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Chinook Salmon Creel Survey and Inriver Gillnetting Study, Lower Kenai River, Alaska, 2009

by

Jeff Perschbacher

October 2012

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

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

FISHERY DATA SERIES NO. 12-61

CHINOOK SALMON CREEL SURVEY AND INRIVER GILLNETTING STUDY, LOWER KENAI RIVER, ALASKA, 2009

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ABSTRACT

A creel survey to estimate angler effort, catch, and harvest of early- and late-run Chinook salmon (*Oncorhynchus tshawytscha*) was conducted on the Kenai River between the Soldotna Bridge and the Warren Ames Bridge from 16 May through 31 July 2009. During the early run (16 May–30 June), anglers harvested 898 (SE 143) Chinook salmon with 53,039 (SE 2,296) angler-hours of effort. Unguided anglers accounted for 45% of effort and 37% of harvest; the remaining effort and harvest were guided. The majority of the early-run harvest was composed of age-1.3 fish (33.5%, SE 6.4%) and age-1.4 fish (46.3%, SE 6.6%) with no age-1.5 fish, whereas early-run Chinook salmon passage at the sonar site was composed of a smaller percentage of age-1.3 fish (24.2%, SE 3.8%) and a greater percentage of age-1.4 fish (56.3%, SE 4.4%) and included 1.6% (SE 1.1%) age-1.5 fish. During the late run (1 July-31 July), effort was 177,176 (SE 6,195) angler-hours and harvest was 7,378 (SE 487) Chinook salmon. Unguided anglers accounted for 56% of effort and 42% of harvest; the remaining effort and harvest were guided. The majority of the late-run harvest was composed of age-1.4 fish (61.1%, SE 3.5%) with no age-1.1 fish, whereas the late-run Chinook salmon passage at the sonar site (1 July–10 August) was composed of 0.3% (SE 0.3%) age-1.1 fish, though a majority of the fish were age 1.4 (54.8%, SE 2.7%). A standardized inriver gillnetting program was conducted from 16 May through 10 August 2009 near the Chinook salmon sonar site. During the early run, 167 Chinook salmon, 931 sockeye salmon, and 4 Dolly Varden were captured. During the late run, 559 Chinook salmon, 1,798 sockeye salmon, 77 coho salmon, 5 pink salmon, and 5 Dolly Varden were captured. The ratio of Chinook salmon catch per unit effort relative to all species averaged 0.25 and 0.29 in the early and late runs, respectively.

Key words: Kenai River, *Oncorhynchus tshawytscha,* Chinook salmon, creel survey, effort, harvest, gillnet, CPUE, age composition.

INTRODUCTION

The Kenai River (Figure 1) supports the largest freshwater sport fishery in Alaska. Anglers fish for Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), pink salmon (*O. gorbuscha*), Dolly Varden (*Salvelinus malma*), and rainbow trout (*O. mykiss*). The Kenai River Chinook salmon fishery between the Warren Ames Bridge (river mile [RM] 5.2) and Soldotna Bridge (RM 21.1), and the inriver gillnetting study (approximately RM 8.5) are the subject of this report (Figure 2).

Chinook salmon returning to the Kenai River exhibit 2 distinct run timing patterns: "early," from late April through late June, and "late," from late June through early August. For management purposes, the early run is composed of all Chinook salmon entering the river before 1 July and the late run is composed of all fish entering on or after 1 July. Sport fish anglers value fish from both runs because of their large size, especially late-run fish, which average approximately 18 kg (40 lb) and can exceed 36 kg (80 lb). The world record sport-caught Chinook salmon (44.1 kg; 97 lb 4 oz) was harvested from the Kenai River in May 1985.

The Alaska Department of Fish and Game (ADF&G) implemented a creel survey in 1974 in response to an increase in the number of boat anglers targeting Chinook salmon, and to monitor the age, sex, and length (ASL) composition of harvested Chinook salmon. Angler effort and harvest continued to increase through 1988, then declined during the early 1990s due to low Chinook salmon returns and restrictions to the fishery (Figures 3 and 4). Effort during the early-run fishery has remained below historical averages since 2003. Early-run harvest remained relatively stable between 2003 and 2008 (Figure 3). In the late-run fishery, effort and harvest have remained below historical averages since 2007 (Figure 4). Beginning in 1981, separate effort and harvest estimates have been produced for guided and unguided anglers (Figures 3 and 4).

In 1979, ADF&G began monitoring the age, sex, and length composition of the inriver run by implementing an inriver gillnetting program. Inriver gillnetting was standardized to include catch

rates in 1998 near the Chinook salmon sonar site at RM 8.5 and further standardized to include species composition in 2002. The creel survey and inriver gillnetting programs coupled with the Chinook salmon sonar project are critical to inseason management and the development of escapement goals for Kenai River Chinook salmon.

MANAGEMENT PLANS

The early and late Kenai River Chinook salmon runs have separate management plans adopted by the Alaska Board of Fisheries (BOF). Management within these plans utilizes estimates of inriver run and harvest. Estimates of inriver run are obtained with sonar (Miller et al. 2004) while estimates of harvest are obtained from creel surveys. Previous Kenai River Chinook salmon creel surveys have been published in Conrad and Hammarstrom (1987); Eskelin (2007, 2009-2010); Hammarstrom (1975-1981, 1988-1994); Hammarstrom et al. (1985); Hammarstrom and Larson (1982-1984, 1986); (King (1995-1997); Marsh (1999-2000); Perschbacher (*In prep*); Reimer (2003, 2004a-b); and Reimer et al. (2002).

The early run is managed to attain an optimal escapement goal (OEG) of 5,300 to 9,000 Chinook salmon. If the spawning escapement is projected to exceed 9,000 fish, the fishery is liberalized to allow bait. If the spawning escapement is projected to be less than 5,300 fish, ADF&G restricts the fishery by prohibiting harvest of Chinook salmon less than 55 inches long, or by closing the fishery. In March 2003, BOF introduced a slot limit (harvest restricted between maximum and minimum sizes) into the *Kenai River and Kasilof River Early-Run King Salmon Management Plan* (5 AAC 57.160). This slot limit prohibits harvest of Chinook salmon between 44 inches total length (TL) and 54.99 inches TL until 1 July below the Soldotna Bridge and until 15 July above the Soldotna Bridge (Figure 5). This change was implemented to protect early-run Chinook salmon that spend 5 winters in salt water. In March 2008, BOF liberalized the slot limit by raising the lower end from 44 inches TL to 46 inches TL. The recent modification to the slot limit was implemented to allow more harvest of younger Chinook salmon while continuing to protect those that spend 5 winters in salt water.

Management of the late-run Chinook salmon sport fishery is more complicated than the early run because harvest from the commercial sockeye salmon setnet fishery occurs along the east shore of Cook Inlet before the run enters the sport fishery. The inriver late-run Chinook salmon sport fishery is managed under the *Kenai River Late-Run King Salmon Management Plan* (Alaska Administrative Code 5 AAC 21.359 updated through register 174; Figure 5), which mandates the sport fishery be managed to achieve a spawning escapement of 17,800 to 35,700 late-run Chinook salmon.

FISHING REGULATIONS

Regulations for the Chinook salmon sport fishery in the Kenai River are among the most restrictive of any waters open to Chinook salmon fishing in Alaska. Although fish do not enter the river in appreciable numbers until mid-May, the Chinook salmon season is open 1 January through 31 July. The area open to Chinook salmon fishing extends from the outlet of Skilak Lake to Cook Inlet, with the exception of the confluence areas of Slikok Creek (RM 18.9), Funny River (RM 30.4), Moose River (RM 36.4) and the Lower Killey River (RM 44.0) (Figures 1 and 2). The Slikok Creek, Lower Killey River, and Funny River confluence areas are closed from 1 January through 31 July; the Moose River confluence area is closed from 15 May through 31 July. The portion of the Kenai River between the Upper Killey River and the outlet of Skilak

Lake is closed to all fishing 2 May through 10 June. In addition, the area between Centennial Campground (RM 20.3) and the Soldotna Bridge (RM 21.1) (Figure 2), and the area around Morgan's Hole (approximately RM 31) are closed to fishing from boats for the entire Chinook salmon fishing season.

The daily bag and possession limit is 1 Chinook salmon per day 20 inches TL or longer, or 10 Chinook salmon less than 20 inches TL per day. An annual limit of 2 Chinook salmon is permitted on the Kenai River although different minimum length measurements apply before and after 1 July. During the early run (prior to 1 July), Chinook salmon measuring 28 inches TL or longer apply toward the annual limit. During the late-run, Chinook salmon measuring 20 inches TL or longer apply toward the annual limit. Fish that are between 46 inches and up to 55 inches TL may not be retained before 1 July downstream of the Soldotna Bridge or before 15 July upstream of the Soldotna Bridge. A person who retains a Chinook salmon 20 inches TL or longer is prohibited from fishing from a boat in the Kenai River downstream of Skilak Lake for the remainder of that day. The use of multiple hooks and treble hooks is prohibited in the early- and late-run fisheries. During the early-run fishery, use of bait is not allowed, whereas bait is allowed during the late-run fishery. On Sundays and Mondays, only unguided fishing is allowed and on Mondays, unguided boat anglers may only fish from non-motorized vessels (those that do not have a motor on board) downstream of the outlet of Skilak Lake.

Kenai River Chinook salmon 55 inches TL and greater must be "sealed" within 3 days of harvest at the Soldotna ADF&G office. The seal consists of a numbered tag that is affixed to the lower jaw after the Chinook salmon is sampled for age, sex, and length. In addition, an angler interview is conducted to collect information regarding the harvest of the largest Kenai River Chinook salmon.

There are further restrictions for fishing guides and guided anglers. Guided anglers are only allowed to fish from 0600 to 1800 hours. Guides are also prohibited from personally fishing while conducting clients and are prohibited from conducting clients on Sundays and Mondays, with the exception of Memorial Day.

No inseason actions were taken during the early or late runs in 2009.

OBJECTIVES

Objectives for the 2009 study were as follows:

1. Estimate catch and harvest of Chinook salmon[1] by the sport fishery in the mainstem Kenai River between the Warren Ames and Soldotna bridges from 16 May through 30 June (early run) and from 1 July through 31 July (late run) such that the relative precision of the estimates for each run is within 20%, or 1,000 fish, of the true value 95% of the time.
2. Estimate the proportion by age of the Chinook salmon population passing the Chinook salmon sonar site (RM 8.5) from 16 May through 10 August such that all age-proportion estimates for each run are within 10 percentage points of the true values 95% of the time.

[1] Harvest is the number of fish caught and retained while catch is the total number of fish caught (including those intentionally released).

3. Estimate the proportion by age of Chinook salmon harvested by the sport fishery in the mainstem Kenai River downstream from the Soldotna Bridge such that all age-proportion estimates for each run are within 20 percentage points of the true values 80% of the time.

In addition to the objectives outlined above, the project was responsible for completing the following tasks:

1. Estimate total sport angler effort, by run, in angler-hours. Precision of the effort estimates is driven by that of the catch and harvest estimates (Objective 1).
2. Estimate daily catch per unit effort (CPUE) of Chinook salmon captured in inriver gillnets at RM 8.5. Precision of the CPUE estimates is driven by that of the Chinook salmon proportion estimates by age (Objective 2.).
3. Calculate the proportion of fish captured in the inriver drift gillnets that are Chinook salmon.
4. Examine Chinook salmon sampled during the creel survey and inriver drift gillnetting for a missing adipose fin, indicating a possible hatchery-produced Chinook salmon stray into the Kenai River.
5. Collect tissue samples from Kenai River Chinook salmon sampled from inriver gillnets and the sport fish harvest for future genetic analysis.

METHODS

CREEL SURVEY

A stratified, 2-stage roving-access creel survey (Bernard et al. 1998) was employed to estimate sport fishing effort, and catch and harvest of Chinook salmon from the Warren Ames Bridge (RM 5.2) to the Soldotna Bridge (RM 21.1) (Figure 2). The creel survey was conducted from 16 May through 31 July 2009. First-stage sampling units were days. The unguided angler day was assumed to be 20 h long (0400 to 2400 hours) while the guided angler day was 12 h long (0600 to 1800 hours) by regulation. Daily catch and harvest were estimated as the product of effort (angler hours) and CPUE or harvest per unit effort (HPUE). Second-stage units for estimating angler effort and CPUE or HPUE were periodic angler counts and angler trips. Angler trips were sampled by interviewing anglers at the end of their fishing trips.

Stratification accounted for the geographical, temporal, and regulatory factors affecting the fishery. Because significant harvest below the sonar site would affect inriver run and escapement estimates, angler counts were geographically stratified into 2 areas: 1) between the Soldotna Bridge and the Chinook salmon sonar site, and 2) between the Chinook salmon sonar site and the Warren Ames Bridge. Angler interviews did not include this level of stratification because past attempts to estimate catch and harvest downstream of the sonar site using geographically-stratified angler interviews were ineffective (Marsh 2000). Thus, catch and harvest downstream of the sonar site are based on estimated effort downstream of the sonar site while assuming CPUE and HPUE are constant throughout the study area.

The creel survey was temporally stratified by day type (weekday, weekends/holidays) because harvest and catch rates can differ by time (King 1995-1997). Similarly, angler counts and interviews were post-stratified by angler type (guided vs. unguided) because catch and harvest rates between guided and unguided anglers can differ (Reimer 2004b). Mondays during the late

run were included into the creel survey in order to recalibrate the index method. The sampling strata used for conducting Kenai River Chinook salmon angler counts and estimating creel statistics are presented in Table 1.

Two of the 4 available weekdays and both weekend days were sampled each week. An exception was the week of 19–25 May, when 2 days were selected randomly from the 3 weekend or holiday days available. The early run was composed of 32 strata. The late run was composed of 25 strata.

Due to budgetary constraints, non-holiday Mondays have not been included in the creel survey since 2001 (Reimer 2003), although unguided drift boat anglers have been allowed to fish. During the years 2002–2008, an "index" angler count and ad hoc procedure were conducted for Mondays to generate effort, catch, and harvest estimates[2]. A trend of increasing popularity and the rise of harvest estimates on late-run Mondays from less than 3% of the total late-run harvest below Soldotna Bridge in 2001 to over 9% in 2008 (Perschbacher *In prep*), justified including the 4 late-run Mondays into the 2009 sampling schedule. During 2009, the late-run Monday creel survey estimates of catch, harvest, and effort were compared to the index estimates for accuracy and recalibration of the index estimation method.

Water clarity was measured to the nearest 0.05 m with a Secchi disk, and temperature was measured to the nearest 0.1°F twice daily near mid-channel at RM 15.3.

Angler Counts

Four angler counts were conducted during each sampled day. The first count began at the start of a randomly chosen hour (0400, 0500, 0600, 0700, or 0800 hours) with the remaining counts done every 5 hours. The schedule ensured that at least 2 angler counts were conducted while guided anglers were fishing (between 0600 and 1800 hours) each day.

Counts were conducted from a survey boat between the Soldotna Bridge and the Warren Ames Bridge, a distance of 15.9 mi. To maximize interview time, the direction (upstream or downstream) traveled to conduct angler counts was pre-selected to minimize total distance traveled and time spent conducting the count. Anglers were counted while driving the survey boat through the survey area. The entire count required approximately 45 minutes to complete, and most counts were completed in less than 1 hour. Angler counts were treated as instantaneous counts; hence they reflected fishing effort at the time the count began. Anglers were counted if they were fishing or rigging their line when observed during an angler count. Boats were counted as fishing if the boat contained at least 1 angler. Eleven thumb counters were used to sum the following categories for each geographic stratum: 1) unguided power boats, 2) unguided drift boats, 3) guided power boats, 4) guided drift boats, 5) unguided anglers in power boats, 6) unguided anglers in drift boats, 7) guided anglers in power boats (excluding the guide), 8) guided anglers in drift boats (excluding the guide), 9) active boats[3], 10) non-active boats[4], and 11) shore anglers. Only categories 5–8 were required for this project; categories 1–4, and 9–11 were supplementary information for management purposes.

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[2] See page 11 for an explanation of Monday angler counts.

[3] Boats were counted as active boats if there were no anglers actively fishing from the boat, but the boat and motor were in operation.

[4] Boats were counted as non-active boats if there were no anglers actively fishing from the boat, the motor was not in operation, but it was obvious the motor had been run during the day.

The second boat count of the day, completed between 0800 and 1400 hours each Monday of the late run (restricted to unguided drift boats), was used to generate an index of effort, catch, and harvest estimates.

Angler Interviews

Anglers who completed fishing were interviewed at the following boat launch sites (Figure 2):

1) Centennial Campground
2) Poacher's Cove
3) Riverbend Campground
4) Pillar's Boat Launch
5) Eagle Rock Campground
6) Kenai Landing[5]

When the creel survey began on 16 May, interviews were conducted only at Pillar's Boat Launch. The other boat launch sites were added to the sampling schedule immediately after sufficient boat traffic was observed. Centennial Campground was added to the sampling schedule on 30 May, Riverbend Campground was added on 7 June, Poacher's Cove was added on 10 June, Eagle Rock Campground was added on 2 July, and a new site for 2009, Kenai Landing, was added on 6 July in an attempt to intercept unguided drift-boat anglers on Mondays. For each day sampled, the first randomly scheduled boat count of the day was completed (between 0500 and 0900 hours) prior to conducting interviews; therefore, the entire angler day was not sampled. The chance of introducing length-of-stay bias (Bernard et al. 1998) is small; in 2001, only 2% of the interviews were conducted from 0400 to 0859 hours and the mean CPUE for that period was similar to the overall mean (Reimer 2003). This is typical across years.

There were 4 time intervals per day during which interviews could be conducted: 3 intervals between consecutive angler counts and 1 interval after the last angler count. During the early run, when there were more interview periods than active boat launches, each launch was sampled once before any launch was repeated in the daily schedule. During the late run, when there were more accessible boat launches than interview periods, access location was chosen with replacement from the locations available. Time and boat launch were paired randomly.

The following information was recorded for each interviewed angler: 1) time of interview, 2) guided or unguided angler, 3) number of hours spent fishing downstream of the Soldotna Bridge[6], 4) number of Chinook salmon harvested downstream of the Soldotna Bridge, 5) number of Chinook salmon released downstream of the Soldotna Bridge, and during the early run only, 6) whether released Chinook salmon were less than 46 inches TL, 46–54.99 inches TL, or 55 inches TL or greater.

Age, Sex, and Length of the Sport Harvest

Harvested Chinook salmon were sampled for ASL during angler interviews. Sex was identified from external morphological characteristics (i.e., protruding ovipositor on females or a developing kype on males). Mid eye to tail fork (METF) length was measured to the nearest

[5] Kenai Landing was sampled only during late-run Mondays.

[6] Hours fishing were rounded to the nearest 0.5 hour and included when an angler's line was in the water or being rigged, but not travel time or time after an angler had harvested a fish.

half-centimeter. Three scales were removed from the preferred area of each fish and placed on an adhesive coated card (Clutter and Whitesel 1956; Welander 1940). Acetate impressions of the scales were aged using a microfiche reader.

Additionally, a tissue sample (tip of axillary process) was taken from harvested fish for genetic analysis, and each harvested fish was inspected for an adipose fin. A missing adipose fin indicates the fish is either missing the fin naturally or received a coded wire tag as a juvenile. Presence of a coded wire tag identifies a hatchery-produced Chinook salmon that strayed to the Kenai River. If a fish without an adipose fin was found, and permission was granted from the angler, the fish's head was removed and examined later for a coded wire tag.

INRIVER GILLNETTING

The inriver gillnetting program began in 1979 and has been modified several times to meet the changing needs of the Kenai River Chinook salmon fishery. Due to concerns of net selectivity bias with respect to CPUE, species composition estimates, abundance estimates, as well as gillnetting time and area considerations, the gillnetting program was standardized to estimate ASL of inriver runs, CPUE, and species composition (Reimer 2004b). Inriver gillnetting was conducted 6 hours each day from 16 May through 10 August in an area approximately 0.6 km in length located immediately downstream of the Chinook salmon sonar site at RM 8.5 (Figure 2). Nets of 2 mesh sizes were fished with equal frequency. Specifications of the nets used in 2009 are shown below:

1) 5.0 inch (stretched mesh) multifiber, 80 meshes deep, 10 fathoms long, Shade 1 (clear-steel blue), MS73 (14 strand) twine
2) 7.5 inch (stretched mesh) multifiber, 55 meshes deep, 10 fathoms long, Shade 1, MS93 (18 strand) twine

During the years 2004–2006, gillnet sampling was conducted approximately 6 hours per day from 3 hours before to 3 hours after a low tide. By examining the percentage of fish passing the sonar site at particular times (from 5 hours before to 1 hour after a low tide vs. 3 hours before to 3 hours after a low tide) it became clear that potentially more fish could be intercepted by inriver gillnets if sampling were to begin 5 hours before low tide (Figure 6). Because gillnetting is not feasible during parts of the rising and high tide stages, sampling was scheduled to begin as close to high tide as possible without interfering with the gillnetting crews' ability to drift the net effectively. Starting in 2007, sampling was scheduled for 6 consecutive hours beginning 5 hours before low tide. One tide was sampled each day, excluding hours of darkness (2300–0400 hours).

Each drift was positioned to sample fish that would pass through the insonified river channel (approximately 15 m offshore from the right-bank transducer to 10 m offshore from the left-bank transducer). The drift area began immediately downstream from the sonar transducers (RM 8.5) and ended approximately 0.3 mi downstream (RM 8.2). Drifts were terminated when either 1) the crew believed there were 5 fish in the net, or 2) the net was drifting within approximately 30 m of either bank, or 3) the net became snagged on the bottom or was not fishing properly, or 4) the end of the drift area was reached. Drifts always began at the upstream end of the study area. Two drifts (1 starting on each bank) were completed with 1 mesh size before switching to the other mesh size. For each set the mesh size, starting bank, start and stop times, and number of fish caught by species were recorded.

Water clarity was measured to the nearest 0.05 m with a Secchi disk 3 times daily (beginning, middle, and end of scheduled shift) in midchannel, near the sonar site.

Age, Sex, and Length of the Inriver Run

Chinook salmon captured in gillnets were removed and placed in a tagging cradle (Larson 1995) for ASL sampling. ASL sample data were recorded on a Juniper Systems Allegro CX[7] field computer. To prevent resampling, a quarter-inch hole was punched in the dorsal lobe of the caudal fin on every Chinook salmon handled. Each captured Chinook salmon was examined for a hole-punch prior to sampling. Chinook salmon were also checked for an adipose fin. If a Chinook salmon adipose fin was missing, the fish was sacrificed and the head was removed and examined later for a coded wire tag. Injuries sustained by Chinook salmon during the capture and handling process were also recorded. Samples were stratified into 2 approximately 3-week strata during each run with a sample-size goal of 149 fish for each stratum. Strata for the early run were 16 May–9 June and 10–30 June; strata for the late run were 1–20 July and 21 July–10 August.

The number and species of all fish captured were recorded. In addition, METF lengths of captured sockeye salmon were measured every other day. Length distribution of captured sockeye salmon was used as 1 variable in a mixture model to evaluate species composition in the insonified area at RM 8.6 (Miller et al. 2005).

Tissue samples (dorsal finclips) were collected from Chinook salmon captured and sampled for age, sex, and length. Samples were placed in individually numbered 2 ml plastic tubes and immersed in an alcohol buffer. Each tube had a unique number and was stored at the ADF&G Gene Conservation Laboratory for future analysis.

After 30 June, only every other Chinook salmon per drift was sampled for biological data. All other captured Chinook salmon were only given a hole punch on the dorsal lobe of the caudal fin to prevent re-sampling and then released. Estimates of age, sex, and length composition of the inriver run were generated using the Chinook salmon catches from 5.0- and 7.5-inch mesh gillnets combined.

DATA ANALYSIS

Effort, catch, and harvest were estimated separately for guided and unguided anglers using the following procedures.

Angler Effort

The mean number of anglers on day i in stratum h was estimated as follows:

$$\bar{x}_{hi} = \frac{\sum_{g=1}^{r_{hi}} x_{hig}}{r_{hi}}, \tag{1}$$

[7] Product names used in this publication are included for completeness but do not constitute product endorsement.

where

x_{hig} = the number of anglers observed in the *g*th count of day *i* in stratum *h*, and

r_{hi} = the number of counts on day *i* in stratum *h*.

Angler counts were conducted systematically within each sample day. The variance of the mean angler count was estimated as follows:

$$\hat{V}(\bar{x}_{hi}) = \frac{\sum_{g=2}^{r_{hi}} \left(x_{hig} - x_{hi(g-1)}\right)^2}{2r_{hi}(r_{hi}-1)}. \quad (2)$$

Effort (angler-hours) during day *i* in stratum *h* was estimated by

$$\hat{E}_{hi} = L_{hi}\bar{x}_{hi}, \quad (3)$$

where

L_{hi} = length of the sample day (20 hours for unguided anglers, 12 hours for guided anglers).

The within-day variance (effort) was estimated as follows:

$$\hat{V}(\hat{E}_{hi}) = L_{hi}^2 \hat{V}(\bar{x}_{hi}). \quad (4)$$

The mean effort for stratum *h* was estimated by

$$\bar{E}_h = \frac{\sum_{i=1}^{d_h} \hat{E}_{hi}}{d_h}, \quad (5)$$

where

d_h = number of days sampled in stratum *h*.

The sample variance of daily effort for stratum *h* was estimated as follows:

$$S^2(E)_h = \frac{\sum_{i=1}^{d_h} \left(\hat{E}_{hi} - \bar{E}_h\right)^2}{(d_h - 1)}. \quad (6)$$

Total effort of stratum *h* was estimated by

$$\hat{E}_h = D_h \bar{E}_h, \quad (7)$$

where

D_h = total number of days the fishery was open in stratum *h*.

