Fishery Data Series No. 07-65

Chinook Salmon Creel Survey and Inriver Gillnetting Study, Lower Kenai River, Alaska, 2004

by

Adam Reimer

November 2007

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

Symbols and Abbreviations

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

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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by

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November 2007

This investigation was partially financed by the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K) under project F-10-20, Job No. S-2-5a.

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This document should be cited as:
Reimer, A. M. 2007. Chinook salmon creel survey and inriver gillnetting study, lower Kenai River, Alaska, 2004. Alaska Department of Fish and Game, Fishery Data Series No. 07-65, Anchorage.

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ABSTRACT

A creel survey to estimate angler effort, catch and harvest of Chinook salmon *Oncorhynchus tshawytscha* was conducted on the Kenai River between the Soldotna Bridge and the Warren Ames Bridge from 16 May to 31 July 2004. For the early run, (16 May through 30 June) angler effort was 65,291 (SE = 3,272) angler-hours and harvest was 2,285 (SE = 338) Chinook salmon. Unguided anglers accounted for 47% of the angler effort and 34% of the harvest versus guided anglers who accounted for 53% of the effort and 66% of the harvest. The early-run sport harvest was composed of 11.1% (SE = 3.2%) age-1.2 fish, 50.5% (SE = 5.1%) age-1.3 fish and 38.4% (SE = 4.9%) age-1.4 fish, whereas early-run Chinook passage at the sonar site was composed of 14.8% (SE = 1.9%) age-1.2 fish, 33.3% (SE = 2.5%) age-1.3 fish and 46.4% (SE = 2.7%) age-1.4 fish. For the late run (July), angler effort was 238,415 (SE = 8,139) angler-hours and harvest was 14,493 (SE = 975) Chinook salmon. Unguided anglers accounted for 54% of the effort and 35% of the harvest versus guided anglers who accounted for 46% of the effort and 65% of the harvest. The late-run sport harvest was composed of 8.9% (SE = 1.6%) age-1.2 fish, 27.5% (SE = 2.5%) age-1.3 fish and 59.3% (SE = 2.8%) age-1.4 fish, whereas the late-run Chinook passage at the sonar site was composed of 14.0% (SE = 1.1%) age-1.2 fish, 24.6% (SE = 1.4%) age-1.3 fish and 58.9% (SE = 1.6%) age-1.4 fish.

A standardized gillnetting project has been conducted near the Chinook salmon sonar site since 1998. In 2004, the netting project ran from 16 May to 10 August. During the early run 456 Chinook salmon, 475 sockeye salmon and 1 Dolly Varden were captured. The ratio of Chinook salmon CPUE to all species CPUE in the early run ranged from 0.00 to 1.00 and averaged 0.55. During the late run 1,144 Chinook salmon, 777 sockeye salmon, 32 coho salmon, 197 pink salmon and 1 Dolly Varden were captured. The ratio of Chinook salmon CPUE to all species CPUE in the late run ranged from 0.13 to 0.90 and averaged 0.58.

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 subject of this report is the Kenai River Chinook salmon fishery between the Soldotna Bridge and Warren Ames Bridge.

Chinook salmon return to the Kenai River in two periods: an early run, late April through late June, and a late run, late June through early August. For management purposes the early run is all Chinook salmon entering the river before 1 July and the late run is all fish entering on or after 1 July. Angler's value fish from both runs because of their large size; average weight is about 40 lb and some fish exceed 80 lb. Late-run fish are generally larger than early-run fish; however, the world record sport-caught Chinook salmon (97 lb, 4 oz) was harvested from the Kenai River in May 1985.

Before 1970, the Kenai River sport fishery was primarily shorebased anglers targeting sockeye salmon in July and coho salmon in August and September. The Alaska Department of Fish and Game implemented a creel survey in 1974 in response to rising effort and harvest from boat anglers targeting Chinook salmon. Angler effort and harvest increased through 1988 but dropped during the early 1990s because of low Chinook salmon returns and fishery restrictions (Figures 2 and 3). Early-run angler effort and harvest have never returned to 1988 levels. Late-run effort has been consistent since the mid 1980s, whereas late-run harvest has been near historic highs the past 6 years. Since 1981, separate effort and harvest estimates have been produced for guided and unguided anglers. Guided anglers have accounted for an increasing proportion of the total effort and harvest in both runs since 1996 (Figures 2 and 3).

