Fishery Data Series No. 12-70

Chinook Salmon Creel Survey and Inriver Gillnetting Study, Lower Kenai River, Alaska, 2008

by

Jeff Perschbacher

November 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)

Measures (fisheries)

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

Mathematics, statistics

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

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ABSTRACT

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 2008. A standardized inriver gillnetting program was conducted to estimate catch rates and species composition near the Chinook salmon sonar site from 16 May through 10 August. Estimates obtained from the creel survey and inriver gillnetting program were used for inseason management of the Kenai River Chinook salmon early- and late-runs. During the early run (16 May–30 June), effort was 72,574 (SE 3,860) angler hours and harvest was 2,602 (SE 218) Chinook salmon. Guided anglers accounted for 60% of effort and 55% of harvest; the remaining effort and harvest were unguided. The early-run harvest was composed of 11.4% (SE 2.5%) age-1.2 fish, 56.5% (SE 3.8%) age-1.3 fish, 31.8% (SE 3.5%) age-1.4 fish, and 0.3% (SE 0.3%) age-1.5 fish, whereas early-run Chinook salmon passage at the sonar site was composed of 13.7% (SE 2.7%) age-1.2 fish, 42.1% (SE 3.9%) age-1.3 fish, 42.3% (SE 3.9%) age-1.4 fish, 1.1% (SE 0.8%) age-1.5 fish and 0.7% (SE 0.7%) age-2.4 fish. During the early run, 210 Chinook salmon, 1,073 sockeye salmon, and 1 Dolly Varden were captured in the inriver gillnetting program; the ratio of Chinook salmon CPUE to all species CPUE averaged 0.21. During the late run (1–31 July), effort was 198,500 (SE 8,465) angler hours and harvest was 9,272 (SE 726) Chinook salmon. Guided anglers accounted for 50% of effort and 62% of harvest; the remaining effort and harvest were unguided. The late-run harvest was composed of 5.0% (SE 1.6%) age-1.2 fish, 27.7% (SE 3.1%) age-1.3 fish, 58.7% (SE 3.4%) age-1.4 fish, 8.5% (SE 2.0%) age-1.5 fish, whereas the late-run Chinook salmon passage at the sonar site (1 July–10 August) was composed of 1.8% (SE 6%) age-1.1 fish, 7.5% (SE 1.2%) age-1.2 fish, 20.6% (SE 1.8%) age-1.3 fish, 62.1% (SE 2.2%) age-1.4 fish, 7.8% (SE 1.2%) age-1.5 fish, and 0.2% (SE 0.2%) age-2.3 fish. During the late run, 916 Chinook salmon, 1,452 sockeye salmon, 111 coho salmon, 893 pink salmon, and 3 Dolly Varden were captured in the inriver gillnetting program; the ratio of Chinook salmon CPUE to all species CPUE averaged 0.30.

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 Warren Ames Bridge (river mile [RM] 5.2) and Soldotna Bridge (RM 21.1), and a standardized inriver gillnetting study (approximately RM 8.5) are the subjects of this report (Figure 2).

Chinook salmon returning to the Kenai River exhibit 2 distinct run timing patterns: "early" (late April–late June) and "late" (late June–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 those entering on or after 1 July. Sport anglers value fish from both runs because of their large size, especially late-run fish, which average about 18 kg and can exceed 36 kg. The world record sport-caught Chinook salmon (44.1 kg) 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 and harvest during the early-run fishery have been relatively stable since 2003 but remain below historical averages (Figure 3). In the late-run fishery, effort has been relatively stable since 1996, whereas harvest has fluctuated and been above historical averages since 1998 (Figure 4). Beginning in 1981, separate effort and harvest estimates have been produced for guided and unguided anglers (Figures 3 and 4).

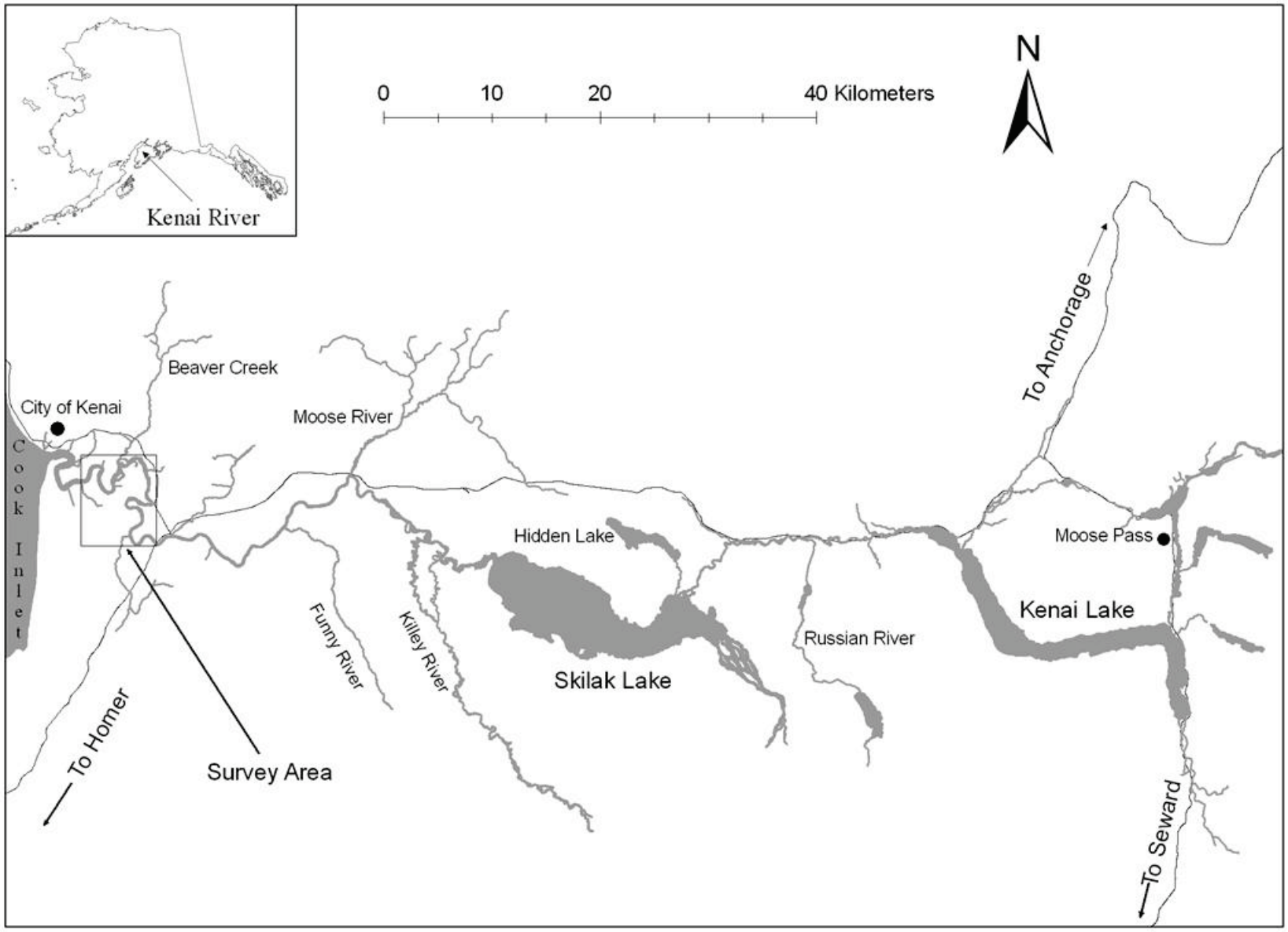

Figure 1.–Kenai River drainage on the Kenai Peninsula in Southcentral Alaska.

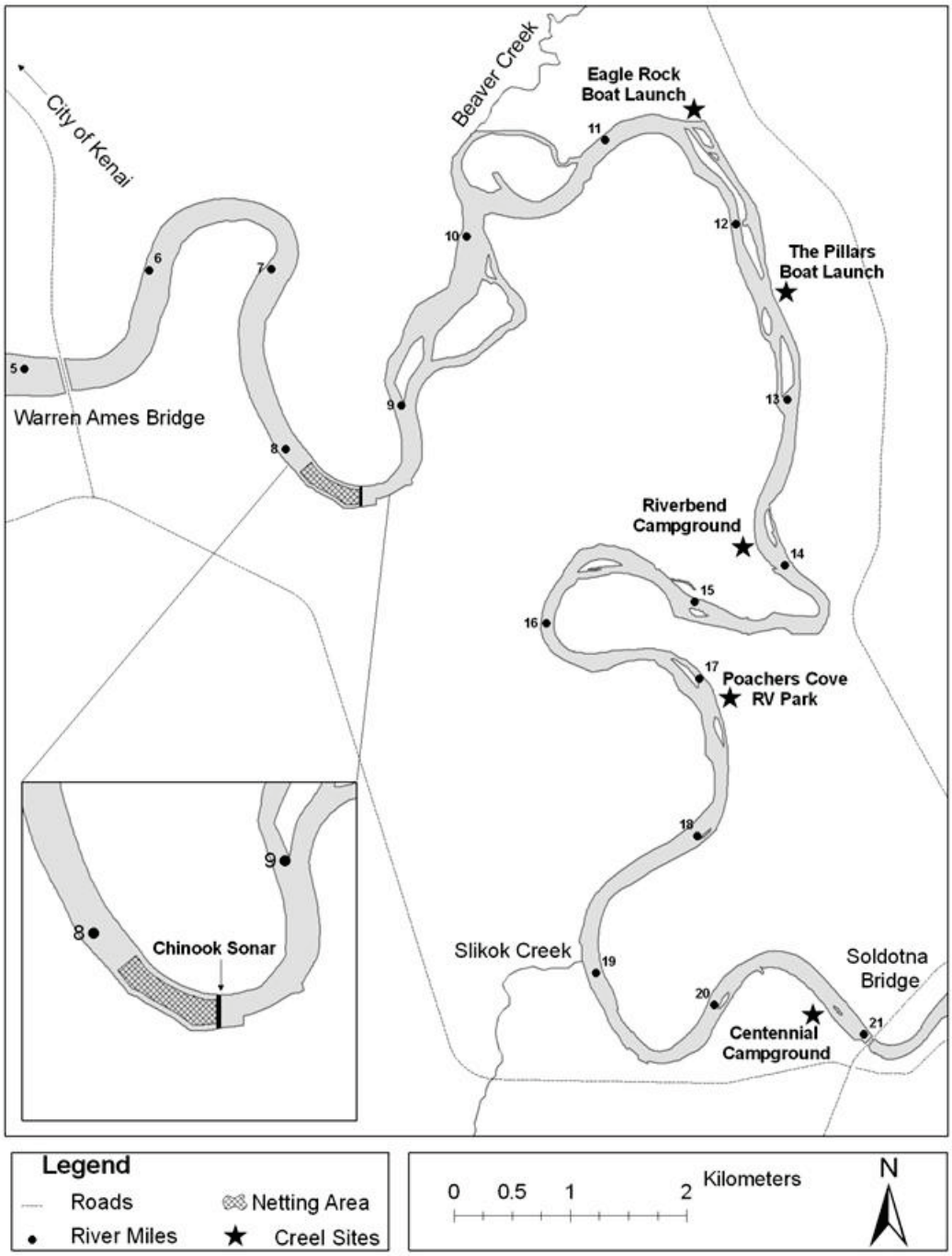

Figure 2.–Lower Kenai River from Warren Ames Bridge (RM 5.2) to Soldotna Bridge (RM 21.1).

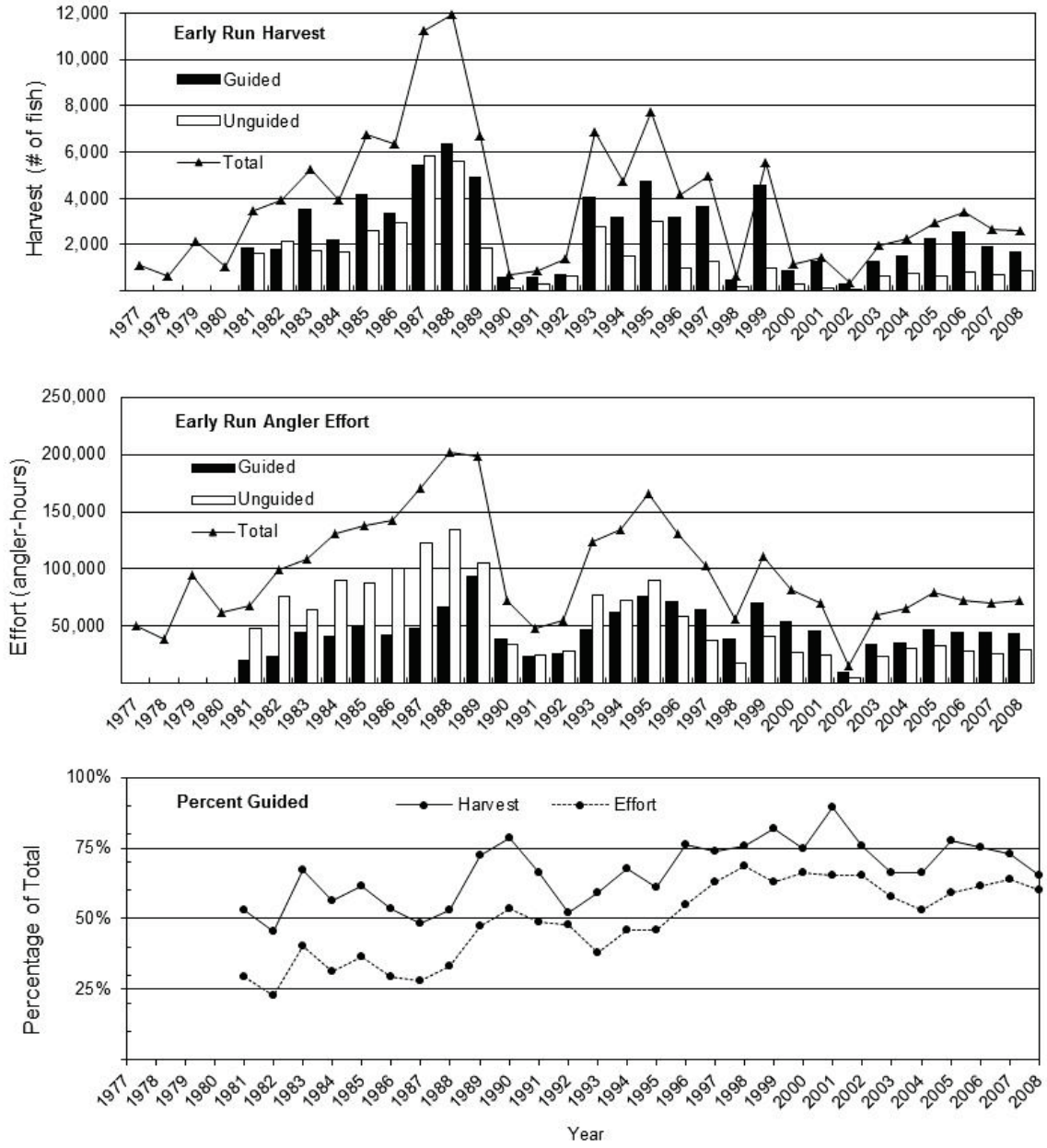

Figure 3.–Guided and unguided sport harvest (top), angler effort (middle), and percent of guided anglers (bottom) from ADF&G creel surveys for early-run Kenai River Chinook salmon between Soldotna Bridge and Warren Ames Bridge, 1977–2008.

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

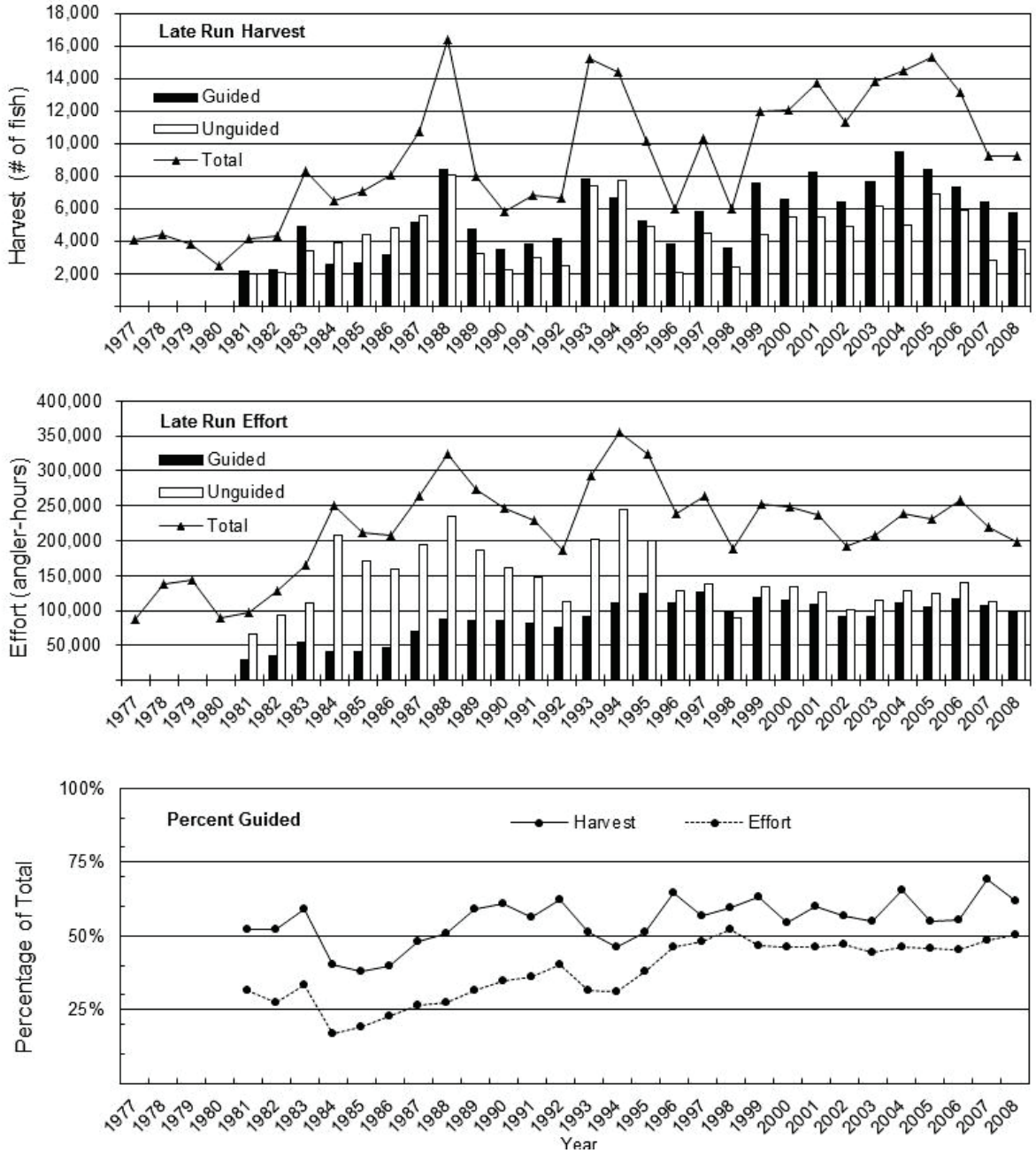

Figure 4.–Guided and unguided sport harvest (top), anger effort (middle), and percent of guided anglers (bottom) from ADF&G creel surveys for late-run Kenai River Chinook salmon between Soldotna Bridge and Warren Ames Bridge, 1977–2008.

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

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 to 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), 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 implements more conservative regulations adopted by the BOF which restricts the harvest of Chinook salmon less than 55 inches total length (TL), or closes the sport 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 Conservation Management Plan* (Alaska Administration Code 5 ACC 57.160). Under this slot limit, anglers were only allowed to retain fish less than 44 inches TL or greater than 55 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 complex because harvest of Chinook salmon by 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* (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 conservative of any water 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 to 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), the area around Morgan's Hole (approximately RM 31), and the Moose River confluence are all closed to fishing from boats for the entire Chinook salmon fishing season. These areas restrict Chinook salmon fishing based on telemetry studies in the early 1980s and early 1990s when early-run Chinook salmon were observed to hold in these confluence areas into July before ascending tributaries to spawn (McKinley et al. 2002).