The variance of total effort of each stratum in a 2-stage design, omitting the finite population correction factor for the second stage, was estimated as follows (Bernard et al. 1998):

$$\hat{V}(\hat{E}_h) = (1-f)D_h^2 \frac{S^2(E)_h}{d_h} + fD_h^2 \frac{\sum_{i=1}^{d_h} \hat{V}(\hat{E}_{hi})}{d_h^2}, \quad (8)$$

where

f = fraction of days sampled (= d_h / D_h).

Catch and Harvest

Catch and harvest per unit (hour) of effort for day *i* was estimated from angler interviews using the jackknife method to minimize the bias of these ratio estimators (Efron 1982). The jackknife estimate of CPUE (similarly HPUE) for angler *j* was calculated as follows:

$$CPUE^*_{hij} = \frac{\sum_{\substack{a=1 \\ a \neq j}}^{m_{hi}} c_{hia}}{\sum_{\substack{a=1 \\ a \neq j}}^{m_{hi}} e_{hia}}, \tag{9}$$

where:

c_{hia} = catch of angler *a* interviewed on day *i* in stratum *h*,

e_{hia} = effort (hours fished) by angler *a* interviewed on day *i* in stratum *h*, and

m_{hi} = number of anglers interviewed on day *i* in stratum *h*.

The jackknife estimate of mean CPUE for day *i* was the mean of the angler estimates:

$$\overline{CPUE}^*_{hi} = \frac{\sum_{j=1}^{m_{hi}} CPUE^*_{hij}}{m_{hi}}, \tag{10}$$

and the bias-corrected mean was

$$\overline{CPUE}^{**}_{hi} = m_{hi}\left(\overline{CPUE}_{hi} - \overline{CPUE}^*_{hi}\right) + \overline{CPUE}^*_{hi}, \tag{11}$$

where

$$\overline{CPUE}_{hi} = \frac{\sum_{j=1}^{m_{hi}} c_{hij}}{\sum_{j=1}^{m_{hi}} e_{hij}}.$$

The variance of the jackknife estimate of CPUE was estimated as follows:

$$\hat{V}\left(\overline{CPUE}^{**}_{hi}\right) = \frac{m_{hi} - 1}{m_{hi}} \sum_{j=1}^{m_{hi}} \left(CPUE^*_{hij} - \overline{CPUE}^*_{hi}\right)^2. \tag{12}$$

Catch during each sample day was estimated as the product of effort and CPUE by

$$\hat{C}_{hi} = \hat{E}_{hi}\overline{CPUE}^{**}_{hi}, \tag{13}$$

and the variance by (Goodman 1960)

$$\hat{V}\left(\hat{C}_{hi}\right)=\hat{V}\left(\hat{E}_{hi}\right)\left(\overline{CPUE}_{hi}^{**}\right)^2+\hat{V}\left(\overline{CPUE}_{hi}^{**}\right)\hat{E}_{hi}^2-\hat{V}\left(\hat{E}_{hi}\right)\hat{V}\left(\overline{CPUE}_{hi}^{**}\right) \quad (14)$$

HPUE was estimated by substituting angler harvest for angler catch in equations (9) through (12). Harvest during sample day *i* was estimated by substituting the appropriate $HPUE_{hi}$ statistics into equations (13) and (14). Total catch and harvest during stratum *h* was estimated using equations (5) through (8), substituting estimated catch ($\hat{C}_{hi}$) and harvest ($\hat{H}_{hi}$) during sample day *i* for the estimated effort ($\hat{E}_{hi}$) during day i.

When no interviews from a particular angler type were obtained during a particular day, there were no CPUE and HPUE estimates to pair with angler counts. For these days, pooled estimates of CPUE and HPUE calculated from interviews obtained during the remaining days within the stratum, or similar strata, were imputed. A bootstrap procedure was used to estimate the variance introduced by use of imputed values.

Total effort, catch, and harvest estimates, and their respective variances, were summed across strata within each run. Technically, estimates of catch and harvest by geographic location and angler type were not statistically independent because HPUE and CPUE were estimated from the same interviews for both geographic strata, and estimates were post-stratified by angler type. This lack of independence between strata could underestimate variances; however, the bias in variance estimates is small.

Angler Effort, Catch, and Harvest on Mondays

During 2009, results of effort, catch, and harvest from the creel survey conducted on Mondays during the late run (restricted to unguided drift boats) were compared to estimates derived from the single index angler count conducted every late-run Monday between 0800 and 1400 hours. For 2009, the index count was used in the following ad hoc procedure to estimate effort, catch, and harvest on drift-boat Mondays:

1) The relationship between index counts and mean angler counts on Mondays for 2001 angler count data was used to estimate the relationship between index counts and mean angler counts on Mondays for 2002–2009. For 2001, the mean number of anglers was approximately 78% of the number counted during the "index" period.
2) To estimate angler hours of effort *E*, the estimated mean count was multiplied by the length of the unguided angler day (20 hours).
3) To estimate CPUE and HPUE on Mondays without angler interviews, we exploited the tendency for angler success to exhibit an autocorrelated time trend. CPUE and HPUE were plotted versus time for days sampled with angler interviews, and then we imputed CPUE and HPUE values for each Monday.
4) Catch and harvest were estimated as the product of the imputed values of CPUE and HPUE and the estimate of *E* derived from the index count.

CPUE of Inriver Gillnetting

Two gillnet mesh sizes were deployed: 5.0 and 7.5 inches. Two drifts were conducted with 1 mesh size, originating from each side (*k*) of the river; the sequence was then repeated with the

other mesh size. A repetition *j* consisted of a complete set of 4 such drifts. Daily CPUE *r* of species *s* in mesh *m* for day *i* was estimated as follows:

$$\hat{r}_{smi} = \frac{\sum_{j=1}^{J_i}\sum_{k=1}^{2} c_{smijk}}{\sum_{j=1}^{J_i}\sum_{k=1}^{2} e_{mijk}}, \tag{15}$$

$$\hat{V}(\hat{r}_{smi}) = \frac{\sum_{j=1}^{J_i}\left(c_{smij\cdot} - \hat{r}_{smi}e_{mij\cdot}\right)^2}{\bar{e}_{mi}{}^2 J_i(J_i - 1)}, \tag{16}$$

where c_{smijk} is the catch of species *s* in mesh *m* during a drift originating from bank *k* during repetition *j* on day *i*, e_{mijk} is the effort (soak time in minutes) for that drift, J_i is the number of repetitions completed on day *i*, c_{smij} is the catch of species *i* in mesh *m* summed across drifts on both banks conducted during repetition *j* of day *i*, $e_{mij.}$ is the effort for mesh *m* summed across drifts on both banks conducted during repetition *j* of day *i*, and $\bar{e}_{mi}$ is the mean of e_{mij} across all repetitions *j* for mesh *m* on day *i*. The variance follows Cochran (1977:66).

Proportion of Chinook Salmon Captured by Inriver Gillnetting

The proportion of species *s* passing through the insonified zone of the river channel during the test-netting period on day *i* was estimated as follows:

$$\hat{p}_{si} = \frac{\sum_{j}^{J_i}\hat{r}_{sij}}{\sum_{s}\sum_{j}^{J_i}\hat{r}_{sij}}, \tag{17}$$

$$\hat{V}(\hat{p}_{si}) = \frac{\sum_{j=1}^{J_i}\left(\hat{r}_{sij} - \hat{p}_{si}\hat{r}_{\cdot ij}\right)^2}{\bar{r}_i^2 J_i(J_i - 1)}, \tag{18}$$

where CPUE *r* of species *s* during repetition *j* of day *i* is estimated as the mean of the CPUEs pooled across bank, for each mesh size:

$$\hat{r}_{sij} = \frac{1}{2}\sum_{m=1}^{2}\frac{\sum_{k=1}^{2} c_{smijk}}{\sum_{k=1}^{2} e_{mijk}}, \tag{19}$$

where

r_{ij} = $\sum_{s}\hat{r}_{sij}$ is the CPUE summed across all species caught during repetition *j* of day *i*, and

$\bar{r}_i$ = the mean CPUE of salmon (all species) caught across all drifts *k* during day *i*.

Only data from repetitions with at least 1 drift with each mesh were used for estimation of species proportions.

Age and Sex Composition

Age and sex composition of the Chinook salmon harvest were estimated for each run, by time stratum *t*. The proportion of Chinook salmon in age or sex group *b* in time stratum *t* was estimated as

$$\hat{p}_{bt} = \frac{n_{bt}}{n_t}, \tag{20}$$

where

n_{bt} = the number of Chinook salmon of age or sex group *b* sampled during stratum *t*, and

n_t = the number of successfully aged or sexed Chinook salmon sampled during stratum *t*.

The variance of $\hat{p}_{bt}$ was approximated[8] as follows (Cochran 1977):

$$\hat{V}(\hat{p}_{bt}) = \frac{\hat{p}_{bt}(1-\hat{p}_{bt})}{(n_t - 1)}. \tag{21}$$

Contingency tables and chi-square tests were used to determine if age or sex composition differed significantly ($P < 0.05$) among strata. If not, the proportion of Chinook salmon in age or sex group *b* during an entire run, and its variance, were estimated by pooling data across strata (equations 20–21 without stratum subscripts *t*).

The harvest of each age or sex group by time stratum *t* and geographic stratum *g* (above and below the sonar), was estimated by

$$\hat{H}_{gbt} = \hat{H}_{gt}\hat{p}_{bt} \tag{22}$$

with variance (Goodman 1960)

$$\hat{V}\left(\hat{H}_{gbt}\right) = \hat{H}_{gt}^2\hat{V}\left(\hat{p}_{bt}\right) + \hat{p}_{bt}^2\hat{V}\left(\hat{H}_{gt}\right) - \hat{V}\left(\hat{p}_{bt}\right)\hat{V}\left(\hat{H}_{gt}\right) \tag{23}$$

where

$\hat{H}_{gt}$ and $\hat{V}\left(\hat{H}_{gt}\right)$ = estimated harvest and its variance in geographic stratum *g* during temporal stratum *t*.

If age or sex composition differed ($P < 0.05$) among strata, a weighted proportion and its variance were calculated as follows:

$$\hat{p}_{gb} = \frac{\sum_t \hat{H}_{gt}\hat{p}_{bt}}{\sum_t \hat{H}_{gt}}, \text{ and} \tag{24}$$

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[8] Variance estimates for species proportions assume that each fish sampled is an independent observation (i.e., that simple random sampling, SRS, was employed). In reality, the sport harvest is sampled with a multistage design (creel survey), and the inriver return is sampled with a cluster design (netting); and technically, the age proportion variances should be estimated in the context of those designs. However, age composition changes very slowly over time; and in the past we have assumed that variability between sampling stages and among clusters is negligible. To verify this, we reanalyzed the 2006 netting data, calculated the age proportions following equation 8 and compared them to the SRS estimator in equation 20. The point estimates and their standard errors were essentially equivalent. Based on this evidence, we continue to use the SRS equations for convenience.

$$\hat{V}(\hat{p}_{gb}) = \frac{1}{\hat{H}_g^2}\left[\frac{\hat{v}(\hat{H}_{g1})\left[\hat{p}_{b1}\hat{H}_{g2} - \hat{H}_{gb2}\right]^2}{\hat{H}_g^2} + \frac{v(\hat{H}_{g2})\left[\hat{p}_{b2}\hat{H}_{g1} - \hat{H}_{gb1}\right]^2}{\hat{H}_g^2} + \hat{v}(\hat{p}_{b1})\hat{H}_{g1}^2 + \hat{v}(\hat{p}_{b2})\hat{H}_{g2}^2\right]. \quad (25)$$

The number of Chinook salmon passing the sonar N was apportioned by age and sex similarly, using equations 20–24, ignoring geographic stratum subscript g, substituting N for H, and using the net-captured Chinook salmon to estimate p. The inriver run R of age or sex group b was estimated as the sum of the age or sex specific sonar passage N_b and harvest below the sonar H_{2b},

$$\hat{R}_b = \hat{N}_b + \hat{H}_{2b}. \quad (26)$$

RESULTS

CREEL SURVEY

Effort, Catch, and Harvest

The creel survey was conducted from 16 May to 31 July. During the early run, the creel survey sampled 59% (20/34) of the days the fishery was open to guided anglers and 65% (26/40) of the days open to unguided fishing (Table 2). During the late run, the creel survey sampled 61% (14/23) of the days the fishery was open to guided anglers and 71% (22/31) of the days open to unguided fishing, including 4 Mondays, when only unguided fishing from non-motorized boats was allowed (Table 3). The creel survey estimates of catch, harvest, and effort on late-run Mondays are included in the seasonal totals presented herein. A total of 3,109 angler interviews were conducted: 1,169 during the early run and 1,940 during the late run (Tables 2 and 3).

During the early run, angler counts ranged from 0 to 121 for unguided anglers and from 0 to 268 for guided anglers (Appendix A1). The largest count occurred on 28 June for unguided anglers and on 16 June for guided anglers. The largest count in the early run for guided and unguided anglers combined was 333 anglers on 16 June between 0400 and 0859 hours. During the late run, angler counts ranged from 4 to 461 for unguided anglers and from 72 to 492 for guided anglers (Appendix A2). The largest count occurred on 19 July for unguided anglers and on 22 July for guided anglers. The largest count in the late run for guided and unguided anglers combined was 826 anglers on 18 July between 0400 and 0859 hours.

Estimated effort was 53,039 (SE 2,296) angler hours during the early run (Table 2) and 177,716 (SE 6,195) angler hours during the late run (Table 3). Guided anglers accounted for 55% of the early-run effort and 44% of the late-run effort.

In the early run, daily catch rates (CPUE) varied from 0 to 0.068 and averaged 0.016 fish per hour for unguided anglers, while daily CPUE for guided anglers ranged from 0 to 0.071 and averaged 0.024 fish per hour (Appendices B1 and B2). Daily CPUE in the early run was highest on 2 June for unguided anglers and on 30 May for guided anglers. In the late run, daily CPUE varied from 0 to 0.190 and averaged 0.053 fish per hour for unguided anglers, while daily CPUE for guided anglers ranged from 0.029 to 0.114 and averaged 0.074 fish per hour (Appendices B3 and B4). Daily CPUE was highest in the late run on 3 July for unguided anglers and 3 July for guided anglers.

The estimated harvest of Chinook salmon during the early run was 898 (SE 143) fish (Table 2). Guided anglers accounted for 63% of the harvest compared to 37% for unguided anglers. The

estimated catch of early-run Chinook salmon was 1,058 (SE 151) fish, meaning 15% of the catch was released. Anglers from the 1,169 interviews conducted during the early run reported releasing 20 Chinook salmon, of which 85% were reported to be below the slot limit of 46 inches TL and 15% were reported to be within the slot limit (46 to 54.99 inches TL) (Table 4). The absolute precision for total early-run harvest (±280 fish) satisfied the project objectives.

The estimated harvest of Chinook salmon during the late run was 7,378 (SE 487) fish (Table 3). Guided anglers accounted for 58% of the harvest compared to 42% for unguided anglers. The estimated catch of late-run Chinook salmon was 10,352 (SE 728), meaning approximately 29% of the catch was released. The relative precision for total harvest (±12.9%) and catch (±13.8%) satisfied the project objectives.

Approximately 1.1% of the early-run effort and 13.0% of the late-run effort occurred downstream of the Chinook salmon sonar site (Appendices C1 and C2). The estimate of late-run harvest below the Chinook salmon sonar site was 1,132 (SE 178) (15.3%), whereas 6,246 (SE 453) (84.7%) Chinook salmon were harvested upstream of the sonar site (Appendix C2).

Late-run Mondays

Two separate methods (index and creel survey) were used to estimate angler effort, catch, and harvest of Chinook salmon on Mondays during the late run. The index estimates indicate an effort of 12,418 angler hours, a harvest of approximately 443 Chinook salmon, and a catch of 628 (Figure 7). The Monday index harvest estimate represented approximately 6% of the total late-run harvest.

Creel survey estimates for late-run Mondays, indicate an effort of 8,760 (SE 1,512) angler hours, a harvest of 329 (SE 62) Chinook salmon, and catch of 427 (SE 78) Chinook salmon (Table 3, Figure 7). The Monday creel harvest estimate represented approximately 4.5% of the total late-run harvest.

The index method overestimated angler hours by 29.5% compared to the creel survey (Figure 7). The 2009 angler count during the index period was 55% of the daily mean number of anglers, compared to 78% of the daily mean number of anglers in 2001 during the same time stratum (Figure 8). Index estimates of catch were overestimated by 32.0%, and harvest by 25.9% compared to direct estimates from the creel survey (Figure 7). Index and creel survey estimates of CPUE and HPUE varied by date but the average late-run index CPUE (0.051), was only slightly higher than the creel CPUE of (0.049), while the index HPUE (0.036) was slightly lower than creel survey HPUE (0.038).

INRIVER GILLNETTING

Species Composition

During the early run, a total of 167 Chinook salmon and 937 sockeye salmon greater than 400 mm METF were captured with 5.0 inch and 7.5 inch mesh gillnets (Appendix D1 and D2). A total of 70 other fish, 4 Dolly Varden, and 63 eulachon (*Thaleichthys pacificus*), were also captured. Only salmonids greater than 400 mm METF length (the lower length limit that is detectable by the split-beam sonar; Debby Burwen, ADF&G, Sport Fish Division, Anchorage, personal communication) were used to calculate daily CPUE by species and daily Chinook salmon ratios. Daily Chinook salmon CPUE for both mesh sizes combined ranged from 0 to 0.087 and averaged 0.025 (Appendix D3). The daily ratio of Chinook salmon to total salmon

captured, again for both mesh sizes combined, ranged from 0 to 1.00 and averaged 0.25 (Appendix D3).

During the late run, a total of 562 Chinook salmon, 1,806 sockeye salmon, 77 coho salmon, and 5 pink salmon greater than 400 mm METF length were captured with gillnets (Appendix D4 and D5). In addition, 3 Dolly Varden were captured in the late run. For both mesh sizes combined, daily Chinook salmon CPUE ranged from 0.012 to 0.330 and average 0.131 (Appendix D6). The daily ratio of Chinook salmon to total salmon captured ranged from 0.06 to 0.67 and averaged 0.29 (Appendix D6).

AGE, SEX, AND LENGTH

Creel Survey

During the early run, the age composition of the harvest differed ($\chi^2 = 7.52$, df = 2, $P = 0.023$) between temporal strata (16 May–8 June, 9–30 June). Therefore, early-run age composition estimates were weighted by the harvest in each temporal stratum (Table 5 and Appendix E1). The early-run harvest was composed of 1.0% (SE 1.0%) age-1.1 fish, 19.2% (SE 5.3%) age-1.2 fish, 33.5% (SE 6.6%) age-1.3 fish, and 46.3% (SE 6.8%) age-1.4 fish. Age-1.3 males (19.3%, SE 5.5%) comprised a higher percentage of the total early-run harvest than age-1.3 females (14.2%, SE 4.7%), whereas age-1.4 males (16.2%, SE 5.0%) comprised a lower percentage of the total early-run harvest than age-1.4 females (30.1%, SE 5.8%) (Table 5). The slot limit truncated the early-run harvest length composition at 46 inches TL (Figure 9).

During the late run, the age composition of the harvest differed ($\chi^2 = 9.03$, df = 3, $P = 0.029$) between temporal strata (1–17 July, 18–31 July). Therefore, late-run age composition estimates were weighted by the harvest in each temporal stratum (Table 6 and Appendix E2). The late-run recreational harvest was composed of 16.9% (SE 2.7%) age-1.2 fish, 20.0% (SE 2.9%) age-1.3 fish, 60.5% (SE 3.5%) age-1.4 fish, and 2.6% (SE 1.1%) age-1.5 fish (Table 6). Age-1.4 females (35.9%, SE 3.4%) comprised a higher percentage of the total late-run harvest than age-1.4 males (24.6%, SE 3.1%), whereas age-1.3 females (8.2%, SE 2.0%) comprised a lower percentage of the total late-run harvest than age-1.3 males (11.8%, SE 2.3%) (Table 6). Sample size goals and relative precision goals for estimates of age proportions of the harvest were met for each sampling stratum in the late run.

The 2008 slot limit change resulted in an additional harvest of 9 Chinook salmon (fish between 44 and 46 inches TL) in 2009. During the early run, 14% of Chinook salmon sampled were below 28 inches TL compared to the 5-year average (2004–2008) of 6%.

Inriver Gillnetting

The early-run age composition for the inriver run was composed of 3.1% (SE 1.5%) age-1.1 fish, 14.8% (SE 3.2%) age-1.2 fish, 24.2% (SE 3.8%) age-1.3 fish, 56.3% (SE 4.4%) age-1.4 fish, and 1.6% (SE 1.1%) age-1.5 fish (Table 7). During the late run, the age composition of the inriver run differed ($\chi^2 = 28.05$, df = 2, $P < 0.0001$) among temporal strata (1–20 July, 21 July–10 August). Therefore, age composition estimates for Chinook salmon passing by the sonar site were weighted by the sonar passage estimates in each temporal stratum (Table 8 and Appendix E3). Age-1.4 fish were most abundant, comprising 54.8% (SE 2.7%) of the total run, followed by age-1.2 fish (29.5%, SE 2.5%), age-1.3 fish (11.2%, SE 1.7%), and age-1.5 fish (4.2%, SE 1.1%).

The age composition of the early-run inriver run and the late-run inriver run differed ($\chi^2 = 18.17$, df = 3, $P < 0.0001$). Age-1.5 fish were more prevalent in the late run (4.2%, SE 1.1%) than in the early run (1.6%, SE 1.1%).

The age composition of the early-run harvest and the early-run inriver run did not differ ($\chi^2 = 0.78$, df = 2, $P = 0.68$) with ages 1.2, 1.3, and 1.4 considered. Anglers harvested a larger percentage of age-1.2 and -1.3 fish, and a smaller percentage of age-1.4 fish (Tables 5 and 7, Figure 10). The age composition of the late-run harvest and the late-run inriver run differed ($\chi^2 = 13.13$, df = 3 $P = 0.004$) with ages 1.2, 1.3, 1.4, and 1.5 considered. Anglers harvested a larger percentage of age-1.3 and age-1.4 fish, and a smaller percentage of age-1.2 and age-1.5 fish (Tables 6 and 8).

LENGTH-AT-AGE COMPARISONS

METF lengths are compiled by age and sex for the early run (Table 9) and the late run (Table 10). A graphical depiction of length-at-age is shown in Figure 11. On average, age-1.2 and age-1.3 female Chinook salmon were slightly larger than males of these ages, while age-1.4 and age-1.5 male Chinook salmon were larger on average than females of these ages.

OTHER RESULTS

Kenai River Secchi disk measurements of water clarity were above average for the early run and below average for the late run, while discharge was average for the early run and above average for most of the late run (Figure 12).

All Chinook salmon in the creel and inriver netting study were examined for the presence of adipose finclips, of which zero were observed.

ADF&G staff sealed 1 Chinook salmon brought into the Soldotna office in fulfillment of the 55 inch or greater sealing requirement.

Tissue samples for future genetic analysis were taken from 529 Chinook salmon sampled from inriver gillnets (151 early run, 378 late run), and 375 tissue samples were taken from Chinook salmon sampled from the creel survey (74 early run, 301 late run).

DISCUSSION AND RECOMMENDATIONS

CREEL SURVEY

The early-run slot limit regulations (44–55 inches TL from 2003 to 2007, 46–55 inches TL in 2008) have been effective at protecting ocean-age-5 Chinook salmon in the early run. Only 2 early-run ocean-age-5 Chinook salmon have been sampled in the creel survey during the 7 years (2003–2009) a slot limit has been in effect. Among ocean-age-4 fish in the early run, females have been harvested at a higher rate than males because ocean-age-4 males are larger on average than ocean-age-4 females and more likely to be protected under the slot limit than females. Also, ocean-age-3 fish have been selectively harvested in the early run since 2003, another unintended result due in part to the imposed slot limit.

In 2009, there were no inseason management decisions during the early-run fishery. Several factors dictated the early-run fishery be managed without any liberalizations; these include a 26% decline in sport fishery effort, a 74% decline in catch, and a 68% decline in harvest below the recent 5 year average (2004–2008) (Figure 3), a 60% decline in cumulative CPUE for the

inriver netting project below the recent 5 year average (2004–2008) (Figure 13), a large influx of sockeye salmon that may have positively biased sonar estimates, and a below-average run size of Chinook salmon throughout Cook Inlet.

There were no inseason management actions in the late-run Chinook salmon fishery. Late-run harvest was approximately 40% below the recent 5 year average (2004–2008) and 20% below the historical (1977–2008) late-run average harvest (Figure 4). Late-run effort was the lowest since 1983 and 19% below the historical (1977–2008) average effort.

Harvest of Chinook salmon downstream of the Chinook salmon sonar had increased from 1996 to 2006 (from 5% to 25%), but from 2007 to 2009, harvest has remained relatively stable between 11% and 19% of the total late-run harvest (Figure 14). Harvest success downstream of the sonar site is largely dependent on water clarity. This section of river is tidally influenced.

Late-run Mondays

Previous years creel surveys had not sampled Mondays in the late run since 2001, and were replaced instead by the single index angler count and ad hoc estimation method. Consequently, 2002–2008 estimates of effort, catch, and harvest have a small negative bias because they did not include Monday estimates. Estimates of effort, catch, and harvest for Mondays sampled during the 2009 creel survey were included in this year's seasonal totals.