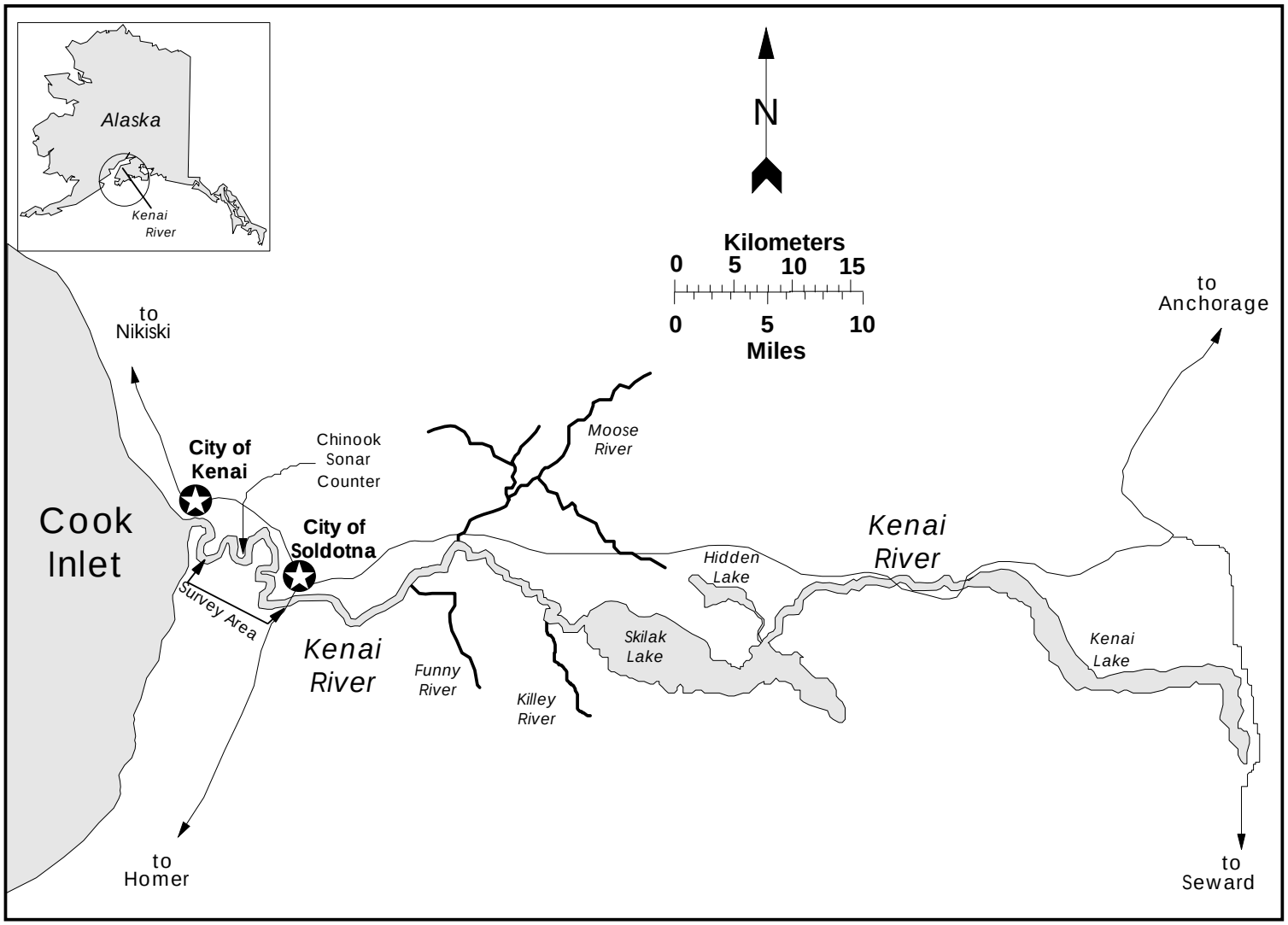


Figure 1.-The Kenai River drainage.