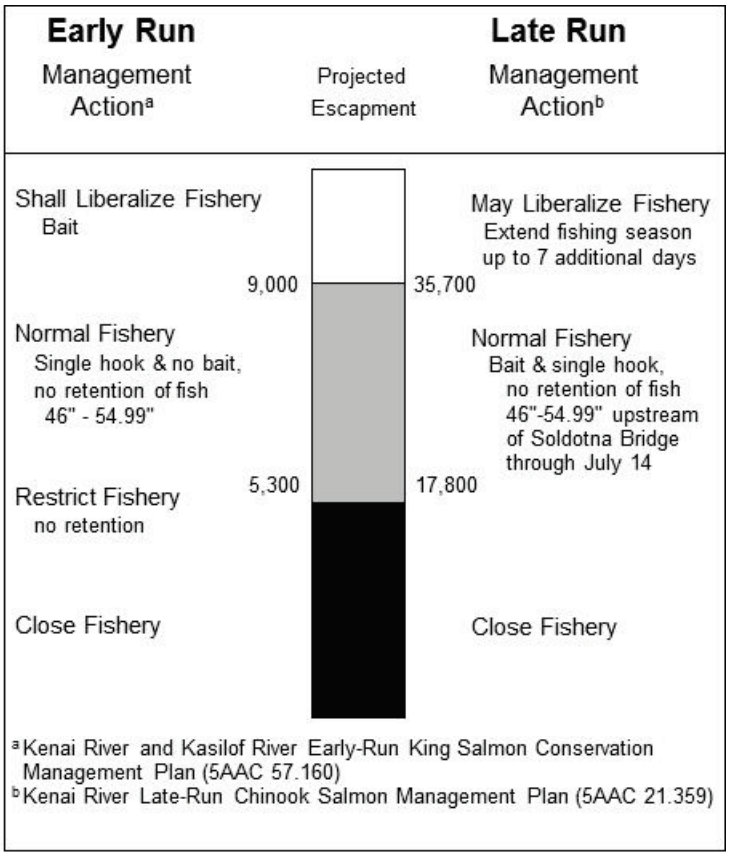

Figure 5.–Escapement levels and sport fish management actions for the Kenai River Chinook salmon fisheries.

The daily bag and possession limit is 1 Chinook salmon per day 20 inches TL or longer. The annual limit is 2 Chinook salmon measuring 28 inches TL or longer prior to 1 July and 20 inches TL or longer 1 July through 31 July. Chinook salmon measuring between 46 and less than 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 onboard) downstream of the outlet of Skilak Lake.

Kenai River Chinook salmon measuring 55 inches TL or 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 harvest of the largest Kenai River Chinook salmon.

There are additional regulations 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.

The early-run fishery was liberalized in 2008 by emergency order to allow the use of bait beginning 1 June from the mouth of the Kenai River upstream to a point 100 yards below the confluence of the Moose River and Kenai River. This management action was taken because the spawning escapement was projected to exceed 9,000 Chinook salmon, which is above the upper end of the escapement goal range for early-run Chinook. No inseason actions were taken during the late run in 2008.

OBJECTIVES

Objectives for the 2008 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 values 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.
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 proportion estimates (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 harvest for future genetic analysis.

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

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 2008. 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 angler interviews were post-stratified by angler type because catch rates between guided and unguided anglers can differ (Reimer 2004b). 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 except the week of 20–26 May, when 2 days were selected randomly from the 3 weekend or holiday days available. The early run was composed of 28 strata. The late run was composed of 20 strata. Mondays were not sampled even though unguided drift boat anglers were allowed to fish.

Water clarity was measured to the nearest 0.05 m twice daily with a Secchi disk near midchannel at RM 15.3.

Table 1.–Sampling strata used for conducting Kenai River Chinook salmon angler counts and estimating creel statistics, 2008.

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: 16–18 May, 20–26 May, 27 May –1 June, 3–8 June, 10–15 June, 17–22 June, and 24–29 June
	5	Late run: 1–6 July, 8–13 July, 15–20 July, 22–27 July, 29–31 July
Day type	2	Weekdays Weekends/holidays
Angler type	2	Guided Unguided

[a] Used for angler counts only.

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 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; they reflect 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[2], 10) non-active boats[3], 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.

One count was completed on Mondays between 0800 and 1400 hours as an index of effort[4].

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) Pillars Boat Launch, and 5) Eagle Rock Campground. 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 on 31 May, Riverbend Campground was added on 8 June, Poacher's Cove was added on 11 June, and Eagle Rock Campground was added on 2 July. 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) was small; in 2001 only 2% of the interviews were conducted from 0400 to 0859 hours and 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

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

[3] 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.

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

more accessible boat launches than interview periods, access location was chosen without 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[5], 4) number of Chinook salmon harvested downstream of the Soldotna Bridge, 5) number of Chinook salmon released downstream of the Soldotna Bridge, and 6) whether released Chinook salmon were less than 46 inches TL, 46–54.99 inches TL, or 55 inches TL or greater[6].

Age, Sex, and Length of the Sport Harvest

Harvested Chinook salmon were sampled for age, sex, and length (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 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 may identify a hatchery-produced Chinook salmon or a wild Chinook salmon tagged in another river system 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 2008 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

[5] 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.

[6] Taken during the early run only.

sonar site at particular times (from 5 hours before to 1 hour after low tide vs. 3 hours before to 3 hours after low tide), it became clear that potentially more fish could be intercepted by inriver gillnets if sampling began 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 and continuing in 2008, the sampling scheduled was changed to 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 5 fish were in the net, 2) the net was drifting within approximately 30 m of either bank, 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 at RM 8.5.

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 8.5 (Miller et al. 2005).

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

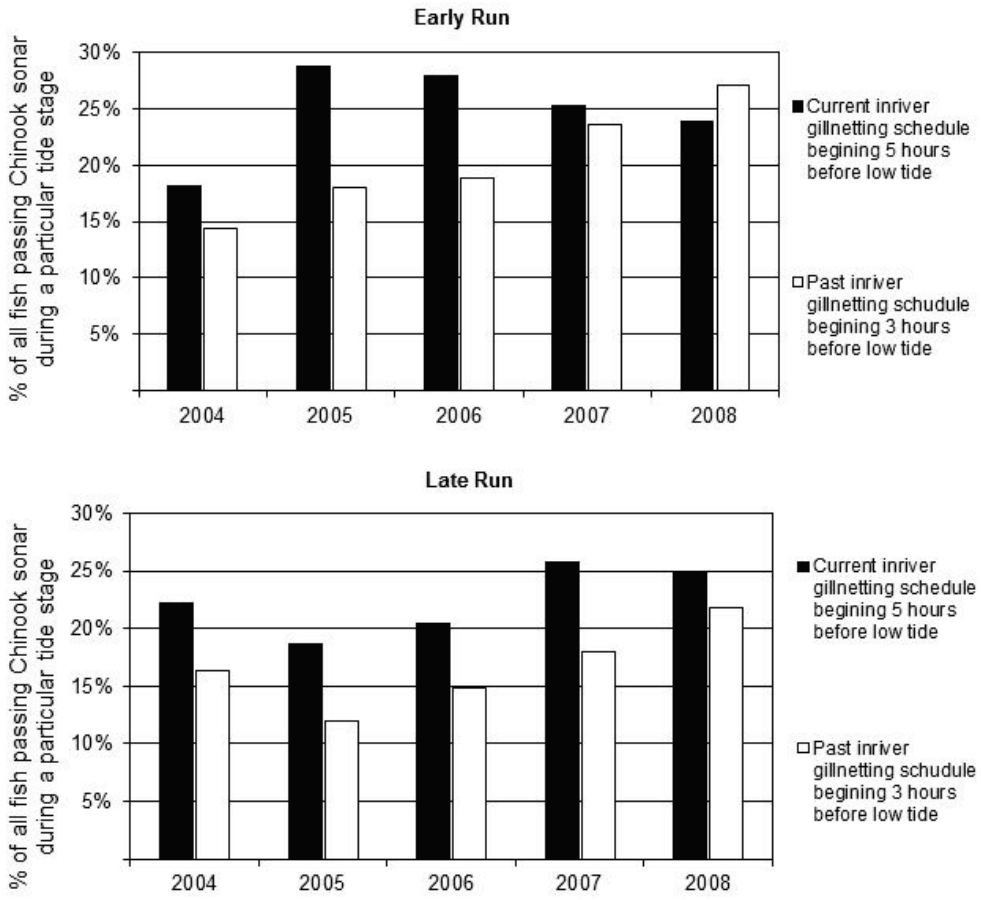

Figure 6.–Percentage of all fish passing the Kenai River Chinook salmon sonar site during 2 tide stages in 6 hour periods for early- (top) and late-run (bottom) Kenai River Chinook salmon, 2004–2008.

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).

Tissue samples (dorsal finclips) were collected from Chinook salmon captured by the inriver gillnets on days when sockeye salmon lengths were not being recorded. The finclips were placed in 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.

Captured Chinook salmon were subsampled in the late run. 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 resampling 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:

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

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:

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

Effort (angler-hours) during day *i* in stratum *h* was estimated as follows:

$$\hat{E}_{hi} = L_{hi}\bar{x}_{hi}, \tag{3}$$

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:

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

The mean effort for stratum *h* was estimated by

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

where

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

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

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

Total effort of stratum *h* was estimated by

$$\hat{E}_h = D_h \bar{E}_h, \tag{7}$$

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):

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

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)

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

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

Regulations allow only unguided fishing from drift boats or from shore on Mondays. A creel survey has not been conducted on Mondays since 2001; rather, 1 "index" angler count has been conducted each Monday during the middle of the day (0800–1400 hours). For 2008, 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 2002–2008. 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; then, the sequence was 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, $c_{smij\cdot}$ is the catch of species i in mesh m summed across drifts on both banks conducted during repetition j of day i, $e_{mij\cdot}$ 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:

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

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

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

$r_{\cdot ij}$ = $\sum_s \hat{r}_{sij}$ 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)

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

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*.

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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.

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

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

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

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 and 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},

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

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 65% (22/34) of the days the fishery was open to guided anglers and 68% (27/40) of the days open to unguided powerboat 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 67% (18/27) of the days open to unguided powerboat fishing (Table 3). A total of 3,155 angler interviews were conducted: 1,567 during the early run and 1,588 during the late run (Tables 2 and 3).

During the early run, angler counts ranged from 0 to 203 for unguided anglers and from 0 to 361 for guided anglers (Appendix A1). The largest count occurred on 15 June for unguided anglers and on 24 June for guided anglers. The largest count in the early run for guided and unguided anglers combined was 427 anglers on 24 June between 0400 and 0859 hours. During the late run, angler counts ranged from 11 to 657 for unguided anglers and from 83 to 637 for guided anglers (Appendix A2). The largest count occurred on 29 July for unguided anglers and on 26 July for guided anglers. The largest count in the late run for guided and unguided anglers combined was 1,056 anglers on 25 July.

Estimated effort was 72,574 (SE 3,680) angler hours during the early run (Table 2) and 198,500 (SE 8,465) angler hours during the late run (Table 3). Guided anglers accounted for 60% of the early-run effort and 50% of the late-run effort.

In the early run, daily catch rates (CPUE) varied from 0 to 0.121 and averaged 0.037 fish per hour for unguided anglers, while daily CPUE for guided anglers ranged from 0 to 0.131 and averaged 0.040 fish per hour (Appendices B1 and B2). Daily CPUE in the early run was highest on 8 June for unguided anglers and on 11 June for guided anglers. In the late run, daily CPUE varied from 0 to 0.070 and averaged 0.038 fish per hour for unguided anglers, while daily CPUE for guided anglers ranged from 0.017 to 0.106 and averaged 0.061 fish per hour (Appendices B3 and B4). Daily CPUE was highest in the late run on 26 July for unguided anglers and 16 July for guided anglers.

Table 2.–Estimated early-run Kenai River Chinook salmon sport fishery effort, catch, and harvest between Soldotna Bridge and Warren Ames Bridge, 16 May–30 June 2008.

Fishing periods	Days open to fishing from powerboats	Sampling days	Number of interviews	Effort		Chinook salmon			
						Catch [a]		Harvest [b]	
				Hours fished	SE	Number of fish	SE	Number of fish	SE
16–18 May									
Guided weekdays	1	1	0	48	24	1	2	1	2
Guided weekends	1	1	6	66	18	2	2	2	2
Unguided weekdays	1	1	3	15	6	0	0	0	0
Unguided weekends	2	2	55	300	153	1	2	0	0
20–26 May									
Guided weekdays	4	2	13	392	87	5	3	1	1
Guided weekends	2	2	30	760	85	3	4	3	4
Unguided weekdays	4	2	21	230	45	5	4	5	4
Unguided weekends	3	2	68	953	192	15	6	7	4
27 May–1 June									
Guided weekdays	4	2	54	1,944	546	60	22	60	22
Guided weekends	2	2	25	1,014	517	51	40	37	28
Unguided weekdays	4	2	61	750	137	30	13	20	11
Unguided weekends	2	2	118	1,220	285	19	9	8	5
3–8 June									
Guided weekdays	4	2	82	5,436	876	263	56	224	55
Guided weekends	1	1	29	1,392	168	81	25	66	23
Unguided weekdays	4	2	78	2,350	389	169	52	140	45
Unguided weekends	2	2	151	2,665	757	281	94	168	58
10–15 June									
Guided weekdays	4	2	93	8,936	2,246	877	145	586	101
Guided weekends	1	1	40	1,848	530	86	32	59	25
Unguided weekdays	4	2	50	3,740	658	203	92	137	66
Unguided weekends	2	2	108	4,335	557	284	69	161	48
17–22 June									
Guided weekdays	4	2	124	9,288	1,207	313	58	279	53
Guided weekends	1	1	35	1,962	210	93	32	84	30
Unguided weekdays	4	2	19	4,600	1,403	184	151	61	62
Unguided weekends	2	2	78	2,605	353	73	27	73	27
24–29 June									
Guided weekdays	4	2	81	8,772	1,554	222	93	222	93
Guided weekends	1	1	37	1,878	367	88	33	79	31
Unguided weekdays	4	2	54	2,640	445	37	16	37	16
Unguided weekends	2	2	54	2,435	477	106	42	83	36
Day type subtotals									
Guided weekdays	25	13	447	34,816	3,161	1,741	191	1,373	159
Guided wkends/holiday	9	9	202	8,920	873	404	73	329	62
Unguided weekdays	25	13	286	14,325	1,665	628	185	399	103
Unguided wkends/holiday	15	14	632	14,513	1,173	779	127	500	88
Angler type subtotals									
Guided	34	22	649	43,736	3,279	2,145	205	1,702	170
% Guided			41%	60%		60%		65%	
Unguided [c]	40	27	918	28,838	2,037	1,408	225	900	135
% Unguided			59%	40%		40%		35%	
Early-run total [c]			1,567	72,574	3,860	3,552	304	2,602	218

[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] 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 Soldotna Bridge and Warren Ames Bridge, 1 July–31 July 2008.

Fishing periods	Days open to fishing from powerboats	Sampling days	Number of interviews	Effort		Chinook salmon			
						Catch [a]		Harvest [b]	
				Hours fished	SE	Number of fish	SE	Number of fish	SE
1–6 July									
Guided weekdays	4	2	76	11,772	2,008	376	94	296	76
Guided weekends	1	1	45	2,744	662	71	30	71	30
Unguided weekdays	4	2	59	4,610	966	98	35	98	35
Unguided weekends	2	2	128	4,810	538	90	30	66	25
8–13 July									
Guided weekdays	4	2	71	12,328	2,748	544	301	492	261
Guided weekends	1	1	53	4,328	1,378	322	119	268	102
Unguided weekdays	4	2	55	7,180	1,859	132	92	105	75
Unguided weekends	2	2	112	8,675	851	394	92	317	81
15–20 July									
Guided weekdays	4	2	86	21,456	3,865	1,864	507	1,734	441
Guided weekends	1	1	37	5,430	647	480	108	284	95
Unguided weekdays	4	2	65	9,250	1,755	216	165	106	90
Unguided weekends	2	2	148	11,510	1,877	560	150	477	137
22–27 July									
Guided weekdays	4	2	124	21,616	2,530	1,340	247	1,231	256
Guided weekends	1	1	56	4,452	919	420	107	351	95
Unguided weekdays	4	2	106	18,470	2,854	923	200	822	176
Unguided weekends	2	2	139	12,910	1,332	864	165	719	141
29–31 July									
Guided weekdays	3	2	70	15,471	1,592	1,074	195	1,022	202
Unguided weekdays	3	2	158	21,488	3,268	1,160	227	815	178
Day Type Subtotals									
Guided weekdays	19	10	427	82,643	5,955	5,198	675	4,774	612
Guided weekends	4	4	191	16,954	1,898	1,294	195	974	171
Unguided weekdays	19	10	443	60,998	5,128	2,529	358	1,945	279
Unguided weekends	8	8	527	37,905	2,512	1,908	244	1,579	214
Angler Type Subtotals									
Guided	23	14	618	99,597	6,250	6,491	703	5,748	635
% Guided			39%	50%		59%		62%	
Unguided[c]	27	18	970	98,903	5,710	4,437	433	3,525	351
% Unguided			61%	50%		41%		38%	
Late-run total [c]			1,588	198,500	8,465	10,929	825	9,272	726

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

The estimated harvest of Chinook salmon during the early run was 2,602 (SE 218) fish (Table 2). Guided anglers accounted for 65% of the harvest compared to 35% for unguided anglers. The estimated catch of early-run Chinook salmon was 3,552 (SE 304), meaning 27% of the catch was released. Anglers from 1,567 interviews conducted during the early run reported releasing 89 Chinook salmon, of which 69 (78%) were reported to be below the slot limit of 46 inches TL and 20 (22%) were reported to be within the slot limit (46–54.99 inches TL) (Table 4). The slot limit change in 2008 resulted in an additional harvest of 16 Chinook salmon (fish between 44 and 46 inches TL). During the early run, 4% of Chinook salmon sampled were below 28 inches TL compared to the 5-year average (2003–2007) of 8%. Relative and absolute precision of total harvest estimates (± 16% or 429 fish) satisfied project objectives.

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, 2003–2008.

	Chinook salmon		
	Below slot limit [a]	Within slot limit [a]	Total
Year	% Released [b]	% Released [b]	number released [c]
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
Min	51.6%	22.5%	64
Mean	66.1%	33.9%	84
Max	77.5%	48.4%	109

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

The estimated harvest of Chinook salmon during the late run was 9,272 (SE 726) fish (Table 3). Guided anglers accounted for 62% of the harvest compared to 38% for unguided anglers. The estimated catch of late-run Chinook salmon was 10,929 (SE 825), meaning 15% of the catch was released. The relative precision for total harvest (±15.4%) and catch (±14.9%) satisfied the project objectives.

Approximately 1.9% of the early-run effort and 9.1% 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 1,011 (SE 232) (10.9%), whereas 8,262 (SE 688) Chinook salmon were harvested upstream of the sonar site (Appendix C2).

Daily angler counts and interpolated values of HPUE and CPUE used to index effort, harvest, and catch on Mondays during the late run, indicated an effort of 18,798 angler hours, a harvest of approximately 875 Chinook salmon, and a catch of 1,096 Chinook salmon on Mondays (Figure 7). This represented approximately 9% of total late-run effort, 10% of total catch, and 9% of total harvest. Estimates of catch, harvest, and effort on Mondays are not included in the seasonal totals presented herein.

