2001	2002	2003	2004	Cumulative Passage 2000	2001	2002	2003	2004	Percent Passage 2000	2001	2002	2003	2004
6/15															
6/16															
6/17															
6/18															
6/19															
6/20															
6/21															
6/22															
6/23		2,186	0		6		2,186	0				16	0		
6/24	2	571	3	[a]	3	2	2,757	3		3	0	20	0		2
6/25	67	2,746	1	[a]	9	69	5,503	4		12	2	41	1		8
6/26	82	2,076	7	[a]	13	151	7,579	11		25	4	56	2		17
6/27	63	1,748	2	[a]	14	214	9,327	13		39	6	69	2		27
6/28	101	113	21	[a]	9	315	9,440	34		48	8	70	6		33
6/29	100	1,095	3	[a]	2	415	10,535	37		50	11	78	6		34
6/30	220	641	19	[a]	4	635	11,176	56		54	17	83	9		37
7/1	406	633	11	[a]	2	1,041	11,809	67		56	27	88	11		39
7/2	641	207	0	[a]	1	1,682	12,016	67		57	44	89	11		39
7/3	489	94	0	[a]	0	2,171	12,110	67		57	57	90	11		39
7/4	264	30	0	[a]	1	2,435	12,140	67		58	64	90	11		40
7/5	134	23	8	0	0	2,569	12,163	75	0	58	68	90	12	0	40
7/6	107	5	1	1	2	2,676	12,168	76	1	60	70	90	13	0	41
7/7	158	0	4	0	0	2,834	12,168	80	1	60	75	90	13	0	41
7/8	229	93	5	8	0	3,063	12,261	85	9	60	81	91	14	1	41
7/9	118	38	2	1	1	3,181	12,299	87	10	61	84	91	14	2	42
7/10	112	117	0	13	1	3,293	12,416	87	23	62	87	92	14	4	43
7/11	94	1	96	1	0	3,387	12,417	183	24	62	89	92	30	4	43
7/12	56	20	75	1	11	3,443	12,437	258	25	73	91	92	43	4	50
7/13	112	110	15	9	1	3,555	12,547	273	34	74	94	93	45	6	51
7/14	60	140	1	29	9	3,615	12,687	274	63	83	95	94	45	10	57
7/15	63	107	7	23 [a]	0	3,678	12,794	281	86	83	97	95	47	14	57
7/16	22	58	0	9	0	3,700	12,852	281	95	83	97	95	47	16	57
7/17	9	9	0	27	0	3,709	12,861	281	122	83	98	96	47	20	57
7/18	7	95	2	0	1	3,716	12,956	283	122	84	98	96	47	20	58
7/19	0	203	4	38	9	3,716	13,159	287	160	93	98	98	48	26	64

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	Daily Passage					Cumulative Passage					Percent Passage				
Date	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004
7/20	3	39	3	144	0	3,719	13,198	290	304	93	98	98	48	50	64
7/21	9	38	1	6	0	3,728	13,236	291	310	93	98	98	48	51	64
7/22	4	9	0	43	1	3,732	13,245	291	353	94	98	98	48	58	65
7/23	0	19	13	38	3	3,732	13,264	304	391	97	98	99	50	64	67
7/24	0	39	0	2	6	3,732	13,303	304	393	103	98	99	50	65	71
7/25	1	19	1	0	0	3,733	13,322	305	393	103	98	99	50	65	71
7/26	4	1	19	22	7	3,737	13,323	324	415	110	98	99	54	68	76
7/27	4	6	0	2	0	3,741	13,329	324	417	110	98	99	54	68	76
7/28	1	1	4	0 [a]	0	3,742	13,330	328	417	110	99	99	54	68	76
7/29	7	34	5	[a]	0	3,749	13,364	333	417	110	99	99	55	68	76
7/30	0	0	98	[a]	0	3,749	13,364	431	417	110	99	99	71	68	76
7/31	2	7	52	[a]	0	3,751	13,371	483	417	110	99	99	80	68	76
8/1	2	9	4	0 [a]	1	3,753	13,380	487	417	111	99	99	81	68	77
8/2	7	22	5	0	0	3,760	13,402	492	417	111	99	100	81	68	77
8/3	3	0	2	1	0	3,763	13,402	494	418	111	99	100	82	69	77
8/4	1	0	0	1	0	3,764	13,402	494	419	111	99	100	82	69	77
8/5	8	0	0	0	6	3,772	13,402	494	419	117	99	100	82	69	81
8/6	4	0	20	4	14	3,776	13,402	514	423	131	99	100	85	69	90
8/7	3	0	14	9	0	3,779	13,402	528	432	131	99	100	87	71	90
8/8	3	0	0	3	1	3,782	13,402	528	435	132	100	100	87	71	91
8/9	0	0	0	4	0	3,782	13,402	528	439	132	100	100	87	72	91
8/10	1	0	0	7	0	3,783	13,402	528	446	132	100	100	87	73	91
8/11	0	0	0	8	0	3,783	13,402	528	454	132	100	100	87	75	91
8/12	7	0	5	0	3	3,790	13,402	533	454	135	100	100	88	75	93
8/13	0	0	6	2	2	3,790	13,402	539	456	137	100	100	89	75	94
8/14	0	0	5	106	0	3,790	13,402	544	562	137	100	100	90	92	94
8/15	0	0	2	19	0	3,790	13,402	546	581	137	100	100	90	95	94
8/16	0	0	2	4	0	3,790	13,402	548	585	137	100	100	91	96	94
8/17	0	0	6	1	1	3,790	13,402	554	586	138	100	100	92	96	95
8/18	0	0	1	0	0	3,790	13,402	555	586	138	100	100	92	96	95
8/19	0	0	0	1	0	3,790	13,402	555	587	138	100	100	92	96	95
8/20	0	0 [a]	0	0	0	3,790	13,402	555 [b]	587	138	100	100	92	96	95
8/21	0	0 [a]	0	0	0	3,790	13,402	555 [b]	587	138	100	100	92	96	95
8/22	2	0 [a]	1	11	0	3,792	13,402	556 [b]	598	138	100	100	92	98	95
8/23	4	0	2	0	0	3,796	13,402	558	598	138	100	100	92	98	95
8/24	1	0	12	0	0	3,797	13,402	570	598	138	100	100	94	98	95

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Date	Daily Passage					Cumulative Passage					Percent Passage				
	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004	2000	2001	2002	2003	2004
8/25	0	0	9	0	0	3,797	13,402	579	598	138	100	100	96	98	95
8/26	1	0	3	3	0	3,798	13,402	582	601	138	100	100	96	99	95
8/27	0	0	7	0	0	3,798	13,402	589	601	138	100	100	98	99	95
8/28	0	0	1	0	0	3,798	13,402	590	601	138	100	100	98	99	95
8/29	0	0	1	0	0	3,798	13,402	591	601	138	100	100	98	99	95
8/30	0	0	1	0	0	3,798	13,402	592	601	138	100	100	98	99	95
8/31	0	0	1	0	0	3,798	13,402	593	601	138	100	100	98	99	95
9/1	0	4	2	0	0	3,798	13,406	595	601	138	100	100	99	99	95
9/2	0	23	0	0	0	3,798	13,429	595	601	138	100	100	99	99	95
9/3	0	16	2	0	0	3,798	13,445	597	601	138	100	100	99	99	95
9/4	0	5	1	0	1	3,798	13,450	598	601	139	100	100	99	99	96
9/5	0	1	1	0	4	3,798	13,451	599	601	143	100	100	99	99	99
9/6	0	1	4	0	0	3,798	13,452	603	601	143	100	100	100	99	99
9/7	0	1	1	0 [a]	0	3,798	13,453	604	601	143	100	100	100	99	99
9/8	0	0	0	0	0	3,798	13,453	604	601	143	100	100	100	99	99
9/9	0	1	0	0	0	3,798	13,454	604	601	143	100	100	100	99	99
9/10	0	1	0	0	0	3,798	13,455	604	601	143	100	100	100	99	99
9/11	0	0	0	0	0	3,798	13,455	604	601	143	100	100	100	99	99
9/12	0	1	0	0	0	3,798	13,456	604	601	143	100	100	100	99	99
9/13	0	0	0	2	0	3,798	13,456	604	603	143	100	100	100	99	99
9/14	0	2	0	0	2	3,798	13,458	604	603	145	100	100	100	99	100
9/15	0	0 [a]	0	0	0	3,798	13,458	604	603	145	100	100	100	99	100
9/16	0	0 [a]	0	0	0	3,798	13,458	604	603	145	100	100	100	99	100
9/17	0	0 [a]	0	0	0	3,798	13,458	604	603	145	100	100	100	99	100
9/18	0	0 [a]	0	3	0	3,798	13,458	604	606	145	100	100	100	100	100
9/19	0	0 [a]	0	0	0	3,798	13,458	604	606	145	100	100	100	100	100
9/20	0	0 [a]	0	3	0	3,798	13,458	604	609	145	100	100	100	100	100

Note: The boxes represent the median passage date and central 50% of the run. Days with no data are days when the project was not operational.

[a] No estimation for missed longnose sucker counts.

[b] Estimated salmon passage (whole day).

APPENDIX C. HISTORIC AGE, SEX, AND LENGTH DATA FOR FISH SAMPLED AT THE TAKOTNA RIVER WEIR

Appendix C1.–Historic age and sex data for trap-caught Chinook salmon at the Takotna River weir.