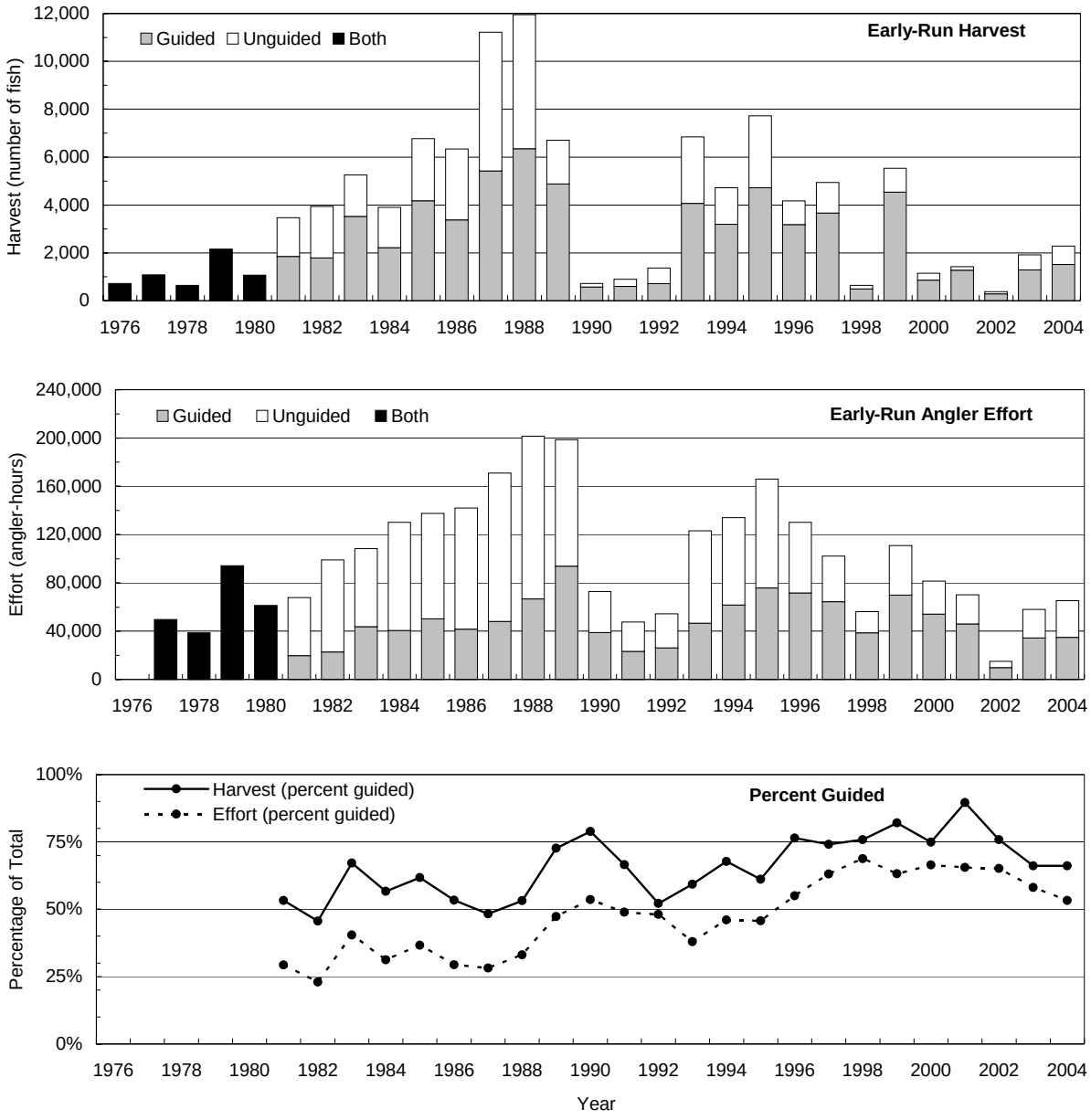


Figure 2.-Historic angler effort and harvest for the early-run Kenai River Chinook salmon fishery between the Soldotna Bridge and the Warren Ames Bridge, 1976-2004.