Overestimation of the 2009 Monday index for effort, catch, and harvest may have been the result of a proportional increase in effort during the time of day unguided drift-anglers fish, and/or selection of HPUE and CPUE values. Preliminary results show an overestimation of the index effort by 29.5% compared to the more statistically valid estimate of effort by the creel survey. Angler counts from the 2009 creel survey show a higher percentage of anglers during this time of day that would result in overestimation of effort using the 0.78 conversion factor. The selection of HPUE and CPUE values for index estimation were similar to the creel survey estimates and did not substantially influence the calculations of catch and harvest. The 2009 season was below average for angler effort, catch, and harvest and explanations for inaccuracies of the index method may be premature.

The late run Monday fishery continues to grow in popularity with anglers and accurate estimates of effort, catch, and harvest need to be further investigated; therefore, we intend to include Mondays during the late run into the 2010 regular creel sampling schedule.

INRIVER GILLNETTING

During the years 2004–2006, inriver gillnetting was conducted during a 6-hour period from 3 hours before low tide to 3 hours after low tide. Analysis of historical sonar passage estimates revealed that more fish tend to pass the sonar near the high tide stage than during low tide and more fish could potentially be intercepted by gillnetting closer to high tide. In 2007, inriver gillnetting was scheduled to begin approximately 2 hours earlier in the tide stage than in previous years, beginning 5 hours before low tide instead of 3 hours before low tide. The sampling schedule change resulted in a higher percentage of fish passing the Chinook salmon sonar during the time when inriver gillnetting was conducted than would have if the sample schedule were left unchanged, especially in the late run. In 2009, approximately 28% of all fish passed the Chinook salmon sonar during the early-run inriver gillnetting and approximately 29% of all fish passed the Chinook salmon sonar during late-run inriver gillnetting. The continued use of the new sampling schedule resulted in a 5% increase in fish interception in the early run and a 4%

increase in the late run over the previous sampling schedule. It is recommended that the change to the inriver gillnetting sampling schedule be retained in future years.

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TABLES

Table 1.–Sampling strata used for conducting Kenai River Chinook salmon angler counts and estimating creel statistics, 2009.

Type	Number	Description	
Geographic[a]	2	Warren Ames Bridge (RM 5.1) to Chinook salmon sonar site (RM 8.5)	
		Chinook salmon sonar site (RM 8.5) to Soldotna Bridge (RM 21.1)	
Temporal	7	Early run:	16–17 May, 19–25 May, 26–31 May, 2–7 June, 9–14 June, 16–21 June, 23–28 June, and 30 June
	5	Late run:	1–5 July, 6–12 July, 13–19 July, 20–26 July, and 27–31 July
Day type	3	Weekdays	
		Weekends/holidays	
		Late-run Mondays	
Angler type	2	Guided	
		Unguided	

[a] Used for angler counts only.

Table 2.–Estimated early-run Kenai River Chinook salmon sport fishery effort, catch, and harvest between the Soldotna Bridge and the Warren Ames Bridge, 16 May–30 June 2009.

						Chinook salmon			
				Effort		Catch [a]		Harvest [b]	
Fishing periods	Days open to fishing from powerboats	Sampling days	Number of interviews	Hours fished	SE	No. fish	SE	No. fish	SE
16–18 May									
Guided weekends	1	1	0	48	48	0	0	0	0
Unguided weekends	2	2	33	290	17	3	2	3	2
20–26 May									
Guided weekdays	4	2	4	88	44	0	0	0	0
Guided weekends	2	1	13	828	165	0	0	0	0
Unguided weekdays	4	2	31	460	114	11	11	0	0
Unguided weekends	3	2	94	1,568	348	4	4	4	4
27 May–1 June									
Guided weekdays	4	2	32	1,268	325	38	14	33	16
Guided weekends	1	1	32	552	160	39	16	29	13
Unguided weekdays	4	2	70	1,050	171	20	10	16	8
Unguided weekends	2	2	57	1,270	331	31	15	26	14
3–8 June									
Guided weekdays	4	2	39	2,840	465	91	72	91	72
Guided weekends	2	2	20	1,980	107	42	38	33	38
Unguided weekdays	4	2	33	1,700	234	66	51	52	42
Unguided weekends	2	2	88	1,745	102	6	6	6	6
10–15 June									
Guided weekdays	4	2	29	4,504	701	112	46	88	50
Guided weekends	1	1	14	1,104	270	59	31	59	31
Unguided weekdays	4	2	52	2,100	498	17	18	17	18
Unguided weekends	2	2	46	2,690	281	42	24	42	24
17–22 June									
Guided weekdays	4	2	90	6,776	1,025	117	65	106	58
Guided weekends	1	1	47	1,816	458	70	28	57	25
Unguided weekdays	4	2	71	2,910	408	22	12	22	12
Unguided weekends	2	2	57	2,310	464	39	24	39	24
24–29 June									
Guided weekdays	4	2	95	4,768	1,176	71	24	48	20
Guided weekends	1	1	36	1,572	312	15	11	7	8
Unguided weekdays	4	2	27	2,340	390	52	30	52	30
Unguided weekends	2	2	59	2,685	320	62	34	41	28
30 June [c]									
Guided weekday	1	0	0	1,192	503	18	12	12	9
Unguided weekday	1	0	0	586	144	13	14	13	14

-continued-

Table 2.–Part 2 of 2.

	Days open to fishing from powerboats	Sampling days	Number of interviews	Effort		Chinook salmon Catch [a]		Chinook salmon Harvest [b]	
				Hours fished	SE	No. fish	SE	No. fish	SE
Day type subtotals									
Guided weekdays	25	12	289	21,436	1,871	445	111	379	108
Guided wkends/holiday	9	8	162	7,900	668	226	59	186	56
Unguided weekdays	25	12	284	11,146	827	201	66	173	58
Unguided wkends/holiday	15	14	434	12,558	799	187	51	161	47
Angler type subtotals									
Guided	34	20	451	29,336	1,987	670	126	564	122
% Guided			39%	55%		63%		63%	
Unguided [d]	40	26	718	23,703	1,150	388	83	334	74
% Unguided			61%	45%		37%		37%	
Early-run total [d]			1,169	53,039	2,296	1,058	151	898	143

[a] "Catch" = fish harvested plus fish released; catch estimates may not sum to total due to rounding.

[b] "Harvest" = fish kept; harvest estimates may not sum to total due to rounding.

[c] The date 30 June was not sampled; estimates for this date are based on 24–29 June effort, catch, and harvest estimates per day.

[d] Because Mondays were not sampled, unguided angler estimates are biased and may underestimate the true value.

Table 3.–Estimated late-run Kenai River Chinook salmon sport fishery effort, catch, and harvest between the Soldotna Bridge and the Warren Ames Bridge, 1 July–31 July 2009.

						Chinook salmon			
				Effort		Catch [a]		Harvest [b]	
Fishing periods	Days open to fishing from powerboats	Sampling days	Number of interviews	Hours fished	SE	No. fish	SE	No. fish	SE
1–5 July									
Guided weekdays	3	2	85	6,642	1,129	645	119	412	96
Guided weekends	1	1	31	2,004	787	183	82	154	72
Unguided weekdays	3	2	67	6,278	1,450	1,054	390	467	138
Unguided weekends	2	2	157	7,250	967	449	85	234	56
6–12 July									
Monday	1	1	100	1,840	282	126	28	81	20
Guided weekdays	4	2	101	12,672	1,884	1,148	220	762	151
Guided weekends	1	1	21	2,460	998	121	62	121	62
Unguided weekdays	4	2	54	9,140	1,157	566	294	173	70
Unguided weekends	2	2	157	8,125	862	284	73	177	43
13–19 July									
Monday	1	1	120	2,020	901	114	55	77	38
Guided weekdays	4	2	74	15,540	1,133	1,615	191	1,224	158
Guided weekends	1	1	44	3,212	757	220	71	154	53
Unguided weekdays	4	2	42	11,930	2,855	691	201	578	199
Unguided weekends	2	2	83	10,805	1,076	634	163	565	154
20–26 July									
Monday	1	1	134	3,135	669	151	40	134	36
Guided weekdays	4	2	122	15,616	1,391	602	146	585	154
Guided weekends	1	1	33	4,152	722	250	95	114	52
Unguided weekdays	4	2	106	13,820	1,541	71	62	71	62
Unguided weekends	2	2	125	9,590	1,185	306	105	227	70
27–31 July									
Monday	1	1	53	1,765	974	36	26	36	26
Guided weekdays	4	2	130	14,940	2,332	780	190	726	163
Unguided weekdays	4	2	101	14,240	1,300	303	99	303	99
Day type subtotals									
Monday	4	4	407	8,760	1,512	427	78	329	62
Guided weekdays	19	10	512	65,410	3,672	4,791	395	3,710	328
Guided weekends	4	4	129	11,828	1,646	775	157	544	120
Unguided weekdays	19	10	370	55,408	3,957	2,685	541	1,592	278
Unguided weekends	8	8	522	35,770	2,059	1,673	224	1,203	184
Angler type subtotals									
Guided	23	14	641	77,238	4,024	5,566	425	4,254	349
% Guided			33%	44%		54%		58%	
Unguided [c]	31	22	1,299	99,938	4,710	4,786	591	3,124	339
% Unguided			67%	56%		46%		42%	
Late-run total [c]			1,940	177,176	6,195	10,352	728	7,378	487

[a] "Catch" = fish harvested plus fish released; catch estimates may not sum to total due to rounding.

[b] "Harvest" = fish kept; harvest estimates may not sum to total due to rounding.

[c] Unguided angler estimates include Mondays sampled.

Table 4.–Kenai River Chinook salmon reported to be released during the early-run slot-limit sport fishery between Warren Ames Bridge and Soldotna Bridge, 2003–2009.

	Chinook salmon		
	Below slot limit [a]	Within slot limit [a]	Total number released [c]
Year	% released [b]	% released [b]	
2003	51.6	48.4	64
2004	67.1	32.9	73
2005	65.1	34.9	109
2006	65.0	35.0	100
2007	70.1	29.9	67
2008	77.5	22.5	89
2009	85.0	15.0	20
Min	52	15	20
Mean	69	31	75
Max	85	48	109

[a] During the years 2003–2007, the 44–55 inch slot limit was in effect, and during the years 2008–2009 the 46–55 inch slot limit was in effect.

[b] The number of fish released below or within the slot limit was given by anglers during creel survey interviews.

[c] There were no fish reported to be released above the slot limit.

Table 5.–Age composition and estimated sport harvest by age class for early-run Kenai River Chinook salmon between Soldotna Bridge and Warren Ames Bridge, 16 May–30 June 2009.

	Age				
Parameter	1.1	1.2	1.3	1.4	Total
Female					
Summed sample size			9	24	33
% Sample			13.6%	36.4%	50.0%
SE % sample			4.3%	6.0%	6.2%
Harvest			127	270	397
SE harvest			42	74	91
% Harvest			14.2%	30.1%	44.2%
SE % harvest			4.7%	5.8%	6.5%
Male					
Summed sample size	1	12	10	10	33
% Sample	1.5%	18.2%	15.2%	15.2%	50.0%
SE % sample	1.5%	4.8%	4.4%	4.4%	6.2%
Harvest	9	173	174	146	501
SE harvest	14	50	45	45	95
% Harvest	1.0%	19.2%	19.3%	16.2%	55.8%
SE % harvest	1.0%	5.3%	5.5%	5.0%	6.4%
Both sexes combined					
Summed sample size	1	12	19	34	66
% Sample	1.5%	18.2%	28.8%	51.5%	100.0%
SE % sample	1.5%	4.8%	5.6%	6.2%	0.0%
Harvest	9	173	301	416	898
SE harvest	14	50	65	92	143
% Harvest	1.0%	19.2%	33.5%	46.3%	100.0%
SE % harvest	1.0%	5.3%	6.6%	6.8%	0.0%

Note: values given by age and sex may not sum to totals due to rounding.

Table 6.–Age composition and estimated sport harvest by age class and geographic strata for late-run Kenai River Chinook salmon between Soldotna Bridge and Warren Ames Bridge, 1 July–31 July 2009.

	Age				
Parameter	1.2	1.3	1.4	1.5	Total
Female					
Summed sample size		16	70	2	88
% Sample		8.2%	35.9%	1.0%	45.1%
SE % sample		2.0%	3.4%	0.7%	3.6%
Downstream harvest		81	369	15	465
SE downstream harvest		25	69	11	82
Upstream harvest		538	2,320	56	2,915
SE upstream harvest		136	279	40	312
Total harvest		619	2,689	71	3,380
SE total harvest		154	312	50	347
% Harvest		8.4%	36.5%	1.0%	45.8%
SE % Harvest		2.0%	3.5%	0.7%	3.6%
Male					
Summed sample size	33	23	48	3	107
% Sample	16.9%	11.8%	24.6%	1.5%	54.9%
SE % sample	2.7%	2.3%	3.1%	0.9%	3.6%
Downstream harvest	223	140	280	23	666
SE downstream harvest	52	37	58	14	117
Upstream harvest	990	722	1,535	84	3,332
SE upstream harvest	175	153	225	48	329
Total harvest	1,214	863	1,815	107	3,998
SE total harvest	209	179	258	62	371
% Harvest	16.4%	11.7%	24.6%	1.5%	54.2%
SE % harvest	2.6%	2.3%	3.1%	0.8%	3.6%
Both sexes combined					
Summed sample size	33	39	118	5	195
% Sample	16.9%	20.0%	60.5%	2.6%	100.0%
SE % sample	2.7%	2.9%	3.5%	1.1%	0.0%
Downstream harvest	223	221	649	39	1,132
SE downstream harvest	52	49	109	18	178
Upstream harvest	990	1,261	3,855	140	6,246
SE upstream harvest	175	205	357	63	453
Total harvest	1,214	1,482	4,504	178	7,378
SE total harvest	209	234	395	80	487
% Harvest	16.4%	20.1%	61.1%	2.4%	100.0%
SE % harvest	2.6%	2.9%	3.5%	1.1%	0.0%

Note: values given by age and sex may not sum to totals due to rounding.

Table 7.–Age composition and estimated sonar passage by age class for early-run Kenai River Chinook salmon, 16 May–30 June 2009.

	Age					
Parameter	1.1	1.2	1.3	1.4	1.5	Total
Female						
Sample size		1	16	42		59
Sonar passage estimate		89	1,417	3,719		5,224
SE sonar passage estimate		89	334	480		516
% Sonar passage		0.8%	12.5%	32.8%		46.1%
SE % sonar passage		0.8%	2.9%	4.2%		4.4%
Male						
Sample size	4	18	15	30	2	69
Sonar passage estimate	354	1,594	1,328	2,656	177	6,110
SE sonar passage estimate	175	351	325	430	125	521
% Sonar passage	3.1%	14.1%	11.7%	23.4%	1.6%	53.9%
SE % sonar passage	1.5%	3.1%	2.9%	3.8%	1.1%	4.4%
Both sexes combined						
Sample size	4	19	31	72	2	128
Sonar passage estimate	354	1,682	2,745	6,375	177	11,334
SE sonar passage estimate	175	360	435	520	125	263
% Sonar passage	3.1%	14.8%	24.2%	56.3%	1.6%	100.0%
SE % sonar passage	1.5%	3.2%	3.8%	4.4%	1.1%	0.0%

Note: values given by age and sex may not sum to totals due to rounding.

Table 8.–Age composition and estimated sonar passage by age class for late-run Kenai River Chinook salmon, 1 July–10 August 2009.

	Age					
Parameter	1.1	1.2	1.3	1.4	1.5	Total
Female						
Summed sample size		1	15	115	4	135
Sonar passage estimate		87	1,164	8,546	265	10,060
SE sonar passage estimate		87	299	681	134	711
% Sonar passage		0.3%	4.5%	33.3%	1.0%	39.2%
SE % sonar passage		0.3%	1.2%	2.6%	0.5%	2.7%
Male						
Summed sample size	1	91	24	76	11	203
Sonar passage estimate	87	7,479	1,725	5,520	817	15,628
SE sonar passage estimate	87	655	348	579	247	741
% Sonar passage	0.3%	29.1%	6.7%	21.5%	3.2%	60.8%
SE % sonar passage	0.3%	2.5%	1.3%	2.2%	1.0%	2.7%
Both sexes combined						
Summed sample size	1	92	39	191	15	338
Sonar passage estimate	87	7,566	2,888	14,066	1,081	25,688
SE sonar passage estimate	87	657	447	740	279	440
% Sonar passage	0.3%	29.5%	11.2%	54.8%	4.2%	100.0%
SE % sonar passage	0.3%	2.5%	1.7%	2.7%	1.1%	0.0%

Note: values given by age and sex may not sum to totals due to rounding.

Table 9.–Early-run Kenai River Chinook salmon lengths by sex and age from creel survey and inriver gillnet samples, 16 May–30 June 2009.

Source	Parameter	Age 1.1	1.2	1.3	1.4	1.5	Combined
Creel Survey							
	Females						
	Sample size[a]			9	24		33
	Mean length (mm)			843	965		932
	SE length (mm)			13	8		12
	Min length (mm)			780	880		780
	Max length (mm)			915	1,040		1,040
	Males						
	Sample size[a]	1	12	10	10		33
	Mean length (mm)	545	578	826	990		777
	SE length (mm)		17	25	10		32
	Min length (mm)	545	470	680	930		470
	Max length (mm)	545	645	940	1,030		1,030
	Both sexes combined						
	Sample size[a]	1	12	19	34		66
	Mean length (mm)	545	578	834	973		854
	SE length (mm)		17	14	7		20
	Min length (mm)	545	470	680	880		470
	Max length (mm)	545	645	940	1,040		1,040
Inriver Gillnet Samples							
	Females						
	Sample size[a]		1	16	42		59
	Mean length (mm)		730	873	1,009		968
	SE length (mm)			11	8		11
	Min length (mm)		730	820	875		730
	Max length (mm)		730	960	1,120		1,120
	Males						
	Sample size[a]	4	18	15	30	2	69
	Mean length (mm)	471	646	813	1,058	1,153	866
	SE length (mm)	47	10	15	15	43	26
	Min length (mm)	410	540	685	865	1,110	410
	Max length (mm)	610	715	930	1,180	1,195	1,195
	Both sexes combined						
	Sample size[a]	4	19	31	72	2	128
	Mean length (mm)	471	651	844	1,030	1,153	913
	SE length (mm)	47	10	10	8	43	15
	Min length (mm)	410	540	685	865	1,110	410
	Max length (mm)	610	730	960	1,180	1,195	1,195

Note: all lengths measured from mid eye to tail fork.

[a] Age and sex values may not sum to totals due to rounding.

Table 10.–Late-run Kenai River Chinook salmon lengths by sex and age from creel survey and inriver gillnet samples, 1 July–31 July 2009.

		Age					
Source	Parameter	1.1	1.2	1.3	1.4	1.5	Combined
Creel Survey							
	Females						
	Sample size[a]			16	70	2	88
	Mean length (mm)			894	1,003	1,005	983
	SE length (mm)			11	6	5	7
	Min length (mm)			810	880	1,000	810
	Max length (mm)			955	1,090	1,010	1,090
	Males						
	Sample size[a]		33	23	48	3	107
	Mean length (mm)		630	848	1,046	1,175	879
	SE length (mm)		11	12	9	25	19
	Min length (mm)		510	680	900	1,130	510
	Max length (mm)		740	980	1,170	1,215	1,215
	Both sexes combined						
	Sample size[a]		33	39	118	5	195
	Mean length (mm)		630	867	1,021	1,107	926
	SE length (mm)		11	9	5	44	11
	Min length (mm)		510	680	880	1,000	510
	Max length (mm)		740	980	1,170	1,215	1,215
Inriver Gillnet Samples							
	Females						
	Sample size[a]		1	15	115	4	135
	Mean length (mm)		680	905	1,015	1,080	1,003
	SE length (mm)			11	5	35	6
	Min length (mm)		680	820	920	1,000	680
	Max length (mm)		680	990	1,140	1,160	1,160
	Males						
	Sample size[a]	1	91	24	76	11	203
	Mean length (mm)	395	622	840	1,063	1,169	841
	SE length (mm)		7	15	8	14	16
	Min length (mm)	395	480	700	865	1,070	395
	Max length (mm)	395	775	990	1,180	1,230	1,230
	Both sexes combined						
	Sample size[a]	1	92	39	191	15	338
	Mean length (mm)	395	622	865	1,034	1,145	906
	SE length (mm)		7	11	5	17	11
	Min length (mm)	395	480	700	865	1,000	395
	Max length (mm)	395	775	990	1,180	1,230	1,230

Note: all lengths measured from mid eye to tail fork.

[a] Age and sex values may not sum to totals due to rounding.

FIGURES

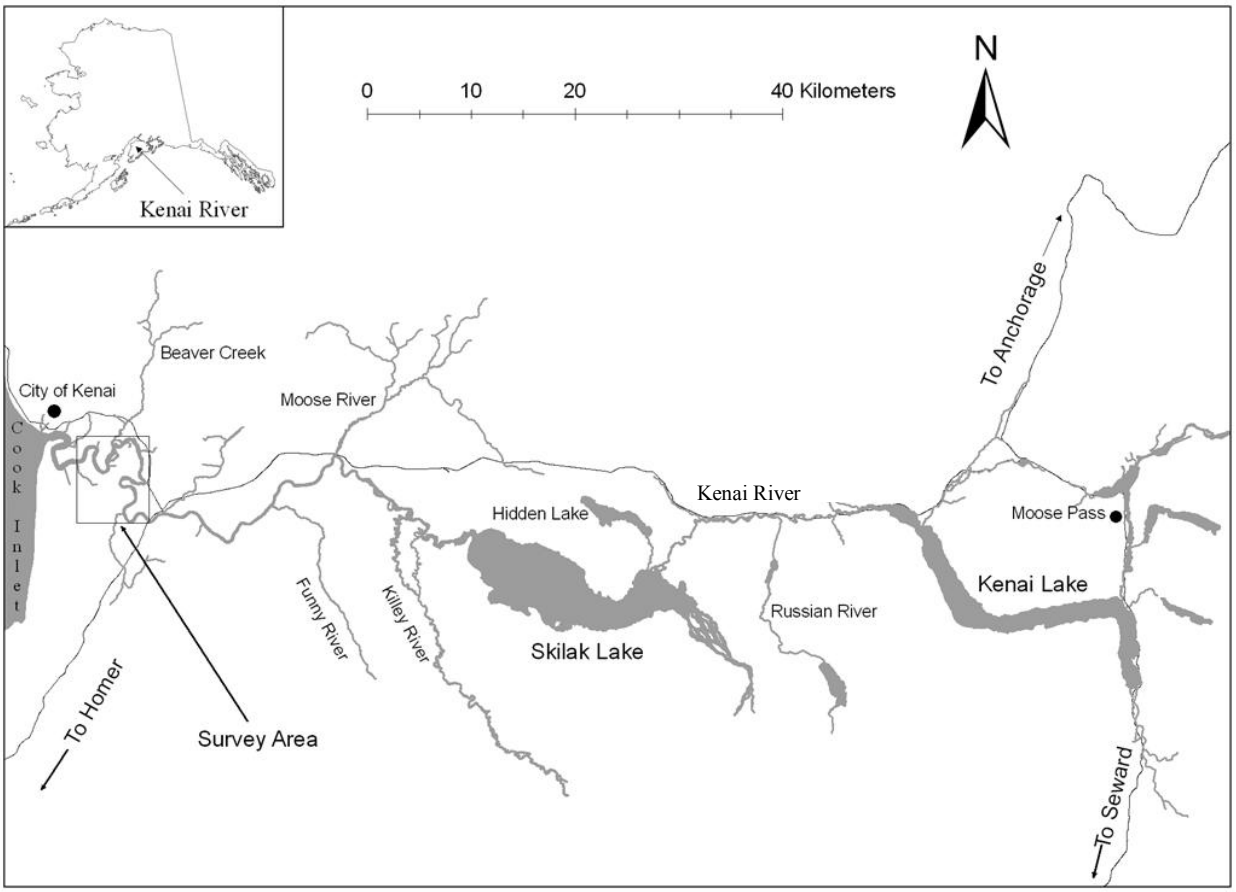

Figure 1.–Kenai River drainage on Kenai Peninsula in Southcentral Alaska.