Year	Sample Dates (Stratum Dates[a])	Sample Size	Sex	0.2 Esc.	0.2 %	1.1 Esc.	1.1 %	1.2 Esc.	1.2 %	2.1 Esc.	2.1 %	1.3 Esc.	1.3 %	2.2 Esc.	2.2 %	1.4 Esc.	1.4 %	2.3 Esc.	2.3 %	1.5 Esc.	1.5 %	2.4 Esc.	2.4 %	1.6 Esc.	1.6 %	2.5 Esc.	2.5 %	Total Esc.	Total %
2000	7/5-7	25	M	0	0.0	5	4.0	38	32.0	0	0.0	38	66.7	0	0.0	15	6.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	96	80.0
	(6/25 - 7/9)		F	0	0.0	0	0.0	0	0.0	0	0.0	5	20.0	0	0.0	19	6.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	24	20.0
			Subtotal	0	0.0	5	4.0	38	32.0	0	0.0	43	86.7	0	0.0	34	13.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	120	100.0
	7/12-14	23	M	0	0.0	0	0.0	8	17.4	0	0.0	18	14.3	0	0.0	12	42.9	0	0.0	2	4.3	0	0.0	0	0.0	0	0.0	39	87.0
	(7/10-16)		F	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6	42.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6	13.0
			Subtotal	0	0.0	0	0.0	8	17.4	0	0.0	18	14.3	0	0.0	18	85.7	0	0.0	2	4.3	0	0.0	0	0.0	0	0.0	45	100.0
	7/19-21	16	M	0	0.0	0	0.0	28	31.3	0	0.0	23	14.3	0	0.0	17	57.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	68	75.0
	(7/17-25)		F	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	22	14.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	22	25.0
			Subtotal	0	0.0	0	0.0	28	31.3	0	0.0	23	14.3	0	0.0	39	71.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	90	100.0
	7/28-30, 8/14,27	14	M	0	0.0	0	0.0	32	35.7	0	0.0	19	14.3	0	0.0	6	57.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	58	64.3
	(7/26-9/9)		F	0	0.0	0	0.0	0	0.0	0	0.0	7	0.0	0	0.0	26	14.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	32	35.7
			Subtotal	0	0.0	0	0.0	32	35.7	0	0.0	26	14.3	0	0.0	32	71.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	90	100.0
	Season[b]	78	M	0	0.0	5	1.4	106	30.7	0	0.0	98	28.4	0	0.0	50	14.5	0	0.0	2	0.6	0	0.0	0	0.0	0	0.0	260	75.5
			F	0	0.0	0	0.0	0	0.0	0	0.0	11	3.2	0	0.0	73	21.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	85	24.5
			Total	0	0.0	5	1.4	106	30.7	0	0.0	109	31.6	0	0.0	123	35.7	0	0.0	2	0.6	0	0.0	0	0.0	0	0.0	345	100.0
2001[c]	7/5-14	34	M		0.0		0.0		6.7		0.0		26.7		0.0		33.3		0.0		0.0		0.0		0.0		0.0		66.7
			F		0.0		0.0		0.0		0.0		4.4		0.0		28.9		0.0		0.0		0.0		0.0		0.0		33.3
			Subtotal		0.0		0.0		6.7		0.0		31.1		0.0		62.2		0.0		0.0		0.0		0.0		0.0		100.0
	7/17-8/7	40	M		0.0		0.0		14.6		0.0		14.6		0.0		19.5		0.0		4.9		0.0		0.0		0.0		53.7
			F		0.0		0.0		0.0		0.0		4.9		0.0		41.5		0.0		0.0		0.0		0.0		0.0		46.3
			Subtotal		0.0		0.0		14.6		0.0		19.5		0.0		61.0		0.0		4.9		0.0		0.0		0.0		100.0
	Season[b]	74	M																										60.5
			F																										39.5
			Total																									721	100.0

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				Age Class																									
	Sample Dates	Sample		0.2		1.1		1.2		2.1		1.3		2.2		1.4		2.3		1.5		2.4		1.6		2.5		Total	
Year	**(Stratum Dates[a])**	**Size**	**Sex**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**
2002	6/27 - 7/1	12	M	0	0.0	0	0.0	7	41.7	0	0.0	5	33.3	0	0.0	2	8.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	13	83.3
(cont.)	(6/23 - 7/2)		F	0	0.0	0	0.0	1	8.3	0	0.0	0	0.0	0	0.0	1	8.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	16.7
			Subtotal	0	0.0	0	0.0	8	50.0	0	0.0	5	33.3	0	0.0	3	16.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	16	100.0
	7/4 - 9, 11	43	M	0	0.0	0	0.0	51	23.3	0	0.0	62	27.9	0	0.0	46	20.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	164	74.4
	(7/3 - 13)		F	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	57	25.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	57	25.6
			Subtotal	0	0.0	0	0.0	51	23.3	0	0.0	62	27.9	0	0.0	103	46.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	221	100.0
	7/15, 17 - 22	26	M	0	0.0	0	0.0	0	0.0	0	0.0	11	34.6	0	0.0	7	23.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	18	57.7
	(7/14 - 23)		F	0	0.0	0	0.0	1	3.8	0	0.0	3	7.7	0	0.0	10	30.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	42.3
			Subtotal	0	0.0	0	0.0	1	3.8	0	0.0	14	42.3	0	0.0	17	53.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	32	100.0
	7/25-26, 29-30, 8/6	17	M	0	0.0	0	0.0	8	17.6	0	0.0	11	23.5	0	0.0	5	11.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	52.9
	(7/24 - 9/19)		F	0	0.0	0	0.0	0	0.0	0	0.0	3	5.9	0	0.0	17	35.3	0	0.0	3	5.9	0	0.0	0	0.0	0	0.0	22	47.1
			Subtotal	0	0.0	0	0.0	8	17.6	0	0.0	14	29.4	0	0.0	22	47.1	0	0.0	3	5.9	0	0.0	0	0.0	0	0.0	47	100.0
	Season[b]	98	M	0	0.0	0	0.0	66	21.0	0	0.0	89	28.2	0	0.0	61	19.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	221	70.0
			F	0	0.0	0	0.0	3	0.8	0	0.0	5	1.7	0	0.0	84	26.7	0	0.0	3	0.9	0	0.0	0	0.0	0	0.0	95	30.0
			Total	0	0.0	0	0.0	69	21.8	0	0.0	94	29.9	0	0.0	145	45.8	0	0.0	3	0.9	0	0.0	0	0.0	0	0.0	316	100.0
2003 [c]	7/5-25	61	M		0.0		0.0		8.2		0.0		31.2		0.0		14.8		0.0		0.0		0.0		0.0		0.0		54.1
			F		0.0		0.0		0.0		0.0		9.8		0.0		34.4		0.0		1.6		0.0		0.0		0.0		45.9
			Subtotal		0.0		0.0		8.2		0.0		41.0		0.0		49.2		0.0		1.6		0.0		0.0		0.0	378	100.0
2004 [c]	7/5-25	69	M		0.0		0.0		39.1		0.0		21.7		0.0		18.8		0.0		0.0		0.0		0.0		0.0		79.7
			F		0.0		0.0		2.9		0.0		1.5		0.0		14.5		0.0		1.4		0.0		0.0		0.0		20.3
			Subtotal		0.0		0.0		42.0		0.0		23.2		0.0		33.3		0.0		1.4		0.0		0.0		0.0	462	100.0
	Grand	176	M	0	0.0	5	0.8	172	26.0	0	0.0	187	28.3	0	0.0	111	16.8	0	0.0	2	0.3	0	0.0	0	0.0	0	0.0	481	72.8
	Total [d]		F	0	0.0	0	0.0	3	0.5	0	0.0	16	2.4	0	0.0	157	23.8	0	0.0	3	0.5	0	0.0	0	0.0	0	0.0	180	27.2
			Total	0	0.0	5	0.8	175	26.5	0	0.0	203	30.7	0	0.0	268	40.5	0	0.0	5	0.8	0	0.0	0	0.0	0	0.0	661	100.0

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

[b] The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

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

[d] The number of fish in the “Grand total” is the sum of the "Season" totals; percentages are derived from those sums.

Appendix C2.–Historic age and length data for trap-caught Chinook salmon at the Takotna River weir.

Year	Sample Dates (Stratum Dates)	Sex		0.2	1.1	1.2	2.1	1.3	2.2	1.4	2.3	1.5	2.4	1.6	2.5
				Age Class											
2000	7/5-7	M	Mean Length		451	515		674		743					
	(6/25-7/9)		Std. Error		-	23		19		8					
			Range		451-451	418		582-754		728-752					
			Sample Size	0	1	8	0	8	0	3	0	0	0	0	0
		F	Mean Length					722		844					
			Std. Error					-		16					
			Range					722-722		805-883					
			Sample Size	0	0	0	0	1	0	4	0	0	0	0	0
	7/12-14	M	Mean Length			519		646		802		895			
	(7/10-16)		Std. Error			22		16		28		-			
			Range			476-575		557-706		728-911		895-895			
			Sample Size	0	0	4	0	9	0	6	0	1	0	0	0
		F	Mean Length							873					
			Std. Error							50					
			Range							780-950					
			Sample Size	0	0	0	0	0	0	3	0	0	0	0	0
	7/19-21	M	Mean Length			482		650		760					
	(7/17-25)		Std. Error			14		28		62					
			Range			453-529		595-719		673-880					
			Sample Size	0	0	5	0	4	0	3	0	0	0	0	0
		F	Mean Length							781					
			Std. Error							37					
			Range							697-860					
			Sample Size	0	0		0	0	0	4	0	0	0	0	0

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Year	Sample Dates (Stratum Dates)	Sex		0.2	1.1	1.2	2.1	1.3	2.2	1.4	2.3	1.5	2.4	1.6	2.5
2000	7/28-30, 8/14, 27	M	Mean Length			498		710		798					
(cont.)	(7/26-9/9)		Std. Error			27		23		-					
			Range			430-585		685-755		798-798					
			Sample Size	0	0	5	0	3	0	1	0	0	0	0	0
		F	Mean Length					812		821					
			Std. Error					-		39					
			Range					812-812		714-898					
			Sample Size	0	0		0	1	0	4	0	0	0	0	0
	Season [a]	M	Mean Length		451	501		671		770		895			
			Range		451-451	418-623		557-755		673-911		895-895			
			Sample Size	0	1	22	0	24	0	13	0	1	0	0	0
		F	Mean Length					744		818					
			Range					722-812		697-950					
			Sample Size	0	0	0	0	2	0	15	0	0	0	0	0
2001	7/5-14	M	Mean Length			552		663		810					
			Std. Error			6		14		15					
			Range			540-560		595-735		710-895					
			Sample Size	0	0	3	0	12	0	15	0	0	0	0	0
		F	Mean Length					783		867					
			Std. Error					78		8					
			Range					705-860		810-910					
			Sample Size	0	0	0	0	2	0	13	0	0	0	0	0

Note: the column headers 0.2 through 2.5 are grouped under "Age Class".

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	1.1	1.2	2.1	1.3	2.2	1.4	2.3	1.5	2.4	1.6	2.5
2001 (cont.)	7/17-8/7	M	Mean Length			498		688		828		855			
			Std. Error			25		33		29		5			
			Range			400-555		590-825		640-895		850-860			
			Sample Size	0	0	6	0	6	0	8	0	2	0	0	0
		F	Mean Length					770		861					
			Std. Error					30		15					
			Range					740-800		780-985					
			Sample Size	0	0	0	0	2	0	17	0	0	0	0	0
	Season [a]	M	Mean Length			516		671		816		855			
			Range			400-560		590-825		640-895		850-860			
			Sample Size	0	0	9	0	18	0	23	0	2	0	0	0
		F	Mean Length					776		864					
			Range					705-860		780-985					
			Sample Size	0	0	0	0	4	0	30	0	0	0	0	0
2002	6/27 - 7/1 (6/23 - 7/2)	M	Mean Length			544		679		765					
			Std Error			12		12		-					
			Range			500-565		645-695		765-765					
			Sample Size	0	0	5	0	4	0	1	0	0	0	0	0
		F	Mean Length			575				865					
			Std Error							-					
			Range			575-575				865-865					
			Sample Size	0	0	1	0	0	0	1	0	0	0	0	0

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	1.1	1.2	2.1	1.3	2.2	1.4	2.3	1.5	2.4	1.6	2.5
2002	7/4 - 9, 11	M	Mean Length			553		679	560	756					
(cont.)	(7/3 - 13)		Std Error			6		12	-	25					
			Range			520-580		595-742	560-560	645-850					
			Sample Size	0	0	10	0	12	1	9	0	0	0	0	0
		F	Mean Length							876					
			Std Error							13					
			Range							800-960					
			Sample Size	0	0	0	0	0	0	11	0	0	0	0	0
	7/15, 17 - 22	M	Mean Length					686		763					
	(7/14 - 23)		Std Error					14		38					
			Range					620-745		612-875					
			Sample Size	0	0	0	0	9	0	6	0	0	0	0	0
		F	Mean Length			627		814		835					
			Std Error			-		20		20					
			Range			627-627		794-833		740-922					
			Sample Size	0	0	1	0	2	0	8	0	0	0	0	0
	7/25-26, 29-30, 8/6	M	Mean Length			568		678		839					
	(7/24 - 9/19)		Std Error			22		14		19					
			Range			543-612		648-710		820-858					
			Sample Size	0	0	3	0	4	0	2	0	0	0	0	0
		F	Mean Length					825		855		827			
			Std Error					-		36		-			
			Range					825-825		755-976		827-827			
			Sample Size	0	0	0	0	1	0	6	0	1	0	0	0