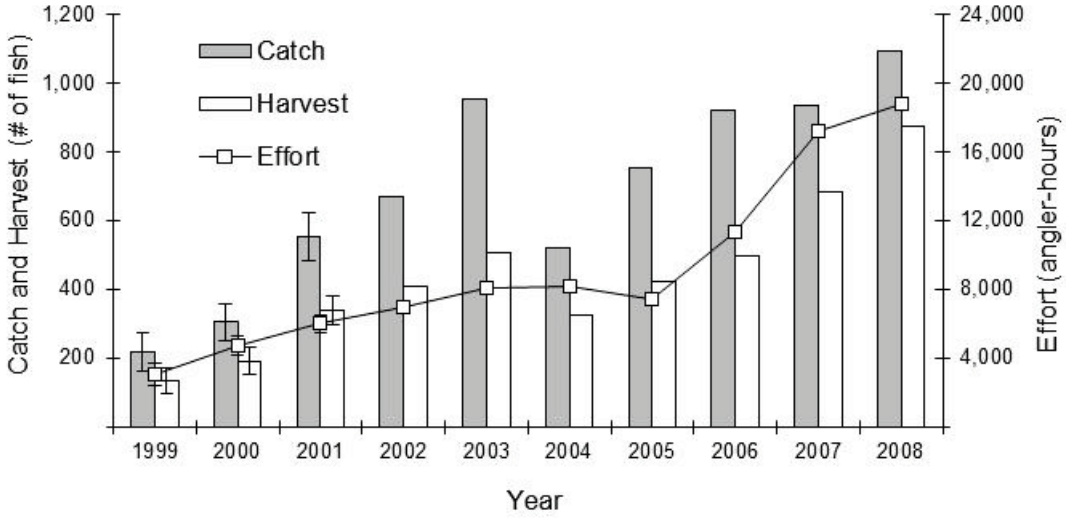

Figure 7.–Monday unguided drift boat sport catch, harvest, and angler effort for late run Kenai River Chinook salmon between Warren Ames Bridge and Soldotna Bridge, 1999–2008.

Note: "Harvest" = fish kept; "catch" = fish harvested plus fish released. Error bars show ± 1 standard error for years 1999–2001 when Mondays were included in creel survey. Precision estimates unavailable for 2002–2008 when angler effort, catch, and harvest were estimated using an index.

INRIVER GILLNETTING

Species Composition

During the early run, a total of 210 Chinook salmon and 1,073 sockeye salmon greater than 400 mm METF were captured with 5.0-inch and 7.5-inch mesh gillnets (Appendix D1 and D2). Only salmonids captured that were greater than 400 mm METF length (the lower length limit detectable by the split-beam sonar; Debby Burwen, ADF&G, Division of Sport Fish, Anchorage, personal communication) were used to calculate daily CPUE by species and daily Chinook salmon ratios. A total of 17 other fish, 1 Dolly Varden and 16 eulachon (*Thaleichthys pacificus*), were captured. Daily Chinook salmon CPUE for both mesh sizes combined ranged from 0 to 0.142 and averaged 0.043 (Appendix D3). The daily ratio of Chinook salmon to total number of fish captured, again for both mesh sizes combined, ranged from 0 to 1.00 and averaged 0.21 (Appendix D3).

During the late run, a total of 916 Chinook salmon, 1,452 sockeye salmon, 111 coho salmon, and 893 pink salmon greater than 400 mm METF length were captured (Appendix D4 and D5). In addition, 3 Dolly Varden were captured in the late run. Daily Chinook salmon CPUE ranged from 0.057 to 0.692 and average 0.297 (Appendix D6). The daily ratio of Chinook salmon to total number of fish captured ranged from 0.08 to 0.64 and averaged 0.30 (Appendix D6).

AGE, SEX, AND LENGTH

Creel Survey

The early-run harvest was composed of 11.4% (SE 2.5%) age-1.2 fish, 56.5% (SE 3.7%) age-1.3 fish, 31.8% (SE 3.4%) age-1.4 fish, and 0.3% (SE 0.3%) age-1.5 fish (Table 5). Age-1.3 males (30.5%, SE 3.5%) comprised a higher percentage of the total early-run harvest than age-1.3 females (26.0%, SE 3.3%), whereas age-1.4 males (9.6%, SE 2.3%) comprised a lower percentage of the total early-run harvest than age-1.4 females (22.3%, SE 3.0%) (Table 5). The slot limit truncated the early-run harvest length composition at 46 inches TL (Figure 8).

The late-run harvest was composed of 5.0% (SE 1.6%) age-1.2 fish, 27.7% (SE 3.1%) age-1.3 fish, 58.7% (SE 3.4%) age-1.4 fish, and 8.5% (SE 2.0%) age-1.5 fish (Table 6). Like the early run, age-1.3 males (19.4%, SE 2.8%) comprised a higher percentage of the total late-run harvest than age-1.3 females (8.3%, SE 1.9%), whereas age-1.4 males (25.8%, SE 3.0%) comprised a lower percentage of the total late-run harvest than age-1.4 females (32.9%, SE 3.2%) (Table 6).

Sample size goals and relative precision goals for estimates of age proportions of the harvest were met for both the early run and late run.

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 2008.

	Age				
Parameter	1.2	1.3	1.4	15	Total
Female					
Summed sample size		51	53	1	105
% Sample		25.8%	26.8%	0.5%	53.0%
SE % sample		3.1%	3.2%	0.5%	3.6%
Harvest		677	579	8	1,264
SE harvest		98	100	13	142
% Harvest		26.0%	22.3%	0.3%	48.6%
SE % harvest		3.3%	3.0%	0.3%	3.8%
Male					
Summed sample size	19	56	18		93
% Sample	9.6%	28.3%	9.1%		47.0%
SE % sample	2.1%	3.2%	2.0%		3.6%
Harvest	295	793	249		1,338
SE harvest	58	103	57		152
% Harvest	11.4%	30.5%	9.6%		51.4%
SE % harvest	2.5%	3.5%	2.3%		3.8%
Both sexes combined					
Summed sample size	19	107	71	1	198
% Sample	9.6%	54.0%	35.9%	0.5%	100.0%
SE % sample	2.1%	3.6%	3.4%	0.5%	0.0%
Harvest	295	1,470	829	8	2,602
SE harvest	58	149	118	13	218
% Harvest	11.4%	56.5%	31.8%	0.3%	100.0%
SE % harvest	2.5%	3.8%	3.5%	0.3%	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 2008.

	Age				
Parameter[a]	1.2	1.3	1.4	1.5	Total
Female					
Sample size		17	75	6	99
% Sample		7.8%	34.4%	2.8%	45.4%
SE % sample		1.8%	3.2%	1.1%	3.4%
Downstream harvest		82	339	28	452
SE downstream harvest		29	76	12	102
Upstream harvest		687	2,713	223	3,656
SE upstream harvest		173	335	93	404
Total harvest		768	3,052	251	4,109
SE total harvest		192	366	104	438
% Harvest		8.3%	32.9%	2.7%	44.3%
SE % harvest		1.9%	3.2%	1.1%	3.4%
Male					
Sample size	9	41	57	12	119
% Sample	4.1%	18.8%	26.1%	5.5%	54.6%
SE % sample	1.4%	2.7%	3.0%	1.5%	3.4%
Downstream harvest	45	193	262	58	558
SE downstream harvest	21	56	64	22	141
Upstream harvest	385	1,604	2,132	484	4,606
SE upstream harvest	132	267	301	144	488
Total harvest	430	1,798	2,395	542	5,164
SE total harvest	146	295	331	160	526
% Harvest	4.6%	19.4%	25.8%	5.8%	55.7%
SE % harvest	1.5%	2.8%	3.0%	1.7%	3.4%
Both sexes combined					
Sample size	10	58	132	18	218
% Sample	4.6%	26.6%	60.6%	8.3%	100.0%
SE % sample	1.4%	3.0%	3.3%	1.9%	0.0%
Downstream harvest	49	275	601	85	1,011
SE downstream harvest	21	79	130	29	232
Upstream harvest	418	2,291	4,846	707	8,262
SE upstream harvest	136	329	473	173	688
Total harvest	467	2,566	5,447	792	9,272
SE total harvest	151	361	509	192	726
% Harvest	5.0%	27.7%	58.7%	8.5%	100.0%
SE % harvest	1.6%	3.1%	3.4%	2.0%	0.0%

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

[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.

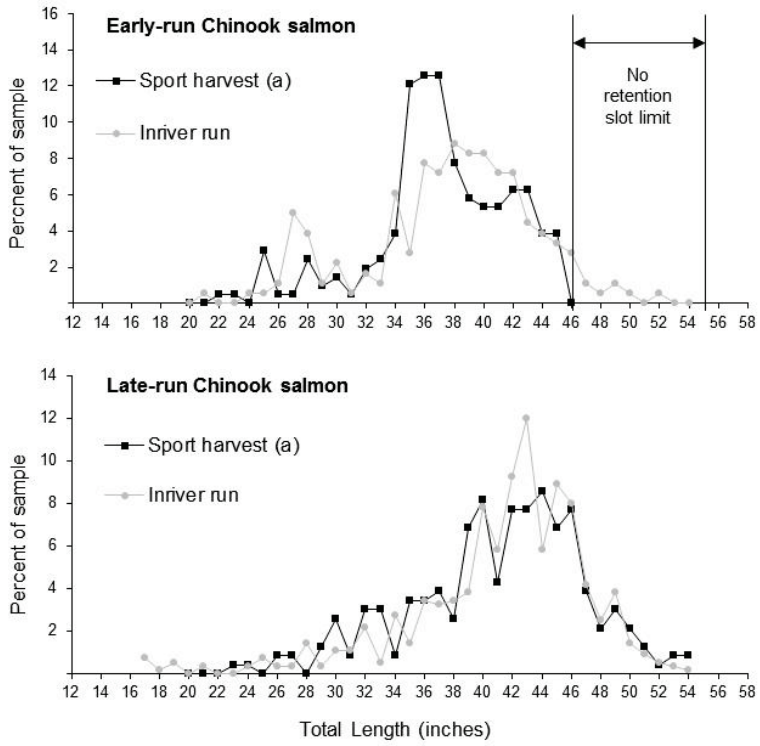

Figure 8.–Length distribution of early-run (top) and late-run (bottom) Kenai River Chinook salmon creel survey and inriver gillnetting samples, 2008.

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

Inriver Gillnetting

The early-run age composition differed among temporal strata ($\chi^2 = 6.96$, df = 2, $P = 0.030$) and age composition estimates for Chinook salmon passing the sonar site were weighted by the sonar passage estimates in each temporal stratum (Table 7 and Appendix E3). The largest age classes were age-1.4 (42.3%, SE 3.9%) and age-1.3 fish (42.1%, SE 3.9%), followed by age-1.2 (13.7%, SE 2.7%), and age-1.5 fish (1.1%, SE 0.8%). During the late run, the age composition of the inriver run differed among temporal strata ($\chi^2 = 45.61$, df = 2, $P < 0.0001$) and 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 E4). Age-1.4 fish were most abundant, comprising 62.1% (SE 2.2%) of the total run, followed by age-1.3 fish (20.6%, SE 1.8%), age-1.5 fish (7.8%, SE 1.2%), and age-1.2 fish (7.5%, SE 1.2%).

The age composition of the early-run inriver run and the late-run inriver run differed ($\chi^2 = 39.41$, df = 2, $P < 0.0001$). Age-1.5 fish were more prevalent in the late run (7.8%, SE 1.2%) than in the early run (1.1%, SE 0.8%).

The age composition of the early-run harvest and the early-run inriver run did not differ ($\chi^2 = 4.44$, df = 2, $P = 0.1084$) with ages 1.2, 1.3, and 1.4 considered (Tables 5 and 7). Since 2003, anglers have continued to harvest a larger percentage of age-1.3 fish and slightly smaller percentages of age-1.2 and age-1.4 fish (Figure 9). The age composition of the late-run harvest and the late-run inriver run did not differ ($\chi^2 = 4.02$, df = 3 $P = 0.259$) with ages 1.2, 1.3, 1.4, and 1.5 considered (Tables 6 and 8).

Table 7.–Age composition and estimated sonar passage by age class for early-run Kenai River Chinook salmon, 16 May–30 June 2008.

	Age					
Parameter	1.2	1.3	1.4	1.5	2.4	Total
Female						
Summed sample size	4	34	46	1	0	85
Sonar passage estimate	370	3,183	4,436	87	0	8,076
SE sonar passage estimate	167	439	481	87	0	626
% Sonar passage	2.4%	20.7%	28.9%	0.6%	0.0%	52.6%
SE % sonar passage	1.1%	2.8%	3.1%	0.6%	0.0%	4.0%
Male						
Summed sample size	19	36	21	1	1	78
Sonar passage estimate	1,741	3,285	2,057	87	110	7,279
SE sonar passage estimate	381	492	421	87	110	622
% Sonar passage	11.3%	21.4%	13.4%	0.6%	0.7%	47.4%
SE % sonar passage	2.5%	3.2%	2.7%	0.6%	0.7%	4.0%
Both sexes combined						
Summed sample size	23	70	67	2	1	163
Sonar passage estimate	2,111	6,467	6,493	173	110	15,355
SE sonar passage estimate	415	606	604	122	110	296
% Sonar passage	13.7%	42.1%	42.3%	1.1%	0.7%	100.0%
SE % sonar passage	2.7%	3.9%	3.9%	0.8%	0.7%	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 2008.

	Age						
Parameter	1.1	1.2	1.3	1.4	1.5	2.3	Total
Female							
Summed sample size		8	28	195	16		247
Sonar passage estimate		635	1,962	13,467	1,082		17,147
SE sonar passage estimate		158	333	981	258		1,169
% Sonar passage		1.8%	5.7%	38.9%	3.1%		49.5%
SE % sonar passage		0.5%	0.9%	2.0%	0.7%		2.3%
Male							
Summed sample size	8	26	73	118	23	1	249
Sonar passage estimate	635	1,978	5,173	8,035	1,609	65	17,494
SE sonar passage estimate	220	373	603	797	338	65	1,125
% Sonar passage	1.8%	5.7%	14.9%	23.2%	4.6%	0.2%	50.5%
SE % sonar passage	0.6%	1.1%	1.6%	1.9%	1.0%	0.2%	2.3%
Both sexes combined							
Summed sample size	8	34	101	313	39	1	496
Sonar passage estimate	635	2,613	7,135	21,502	2,690	65	34,641
SE sonar passage estimate	220	420	709	1,393	439	65	1,682
% Sonar passage	1.8%	7.5%	20.6%	62.1%	7.8%	0.2%	100.0%
SE % sonar passage	0.6%	1.2%	1.8%	2.2%	1.2%	0.2%	0.0%

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

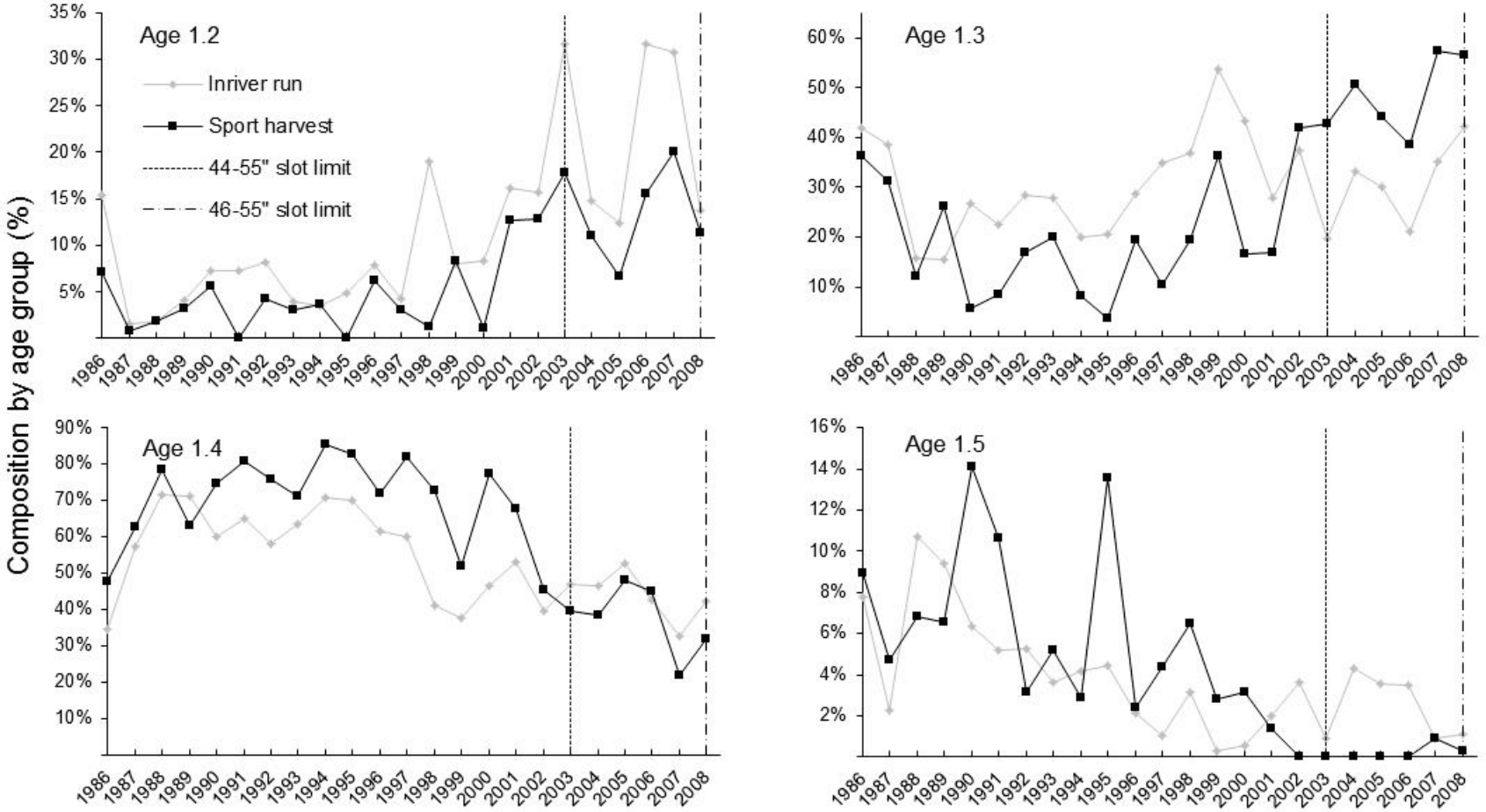

Figure 9.–Age composition of early-run Kenai River Chinook salmon sport harvest versus inriver run between Soldotna Bridge and Warren Ames Bridge for age-1.2 (top left), age-1.3 (top right), age-1.4 (bottom left), and age-1.5 (bottom right) Chinook salmon, 1986–2008.

Note: during 2003–2007, a non-retention 44–55 inch slot limit was in effect. During 2008, a non-retention 46–55 inch slot limit was in effect.

LENGTH-AT-AGE COMPARISONS

METF lengths were 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 10. Average lengths of Chinook salmon in the inriver gillnetting survey were slightly larger than in the creel survey, except early run age-1.3 females, which were slightly smaller in the netting survey (838 mm, SE 8) than the creel survey (841 mm, SE 5).

Table 9.–Early-run Kenai River Chinook salmon lengths by sex and age from creel survey and inriver gillnet samples, 16 May–30 June 2008.

		Age					
Source	Parameter	1.2	1.3	1.4	1.5	2.4	Combined
Creel Survey							
	Females						
	Sample size[a]		51	53	1		105
	Mean length (mm)		841	947	980		896
	SE length (mm)		5	8			7
	Min length (mm)		735	805	980		735
	Max length (mm)		900	1,040	980		1,040
	Males						
	Sample size[a]	19	56	18			93
	Mean length (mm)	606	803	966			795
	SE length (mm)	13	6	11			13
	Min length (mm)	510	660	900			510
	Max length (mm)	700	905	1,050			1,050
	Both sexes combined						
	Sample size[a]	19	107	71	1		198
	Mean length (mm)	606	821	952	980		848
	SE length (mm)	13	4	6			8
	Min length (mm)	510	660	805	980		510
	Max length (mm)	700	905	1,050	980		1,050
Inriver Gillnet							
	Females						
	Sample size[a]	4	34	46	1	1	86
	Mean length (mm)	645	838	965	1,065	1,109	829
	SE length (mm)	16	8	7			17
	Min length (mm)	615	700	889	1,065	1,109	615
	Max length (mm)	681	905	1,070	1,065	1,109	1,109
	Males						
	Sample size[a]	19	36	21	1		77
	Mean length (mm)	624	826	992	1,175		830
	SE length (mm)	8	10	15			17
	Min length (mm)	550	680	880	1,175		550
	Max length (mm)	715	920	1,140	1,175		1,175
	Both sexes combined						
	Sample size[a]	23	70	67	2	1	163
	Mean length (mm)	627	832	973	1,120	1,109	866
	SE length (mm)	7	6	7	55		10
	Min length (mm)	550	680	880	1,065	1,109	550
	Max length (mm)	715	920	1,140	1,175	1,109	1,175

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 2008.