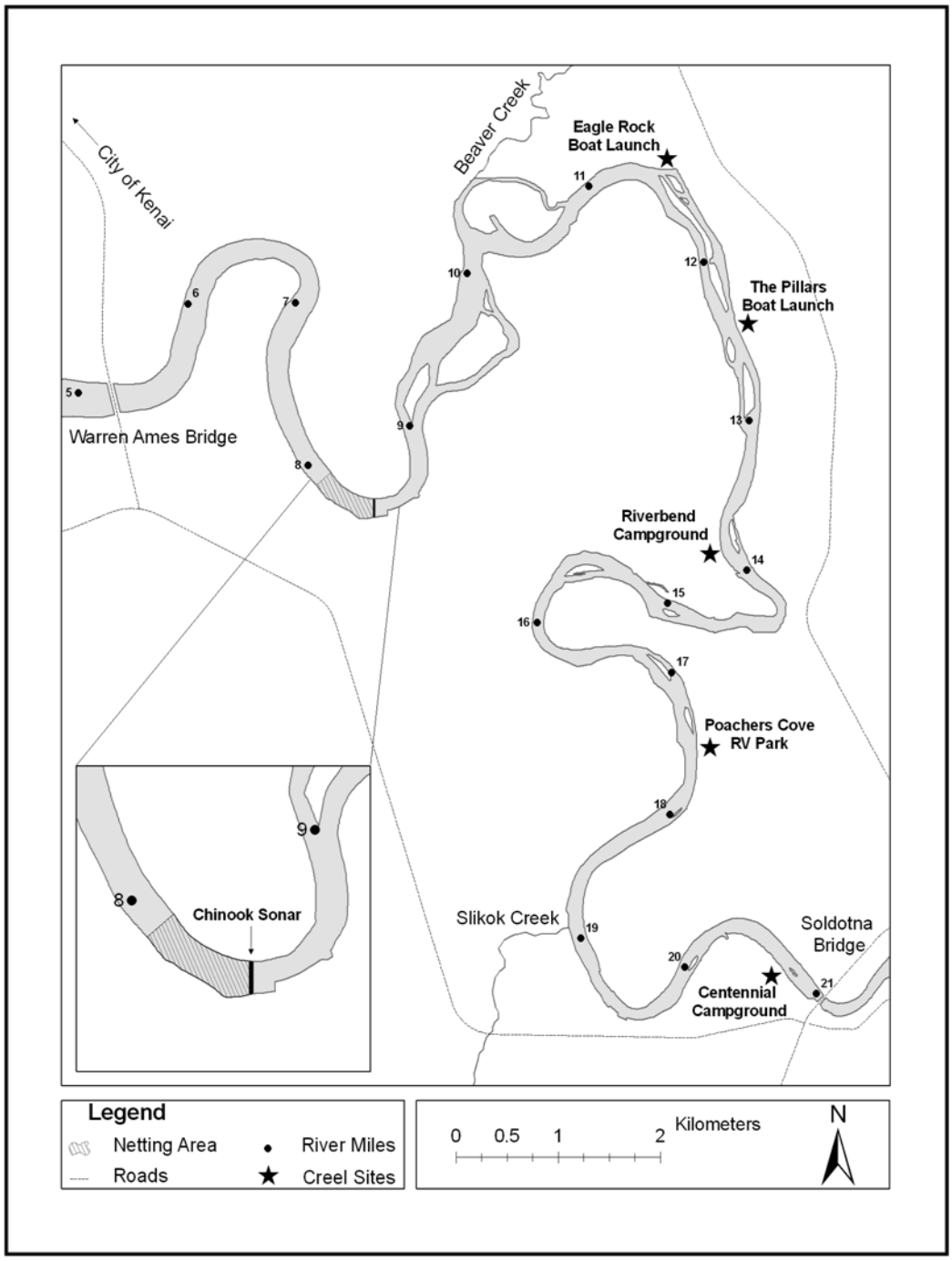

Figure 2.–Lower Kenai River from Warren Ames Bridge (RM 5.2) to Soldotna Bridge (RM 21.1).

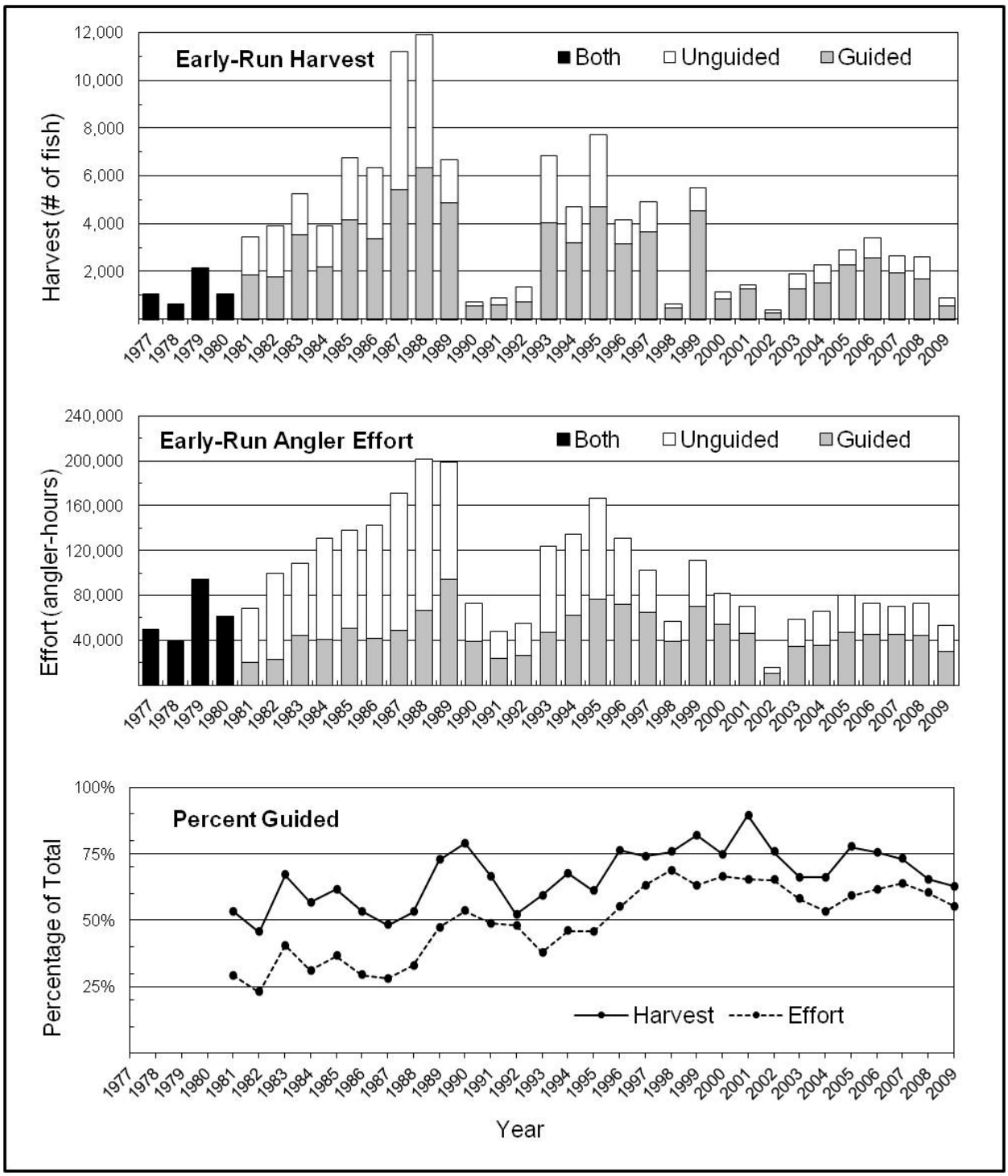

Figure 3.–Guided and unguided sport fish harvest (top), angler effort (middle), and percent of guided anglers (bottom) from ADF&G creel surveys for the early-run Kenai River Chinook salmon fishery between Soldotna Bridge and Warren Ames Bridge, 1977–2009.

Note: Prior to 1981, there was no distinction between guided and unguided anglers.

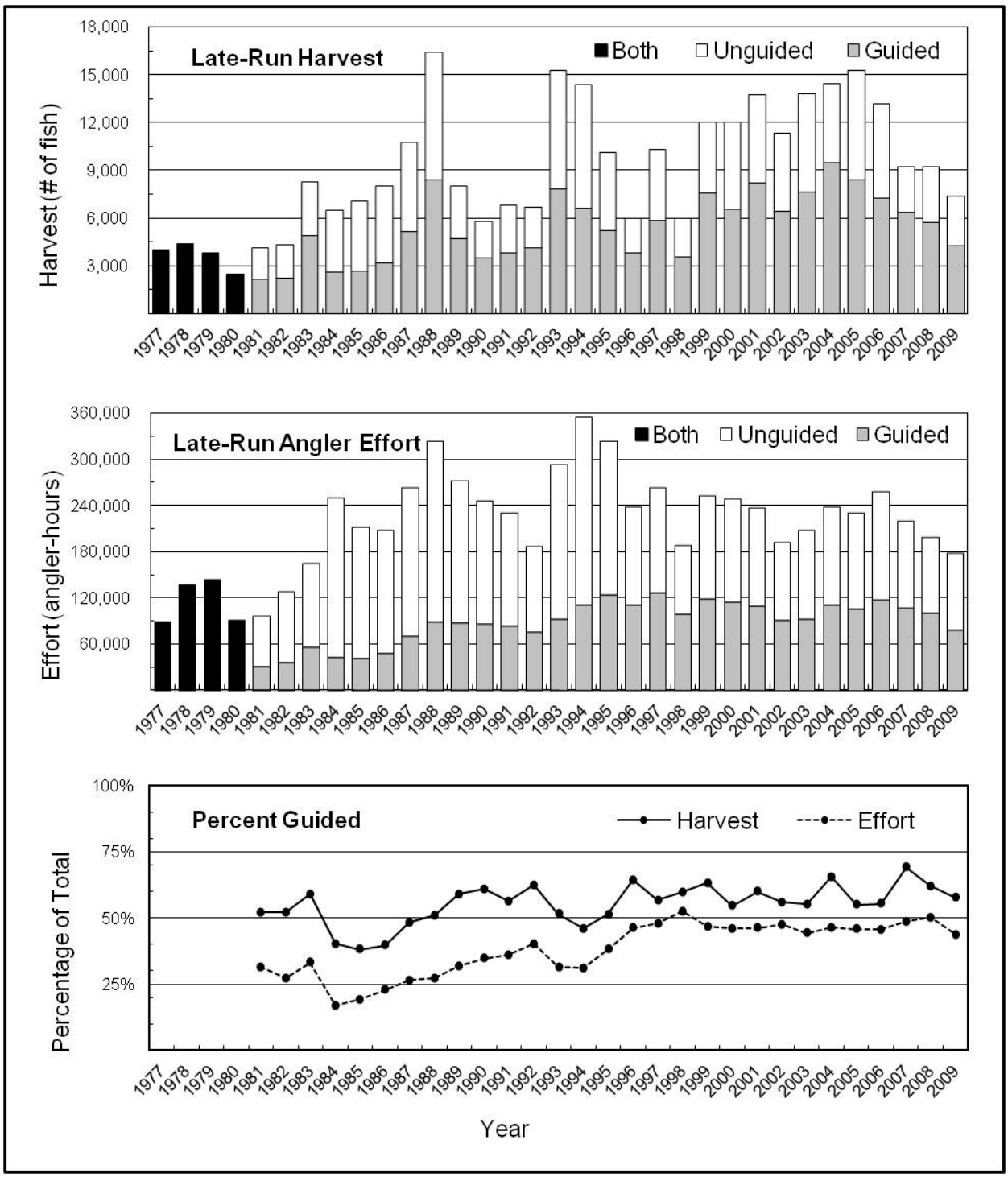

Figure 4.–Guided and unguided sport fish harvest (top), angler effort (middle), and percentage of guided anglers (bottom) from ADF&G creel surveys for the late-run Kenai River Chinook salmon fishery between Soldotna Bridge and Warren Ames Bridge, 1977–2009.

Note: Prior to 1981, there was no distinction between guided and unguided anglers.

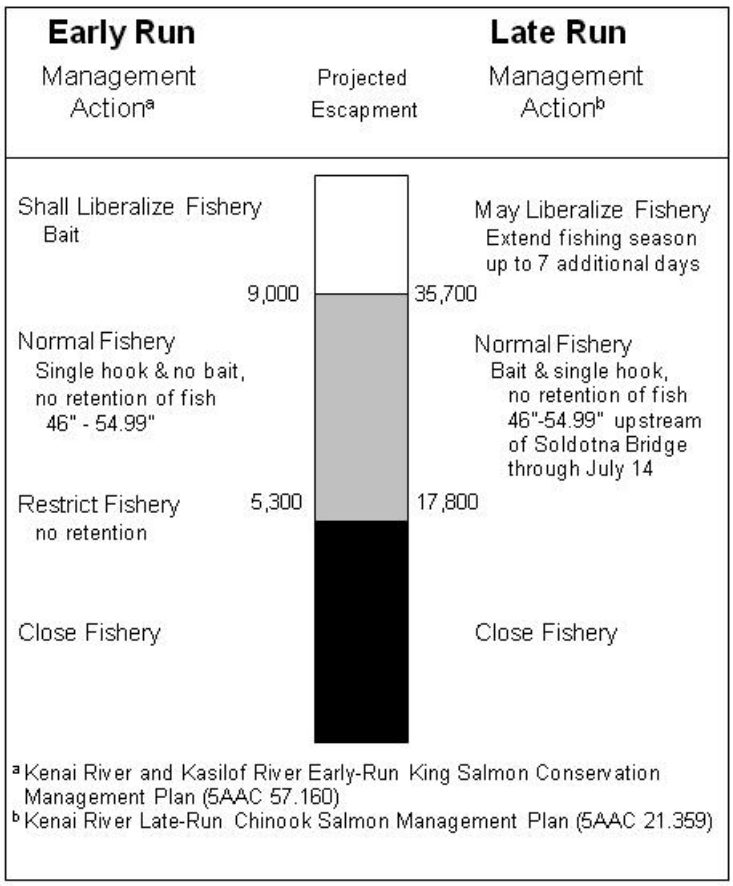

Figure 5.–Escapement levels and sport fish management actions for the Kenai River Chinook salmon fisheries.

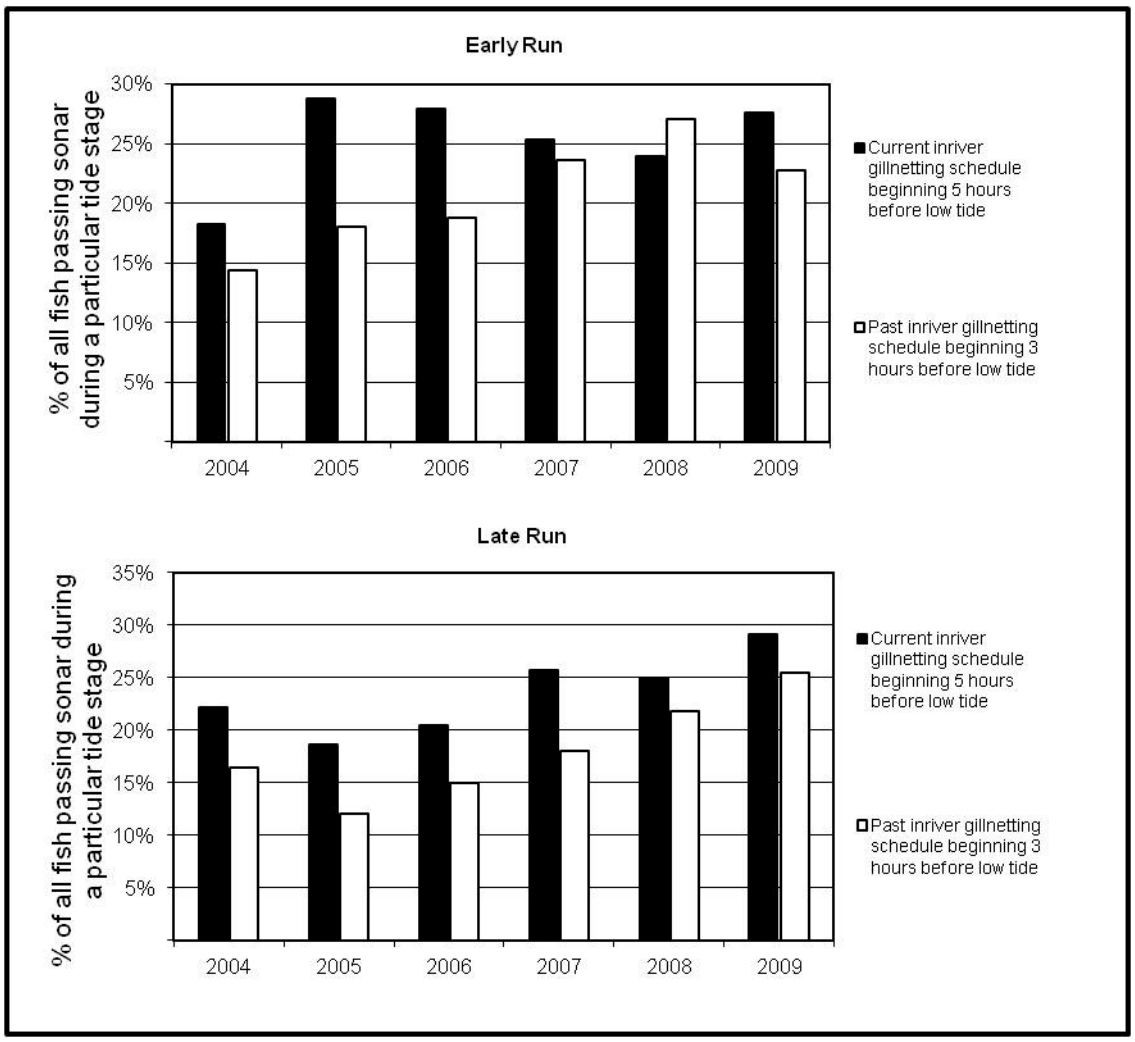

Figure 6.–Percentage of all fish passing the Kenai River Chinook salmon sonar site for the early run (top) and late run (bottom) during 2 tide stages.

Note: 2 tide stages were compared: 3 hours before low tide to 3 hours after low tide (2004–2006 gillnet sampling schedule) vs. 5 hours before low tide to 1 hour after low tide (2007–2009) gillnet sampling schedule.

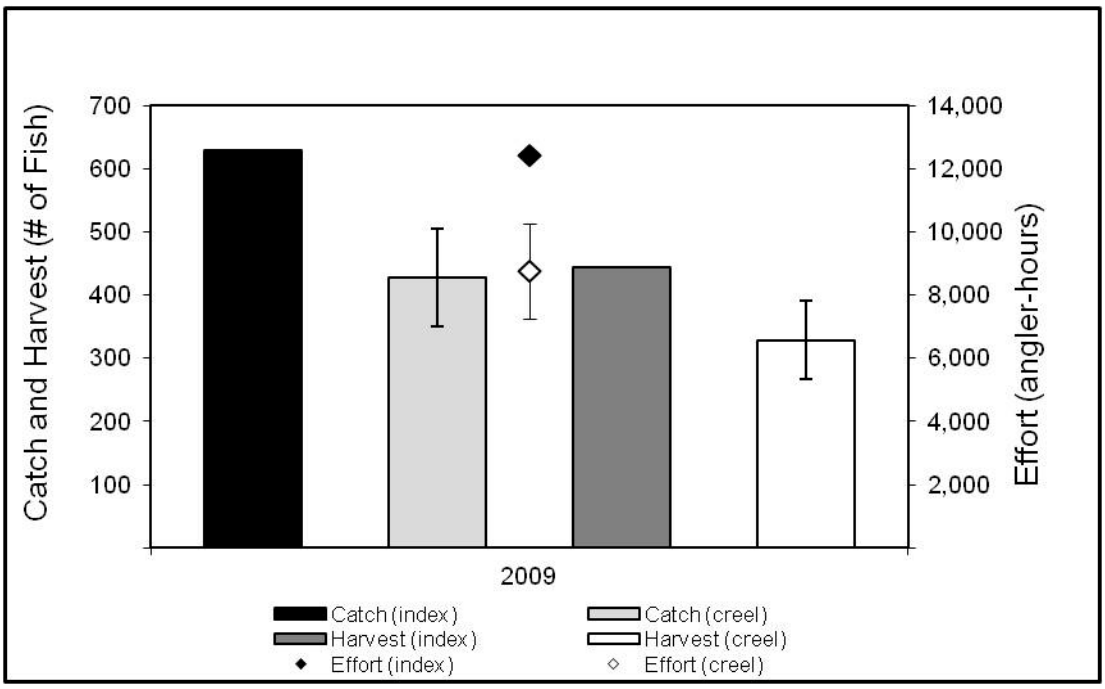

Figure 7.–Index count and creel survey estimates of unguided angler effort, and sport harvest and catch of Chinook salmon, occurring on Mondays during the late run, between Soldotna Bridge and Warren Ames Bridge, Kenai River, 2009.

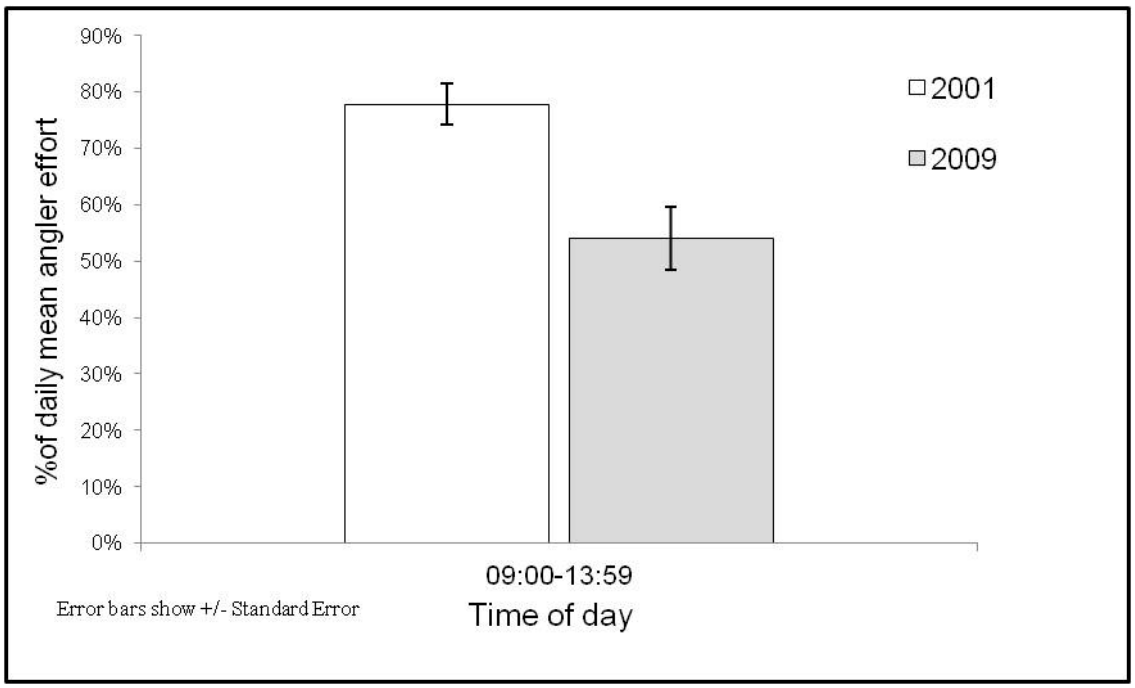

Figure 8.–Percent of daily mean unguided effort between Soldotna Bridge and Warren Ames Bridge occurring during 09:00–13:59 for late-run Mondays, Kenai River, 2009.

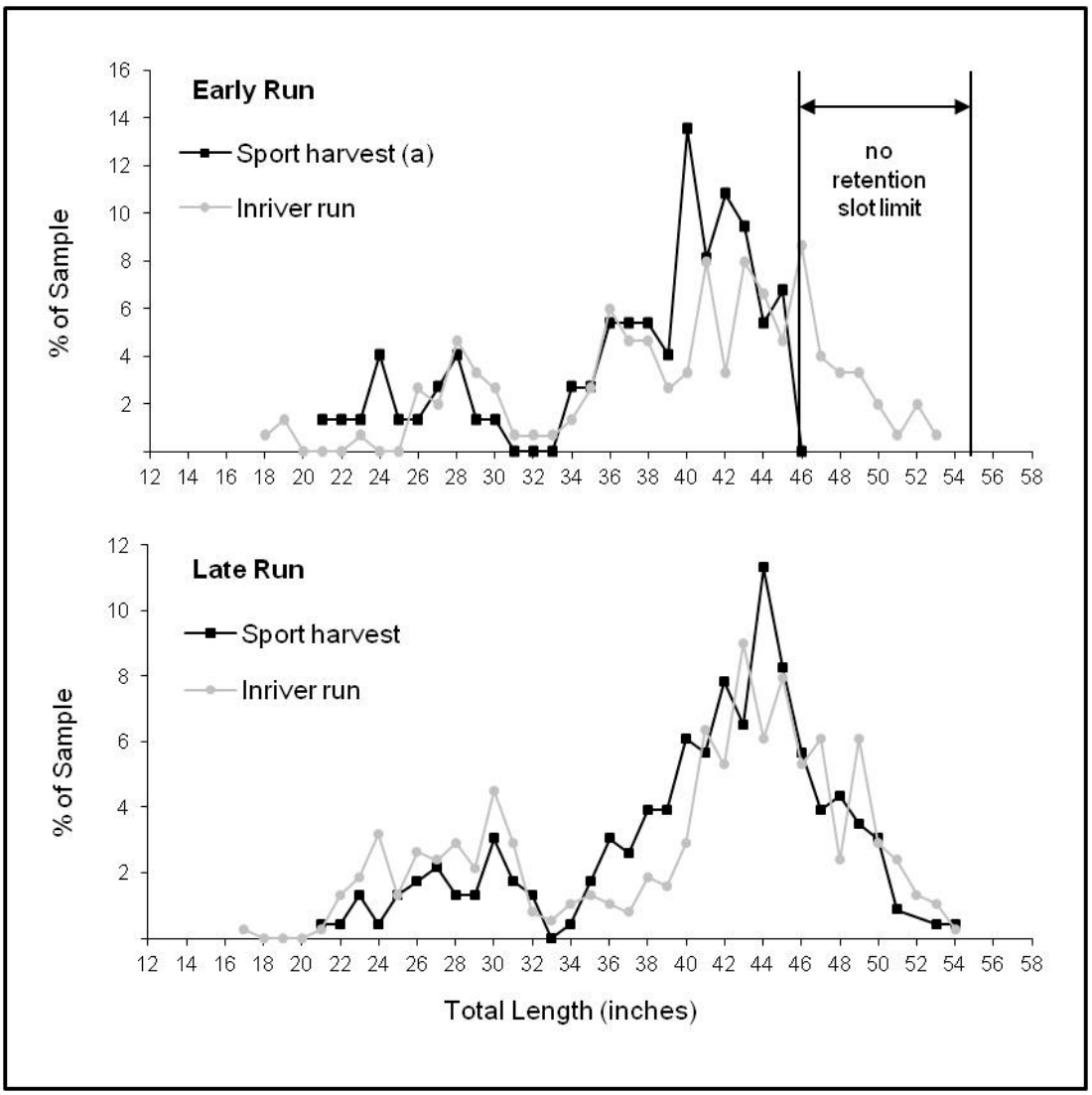

Figure 9.–Length distribution of early-run (top) and late-run (bottom) Kenai River Chinook salmon creel survey and inriver gillnetting samples, 2009.