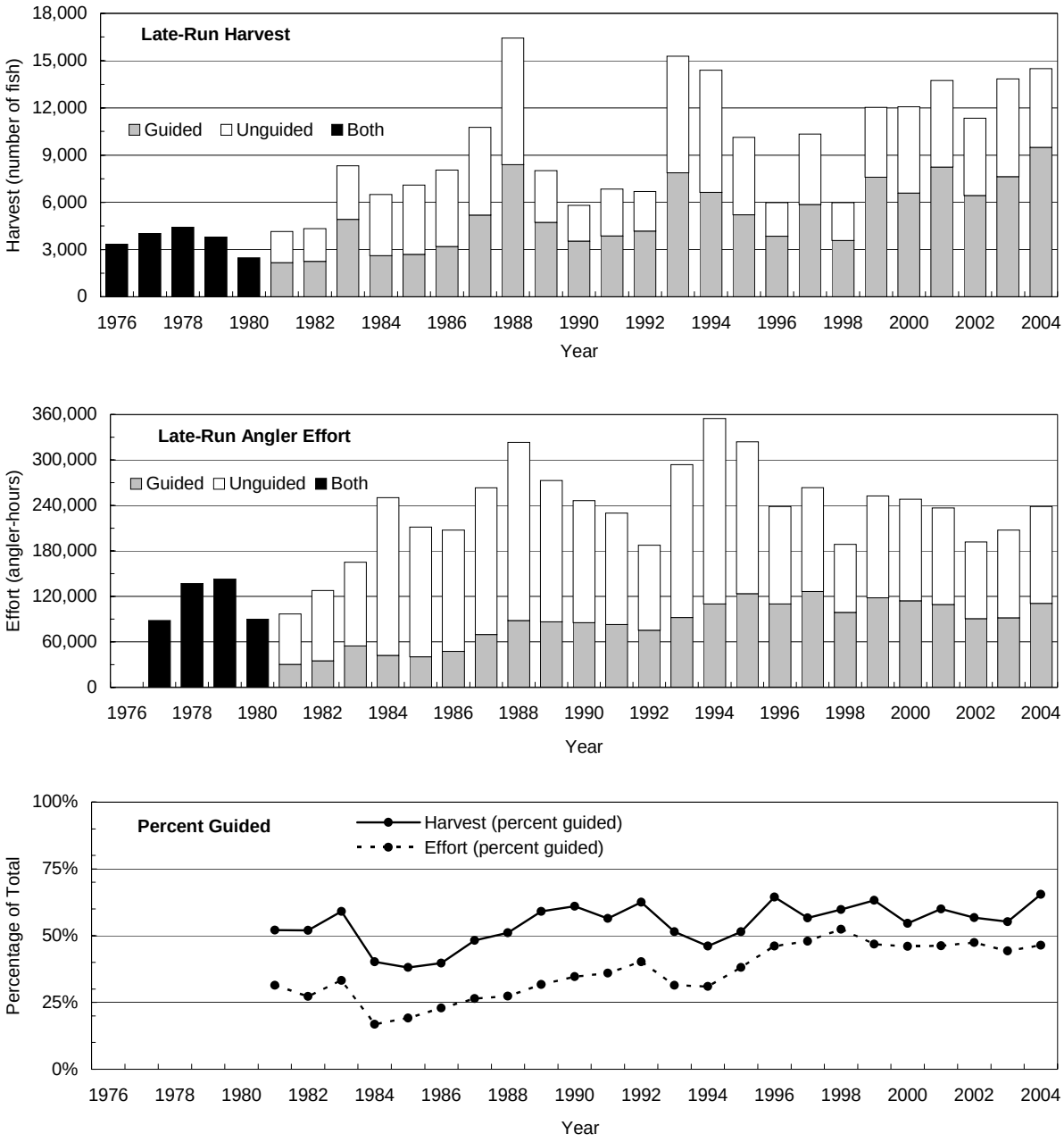


Figure 3.-Historic angler effort and harvest for the late-run Kenai River Chinook salmon fishery between the Soldotna Bridge and the Warren Ames Bridge, 1976-2004.

MANAGEMENT PLANS

The early- and late-run Kenai River Chinook salmon returns have separate management plans adopted by the Alaska Board of Fisheries. Management within these plans utilizes estimates of inriver return and harvest. Estimates of inriver return are obtained with sonar (Miller et al. 2004), while estimates of harvest are obtained from creel surveys. Previous Kenai River

Chinook salmon creel surveys are published in Conrad and Hammarstrom (1987); Hammarstrom (1975-1981, 1988-1994); Hammarstrom et al. (1985); Hammarstrom and Larson (1982-1984, 1986); King (1995-1997); Marsh (1999, 2000); Reimer (2003, 2004a, 2004b); and Reimer et al. (2002).

In March 2003, the Alaska Board of Fisheries met and changed the Kenai River and Kasilof River Early-Run King Salmon Conservation Management Plan (5 AAC 56.070 updated through register 166, Figure 4) by introducing a slot limit that prohibits harvest of Chinook salmon between 44 and 54.99 in TL until 1 July downstream of the Soldotna Bridge and until 15 July upstream of the Soldotna Bridge. This change was implemented to protect early-run Chinook salmon that spend 5 years in salt water. The fishery is managed to achieve a spawning escapement between 7,200 and 14,400 Chinook salmon. If the projected spawning escapement exceeds 14,400 fish then the fishery will be liberalized to allow bait. If the projected spawning escapement is less than 7,200 fish then the fishery will be restricted by prohibiting the harvest of Chinook salmon between 20 and 54.99 in TL or by closing the sport fishery.

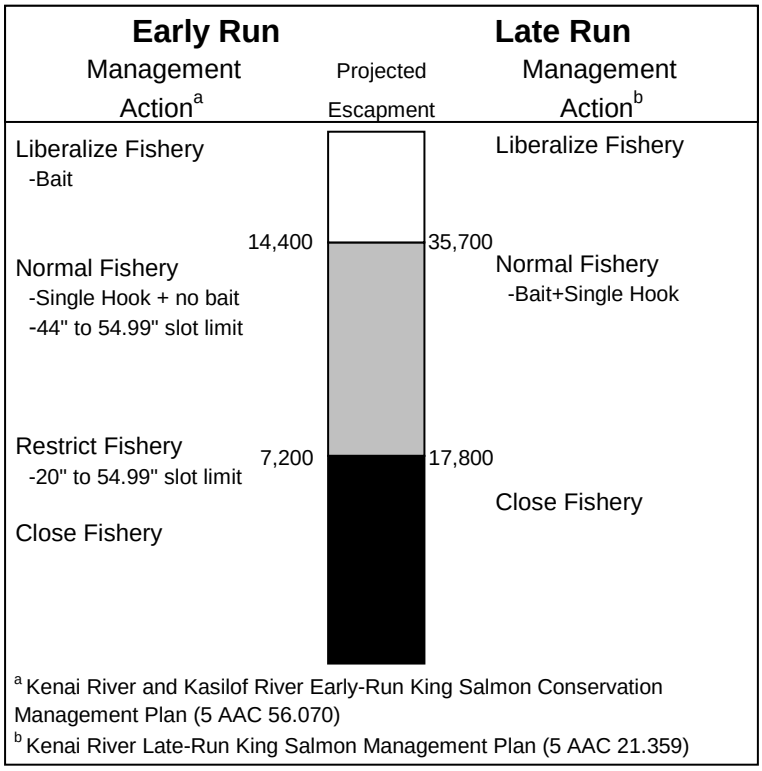


Figure 4.-Escapement goals and inriver management actions for the Kenai River Chinook salmon fisheries.