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	1.1	1.2	2.1	1.3	2.2	1.4	2.3	1.5	2.4	1.6	2.5
2002 (cont.)	Season [a]	M	Mean Length			554		679	560	765					
			Range			500-612		595-745	560-560	612-875					
			Sample Size	0	0	18	0	29	1	18	0	0	0	0	0
		F	Mean Length			600		820		867		827			
			Range			575-627		794-833		740-976		827-827			
			Sample Size	0	0	2	0	3	0	26	0	1	0	0	0
2003 [b]	7/5-25	M	Mean Length			514		723		764					
			Range			430-607		635-785		675-893					
			Sample Size	0	0	5	0	19	0	9	0	0	0	0	0
		F	Mean Length					817	975	867		975			
			Range					765-850	975-975	770-980		975-975			
			Sample Size	0	0	0	0	6	1	21	0	1	0	0	0
2004 [b]	6/29 - 7/1, 6 - 8 15- 17, 21 - 22, 28 - 29, 8/4 - 5	M	Mean Length			577		675		768					
			Range			454-650		618-818		613-936					
			Sample Size	0	0	27	0	15	0	13	0	0	0	0	0
		F	Mean Length			622		707		857		903			
			Range			602-641		707-707		744-924		903-903			
			Sample Size	0	0	2	0	1	0	10	0	1	0	0	0
	Grand Total [c]	M	Mean Length		451	528		675	560	768		895			
			Range		451-451	418-623		557-755	560-560	673-911		895-895			
			Sample Size	0	1	40	0	53	1	31	0	1	0	0	0
		F	Mean Length			600		782		843		827			
			Range			575 - 627		722-812		697-950		827-827			
			Sample Size	0	0	2	0	5	0	41	0	1	0	0	0

[a] "Season" mean lengths are weighted by the escapement passage in each stratum.
[b] Sampling dates do not meet criteria for estimating escapement percentages for some or all of the strata; "Season" is not included in "Grand Total".
[c] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Appendix C3.–Historic age and sex data for trap-caught chum salmon at the Takotna River weir.

				Age Class									
				0.2		0.3		0.4		0.5		Total	
Year	Sample Dates (Stratum Dates[a])	Sample Size	Sex	Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%
2000	7/5 - 7	85	M	0	0.0	73	17.6	117	28.2	5	1.2	195	47.1
	(6/24 - 7/9)		F	0	0.0	132	31.8	88	21.2	0	0.0	220	52.9
			Subtotal	0	0.0	205	49.4	205	49.4	5	1.2	415	100.0
	7/12 - 14	117	M	0	0.0	58	20.5	41	14.6	0	0.0	98	35.0
	(7/10 - 16)		F	0	0.0	120	42.7	62	22.2	0	0.0	183	65.0
			Subtotal	0	0.0	178	63.2	103	36.8	0	0.0	281	100.0
	7/19 - 21	140	M	8	2.2	104	30.0	52	15.0	0	0.0	163	47.1
	(7/17 - 24)		F	7	2.1	131	37.9	44	12.9	0	0.0	183	52.9
			Subtotal	15	4.3	235	67.9	96	27.9	0	0.0	346	100.0
	7/28 - 29	23	M	0	0.0	55	26.1	19	8.7	0	0.0	74	34.8
	(7/25 - 8/29)		F	18	8.7	102	47.8	18	8.7	0	0.0	138	65.2
			Subtotal	18	8.7	157	73.9	37	17.4	0	0.0	212	100.0
	Season[b]	365	M	7	0.6	290	23.1	229	18.2	5	0.4	531	42.3
			F	26	2.1	484	38.6	213	17.0	0	0.0	723	57.7
			Total	33	2.7	774	61.7	442	35.2	5	0.4	1,254	100.0
2001	7/5, 6	74	M	0	0.0	223	36.5	190	31.1	0	0.0	413	67.6
	(6/20, 7/8)		F	0	0.0	74	12.1	124	20.3	0	0.0	198	32.4
			Subtotal	0	0.0	297	48.6	314	51.4	0	0.0	611	100.0
	7/10, 11, 13, 14	153	M	0	0.0	567	33.3	289	17.0	11	0.7	867	51.0
	(7/9, 15)		F	0	0.0	589	34.7	245	14.4	0	0.0	834	49.0
			Subtotal	0	0.0	1,156	68.0	534	31.4	11	0.7	1,701	100.0
	7/17, 18	83	M	0	0.0	429	39.7	130	12.1	0	0.0	559	51.8
	(7/16, 19)		F	0	0.0	468	43.4	52	4.8	0	0.0	520	48.2
			Subtotal	0	0.0	897	83.1	182	16.9	0	0.0	1,079	100.0
	7/21, 22, 23	103	M	0	0.0	421	34.9	141	11.7	0	0.0	562	46.6
	(7/20 , 25)		F	0	0.0	527	43.7	117	9.7	0	0.0	644	53.4
			Subtotal	0	0.0	948	78.6	258	21.4	0	0.0	1,206	100.0

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				Age Class									
	Sample Dates	**Sample**		**0.2**		**0.3**		**0.4**		**0.5**		**Total**	
Year	**(Stratum Dates[a])**	**Size**	**Sex**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**	**Esc.**	**%**
2001	7/28, 29, 30	106	M	0	0.0	222	36.8	12	1.9	0	0.0	233	38.7
(cont.)	(7/26 , 8/2)		F	0	0.0	335	55.7	34	5.6	0	0.0	370	61.3
			Subtotal	0	0.0	557	92.5	46	7.5	0	0.0	603	100.0
	8/5, 6, 7	54	M	0	0.0	57	25.9	4	1.9	0	0.0	61	27.8
	(8/3, 28)		F	4	0.9	155	70.4	0	0.0	0	0.0	159	72.2
			Subtotal	4	0.9	212	96.3	4	1.9	0	0.0	220	100.0
	Season[b]	573	M	0	0.0	1,919	35.4	765	14.1	11	0.2	2,695	49.7
			F	4	0.1	2,149	39.7	572	10.6	0	0.0	2,725	50.3
			Total	4	0.1	4,068	75.1	1,337	24.7	11	0.2	5,420	100
2002	6/27 - 28	190	M	0	0.0	59	11.1	188	35.2	6	1.1	253	47.4
	(6/23 - 29)		F	0	0.0	76	14.2	200	37.4	5	1.0	281	52.6
			Subtotal	0	0.0	135	25.3	388	72.6	11	2.1	534	100.0
	7/1 - 3	137	M	0	0.0	207	23.4	311	35.0	7	0.7	525	59.1
	(6/30 - 7/5)		F	0	0.0	156	17.5	188	21.2	19	2.2	363	40.9
			Subtotal	0	0.0	363	40.9	499	56.2	26	2.9	888	100.0
	7/8 - 10	164	M	9	0.6	277	19.5	476	33.5	9	0.6	770	54.3
	(7/6 - 12)		F	8	0.6	311	22.0	329	23.2	0	0.0	649	45.7
			Subtotal	17	1.2	588	41.5	805	56.7	9	0.6	1,419	100.0
	7/15 - 17	131	M	6	0.8	203	29.0	112	16.0	0	0.0	320	45.8
	(7/13 - 19)		F	5	0.7	181	26.0	192	27.5	0	0.0	379	54.2
			Subtotal	11	1.5	384	55.0	304	43.5	0	0.0	699	100.0
	7/22 - 24	141	M	15	2.8	213	39.7	84	15.6	4	0.7	316	58.9
	(7/20 - 26)		F	23	4.3	153	28.4	45	8.5	0	0.0	221	41.1
			Subtotal	38	7.1	366	68.1	129	24.1	4	0.7	537	100.0
	7/29 - 31, 8/5 - 7	61	M	27	9.9	74	26.3	23	8.2	0	0.0	124	44.3
	(7/27-9/20)		F	14	4.9	73	26.2	64	22.9	5	1.6	156	55.7
			Subtotal	41	14.8	147	52.5	87	31.1	5	1.6	280	100.0
	Season[b]	824	M	57	1.3	1,039	23.8	1,197	27.3	24	0.5	2,317	53.0
			F	50	1.2	955	21.8	1,024	23.4	30	0.7	2,060	47.0
			Total	107	2.5	1,994	45.6	2,221	50.7	54	1.2	4,377	100.0

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Year	Sample Dates (Stratum Dates[a])	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 %
2003	7/5 - 7	212	M	0	0.0	496	54.3	104	11.3	9	0.9	608	66.5
	(6/24 - 7/10)		F	26	2.8	224	24.5	56	6.2	0	0.0	306	33.5
			Subtotal	26	2.8	720	78.8	160	17.5	9	0.9	914	100.0
	7/14 - 16	187	M	6	0.5	556	49.7	102	9.1	0	0.0	664	59.4
	(7/11 - 7/19)		F	24	2.2	413	36.9	18	1.6	0	0.0	455	40.6
			Subtotal	30	2.7	969	86.6	120	10.7	0	0.0	1,119	100.0
	7/23 - 25, 8/10 - 11	165	M	8	0.6	445	32.7	41	3.0	8	0.6	503	37.0
	(7/20 - 9/20)		F	107	7.9	701	51.5	50	3.7	0	0.0	857	63.0
			Subtotal	115	8.5	1,145	84.2	91	6.7	8	0.6	1,360	100.0
	Season[b]	564	M	14	0.4	1,497	44.2	246	7.3	17	0.5	1,775	52.3
			F	157	4.6	1,338	39.4	124	3.6	0	0.0	1,618	47.7
			Total	171	5.0	2,835	83.6	370	10.9	17	0.5	3,393	100.0
2004	6/30 - 7/3, 6 - 8	210	M	24	2.4	227	22.9	274	27.6	0	0.0	525	52.9
	(6/23 - 7/12)		F	38	3.8	251	25.2	180	18.1	0	0.0	469	47.1
			Subtotal	62	6.2	478	48.1	454	45.7	0	0.0	994	100.0
	7/15 - 17, 20 - 22	91	M	31	6.6	103	22.0	62	13.2	0	0.0	196	41.8
	(7/13 - 7/25)		F	46	9.9	150	31.8	77	16.5	0	0.0	273	58.2
			Subtotal	77	16.5	253	53.8	139	29.7	0	0.0	469	100.0
	7/27 - 29, 8/3 - 5	42	M	44	26.2	29	16.7	24	14.3	0	0.0	97	57.1
	(7/26 - 9/20)		F	53	30.9	16	9.5	4	2.4	0	0.0	73	42.9
			Subtotal	97	57.1	45	26.2	28	16.7	0	0.0	170	100.0
	Season[b]	343	M	99	6.1	359	22.0	361	22.1	0	0.0	818	50.1
			F	137	8.4	416	25.5	261	16.0	0	0.0	815	49.9
			Total	236	14.5	775	47.5	622	38.1	0	0.0	1,633	100.0
	Grand	2,669	M	78	0.5	4,745	29.5	2,437	15.2	57	0.4	7,318	45.5
	Total[c]		F	237	1.5	4,926	30.6	1,933	12.0	30	0.2	7,126	44.3
			Total	551	3.4	10,446	65.0	4,992	31.1	87	0.5	16,077	89.8

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

[b] The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[c] The number of fish in the "Grand total" are the sum of the "Season" totals; percentages are derived from those sums.