[a] Length distribution of the early-run harvest is truncated 46 inches due to the 46-inch–55-inch slot limit.

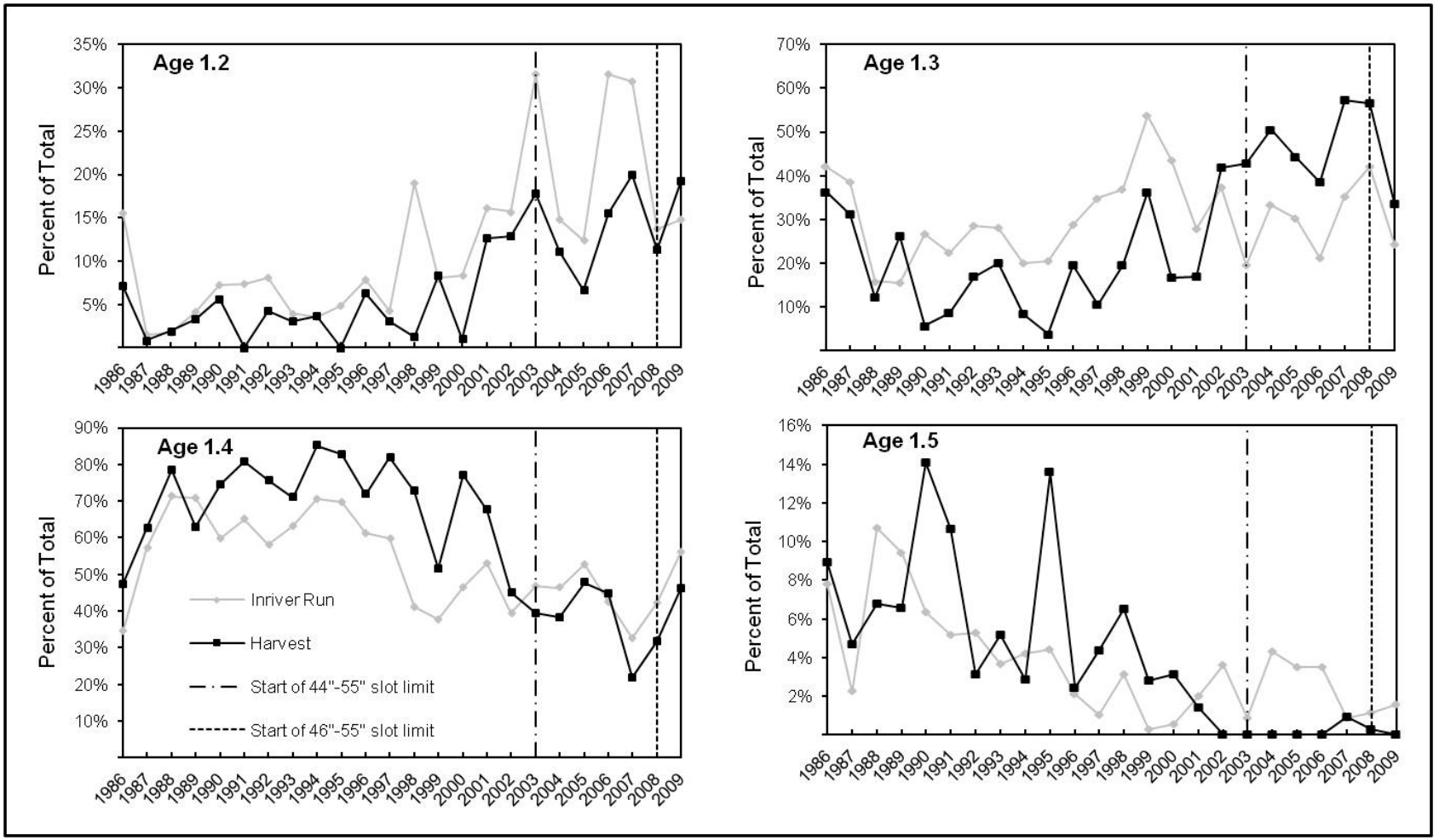

Figure 10.–Age composition of early-run harvest versus early-run inriver run between Soldotna Bridge and Warren Ames Bridge for age-1.2 (top left), age-1.3 (top right), age-1.4 (bottom left), and age-1.5 (bottom right) Chinook salmon, 1986–2009.

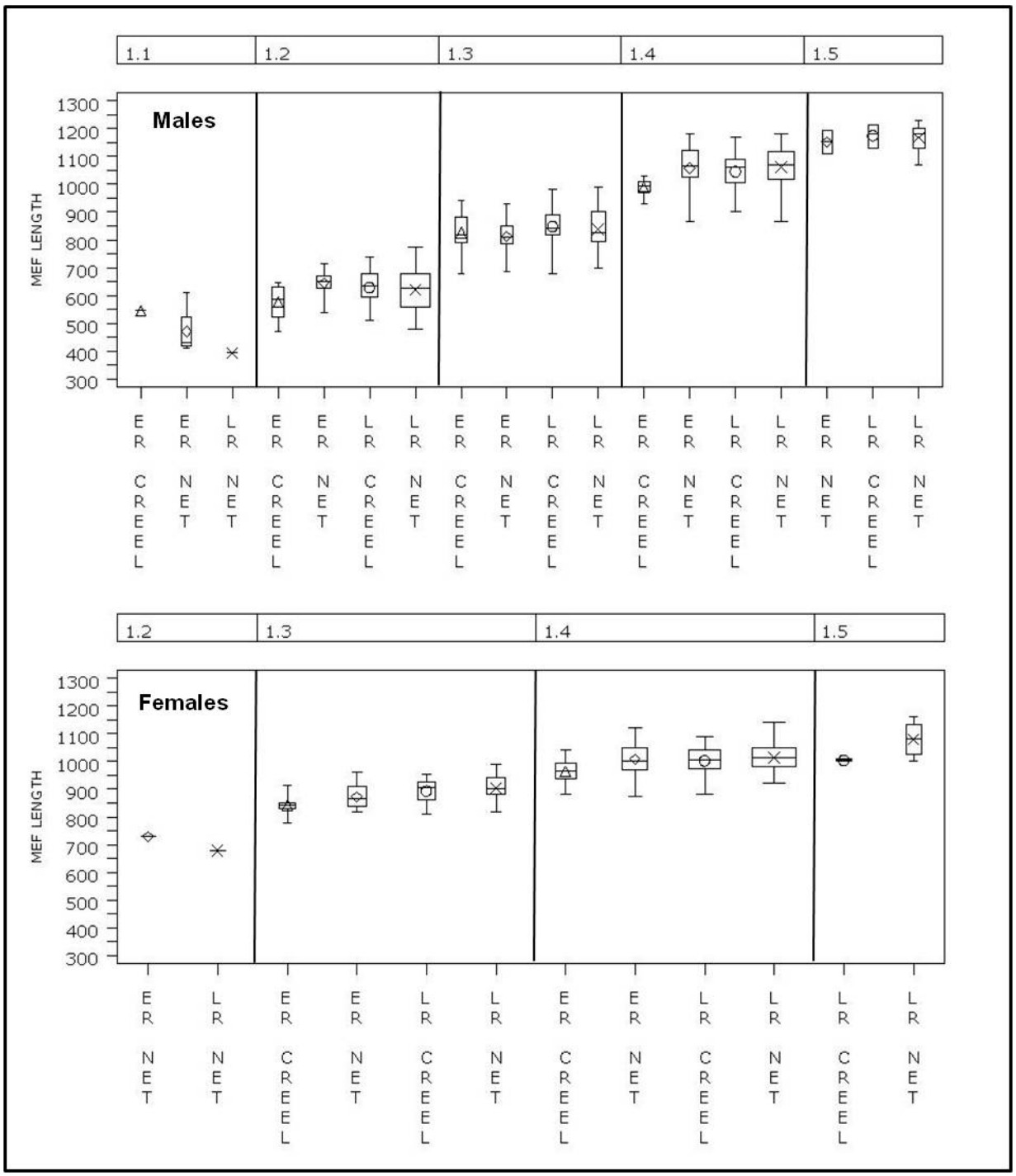

Figure 11.–Box plots of length distribution by age of early- and late-run Kenai River Chinook salmon males (top) and females (bottom) from creel survey and inriver gillnetting samples, 2009.

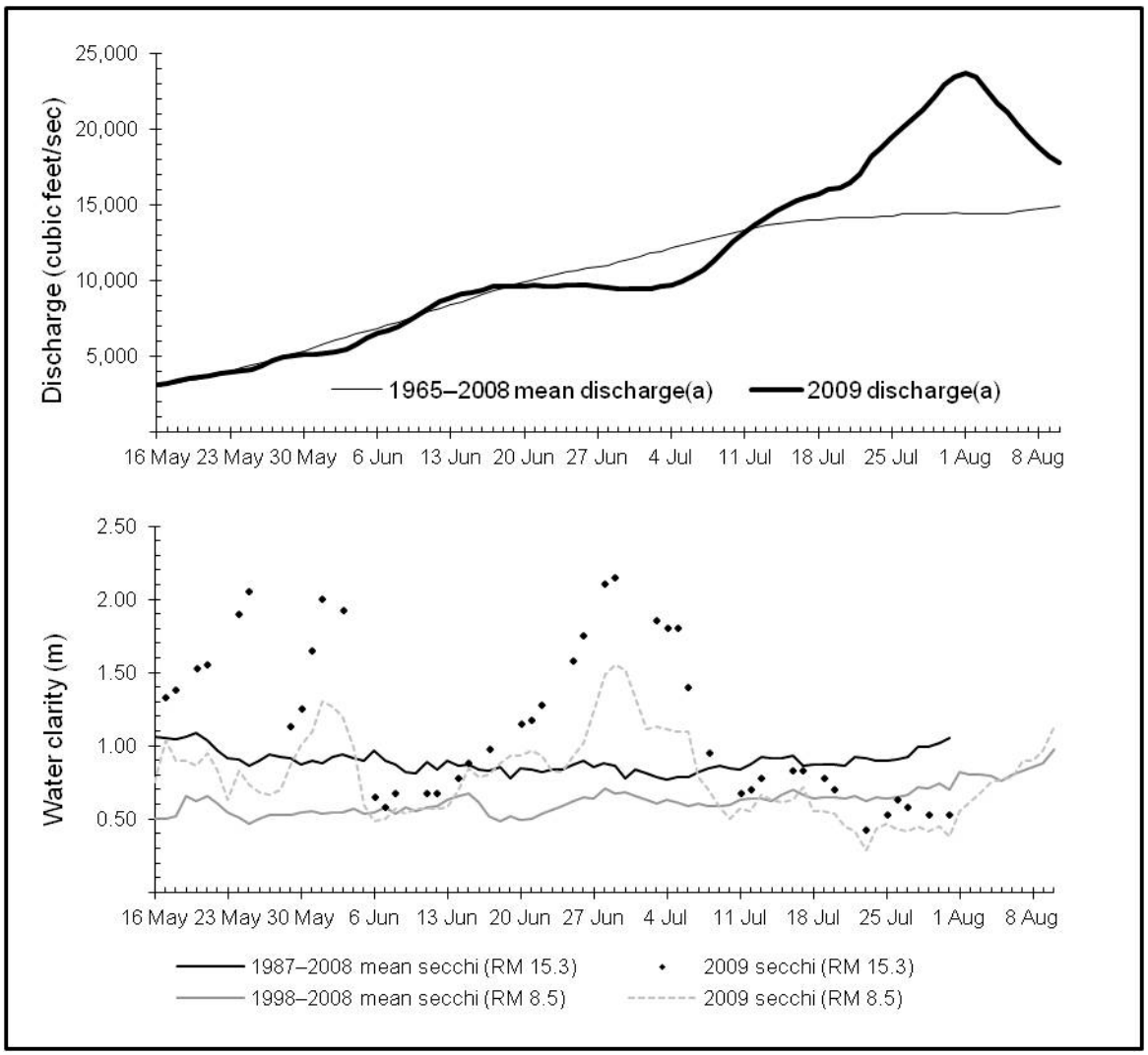

Figure 12.–Kenai River discharge and water clarity, 16 May to 10 August 2009.

[a] Discharge data downloaded from USGS 15266300 KENAI RIVER AT SOLDOTNAAK 2009-09-01 09:15:52 EST http://waterdata.usgs.gov/ak/nwis/discharge

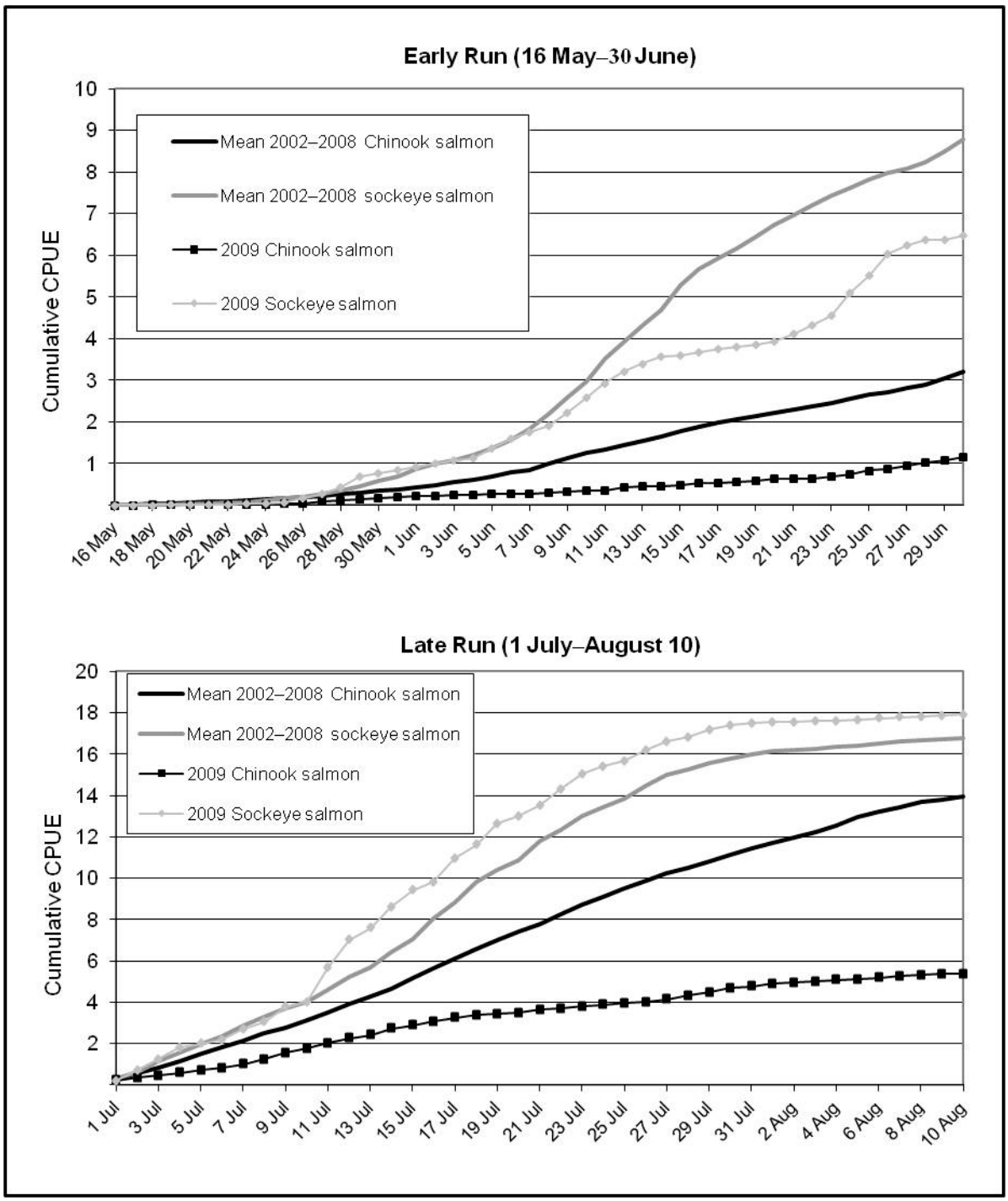

Figure 13.–Cumulative CPUE for early-run and late-run Kenai River Chinook and sockeye salmon inriver gillnet catches, Kenai River, 2002–2009.

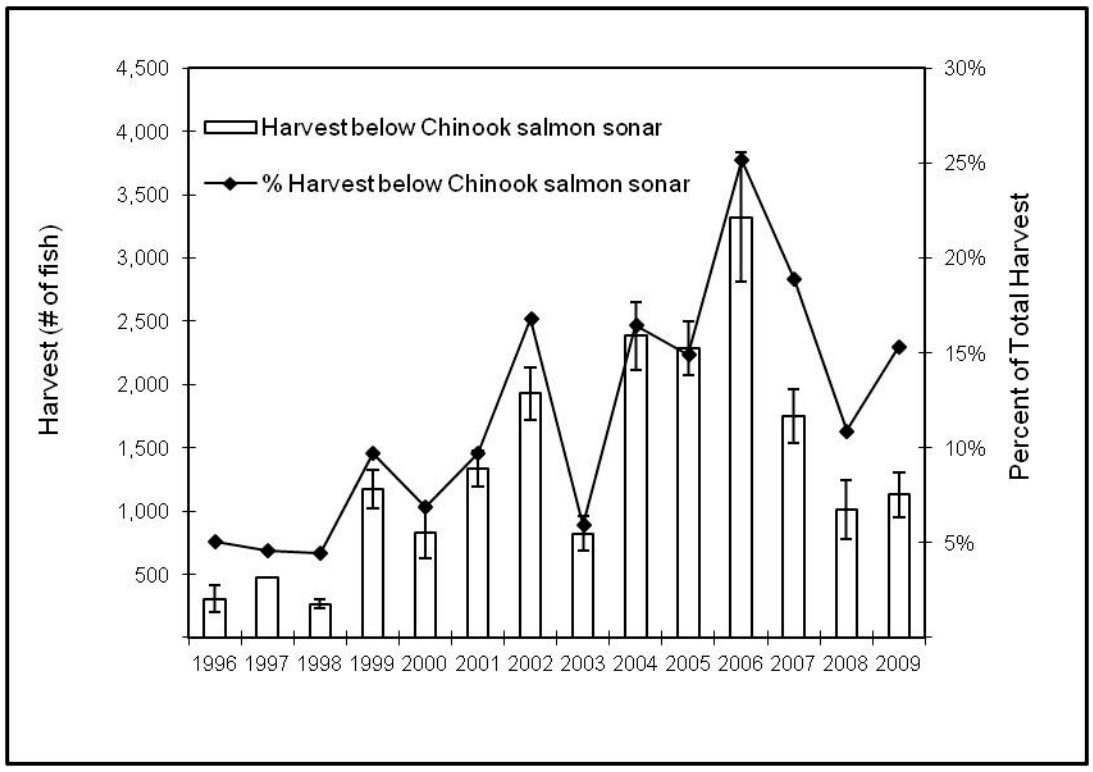

Figure 14.–Estimated number of fish and percent of Kenai River Chinook salmon sport harvest between the Chinook sonar site (RM 8.5) and Warren Ames Bridge (RM 5.2), 1996–2009.

Note: error bars show +/- 1 standard error. Precision estimates are unavailable for 1997.

APPENDIX A: BOAT AND ANGLER COUNTS DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2009.

Appendix A1.–Guided and unguided boat angler counts, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2009.

		Downstream[a]								Upstream[a]								Combined strata							
	Day	Unguided [b]				Guided [b]				Unguided [b]				Guided [b]				Unguided [b]				Guided [b]			
Date	type[c]	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
16 May	we/h	0	0	0	0	0	0			8	5	4	3	8	0			8	5	4	3	8	0		
17 May	we/h	0	0	0	0					11	10	8	9					11	10	8	9				
19 May	wd	0	0	0	0	0	0	0		2	13	6	1	2	0	0		2	13	6	1	2	0	0	
20 May	wd	0	0	0	0		0	0		0	12	9	3		2	4		0	12	9	3		2	4	
23 May	we/h	0	1	0	0	0	4			20	18	31	8	42	23			20	19	31	8	42	27		
24 May	we/h	0	0	0	4					33	37	51	6					33	37	51	10				
28 May	wd	0	0	0	0	0	0	0		7	5	8	23	23	26	6		7	5	8	23	23	26	6	
29 May	wd	0	0	0	0	0	0			13	14	21	14	43	26			13	14	21	14	43	26		
30 May	we/h	0	0	0	0	0	0	0		16	45	12	24	58	63	17		16	45	12	24	58	63	17	
31 May	we/h	0	0	0	0					48	76	15	18					48	76	15	18				
2 Jun	wd	0	0	0	0	0	0	0		17	35	27	18	68	79	19		17	35	27	18	68	79	19	
5 Jun	wd	0	0	0	0	0	0	0		26	15	22	10	107	69	13		26	15	22	10	107	69	13	
6 Jun	we/h	0	0	0	0	0	0	0		51	54	50	43	62	68	98		51	54	50	43	62	68	98	
7 Jun	we/h	0	0	0	0	0	0			52	47	36	16	90	88			52	47	36	16	90	88		
10 Jun	wd	0	0	0	0	0	2			56	30	38	10	124	76			56	30	38	10	124	78		
11 Jun	wd	0	0	0	0	0	0	0		40	12	16	8	164	60	36		40	12	16	8	164	60	36	
13 Jun	we/h	0	0	0	0	0	0	0		78	67	81	49	139	103	34		78	67	81	49	139	103	34	
14 Jun	we/h	0	3	0	0					97	96	53	14					97	99	53	14				
16 Jun	wd	0	4	0	0	0	0	3		65	49	33	23	268	149	26		65	53	33	23	268	149	29	
19 Jun	wd	0	0	0	0	0	10	0		24	32	34	27	206	123	62		24	32	34	27	206	133	62	
20 Jun	we/h	0	23	0	4	0	0	0		79	43	54	26	220	180	54		79	66	54	30	220	180	54	
21 Jun	we/h	0	0	0	0					7	96	85	45					7	96	85	45				
24 Jun	wd	0	0	0	3		0	0		27	40	15	51		139	29		27	40	15	54		139	29	
25 Jun	wd	0	0	0	0	0	0	0		25	26	13	34	157	143	44		25	26	13	34	157	143	44	
27 Jun	we/h	0	0	4	5	0	0			60	51	65	11	157	105			60	51	69	16	157	105		
28 Jun	we/h	0	8	8	0					102	113	65	45					102	121	73	45				

-continued-

Appendix A1.–Part 2 of 2.

	Downstream[a]								Upstream[a]								Combined strata							
	Unguided [b]				Guided [b]				Unguided [b]				Guided [b]				Unguided [b]				Guided [b]			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Min (All A–D)	0				0				0				0				0				0			
Mean (All A–D)	1				0				33				75				33				75			
Max (All A–D)	23				10				113				268				121				268			

Note: blank spaces in data fields = fishing was closed for guided anglers during the time of this count, therefore no data to present.

[a] "Downstream" = Kenai River reach from Warren Ames Bridge to the Chinook salmon sonar site; "Upstream" = Kenai River reach from the Chinook salmon sonar site to Soldotna Bridge.

[b] Unguided and guided angler count times: A = 0400–0859 hours, B = 0900–1359 hours, C = 1400–1959 hours, and D = 2000–2359 hours.

[c] "wd" = weekday, "we/h" = weekend/holiday.

Appendix A2.–Guided and unguided boat angler counts, by geographic strata, during the late-run Kenai River Chinook salmon fishery, 1 July–31 July 2009.

		Downstream[a]								Upstream[a]								Combined strata							
	Day	Unguided[b]				Guided[b]				Unguided[b]				Guided[b]				Unguided[b]				Guided[b]			
Date	type[c]	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
2 Jul	wd	20	4	4	0	94	41			72	52	51	42	181	104			92	56	55	42	275	145		
3 Jul	wd	0	38	3	17		111	6		126	109	165	134		107	94		126	147	168	151		218	100	
4 Jul	we/h	11	63	16	10	27	142	3		173	104	168	45	199	61	69		184	167	184	55	226	203	72	
5 Jul	we/h	53	85	8	7					216	174	222	95					269	259	230	102				
6 Jul	Mon.	0	9	8	0					88	111	108	44					88	120	116	44				
7 Jul	wd	38	17	0	4	84	138			159	64	143	50	258	131			197	81	143	54	342	269		
10 Jul	wd	2	35	23	1		68	47		36	115	81	146		226	104		38	150	104	147		294	151	
11 Jul	we/h	0	22	48	5		43	22		139	181	128	140		255	90		139	203	176	145		298	112	
12 Jul	we/h	3	16	54	0					390	238	154	107					393	254	208	107				
13 Jul	Mon.	0	3	13	0					4	201	112	71					4	204	125	71				
15 Jul	wd	9	8	6	333	96	38			139	108	74	46	306	251			148	116	80	379	402	289		
16 Jul	wd	46	4	13	0	90	3			137	114	86	70	260	251			183	118	99	70	350	254		
18 Jul	we/h	54	36	9	7	60	76	6		339	199	125	162	373	178	110		393	235	134	169	433	254	116	
19 Jul	we/h	40	66	8	7					421	276	271	141					461	342	279	148				
20 Jul	Mon.	2	25	4	0					212	239	130	15					214	264	134	15				
22 Jul	wd	4	10	0	2	0	18	0		298	146	187	86	492	288	149		302	156	187	88	492	306	149	
24 Jul	wd	0	35	0	0	0	18			195	195	177	47	361	291			195	230	177	47	361	309		
25 Jul	we/h	4	13	3	0	0	8			297	240	185	50	402	282			301	253	188	50	402	290		
26 Jul	we/h	4	28	46	3					407	368	133	137					411	396	179	140				
27 Jul	Mon.	0	0	0	0					11	208	74	60					11	208	74	60				
28 Jul	wd	42	9	10	0	39	4	0		303	215	134	74	388	409	153		345	224	144	74	427	413	153	
30 Jul	wd	0	13	10	2		12	0		167	213	128	104		396	175		167	226	138	106		408	175	
Min (All A–D)					0				0				4				61				4				72
Mean (All A–D)					18				40				149				231				167				272
Max (All A–D)					333				142				421				492				461				492

Note: blank spaces in data fields = fishing was closed for guided anglers during the time of this count, therefore no data to present.