		Age						
Source	Parameter	1.1	1.2	1.3	1.4	1.5	2.4	Combined
Creel Survey								
	Females							
	Sample size[a]		1	17	75	6		99
	Mean length (mm)		585	865	976	1,023		956
	SE length (mm)			8	5	18		7
	Min length (mm)		585	800	890	990		585
	Max length (mm)		585	920	1,080	1,110		1,110
	Males							
	Sample size[a]		9	41	57	12		119
	Mean length (mm)		632	791	1,026	1,102		923
	SE length (mm)		21	10	10	16		15
	Min length (mm)		530	670	860	1,000		530
	Max length (mm)		700	940	1,200	1,180		1,200
	Both sexes combined							
	Sample size[a]		10	58	132	18		218
	Mean length (mm)		628	813	998	1,075		938
	SE length (mm)		20	9	6	15		9
	Min length (mm)		530	670	860	990		530
	Max length (mm)		700	940	1,200	1,180		1,200
Inriver Gillnet Samples								
	Females							
	Sample size[a]		8	28	195	16		247
	Mean length (mm)		629	887	997	1,045		975
	SE length (mm)		24	11	3	11		6
	Min length (mm)		550	730	890	965		550
	Max length (mm)		740	985	1,125	1,135		1,135
	Males							
	Sample size[a]	8	26	73	118	23	1	249
	Mean length (mm)	419	652	820	1,031	1,101	860	916
	SE length (mm)	11	12	6	6	11		11
	Min length (mm)	390	490	685	875	990	860	390
	Max length (mm)	475	740	935	1,205	1,175	860	1,205
	Both sexes combined							
	Sample size[a]	8	34	101	313	39	1	496
	Mean length (mm)	419	647	838	1,010	1,078	860	945
	SE length (mm)	11	11	6	3	9		6
	Min length (mm)	390	490	685	875	965	860	390
	Max length (mm)	475	740	985	1,205	1,175	860	1,205

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

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

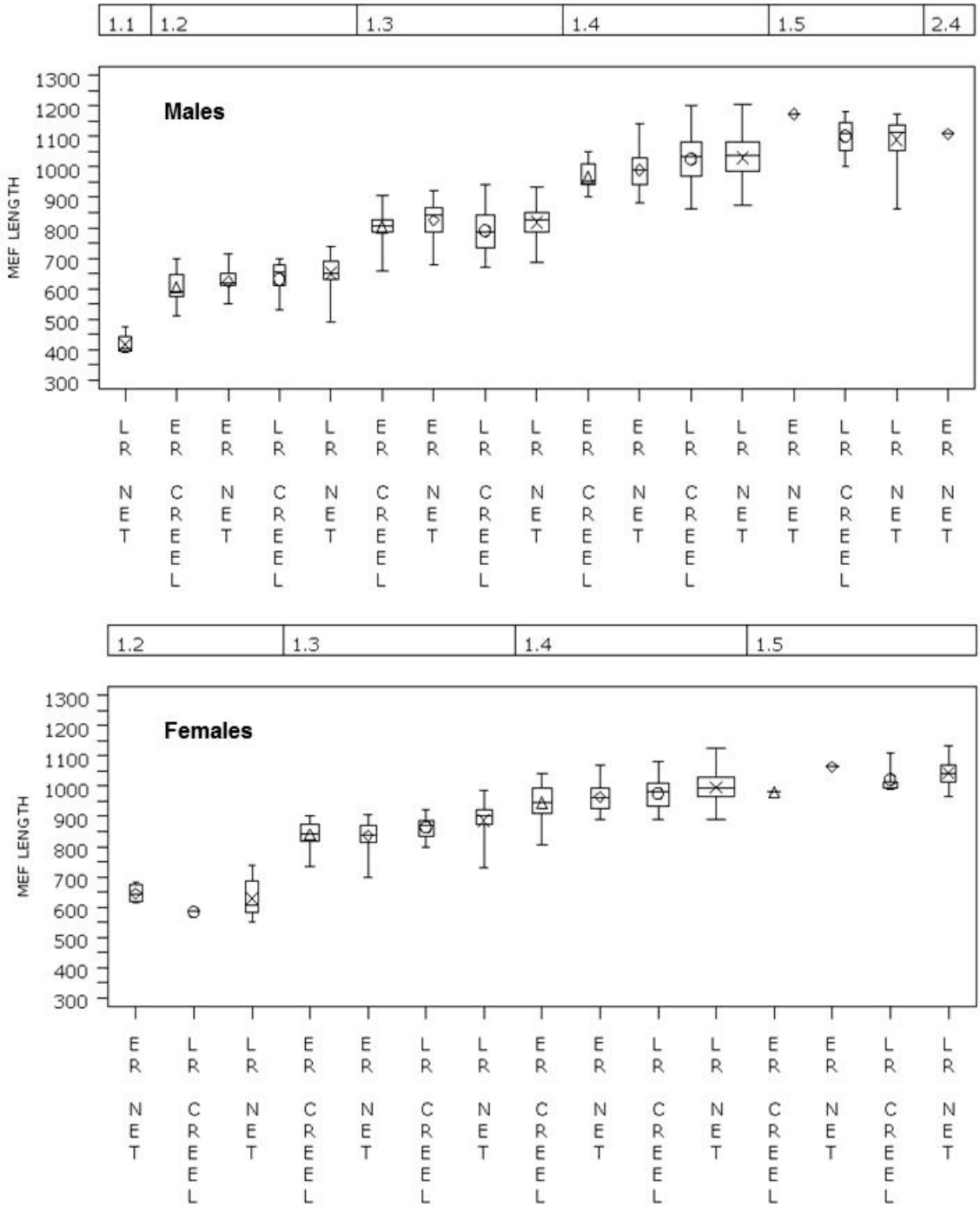

Figure 10.–Box plots of length distributions by sex and age of early- and late-run Kenai River Chinook salmon males (top) and females (bottom) from creel survey and inriver gillnetting samples, 2008.

Note: "ER" = early run; "LR" = late run. The single character within each box identifies the source of the data (e.g., Δ = early-run creel; ◊ = early-run net; O = late-run creel; and X = late-run net).

OTHER RESULTS

During 2008, the Kenai River Secchi disk measurements of water clarity at RM 15.3 ranged between 0.5 m and 1.6 m with an average (1.2 m) slightly above the historic early-run (1998–2007) average of 0.9 m. Secchi disk measurements at RM 8.5 fluctuated between 0.27 m and 1.25 m; early-run (0.5 m) and late-run (0.6 m) averages were slightly lower than their historic averages of 0.6 m and 0.7 m, respectively (Figure 11). The average discharge (6,400 ft^3/s) during the early run was below the historic average discharge of 7,100 ft^3/s, while the late-run average discharge (13,600 ft^3/s) was similar to the historic average discharge of 13,781 ft^3/s.

Of 586 unique Chinook salmon examined in the sport harvest, 2 were missing an adipose fin. Of 1,100 Chinook salmon examined in gillnets, 2 were missing an adipose fin. Chinook salmon missing adipose fins were harvested and their heads were sent to the ADF&G Age-Tag lab in Juneau, AK where it was determined that none contained a CWT and all most likely lost their adipose fins naturally.

There was no reported harvest of Chinook salmon 55 inches TL or greater in either run.

Tissue samples for future genetic analysis were taken from 732 Chinook salmon sampled from inriver gillnets, (181 early run, 551 late run) and 442 tissue samples were taken from Chinook salmon sampled from the creel survey (209 early run, 233 late run).

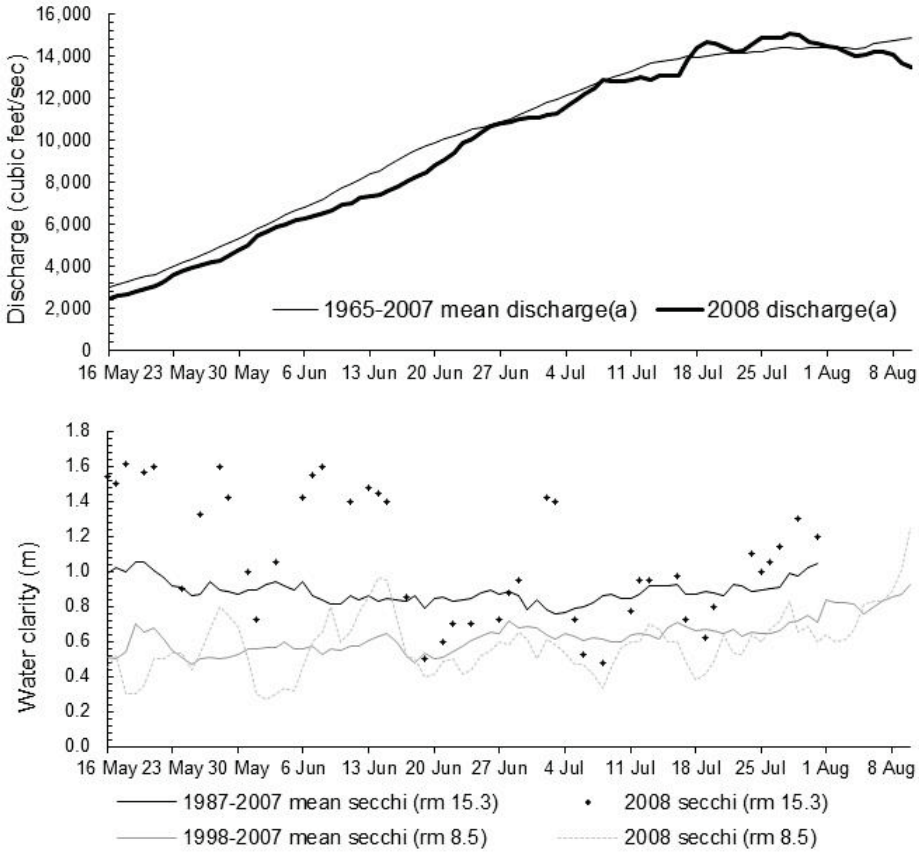

Figure 11.–Kenai River discharge (top) and water clarity (bottom), 16 May–10 August 2008.

[a] Discharge data downloaded from USGS 15266300 KENAI RIVER AT SOLDOTNA AK 2008-09-10 15:45:46 EST http//waterdata.usgs.gov/ak/nwis/discharge.

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 6 years (2003–2008) 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 over ocean-age-1 and ocean-age-2 fish caught in the early run since 2003, another unintended result due in part to the imposed slot limit.

In 2008, the early-run fishery was liberalized on 1 June by emergency order to allow bait. Effort and harvest were similar to the average effort and harvest since the slot limit inception in 2003.

There were no inseason management actions in the late-run Chinook salmon fishery. Late-run harvest was approximately 30% below the recent 5-year average (2003–2007) and near the historical (1976–2007) late run average harvest (Figure 4). Late-run effort was the lowest since 2002 and 9% below the historical (1976–2007) average effort.

Harvest of Chinook salmon downstream of the Chinook salmon sonar showed an upward trend from 1996 (when the creel survey began estimating harvest upstream and downstream of the Chinook salmon sonar) to 2006, but declined in 2007 and 2008 (Figure 12). Harvest success downstream of the sonar site is largely dependent on water clarity. This section of the river is tidally influenced.

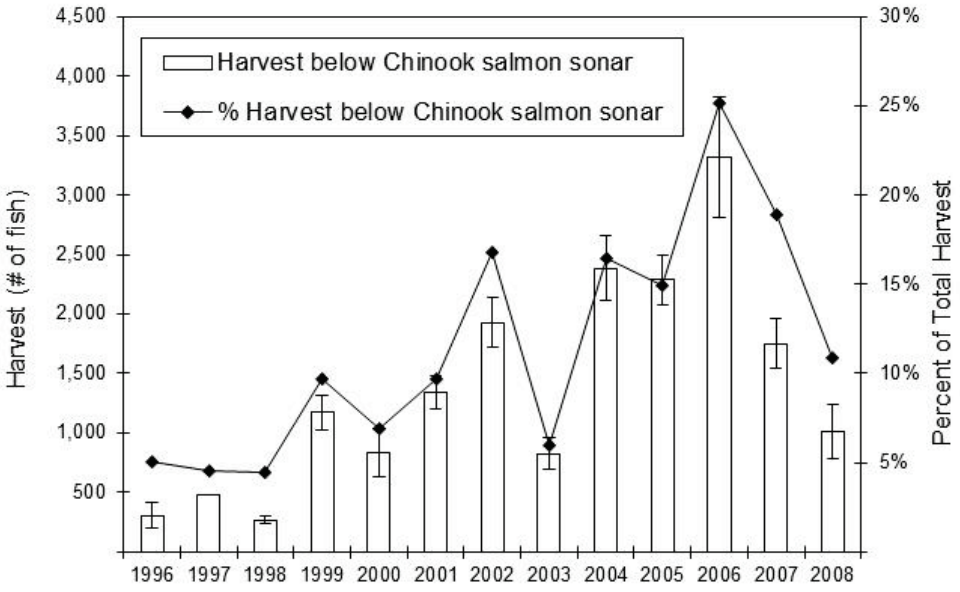

Figure 12.–Estimated number and percent of Kenai River Chinook salmon sport harvest between the Chinook salmon sonar site (RM 8.5) and Warren Ames Bridge (RM 5.2), 1996–2008.

Note: error bars show ±1 standard error. Precision estimates are unavailable for 1997.

Unguided anglers have been allowed to fish from drift boats on Mondays during the late run since 1999 and on Mondays during both the early and late runs since 2003. Mondays during the early run have never been sampled and Mondays have not been included in the late-run regular creel sampling since 2001, 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 do not include Mondays, meaning the unbiased seasonal estimates may be slightly larger than the estimates presented. Late-run harvest and effort estimates have shown an upward trend since the inception of the "drift boat Monday" regulation in 1999. Estimates of effort and harvest on Mondays were substantially higher in 2008 than any previous year. Approximately 9% of total late-run harvest occurred on Mondays and harvest was 41% greater than the 5-year (2003–2007) moving average. The late-run Monday fishery continues to grow in popularity with anglers and needs to be monitored more closely. Mondays in the late run should be added to the regular creel sampling schedule. This will allow for recalibration of the index in order to generate accurate catch, harvest, and effort estimates.

INRIVER GILLNETTING

In 2008, approximately 24% of all fish passed the Chinook salmon sonar during early-run inriver gillnetting and approximately 25% of all fish passed the Chinook salmon sonar during late-run inriver gillnetting. The continued use of the new sampling schedule resulted in a 3% decrease of fish interception in the early run and a 3% increase in the late run over previous sampling schedules. It is recommended that the change to the inriver gillnetting sampling schedule be retained in future years.

Sockeye salmon cumulative CPUE was slightly above the 2002–2007 average in both the early and late runs (Figure 13). Chinook salmon CPUE was below the 2002–2007 average in both the early and late runs.

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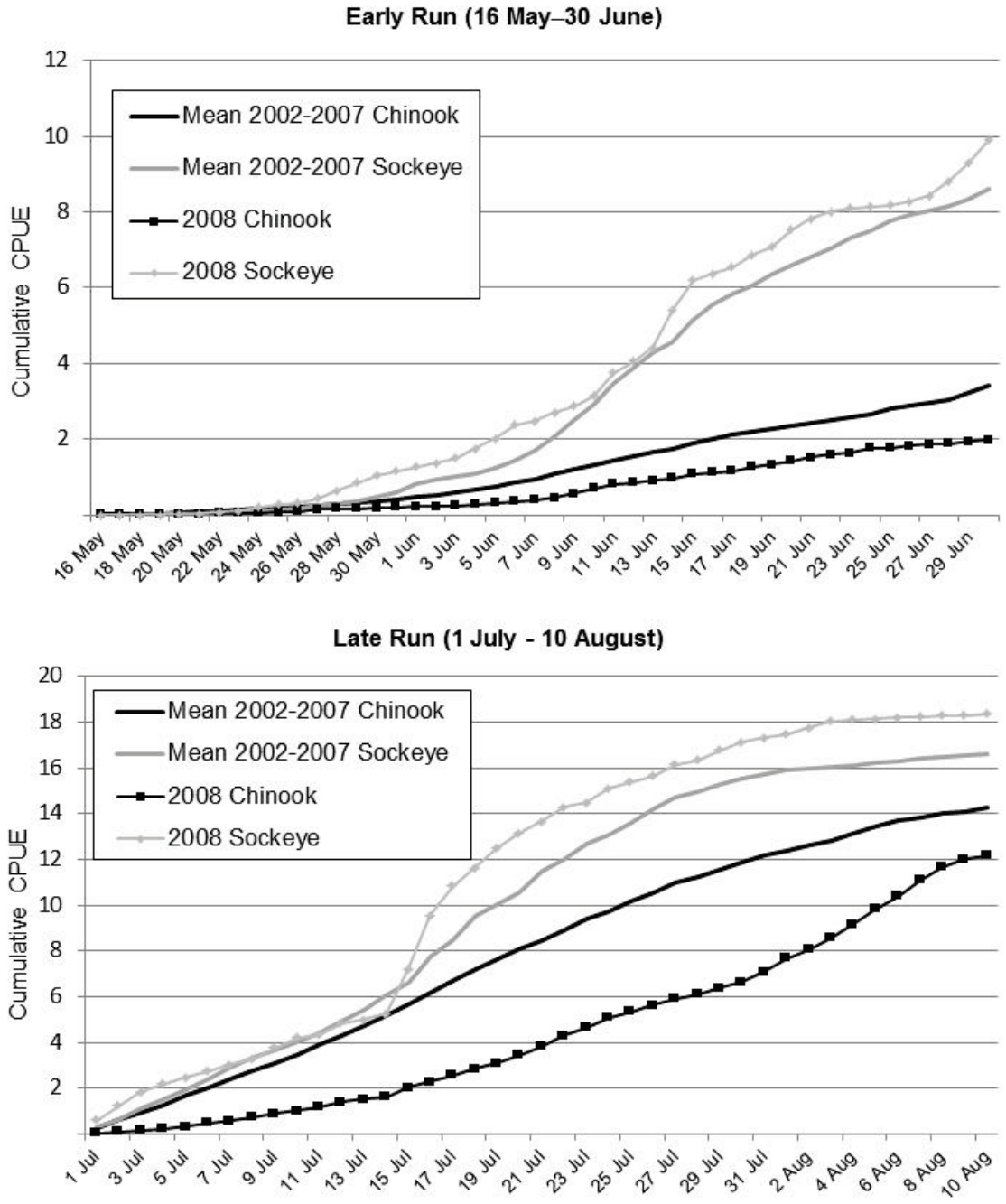

Figure 13.–Cumulative CPUE for early-run (top) and late-run (bottom) Kenai River Chinook and sockeye salmon inriver gillnetting catch, 2002–2008.

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APPENDIX A: BOAT AND ANGLER COUNTS DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2008.

Appendix A1.–Guided and unguided boat angler counts, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2008.