Appendix C4.–Historic age and length data for trap-caught chum salmon at the Takotna River weir.

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
2000	7/5 - 7	M	Mean Length		554	606	648
	(6/24 - 7/9)		Std. Error		6	7	-
			Range		507- 580	540- 658	648- 648
			Sample Size	0	15	24	1
		F	Mean Length		542	576	
			Std. Error		4	9	
			Range		490- 583	514- 667	
			Sample Size	0	27	18	0
	7/12 - 14	M	Mean Length		561	577	
	(7/10 - 16)		Std. Error		3	4	
			Range		537- 587	548- 602	
			Sample Size	0	24	17	0
		F	Mean Length		540	558	
			Std. Error		3	6	
			Range		500- 583	485- 614	
			Sample Size	0	50	26	0
	7/19 - 21	M	Mean Length	547	562	590	
	(7/17 - 24)		Std. Error	29	4	8	
			Range	496- 596	502- 610	530- 698	
			Sample Size	3	42	21	0
		F	Mean Length	546	542	551	
			Std. Error	23	3	7	
			Range	516- 591	477- 591	515- 618	
			Sample Size	3	53	18	0
	7/28, 29	M	Mean Length		564	620	
	(7/25 - 8/29)		Std. Error		6		
			Range		548- 588	620- 620	
			Sample Size	0	6	2	0
		F	Mean Length	525	542	519	
			Std. Error	15	10	5	
			Range	510- 540	485- 587	514- 523	
			Sample Size	2	11	2	0
	Season[a]	M	Mean Length	547	560	598	648
			Range	496- 596	502- 610	530- 698	648- 648
			Sample Size	3	87	64	1
		F	Mean Length	531	542	560	
			Range	510- 591	477- 591	485- 667	
			Sample Size	5	141	64	0

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
2001	7/5, 6	M	Mean Length		603	587	
	(6/23 - 7/8)		Std. Error		6	7	
			Range		540- 645	505- 640	
			Sample Size	0	27	23	0
		F	Mean Length		572	563	
			Std. Error		4	7	
			Range		545- 585	500- 600	
			Sample Size	0	9	15	0
	7/10 - 14	M	Mean Length		585	591	540
	(7/9 - 15)		Std. Error		4	7	-
			Range		535- 650	500- 645	540- 540
			Sample Size	0	51	26	1
		F	Mean Length		551	565	
			Std. Error		3	5	
			Range		495- 600	530- 615	
			Sample Size	0	53	22	0
	7/17 - 18	M	Mean Length		578	600	
	(7/16 - 19)		Std. Error		4	5	
			Range		540- 620	570- 620	
			Sample Size	0	33	10	0
		F	Mean Length		549	569	
			Std. Error		4	12	
			Range		515- 590	540- 590	
			Sample Size	0	36	4	0
	7/21 - 23	M	Mean Length		574	584	
	(7/20 - 25)		Std. Error		5	7	
			Range		520- 665	540- 625	
			Sample Size	0	36	12	0
		F	Mean Length		546	576	
			Std. Error		4	7	
			Range		475- 600	540- 615	
			Sample Size	0	45	10	0
	7/28 - 30	M	Mean Length		578	585	
	(7/26 - 8/2)		Std. Error		5	10	
			Range		510- 630	575- 595	
			Sample Size	0	39	2	0
		F	Mean Length		552	543	
			Std. Error		3	8	
			Range		500- 600	510- 565	
			Sample Size	0	59	6	0

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
2001	8/5 - 7	M	Mean Length		559	620	
(cont.)	(8/3 - 28)		Std. Error		10	-	
			Range		490- 610	620- 620	
			Sample Size	0	14	1	0
		F	Mean Length	500	519		
			Std. Error	-	4		
			Range	500- 500	465- 610		
			Sample Size	1	38	0	0
	Season[a]	M	Mean Length		581	590	540
			Range		490- 665	500- 645	540- 540
			Sample Size	0	200	74	1
		F	Mean Length	500	548	566	
			Range	500- 500	465- 610	500- 615	
			Sample Size	1	240	57	0
2002	6/27 - 28	M	Mean Length		590	609	613
	(6/23 - 29)		Std. Error		5	3	8
			Range		544- 624	550- 660	605- 620
			Sample Size	0	21	67	2
		F	Mean Length		574	582	583
			Std. Error		4	3	28
			Range		537- 625	526- 630	555- 610
			Sample Size	0	27	71	2
	7/1 - 3	M	Mean Length		590	610	572
	(6/30 - 7/5)		Std. Error		7	4	-
			Range		520- 696	543- 680	572- 572
			Sample Size	0	32	48	1
		F	Mean Length		555	576	555
			Std. Error		5	4	3
			Range		500- 583	530- 611	551- 562
			Sample Size	0	24	29	3
	7/8 - 10	M	Mean Length	556	579	605	612
	(7/6 - 12)		Std. Error	-	5	4	-
			Range	556- 556	525- 633	525- 690	612- 612
			Sample Size	1	32	55	1
		F	Mean Length	496	556	571	
			Std. Error	-	4	4	
			Range	496- 496	498- 615	519- 625	
			Sample Size	1	36	38	0

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
2002	7/15 - 17	M	Mean Length	515	589	605	
(cont.)	(7/13 - 19)		Std. Error	-	5	7	
			Range	515- 515	538- 648	550- 655	
			Sample Size	1	38	21	0
		F	Mean Length	532	542	573	
			Std. Error	-	4	5	
			Range	532- 532	508- 586	515- 643	
			Sample Size	1	34	36	0
	7/22 - 24	M	Mean Length	563	578	591	610
	(7/20 - 26)		Std. Error	22	4	7	-
			Range	506- 605	493- 660	550- 672	610- 610
			Sample Size	4	56	22	1
		F	Mean Length	528	551	561	
			Std. Error	8	4	7	
			Range	498- 552	476- 611	528- 600	
			Sample Size	6	40	12	0
	7/29 - 31, 8/5 - 7	M	Mean Length	538	578	605	
	(7/27-9/20)		Std. Error	11	6	20	
			Range	510- 586	515- 611	550- 650	
			Sample Size	6	16	5	0
		F	Mean Length	503	536	552	587
			Std. Error	12	7	5	-
			Range	482- 522	485- 574	518- 603	587- 587
			Sample Size	3	16	14	1
	Season[a]	M	Mean Length	545	583	606	601
			Range	506- 605	493- 696	525- 690	572- 620
			Sample Size	12	195	218	5
		F	Mean Length	516	552	573	565
			Range	482- 552	476- 625	515- 643	551- 610
			Sample Size	11	177	200	6
2003	7/5 - 7	M	Mean Length		585	624	618
	(6/24 - 7/10)		Std. Error		3	5	18
			Range		500- 645	570- 676	600- 635
			Sample Size	0	115	24	2
		F	Mean Length	540	568	585	
			Std. Error	10	4	7	
			Range	505- 563	520- 647	555- 625	
			Sample Size	6	51	13	0

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
2003	7/14 - 16	M	Mean Length	550	567	604	
(cont.)	(7/11 - 7/19)		Std. Error	-	3	9	
			Range	550- 550	505- 635	500- 655	
			Sample Size	1	93	17	0
		F	Mean Length	521	544	590	
			Std. Error	5	4	30	
			Range	510- 532	475- 620	535- 640	
			Sample Size	4	69	3	0
	7/23 - 25, 8/10 - 11	M	Mean Length	530	554	603	630
	(7/20 - 9/20)		Std. Error	-	4	14	-
			Range	530- 530	476- 620	570- 650	630- 630
			Sample Size	1	54	5	1
		F	Mean Length	502	527	547	
			Std. Error	6	3	12	
			Range	470- 537	485- 605	495- 580	
			Sample Size	13	85	6	0
	Season[a]	M	Mean Length	538	569	612	624
			Range	530- 550	476- 645	500- 676	600- 635
			Sample Size	2	262	46	3
		F	Mean Length	510	539	570	
			Range	470- 563	475- 647	495- 640	
			Sample Size	23	205	22	0
2004	6/30 - 7/3, 6 - 8	M	Mean Length	550	558	584	
	(6/23 - 7/12)		Std. Error	9	5	4	
			Range	530- 571	485- 672	504- 694	
			Sample Size	5	48	58	0
		F	Mean Length	523	544	552	
			Std. Error	4	3	4	
			Range	506- 537	476- 606	508- 612	
			Sample Size	8	53	38	0
	7/15 - 17, 20 - 22	M	Mean Length	526	560	584	
	(7/13 - 7/25)		Std. Error	10	6	10	
			Range	502- 566	502- 604	506- 619	
			Sample Size	6	20	12	0
		F	Mean Length	506	528	541	
			Std. Error	6	6	6	
			Range	484- 536	451- 574	514- 587	
			Sample Size	9	29	15	0

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
2004	7/27 - 29, 8/3 - 5	M	Mean Length	530	550	582	
(cont.)	(7/26 - 9/20)		Std. Error	6	7	15	
			Range	497- 566	532- 577	530- 626	
			Sample Size	11	7	6	0
		F	Mean Length	505	531	538	
			Std. Error	7	10	N/A	
			Range	446- 534	514- 550	538- 538	
			Sample Size	13	4	1	0
	Season[a]	M	Mean Length	534	558	584	
			Range	497- 571	485- 672	504- 694	
			Sample Size	22	75	76	0
		F	Mean Length	510	538	548	
			Range	446- 537	451- 606	508- 612	
			Sample Size	30	86	54	0
	Grand Total[b]	M	Mean Length	541	570	598	603
			Range	496-596	476-696	500-698	540-648
			Sample Size	39	819	478	10
		F	Mean Length	517	547	571	607
			Range	446-591	451-647	485-667	551-610
			Sample Size	70	849	397	6

[a] "Season" mean lengths are weighted by the escapement passage in each stratum.
[b] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Appendix C5.–Historic age and sex data for trap-caught coho salmon at the Takotna River weir.