[a] "Downstream" = Kenai River reach from Warren Ames Bridge to the Chinook salmon sonar site; "Upstream" = Kenai River reach from the Chinook salmon sonar site to Soldotna Bridge.

[b] Unguided and guided angler count times: A = 0400–0859 hours, B = 0900–1359 hours, C = 1400–1959 hours, and D = 2000–2359 hours.

[c] "wd" = weekday, "we/h" = weekend/holiday, "Mon." = unguided drift boat fishing only.

APPENDIX B: EFFORT, CATCH, AND HARVEST ESTIMATES BY GEOGRAPHIC STRATA DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2009

Appendix B1.–Daily estimates of unguided boat angler CPUE, HPUE, angler effort, catch, and harvest, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2009.

		Angler interview data[a]					Downstream[b]								Upstream[b]							
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	type[c]	*n*[d]	CPUE	SE	HPUE	SE	*n*	Mean	Est.	SE	Est.	SE	Est.	SE	*n*	Mean	Est.	SE	Est.	SE	Est.	SE
16 May	we/h	19	0.029	0.021	0.029	0.021	4	0	0	0	0	0	0	0	4	5	100	14	3	2	3	2
17 May	we/h	14	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	4	10	190	10	0	0	0	0
19 May	wd	18	0.048	0.049	0.000	0.000	4	0	0	0	0	0	0	0	4	6	110	57	5	6	0	0
20 May	wd	13	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	4	6	120	56	0	0	0	0
23 May	we/h	36	0.007	0.007	0.007	0.007	4	0	5	6	0	0	0	0	4	19	385	108	3	3	3	3
24 May	we/h	58	0.000	0.000	0.000	0.000	4	1	20	16	0	0	0	0	4	32	635	193	0	0	0	0
28 May	wd	36	0.034	0.018	0.026	0.015	4	0	0	0	0	0	0	0	4	11	215	63	7	4	6	4
29 May	wd	34	0.008	0.008	0.008	0.008	4	0	0	0	0	0	0	0	4	16	310	41	3	3	3	3
30 May	we/h	25	0.024	0.018	0.024	0.018	4	0	0	0	0	0	0	0	4	24	485	186	12	10	12	10
31 May	we/h	32	0.025	0.012	0.019	0.011	4	0	0	0	0	0	0	0	4	39	785	274	20	12	15	10
2 Jun	wd	25	0.068	0.029	0.054	0.027	4	0	0	0	0	0	0	0	4	24	485	88	33	15	26	14
5 Jun	wd	8	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	4	18	365	72	0	0	0	0
6 Jun	we/h	54	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	4	50	990	35	0	0	0	0
7 Jun	we/h	34	0.008	0.008	0.008	0.008	4	0	0	0	0	0	0	0	4	38	755	95	6	6	6	6
10 Jun	wd	28	0.013	0.013	0.013	0.013	4	0	0	0	0	0	0	0	4	34	670	159	9	9	9	9
11 Jun	wd	24	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	4	19	380	120	0	0	0	0
13 Jun	we/h	24	0.022	0.015	0.022	0.015	4	0	0	0	0	0	0	0	4	69	1,375	149	30	21	30	21
14 Jun	we/h	22	0.009	0.009	0.009	0.009	4	1	15	17	0	0	0	0	4	65	1,300	237	11	12	11	12
16 Jun	wd	44	0.005	0.005	0.005	0.005	4	1	20	23	0	0	0	0	4	43	850	101	4	5	4	5
19 Jun	wd	27	0.011	0.012	0.011	0.012	4	0	0	0	0	0	0	0	4	29	585	44	6	7	6	7
20 Jun	we/h	21	0.000	0.000	0.000	0.000	4	7	135	134	0	0	0	0	4	51	1,010	192	0	0	0	0
21 Jun	we/h	36	0.033	0.017	0.033	0.017	4	0	0	0	0	0	0	0	4	58	1,165	401	39	24	39	24
24 Jun	wd	12	0.023	0.025	0.023	0.025	4	1	15	12	0	0	0	0	4	33	665	187	15	17	15	17
25 Jun	wd	15	0.021	0.022	0.021	0.022	4	0	0	0	0	0	0	0	4	25	490	101	10	11	10	11
27 Jun	we/h	38	0.000	0.000	0.000	0.000	4	2	45	17	0	0	0	0	4	47	935	231	0	0	0	0
28 Jun	we/h	21	0.036	0.020	0.024	0.017	4	4	80	46	3	2	2	2	4	81	1,625	217	59	33	39	28

-continued-

Appendix B1.–Part 2 of 2.

	Angler interview data[a]					Downstream[b]							Upstream[b]						
		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
	n[d]	CPUE	SE	HPUE	SE	n	Mean	Est.	SE	Est.	SE	Est.	SE	n	Mean	Est.	SE	Est.	SE	Est.	SE
Min	8	0.000		0.000		4	0	0		0		0		4	5	100		0		0	
Mean	28	0.016		0.013		4	1	13		0		0		4	33	653		11		9	
Max	58	0.068		0.054		4	7	13		3		2		4	81	1,625		59		39	

Note: "Catch" = fish harvested plus fish released; "harvest" = fish kept; "CPUE" = catch per unit effort (fish per hour); "HPUE" = harvest per unit effort (fish per hour).

[a] Angler counts are geographically stratified, angler interviews are not.

[b] "Downstream" = Kenai River reach from Warren Ames Bridge to the Chinook salmon sonar site, "Upstream" = Kenai River reach from the Chinook salmon sonar site to Soldotna Bridge.

[c] "wd" = weekday, "we/h" = weekend/holiday.

[d] On days with less than 5 angler interviews, pooled estimates of CPUE and HPUE from other days in the stratum were used.

Appendix B2.–Daily estimates of guided boat angler CPUE, HPUE, angler effort, catch, and harvest, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2009.

		Angler interview data[a]					Downstream[b]								Upstream[b]							
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	type[c]	*n*	CPUE	SE	HPUE	SE	*n*	Mean	Est.	SE	Est.	SE	Est.	SE	*n*	Mean	Est.	SE	Est.	SE	Est.	SE
16 May	we/h	0					2	0	0	0	0	0	0	0	2	4	48	48				
19 May	wd	2	0.000	0.000	0.000	0.000	3	0	0	0	0	0	0	0	3	1	8	7	0	0	0	0
20 May	wd	2	0.000	0.000	0.000	0.000	3	0	0	0	0	0	0	0	3	3	36	12	0	0	0	0
23 May	we/h	13	0.000	0.000	0.000	0.000	2	2	24	24	0	0	0	0	2	33	390	114	0	0	0	0
28 May	wd	15	0.030	0.019	0.020	0.015	3	0	0	0	0	0	0	0	3	18	220	70	7	5	4	4
29 May	wd	17	0.030	0.014	0.030	0.014	2	0	0	0	0	0	0	0	2	35	414	102	12	7	12	7
30 May	we/h	32	0.071	0.019	0.053	0.017	3	0	0	0	0	0	0	0	3	46	552	160	39	16	29	13
2 Jun	wd	12	0.068	0.027	0.068	0.027	3	0	0	0	0	0	0	0	3	55	664	211	45	23	45	23
5 Jun	wd	27	0.000	0.000	0.000	0.000	3	0	0	0	0	0	0	0	3	63	756	234	0	0	0	0
6 Jun	we/h	20	0.022	0.012	0.015	0.010	3	0	0	0	0	0	0	0	3	76	912	106	20	11	13	10
7 Jun	we/h	0	0.021	0.034	0.018	0.034	2	0	0	0	0	0	0	0	2	89	1,068	12	22	36	19	36
10 Jun	wd	12	0.027	0.020	0.027	0.020	2	1	12	12	0	0	0	0	2	100	1,200	288	32	25	32	25
11 Jun	wd	17	0.022	0.016	0.011	0.011	3	0	0	0	0	0	0	0	3	87	1,040	370	23	19	11	13
13 Jun	we/h	14	0.053	0.025	0.053	0.025	3	0	0	0	0	0	0	0	3	92	1,104	270	59	31	59	31
16 Jun	wd	35	0.005	0.005	0.005	0.005	3	1	12	10	0	0	0	0	3	148	1,772	593	8	9	8	9
19 Jun	wd	55	0.031	0.010	0.028	0.010	3	3	40	49	1	2	1	1	3	130	1,564	357	49	19	44	18
20 Jun	we/h	47	0.039	0.012	0.032	0.011	3	0	0	0	0	0	0	0	3	151	1,816	458	70	28	57	25
24 Jun	wd	53	0.015	0.007	0.009	0.005	3	0	0	0	0	0	0	0	3	84	1,008	660	15	12	9	8
25 Jun	wd	42	0.015	0.007	0.011	0.006	3	0	0	0	0	0	0	0	3	115	1,376	346	20	11	15	10
27 Jun	we/h	36	0.010	0.007	0.005	0.005	2	0	0	0	0	0	0	0	2	131	1,572	312	15	11	7	8
	Min	0	0.000		0.000		2	0	0		0		0		2	1	8		0		0	
	Mean	23	0.024		0.020		3	0	4		0		0		3	73	876		23		19	
	Max	55	0.071		0.068		3	3	40		1		1		3	151	1,816		70		59	

Note: "Catch" = harvested plus released; "harvest" = fish kept; "CPUE" = catch per unit effort (fish per hour); "HPUE" = harvest per unit effort (fish per hour).

[a] Angler counts are geographically stratified, angler interviews are not.

[b] "Downstream" = Kenai River reach from Warren Ames Bridge to the Chinook salmon sonar site, "Upstream" = Kenai River reach from the Chinook salmon sonar site to Soldotna Bridge.

[c] "wd" = weekday, "we/h" = weekend/holiday.

Appendix B3.–Daily estimates of unguided boat angler CPUE, HPUE, angler effort, catch, and harvest, by geographic strata, during the late-run Kenai River Chinook salmon fishery, 1 July–31 July 2009.

		Angler interview data[a]					Downstream[b]								Upstream[b]							
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	type[c]	*n*	CPUE	SE	HPUE	SE	*n*	Mean	Est.	SE	Est.	SE	Est.	SE	*n*	Mean	Est.	SE	Est.	SE	Est.	SE
2 Jul	wd	28	0.115	0.040	0.076	0.029	4	7.0	140	67	16	10	11	7	4	54.3	1,085	90	125	45	82	32
3 Jul	wd	39	0.190	0.055	0.074	0.025	4	14.5	290	219	55	44	21	18	4	133.5	2,670	270	507	155	197	68
4 Jul	we/h	58	0.071	0.017	0.044	0.014	4	25.0	500	287	36	22	22	14	4	122.5	2,450	632	174	60	109	44
5 Jul	we/h	99	0.056	0.011	0.024	0.008	4	38.3	765	340	43	21	18	10	4	176.8	3,535	580	197	51	85	31
6 Jul	Mon.	100	0.068	0.011	0.044	0.009	4	4.3	85	49	6	4	4	2	4	88	1,755	278	120	28	78	20
7 Jul	wd	17	0.094	0.063	0.011	0.012	4	14.8	295	112	28	21	3	4	4	104.0	2,080	631	195	144	23	26
10 Jul	wd	37	0.027	0.014	0.027	0.014	4	15.3	305	169	8	6	8	6	4	94.5	1,890	440	52	30	52	30
11 Jul	we/h	54	0.021	0.008	0.021	0.008	4	18.8	375	224	8	6	8	6	4	147.0	2,940	280	62	26	62	26
12 Jul	we/h	103	0.044	0.013	0.022	0.006	4	18.3	365	275	16	13	8	7	4	222.3	4,445	734	198	67	99	33
13 Jul	Mon.	120	0.057	0.010	0.038	0.008	4	4.0	80	68	5	4	3	3	4	97.0	1,940	898	110	54	74	38
15 Jul	wd	27	0.046	0.019	0.030	0.016	4	89.0	1,780	1,335	82	70	54	50	4	91.8	1,835	220	84	36	56	30
16 Jul	wd	15	0.076	0.035	0.076	0.035	4	15.8	315	183	24	18	24	18	4	101.8	2,035	162	155	73	155	73
18 Jul	we/h	36	0.018	0.010	0.012	0.009	4	26.5	530	133	10	6	6	5	4	206.3	4,125	664	76	45	50	37
19 Jul	we/h	47	0.089	0.025	0.083	0.024	4	30.3	605	260	54	28	50	26	4	277.3	5,545	795	494	154	459	148
20 Jul	Mon.	134	0.05	0.008	0.043	0.007	4	7.8	155	128	7	6	7	6	4	149.0	2,980	656	143	39	127	36
22 Jul	wd	41	0.010	0.007	0.010	0.007	4	4.0	80	48	1	1	1	1	4	179.3	3,585	764	35	27	35	27
24 Jul	wd	65	0.000	0.000	0.000	0.000	4	8.8	175	202	0	0	0	0	4	153.5	3,070	536	0	0	0	0
25 Jul	we/h	41	0.027	0.014	0.027	0.014	4	5.0	100	56	3	2	3	2	4	193.0	3,860	639	106	56	106	56
26 Jul	we/h	84	0.035	0.016	0.021	0.007	4	20.3	405	214	14	10	9	5	4	261.3	5,225	973	184	88	110	41
27 Jul	Mon.	53	0.021	0.009	0.021	0.009	4	0.0	0	0	0	0	0	0	4	88.3	1,765	974	36	26	36	26
28 Jul	wd	76	0.027	0.008	0.027	0.008	4	15.3	305	141	8	5	8	5	4	181.5	3,630	546	97	34	97	34
30 Jul	wd	25	0.015	0.010	0.015	0.010	4	6.3	125	64	2	2	2	2	4	153.0	3,060	407	45	32	45	32
	Min	15	0.000		0.000		4	0.0	0		0		0		4	54.3	1,085		0		0	
	Mean	59	0.053		0.034		4	17.7	353		19		12		4	148.9	2,978		145		97	
	Max	134	0.190		0.083		4	89.0	1,780		82		54		4	277.3	5,545		507		459	

Note: "Catch" = fish harvested plus fish released; "harvest" = fish kept; "CPUE" = catch per unit effort (fish per hour); "HPUE" = harvest per unit effort (fish per hour).

[a] Angler counts are geographically stratified, angler interviews are not.

[b] "Downstream" = Kenai River reach from Warren Ames Bridge to the Chinook salmon sonar site, "Upstream" = Kenai River reach from the Chinook salmon sonar site to Soldotna Bridge.

[c] "wd" = weekday, "we/h" = weekend/holiday, "Mon." = unguided drift boat only fishing.

Appendix B4.–Daily estimates of guided boat angler CPUE, HPUE, angler effort, catch, and harvest, by geographic strata, during the late-run Kenai River Chinook salmon fishery, 1 July–31 July 2009.

		Angler interview data[a]					Downstream[b]								Upstream[b]							
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	type[c]	*n*	CPUE	SE	HPUE	SE	*n*	Mean	Est.	SE	Est.	SE	Est.	SE	*n*	Mean	Est.	SE	Est.	SE	Est.	SE
2 Jul	wd	53	0.084	0.015	0.042	0.012	2	67.5	810	318	68	29	34	16	2	142.5	1,710	462	144	46	72	28
3 Jul	wd	32	0.114	0.024	0.089	0.022	3	58.5	702	630	80	74	62	58	3	100.5	1,206	78	138	30	107	27
4 Jul	we/h	31	0.091	0.026	0.077	0.026	3	57.3	688	625	63	60	53	51	3	109.7	1,316	479	120	56	101	50
7 Jul	wd	67	0.098	0.018	0.065	0.013	2	111.0	1,332	324	131	40	87	27	2	194.5	2,334	762	229	86	152	58
10 Jul	wd	34	0.080	0.016	0.053	0.015	3	57.5	690	126	55	15	37	12	3	165.0	1,980	732	159	66	105	49
11 Jul	we/h	21	0.049	0.018	0.049	0.018	3	32.5	390	126	19	9	19	9	3	172.5	2,070	990	102	62	102	62
15 Jul	wd	39	0.103	0.022	0.077	0.020	2	67.0	804	348	83	40	62	31	2	278.5	3,342	330	344	81	257	73
16 Jul	wd	35	0.105	0.025	0.081	0.020	2	46.5	558	522	59	57	45	44	2	255.5	3,066	54	322	76	248	63
18 Jul	we/h	44	0.068	0.018	0.048	0.014	3	47.3	568	249	39	20	27	14	3	220.3	2,644	715	181	69	127	51
22 Jul	wd	62	0.029	0.008	0.026	0.008	3	6.0	72	88	2	3	2	2	3	309.7	3,716	855	106	39	98	37
24 Jul	wd	60	0.048	0.012	0.048	0.012	2	9.0	108	108	5	5	5	5	2	326.0	3,912	420	188	49	188	49
25 Jul	we/h	33	0.060	0.021	0.028	0.012	2	4.0	48	48	3	3	1	1	2	342.0	4,104	720	247	95	113	52
28 Jul	wd	47	0.061	0.015	0.054	0.014	3	14.3	172	122	10	8	9	7	3	316.7	3,800	890	231	79	205	73
30 Jul	wd	83	0.042	0.009	0.042	0.009	3	6	72	72	3	3	3	3	3	285.5	3,426	1,326	145	65	145	65
	Min	21	0.029		0.026		2	4.0	48		2		1		2	100.5	1,206		102		72	
	Mean	46	0.074		0.056		3	41.8	501		44		32		3	229.9	2,759		190		144	
	Max	83	0.114		0.089		3	111.0	1,332		131		87		3	342.0	4,104		344		257	

Note: "Catch" = fish harvested plus fish released; "harvest" = fish kept; "CPUE" = catch per unit effort (fish per hour); "HPUE" = harvest per unit effort (fish per hour).

[a] Angler counts are geographically stratified, angler interviews are not.

[b] "Downstream" = Kenai River reach from Warren Ames Bridge to the Chinook salmon sonar site, "Upstream" = Kenai River reach from the Chinook salmon sonar site to Soldotna Bridge.

[c] "wd" = weekday, "we/h" = weekend/holiday.

APPENDIX C: EFFORT, CATCH, AND HARVEST ESTIMATES BY TEMPORAL AND GEOGRAPHIC STRATA DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2009

Appendix C1.–Estimated effort, catch, and harvest, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2009.

	Downstream[a] creel estimates						Upstream[a] creel estimates								
			Chinook salmon						Chinook salmon						
	Effort		Catch		Harvest		Effort		Catch		Harvest				
Fishing periods	Days fished	SE	No. fish	SE	No. fish	SE	Days fished	SE	No. fish	SE	No. fish	SE	Downstream % Effort	Catch	Harvest
16–17 May															
Guided weekends	0	0	0	0	0	0	48	48	0	0	0	0	0.0%	N/A	N/A
Unguided weekends	0	0	0	0	0	0	290	17	3	2	3	2	0.0%	0.0%	0.0%
19–25 May															
Guided weekdays	0	0	0	0	0	0	88	44	0	0	0	0	0.0%	N/A	N/A
Guided weekends	48	34	0	0	0	0	780	161	0	0	0	0	5.8%	N/A	N/A
Unguided weekdays	0	0	0	0	0	0	460	114	11	11	0	0	0.0%	0.0%	N/A
Unguided weekends	38	25	0	0	0	0	1,530	347	4	4	4	4	2.4%	1.3%	1.3%
26–31 May															
Guided weekdays	0	0	0	0	0	0	1,268	325	38	14	33	16	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	552	160	39	16	29	13	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	1,050	171	20	10	16	8	0.0%	0.0%	0.0%
Unguided weekends	0	0	0	0	0	0	1,270	331	31	15	26	14	0.0%	0.0%	0.0%
2–7 June															
Guided weekdays	0	0	0	0	0	0	2,840	465	91	72	91	72	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	1,980	107	42	38	33	38	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	1,700	234	66	51	52	42	0.0%	0.0%	0.0%
Unguided weekends	0	0	0	0	0	0	1,745	102	6	6	6	6	0.0%	0.0%	0.0%
9–14 June															
Guided weekdays	24	24	1	1	1	1	4,480	700	111	46	87	50	0.5%	0.6%	0.7%
Guided weekends	0	0	0	0	0	0	1,104	270	59	31	59	31	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	2,100	498	17	18	17	18	0.0%	0.0%	0.0%
Unguided weekends	15	17	0	0	0	0	2,675	280	42	24	42	24	0.6%	0.3%	0.3%

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Appendix C1.–Part 2 of 2.

	Downstream[a] creel estimates						Upstream[a] creel estimates								
			Chinook salmon						Chinook salmon						
	Effort		Catch		Harvest		Effort		Catch		Harvest				
Fishing periods	Days fished	SE	No. fish	SE	No. fish	SE	Days fished	SE	No. fish	SE	No. fish	SE	Downstream % Effort	Catch	Harvest
16–21 June															
Guided weekdays	104	81	3	3	2	3	6,672	1,022	114	65	104	58	1.5%	2.2%	2.2%
Guided weekends	0	0	0	0	0	0	1,816	458	70	28	57	25	0.0%	0.0%	0.0%
Unguided weekdays	40	43	0	0	0	0	2,870	406	22	12	22	12	1.4%	1.0%	1.0%
Unguided weekends	135	134	0	0	0	0	2,175	444	39	24	39	24	5.8%	0.0%	0.0%
23–28 June															
Guided weekdays	0	0	0	0	0	0	4,768	1,176	71	24	48	20	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	1,572	312	15	11	7	8	0.0%	0.0%	0.0%
Unguided weekdays	30	27	1	1	1	1	2,310	389	51	30	51	30	1.3%	1.3%	1.3%
Unguided weekends	125	49	3	2	2	2	2,560	317	59	33	39	28	4.7%	4.7%	4.7%
30 June[b]															
Guided weekday	0	0	0	0	0	0	1,192	503	18	12	12	9	0.0%	0.0%	0.0%
Unguided weekday	8	6	0	0	0	0	578	144	13	14	13	14	1.3%	1.3%	1.3%
Day type subtotals															
Guided weekdays	128	85	3	3	3	3	21,308	1,869	441	111	376	108	0.6%	0.7%	0.8%
Guided weekends/holiday	48	34	0	0	0	0	7,852	667	226	59	186	56	0.6%	0.0%	0.0%
Unguided weekdays	78	52	1	1	1	1	11,068	826	199	66	171	58	0.7%	0.5%	0.6%
Unguided weekends/holiday	313	146	3	2	2	2	12,245	785	184	51	159	47	2.5%	1.6%	1.3%
Angler type subtotals															
Guided	176	91	3	3	3	3	29,160	1,985	667	126	561	122	0.6%	0.5%	0.5%
% Guided	31.1%		43.9%		48.6%		55.6%		63.5%		62.9%				
Unguided	390	155	4	2	3	2	23,313	1,140	383	83	331	74	1.6%	1.1%	1.0%
% Unguided	68.9%		56.1%		51.4%		44.4%		36.5%		37.1%				
Early-run total	566	179	7	4	6	3	52,473	2,289	1,051	151	892	143	1.1%	0.7%	0.7%

Note: "N/A" = not applicable.

[a] "Downstream" = Kenai River reach from Warren Ames Bridge to the Chinook salmon sonar site, "Upstream" = Kenai River reach from the Chinook salmon sonar site to Soldotna Bridge.

[b] June 30th was not sampled; estimates based on June 24–29 effort, catch, and harvest estimates per day.

Appendix C2.–Estimated effort, catch, and harvest, by geographic strata, during the late-run Kenai River Chinook salmon fishery, 1 July–31 July 2009.