		Downstream[a]								Upstream[a]								Combined strata							
	Day	Unguided anglers[b]				Guided anglers[b]				Unguided anglers[b]				Guided anglers[b]				Unguided anglers[b]				Guided anglers[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	wd	0	0	0	0	0	0			2	1	0	0	2	6			2	1	0	0	2	6		
17 May	we/h	0	0	0	0		0	0		2	13	9	4		7	4		2	13	9	4		7	4	
18 May	we/h	0	0	0	0					0	5	27	0					0	5	27	0				
20 May	wd	0	0	0	0	0	0	0		2	6	3	2	5	14	12		2	6	3	2	5	14	12	
21 May	wd	0	0	0	0	0	0	0		6	2	2	0	7	6	5		6	2	2	0	7	6	5	
24 May	we/h	0	0	0	0	0	0	0		8	15	7	15	32	30	26		8	15	7	15	32	30	26	
26 May	we/h	0	0	0	0	0	0			28	24	23	7	41	27			28	24	23	7	41	27		
28 May	wd	0	0	0	0	0	0			9	8	14	6	73	31			9	8	14	6	73	31		
29 May	wd	0	0	0	0	0	0	0		8	21	4	5	41	37	9		8	21	4	5	41	37	9	
31 May	we/h	0	0	0	0		0	0		0	32	32	16		33	52		0	32	32	16		33	52	
1 Jun	we/h	0	4	0	0		0	0		0	51	55	13		84	0		0	55	55	13		84	0	
3 Jun	wd	0	3	0	0	0	0			34	12	48	9	160	74			34	15	48	9	160	74		
6 Jun	wd	0	4	0	0	0	0			26	28	43	28	137	82			26	32	43	28	137	82		
7 Jun	we/h	0	0	0	0	0	0			53	62	95	18	130	102			53	62	95	18	130	102		
8 Jun	we/h	0	0	0	0					2	149	74	80					2	149	74	80				
11 Jun	wd	0	0	0	0	0	0	0		38	31	23	52	188	142	46		38	31	23	52	188	142	46	
13 Jun	wd	0	0	0	0	0	0			55	67	68	40	289	205			55	67	68	40	289	205		
14 Jun	we/h	2	4	0	0	0	26	0		83	69	95	69	256	120	60		85	73	95	69	256	146	60	
15 Jun	we/h	8	5	0	0					147	198	148	39					155	203	148	39				
17 Jun	wd	0	0	0	0		7	0		126	52	59	85		243	142		126	52	59	85		250	142	
19 Jun	wd	0	0	0	0	0	12			30	42	54	12	234	136			30	42	54	12	234	148		
21 Jun	we/h	3	0	0	0	0	0			74	84	86	26	181	146			77	84	86	26	181	146		
22 Jun	we/h	0	2	6	0					34	86	75	45					34	88	81	45				
24 Jun	wd	0	8	0	0	0	0	0		66	26	23	15	361	152	63		66	34	23	15	361	152	63	
27 Jun	wd	0	8	0	9		40	0		4	44	50	11		196	111		4	52	50	20		236	111	
28 Jun	we/h	4	2	0	0	4	0			28	71	30	26	185	124			32	73	30	26	189	124		
29 Jun	we/h	0	2	3	2					53	125	104	37					53	127	107	39				
Min (A–D)		0				0				0				0				0				0			
Mean (A–D)		1				2				38				95				39				97			
Max (A–D)		9				40				198				361				203				361			

Note: blank space 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] 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 2008.

		Downstream[a]								Upstream[a]								Combined strata							
	Day	Unguided anglers[b]				Guided anglers[b]				Unguided anglers[b]				Guided anglers[b]				Unguided anglers[b]				Guided anglers[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	2	0	8	0	2	35			42	35	77	11	332	128			44	35	85	11	334	163		
3 Jul	wd	0	2	0	0	0	1	9		72	60	74	78	348	271	97		72	62	74	78	348	272	106	
5 Jul	we/h	2	7	24	0	0	4	36		120	102	128	102	343	225	78		122	109	152	102	343	229	114	
6 Jul	we/h	7	4	0	0					183	184	84	15					190	188	84	15				
8 Jul	wd	0	0	6	0	0	5	7		111	52	20	21	349	225	76		111	52	26	21	349	230	83	
11 Jul	wd	0	18	23	17		39	16		61	119	124	146		407	124		61	137	147	163		446	140	
12 Jul	we/h	30	22	12	2	23	84	3		233	187	145	88	435	213	103		263	209	157	90	458	297	106	
13 Jul	we/h	18	57	11	6					302	325	221	76					320	382	232	82				
16 Jul	wd	9	18	3	0	47	164			150	59	117	13	539	242			159	77	120	13	586	406		
17 Jul	wd	1	6	7	4		25	0		116	96	115	211		518	253		117	102	122	215		543	253	
19 Jul	we/h	25	11	0	32	3	17			219	212	239	96	496	389			244	223	239	128	499	406		
20 Jul	we/h	1	31	61	2					207	562	328	276					208	593	389	278				
24 Jul	wd	16	0	15	0	60	10	11		235	138	131	161	517	334	201		251	138	146	161	577	344	212	
25 Jul	wd	47	31	42	3	102	42			387	279	219	143	520	382			434	310	261	146	622	424		
26 Jul	we/h	61	21	19	0	182	19	6		255	293	150	259	455	289	162		316	314	169	259	637	308	168	
27 Jul	we/h	21	68	12	4					340	504	317	258					361	572	329	262				
29 Jul	wd	12	65	28	43		149	12		645	253	331	293		355	428		657	318	359	336		504	440	
31 Jul	wd	0	48	20	43		105	16		105	244	215	520		365	289		105	292	235	563		470	305	
Min (A–D)		0				0				11				76				11				83			
Mean (A–D)		15				36				185				308				200				345			
Max (A–D)		68				182				645				539				657				637			

Note: blank space 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] Angler count times: A = 0400–0859 hours; B = 0900–1359 hours; C = 1400–1959 hours; D = 2000–2359 hours.

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

APPENDIX B: EFFORT, CATCH, AND HARVEST ESTIMATES BY GEOGRAPHIC STRATA DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2008.

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 2008.

		Angler interview data[a]					Downstream[b]								Upstream[b]							
	Day		Catch		Harvest		Counts		Effort[e]		Catch		Harvest		Counts		Effort[e]		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	wd	3	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	4	1	15	6	0	0	0	0
17 May	we/h	23	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	4	7	140	52	0	0	0	0
18 May	we/h	32	0.007	0.007	0.000	0.000	4	0	0	0	0	0	0	0	4	8	160	144	1	2	0	0
20 May	wd	16	0.038	0.027	0.038	0.027	4	0	0	0	0	0	0	0	4	3	65	21	3	2	3	2
21 May	wd	5	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	4	3	50	18	0	0	0	0
24 May	we/h	27	0.021	0.016	0.011	0.011	4	0	0	0	0	0	0	0	4	11	225	54	5	4	2	3
26 May	we/h	41	0.012	0.009	0.006	0.006	4	0	0	0	0	0	0	0	4	21	410	67	5	4	2	3
28 May	wd	33	0.060	0.022	0.043	0.019	4	0	0	0	0	0	0	0	4	9	185	41	11	5	8	4
29 May	wd	28	0.022	0.015	0.011	0.011	4	0	0	0	0	0	0	0	4	10	190	87	4	3	2	2
31 May	we/h	34	0.007	0.007	0.000	0.000	4	0	0	0	0	0	0	0	4	20	400	146	3	3	0	0
1 Jun[f]	we/h	84	0.020	0.008	0.010	0.006	3	1	27	23	1	1	0	0	3	40	793	244	16	8	8	5
3 Jun	wd	31	0.052	0.020	0.044	0.019	4	1	15	17	1	1	1	1	4	26	515	235	27	16	22	14
6 Jun	wd	47	0.088	0.025	0.073	0.024	4	1	20	23	2	2	1	2	4	31	625	87	55	17	46	16
7 Jun	we/h	58	0.084	0.018	0.053	0.014	4	0	0	0	0	0	0	0	4	57	1,140	344	96	36	61	24
8 Jun	we/h	93	0.121	0.019	0.070	0.015	4	0	0	0	0	0	0	0	4	76	1,525	674	185	87	107	52
11 Jun	wd	16	0.109	0.039	0.074	0.032	4	0	0	0	0	0	0	0	4	36	720	126	78	31	53	25
13 Jun	wd	34	0.020	0.011	0.013	0.009	4	0	0	0	0	0	0	0	4	58	1,150	124	23	13	15	11
14 Jun	we/h	35	0.047	0.020	0.039	0.018	4	2	30	18	1	1	1	1	4	79	1,580	161	74	32	62	29
15 Jun	we/h	73	0.077	0.017	0.036	0.012	4	3	65	24	5	2	2	1	4	133	2,660	532	204	60	96	38
17 Jun	wd	11	0.057	0.031	0.019	0.020	4	0	0	0	0	0	0	0	4	81	1,610	321	92	54	30	32
19 Jun	wd	8	0.000	0.000	0.000	0.000	4	0	0	0	0	0	0	0	4	35	690	185	0	0	0	0
21 Jun	we/h	31	0.039	0.016	0.039	0.016	4	1	15	12	1	1	1	1	4	68	1,350	248	53	24	53	24
22 Jun	we/h	47	0.016	0.009	0.016	0.009	4	2	40	31	1	1	1	1	4	60	1,200	249	19	11	19	11
24 Jun	wd	26	0.012	0.012	0.012	0.012	4	2	40	46	0	1	0	1	4	33	650	167	8	8	8	8
27 Jun	wd	28	0.016	0.012	0.016	0.012	4	4	85	59	1	1	1	1	4	27	545	229	9	7	9	7
28 Jun	we/h	17	0.017	0.018	0.017	0.018	4	2	30	12	1	1	1	1	4	39	775	243	13	14	13	14
29 Jun	we/h	37	0.057	0.020	0.043	0.018	4	2	35	10	2	1	1	1	4	80	1,595	411	91	40	68	33

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Appendix B1.–Part 2 of 2.

	Angler interview data[a]					Downstream[b]							Upstream[b]							
		Catch		Harvest		Counts		Effort[e]		Catch		Harvest		Counts		Effort[e]		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	3	0.000		0.000		3	0	0		0		0		3	1	15		0		0	
Mean	34	0.037		0.025		4	1	15		1		0		4	39	776		40		25	
Max	93	0.121		0.074		4	4	85		5		2		4	133	2,660		204		107	

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

[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.

[e] "Effort" = angler hours fished.

[f] Fishery was liberalized to allow the use of bait, slot limit (44–55 inches TL) still in effect.

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, 19 May–30 June 2008.

		Angler interview data[a]					Downstream[b]								Upstream[b]							
	Day		Catch		Harvest		Counts		Effort[e]		Catch		Harvest		Counts		Effort[e]		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	wd	0	0.028	0.030	0.028	0.030	2	0	0	0	0	0	0	0	2	4	48	24	1	2	1	2
17 May	we/h	6	0.025	0.028	0.025	0.028	3	0	0	0	0	0	0	0	3	6	66	18	2	2	2	2
20 May	wd	11	0.014	0.016	0.000	0.000	3	0	0	0	0	0	0	0	3	10	124	32	2	2	0	0
21 May	wd	2	0.008	0.012	0.004	0.005	3	0	0	0	0	0	0	0	3	6	72	5	1	1	0	0
24 May	we/h	11	0.000	0.000	0.000	0.000	3	0	0	0	0	0	0	0	3	29	352	15	0	0	0	0
26 May	we/h	19	0.008	0.008	0.008	0.008	2	0	0	0	0	0	0	0	2	34	408	84	3	4	3	4
28 May	wd	27	0.031	0.013	0.031	0.013	2	0	0	0	0	0	0	0	2	52	624	252	19	11	19	11
29 May	wd	27	0.030	0.015	0.030	0.015	3	0	0	0	0	0	0	0	3	29	348	98	11	6	11	6
31 May	we/h	10	0.033	0.028	0.033	0.028	3	0	0	0	0	0	0	0	3	43	510	114	17	15	17	15
1 Jun[f]	we/h	15	0.068	0.029	0.040	0.025	2	0	0	0	0	0	0	0	2	42	504	504	34	37	20	24
3 Jun	wd	27	0.045	0.015	0.034	0.013	2	0	0	0	0	0	0	0	2	117	1,404	516	63	31	47	26
6 Jun	wd	55	0.052	0.013	0.049	0.012	2	0	0	0	0	0	0	0	2	110	1,314	330	69	24	65	23
7 Jun	we/h	29	0.058	0.017	0.047	0.016	2	0	0	0	0	0	0	0	2	116	1,392	168	81	25	66	23
11 Jun	wd	49	0.131	0.024	0.091	0.018	3	0	0	0	0	0	0	0	3	125	1,504	369	197	60	137	43
13 Jun	wd	44	0.081	0.019	0.053	0.016	2	0	0	0	0	0	0	0	2	247	2,964	504	241	70	156	54
14 Jun	we/h	40	0.047	0.012	0.032	0.011	3	9	104	127	5	6	3	4	3	145	1,744	515	81	32	56	25
17 Jun	wd	72	0.034	0.009	0.029	0.008	3	4	42	42	1	1	1	1	3	193	2,310	606	78	29	68	26
19 Jun	wd	52	0.034	0.010	0.031	0.009	2	6	72	72	2	3	2	2	2	185	2,220	588	75	29	68	27
21 Jun	we/h	35	0.047	0.015	0.043	0.015	2	0	0	0	0	0	0	0	2	164	1,962	210	93	32	84	30
24 Jun	wd	43	0.034	0.011	0.034	0.011	3	0	0	0	0	0	0	0	3	192	2,304	787	79	37	79	37
27 Jun	wd	38	0.015	0.009	0.015	0.009	3	20	240	240	4	4	4	4	3	154	1,842	510	28	18	28	18
28 Jun	we/h	37	0.047	0.015	0.042	0.015	2	2	24	24	1	1	1	1	2	155	1,854	366	87	33	78	31
	Min	0	0.000		0.000		2	0	0		0		0		2	4	48		0		0	
	Mean	30	0.040		0.032		3	2	22		1		1		3	98	1,176		57		46	
	Max	72	0.131		0.091		3	20	240		5		4		3	247	2,964		241		156	

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

[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.

[e] "Effort" = angler hours fished.

[f] Fishery was liberalized to allow the use of bait, slot limit (44–55 inches TL) still in effect.

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 2008.

		Angler interview data[a]					Downstream[b]								Upstream[b]							
	Day		Catch		Harvest		Counts		Effort[d]		Catch		Harvest		Counts		Effort[d]		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	16	0.030	0.022	0.030	0.022	4	2.5	50	47	2	2	2	2	4	41.3	825	321	25	21	25	21
3 Jul	wd	43	0.015	0.009	0.015	0.009	4	0.5	10	12	0	0	0	0	4	71.0	1,420	77	22	13	22	13
5 Jul	we/h	41	0.020	0.010	0.015	0.009	4	8.3	165	122	3	3	2	2	4	113.0	2,260	167	46	24	34	21
6 Jul	we/h	87	0.017	0.006	0.012	0.006	4	2.8	55	20	1	1	1	0	4	116.5	2,330	496	40	17	29	14
8 Jul	wd	16	0.000	0.000	0.000	0.000	4	1.5	30	35	0	0	0	0	4	51.0	1,020	274	0	0	0	0
11 Jul	wd	39	0.026	0.011	0.021	0.010	4	14.5	290	80	8	4	6	3	4	112.5	2,250	254	58	27	47	24
12 Jul	we/h	28	0.027	0.015	0.018	0.013	4	16.5	330	66	9	5	6	4	4	163.3	3,265	345	89	51	59	42
13 Jul	we/h	84	0.058	0.013	0.049	0.012	4	23.0	460	247	27	16	23	13	4	231.0	4,620	735	269	74	229	68
16 Jul	wd	18	0.059	0.029	0.029	0.021	4	7.5	150	72	9	6	4	4	4	84.8	1,695	612	99	60	49	40
17 Jul	wd	47	0.000	0.000	0.000	0.000	4	4.5	90	24	0	0	0	0	4	134.5	2,690	408	0	0	0	0
19 Jul	we/h	30	0.033	0.019	0.022	0.016	4	17.0	340	149	11	8	7	6	4	191.5	3,830	595	126	75	83	62
20 Jul	we/h	118	0.058	0.012	0.053	0.011	4	23.8	475	297	27	18	25	17	4	343.3	6,865	1,749	395	129	362	121
24 Jul	wd	60	0.050	0.015	0.046	0.014	4	7.8	155	108	8	6	7	5	4	166.3	3,325	415	166	53	152	51
25 Jul	wd	46	0.050	0.017	0.044	0.016	4	30.8	615	178	31	14	27	12	4	257.0	5,140	592	257	90	225	85
26 Jul	we/h	67	0.070	0.018	0.051	0.014	4	25.3	505	181	35	16	26	12	4	239.3	4,785	750	335	102	246	77
27 Jul	we/h	72	0.065	0.015	0.059	0.014	4	26.3	525	300	34	21	31	19	4	354.8	7,095	1,044	460	127	416	116
29 Jul	wd	74	0.052	0.014	0.037	0.013	4	37.0	740	271	38	18	27	14	4	380.5	7,610	1,639	394	139	280	113
31 Jul	wd	84	0.057	0.013	0.039	0.010	4	27.8	555	246	32	16	22	11	4	271.0	5,420	1,373	310	105	214	75
	Min	16	0.000		0.000		4	0.5			0		0		4	41.3	825		0		0	
	Mean	54	0.038		0.030		4	15.4			15		12		4	184.6	3,691		172		137	
	Max	118	0.070		0.059		4	37.0			38		31		4	380.5	7,610		460		416	

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

[a] Angler couts 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] "Effort" = angler hours fished.

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, 3 July–31 July 2008.

		Angler interview data[a]					Downstream[b]								Upstream[b]							
	Day		Catch		Harvest		Counts		Effort[d]		Catch		Harvest		Counts		Effort[d]		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	35	0.035	0.012	0.025	0.011	2	18.5	222	198	8	7	6	5	2	230.0	2,760	1,224	96	55	69	42
3 Jul	wd	41	0.029	0.010	0.025	0.009	3	3.3	40	28	1	1	1	1	3	238.7	2,864	659	83	34	73	32
5 Jul	we/h	45	0.026	0.010	0.026	0.010	3	13.3	160	112	4	3	4	3	3	215.3	2,584	653	67	30	67	30
8 Jul	wd	46	0.017	0.007	0.017	0.007	3	4.0	48	19	1	0	1	0	3	216.7	2,600	672	43	21	43	21
11 Jul	wd	25	0.065	0.023	0.057	0.020	3	27.5	330	138	21	12	19	10	3	265.5	3,186	1,698	207	132	183	116
12 Jul	we/h	53	0.074	0.015	0.062	0.014	3	36.7	440	351	33	27	27	23	2	324.0	3,888	1,332	290	116	241	99
16 Jul	wd	56	0.106	0.020	0.095	0.018	2	105.5	1,266	702	134	79	121	71	2	390.5	4,686	1,782	497	210	446	189
17 Jul	wd	30	0.063	0.021	0.063	0.021	3	12.5	150	150	9	10	9	10	3	385.5	4,626	1,590	291	140	291	140
19 Jul	we/h	37	0.088	0.017	0.052	0.017	2	10.0	120	84	11	8	6	5	2	442.5	5,310	642	470	107	277	94
24 Jul	wd	69	0.056	0.011	0.049	0.010	3	27.0	324	173	18	10	16	9	3	350.7	4,208	784	236	63	205	58
25 Jul	wd	55	0.066	0.014	0.063	0.014	2	72.0	864	360	57	27	54	26	2	451.0	5,412	828	359	95	341	93
26 Jul	we/h	56	0.094	0.017	0.079	0.016	3	69.0	828	566	78	55	65	47	3	302.0	3,624	724	342	91	286	83
29 Jul	wd	24	0.070	0.024	0.070	0.024	3	80.5	966	822	67	62	67	62	3	391.5	4,698	438	328	119	328	119
31 Jul	wd	46	0.069	0.014	0.062	0.015	3	60.5	726	534	50	38	45	35	3	327.0	3,924	456	271	65	241	64
	Min	24	0.017		0.017		2	3.3	40		1		1		2	215.3	2,584		43		43	
	Mean	44	0.061		0.053		3	38.6	463		35		32		3	323.6	3,884		256		221	
	Max	69	0.106		0.095		3	105.5	1,266		134		121		3	451.0	5,412		497		446	

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

[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] "Effort" = angler hours fished.