				Age Class							
				1.1		2.1		3.1		Total	
Year	Sample Dates (Stratum Dates[a])	Sample Size	Sex	Esc.	%	Esc.	%	Esc.	%	Esc.	%
2000	8/14	36	M	0	0.0	421	47.2	25	2.8	446	50.0
	(8/4-19)		F	0	0.0	445	50.0	0	0.0	445	50.0
			Subtotal	0	0.0	866	97.2	25	2.8	891	100.0
	8/25-27	152	M	0	0.0	1,059	48.7	15	0.7	1,073	49.3
	(8/20-29)		F	0	0.0	1,087	50.0	14	0.6	1,102	50.7
			Subtotal	0	0.0	2,146	98.7	29	1.3	2,175	100.0
	9/1- 3	136	M	0	0.0	273	43.4	0	0.0	273	43.4
	(8/30-9/7)		F	0	0.0	334	52.9	23	3.7	357	56.6
			Subtotal	0	0.0	607	96.3	23	3.7	630	100.0
	9/11-13	71	M	4	1.4	106	40.9	0	0.0	110	42.3
	(9/8-20)		F	7	2.8	140	53.5	4	1.4	151	57.7
			Subtotal	11	4.2	246	94.4	4	1.4	261	100.0
	Season[b]	395	M	4	0.1	1,860	47.0	39	1.0	1,902	48.1
			F	7	0.2	2,006	50.7	41	1.0	2,055	51.9
			Total	11	0.3	3,866	97.7	80	2.0	3,957	100.0
2001	8/19-20, 24	142	M	7	0.7	589	58.4	107	10.6	703	69.7
	(7/30, 31, 8/1, 25)		F	0	0.0	277	27.5	28	2.8	305	30.3
			Subtotal	7	0.7	866	85.9	135	13.4	1,008	100.0
	8/28-29	119	M	0	0.0	522	47.0	38	3.4	560	50.4
	(8/26, 31, 9/1)		F	0	0.0	494	44.5	57	5.1	551	49.6
			Subtotal	0	0.0	1,016	91.5	95	8.5	1,111	100.0
	9/5-6	44	M	0	0.0	199	40.9	66	13.6	265	54.5
	(9/2, 20)		F	0	0.0	210	43.2	11	2.3	221	45.5
			Subtotal	0	0.0	409	84.1	77	15.9	486	100.0
	Season[b]	305	M	7	0.3	1,310	50.3	211	8.1	1,528	58.7
			F	0	0.0	981	37.6	96	3.7	1,077	41.3
			Total	7	0.3	2,291	87.9	307	11.8	2,605	100.0
2002	8/19 - 20, 22 - 23	123	M	0	0.0	1,388	69.1	33	1.6	1,420	70.7
	(8/23 - 8/25)		F	0	0.0	506	25.2	81	4.1	588	29.3
			Subtotal	0	0.0	1,894	94.3	114	5.7	2,008	100.0
	8/27 - 28	114	M	0	0.0	523	54.4	34	3.5	556	57.9
	(8/26 - 31)		F	0	0.0	379	39.5	25	2.6	405	42.1
			Subtotal	0	0.0	902	93.9	59	6.1	961	100.0
	9/4 - 5	112	M	0	0.0	417	41.1	18	1.8	435	42.9
	(9/1 - 20)		F	9	0.9	544	53.5	27	2.7	580	57.1
			Subtotal	9	0.9	961	94.6	45	4.5	1,015	100.0
	Season[b]	349	M	0	0.0	2,327	58.4	85	2.1	2,412	60.5
			F	9	0.2	1,429	35.9	134	3.4	1,572	39.5
			Total	9	0.2	3,756	94.3	219	5.5	3,984	100.0

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Year	Sample Dates (Stratum Dates[a])	Sample Size	Sex	Age Class 1.1 Esc.	1.1 %	2.1 Esc.	2.1 %	3.1 Esc.	3.1 %	Total Esc.	Total %
2003	8/10 - 11	61	M	0	0.0	623	55.7	19	1.7	641	57.4
	(7/26 - 8/16)		F	0	0.0	458	41.0	18	1.6	477	42.6
			Subtotal	0	0.0	1,081	96.7	37	3.3	1,118	100.0
	8/22 - 23	62	M	62	1.6	1,617	41.9	311	8.1	1,990	51.6
	(8/17 - 8/31)		F	0	0.0	1,741	45.2	124	3.2	1,865	48.4
			Subtotal	62	1.6	3,358	87.1	435	11.3	3,855	100.0
	9/10 - 11	60	M	0	0.0	696	31.7	110	5.0	806	36.7
	(9/1 - 20)		F	0	0.0	1,062	48.3	330	15.0	1,392	63.3
			Subtotal	0	0.0	1,758	80	440	20.0	2,198	100.0
	Season[b]	183	M	62	0.9	2,936	40.9	439	6.1	3,437	47.9
			F	0	0.0	3,261	45.5	472	6.6	3,734	52.1
			Total	62	0.9	6,197	86.4	911	12.7	7,171	100.0
2004	8/4 - 5, 14 - 16	162	M	0	0.0	433	58.0	18	2.5	451	60.5
	(7/20 - 8/18)		F	0	0.0	295	39.5	0	0.0	295	39.5
			Subtotal	0	0.0	728	97.5	18	2.5	746	100.0
	8/22 - 24	145	M	8	0.7	782	64.1	9	0.7	799	65.5
	(8/19 - 8/29)		F	0	0.0	412	33.8	8	0.7	420	34.5
			Subtotal	8	0.7	1,194	97.9	17	1.4	1,219	100.0
	8/30 - 9/1, 5 - 7	73	M	0	0.0	630	50.7	17	1.4	647	52.1
	(9/1 - 20)		F	0	0.0	595	47.9	0	0.0	595	47.9
			Subtotal	0	0.0	1,225	98.6	17	1.4	1,242	100.0
	Season [b]	380	M	8	0.3	1,844	57.5	44	1.4	1,896	59.1
			F	0	0.0	1,302	40.6	8	0.2	1,311	40.9
			Total	8	0.3	3,146	98.1	52	1.6	3,207	100.0
	Grand	1,232	M	81	0.4	10,277	49.1	818	3.9	11,175	53.4
	Total [c]		F	16	0.1	8,979	42.9	751	3.6	9,749	46.6
			Total	97	0.5	16,110	77.0	1,517	7.3	20,924	100.0

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

[b] The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[c] The number of fish in the "Grand total" are the sum of the "Season" totals; percentages are derived from those sums.

Appendix C6.–Historic age and length data for trap-caught coho salmon at the Takotna River weir.

	Sample Dates			Age Class		
Year	(Stratum Dates)	Sex		1.1	2.1	3.1
2000	8/14	M	Mean Length		541	650
	(8/4-19)		Std. Error		9	-
			Range		476- 614	650- 650
			Sample Size	0	17	1
		F	Mean Length		535	
			Std. Error		11	
			Range		425- 610	
			Sample Size	0	18	0
	8/25-27	M	Mean Length		537	506
	(8/20-29)		Std. Error		5	-
			Range		412- 611	506- 506
			Sample Size	0	74	1
		F	Mean Length		552	543
			Std. Error			-
			Range		488- 600	543- 543
			Sample Size	0	76	1
	9/1- 3	M	Mean Length		547	
	(8/30-9/7)		Std. Error		6	
			Range		420- 640	
			Sample Size	0	59	0
		F	Mean Length		544	563
			Std. Error		4	13
			Range		435- 594	523- 597
			Sample Size	0	72	5
	9/11-13	M	Mean Length	573	551	
	(9/8-20)		Std. Error	-	8	
			Range	573- 573	444- 611	
			Sample Size	1	29	0
		F	Mean Length	571	558	575
			Std. Error	21	5	-
			Range	550- 591	477- 614	575- 575
			Sample Size	2	38	1
	Season[a]	M	Mean Length	573	540	597
			Range	573- 573	412- 640	506- 650
			Sample Size	1	179	2
		F	Mean Length	571	547	557
			Range	550- 591	425- 614	523- 597
			Sample Size	2	204	7

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
2001	8/19-20, 24	M	Mean Length	550	567	559
	7/30,31,8/1,25		Std. Error	-	5	12
			Range	550- 550	475- 635	430- 620
			Sample Size	1	79	19
		F	Mean Length		568	558
			Std. Error		4	9
			Range		505- 620	535- 585
			Sample Size	0	38	5
	8/28-29	M	Mean Length		561	581
	8/26,31,9/1		Std. Error		8	14
			Range		395- 640	520- 630
			Sample Size	0	53	7
		F	Mean Length		577	578
			Std. Error		4	12
			Range		500- 635	530- 620
			Sample Size	0	51	8
	9/5-6	M	Mean Length		559	580
	9/2,20		Std. Error		14	13
			Range		440- 640	515- 615
			Sample Size	0	17	7
		F	Mean Length		568	563
			Std. Error		6	33
			Range		515- 605	530- 595
			Sample Size	0	18	2
	Season[a]	M	Mean Length	550	563	570
			Range	550- 550	395- 640	430- 630
			Sample Size	1	149	33
		F	Mean Length		573	570
			Range		500- 635	530- 620
			Sample Size	0	107	15
2002	8/19 - 20, 22 - 23	M	Mean Length		530	480
	(6/23 - 8/25)		Std. Error		5	45
			Range		440- 615	435- 525
			Sample Size	0	85	2
		F	Mean Length		564	628
			Std. Error		4	47
			Range		525- 620	536- 810
			Sample Size	0	31	5

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
2002	8/27 - 28	M	Mean Length		563	607
(Cont.)	(8/26 - 31)		Std. Error		6	12
			Range		405- 630	580- 635
			Sample Size	0	62	4
		F	Mean Length		570	591
			Std. Error		4	14
			Range		516- 648	567- 615
			Sample Size	0	45	3
	9/4 - 5	M	Mean Length		568	550
	(9/1 - 20)		Std. Error		8	40
			Range		405- 660	510- 590
			Sample Size	0	46	2
		F	Mean Length	535	579	591
			Std. Error	-	4	11
			Range	535- 535	500- 650	578- 612
			Sample Size	1	60	3
	Season[a]	M	Mean Length		545	546
			Range		405- 660	435- 635
			Sample Size	0	193	8
		F	Mean Length	535	571	613
			Range	535- 535	500- 650	536- 810
			Sample Size	1	136	11
2003	8/10 - 11	M	Mean Length		544	628
	(7/26 - 8/16)		Std. Error		7	-
			Range		462- 641	628- 628
			Sample Size	0	34	1
		F	Mean Length		562	547
			Std. Error		4	-
			Range		537- 604	547- 547
			Sample Size	0	25	1
	8/22 - 23	M	Mean Length	488	533	578
	(8/17 - 8/31)		Std. Error	-	7	21
			Range	488- 488	427- 598	510- 624
			Sample Size	1	26	5
		F	Mean Length		567	548
			Std. Error		5	36
			Range		492- 612	512- 583
			Sample Size	0	28	2

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Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
2003 (Cont.)	9/10 - 11 (9/1 - 20)	M	Mean Length		551	564
			Std. Error		12	24
			Range		450- 640	523- 606
			Sample Size	0	19	3
		F	Mean Length		568	576
			Std. Error		7	8
			Range		480- 625	542- 605
			Sample Size	0	29	9
	Season[a]	M	Mean Length	488	540	576
			Range	488- 488	427- 641	510- 628
			Sample Size	1	79	9
		F	Mean Length		566	567
			Range		480- 625	512- 605
			Sample Size	0	82	12
2004	8/4 - 5, 14 - 16 (7/20 - 8/18)	M	Mean Length		515	581
			Std. Error		5	9
			Range		400- 605	566- 600
			Sample Size	0	94	4
		F	Mean Length		533	
			Std. Error		4	
			Range		422- 586	
			Sample Size	0	64	0
	8/22 - 24 (8/19 - 8/29)	M	Mean Length	418	521	499
			Std. Error	-	4	-
			Range	418- 418	426- 593	499- 499
			Sample Size	1	93	1
		F	Mean Length		528	552
			Std. Error		4	-
			Range		415- 582	552- 552
			Sample Size	0	49	1
	8/30 - 9/1, 5 - 7 (8/29 - 20)	M	Mean Length		515	498
			Std. Error		7	-
			Range		412- 602	498- 498
			Sample Size	0	37	1
		F	Mean Length		531	
			Std. Error		5	
			Range		468- 592	
			Sample Size	0	35	0

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	Sample Dates			Age Class		
Year	(Stratum Dates)	Sex		1.1	2.1	3.1
2004 (cont.)	Season[a]	M	Mean Length	418	518	533
			Range	418- 418	400- 605	498- 600
			Sample Size	1	224	6
		F	Mean Length		530	552
			Range		415- 592	552- 552
			Sample Size	0	148	1
	Grand Total [b]	M	Mean Length	507	541	564
			Range	418-573	395-660	430 - 650
			Sample Size	1	224	6
		F	Mean Length	553	557	572
			Range	535 - 591	415-650	512 - 810
			Sample size	0	701	630

[a] "Season" mean lengths are weighted by the escapement passage in each stratum.