	Downstream[a] Creel Estimates						Upstream[a] Creel Estimates								
			Chinook salmon						Chinook salmon						
	Effort		Catch		Harvest		Effort		Catch		Harvest				
Fishing periods	Days fished	SE	No. fish	SE	No. fish	SE	Days fished	SE	No. fish	SE	No. fish	SE	Downstream % Effort	Catch	Harvest
1–5 July															
Guided weekdays	2,268	869	223	98	144	78	4,374	721	423	68	268	56	34.1%	34.5%	35.0%
Guided weekends	688	625	63	60	53	51	1,316	479	120	56	101	50	34.3%	34.3%	34.3%
Unguided weekdays	645	309	107	65	48	25	5,633	1,416	947	385	419	136	10.3%	10.1%	10.3%
Unguided weekends	1,265	445	78	30	41	18	5,985	858	371	79	194	54	17.4%	17.4%	17.3%
6–12 July															
Monday	85	49	6	4	4	2	1,755	278	120	28	78	20	4.6%	4.6%	4.6%
Guided weekdays	4,044	1,032	372	123	247	83	8,628	1,576	776	183	515	127	31.9%	32.4%	32.4%
Guided weekends	390	126	19	9	19	9	2,070	990	102	62	102	62	15.9%	15.9%	15.9%
Unguided weekdays	1,200	287	72	42	23	13	7,940	1,121	494	291	150	69	13.1%	12.7%	13.4%
Unguided weekends	740	354	24	14	16	9	7,385	786	260	71	161	42	9.1%	8.5%	9.1%
13–19 July															
Monday	80	68	5	4	3	3	1,940	898	110	54	74	38	4.0%	4.0%	4.0%
Guided weekdays	2,724	953	283	104	214	80	12,816	613	1,332	160	1,010	137	17.5%	17.5%	17.5%
Guided weekends	568	249	39	20	27	14	2,644	715	181	69	127	51	17.7%	17.7%	17.7%
Unguided weekdays	4,190	2,815	212	131	156	86	7,740	479	479	153	422	180	35.1%	30.6%	27.0%
Unguided weekends	1,135	291	64	28	56	26	9,670	1,036	570	160	509	152	10.5%	10.0%	10.0%
20–26 July															
Monday	155	128	7	6	7	6	2,980	656	143	39	127	36	4.9%	4.9%	4.9%
Guided weekdays	360	204	14	9	14	9	15,256	1,376	588	145	571	154	2.3%	2.4%	2.4%
Guided weekends	48	48	3	3	1	1	4,104	720	247	95	113	52	1.2%	1.2%	1.2%
Unguided weekdays	510	323	2	2	2	2	13,310	1,507	69	62	69	62	3.7%	2.2%	2.2%
Unguided weekends	505	221	17	10	11	6	9,085	1,164	289	105	216	70	5.3%	5.5%	5.0%

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Appendix C2.–Part 2 of 2.

	Downstream[a] Creel Estimates						Upstream[a] Creel Estimates								
			Chinook salmon						Chinook salmon						
	Effort		Catch		Harvest		Effort		Catch		Harvest				
Fishing periods	Days fished	SE	No. fish	SE	No. fish	SE	Days fished	SE	No. fish	SE	No. fish	SE	Downstream % Effort	Catch	Harvest
27–31 July															
Monday	0	0	0	0	0	0	1,765	974	36	26	36	26	0.0%	0.0%	0.0%
Guided weekdays	488	245	27	16	25	14	14,452	2,319	753	189	701	162	3.3%	3.5%	3.4%
Unguided weekdays	860	335	20	11	20	11	13,380	1,256	283	99	283	99	6.0%	6.6%	6.6%
Day type subtotals															
Monday	320	153	18	8	13	7	8,440	1,505	409	77	315	61	3.7%	4.2%	4.1%
Guided weekdays	9,884	1,683	919	189	644	140	55,526	3,264	3,872	347	3,066	296	15.1%	19.2%	17.4%
Guided weekends	1,694	686	124	64	101	54	10,134	1,497	651	143	443	107	14.3%	16.0%	18.5%
Unguided weekdays	7,405	2,884	412	152	249	91	48,003	2,709	2,273	519	1,343	263	13.4%	15.3%	15.6%
Unguided weekends	3,645	677	183	45	124	33	32,125	1,945	1,490	219	1,079	181	10.2%	10.9%	10.3%
Angler type subtotals															
Guided	11,578	1,817	1,043	199	745	150	65,660	3,590	4,523	376	3,509	315	15.0%	18.7%	17.5%
% Guided	50.5%		63.0%		65.8%		42.6%		52.0%		56.2%				
Unguided	11,370	2,966	613	159	387	97	88,568	3,659	4,173	569	2,737	325	11.4%	12.8%	12.4%
% Unguided	49.5%		37.0%		34.2%		57.4%		48.0%		43.8%				
Late-run total	22,948	3,479	1,656	255	1,132	178	154,228	5,126	8,696	682	6,246	453	13.0%	16.0%	15.3%

[a] "Downstream" = Kenai River reach from Warren Ames Bridge to the Chinook salmon sonar site, "Upstream" = Kenai River reach from the Chinook salmon sonar site to Soldotna Bridge.

APPENDIX D: INRIVER GILLNETTING DAILY CATCH, CPUE, AND SPECIES PROPORTION DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2009

Appendix D1.–Catch and CPUE of Chinook and sockeye salmon, and proportion of Chinook salmon caught inriver in 5.0 inch mesh gillnets during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2009.

	Inriver drift gillnetting											
			Catch								Chinook salmon	
			Chinook salmon			Sockeye salmon			Total			
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [a]	SE
16 May	10	90	0	0.000	0.000	0	0.000	0.000	0	0.000		
17 May	10	81	0	0.000	0.000	0	0.000	0.000	0	0.000		
18 May	10	90	0	0.000	0.000	0	0.000	0.000	0	0.000		
19 May	9	85	0	0.000	0.000	1	0.012	0.012	1	0.012	0.00	0.00
20 May	10	97	0	0.000	0.000	0	0.000	0.000	0	0.000		
21 May	10	87	1	0.012	0.012	0	0.000	0.000	1	0.012	1.00	0.00
22 May	10	89	0	0.000	0.000	0	0.000	0.000	0	0.000		
23 May	10	80	0	0.000	0.000	1	0.013	0.012	1	0.013	0.00	0.00
24 May	10	78	0	0.000	0.000	1	0.013	0.012	1	0.013	0.00	0.00
25 May	9	80	2	0.025	0.015	2	0.025	0.015	4	0.050	0.50	0.19
26 May	10	91	0	0.000	0.000	13	0.142	0.050	13	0.142	0.00	0.00
27 May	8	78	3	0.038	0.019	16	0.204	0.073	19	0.243	0.16	0.07
28 May	8	82	3	0.036	0.019	22	0.268	0.104	25	0.304	0.12	0.08
29 May	8	61	2	0.033	0.020	23	0.375	0.162	25	0.407	0.08	0.06
30 May	10	76	2	0.026	0.018	13	0.170	0.066	15	0.196	0.13	0.08
31 May	9	79	1	0.013	0.013	8	0.101	0.042	9	0.114	0.11	0.12
1 Jun	10	85	1	0.012	0.012	11	0.129	0.048	12	0.141	0.08	0.07
2 Jun	10	94	1	0.011	0.010	13	0.138	0.062	14	0.149	0.07	0.07
3 Jun	10	85	1	0.012	0.012	10	0.117	0.043	11	0.129	0.09	0.09
4 Jun	9	75	0	0.000	0.000	7	0.094	0.039	7	0.094	0.00	0.00
5 Jun	10	82	1	0.012	0.012	33	0.403	0.089	34	0.415	0.03	0.03
6 Jun	10	71	0	0.000	0.000	28	0.393	0.138	28	0.393	0.00	0.00
7 Jun	10	77	1	0.013	0.013	18	0.233	0.053	19	0.245	0.05	0.04
8 Jun	9	72	0	0.000	0.000	20	0.277	0.106	20	0.277	0.00	0.00
9 Jun	8	71	1	0.014	0.014	37	0.519	0.083	38	0.533	0.03	0.03
10 Jun	9	74	0	0.000	0.000	38	0.514	0.103	38	0.514	0.00	0.00
11 Jun	10	80	1	0.012	0.012	34	0.423	0.125	35	0.435	0.03	0.03
12 Jun	9	69	2	0.029	0.019	25	0.363	0.125	27	0.392	0.07	0.06
13 Jun	11	86	2	0.023	0.015	23	0.267	0.100	25	0.291	0.08	0.04
14 Jun	9	68	0	0.000	0.000	18	0.265	0.112	18	0.265	0.00	0.00
15 Jun	10	82	0	0.000	0.000	4	0.049	0.019	4	0.049	0.00	0.00
16 Jun	8	64	3	0.047	0.023	6	0.094	0.060	9	0.141	0.33	0.17
17 Jun	10	82	3	0.037	0.026	11	0.134	0.059	14	0.171	0.21	0.10
18 Jun	11	87	2	0.023	0.016	9	0.104	0.051	11	0.127	0.15	0.10

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Appendix D1.–Part 2 of 2.

	Inriver drift gillnetting											
			Catch								Chinook salmon	
			Chinook salmon			Sockeye salmon			Total			
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [a]	SE
19 Jun	11	89	2	0.022	0.015	7	0.078	0.055	9	0.101	0.22	0.11
20 Jun	10	79	2	0.025	0.017	10	0.127	0.033	12	0.152	0.17	0.10
21 Jun	9	62	0	0.000	0.000	16	0.258	0.110	16	0.258	0.00	0.00
22 Jun	9	60	2	0.033	0.022	23	0.384	0.133	25	0.417	0.08	0.05
23 Jun	10	82	0	0.000	0.000	22	0.268	0.084	22	0.268	0.00	0.00
24 Jun	8	59	2	0.034	0.034	44	0.746	0.213	46	0.780	0.04	0.04
25 Jun	8	53	6	0.113	0.066	33	0.622	0.128	39	0.735	0.15	0.09
26 Jun	10	71	1	0.014	0.014	56	0.792	0.116	57	0.806	0.02	0.02
27 Jun	10	70	3	0.043	0.030	20	0.284	0.079	23	0.327	0.13	0.08
28 Jun	10	70	4	0.057	0.031	11	0.158	0.054	15	0.215	0.27	0.14
29 Jun	10	78	4	0.051	0.022	2	0.026	0.016	6	0.077	0.67	0.20
30 Jun	8	66	5	0.076	0.032	10	0.153	0.087	15	0.229	0.33	0.19
Total	437	3,567	64	0.898		699	9.734		763	0.214	NA	NA
Min	8	53	0	0.000		0	0.000		0	0.000	0.00	
Mean	10	78	1	0.020		15	0.212		17	0.214	0.13	
Max	11	97	6	0.113		56	0.792		57	0.588	1.00	

Note: "NA" = not applicable.

[a] Proportion of combined total catch = Chinook salmon CPUE / Total CPUE.

Appendix D2.–Catch and CPUE of Chinook and sockeye salmon, and proportion of Chinook salmon caught inriver in 7.5 inch mesh gillnets during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2009.

	Inriver drift gillnetting											
			Catch								Chinook salmon	
			Chinook salmon			Sockeye salmon			Total			
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [a]	SE
16 May	8	74	0	0.000	0.000	0	0.000	0.000	0	0.000		
17 May	10	91	0	0.000	0.000	0	0.000	0.000	0	0.000		
18 May	9	79	1	0.013	0.013	0	0.000	0.000	1	0.013	1.00	0.00
19 May	10	92	0	0.000	0.000	0	0.000	0.000	0	0.000		
20 May	10	98	1	0.010	0.010	0	0.000	0.000	1	0.010	1.00	0.00
21 May	10	91	0	0.000	0.000	0	0.000	0.000	0	0.000		
22 May	10	87	0	0.000	0.000	0	0.000	0.000	0	0.000		
23 May	11	93	0	0.000	0.000	1	0.011	0.010	1	0.011	0.00	0.00
24 May	9	65	1	0.015	0.016	0	0.000	0.000	1	0.015	1.00	0.00
25 May	10	85	2	0.023	0.016	2	0.023	0.016	4	0.047	0.50	0.19
26 May	10	83	0	0.000	0.000	5	0.060	0.027	5	0.060	0.00	0.00
27 May	9	87	2	0.023	0.016	2	0.023	0.015	4	0.046	0.50	0.27
28 May	8	85	2	0.023	0.015	4	0.047	0.034	6	0.070	0.33	0.15
29 May	8	70	2	0.029	0.017	11	0.157	0.050	13	0.185	0.15	0.07
30 May	10	76	4	0.052	0.021	1	0.013	0.013	5	0.066	0.80	0.19
31 May	10	82	1	0.012	0.012	3	0.037	0.019	4	0.049	0.25	0.23
1 Jun	9	77	2	0.026	0.017	3	0.039	0.027	5	0.065	0.40	0.22
2 Jun	10	91	1	0.011	0.011	1	0.011	0.011	2	0.022	0.50	0.37
3 Jun	9	71	2	0.028	0.019	4	0.056	0.030	6	0.085	0.33	0.22
4 Jun	10	81	2	0.025	0.017	0	0.000	0.000	2	0.025	1.00	0.00
5 Jun	9	69	2	0.029	0.019	7	0.101	0.030	9	0.130	0.22	0.13
6 Jun	11	76	1	0.013	0.013	10	0.132	0.066	11	0.145	0.09	0.09
7 Jun	9	68	0	0.000	0.000	5	0.074	0.045	5	0.074	0.00	0.00
8 Jun	10	83	3	0.036	0.017	6	0.072	0.035	9	0.108	0.33	0.08
9 Jun	8	69	3	0.043	0.021	7	0.101	0.035	10	0.145	0.30	0.15
10 Jun	10	80	2	0.025	0.017	18	0.226	0.074	20	0.251	0.10	0.07
11 Jun	8	64	1	0.016	0.016	14	0.218	0.097	15	0.234	0.07	0.07
12 Jun	10	76	8	0.105	0.034	17	0.224	0.062	25	0.329	0.32	0.10
13 Jun	10	78	2	0.026	0.017	9	0.115	0.044	11	0.141	0.18	0.07
14 Jun	10	81	2	0.025	0.017	10	0.124	0.058	12	0.149	0.17	0.13
15 Jun	10	77	2	0.026	0.017	1	0.013	0.013	3	0.039	0.67	0.29
16 Jun	8	65	4	0.062	0.032	3	0.046	0.023	7	0.108	0.57	0.22
17 Jun	9	65	0	0.000	0.000	1	0.015	0.015	1	0.015	0.00	0.00
18 Jun	12	90	1	0.011	0.011	0	0.000	0.000	1	0.011	1.00	0.00

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Appendix D2.–Part 2 of 2.

	Inriver drift gillnetting											
			Catch								Chinook salmon	
			Chinook salmon			Sockeye salmon			Total			
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [a]	SE
19 Jun	10	77	3	0.039	0.019	2	0.026	0.016	5	0.065	0.60	0.10
20 Jun	11	90	4	0.044	0.025	3	0.033	0.017	7	0.078	0.57	0.19
21 Jun	8	58	0	0.000	0.000	5	0.086	0.048	5	0.086	0.00	0.00
22 Jun	10	79	1	0.013	0.012	10	0.126	0.075	11	0.139	0.09	0.10
23 Jun	8	56	4	0.071	0.037	4	0.071	0.037	8	0.142	0.50	0.13
24 Jun	8	63	7	0.112	0.035	20	0.320	0.105	27	0.432	0.26	0.07
25 Jun	7	52	2	0.039	0.039	11	0.214	0.074	13	0.252	0.15	0.12
26 Jun	10	71	4	0.056	0.044	20	0.281	0.082	24	0.338	0.17	0.09
27 Jun	9	66	7	0.106	0.031	9	0.136	0.068	16	0.242	0.44	0.15
28 Jun	10	69	8	0.116	0.060	5	0.073	0.032	13	0.189	0.62	0.20
29 Jun	10	72	3	0.042	0.030	1	0.014	0.014	4	0.056	0.75	0.25
30 Jun	9	72	6	0.083	0.042	3	0.042	0.030	9	0.125	0.67	0.22
Total	434	3,525	103	1.428		238	3.359		341	0.097	NA	NA
Min	7	52	0	0.000		0	0.000		0	0.000	0.00	
Mean	9	77	2	0.031		5	0.073		7	0.097	0.40	
Max	12	98	8	0.116		20	0.320		27	0.276	1.00	

Note: "NA" = not applicable.

[a] Proportion of combined total catch = Chinook salmon CPUE / Total CPUE.

Appendix D3.–Catch and CPUE of Chinook and sockeye salmon, and proportion of Chinook salmon caught inriver in 5.0 and 7.5 inch mesh gillnets during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2009.

	Inriver drift gillnetting												
				Catch								Chinook salmon	
				Chinook salmon			Sockeye salmon			Total			
Date	Reps[a]	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [b]	SE
16 May	4	16	147	0	0.000	0.000	0	0.000	0.000				
17 May	5	20	172	0	0.000	0.000	0	0.000	0.000				
18 May	5	19	169	1	0.005	0.005	0	0.000	0.000	1	0.006	1.00	0.00
19 May	5	19	178	0	0.000	0.000	1	0.019	0.019	1	0.006	0.00	0.00
20 May	5	20	195	1	0.005	0.005	0	0.000	0.000	1	0.005	1.00	0.00
21 May	5	20	177	1	0.006	0.006	0	0.000	0.000	1	0.006	1.00	0.00
22 May	5	20	175	0	0.000	0.000	0	0.000	0.000				
23 May	5	20	164	0	0.000	0.000	2	0.010	0.006	2	0.012	0.00	0.00
24 May	4	16	123	1	0.009	0.009	1	0.006	0.006	2	0.016	0.57	0.40
25 May	5	19	165	4	0.023	0.010	4	0.026	0.011	8	0.049	0.47	0.02
26 May	5	20	174	0	0.000	0.000	18	0.097	0.030	18	0.103	0.00	0.00
27 May	4	16	156	5	0.034	0.014	17	0.109	0.044	22	0.141	0.24	0.12
28 May	4	16	167	5	0.030	0.013	26	0.152	0.084	31	0.185	0.17	0.12
29 May	4	16	132	4	0.028	0.012	34	0.259	0.064	38	0.289	0.10	0.05
30 May	5	20	153	6	0.040	0.019	14	0.094	0.033	20	0.131	0.30	0.12
31 May	5	19	161	2	0.012	0.008	11	0.065	0.018	13	0.081	0.16	0.07
1 Jun	5	19	162	3	0.018	0.007	14	0.080	0.041	17	0.105	0.18	0.09
2 Jun	5	20	185	2	0.010	0.006	14	0.074	0.051	16	0.086	0.12	0.10
3 Jun	5	19	156	3	0.019	0.008	14	0.085	0.030	17	0.109	0.18	0.10
4 Jun	5	19	156	2	0.013	0.008	7	0.042	0.023	9	0.058	0.24	0.20
5 Jun	5	19	151	3	0.020	0.008	40	0.246	0.079	43	0.284	0.07	0.04
6 Jun	5	20	143	1	0.006	0.006	34	0.242	0.115	35	0.244	0.03	0.02
7 Jun	5	19	145	1	0.006	0.006	23	0.149	0.057	24	0.165	0.04	0.03
8 Jun	5	19	156	3	0.017	0.007	26	0.147	0.075	29	0.186	0.11	0.05
9 Jun	4	16	140	4	0.028	0.011	44	0.313	0.053	48	0.342	0.08	0.04
10 Jun	5	19	154	2	0.013	0.008	56	0.358	0.084	58	0.377	0.03	0.02

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Appendix D3.–Part 2 of 2.

	Inriver drift gillnetting												
				Catch								Chinook salmon	
				Chinook salmon			Sockeye salmon			Total			
Date	Reps[a]	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [b]	SE
11 Jun	4	16	129	2	0.016	0.009	48	0.361	0.129	50	0.387	0.04	0.03
12 Jun	5	19	145	10	0.065	0.010	42	0.271	0.088	52	0.359	0.19	0.06
13 Jun	5	20	157	4	0.025	0.011	32	0.196	0.087	36	0.229	0.11	0.02
14 Jun	5	19	149	2	0.011	0.007	28	0.177	0.071	30	0.202	0.06	0.04
15 Jun	5	20	159	2	0.012	0.007	5	0.029	0.008	7	0.044	0.29	0.11
16 Jun	4	16	129	7	0.053	0.010	9	0.068	0.035	16	0.124	0.44	0.09
17 Jun	5	19	147	3	0.017	0.011	12	0.071	0.037	15	0.102	0.20	0.08
18 Jun	6	23	177	3	0.016	0.011	9	0.047	0.033	12	0.068	0.22	0.14
19 Jun	5	20	159	5	0.030	0.016	9	0.052	0.038	14	0.088	0.37	0.09
20 Jun	5	20	162	6	0.036	0.017	13	0.082	0.008	19	0.118	0.31	0.10
21 Jun	4	16	113	0	0.000	0.000	21	0.183	0.111	21	0.185	0.00	0.00
22 Jun	5	19	139	3	0.019	0.012	33	0.222	0.132	36	0.259	0.08	0.06
23 Jun	4	16	123	4	0.033	0.019	25	0.212	0.078	29	0.237	0.13	0.05
24 Jun	4	16	122	9	0.073	0.034	64	0.546	0.202	73	0.601	0.12	0.02
25 Jun	4	15	105	8	0.082	0.049	44	0.415	0.110	52	0.497	0.16	0.10
26 Jun	5	20	142	5	0.036	0.023	76	0.539	0.116	81	0.571	0.06	0.03
27 Jun	5	19	136	10	0.076	0.013	29	0.202	0.088	39	0.286	0.27	0.11
28 Jun	5	20	139	12	0.087	0.015	16	0.113	0.035	28	0.202	0.43	0.05
29 Jun	5	20	150	7	0.049	0.021	3	0.019	0.008	10	0.067	0.72	0.12
30 Jun	4	16	130	11	0.086	0.038	13	0.097	0.058	24	0.184	0.47	0.23
Total	218	854	6,967	167	1.164		931	6.476		1,098	0.158	NA	NA
Min	4	15	105	0	0.000		0	0.000		1	0.01	0.00	
Mean	5	19	151	4	0.025		20	0.141		26	0.169	0.25	
Max	6	23	195	12	0.087		76	0.546		81	0.416	1.00	

Note: "NA" = not applicable.

[a] A complete replicate (rep) consists of 4 drifts (2 mesh sizes, 2 banks). Only reps that had at least 1 drift from each mesh size were used in this table.

[b] Proportion of combined total catch = Chinook salmon CPUE / Total CPUE.

Appendix D4.–Catch and CPUE of Chinook, sockeye, coho, and pink salmon, and proportion of Chinook salmon caught inriver in 5.0 inch mesh gillnets during the late-run Kenai River Chinook salmon sport fishery, 1 July–10 August 2009.

	Inriver drift gillnetting																	
			Catch														Chinook salmon	
		Time	Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Total			
Date	No. drifts	fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [a]	SE
1 Jul	8	57	18	0.315	0.087	13	0.227	0.086	0	0.000	0.000	1	0.017	0.023	32	0.560	0.56	0.11
2 Jul	8	57	5	0.088	0.027	48	0.840	0.186	0	0.000	0.000	0	0.000	0.000	53	0.928	0.09	0.04
3 Jul	8	63	7	0.111	0.027	42	0.665	0.153	0	0.000	0.000	0	0.000	0.000	49	0.776	0.14	0.03
4 Jul	7	56	8	0.142	0.054	48	0.853	0.119	0	0.000	0.000	0	0.000	0.000	56	0.996	0.14	0.04
5 Jul	8	54	7	0.129	0.042	16	0.294	0.085	0	0.000	0.000	0	0.000	0.000	23	0.423	0.30	0.10
6 Jul	9	64	6	0.094	0.052	17	0.265	0.094	0	0.000	0.000	0	0.000	0.000	23	0.359	0.26	0.14
7 Jul	8	57	13	0.230	0.049	41	0.725	0.163	0	0.000	0.000	0	0.000	0.000	54	0.955	0.23	0.07
8 Jul	7	49	15	0.305	0.079	23	0.468	0.158	0	0.000	0.000	0	0.000	0.000	38	0.773	0.39	0.11
9 Jul	8	53	13	0.243	0.050	44	0.823	0.189	0	0.000	0.000	1	0.019	0.025	58	1.085	0.22	0.03
10 Jul	8	53	5	0.095	0.040	17	0.322	0.115	0	0.000	0.000	0	0.000	0.000	22	0.417	0.23	0.10
11 Jul	8	45	9	0.200	0.050	84	1.865	0.294	0	0.000	0.000	0	0.000	0.000	93	2.064	0.10	0.03
12 Jul	7	37	9	0.245	0.095	75	2.038	0.444	0	0.000	0.000	0	0.000	0.000	84	2.283	0.11	0.04
13 Jul	8	50	5	0.100	0.044	37	0.739	0.098	0	0.000	0.000	0	0.000	0.000	42	0.839	0.12	0.05
14 Jul	7	41	12	0.294	0.048	65	1.594	0.344	0	0.000	0.000	0	0.000	0.000	77	1.889	0.16	0.04
15 Jul	8	51	5	0.098	0.029	56	1.099	0.211	0	0.000	0.000	0	0.000	0.000	61	1.198	0.08	0.03
16 Jul	7	39	6	0.155	0.007	29	0.750	0.184	0	0.000	0.000	1	0.026	0.034	36	0.931	0.17	0.03
17 Jul	8	50	6	0.119	0.050	78	1.552	0.359	0	0.000	0.000	0	0.000	0.000	84	1.672	0.07	0.03
18 Jul	9	50	5	0.100	0.047	36	0.718	0.238	0	0.000	0.000	0	0.000	0.000	41	0.817	0.12	0.06
19 Jul	8	51	1	0.019	0.019	65	1.263	0.270	0	0.000	0.000	0	0.000	0.000	66	1.283	0.02	0.01
20 Jul	8	48	2	0.041	0.028	28	0.579	0.172	0	0.000	0.000	0	0.000	0.000	30	0.620	0.07	0.05
21 Jul	10	59	7	0.119	0.058	37	0.630	0.111	0	0.000	0.000	0	0.000	0.000	44	0.750	0.16	0.06
22 Jul	8	53	1	0.019	0.018	46	0.875	0.245	0	0.000	0.000	0	0.000	0.000	47	0.894	0.02	0.02
23 Jul	8	48	3	0.062	0.032	54	1.121	0.209	0	0.000	0.000	1	0.021	0.021	58	1.205	0.05	0.03
24 Jul	9	51	3	0.059	0.041	20	0.394	0.156	0	0.000	0.000	0	0.000	0.000	23	0.453	0.13	0.07

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Appendix D4.–Part 2 of 2.