APPENDIX C: EFFORT, CATCH, AND HARVEST ESTIMATES BY TEMPORAL AND GEOGRAPHIC STRATA DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2008.

Appendix C1.–Estimated effort, catch, and harvest estimates, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2008.

	Downstream[a] creek estimates						Upstream[a] creek estimates								
			Chinook salmon						Chinook salmon						
	Effort		Catch		Harvest		Effort		Catch		Harvest		Downstream %		
Fishing periods	Days fished	SE	No. fish	SE	No. fish	SE	Days fished	SE	No. fish	SE	No. fish	SE	Effort	Catch	Harvest
16–18 May															
Guided weekdays	0	0	0	0	0	0	48	24	1	2	1	2	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	66	18	2	2	2	2	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	15	6	0	0	0	0	0.0%	N/A	N/A
Unguided weekends	0	0	0	0	0	0	300	153	1	2	0	0	0.0%	0.0%	N/A
20–26 May															
Guided weekdays	0	0	0	0	0	0	392	87	5	3	1	1	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	760	85	3	4	3	4	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	230	45	5	4	5	4	0.0%	0.0%	0.0%
Unguided weekends	0	0	0	0	0	0	953	192	15	6	7	4	0.0%	0.0%	0.0%
27 May–1 June															
Guided weekdays	0	0	0	0	0	0	1,944	546	60	22	60	22	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	1,014	517	51	40	37	28	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	750	137	30	13	20	11	0.0%	0.0%	0.0%
Unguided weekends	27	23	1	1	0	0	1,193	284	19	9	8	5	2.2%	2.8%	3.3%
3–8 June															
Guided weekdays	0	0	0	0	0	0	5,436	876	263	56	224	55	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	1,392	168	81	25	66	23	0.0%	0.0%	0.0%
Unguided weekdays	70	41	5	4	4	3	2,280	386	164	52	136	45	3.0%	3.0%	3.0%
Unguided weekends	0	0	0	0	0	0	2,665	757	281	94	168	58	0.0%	0.0%	0.0%
10–15 June															
Guided weekdays	0	0	0	0	0	0	8,936	2,246	877	145	586	101	0.0%	0.0%	0.0%
Guided weekends	104	127	5	6	3	4	1,744	515	81	32	56	25	5.6%	5.6%	5.6%
Unguided weekdays	0	0	0	0	0	0	3,740	658	203	92	137	66	0.0%	0.0%	0.0%
Unguided weekends	95	30	6	2	4	1	4,240	556	277	69	157	48	2.2%	2.2%	2.2%

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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
17–22 June															
Guided weekdays	228	125	8	4	7	4	9,060	1,201	305	58	272	53	2.5%	2.5%	2.5%
Guided weekends	0	0	0	0	0	0	1,962	210	93	32	84	30	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	4,600	1,403	184	151	61	62	0.0%	0.0%	0.0%
Unguided weekends	55	33	1	1	1	1	2,550	352	72	27	72	27	2.1%	1.7%	1.7%
24–29 June															
Guided weekdays	480	480	7	8	7	8	8,292	1,478	215	93	215	93	5.5%	3.3%	3.3%
Guided weekends	24	24	1	1	1	1	1,854	366	87	33	78	31	1.3%	1.3%	1.3%
Unguided weekdays	250	124	4	3	4	3	2,390	428	33	16	33	16	9.5%	10.1%	10.1%
Unguided weekends	65	15	2	1	2	1	2,370	477	104	42	81	36	2.7%	2.3%	2.4%
Day type subtotals															
Guided weekdays	708	496	15	9	14	9	34,108	3,122	1,726	191	1,358	158	2.0%	0.9%	1.0%
Guided wkends/hol	128	130	6	6	4	4	8,792	864	398	73	325	62	1.4%	1.5%	1.3%
Unguided weekdays	320	130	9	4	8	4	14,005	1,659	620	185	391	103	2.2%	1.4%	2.0%
Unguided wkends/hol	242	52	11	3	7	2	14,271	1,172	769	127	493	88	1.7%	1.4%	1.4%
Angler type subtotals															
Guided	836	513	21	11	19	10	42,900	3,239	2,124	205	1,684	170	1.9%	1.0%	1.1%
% Guided	59.8%		52.0%		55.5%		60.3%		60.5%		65.6%				
Unguided	562	141	19	5	15	4	28,276	2,032	1,388	225	885	135	1.9%	1.4%	1.7%
% Unguided	40.2%		48.0%		44.5%		39.7%		39.5%		34.4%				
Early-run total	1,398	532	40	12	34	11	71,176	3,823	3,512	304	2,568	217	1.9%	1.1%	1.3%

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.

Appendix C2.–Estimated effort, catch, and harvest estimates, by geographic strata, during the late-run Kenai River Chinook salmon fishery, 1 July–31 July 2008.

	Downstream[a] creek estimates						Upstream[a] creek 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
1-6 July															
Guided weekdays	524	382	18	14	13	10	11,248	1,972	359	93	283	75	4.5%	4.7%	4.4%
Guided weekends	160	112	4	3	4	3	2,584	653	67	30	67	30	5.8%	5.8%	5.8%
Unguided weekdays	120	89	3	3	3	3	4,490	962	94	35	94	35	2.6%	3.4%	3.4%
Unguided weekends	220	123	4	3	3	2	4,590	523	86	30	63	25	4.6%	4.7%	4.8%
8-13 July															
Guided weekdays	756	445	44	34	40	30	11,572	2,712	499	299	452	259	6.1%	8.2%	8.0%
Guided weekends	440	351	33	27	27	23	3,888	1,332	290	116	241	99	10.2%	10.2%	10.2%
Unguided weekdays	640	388	15	12	12	10	6,540	1,818	117	91	93	74	8.9%	11.4%	11.4%
Unguided weekends	790	256	36	17	29	14	7,885	811	358	90	288	80	9.1%	9.1%	9.1%
15-20 July															
Guided weekdays	2,832	1,877	288	209	260	187	18,624	3,379	1,577	462	1,474	399	13.2%	15.4%	15.0%
Guided weekends	120	84	11	8	6	5	5,310	642	470	107	277	94	2.2%	2.2%	2.2%
Unguided weekdays	480	137	18	15	9	8	8,770	1,750	199	164	97	89	5.2%	8.1%	8.1%
Unguided weekends	815	332	39	20	32	18	10,695	1,847	521	149	445	136	7.1%	6.9%	6.8%
22-27 July															
Guided weekdays	2,376	950	151	69	140	67	19,240	2,345	1,189	237	1,091	247	11.0%	11.3%	11.4%
Guided weekends	828	566	78	55	65	47	3,624	724	342	91	286	83	18.6%	18.6%	18.6%
Unguided weekdays	1,540	714	77	39	68	34	16,930	2,763	846	196	754	173	8.3%	8.3%	8.3%
Unguided weekends	1,030	351	69	26	57	22	11,880	1,285	795	163	663	139	8.0%	8.0%	7.9%

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Appendix C2.–Part 2 of 2.

	Downstream[a] creek estimates						Upstream[a] creek 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
29-31 July															
Guided weekdays	2,538	1,218	176	91	168	89	12,933	1,024	897	173	854	181	16.4%	16.4%	16.4%
Unguided weekdays	1,943	476	105	30	74	22	19,545	3,234	1,055	225	741	176	9.0%	9.1%	9.0%
Day type subtotals															
Guided weekdays	9,026	2,500	677	241	621	220	73,617	5,404	4,521	631	4,153	571	10.9%	13.0%	13.0%
Guided weekends	1,548	681	126	62	103	52	15,406	1,771	1,168	185	871	163	9.1%	9.7%	10.6%
Unguided weekdays	4,723	956	218	52	166	43	56,275	5,038	2,311	355	1,779	275	7.7%	8.6%	8.5%
Unguided weekends	2,855	560	148	37	121	32	35,050	2,449	1,760	241	1,458	212	7.5%	7.8%	7.7%
Angler type subtotals															
Guided	10,574	2,592	802	249	724	226	89,023	5,687	5,689	657	5,024	594	10.6%	12.4%	12.6%
% Guided	58.3%		68.7%		71.6%		49.4%		58.3%		60.8%				
Unguided	7,578	1,108	366	64	287	53	91,325	5,602	4,071	429	3,238	347	7.7%	8.2%	8.1%
% Unguided	41.7%		31.3%		28.4%		50.6%		41.7%		39.2%				
Late-run total	18,152	2,818	1,168	257	1,011	232	180,348	7,983	9,760	784	8,262	688	9.1%	10.7%	10.9%

[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 PROPORTIONS DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2008

Appendix D1.–Catch and CPUE of Chinook salmon, sockeye salmon, and Dolly Varden, and proportion of Chinook salmon caught inriver in 5.0-inch mesh gillnets during the early-run Kenai River Chinook salmon sport fishery, 16 May–30 June 2008.

	Inriver drift gillnetting														
			Catch												
			Chinook salmon			Sockeye salmon			Dolly Varden			Combined total		Chinook salmon	
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Proportion[a]	SE
16 May	8	76	1	0.013	0.014	0	0.000	0.000	0	0.000	0.000	1	0.013	1.00	0.00
17 May	8	84	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0	0.00	0.00
18 May	10	79	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0	0.00	0.00
19 May	8	92	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0	0.00	0.00
20 May	8	79	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0	0.00	0.00
21 May	9	94	2	0.021	0.014	1	0.011	0.010	0	0.000	0.000	3	0.032	0.67	0.29
22 May	10	99	2	0.020	0.013	8	0.080	0.036	0	0.000	0.000	10	0.101	0.20	0.12
23 May	8	86	0	0.000	0.000	8	0.093	0.037	0	0.000	0.000	8	0.093	0.00	0.00
24 May	8	84	0	0.000	0.000	13	0.154	0.053	0	0.000	0.000	13	0.154	0.00	0.00
25 May	8	83	0	0.000	0.000	8	0.097	0.031	0	0.000	0.000	8	0.097	0.00	0.00
26 May	8	97	1	0.010	0.010	6	0.062	0.022	0	0.000	0.000	7	0.073	0.14	0.14
27 May	6	60	1	0.017	0.016	10	0.167	0.058	0	0.000	0.000	11	0.183	0.09	0.07
28 May	8	74	1	0.014	0.014	22	0.297	0.099	0	0.000	0.000	23	0.311	0.04	0.05
29 May	8	76	2	0.026	0.017	23	0.302	0.091	0	0.000	0.000	25	0.328	0.08	0.06
30 May	8	72	2	0.028	0.019	19	0.264	0.077	0	0.000	0.000	21	0.292	0.10	0.04
31 May	7	68	1	0.015	0.013	15	0.222	0.061	0	0.000	0.000	16	0.237	0.06	0.05
1 Jun	6	54	0	0.000	0.000	11	0.204	0.076	0	0.000	0.000	11	0.204	0.00	0.00
2 Jun	7	67	0	0.000	0.000	12	0.179	0.051	0	0.000	0.000	12	0.179	0.00	0.00
3 Jun	8	67	1	0.015	0.015	14	0.208	0.070	0	0.000	0.000	15	0.222	0.07	0.07
4 Jun	7	58	2	0.035	0.023	25	0.433	0.062	0	0.000	0.000	27	0.468	0.07	0.04
5 Jun	8	57	0	0.000	0.000	30	0.525	0.087	0	0.000	0.000	30	0.525	0.00	0.00
6 Jun	8	61	2	0.033	0.021	32	0.523	0.092	0	0.000	0.000	34	0.556	0.06	0.04
7 Jun	6	56	1	0.018	0.018	8	0.144	0.046	0	0.000	0.000	9	0.162	0.11	0.10
8 Jun	6	44	3	0.069	0.049	15	0.343	0.125	0	0.000	0.000	18	0.411	0.17	0.07
9 Jun	6	49	3	0.061	0.028	15	0.306	0.128	0	0.000	0.000	18	0.367	0.17	0.06

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Appendix D1.–Part 2 of 2.

			Inriver drift gillnetting												
			Catch												
			Chinook salmon			Sockeye salmon			Dolly Varden			Combined total		Chinook salmon	
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Proportion[a]	SE
10 Jun	6	44	9	0.206	0.066	17	0.388	0.098	0	0.000	0.000	26	0.594	0.35	0.12
11 Jun	8	59	4	0.068	0.039	47	0.801	0.107	0	0.000	0.000	51	0.869	0.08	0.04
12 Jun	7	52	2	0.038	0.025	23	0.441	0.119	0	0.000	0.000	25	0.48	0.08	0.05
13 Jun	8	74	1	0.014	0.012	42	0.570	0.053	0	0.000	0.000	43	0.584	0.02	0.02
14 Jun	6	37	1	0.027	0.027	53	1.451	0.358	0	0.000	0.000	54	1.479	0.02	0.02
15 Jun	8	35	3	0.086	0.072	36	1.028	0.299	0	0.000	0.000	39	1.113	0.08	0.05
16 Jun	10	49	1	0.021	0.020	9	0.185	0.054	0	0.000	0.000	10	0.205	0.10	0.10
17 Jun	8	62	4	0.064	0.025	15	0.241	0.104	0	0.000	0.000	19	0.305	0.21	0.10
18 Jun	6	45	5	0.110	0.040	22	0.485	0.178	0	0.000	0.000	27	0.595	0.19	0.10
19 Jun	6	62	2	0.032	0.020	17	0.276	0.092	0	0.000	0.000	19	0.308	0.11	0.07
20 Jun	6	40	5	0.124	0.061	23	0.570	0.214	0	0.000	0.000	28	0.694	0.18	0.07
21 Jun	8	57	3	0.052	0.026	27	0.472	0.114	0	0.000	0.000	30	0.524	0.10	0.06
22 Jun	7	49	2	0.041	0.026	13	0.264	0.084	1	0.020	0.027	16	0.324	0.13	0.09
23 Jun	8	63	1	0.016	0.016	8	0.128	0.073	0	0.000	0.000	9	0.144	0.11	0.09
24 Jun	6	47	3	0.064	0.028	0	0.000	0.000	0	0.000	0.000	3	0.064	1.00	0.00
25 Jun	10	73	1	0.014	0.014	4	0.055	0.031	0	0.000	0.000	5	0.069	0.20	0.20
26 Jun	10	69	3	0.043	0.023	12	0.173	0.041	0	0.000	0.000	15	0.217	0.20	0.09
27 Jun	10	75	5	0.066	0.022	14	0.186	0.050	0	0.000	0.000	19	0.252	0.26	0.09
28 Jun	8	60	0	0.000	0.000	31	0.519	0.145	0	0.000	0.000	31	0.519	0.00	0.00
29 Jun	8	61	1	0.016	0.016	42	0.684	0.148	0	0.000	0.000	43	0.701	0.02	0.02
30 Jun	6	45	1	0.022	0.023	36	0.803	0.134	0	0.000	0.000	37	0.825	0.03	0.03
Total	352	2,973	82	1.519		786	14.330		1	0.020		869	0.292	NA	NA
Min	6	35	0	0.000		0	0.000		0	0.000		0	0.000	0.00	
Mean	8	65	2	0.033		17	0.312		0	0.000		19	0.292	0.14	
Max	10	99	9	0.206		53	1.451		1	0.020		54	0.543	1.00	

Note: NA = not applicable.

[a] Proportion of combined total catch = Chinook salmon CPUE / Combined total of all species CPUE.

Appendix D2.–Catch and CPUE of Chinook and sockeye salmon, and proportion of Chinook salmon caught in the 7.5-inch mesh gillnet during the early-run Kenai River Chinook salmon fishery, 16 May–30 June 2008.

	Inriver drift gillnetting										
			Catch								
			Chinook salmon			Sockeye salmon			Combined total	Chinook salmon	
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Proportion [a]	SE
16 May	7	64	0	0.000	0.000	0	0.000	0.000	0	0.000		
17 May	10	97	0	0.000	0.000	0	0.000	0.000	0	0.000		
18 May	9	82	0	0.000	0.000	0	0.000	0.000	0	0.000		
19 May	8	87	0	0.000	0.000	0	0.000	0.000	0	0.000		
20 May	8	74	2	0.027	0.018	1	0.014	0.013	3	0.041	0.67	0.29
21 May	10	98	0	0.000	0.000	3	0.031	0.022	3	0.031	0.00	0.00
22 May	8	83	1	0.012	0.012	1	0.012	0.012	2	0.024	0.50	0.38
23 May	8	76	2	0.026	0.018	0	0.000	0.000	2	0.026	1.00	0.00
24 May	8	85	1	0.012	0.012	3	0.035	0.035	4	0.047	0.25	0.28
25 May	8	83	1	0.012	0.012	4	0.048	0.019	5	0.060	0.20	0.19
26 May	7	66	1	0.015	0.016	2	0.030	0.018	3	0.045	0.33	0.29
27 May	8	74	5	0.067	0.029	4	0.054	0.029	9	0.121	0.56	0.20
28 May	6	60	1	0.017	0.017	6	0.101	0.055	7	0.118	0.14	0.14
29 May	8	82	0	0.000	0.000	7	0.086	0.024	7	0.086	0.00	0.00
30 May	6	56	1	0.018	0.018	5	0.090	0.032	6	0.108	0.17	0.17
31 May	8	72	2	0.028	0.018	1	0.014	0.014	3	0.042	0.67	0.29
1 Jun	6	55	1	0.018	0.019	3	0.055	0.040	4	0.073	0.25	0.26
2 Jun	8	71	1	0.014	0.014	1	0.014	0.014	2	0.028	0.50	0.38
3 Jun	8	69	1	0.014	0.015	5	0.072	0.057	6	0.087	0.17	0.19
4 Jun	8	60	3	0.050	0.025	3	0.050	0.024	6	0.100	0.50	0.22
5 Jun	6	49	4	0.082	0.052	5	0.103	0.067	9	0.185	0.44	0.18
6 Jun	8	66	2	0.030	0.020	12	0.182	0.047	14	0.212	0.14	0.07
7 Jun	6	56	4	0.071	0.054	3	0.053	0.036	7	0.124	0.57	0.16
8 Jun	6	55	3	0.055	0.036	6	0.110	0.074	9	0.165	0.33	0.19
9 Jun	6	47	7	0.149	0.031	1	0.021	0.023	8	0.170	0.88	0.09

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Appendix D2.–Part 2 of 2.

	Inriver drift gillnetting										
			Catch								
			Chinook salmon			Sockeye salmon			Combined total	Chinook salmon	
Date	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Proportion [a]	SE
10 Jun	7	50	3	0.060	0.026	8	0.161	0.096	11	0.221	0.27	0.12
11 Jun	8	53	7	0.132	0.034	19	0.358	0.083	26	0.490	0.27	0.07
12 Jun	8	62	3	0.049	0.036	12	0.194	0.062	15	0.243	0.20	0.13
13 Jun	6	50	4	0.081	0.040	7	0.141	0.073	11	0.222	0.36	0.16
14 Jun	6	45	5	0.110	0.061	23	0.508	0.109	28	0.618	0.18	0.06
15 Jun	8	45	4	0.088	0.072	12	0.264	0.120	16	0.352	0.25	0.10
16 Jun	12	60	2	0.033	0.022	7	0.116	0.051	9	0.149	0.22	0.14
17 Jun	8	62	2	0.032	0.021	6	0.097	0.039	8	0.129	0.25	0.07
18 Jun	8	65	4	0.062	0.034	10	0.154	0.036	14	0.216	0.29	0.14
19 Jun	6	50	5	0.099	0.048	6	0.119	0.049	11	0.219	0.45	0.17
20 Jun	8	55	3	0.054	0.027	15	0.271	0.081	18	0.326	0.17	0.03
21 Jun	8	53	7	0.132	0.036	5	0.094	0.029	12	0.227	0.58	0.08
22 Jun	8	60	7	0.117	0.046	7	0.117	0.082	14	0.235	0.50	0.20
23 Jun	8	61	2	0.033	0.022	4	0.066	0.044	6	0.098	0.33	0.00
24 Jun	8	64	11	0.173	0.045	2	0.031	0.032	13	0.205	0.85	0.13
25 Jun	8	56	0	0.000	0.000	2	0.035	0.023	2	0.035	0.00	0.00
26 Jun	10	68	3	0.044	0.023	1	0.015	0.015	4	0.059	0.75	0.23
27 Jun	8	66	3	0.045	0.022	8	0.121	0.044	11	0.166	0.27	0.11
28 Jun	10	70	4	0.057	0.022	15	0.214	0.062	19	0.272	0.21	0.09
29 Jun	7	47	3	0.064	0.032	18	0.387	0.118	21	0.451	0.14	0.08
30 Jun	8	57	3	0.052	0.035	24	0.419	0.062	27	0.472	0.11	0.06
Total	357	2,963	128	2.239		287	5.059		415	0.140	NA	NA
Min	6	45	0	0.000		0	0.000		0	0.000	0.00	
Mean	8	64	3	0.049		6	0.110		9	0.140	0.36	
Max	12	98	11	0.173		24	0.508		28	0.287	1.00	

Note: NA = not applicable.