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

APPENDIX D. DAILY CLIMATE AND WATER LEVEL DATA COLLECTED AT THE TAKOTNA RIVER WEIR SITE, 2004

Appendix D1.–Daily climate and water level data collected at the Takotna River weir site, 2004.

Date	Time	Sky Codes[a]	Precipitation (mm)	Wind	Temperature (°C) Air	Temperature (°C) Water	Water Stage (cm)
6/24	8:00	4	3.3	Calm	12.0	13.0	51.0
6/25	8:00	5	ND	Calm	12.8	12.1	56.0
6/26	8:00	3	0	Calm	15.7	12.0	65.0
6/27	8:00	1	0	Calm	17.5	13.0	63.0
6/28	8:00	1	0	Calm	13.0	15.0	60.0
6/29	8:00	3	0	S 5	17.2	16.3	55.0
6/30	8:00	- [b]	0	SW 5	13.8	16.0	53.0
7/1	8:30	- [b]	0	Calm	11.9	15.1	52.0
7/2	8:00	4	0	SW 5	15.0	14.0	51.0
7/3	8:00	2	0	SW 5	10.5	12.8	50.0
7/4	8:00	4	0	W 3	15.2	14.3	49.5
7/5	8:00	3	1.2	SW 3	12.5	14.9	50.5
7/6	8:00	1	0	SW 10	10.6	13.9	52.0
7/7	8:00	2	0	SW 3	11.5	14.5	50.0
7/8	8:00	4	0	Calm	14.0	16.0	48.0
7/9	8:00	2	0	NW 5	12.0	15.0	46.5
7/10	8:00	1	0	Calm	11.0	15.7	47.0
7/11	8:00	1 [c]	0	Calm	15.1	16.7	44.0
7/12	8:00	3	0	Calm	12.5	16.5	40.0
7/13	8:00	2	0	Calm	14.0	16.9	42.0
7/14	8:00	3	0	SW 5	16.2	17.7	41.0
7/15	8:00	3	0	S 10	16.3	18.0	40.0
7/16	8:00	3	0	Calm	14.8	18.0	40.0
7/17	8:00	3	0	Calm	14.8	16.0	39.5
7/18	8:00	3	0	Calm	13.6	15.5	39.0
7/19	7:45	4	0.3	Calm	11.2	17.0	40.0
7/20	7:45	1	4.6	Calm	12.2	17.0	40.0
7/21	7:45	4	4.4	Calm	13.8	15.1	42.0
7/22	8:00	4	0.1	Calm	10.2	17.0	42.5
7/23	8:00	2	0	SW 10	10.4	16.0	44.0
7/24	8:00	4	1	Calm	13.0	17.0	42.0
7/25	7:00	5	3	Calm	8.4	14.5	41.5
7/26	8:00	4	0	Calm	11.3	16.0	40.0
7/27	8:00	4	36.0	Calm	11.9	14.0	40.0
7/28	8:00	3	2.4	Calm	10.3	14.0	41.0
7/29	8:00	4	0	SW 10	13.4	15.0	42.0
7/30	8:00	3	0	SW 5	13.9	15.0	43.0
7/31	7:30	3	0	SW 10	8.1	15.0	41.0
8/1	7:30	3	0	S 3	13.1	15.5	40.0
8/2	7:30	4	0	Calm	13.4	14.0	38.5
8/3	7:30	5	6.9	Calm	7.6	14.1	37.5
8/4	7:30	5	3.6	Calm	13.3	15.0	38.0
8/5	8:00	4	0.3	Calm	11.9	14.1	41.5
8/6	8:00	1	0	SW 5	9.4	14.0	50.0
8/7	7:00	3	0	S 5	9.9	15.5	46.0
8/8	8:00	3	0	W 5	13.7	16.0	42.5
8/9	7:00	2	0	SW 3	12.4	15.5	40.0
8/10	8:00	4	0	Calm	14.4	16.2	38.0
8/11	8:00	3	0	SW 5	12.7	17.0	37.5
8/12	7:30	4	0	SW 3	14.3	15.8	41.0
8/13	7:30	3	0	SW 15	14.8	15.4	51.0

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			Precipitation		Temperature (°C)		Water Stage
Date	Time	Sky Codes[a]	(mm)	Wind	Air	Water	(cm)
8/14	8:00	2	0	Calm	9.9	14.0	47.5
8/15	8:00	4	0	Calm	11.8	14.5	41.5
8/16	8:00	4	0	S 3	11.2	14.5	41.0
8/17	8:00	1 [c]	0	Calm	14.0	15.5	40.0
8/18	8:00	3	0	SW 5	13.6	16.8	39.0
8/19	8:00	1 [c]	0	Calm	16.5	15.2	38.0
8/20	8:00	4 [c]	0	Calm	12.7	17.0	37.5
8/21	8:00	5	0	Calm	10.4	16.0	36.5
8/22	8:00	4 [c]	0	Calm	8.6	15.2	36.0
8/23	8:00	4 [c]	0	Calm	8.4	15.2	35.5
8/24	8:00	4 [c]	0	Calm	7.6	15.0	35.0
8/25	8:00	5	0	Calm	3.8	13.9	35.0
8/26	8:00	4	14.0	Calm	6.3	13.0	36.0
8/27	8:00	4	0	N 3	4.1	10.1	35.5
8/28	7:00	3	0	Calm	6.1	10.2	35.0
8/29	8:00	5 [c]	0	SW 10	0.3	9.0	34.5
8/30	8:00	3	0	W 10	5.5	10.1	34.0
8/31	8:00	4	0	Calm	8.5	11.0	33.5
9/1	8:00	4	2.8	Calm	9.5	10.5	34.0
9/2	8:00	3	0	Calm	6.6	11.0	34.0
9/3	8:00	1	0.6	Calm	-0.1	10.5	34.5
9/4	8:00	4	0	W 5	1.3	9.0	33.5
9/5	8:00	4	2.2	Calm	5.8	9.5	33.0
9/6	8:00	1	0	Calm	-1.6	8.5	33.5
9/7	8:00	1	0	Calm	-4.1	7.5	33.0
9/8	8:00	2	0	W 5	-1.8	7.0	33.0
9/9	8:00	1	0	Calm	-2.5	7.0	32.5
9/10	8:00	3	0	Calm	0.0	7.0	32.0
9/11	8:00	2	0	SW 5	-1.5	7.0	32.0
9/12	8:00	4	1.9	Calm	4.8	7.0	32.0
9/13	8:30	3	0	W 5	-1.9	6.0	32.0
9/14	8:30	4	0	W 5	-0.3	5.5	32.0
9/15	8:30	1	0	Calm	-4.9	5.0	32.0
9/16	8:30	4	0.6	Calm	1.0	6.0	31.5
9/17	8:30	1	0	Calm	-7.5	4.0	31.5
9/18	8:30	3	0	Calm	-7.4	3.0	31.5
9/19	9:00	4	0.6	Calm	2.1	4.0	31.0
				Averages:	9.2	13.2	40.9
				Minimum:	-7.5	3.0	31.0
				Maximum:	17.5	18.0	65.0

[a] Sky Codes: 0 = no observation
1 = clear or mostly clear (<10% cloud cover)
2 = cloud cover less than 50% of the sky
3 = cloud cover more than 50% of the sky
4 = complete overcast

[b] Cloud cover obscured by smoke haze.

[c] Smoke haze present.

APPENDIX E. HISTORIC JUVENILE SALMON CPUE

Appendix E1.–Historic juvenile Chinook and coho salmon CPUE by gear type.

Chinook									
Index	Beach Seine				Trap				
Area[a]	2000	2001	2002	2004	2000	2001	2002	2003	2004
1	0.26	ND	ND	0.33	0.00	0.00	ND	ND	0.04
2	2.76	1.06	ND	1.20	0.01	0.00	0.01	0.01	0.00
3	5.00	1.13	ND	ND	0.07	0.04	0.02	0.00	0.02
4	0.00	0.00	ND	ND	0.07	0.09	0.13	0.21	0.06
5	0.14	0.00	ND	0.00	0.00	ND	0.01	ND	0.00
6	ND	ND	ND	ND	0.00	0.00	ND	ND	0.00
7	ND	ND	ND	ND	ND	0.00	ND	ND	ND
8	ND	0.00	ND	ND	ND	ND	0.00	ND	ND
9	ND	0.02	ND	0.16	ND	0.00	ND	ND	0.00
10	ND	0.00	ND	ND	ND	0.00	ND	ND	0.00
11	ND	0.00	0.00	ND	ND	ND	ND	0.00	0.00
12	ND	ND	ND	ND	ND	0.00	ND	ND	ND
13	ND	ND	ND	0.00	ND	0.00	ND	ND	ND
14[b]	ND	ND	ND	ND	ND	ND	ND	ND	0.51
Totals:	1.45	0.33	0.00	0.32	0.03	0.03	0.04	0.05	0.08

Coho									
Index	Beach Seine				Trap				
Area[a]	2000	2001	2002	2004	2000	2001	2002	2003	2004
1	0.00	ND	ND	19.67	0.00	0.00	ND	ND	0.28
2	0.00	0.06	ND	3.90	0.00	0.00	0.03	0.01	0.00
3	3.33	0.55	ND	ND	0.01	0.27	0.02	0.11	0.62
4	0.00	0.00	ND	ND	0.01	0.12	0.02	0.00	0.04
5	0.00	0.00	ND	0.00	0.00	ND	0.06	ND	0.00
6	0.00	ND	ND	ND	0.00	0.00	ND	ND	0.00
7	0.00	ND	ND	ND	ND	0.00	ND	ND	ND
8	ND	0.00	ND	ND	ND	ND	0.20	ND	ND
9	0.00	0.00	ND	0.06	ND	0.00	ND	ND	0.00
10	0.00	0.00	ND	ND	ND	0.00	ND	ND	0.00
11	0.00	1.65	0.00	ND	ND	ND	ND	0.00	0.01
12	ND	ND	ND	ND	ND	0.00	ND	ND	ND
13	ND	ND	ND	0.00	ND	0.00	ND	ND	ND
14[b]	ND	ND	ND	ND	ND	ND	ND	ND	0.03
Totals:	0.08	0.50	0.00	1.79	0.00	0.06	0.03	0.03	0.08

[a] Area:
1 below weir
2 above weir to Fourth of July Creek
3 Big Creek (lower)
4 Fourth of July Creek
5 Fourth of July Creek to Big Waldren Fork
6 Bonnie Creek
7 Minnie Creek
8 Big Waldren Fork
9 Big Waldren Fork to Moore Creek/Little Waldren Confluence
10 Little Waldren Fork
11 Moore Creek
12 Big Creek (upper)
13 Tatalina Creek
14 Gold Creek

[b] Added as an Index Area in 2004.