Management of the late-run Chinook salmon sport fishery is complicated because Chinook salmon are harvested by the commercial setnet fishery along the east shore of Cook Inlet (McBride et al. 1985). The inriver Chinook salmon sport fishery is managed under the Kenai River Late-Run King Salmon Management Plan (5 AAC 21.359 updated through register 166,

Figure 4). The Kenai River Late-Run King Salmon Management Plan mandates the sport fishery be managed to achieve a spawning escapement between 17,800 and 35,700 Chinook salmon. Bait and one single hook are permitted. If the projected spawning escapement is less than 17,800 then the sport fishery will be closed.

FISHING REGULATIONS

Regulations for the Chinook salmon sport fishery in the Kenai River are among the most restrictive in Alaska. The river is open to Chinook salmon fishing between the outlet of Skilak Lake and Cook Inlet, with the exception of the confluence areas of Slikok Creek (river mile [rm] 18.9), Funny River (rm 30.4), Moose River (rm 36.4) and the Lower Killey River (rm 44.0) with the Kenai River (Figures 1 and 5). The Slikok Creek and Funny River confluence areas are closed from 1 January to 14 July, the Lower Killey River confluence area is closed from 25 June to 14 July, and the Moose River confluence area is closed for the entire Chinook salmon fishing season. In addition, the area between Centennial Campground (rm 20.3) and the Soldotna Bridge (rm 21.1) (Figure 5) and the area around Morgan's Hole (approximately rm 31) is closed to fishing from boats for the entire Chinook salmon fishing season. The Chinook salmon season begins by regulation on 1 January, although fish do not enter the river in harvestable numbers until mid-May, and closes on 31 July.

The daily bag and possession limit is one Chinook salmon per day 20 in TL or longer; the seasonal limit is two Chinook salmon 20 in TL or longer. Chinook salmon between 44 and 54.99 in TL may not be retained before 1 July downstream of the Soldotna Bridge or before 15 July upstream of the Soldotna Bridge. An angler that keeps a Chinook salmon 20 in 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 early-run fishery is prohibited from using bait, multiple hooks, or treble hooks. The late-run fishery is prohibited from using multiple hooks and treble hooks. On Mondays, boat anglers may only fish from unguided drift boats downstream of the outlet of Skilak Lake.

There are further restrictions for fishing guides, guided anglers and non-resident anglers. Guided anglers are only allowed to fish from 0600 to 1800 hours. Guided anglers are prohibited from fishing on Sundays and Mondays with the exception of the last two Sundays in May (for charitable purposes) and Memorial Day. Guides are prohibited from personally fishing while conducting clients. Lastly, nonresident anglers are only allowed to fish from a boat downstream of Skilak Lake between 0600 and 1800 hours in May and June.

OBJECTIVES

The objectives for the 2004 study were to estimate:

1. The total catch and harvest by the sport fishery in the mainstem Kenai River between the Warren Ames and Soldotna Bridges from 16 May to 30 June (early run) and from 1 July to 31 July (late run) such that estimates for each run are within 20% or 500 fish of the true values 95% of the time.
2. Angler effort by the sport fishery in the mainstem Kenai River between the Warren Ames and Soldotna Bridges from 16 May to 30 June (early run) and 1 July to 31 July (late run) such that estimates for each run are within 10% or 5,000 angler-hours of the true values 95% of the time.