	Inriver drift gillnetting																	
			Catch														Chinook salmon	
			Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Total			
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [a]	SE
25 Jul	12	64	2	0.031	0.031	16	0.249	0.134	0	0.000	0.000	0	0.000	0.000	18	0.280	0.11	0.12
26 Jul	9	48	1	0.021	0.021	34	0.714	0.348	0	0.000	0.000	0	0.000	0.000	35	0.735	0.03	0.03
27 Jul	10	58	3	0.051	0.027	16	0.274	0.143	0	0.000	0.000	0	0.000	0.000	19	0.326	0.16	0.10
28 Jul	8	42	6	0.144	0.076	6	0.144	0.077	0	0.000	0.000	0	0.000	0.000	12	0.289	0.50	0.18
29 Jul	8	51	4	0.078	0.041	24	0.470	0.127	1	0.020	0.019	0	0.000	0.000	29	0.567	0.14	0.05
30 Jul	8	44	5	0.114	0.066	12	0.274	0.122	1	0.023	0.031	0	0.000	0.000	18	0.412	0.28	0.04
31 Jul	11	69	6	0.087	0.047	5	0.072	0.031	2	0.029	0.033	0	0.000	0.000	13	0.188	0.46	0.11
1 Aug	10	56	12	0.214	0.062	5	0.089	0.070	2	0.036	0.041	0	0.000	0.000	19	0.339	0.63	0.11
2 Aug	12	63	5	0.080	0.049	1	0.016	0.016	1	0.016	0.022	1	0.016	0.022	8	0.127	0.63	0.20
3 Aug	12	73	4	0.055	0.030	4	0.055	0.031	3	0.041	0.042	0	0.000	0.000	11	0.152	0.36	0.18
4 Aug	10	58	6	0.103	0.036	1	0.017	0.017	4	0.069	0.070	0	0.000	0.000	11	0.189	0.55	0.13
5 Aug	10	65	1	0.015	0.015	7	0.108	0.046	4	0.062	0.067	0	0.000	0.000	12	0.186	0.08	0.06
6 Aug	8	58	6	0.103	0.057	10	0.172	0.048	9	0.155	0.160	0	0.000	0.000	25	0.430	0.24	0.09
7 Aug	9	69	3	0.043	0.022	4	0.058	0.032	1	0.014	0.020	0	0.000	0.000	8	0.115	0.38	0.13
8 Aug	10	77	5	0.065	0.021	1	0.013	0.013	6	0.078	0.083	0	0.000	0.000	12	0.155	0.42	0.13
9 Aug	8	61	2	0.033	0.021	6	0.098	0.052	13	0.212	0.209	0	0.000	0.000	21	0.343	0.10	0.06
10 Aug	10	84	2	0.024	0.016	5	0.060	0.032	10	0.120	0.118	0	0.000	0.000	17	0.203	0.12	0.08
Total	357	2,276	244	4.645		1,176	23.587		57	0.874		5	0.099		1,482	0.651	NA	NA
Min	7	37	1	0.015		1	0.013		0	0.000		0	0.000		8	0.217	0.02	
Mean	9	56	6	0.113		29	0.575		1	0.021		0	0.002		36	0.651	0.22	
Max	12	84	18	0.315		84	2.038		13	0.212		1	0.026		93	1.113	0.63	

Note: "NA" = not applicable.

[a] Proportion of combined total catch = Chinook salmon CPUE / Total CPUE.

Appendix D5.–Catch and CPUE of Chinook, sockeye, and coho salmon, and proportion of Chinook salmon caught in inriver 7.5 inch mesh gillnets during the late-run Kenai River Chinook salmon sport fishery, 1 July–10 August 2009.

	Inriver drift gillnetting														
			Catch											Chinook salmon	
			Chinook salmon			Sockeye salmon			Coho salmon			Total			
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [a]	SE
1 Jul	7	50	6	0.120	0.063	9	0.179	0.062	0	0.000	0.000	15	0.299	0.35	0.18
2 Jul	8	62	10	0.162	0.044	16	0.259	0.105	0	0.000	0.000	26	0.421	0.38	0.11
3 Jul	8	60	6	0.100	0.032	22	0.365	0.078	0	0.000	0.000	28	0.465	0.21	0.07
4 Jul	8	69	7	0.102	0.033	21	0.306	0.084	0	0.000	0.000	28	0.409	0.25	0.07
5 Jul	8	54	8	0.148	0.053	3	0.055	0.027	0	0.000	0.000	11	0.203	0.73	0.14
6 Jul	10	72	8	0.112	0.046	9	0.126	0.043	0	0.000	0.000	17	0.238	0.47	0.14
7 Jul	7	47	6	0.128	0.040	15	0.320	0.081	0	0.000	0.000	21	0.448	0.29	0.07
8 Jul	8	56	9	0.161	0.064	16	0.287	0.067	0	0.000	0.000	25	0.448	0.36	0.13
9 Jul	7	44	19	0.427	0.073	29	0.652	0.259	0	0.000	0.000	48	1.080	0.40	0.12
10 Jul	8	52	18	0.344	0.093	8	0.153	0.054	0	0.000	0.000	26	0.497	0.69	0.12
11 Jul	8	40	13	0.328	0.062	58	1.465	0.164	0	0.000	0.000	71	1.794	0.18	0.03
12 Jul	8	45	10	0.223	0.068	43	0.958	0.302	0	0.000	0.000	53	1.180	0.19	0.03
13 Jul	7	45	10	0.223	0.072	19	0.423	0.138	0	0.000	0.000	29	0.646	0.34	0.06
14 Jul	8	45	16	0.355	0.107	33	0.732	0.125	0	0.000	0.000	49	1.087	0.33	0.08
15 Jul	7	44	10	0.227	0.051	26	0.590	0.256	0	0.000	0.000	36	0.817	0.27	0.07
16 Jul	8	45	14	0.310	0.089	11	0.244	0.085	0	0.000	0.000	25	0.554	0.56	0.09
17 Jul	8	45	9	0.202	0.052	30	0.673	0.147	0	0.000	0.000	39	0.875	0.23	0.08
18 Jul	10	62	10	0.161	0.055	34	0.546	0.104	0	0.000	0.000	44	0.707	0.23	0.06
19 Jul	7	42	5	0.118	0.048	28	0.663	0.139	0	0.000	0.000	33	0.781	0.15	0.05
20 Jul	9	57	4	0.071	0.037	10	0.176	0.092	0	0.000	0.000	14	0.247	0.29	0.16
21 Jul	8	48	7	0.147	0.067	12	0.253	0.103	0	0.000	0.000	19	0.400	0.37	0.09
22 Jul	9	56	6	0.108	0.053	36	0.649	0.187	0	0.000	0.000	42	0.757	0.14	0.07
23 Jul	7	43	6	0.140	0.075	16	0.374	0.128	0	0.000	0.000	22	0.514	0.27	0.11
24 Jul	10	64	9	0.141	0.044	19	0.299	0.085	0	0.000	0.000	28	0.440	0.32	0.10

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Appendix D5.–Part 2 of 2.

	Inriver drift gillnetting														
			Catch											Chinook salmon	
			Chinook salmon			Sockeye salmon			Coho salmon			Total			
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop[a]	SE
25 Jul	10	56	7	0.126	0.053	11	0.197	0.082	0	0.000	0.000	18	0.323	0.39	0.15
26 Jul	10	55	5	0.092	0.041	25	0.458	0.171	0	0.000	0.000	30	0.550	0.17	0.08
27 Jul	8	42	8	0.189	0.050	20	0.472	0.284	0	0.000	0.000	28	0.661	0.29	0.10
28 Jul	8	47	11	0.234	0.047	14	0.298	0.118	0	0.000	0.000	25	0.532	0.44	0.10
29 Jul	8	46	13	0.283	0.093	11	0.240	0.148	0	0.000	0.000	24	0.523	0.54	0.16
30 Jul	10	59	12	0.204	0.059	6	0.102	0.069	0	0.000	0.000	18	0.305	0.67	0.14
31 Jul	10	61	7	0.115	0.068	10	0.164	0.055	0	0.000	0.000	17	0.279	0.41	0.17
1 Aug	11	63	4	0.063	0.026	1	0.016	0.016	0	0.000	0.000	5	0.079	0.80	0.15
2 Aug	12	61	1	0.016	0.016	0	0.000	0.000	1	0.016	0.023	2	0.033	0.50	0.37
3 Aug	13	78	1	0.013	0.013	0	0.000	0.000	1	0.013	0.018	2	0.026	0.50	0.00
4 Aug	10	56	4	0.071	0.029	0	0.000	0.000	0	0.000	0.000	4	0.071	1.00	0.00
5 Aug	10	66	1	0.015	0.015	1	0.015	0.015	0	0.000	0.000	2	0.030	0.50	0.37
6 Aug	8	53	4	0.075	0.039	0	0.000	0.000	1	0.019	0.026	5	0.094	0.80	0.20
7 Aug	10	70	8	0.114	0.036	3	0.043	0.021	1	0.014	0.020	12	0.171	0.67	0.17
8 Aug	9	66	4	0.060	0.033	1	0.015	0.015	3	0.045	0.048	8	0.120	0.50	0.13
9 Aug	9	70	2	0.029	0.019	3	0.043	0.030	8	0.114	0.117	13	0.185	0.15	0.08
10 Aug	9	70	0	0.000	0.000	1	0.014	0.014	5	0.072	0.072	6	0.086	0.00	0.00
Total	358	2,264	318	6.256		630	12.824		20	0.293		968	0.428	NA	NA
Min	7	40	0	0.000		0	0.000		0	0.000		2	0.051	0.00	
Mean	9	55	8	0.153		15	0.313		0	0.007		24	0.428	0.40	
Max	13	78	19	0.427		58	1.465		8	0.114		71	0.912	1.00	

Note: "NA" = not applicable.

[a] Proportion of combined total catch = Chinook salmon CPUE / Total CPUE.

Appendix D6.–Chinook, sockeye, coho, and pink salmon catch, CPUE, and proportion of Chinook salmon caught inriver in 5.0 and 7.5 inch mesh gillnets during the late-run Kenai River Chinook salmon sport fishery, 1 July–10 August 2009.

	Inriver drift gillnetting																		
				Catch														Chinook salmon	
				Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Total			
Date	Reps[a]	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop [b]	SE
1 Jul	4	15	107	24	0.233	0.062	22	0.188	0.079	0	0.000	0.000	1	0.010	0.010	47	0.438	0.52	0.12
2 Jul	4	16	119	15	0.129	0.029	64	0.532	0.177	0	0.000	0.000	0	0.000	0.000	79	0.665	0.19	0.07
3 Jul	4	16	123	13	0.104	0.014	64	0.510	0.140	0	0.000	0.000	0	0.000	0.000	77	0.624	0.17	0.06
4 Jul	4	15	125	15	0.129	0.030	69	0.595	0.118	0	0.000	0.000	0	0.000	0.000	84	0.673	0.18	0.02
5 Jul	4	16	109	15	0.135	0.051	19	0.174	0.018	0	0.000	0.000	0	0.000	0.000	34	0.313	0.44	0.09
6 Jul	5	19	136	14	0.096	0.045	26	0.183	0.062	0	0.000	0.000	0	0.000	0.000	40	0.295	0.34	0.12
7 Jul	4	15	103	19	0.182	0.037	56	0.517	0.129	0	0.000	0.000	0	0.000	0.000	75	0.725	0.25	0.07
8 Jul	4	15	105	24	0.224	0.035	39	0.357	0.128	0	0.000	0.000	0	0.000	0.000	63	0.600	0.39	0.08
9 Jul	4	15	98	32	0.330	0.042	73	0.723	0.252	0	0.000	0.000	1	0.008	0.008	106	1.083	0.31	0.07
10 Jul	4	16	105	23	0.223	0.050	25	0.237	0.086	0	0.000	0.000	0	0.000	0.000	48	0.457	0.48	0.11
11 Jul	4	16	85	22	0.262	0.046	142	1.647	0.221	0	0.000	0.000	0	0.000	0.000	164	1.938	0.14	0.03
12 Jul	4	15	82	19	0.215	0.055	118	1.365	0.519	0	0.000	0.000	0	0.000	0.000	137	1.677	0.14	0.04
13 Jul	4	15	95	15	0.158	0.038	56	0.572	0.076	0	0.000	0.000	0	0.000	0.000	71	0.748	0.22	0.05
14 Jul	4	15	86	28	0.312	0.059	98	1.002	0.333	0	0.000	0.000	0	0.000	0.000	126	1.468	0.24	0.08
15 Jul	4	15	95	15	0.162	0.021	82	0.829	0.230	0	0.000	0.000	0	0.000	0.000	97	1.021	0.16	0.03
16 Jul	4	15	84	20	0.203	0.057	40	0.396	0.160	0	0.000	0.000	1	0.010	0.010	61	0.728	0.33	0.03
17 Jul	4	16	95	15	0.163	0.020	108	1.136	0.343	0	0.000	0.000	0	0.000	0.000	123	1.297	0.13	0.04
18 Jul	5	19	112	15	0.121	0.034	70	0.664	0.172	0	0.000	0.000	0	0.000	0.000	85	0.756	0.15	0.04
19 Jul	4	15	94	6	0.061	0.026	93	1.002	0.148	0	0.000	0.000	0	0.000	0.000	99	1.057	0.06	0.02
20 Jul	4	16	99	6	0.059	0.020	38	0.400	0.170	0	0.000	0.000	0	0.000	0.000	44	0.443	0.13	0.08
21 Jul	4	16	94	14	0.149	0.049	45	0.487	0.139	0	0.000	0.000	0	0.000	0.000	59	0.628	0.23	0.04
22 Jul	4	16	102	6	0.059	0.032	81	0.794	0.168	0	0.000	0.000	0	0.000	0.000	87	0.853	0.07	0.04
23 Jul	4	15	91	9	0.092	0.035	70	0.737	0.195	0	0.000	0.000	1	0.012	0.012	80	0.879	0.11	0.03
24 Jul	5	19	114	12	0.089	0.045	39	0.369	0.110	0	0.000	0.000	0	0.000	0.000	51	0.446	0.20	0.09
25 Jul	5	20	110	9	0.079	0.031	27	0.248	0.148	0	0.000	0.000	0	0.000	0.000	36	0.327	0.24	0.17
26 Jul	5	19	102	6	0.056	0.018	59	0.554	0.240	0	0.000	0.000	0	0.000	0.000	65	0.636	0.09	0.04

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Appendix D6.–Part 2 of 2.

				Inriver drift gillnetting															
				Catch														Chinook salmon	
				Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Total			
Date	Reps[a]	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Prop[b]	SE
27 Jul	4	16	86	10	0.118	0.014	33	0.400	0.155	0	0.000	0.000	0	0.000	0.000	43	0.501	0.23	0.07
28 Jul	4	16	89	17	0.183	0.035	20	0.226	0.089	0	0.000	0.000	0	0.000	0.000	37	0.418	0.45	0.10
29 Jul	4	16	97	17	0.176	0.061	35	0.355	0.105	1	0.010	0.010	0	0.000	0.000	53	0.546	0.33	0.06
30 Jul	4	16	91	17	0.181	0.047	18	0.196	0.080	1	0.012	0.012	0	0.000	0.000	36	0.394	0.47	0.04
31 Jul	5	20	125	13	0.098	0.064	15	0.117	0.037	2	0.017	0.011	0	0.000	0.000	30	0.240	0.42	0.18
1 Aug	5	20	113	16	0.135	0.039	6	0.049	0.039	2	0.017	0.017	0	0.000	0.000	24	0.213	0.67	0.10
2 Aug	6	24	124	6	0.050	0.032	1	0.008	0.008	2	0.015	0.010	1	0.009	0.009	10	0.081	0.61	0.22
3 Aug	6	24	145	5	0.035	0.012	4	0.027	0.014	4	0.026	0.013	0	0.000	0.000	13	0.090	0.39	0.15
4 Aug	5	20	114	10	0.087	0.014	1	0.009	0.009	4	0.035	0.009	0	0.000	0.000	15	0.131	0.67	0.06
5 Aug	5	20	131	2	0.015	0.009	8	0.060	0.038	4	0.031	0.014	0	0.000	0.000	14	0.107	0.14	0.03
6 Aug	4	16	111	10	0.088	0.008	10	0.086	0.022	10	0.088	0.042	0	0.000	0.000	30	0.269	0.34	0.08
7 Aug	5	19	140	11	0.078	0.007	7	0.048	0.025	2	0.014	0.008	0	0.000	0.000	20	0.143	0.56	0.11
8 Aug	5	19	144	9	0.075	0.037	2	0.013	0.008	9	0.066	0.029	0	0.000	0.000	20	0.139	0.49	0.15
9 Aug	4	16	124	3	0.024	0.015	9	0.071	0.045	21	0.167	0.062	0	0.000	0.000	33	0.266	0.09	0.04
10 Aug	5	19	153	2	0.012	0.012	6	0.035	0.023	15	0.100	0.030	0	0.000	0.000	23	0.150	0.08	0.08
Total	180	701	4,456	559	5.381		1,798	17.915		77	0.598		5	0.050		2,439	0.547	NA	NA
Min	4	15	82	2	0.012		1	0.008		0	0.000		0	0.000		10	0.122	0.06	
Mean	4	17	109	14	0.131		44	0.437		2	0.015		0	0.001		59	0.547	0.29	
Max	6	24	153	32	0.330		142	1.647		21	0.167		1	0.012		164	1.071	0.67	

Note: "NA" = not applicable.

[a] A complete replicate (rep) consists of 4 drifts (2 mesh sizes, 2 banks). Only reps that had at least 1 drift from each mesh size were used in this table.

[b] Proportion of combined total catch = Chinook salmon CPUE / Total CPUE.

APPENDIX E: TEMPORALLY STRATIFIED AGE COMPOSITION ESTIMATES FOR THE KENAI RIVER CHINOOK SALMON FISHERY, 2009.

Appendix E1.–Temporally stratified age composition and estimated sport harvest by age class for early-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge, 16 May–30 June 2009.

		Age				
Dates	Parameter	1.1	1.2	1.3	1.4	Total
16 May–8 June						
	Female					
	Sample size			4	18	22
	% Sample			12.1%	54.5%	66.7%
	SE % sample			5.8%	8.8%	8.3%
	Harvest			36	160	196
	SE Harvest			20	57	68
	Male					
	Sample size	1	5	1	4	11
	% Sample	3.0%	15.2%	3.0%	12.1%	33.3%
	SE % sample	3.0%	6.3%	3.0%	5.8%	8.3%
	Harvest	9	45	9	36	98
	SE Harvest	9	23	9	20	39
	Both sexes combined					
	Sample size	1	5	5	22	33
	% Sample	3.0%	15.2%	15.2%	66.7%	100.0%
	SE % sample	3.0%	6.3%	6.3%	8.3%	0.0%
	Harvest	9	45	45	196	294
	SE Harvest	9	23	23	68	95
9–30 June						
	Female					
	Sample size			5	6	11
	% Sample			15.2%	18.2%	33.3%
	SE % sample			6.3%	6.8%	8.3%
	Harvest			92	110	201
	SE Harvest			41	45	61
	Male					
	Sample size		7	9	6	22
	% Sample		21.2%	27.3%	18.2%	66.7%
	SE % sample		7.2%	7.9%	6.8%	8.3%
	Harvest		128	165	110	403
	SE Harvest		49	55	45	87
	Both sexes combined					
	Sample size		7	14	12	33
	% Sample		21.2%	42.4%	36.4%	100.0%
	SE % sample		7.2%	8.7%	8.5%	0.0%
	Harvest		128	256	220	604
	SE Harvest		49	69	64	106

Note: values given by age and sex may not sum to totals due to rounding.

Appendix E2.–Temporally stratified age composition and estimated sport harvest by age class and geographic location for late-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge, 1 July–31 July 2009.

		Age				
Dates	Parameter	1.2	1.3	1.4	1.5	Total
1–17 July						
	Female					
	Sample size		8	38	2	48
	% Sample		6.4%	30.4%	1.6%	38.4%
	SE % sample		2.2%	4.1%	1.1%	4.4%
	Downstream harvest		62	294	15	372
	SE downstream harvest		24	66	11	79
	Upstream harvest		224	1,062	56	1,341
	SE upstream harvest		79	174	40	197
	Total harvest		286	1,356	71	1,713
	SE total harvest		101	215	50	241
	Male					
	Sample size	27	16	31	3	77
	% Sample	21.6%	12.8%	24.8%	2.4%	61.6%
	SE % sample	3.7%	3.0%	3.9%	1.4%	4.4%
	Downstream harvest	209	124	240	23	596
	SE downstream harvest	52	36	57	14	115
	Upstream harvest	754	447	866	84	2,152
	SE upstream harvest	147	112	157	48	252
	Total harvest	964	571	1,106	107	2,748
	SE total harvest	183	142	195	62	299
	Both sexes combined					
	Summed sample size	27	24	69	5	125
	% Sample	21.6%	19.2%	55.2%	4.0%	100.0%
	SE % sample	3.7%	3.5%	4.5%	1.8%	0.0%
	Downstream harvest	209	186	534	39	968
	SE downstream harvest	52	48	105	18	175
	Upstream harvest	754	671	1,928	140	3,493
	SE upstream harvest	147	138	238	63	326
	Total harvest	964	857	2,463	178	4,461
	SE total harvest	183	173	285	80	370

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Appendix E2.–Part 2 of 2.

Dates	Parameter	Age 1.2	1.3	1.4	1.5	Total
18–31 July						
	Female					
	Sample size		8	32	0	40
	% Sample		11.4%	45.7%	0.0%	57.1%
	SE % sample		3.8%	6.0%	0.0%	6.0%
	Downstream harvest		19	75	0	93
	SE downstream harvest		7	19	0	23
	Upstream harvest		315	1,259	0	1,573
	SE upstream harvest		111	218	0	242
	Total harvest		333	1,333	0	1,667
	SE total harvest		117	226	0	250
	Male					
	Sample size	6	7	17	0	30
	% Sample	8.6%	10.0%	24.3%	0.0%	42.9%
	SE % sample	3.4%	3.6%	5.2%	0.0%	6.0%
	Downstream harvest	14	16	40	0	70
	SE downstream harvest	6	7	12	0	19
	Upstream harvest	236	275	669	0	1,180
	SE upstream harvest	96	104	161	0	211
	Total harvest	250	292	708	0	1,250
	SE total harvest	101	109	168	0	220
	Both sexes combined					
	Summed sample size	6	15	49	0	70
	% Sample	8.6%	21.4%	70.0%	0.0%	100.0%
	SE % sample	3.4%	4.9%	5.5%	0.0%	0.0%
	Downstream harvest	14	35	114	0	163
	SE downstream harvest	6	11	27	0	37
	Upstream harvest	236	590	1,927	0	2,753
	SE upstream harvest	96	151	267	0	314
	Total harvest	250	625	2,042	0	2,916
	SE total harvest	101	158	273	0	316

Note: values given by age and sex may not sum to totals due to rounding.

Appendix E3.–Temporally stratified sonar passage estimates by age class for late-run Kenai River Chinook salmon, 1 July–10 August 2009.

		Age					
Dates	Parameter	1.1	1.2	1.3	1.4	1.5	Total
1–20 July							
	Female						
	Sample size		1	10	63	1	75
	Sonar passage estimate		0.5%	4.9%	30.6%	0.5%	36.4%
	SE sonar passage estimate		0.5%	1.5%	3.2%	0.5%	3.4%
	% Sonar passage		87	867	5,463	87	6,503
	SE % sonar passage		87	269	586	87	615
	Male						
	Sample size	1	76	11	37	6	131
	Sonar passage estimate	0.5%	36.9%	5.3%	18.0%	2.9%	63.6%
	SE sonar passage estimate	0.5%	3.4%	1.6%	2.7%	1.2%	3.4%
	% Sonar passage	87	6,590	954	3,208	520	11,359
	SE % sonar passage	87	618	281	483	210	646
	Both sexes combined						
	Summed sample size	1	77	21	100	7	206
	Sonar passage estimate	0.5%	37.4%	10.2%	48.5%	3.4%	100.0%
	SE sonar passage estimate	0.5%	3.4%	2.1%	3.5%	1.3%	0.0%
	% Sonar passage	87	6,677	1,821	8,671	607	17,862
	SE % sonar passage	87	620	379	649	226	375
21 July–10 August							
	Female						
	Sample size			5	52	3	60
	Sonar passage estimate			3.8%	39.4%	2.3%	45.5%
	SE sonar passage estimate			1.7%	4.3%	1.3%	4.4%
	% Sonar passage			296	3,083	178	3,557
	SE % sonar passage			131	346	102	356
	Male						
	Sample size		15	13	39	5	72
	Sonar passage estimate		11.4%	9.8%	29.5%	3.8%	54.5%
	SE sonar passage estimate		2.8%	2.6%	4.0%	1.7%	4.4%
	% Sonar passage		889	771	2,312	296	4,269
	SE % sonar passage		218	205	319	131	363
	Both sexes combined						
	Summed sample size		15	18	91	8	132
	Sonar passage estimate		11.4%	13.6%	68.9%	6.1%	100.0%
	SE sonar passage estimate		2.8%	3.0%	4.0%	2.1%	0.0%
	% Sonar passage		889	1,067	5,395	474	7,826
	SE % sonar passage		218	237	354	164	230

Note: values given by age and sex may not sum to totals due to rounding.