[a] Proportion of combined total catch = Chinook salmon CPUE / Combined total of all species CPUE.

Appendix D3.–Catch and CPUE of Chinook salmon, sockeye salmon, and Dolly Varden, and proportion of Chinook salmon caught inriver in 5.0- and 7.5-inch mesh gillnets during the early-run Kenai River Chinook salmon sport fishery, 16 May–30 June 2008.

	Inriver drift gillnetting															
				Catch												
				Chinook salmon			Sockeye salmon			Dolly Varden			Combined total		Chinook salmon	
Date	Reps[a]	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Proportion [b]	SE
16 May	4	15	140	1	0.009	0.009	0	0.000	0.000	0	0.000	0.000	1	0.007	1.00	0.00
17 May	4	16	158	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.00	0.00
18 May	5	19	160	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.00	0.00
19 May	4	16	179	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.00	0.00
20 May	4	16	153	2	0.014	0.008	1	0.007	0.007	0	0.000	0.000	3	0.020	0.67	0.31
21 May	5	19	192	2	0.010	0.006	4	0.020	0.010	0	0.000	0.000	6	0.031	0.35	0.24
22 May	4	16	162	2	0.012	0.012	7	0.043	0.029	0	0.000	0.000	9	0.056	0.22	0.25
23 May	4	16	162	2	0.013	0.008	8	0.048	0.022	0	0.000	0.000	10	0.062	0.21	0.12
24 May	4	16	169	1	0.005	0.005	16	0.094	0.056	0	0.000	0.000	17	0.100	0.05	0.06
25 May	4	16	166	1	0.007	0.007	12	0.073	0.004	0	0.000	0.000	13	0.078	0.09	0.08
26 May	4	15	163	2	0.025	0.020	8	0.046	0.014	0	0.000	0.000	10	0.061	0.35	0.15
27 May	3	12	115	5	0.049	0.039	12	0.100	0.026	0	0.000	0.000	17	0.147	0.33	0.21
28 May	3	12	123	2	0.016	0.008	25	0.209	0.095	0	0.000	0.000	27	0.219	0.07	0.05
29 May	4	16	158	2	0.013	0.008	30	0.211	0.058	0	0.000	0.000	32	0.203	0.06	0.04
30 May	3	12	111	2	0.021	0.011	21	0.192	0.048	0	0.000	0.000	23	0.207	0.10	0.04
31 May	4	15	139	3	0.020	0.012	16	0.118	0.022	0	0.000	0.000	19	0.136	0.14	0.07
1 Jun	3	12	108	1	0.009	0.009	14	0.123	0.027	0	0.000	0.000	15	0.138	0.07	0.05
2 Jun	4	15	138	1	0.007	0.007	13	0.095	0.021	0	0.000	0.000	14	0.101	0.07	0.06
3 Jun	4	16	137	2	0.015	0.008	19	0.134	0.052	0	0.000	0.000	21	0.154	0.10	0.05
4 Jun	4	15	118	5	0.042	0.016	28	0.239	0.036	0	0.000	0.000	33	0.281	0.15	0.04
5 Jun	3	12	95	4	0.040	0.020	26	0.276	0.108	0	0.000	0.000	30	0.317	0.13	0.05
6 Jun	4	16	127	4	0.033	0.013	44	0.352	0.077	0	0.000	0.000	48	0.377	0.08	0.04
7 Jun	3	12	112	5	0.044	0.044	11	0.096	0.042	0	0.000	0.000	16	0.143	0.31	0.13
8 Jun	3	12	98	6	0.057	0.009	21	0.237	0.044	0	0.000	0.000	27	0.275	0.19	0.00
9 Jun	3	12	96	10	0.109	0.020	16	0.168	0.054	0	0.000	0.000	26	0.271	0.39	0.06

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Appendix D3.–Part 2 of 2.

				Inriver drift gillnetting											
				Catch											
				Chinook salmon			Sockeye salmon			Dolly Varden			Combined total		Chinook salmon	
Date	Reps[a]	No. drifts	Time fished (min)	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	SE	No. fish	CPUE	Proportion[b]	SE
10 Jun	3	12	87	12	0.142	0.045	25	0.274	0.102	0	0.000	0.000	37	0.424	0.34	0.11
11 Jun	4	16	112	11	0.104	0.033	66	0.592	0.099	0	0.000	0.000	77	0.689	0.15	0.05
12 Jun	4	15	114	5	0.043	0.032	35	0.324	0.088	0	0.000	0.000	40	0.351	0.12	0.07
13 Jun	3	12	109	5	0.047	0.025	42	0.359	0.059	0	0.000	0.000	47	0.431	0.12	0.05
14 Jun	3	12	82	6	0.071	0.038	76	0.986	0.265	0	0.000	0.000	82	1.002	0.07	0.02
15 Jun	4	16	81	7	0.111	0.066	48	0.787	0.307	0	0.000	0.000	55	0.683	0.12	0.03
16 Jun	5	20	99	3	0.030	0.012	16	0.162	0.037	0	0.000	0.000	19	0.192	0.16	0.08
17 Jun	4	16	124	6	0.050	0.010	21	0.171	0.077	0	0.000	0.000	27	0.217	0.22	0.06
18 Jun	3	12	94	9	0.100	0.050	30	0.327	0.113	0	0.000	0.000	39	0.416	0.23	0.13
19 Jun	3	12	112	7	0.067	0.009	23	0.219	0.086	0	0.000	0.000	30	0.268	0.23	0.08
20 Jun	3	12	82	8	0.102	0.056	36	0.461	0.219	0	0.000	0.000	44	0.538	0.18	0.02
21 Jun	4	16	110	10	0.094	0.024	32	0.282	0.049	0	0.000	0.000	42	0.381	0.25	0.08
22 Jun	4	15	109	9	0.075	0.008	20	0.193	0.040	1	0.008	0.008	30	0.275	0.27	0.03
23 Jun	4	16	124	3	0.024	0.015	12	0.097	0.068	0	0.000	0.000	15	0.121	0.20	0.02
24 Jun	3	12	98	14	0.136	0.036	2	0.024	0.024	0	0.000	0.000	16	0.163	0.85	0.16
25 Jun	4	16	115	1	0.008	0.008	5	0.044	0.017	0	0.000	0.000	6	0.052	0.16	0.15
26 Jun	5	20	137	6	0.046	0.014	13	0.093	0.021	0	0.000	0.000	19	0.138	0.33	0.10
27 Jun	4	16	131	6	0.042	0.021	21	0.163	0.021	0	0.000	0.000	27	0.205	0.21	0.07
28 Jun	4	16	119	4	0.032	0.011	44	0.377	0.092	0	0.000	0.000	48	0.403	0.08	0.04
29 Jun	4	15	108	4	0.050	0.017	60	0.496	0.122	0	0.000	0.000	64	0.593	0.09	0.04
30 Jun	3	12	90	4	0.042	0.026	54	0.594	0.064	0	0.000	0.000	58	0.641	0.07	0.03
Total	172	678	5,718	205	1.986		1,033	9.906		1	0.008		1,239	0.217	NA	NA
Min	3	12	81	0	0.000		0	0.000		0	0.000		0	0.000	0.00	
Mean	4	15	124	4	0.043		22	0.215		0	0.000		27	0.217	0.21	
Max	5	20	192	14	0.142		76	0.986		1	0.008		82	0.427	1.00	

Note: "NA" = not applicable.

[a] A complete 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 / Combined total of all species CPUE.

Appendix D4.–Catch (N) and CPUE of Chinook, sockeye, coho, and pink salmon, and Dolly Varden, 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 2008.

	Inriver drift gillnetting																				
			Catch																		
			Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Dolly Varden			Total		Chinook salmon	
Date	No. drifts	Time fished (min)	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	Prop.[a]	SE
1 Jul	9	60	0	0.000	0.000	44	0.728	0.129	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	44	0.728	0.00	0.00
2 Jul	8	49	3	0.061	0.028	42	0.860	0.190	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	45	0.922	0.07	0.03
3 Jul	8	59	2	0.034	0.020	41	0.696	0.139	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	43	0.730	0.05	0.03
4 Jul	8	52	3	0.057	0.028	27	0.517	0.089	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	30	0.575	0.10	0.04
5 Jul	9	59	9	0.153	0.044	19	0.322	0.039	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	28	0.475	0.32	0.06
6 Jul	6	39	3	0.077	0.035	19	0.490	0.238	0	0.000	0.000	0	0.000	0.000	1	0.026	0.035	23	0.594	0.13	0.08
7 Jul	7	48	5	0.105	0.026	22	0.462	0.099	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	27	0.567	0.19	0.04
8 Jul	7	46	6	0.129	0.070	13	0.280	0.070	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	19	0.409	0.32	0.10
9 Jul	8	54	9	0.167	0.044	32	0.593	0.181	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	41	0.760	0.22	0.08
10 Jul	8	53	8	0.152	0.041	34	0.645	0.081	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	42	0.797	0.19	0.02
11 Jul	8	60	12	0.199	0.065	11	0.182	0.084	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	23	0.381	0.52	0.10
12 Jul	6	43	6	0.139	0.043	22	0.509	0.108	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	28	0.648	0.21	0.04
13 Jul	6	47	7	0.151	0.043	7	0.151	0.070	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	14	0.301	0.50	0.17
14 Jul	8	54	6	0.111	0.039	18	0.333	0.077	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	24	0.444	0.25	0.08
15 Jul	7	35	12	0.344	0.045	67	1.923	0.298	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	79	2.267	0.15	0.04
16 Jul	7	27	7	0.255	0.182	70	2.555	0.729	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	77	2.810	0.09	0.07
17 Jul	8	37	9	0.245	0.065	54	1.470	0.283	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	63	1.715	0.14	0.04
18 Jul	8	41	8	0.197	0.077	37	0.911	0.269	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	45	1.107	0.18	0.06
19 Jul	8	43	8	0.187	0.066	25	0.586	0.140	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	33	0.773	0.24	0.07
20 Jul	8	44	12	0.275	0.085	18	0.412	0.063	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	30	0.686	0.40	0.09
21 Jul	8	37	15	0.406	0.122	23	0.623	0.119	0	0.000	0.000	2	0.054	0.062	0	0.000	0.000	40	1.083	0.38	0.04
22 Jul	8	39	14	0.357	0.216	31	0.791	0.183	0	0.000	0.000	1	0.026	0.034	0	0.000	0.000	46	1.174	0.30	0.11
23 Jul	6	26	8	0.311	0.151	7	0.272	0.133	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	15	0.584	0.53	0.11
24 Jul	8	36	18	0.496	0.102	29	0.799	0.120	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	47	1.295	0.38	0.06
25 Jul	10	52	12	0.231	0.071	17	0.328	0.071	0	0.000	0.000	3	0.058	0.063	0	0.000	0.000	32	0.617	0.38	0.09

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Appendix D4.–Part 2 of 2.

			Inriver drift gillnetting																		
			Catch																	Chinook salmon	
			Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Dolly Varden			Total			
Date	No. drifts	Time fished (min)	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	Prop.[a]	SE
26 Jul	8	43	14	0.326	0.112	15	0.350	0.099	0	0.000	0.000	2	0.047	0.052	0	0.000	0.000	31	0.723	0.45	0.10
27 Jul	8	40	14	0.346	0.108	28	0.692	0.127	0	0.000	0.000	4	0.099	0.095	0	0.000	0.000	46	1.138	0.30	0.06
28 Jul	9	54	12	0.223	0.047	19	0.354	0.087	0	0.000	0.000	10	0.186	0.174	0	0.000	0.000	41	0.764	0.29	0.04
29 Jul	10	41	13	0.321	0.112	27	0.666	0.149	0	0.000	0.000	8	0.197	0.198	0	0.000	0.000	48	1.184	0.27	0.07
30 Jul	9	41	8	0.195	0.090	17	0.415	0.131	3	0.073	0.084	11	0.268	0.263	0	0.000	0.000	39	0.952	0.21	0.09
31 Jul	7	36	15	0.417	0.109	9	0.250	0.119	2	0.056	0.061	10	0.278	0.265	0	0.000	0.000	36	1.001	0.42	0.07
1 Aug	7	32	13	0.411	0.094	9	0.284	0.136	1	0.032	0.042	8	0.253	0.243	0	0.000	0.000	31	0.979	0.42	0.09
2 Aug	8	39	13	0.330	0.102	15	0.381	0.072	9	0.229	0.222	9	0.229	0.219	0	0.000	0.000	46	1.169	0.28	0.05
3 Aug	6	31	11	0.360	0.077	13	0.426	0.167	8	0.262	0.250	31	1.016	0.949	0	0.000	0.000	63	2.064	0.17	0.04
4 Aug	6	29	17	0.581	0.040	4	0.137	0.070	4	0.137	0.136	22	0.752	0.666	0	0.000	0.000	47	1.606	0.36	0.06
5 Aug	6	28	14	0.500	0.150	2	0.071	0.045	3	0.107	0.108	28	1.001	0.909	0	0.000	0.000	47	1.680	0.30	0.08
6 Aug	8	33	13	0.397	0.086	3	0.092	0.042	11	0.336	0.317	70	2.137	2.016	0	0.000	0.000	97	2.962	0.13	0.04
7 Aug	6	21	9	0.435	0.100	1	0.048	0.050	3	0.145	0.159	53	2.562	2.231	0	0.000	0.000	66	3.191	0.14	0.03
8 Aug	8	33	16	0.479	0.080	2	0.060	0.037	10	0.299	0.290	84	2.512	2.391	0	0.000	0.000	112	3.350	0.14	0.04
9 Aug	8	42	10	0.238	0.044	1	0.024	0.024	6	0.143	0.157	69	1.645	1.601	0	0.000	0.000	86	2.050	0.12	0.04
10 Aug	8	52	4	0.077	0.046	5	0.096	0.067	7	0.135	0.144	75	1.446	1.387	0	0.000	0.000	91	1.754	0.04	0.03
Total	314	1,733	398	10.479		899	21.784		67	1.953		500	14.766		1	0.026		1,865	1.076	NA	NA
Min	6	21	0	0.000		1	0.024		0	0.000		0	0.000		0	0.000		14	0.677	0.00	
Mean	8	42	10	0.256		22	0.531		2	0.048		12	0.360		0	0.001		45	1.076	0.25	
Max	10	60	18	0.581		70	2.555		11	0.336		84	2.562		1	0.026		112	1.853	0.53	

Note: "NA" = not applicable.

[a] Proportion of combined total catch = Chinook salmon CPUE / Combined total of all species CPUE.

Appendix D5.–Catch (N) and CPUE of Chinook, sockeye, coho, and pink salmon, and Dolly Varden, 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 2008.

	Inriver drift gillnetting																				
			Catch																	Chinook salmon	
	No.	Time fished	Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Dolly Varden			Total			
Date	drifts	(min)	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	Prop.[a]	SE
1 Jul	8	51	6	0.117	0.062	24	0.466	0.122	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	30	0.583	0.20	0.12
2 Jul	8	55	5	0.091	0.027	21	0.381	0.066	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	26	0.471	0.19	0.04
3 Jul	8	51	5	0.097	0.052	25	0.486	0.142	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	30	0.583	0.17	0.10
4 Jul	9	57	4	0.070	0.030	10	0.174	0.056	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	14	0.244	0.29	0.08
5 Jul	8	52	1	0.019	0.019	14	0.271	0.088	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	15	0.290	0.07	0.05
6 Jul	6	43	10	0.232	0.051	3	0.070	0.034	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	13	0.301	0.77	0.12
7 Jul	6	42	4	0.095	0.048	4	0.095	0.031	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	8	0.190	0.50	0.14
8 Jul	8	53	11	0.207	0.057	9	0.170	0.033	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	20	0.377	0.55	0.08
9 Jul	7	48	8	0.167	0.065	21	0.438	0.205	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	29	0.605	0.28	0.11
10 Jul	8	52	7	0.134	0.052	15	0.287	0.037	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	22	0.421	0.32	0.09
11 Jul	7	43	6	0.138	0.063	2	0.046	0.029	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	8	0.184	0.75	0.14
12 Jul	6	41	9	0.221	0.097	19	0.466	0.136	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	28	0.687	0.32	0.08
13 Jul	6	42	5	0.120	0.056	6	0.144	0.038	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	11	0.264	0.45	0.14
14 Jul	8	55	4	0.073	0.055	11	0.201	0.072	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	15	0.273	0.27	0.19
15 Jul	6	24	11	0.452	0.117	44	1.808	0.267	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	55	2.260	0.20	0.06
16 Jul	8	33	11	0.332	0.091	64	1.932	0.732	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	75	2.264	0.15	0.05
17 Jul	8	42	14	0.335	0.052	37	0.885	0.338	0	0.000	0.000	0	0.000	0.000	1	0.024	0.033	52	1.244	0.27	0.10
18 Jul	8	40	15	0.376	0.080	28	0.701	0.123	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	43	1.077	0.35	0.07
19 Jul	8	36	11	0.302	0.123	41	1.127	0.260	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	52	1.429	0.21	0.09
20 Jul	8	33	14	0.423	0.133	27	0.816	0.265	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	41	1.239	0.34	0.11
21 Jul	8	36	13	0.361	0.102	13	0.361	0.088	0	0.000	0.000	1	0.028	0.038	0	0.000	0.000	27	0.750	0.48	0.10
22 Jul	9	36	21	0.589	0.039	18	0.504	0.101	0	0.000	0.000	3	0.084	0.087	0	0.000	0.000	42	1.177	0.50	0.03
23 Jul	5	20	7	0.357	0.074	2	0.102	0.063	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	9	0.459	0.78	0.09
24 Jul	8	34	14	0.410	0.138	14	0.410	0.119	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	28	0.819	0.50	0.14
25 Jul	9	39	13	0.337	0.073	12	0.311	0.124	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	25	0.647	0.52	0.10

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Appendix D5.–Part 2 of 2.