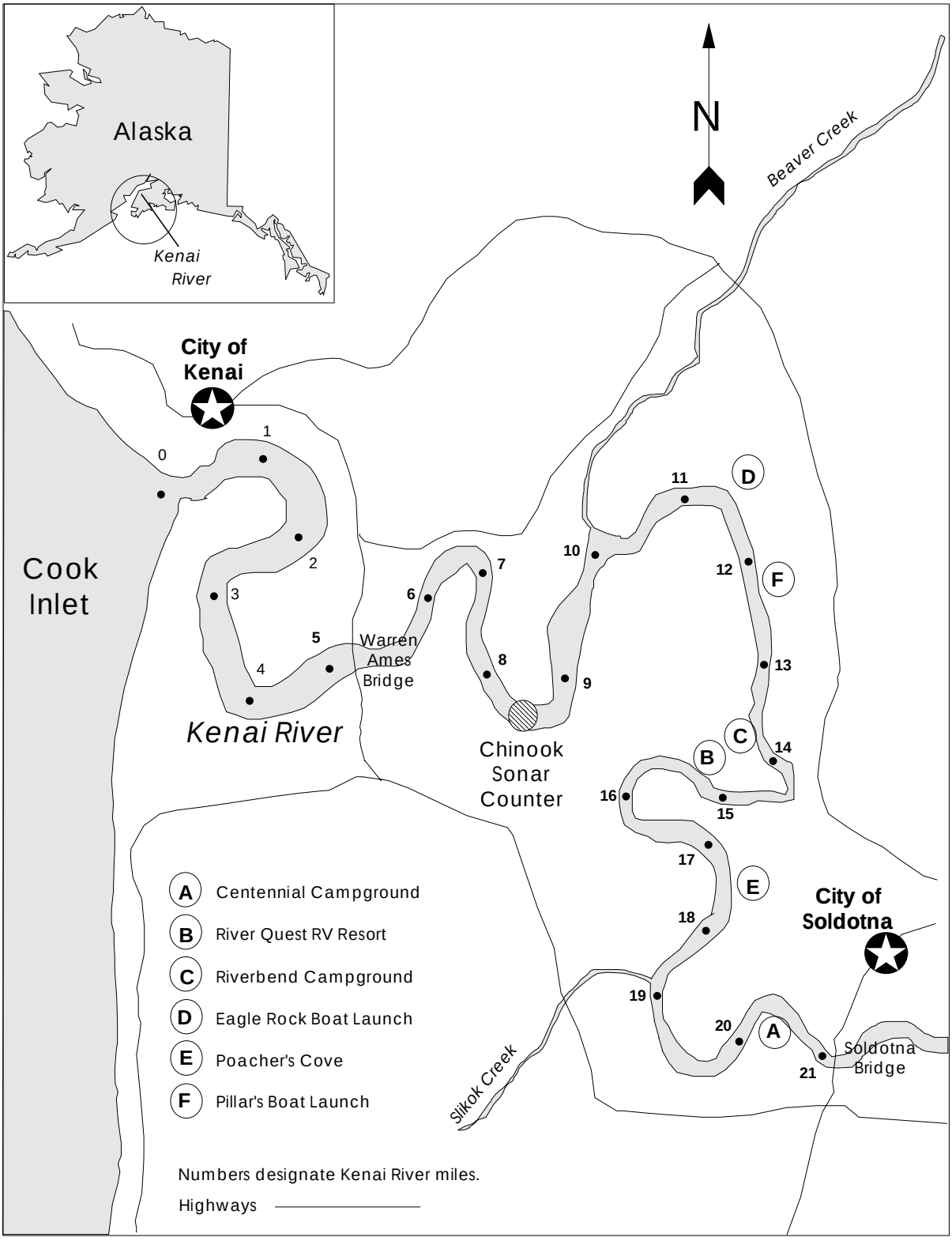


Figure 5.-The Kenai River creel survey study area.

3. The proportion, by age and sex, of the Chinook salmon population entering the Kenai River from 16 May to 10 August such that all age-proportion estimates, for each sampling stratum, are within 0.10 of the true values 95% of the time.
4. The proportion, by age and sex, of Chinook salmon harvested by the sport fishery in the mainstem Kenai River between the Warren Ames and Soldotna Bridges such that all proportion estimates by age, for each sampling stratum, are within 0.10 of the true values 95% of the time, or alternatively, that harvest estimates by age are within 250 fish for all age groups 95% of the time.

In addition, the project is responsible for completing the following tasks:

1. Examine Chinook salmon sampled during the creel survey and gillnetting project for presence of the adipose fin.
2. Clip dorsal fins from Kenai River Chinook salmon sampled from the creel survey and gillnetting project for possible future genetic analysis.
3. Calculate the ratio of Chinook salmon to total salmon captured during the gillnetting project.
4. Mark all Chinook salmon captured during the gillnetting project with individually numbered spaghetti tags.
5. Inspect Chinook salmon sampled during creel survey for a spaghetti tag and record the number.

METHODS

CREEL SURVEY

A stratified, two-stage roving-access creel survey (Bernard et al. 1998a, b) was used to estimate angler effort, catch, and harvest of Chinook salmon from the Warren Ames Bridge (rm 5.2) to the Soldotna Bridge (rm 21.1) (Figure 5). Angler-hours were the units of measurement for angler effort. The creel survey was conducted from 16 May to 31 July 2004. First-stage sampling units were calendar days. The unguided angler-day was assumed to be 20 hours long[1] (0400 to 2400 hours) while the guided angler-day was 12 hours long (0600 to 1800 hours) by regulation. Daily catch and harvest[2] were estimated as the product of effort and CPUE or HPUE. Second-stage sampling units were periodic angler counts for estimating angler effort and angler trips for estimating CPUE/HPUE. Angler trips were sampled by conducting completed-trip angler interviews.

Stratified sampling was used to account for geographical, temporal and regulatory factors affecting the sport fishery. Since substantial harvest downstream of the sonar site would affect inriver return and escapement estimates, angler counts were geographically stratified into two 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 were not

[1] This assumption is known to be false during the early run as non-resident anglers fishing from unguided boats are restricted to a 12-hour day by regulation. This causes early-run unguided angler effort, catch and harvest estimates to be overestimated.

[2] Harvest refers to fish caught and retained by anglers. Catch refers to fish caught and retained plus those reported as released by anglers, but not those fish that escaped before being brought to the boat.

geographically stratified because past attempts to estimate CPUE and HPUE downstream of the sonar site were ineffective (Reimer et al. 2002). 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.