APPENDIX F. LENGTH DATA FOR JUVENILE SALMON IN THE TAKOTNA RIVER DRAINAGE, 2004

Appendix F1.–Trap-caught juvenile Chinook salmon lengths by month, Index Area, and number caught, 2004.

	June					July		
Lengths (mm)	Takotna River (2)	Big Creek (lower) (3)	Fourth of July Creek (4)	Little Waldren Fork (10)	Moore Creek (11)	Takotna River (2)	Takotna River (5)	Takotna River (9)
50	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	1
54	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	1
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0
68	0	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0
71	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0
86	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0
89	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0
91	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0
93	0	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	2

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	August			September		October	November	December		
Lengths (mm)	**Big Creek (lower) (3)**	**Fourth of July Creek (4)**	**Gold Creek (14)**	**Takotna River (2)**	**Bonnie Creek (6)**	**Gold Creek (14)**	**Gold Creek (14)**	**Takotna River (1)**	**Gold Creek (14)**	**Total**
50	0	0	1	0	0	0	0	0	0	1
51	1	0	0	0	0	0	0	0	0	1
52	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	1
54	0	0	1	0	0	0	0	0	0	1
55	0	0	0	0	0	0	0	0	0	1
56	0	0	1	0	0	0	0	0	0	1
57	0	0	0	0	0	0	0	0	0	0
58	0	0	4	0	0	0	0	0	1	5
59	0	0	0	0	0	0	0	0	0	0
60	0	0	3	0	0	0	0	0	0	3
61	0	0	2	0	0	0	0	0	0	2
62	0	1	0	0	0	0	0	0	0	1
63	0	0	0	0	0	0	0	0	0	0
64	0	2	3	0	0	0	0	0	0	5
65	1	0	4	0	0	0	0	0	0	5
66	0	2	2	0	0	0	0	0	0	4
67	0	0	5	0	0	0	0	0	1	6
68	0	1	7	0	0	0	0	0	1	9
69	1	0	2	0	0	2	0	0	0	5
70	0	3	3	0	0	0	0	0	0	6
71	0	0	5	0	0	0	0	0	0	5
72	0	0	13	0	0	1	0	0	0	14
73	0	0	12	0	0	4	1	0	0	17
74	1	0	10	0	0	2	0	0	0	13
75	0	2	7	0	0	0	0	0	0	9
76	0	0	13	0	0	3	0	0	0	16
77	0	1	8	0	0	2	1	1	3	16
78	0	0	12	0	0	3	3	0	2	20
79	0	0	5	0	0	3	0	0	1	9
80	0	0	8	0	0	3	4	0	0	15
81	0	1	4	0	0	3	1	0	1	10
82	0	1	1	0	0	3	0	0	2	7
83	0	0	3	0	0	2	1	0	4	10
84	1	2	2	0	0	0	1	0	1	7
85	0	2	2	0	0	1	1	0	1	7
86	0	2	1	0	0	1	3	0	1	8
87	1	1	0	0	0	3	2	0	1	8
88	0	0	0	0	0	0	1	0	1	2
89	0	0	0	0	0	1	2	0	0	3
90	0	1	0	0	0	1	0	0	1	3
91	0	0	0	0	0	0	0	0	0	0
92	1	1	1	0	0	1	0	0	0	4
93	0	0	1	0	0	0	1	0	0	2
94	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	1	0	0	1
96	0	0	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	0	0	0
99	0	1	0	0	0	0	0	0	0	1
Totals	7	24	146	0	0	39	23	1	22	264

Note: Takotna River Index Areas:
1 = below weir
2 = above weir to Fourth of July Creek
5 = Fourth of July Creek to Big Waldren Fork
9 = Big Waldren Fork to Moore Creek/Little Waldren Confluence

Appendix F2.–Beach seine-caught juvenile Chinook salmon lengths by month, Index Area, and number caught, 2004.

	June	July		August	September			
Lengths (mm)	Takotna River (1)	Takotna River (2)	Takotna River (3)	Takotna River (1)	Takotna River (2)	Takotna River (5)	Tatalina Creek (13)	Total
44	0	0	1	0	0	0	0	1
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0
49	0	0	1	0	0	0	0	1
50	0	0	0	0	0	0	0	0
51	0	1	0	0	0	0	0	1
52	0	0	1	0	0	0	0	1
53	0	0	1	0	0	0	0	1
54	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	1	0	0	0	0	1
61	0	1	0	0	0	0	0	1
62	0	0	0	0	0	0	0	0
63	0	1	0	0	0	0	0	1
64	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0
67	0	1	0	1	0	0	0	2
68	0	1	0	0	0	0	0	1
69	0	1	0	0	0	0	0	1
70	0	3	0	0	0	0	0	3
71	0	0	0	0	0	0	0	0
72	0	1	0	0	0	0	0	1
73	0	0	0	0	0	0	0	0
74	0	1	0	0	0	0	0	1
75	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0
84	0	1	0	0	0	0	0	1
Totals	0	12	5	1	0	0	0	18

Note: Takotna River Index Areas: 1 = below weir
2 = above weir to Fourth of July Creek
5 = Fourth of July Creek to Big Waldren Fork
9 = Big Waldren Fork to Moore Creek/Little Waldren Confluence

Appendix F3.–Dip net-caught juvenile Chinook salmon lengths by month, Index Area, and number caught, 2004.

Lengths (mm)	May	June	July	August		Total
	Fourth of July Creek (4)	Fourth of July Creek (4)	Takotna River (9)	Big Creek (lower) (3)	Fourth of July Creek (4)	
54	0	0	0	0	1	1
55	0	0	0	0	2	2
56	0	0	0	0	0	0
57	0	0	0	0	1	1
58	0	0	0	0	1	1
59	0	0	0	0	0	0
60	0	0	0	0	1	1
61	0	0	0	0	0	0
62	0	0	0	0	0	0
63	0	0	0	0	2	2
64	0	0	0	0	0	0
65	0	0	0	0	0	0
66	0	0	0	0	1	1
67	0	0	0	0	0	0
68	0	0	0	0	1	1
69	0	0	0	0	0	0
70	0	0	0	0	0	0
71	0	0	0	0	0	0
72	0	0	0	0	1	1
73	0	0	0	0	1	1
74	0	0	0	0	0	0
75	0	0	0	0	1	1
76	0	0	0	0	2	2
77	0	0	0	0	0	0
78	0	0	0	0	1	1
79	0	0	0	0	3	3
80	0	0	0	0	1	1
81	0	0	0	0	0	0
82	0	0	0	0	1	1
83	0	0	0	0	0	0
84	0	0	0	0	1	1
Totals	0	0	0	0	22	22

Note: Takotna River Index Area: 9 = Big Waldren Fork to Moore Creek/Little Waldren Confluence

Appendix F4.–Beach seine-caught juvenile chum salmon lengths by month, Index Area, and number caught, 2004.

	June	July		August	September			
Lengths (mm)	Takotna River (1)	Takotna River (2)	Takotna River (9)	Takotna River (1)	Takotna River (2)	Takotna River (5)	Tatalina Creek (13)	Total
55	0	0	2	0	0	0	0	2
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0
62	0	0	1	0	0	0	0	1
Totals	0	0	3	0	0	0	0	3

Note: Takotna River Index Areas:
1 = below weir
2 = above weir to Fourth of July Creek
5 = Fourth of July Creek to Big Waldren Fork
9 = Big Waldren Fork to Moore Creek/Little Waldren Confluence

Appendix F5.–Dip net-caught juvenile chum salmon lengths by month, Index Area, and number caught, 2004.

	May	June	July	August		
Lengths (mm)	Fourth of July Creek (4)	Fourth of July Creek (4)	Takotna River (9)	Big Creek (lower) (3)	Fourth of July Creek (4)	Total
34	0	1	0	0	0	1
35	0	0	0	0	0	0
36	0	1	0	0	0	1
37	0	0	0	0	0	0
38	0	2	0	0	0	2
39	0	1	0	0	0	1
40	0	1	0	0	0	1
Totals	0	6	0	0	0	6

Note: Takotna River Index Area: 9 = Big Waldren Fork to Moore Creek/Little Waldren Confluence

Appendix F6.–Stationary net caught juvenile chum salmon lengths by month, Index Area, and number caught.

Lengths	April	May	June	
(mm)	Big Creek (lower) (3)	Fourth of July Creek (4)	Big Creek (lower) (3)	Total
33	0	1	0	1
34	0	1	0	1
35	0	5	0	5
36	0	12	0	12
37	0	5	0	5
38	0	9	0	9
39	0	4	0	4
40	0	5	0	5
41	0	0	0	0
42	0	1	0	1
Totals	0	43	0	43

Appendix F7.–Trap-caught juvenile coho salmon lengths by month, Index Area, and number caught.

	June					July		
Lengths (mm)	Takotna River (2)	Big Creek (lower) (3)	Fourth of July Creek (4)	Little Waldren Fork (10)	Moore Creek (11)	Takotna River (2)	Takotna River (5)	Takotna River (9)
33	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0
65	0	1	0	0	0	0	0	0
66	0	0	0	0	0	0	0	0
67	0	1	1	0	0	0	0	0
68	0	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0	0
70	0	2	0	0	0	0	0	0
71	0	0	0	0	0	0	0	0
72	0	1	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0
76	0	0	1	0	0	0	0	0
77	0	0	0	0	0	0	0	0
78	0	1	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0
82	0	2	0	0	0	0	0	0
83	0	0	0	0	1	0	0	0
84	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0
86	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0

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	June					July		
Lengths (mm)	**Takotna River (2)**	**Big Creek (lower) (3)**	**Fourth of July Creek (4)**	**Little Waldren Fork (10)**	**Moore Creek (11)**	**Takotna River (2)**	**Takotna River (5)**	**Takotna River (9)**
89	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0
91	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0
93	0	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0
113	0	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0	0
119	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	0
122	0	0	0	0	0	0	0	0
123	0	0	0	0	0	0	0	0
124	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0
126	0	0	0	0	0	0	0	0
127	0	0	0	0	0	0	0	0
128	0	0	0	0	0	0	0	0
129	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0
131	0	0	0	0	0	0	0	0
132	0	0	0	0	0	0	0	0
133	0	0	0	0	0	0	0	0
134	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0
136	0	0	0	0	0	0	0	0
137	0	0	0	0	0	0	0	0
Totals	0	8	2	0	1	0	0	0