	Inriver drift gillnetting																				
			Catch																Chinook salmon		
			Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Dolly Varden			Total			
Date	No. drifts	Time fished (min)	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	Prop.[a]	SE
26 Jul	8	45	10	0.224	0.064	5	0.112	0.034	0	0.000	0.000	2	0.045	0.062	0	0.000	0.000	17	0.381	0.59	0.10
27 Jul	8	42	11	0.260	0.066	13	0.308	0.088	0	0.000	0.000	2	0.047	0.053	0	0.000	0.000	26	0.615	0.42	0.10
28 Jul	10	49	8	0.162	0.067	4	0.081	0.030	0	0.000	0.000	5	0.101	0.115	0	0.000	0.000	17	0.345	0.47	0.13
29 Jul	9	38	13	0.346	0.110	8	0.213	0.107	1	0.027	0.036	17	0.453	0.450	0	0.000	0.000	39	1.038	0.33	0.12
30 Jul	10	50	15	0.301	0.049	16	0.321	0.102	0	0.000	0.000	14	0.281	0.273	0	0.000	0.000	45	0.903	0.33	0.07
31 Jul	6	31	16	0.508	0.135	3	0.095	0.044	0	0.000	0.000	16	0.508	0.485	0	0.000	0.000	35	1.112	0.46	0.06
1 Aug	8	38	30	0.788	0.149	3	0.079	0.036	0	0.000	0.000	8	0.210	0.215	0	0.000	0.000	41	1.077	0.73	0.08
2 Aug	8	48	18	0.376	0.126	10	0.209	0.064	7	0.146	0.158	12	0.250	0.256	0	0.000	0.000	47	0.981	0.38	0.07
3 Aug	7	39	23	0.587	0.166	3	0.077	0.055	3	0.077	0.082	30	0.765	0.754	0	0.000	0.000	59	1.505	0.39	0.09
4 Aug	6	30	17	0.569	0.112	1	0.033	0.034	1	0.033	0.045	15	0.502	0.478	0	0.000	0.000	34	1.138	0.50	0.11
5 Aug	7	33	29	0.890	0.192	0	0.000	0.000	2	0.061	0.063	27	0.829	0.821	1	0.031	0.042	59	1.812	0.49	0.10
6 Aug	8	30	23	0.760	0.126	1	0.033	0.031	2	0.066	0.075	41	1.355	1.336	0	0.000	0.000	67	2.214	0.34	0.09
7 Aug	7	27	26	0.954	0.145	0	0.000	0.000	3	0.110	0.130	50	1.834	1.757	0	0.000	0.000	79	2.897	0.33	0.03
8 Aug	8	32	21	0.657	0.170	1	0.031	0.028	1 0	0.313	0.304	60	1.878	1.757	0	0.000	0.000	92	2.879	0.23	0.07
9 Aug	8	43	20	0.466	0.095	1	0.023	0.023	6	0.140	0.153	44	1.026	1.018	0	0.000	0.000	71	1.656	0.28	0.09
10 Aug	6	40	9	0.224	0.114	0	0.000	0.000	9	0.224	0.210	46	1.145	1.079	0	0.000	0.000	64	1.593	0.14	0.08
Total	312	1,675	518	14.125		553	14.265		4 4	1.197		393	11.341		2	0.055		1,510	0.902	NA	NA
Min	5	20	1	0.019		0	0.000		0	0.000		0	0.000		0	0.000		8	0.408	0.07	
Mean	8	41	13	0.345		13	0.348		1	0.029		10	0.277		0	0.001		37	0.902	0.39	
Max	10	57	30	0.954		64	1.932		1 0	0.313		60	1.878		1	0.031		92	1.600	0.78	

Note: "NA" = not applicable.

[a] Proportion of combined total catch = Chinook salmon CPUE / Combined total of all species CPUE.

Appendix D6.–Catch (N) and CPUE of Chinook, sockeye, coho, and pink salmon, and Dolly Varden , 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 2008.

	Inriver drift gillnetting																				
				Catch																Chinook salmon	
				Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Dolly Varden			Total			
Date	Reps[a]	No. drifts	Time fished (min)	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	Prop.[b]	SE
1 Jul	4	16	106	6	0.057	0.037	67	0.634	0.060	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	73	0.691	0.08	0.05
2 Jul	4	16	104	8	0.074	0.004	63	0.622	0.083	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	71	0.683	0.11	0.01
3 Jul	4	16	110	7	0.065	0.027	66	0.598	0.158	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	73	0.662	0.10	0.04
4 Jul	4	16	105	6	0.059	0.027	36	0.346	0.093	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	42	0.399	0.15	0.03
5 Jul	4	16	105	9	0.084	0.028	31	0.294	0.039	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	40	0.382	0.22	0.05
6 Jul	3	12	82	13	0.153	0.036	22	0.275	0.103	0	0.000	0.000	0	0.000	0.000	1	0.014	0.014	36	0.44	0.35	0.07
7 Jul	3	12	82	8	0.098	0.044	23	0.284	0.075	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	31	0.376	0.26	0.09
8 Jul	4	15	100	17	0.161	0.021	22	0.212	0.045	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	39	0.392	0.43	0.03
9 Jul	4	15	102	17	0.153	0.038	53	0.503	0.261	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	70	0.687	0.23	0.09
10 Jul	4	16	105	15	0.144	0.026	49	0.465	0.041	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	64	0.609	0.24	0.04
11 Jul	4	15	104	18	0.156	0.042	13	0.110	0.026	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	31	0.299	0.59	0.09
12 Jul	3	12	84	15	0.197	0.098	41	0.515	0.159	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	56	0.667	0.28	0.05
13 Jul	3	12	88	12	0.138	0.037	13	0.148	0.028	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	25	0.283	0.48	0.02
14 Jul	4	16	109	10	0.093	0.034	29	0.266	0.088	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	39	0.358	0.26	0.09
15 Jul	3	12	53	21	0.406	0.046	102	1.933	0.359	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	123	2.308	0.17	0.03
16 Jul	4	15	61	18	0.269	0.099	134	2.362	1.077	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	152	2.511	0.10	0.06
17 Jul	4	16	79	23	0.288	0.035	91	1.270	0.380	0	0.000	0.000	0	0.000	0.000	1	0.010	0.010	115	1.464	0.18	0.06
18 Jul	4	16	81	23	0.276	0.046	65	0.815	0.127	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	88	1.092	0.25	0.06
19 Jul	4	16	79	19	0.246	0.097	66	0.867	0.116	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	85	1.075	0.22	0.08
20 Jul	4	16	77	26	0.358	0.084	45	0.631	0.170	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	71	0.924	0.36	0.05
21 Jul	4	16	73	28	0.378	0.091	36	0.494	0.110	0	0.000	0.000	3	0.039	0.027	0	0.000	0.000	67	0.919	0.41	0.03
22 Jul	4	16	71	33	0.473	0.098	49	0.656	0.068	0	0.000	0.000	3	0.042	0.026	0	0.000	0.000	85	1.202	0.40	0.05
23 Jul	3	11	45	15	0.322	0.023	9	0.183	0.020	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	24	0.53	0.64	0.04
24 Jul	4	16	70	32	0.451	0.107	43	0.613	0.111	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	75	1.064	0.42	0.09
25 Jul	5	19	90	25	0.257	0.053	29	0.301	0.091	0	0.000	0.000	3	0.031	0.021	0	0.000	0.000	57	0.63	0.44	0.06

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Appendix D6.–Part 2 of 2.

	Inriver drift gillnetting																					
				Catch																	Chinook salmon	
				Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Dolly Varden			Total			
Date	Reps[a]	No. drifts	Time fished (min)	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	SE	N	CPUE	Prop.[b]	SE
26 Jul	4	16	88	24	0.274	0.088	20	0.235	0.059	0	0.000	0.000	4	0.048	0.021	0	0.000	0.000	48	0.548	0.49	0.12
27 Jul	4	16	83	25	0.305	0.042	41	0.506	0.105	0	0.000	0.000	6	0.072	0.040	0	0.000	0.000	72	0.871	0.35	0.02
28 Jul	5	19	103	20	0.181	0.046	23	0.214	0.045	0	0.000	0.000	15	0.137	0.022	0	0.000	0.000	58	0.563	0.34	0.05
29 Jul	5	19	78	26	0.295	0.089	35	0.417	0.109	1	0.012	0.012	25	0.286	0.087	0	0.000	0.000	87	1.114	0.29	0.06
30 Jul	5	19	91	23	0.237	0.033	33	0.367	0.107	3	0.029	0.029	25	0.279	0.043	0	0.000	0.000	84	0.925	0.26	0.06
31 Jul	3	12	63	27	0.430	0.035	11	0.176	0.065	2	0.032	0.016	24	0.376	0.139	0	0.000	0.000	64	1.022	0.42	0.07
1 Aug	4	15	70	43	0.604	0.113	12	0.155	0.060	1	0.013	0.013	16	0.210	0.057	0	0.000	0.000	72	1.032	0.61	0.09
2 Aug	4	16	87	31	0.378	0.063	25	0.308	0.042	16	0.188	0.056	21	0.249	0.079	0	0.000	0.000	93	1.065	0.34	0.01
3 Aug	3	12	63	34	0.522	0.113	16	0.258	0.117	10	0.165	0.060	58	0.934	0.029	0	0.000	0.000	118	1.871	0.28	0.07
4 Aug	3	12	59	34	0.581	0.064	5	0.087	0.062	5	0.085	0.063	37	0.647	0.123	0	0.000	0.000	81	1.369	0.42	0.09
5 Aug	3	12	58	38	0.690	0.236	2	0.034	0.034	5	0.085	0.012	45	0.776	0.107	1	0.017	0.017	91	1.582	0.43	0.11
6 Aug	4	16	63	36	0.564	0.074	4	0.063	0.005	13	0.195	0.046	111	1.823	0.470	0	0.000	0.000	164	2.602	0.21	0.06
7 Aug	3	12	44	32	0.692	0.082	1	0.029	0.029	6	0.149	0.017	97	2.172	0.162	0	0.000	0.000	136	3.071	0.23	0.01
8 Aug	4	16	65	37	0.559	0.060	3	0.038	0.023	20	0.363	0.141	144	2.156	0.365	0	0.000	0.000	204	3.12	0.18	0.03
9 Aug	4	16	85	30	0.359	0.062	2	0.022	0.013	12	0.151	0.106	113	1.372	0.416	0	0.000	0.000	157	1.851	0.19	0.07
10 Aug	3	12	81	11	0.144	0.021	5	0.048	0.048	14	0.170	0.030	106	1.341	0.156	0	0.000	0.000	136	1.681	0.08	0.01
Total	156	614	3,344	895	12.173		1,435	18.357		108	1.636		856	12.988		3	0.041		3,297	0.99	NA	NA
Min	3	11	44	6	0.057		1	0.022		0	0.000		0	0.000		0	0.000		24	0.542	0.08	
Mean	4	15	82	22	0.297		35	0.448		3	0.040		21	0.317		0	0.001		80	0.986	0.30	
Max	5	19	110	43	0.692		134	2.362		20	0.363		144	2.172		1	0.017		204	1.849	0.64	

Note: "NA" = not applicable.

[a] A complete 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 / Combined total of all species CPUE.

APPENDIX E: TEMPORALLY STRATIFIED AGE COMPOSITION ESTIMATES FOR THE KENAI RIVER CHINOOK SALMON FISHERY, 2008.

Appendix E1.–Temporally stratified age composition and estimated sport harvest by age class for early-run Kenai River Chinook salmon, 16 May–30 June 2008.

		Age				
Dates	Parameter	1.2	1.3	1.4	1.5	Total
16 May–9 June						
	Female					
	Sample size		23	37	1	61
	% Sample		25.0%	40.2%	1.1%	66.3%
	SE % sample		4.5%	5.1%	1.1%	5.0%
	Harvest		186	298	8	492
	SE harvest		42	56	8	77
	Male					
	Sample size	4	20	7		31
	% Sample	4.3%	21.7%	7.6%		33.7%
	SE % sample	2.1%	4.3%	2.8%		5.0%
	Harvest	32	161	56		250
	SE harvest	16	39	22		50
	Both sexes combined					
	Sample size	4	43	44	1	92
	% Sample	4.3%	46.7%	47.8%	1.1%	100.0%
	SE % sample	2.1%	5.2%	5.2%	1.1%	0.0%
	Harvest	32	347	355	8	742
	SE harvest	16	61	62	8	102
10–30 June						
	Female					
	Sample size		28	16		44
	% Sample		26.4%	15.1%		41.5%
	SE % sample		4.3%	3.5%		4.8%
	Harvest		491	281		772
	SE harvest		94	71		120
	Male					
	Sample size	15	36	11		62
	% Sample	14.2%	34.0%	10.4%		58.5%
	SE % sample	3.4%	4.6%	3.0%		4.8%
	Harvest	263	632	193		1,088
	SE harvest	69	108	59		143
	Both sexes combined					
	Sample size	15	64	27		106
	% Sample	14.2%	60.4%	25.5%		100.0%
	SE % sample	3.4%	4.8%	4.3%		0.0%
	Harvest	263	1,123	474		1,860
	SE harvest	69	146	93		192

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

Appendix E2.–Temporally stratified sport harvest estimates by age class and geographic strata, for late-run Kenai River Chinook salmon, 1 July–31 July 2008.

Dates	Parameter[a]	Age 1.2	1.3	1.4	1.5	Total
1–19 July						
	Female					
	Sample size		10	19	2	31
	% Sample		11.8%	22.4%	2.4%	36.5%
	SE % sample		3.5%	4.5%	1.7%	5.3%
	Downstream harvest		52	98	10	160
	SE downstream harvest		27	47	8	73
	Upstream harvest		456	866	91	1,413
	SE upstream harvest		149	212	65	282
	Total harvest		507	964	101	1,573
	SE total harvest		165	233	72	307
	Male					
	Sample size	7	20	20	7	54
	% Sample	8.2%	23.5%	23.5%	8.2%	63.5%
	SE % sample	3.0%	4.6%	4.6%	3.0%	5.3%
	Downstream harvest	36	103	103	36	279
	SE downstream harvest	20	49	49	20	124
	Upstream harvest	319	912	912	319	2,461
	SE upstream harvest	123	218	218	123	398
	Total harvest	355	1,015	1,015	355	2,740
	SE total harvest	137	239	239	137	428
	Both sexes combined					
	Sample size	7	30	39	9	85
	% Sample	8.2%	35.3%	45.9%	10.6%	100.0%
	SE % sample	3.0%	5.2%	5.4%	3.4%	0.0%
	Downstream harvest	36	155	201	46	438
	SE downstream harvest	20	71	91	24	192
	Upstream harvest	319	1,367	1,778	410	3,874
	SE upstream harvest	123	276	324	141	540
	Total harvest	355	1,522	1,979	457	4,313
	SE total harvest	137	301	351	156	574

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Appendix E2.–Part 2 of 2.

Dates	Parameter[a]	Age 1.2	1.3	1.4	1.5	Total
20–31 July						
	Female					
	Sample size	6	7	56	4	73
	% Sample	4.3%	5.1%	40.6%	2.9%	52.9%
	SE % sample	1.7%	1.9%	4.2%	1.4%	4.3%
	Downstream harvest	25	29	232	17	303
	SE downstream harvest	11	12	57	9	72
	Upstream harvest	191	223	1,780	127	2,321
	SE upstream harvest	78	85	252	64	292
	Total harvest	216	252	2,013	144	2,624
	SE total harvest	88	95	275	72	316
	Male					
	Sample size	2	21	37	5	65
	% Sample	1.4%	15.2%	26.8%	3.6%	47.1%
	SE % sample	1.0%	3.1%	3.8%	1.6%	4.3%
	Downstream harvest	8	87	153	21	269
	SE downstream harvest	6	26	41	10	65
	Upstream harvest	64	668	1,176	159	2,067
	SE upstream harvest	45	149	201	71	274
	Total harvest	72	755	1,330	180	2,336
	SE total harvest	51	166	222	80	297
	Both sexes combined					
	Sample size	8	28	93	9	138
	% Sample	5.8%	20.3%	67.4%	6.5%	100.0%
	SE % sample	2.0%	3.4%	4.0%	2.1%	0.0%
	Downstream harvest	33	116	386	37	572
	SE downstream harvest	13	32	90	14	129
	Upstream harvest	254	890	2,957	286	4,387
	SE upstream harvest	91	173	336	96	426
	Total harvest	288	1,006	3,342	323	4,960
	SE total harvest	102	192	359	108	445

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

[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 E3.–Temporally stratified sonar passage estimates by age class for early-run Kenai River Chinook salmon, 16 May–30 June 2008.

		Age					
Dates	Parameter	1.2	1.3	1.4	1.5	2.4	Total
16 May–9 June							
	Female						
	Sample size	1	10	19			30
	% Sample	1.9%	19.2%	36.5%	0.0%	0.0%	57.7%
	SE % sample	1.3%	3.8%	4.6%	0.0%	0.0%	6.9%
	Sonar passage estimate	110	1,104	2,097	0	0	3,312
	SE sonar passage estimate	75	218	271	0	0	410
	Male						
	Sample size	4	7	10		1	22
	% Sample	7.7%	13.5%	19.2%	0.0%	1.9%	42.3%
	SE % sample	3.7%	4.8%	5.5%	0.0%	1.9%	6.9%
	Sonar passage estimate	442	773	1,104	0	110	2,428
	SE sonar passage estimate	215	275	318	0	110	404
	Combined						
	Sample size	5	17	29	0	1	52
	% Sample	9.6%	32.7%	55.8%	0.0%	1.9%	100.0%
	SE % sample	4.1%	6.6%	7.0%	0.0%	1.9%	0.0%
	Sonar passage estimate	552	1,877	3,201	0	110	5,740
	SE sonar passage estimate	237	381	411	0	110	178
10 June–30 June							
	Female						
	Sample size	3	24	27	1	0	55
	% Sample	2.7%	21.6%	24.3%	0.9%	0.0%	49.5%
	SE % sample	1.5%	3.9%	4.1%	0.9%	0.0%	4.8%
	Sonar passage estimate	260	2,079	2,339	87	0	4,764
	SE sonar passage estimate	149	381	397	87	0	473
	Male						
	Sample size	15	29	11	1		56
	% Sample	13.5%	26.1%	9.9%	0.9%	0.0%	50.5%
	SE % sample	3.3%	4.2%	2.8%	0.9%	0.0%	4.8%
	Sonar passage estimate	1,299	2,512	953	87	0	4,851
	SE sonar passage estimate	315	407	275	87	0	473
	Combined						
	Sample size	18	53	38	2	0	111
	% Sample	16.2%	47.7%	34.2%	1.8%	0.0%	100.0%
	SE % sample	3.5%	4.8%	4.5%	1.3%	0.0%	0.0%
	Sonar passage estimate	1,559	4,591	3,292	173	0	9,615
	SE sonar passage estimate	340	471	442	122	0	236

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

Appendix E4.–Temporally stratified sonar passage estimates by age class for late-run Kenai River Chinook salmon, 1 July–10 August 2008.

		Age						
Dates	Parameter	1.1	1.2	1.3	1.4	1.5	2.3	Total
1–20 July								
	Female							
	Sample size		8	10	56	3	0	77
	% Sample		4.7%	5.9%	33.1%	1.8%	0.0%	45.6%
	SE % sample		1.2%	1.3%	2.6%	0.7%	0.0%	3.8%
	Sonar passage estimate		635	794	4,448	238	0	6,116
	SE sonar passage estimate		158	176	364	98	0	534
	Male							
	Sample size	8	20	30	26	8	0	92
	% Sample	4.7%	11.8%	17.8%	15.4%	4.7%	0.0%	54.4%
	SE % sample	1.6%	2.5%	2.9%	2.8%	1.6%	0.0%	3.8%
	Sonar passage estimate	635	1,589	2,383	2,065	635	0	7,308
	SE sonar passage estimate	220	336	399	376	220	0	541
	Combined							
	Sample size	8	28	40	82	11	0	169
	% Sample	4.7%	16.6%	23.7%	48.5%	6.5%	0.0%	100.0%
	SE % sample	1.6%	2.9%	3.3%	3.9%	1.9%	0.0%	0.0%
	Sonar passage estimate	635	2,224	3,177	6,513	874	0	13,424
	SE sonar passage estimate	220	388	446	538	256	0	301
21 July–10 August								
	Female							
	Sample size			18	139	13	0	170
	% Sample			5.5%	42.5%	4.0%	0.0%	52.0%
	SE % sample			1.3%	2.7%	1.1%	0.0%	2.8%
	Sonar passage estimate			1,168	9,019	843	0	11,030
	SE sonar passage estimate			282	911	238	0	1,040
	Male							
	Sample size		6	43	92	15	1	157
	% Sample		1.8%	13.1%	28.1%	4.6%	0.3%	48.0%
	SE % sample		0.7%	1.9%	2.5%	1.2%	0.3%	2.8%
	Sonar passage estimate		389	2,790	5,969	973	65	10,187
	SE sonar passage estimate		160	452	703	257	65	987
	Combined							
	Sample size		6	61	231	28	1	327
	% Sample		1.8%	18.7%	70.6%	8.6%	0.3%	100.0%
	SE % sample		0.7%	2.2%	2.5%	1.5%	0.3%	0.0%
	Sonar passage estimate		389	3,958	14,988	1,817	65	21,217
	SE sonar passage estimate		160	551	1,285	357	65	1,654

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