Harvest and catch rates can differ by time and between weekdays and weekend/holidays (J. Hasbrouck, ADF&G, Division of Sport Fish, Anchorage, personal communication). Therefore, the creel survey was stratified by week and by day type (weekdays and weekends/holidays).

Although both guided and unguided anglers participate in the Kenai River Chinook salmon fishery, current regulations restrict guided angler participation to Tuesday through Saturday from 0600 to 1800 hours. Further, catch rates can be significantly different between guided and unguided anglers (J. Hasbrouck, ADF&G, Division of Sport Fish, Anchorage, personal communication). Therefore, both angler counts and angler interviews were poststratified by angler type.

Based upon these factors, the following strata were used for conducting angler counts and estimating creel statistics:

Stratum	Number of Strata	Description
Geographic:	2 strata	Upstream and downstream of the Chinook salmon sonar site (angler counts only)
Temporal:	8 strata	Early Run: 16 May, 18-23 May, 25-31 May, 1-6 June, 8-13 June, 15-20 June, 22-27 June, 29-30 June
	5 strata	Late Run: 1-4 July, 6-11 July, 13-18 July, 20-25 July, 27-30 July
Day Type:	2 strata	Weekdays and weekends/holidays
Angler Type:	2 strata	Guided and unguided

Two of the 4 available weekdays and both weekend days were sampled each week. An exception was 25-31 May where 2 days were selected randomly from the 3 day holiday weekend. During the first (16 May) and last (29-30 June) temporal strata in the early run only one day-type strata occurred. Thus, the early run was composed of 28 strata. The late run was composed of 20 strata. Mondays were not sampled, although unguided drift boat anglers fished on Mondays.

Secchi disc and water temperature measurements were taken twice daily at rm 15.3.

Angler Counts

Four angler counts were conducted during each day sampled. 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. This schedule ensured at least two guided-angler counts (between 0600 and 1800 hours) per day.

Counts were conducted 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 travel time. Anglers were counted while driving the boat at a constant speed through the survey area. The entire count usually took about 45 minutes and every effort was made to complete the trip in less than 1 hour. Angler counts were treated as if they were instantaneous and reflected fishing effort at the time the count began. Anglers were considered fishing if the angler's line was in the water or the angler was rigging their line when the count was conducted. Boats were counted as fishing if they contained at least one angler. Nine hand tally counters were used to sum the following categories for both 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), and (9) shore anglers. Only counts 5-8 were required for this project; counts 1-4 and 9 are auxiliary information used for management purposes.

Because the unguided drift boat fishery on Mondays is a new and evolving fishery, one boat count was completed between 0800 and 1400 hours as an index of effort.

Angler Interviews

Anglers who completed fishing were interviewed at the following boat launches (Figure 5):

A) Centennial Campground
B) River Quest RV Resort
C) Riverbend Campground
D) Eagle Rock Boat Launch
E) Poacher's Cove
F) Pillar's Boat Launch

Because of low water conditions most boat launches were inaccessible in mid-May. Interviews were conducted only at Pillar's Boat Launch when the creel survey began on 16 May. The other launches were added to the sampling schedule immediately after substantial boat traffic was observed. In 2004, Centennial Campground was added to the sampling schedule on 26 May, River Quest RV Resort and Riverbend Campground were added on 5 June, and Poacher's Cove was added on 12 June. Interviews were conducted at all boat launches during the late run.

Interviews were not conducted until after the first randomly scheduled boat count of the day was completed (between 0500 and 0900 hours); therefore, the entire angler-day was not sampled. The chance of introducing length-of-stay bias (Bernard et al. 1998a) is small, in 2001 only 2% of the interviews were conducted from 0400 to 0859 hours and the mean CPUE for that period was similar to the overall mean (Reimer 2003). This is considered typical across years.

There were three or four time intervals per day during which interviews could be conducted, three intervals between consecutive angler counts, and a possible additional interval after the last count. During the early run, when there were more interview periods than active boat launches, each boat launch was sampled once before any launch was repeated in the daily schedule. During the late run, when there were more accessible boat launches than interview periods, access location was chosen 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 (truncated to the nearest hour), (2) boat or shore angler, (3) guided or unguided angler, (4) number of hours spent fishing downstream of the Soldotna Bridge (to the nearest 0.5 hour), (5) number of fish harvested downstream of the Soldotna Bridge by species, (6) number of fish released downstream of the Soldotna Bridge by species, and (7) whether released Chinook salmon were less than 44 in TL, 44-54.99 in, or 55 in or greater. Hours spent fishing included time 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.

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 morphologic characteristics. MEF length was measured to the nearest half-centimeter. Three scales were collected from the right side of the fish approximately two rows above the lateral line along a diagonal line downward from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin and placed on gum cards. Acetate impressions of the scales were made to age fish using a microfiche reader.

Sport-harvest ASL samples were stratified into two 3-week strata in the early run (16 May-6 June and 7-30 June) and two 2-week strata in the late run (1-17 July and 18-31 July). The goal for the late run was to collect 150 fish per stratum; a sufficient sample size to achieve the desired precision (objective 4), assuming 15% of the scales could not be aged (Thompson 1987). Because of the slot limit, a sample size of 150 fish per stratum was unrealistic for the early run although preseason analysis indicated that objective 4 would be satisfied under the absolute precision objective.