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	August			September		October	November	December		
Lengths (mm)	Big Creek (lower) (3)	Fourth of July Creek(4)	Gold Creek (14)	Takotna River (2)	Bonnie Creek (6)	Gold Creek (14)	Gold Creek (14)	Takotna River (1)	Gold Creek (14)	Total
33	1	0	0	0	0	0	0	0	0	1
34	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0
42	4	0	0	0	0	0	0	0	0	4
43	3	0	0	0	0	0	0	0	0	3
44	2	1	0	0	0	0	0	0	0	3
45	9	0	0	0	0	0	0	0	0	9
46	12	0	0	0	0	0	0	0	0	12
47	11	0	0	0	0	0	0	0	0	11
48	20	0	0	0	0	0	0	0	0	20
49	13	0	0	0	0	0	0	0	0	13
50	9	0	0	0	0	0	0	0	0	9
51	3	0	0	0	0	0	0	0	0	3
52	19	0	0	0	0	0	0	0	0	19
53	24	1	0	0	0	0	0	0	0	25
54	16	0	0	0	0	0	0	0	0	16
55	10	0	0	0	0	0	0	0	0	10
56	9	0	0	0	0	0	0	0	0	9
57	7	2	0	0	0	0	0	0	0	9
58	10	0	0	0	0	0	0	0	0	10
59	7	0	0	0	0	0	0	0	0	7
60	10	1	0	0	0	0	0	0	0	11
61	0	1	0	0	0	0	0	0	0	1
62	6	2	0	0	0	0	0	0	0	8
63	7	1	0	0	0	0	0	0	0	8
64	1	0	0	0	0	0	0	0	0	1
65	1	0	1	0	0	0	0	0	1	4
66	2	1	0	0	0	0	0	0	0	3
67	2	1	0	0	0	0	1	0	0	6
68	2	1	0	0	0	0	0	0	0	3
69	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	1	0	0	0	3
71	0	0	0	0	0	0	0	0	0	0
72	1	1	0	0	0	0	0	0	1	4
73	0	0	0	0	0	0	1	0	1	2
74	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0	0	1
77	0	0	0	0	0	1	1	0	0	2
78	1	0	0	0	0	0	0	0	0	2
79	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0	0	0	2
83	0	0	0	0	0	0	0	0	0	1
84	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0
86	0	0	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0	0	1	1

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	August			September		October	November	December		
Lengths (mm)	Big Creek (lower) (3)	Fourth of July Creek(4)	Gold Creek (14)	Takotna River (2)	Bonnie Creek (6)	Gold Creek (14)	Gold Creek (14)	Takotna River (1)	Gold Creek (14)	Total
89	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	1	0	1
91	0	0	0	0	0	0	0	0	0	0
92	1	0	0	0	0	0	0	1	0	2
93	0	0	0	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0	0	0	0
95	2	0	0	0	0	0	0	0	0	2
96	0	0	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0	0	0
98	1	0	0	0	0	0	0	1	1	3
99	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0	0	0	0
102	2	0	0	0	0	0	0	0	0	2
103	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	1	1	2
105	0	1	0	0	0	0	0	0	0	1
106	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0	0	0
108	1	0	0	0	0	0	0	0	0	1
109	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0
111	1	0	0	0	0	0	0	0	0	1
112	0	0	0	0	0	0	0	1	0	1
113	0	0	0	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0	1	0	1
115	0	0	0	0	0	0	0	1	0	1
116	1	0	0	0	0	0	0	0	0	1
117		0	0	0	0	0	0	0	0	0
118	1	0	0	0	0	0	0	0	0	1
119	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	0	0	0
122	0	0	0	0	0	0	0	0	0	0
123	2	0	0	0	0	0	0	0	0	2
124	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0
126	0	0	0	0	0	0	0	0	0	0
127	0	0	0	0	0	0	0	0	0	0
128	0	0	0	0	0	0	0	0	0	0
129	1	0	0	0	0	0	0	0	0	1
130	0	0	0	0	0	0	0	0	0	0
131	0	0	0	0	0	0	0	0	0	0
132	0	0	0	0	0	0	0	0	0	0
133	0	0	0	0	0	0	0	0	0	0
134	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0
136	1	0	0	0	0	0	0	0	0	1
137	1	0	0	0	0	0	0	0	0	1
Totals	237	14	1	0	0	2	3	7	6	281

Note: Takotna River Index Areas:
1 = below weir
2 = above weir to Fourth of July Creek
5 = Fourth of July Creek to Big Waldren Fork
9 = Big Waldren Fork to Moore Creek/Little Waldren Confluence

Appendix F8.–Beach seine-caught juvenile coho salmon lengths by month, Index Area, and number caught.

	June	July		August	September			
Lengths (mm)	Takotna River (1)	Takotna River (2)	Takotna River (9)	Takotna River (1)	Takotna River (2)	Takotna River (5)	Tatalina Creek (13)	Total
20	1	0	0	0	0	0	0	1
21	0	0	0	0	0	0	0	0
22	1	0	0	0	0	0	0	1
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0
28	2	0	0	0	0	0	0	2
29	2	0	0	0	0	0	0	2
30	10	0	0	0	0	0	0	10
31	8	0	0	0	0	0	0	8
32	10	0	0	0	0	0	0	10
33	4	0	0	0	0	0	0	4
34	2	0	0	0	0	0	0	2
35	3	0	0	0	0	0	0	3
36	2	0	0	0	0	0	0	2
37	0	0	0	0	1	0	0	1
38	0	0	0	0	2	0	0	2
39	0	0	0	0	0	0	0	0
40	2	0	0	0	1	0	0	3
41	0	0	0	0	1	0	0	1
42	0	2	0	0	1	0	0	3
43	0	0	0	0	2	0	0	2
44	0	0	0	0	3	0	0	3
45	0	0	0	0	2	0	0	2
46	0	0	0	0	2	0	0	2
47	0	0	0	0	0	0	0	0
48	0	0	0	0	2	0	0	2
49	0	0	0	0	1	0	0	1
50	0	0	0	1	2	0	0	3
51	0	1	0	0	2	0	0	3
52	0	0	0	1	4	0	0	5
53	0	0	0	0	2	0	0	2
54	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
58	0	0	0	1	1	0	0	2
59	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0
61	0	1	0	0	0	0	0	1
62	0	1	0	0	0	0	0	1
63	0	0	0	3	0	0	0	3
64	0	2	0	1	0	0	0	3
65	0	0	0	1	0	0	0	1
66	0	0	0	1	0	0	0	1
67	0	0	0	0	1	0	0	1

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Lengths (mm)	June Takotna River (1)	July Takotna River (2)	July Takotna River (9)	August Takotna River (1)	September Takotna River (2)	September Takotna River (5)	September Tatalina Creek (13)	Total
68	0	0	0	0	0	0	0	0
69	0	0	0	1	0	0	0	1
70	0	0	0	0	0	0	0	0
71	0	0	0	1	0	0	0	1
72	0	0	0	1	0	0	0	1
73	0	0	0	0	0	0	0	0
74	0	0	0	0	1	0	0	1
75	0	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0
86	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0
88	0	0	0	0	1	0	0	1
89	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0
91	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0
93	0	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0
106	0	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0
110	0	0	1	0	0	0	0	1
111	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0
113	0	0	0	0	0	0	0	0

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Lengths (mm)	June	July		August	September			
	Takotna River (1)	Takotna River (2)	Takotna River (9)	Takotna River (1)	Takotna River (2)	Takotna River (5)	Tatalina Creek (13)	Total
114	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0	0
119	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	0
122	0	0	0	0	0	0	0	0
123	0	0	0	0	0	0	0	0
124	0	0	0	0	0	0	0	0
125	0	0	1	0	0	0	0	1
Totals	47	7	2	12	32	0	0	100

Note: Takotna River Index Areas: 1 = below weir
2 = weir to Fourth of July Creek
5 = Fourth of July Creek to Big Waldren Fork
9 = Big Waldren Fork to Moore Creek/Little Waldren Confluence

Appendix F9.–Dip net-caught juvenile coho salmon lengths by month, Index Area, and number caught.

Lengths (mm)	May Fourth of July Creek (4)	June Fourth-of-July Creek (4)	July Takotna River (9)	August Big Creek (lower) (3)	August Fourth of July Creek (4)	Totals
32	0	0	0	1	0	1
33	0	0	0	0	0	0
34	0	0	0	1	0	1
35	0	0	0	3	0	3
36	0	0	0	2	0	2
37	0	0	0	1	0	1
38	0	0	0	3	0	3
39	0	0	0	2	0	2
40	0	0	0	1	0	1
41	0	0	0	1	0	1
42	0	0	0	3	1	4
43	0	0	0	1	0	1
44	0	0	0	3	1	4
45	0	0	0	1	1	2
46	0	0	0	2	1	3
47	0	0	0	1	1	2
48	0	0	0	1	1	2
49	0	0	0	0	3	3
50	0	0	0	0	4	4
51	0	0	0	0	2	2
52	0	0	0	2	5	7
53	0	0	0	2	4	6
54	0	0	0	0	4	4
55	0	0	0	0	0	0
56	0	0	0	0	1	1
57	0	0	0	0	0	0
58	0	0	0	0	3	3
59	0	0	0	0	0	0
60	1	0	0	0	4	5
61	0	0	0	0	3	3
62	1	0	0	0	0	1
63	0	0	0	0	2	2
64	0	0	0	0	2	2
65	0	0	0	0	0	0
66	0	0	0	0	0	0
67	0	0	0	0	2	2
68	0	0	0	0	1	1
69	0	0	0	0	0	0
70	0	0	0	0	1	1
71	0	0	0	0	0	0
72	0	0	0	0	0	0
73	0	0	0	0	0	0
74	0	0	0	0	0	0
75	0	0	0	0	0	0
76	0	0	0	0	0	0
77	0	0	0	0	0	0
78	0	0	0	0	0	0
79	0	0	0	0	0	0
80	0	0	0	0	0	0

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Lengths (mm)	May	June	July	August		Totals
	Fourth of July Creek (4)	Fourth of July Creek (4)	Takotna River (9)	Big Creek (lower) (3)	Fourth of July Creek (4)	
81	0	0	0	0	0	0
82	0	0	0	0	0	0
83	0	0	0	0	0	0
84	0	0	0	0	0	0
85	0	0	0	0	0	0
86	0	0	0	0	0	0
87	0	0	0	0	0	0
88	0	0	0	0	0	0
89	0	0	0	0	0	0
90	0	0	0	0	0	0
91	0	0	0	0	0	0
92	0	0	0	0	0	0
93	0	0	0	0	0	0
94	0	0	0	0	0	0
95	0	0	0	0	0	0
96	0	0	0	0	0	0
97	0	0	0	0	0	0
98	0	0	0	0	0	0
99	0	0	0	0	0	0
100	0	0	0	0	0	0
101	0	0	0	0	0	0
102	0	0	0	0	0	0
103	0	0	0	0	0	0
104	0	0	0	0	1	1
105	0	0	0	0	0	0
106	0	0	0	0	0	0
107	0	0	0	0	0	0
108	0	0	0	0	0	0
109	0	0	0	0	1	1
Totals	2	0	0	31	49	82

Note: Takotna River Index Area: 9 = Big Waldren Fork to Moore Creek/Little Waldren Confluence