Additionally, harvested fish were inspected for an adipose finclip indicating the fish had received a coded wire tag as a juvenile. Coded wire tags help estimate the Upper Cook Inlet marine sport harvest of Kenai River Chinook salmon (King and Breakfield 2002). If an adipose fin was missing, and permission was granted from the angler, the fish's head was removed to recover the coded wire tag.

Finally, harvested fish were inspected for a grey spaghetti tag indicating the fish had been captured and released by our gillnetting crew. If a spaghetti tag was found, the number was recorded.

INRIVER GILLNETTING

The gillnetting project has been modified several times to meet the changing needs of the Kenai River Chinook salmon fishery. The project began in 1979 and was originally designed as a mark-recapture study to provide estimates of inriver return. Reliable estimates were not produced until 1984. The original design was continued until 1989, when the sample sizes were reduced and the emphasis was changed to collecting ASL samples from returning Chinook salmon. In 1998, the project was standardized with respect to drift location and procedures, and the task of estimating the daily netting CPUE, by salmon species, was added to the ASL objective. Analysis of the 1998-2000 gillnetting data and corresponding sonar data showed that the netting data were better for determining species composition within the insonified zone than for estimating abundance (Reimer et al. 2002). In early 2001, species composition of the gillnet catches was thought to reflect the species composition in the insonified zone of the river. By the end of 2001, it was clear that more than one mesh size would be needed to obtain less-biased

estimates of species composition. A pilot study in August 2001 concluded that deployment of two mesh sizes was logistically feasible (Reimer 2003).

Net selectivity estimates from other projects indicated that use of a 5 in mesh gillnet and a 7.5 in mesh gillnet, fished with equal frequency, would provide a relatively flat composite size selectivity curve (S. Fleischman, ADF&G, Division of Sport Fish, Research and Technical Services, Anchorage, personal communication). An advantage of these mesh sizes is that they are slightly small for most fish captured and therefore less likely to slip behind the operculum and damage the gill filaments of captured fish (Hammarstrom and Larson 1984). The project has used 5.0 and 7.5 in mesh gillnets since 2002 to produce estimates of ASL, CPUE, and species composition. Mesh type and color were also changed in 2002. Before 2002, the project used dark green 'cable lay' nylon nets, typical 1960s commercial fishing gear. Since 2002, the project has used 'multifiber' nylon nets typical of modern day commercial gear.

Multifiber nets, though less durable and more abrasive to fish, were more effective (Bue 1986, Reimer 2003, 2004a, 2004b). The new nets captured 2-8 times more of the inriver return, without excessive injury rates (Reimer 2004a, 2004b). Species composition differed between the 5.0 and 7.5 in mesh gillnets for both the early and late runs in 2002 and 2003 (Reimer 2004a, 2004b). Age composition did not differ between the 5.0 and 7.5 in mesh nets in 2002, but did differ in 2003 (Reimer 2004a, 2004b). These results were encouraging because the 5.0 in mesh was introduced to better differentiate species composition; however, comparability with historic age composition estimates (generated from the catch in 7.5 in mesh gillnet only) was a concern. All changes were retained in 2004.

Specifications of the nets used in 2004 are shown below:

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

Inriver sampling was scheduled daily for 6 hours from 16 May to 10 August. Daily sampling was constrained by tidal influence, which makes drifting nets unfeasible during rising and high tide stages. Therefore, sampling took place from 3 hours before to 3 hours after low tide,[1] excluding hours of darkness (2300-0400 hours). One low tide was sampled each day.

Each drift was positioned to capture 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 began immediately downstream of the sonar transducers (rm 8.5) and ended 0.4 mi downstream (rm 8.2). As the boat drifted downstream, and the effective insonified area became difficult to define, the gillnet was drifted near the thalweg. Drifts were terminated

[1] Sampling effort before 2004 was eight hours daily (4 hours before to 4 hours after the published low tide). In 2004 sampling effort was reduced to six hours daily (3 hours before to 3 hours after the published low tide) as a cost-saving measure and because tidal influence at the site is often felt between three and four hours after the published low tide.

when either: (1) the crew believed five fish were in the net, (2) the net was drifting off the thalweg, or (3) the end of the drift area was reached. Successive drifts always began at the upstream end of the study area. Two drifts (one starting on each bank) were completed with each mesh size before switching to the other mesh size. For each drift the mesh size, starting bank, start and stop time, and number of fish caught by species were recorded.

Water level and clarity were recorded at the beginning, midpoint, and end of each 6 hour shift at rm 8.5. Water level was a relative measure using a staff gauge at the sonar site. Water clarity was measured near the staff gauge with a Secchi disk.

Age, Sex, and Length of the Inriver Return

Chinook salmon captured in gillnets were untangled and placed in a tagging cradle (Larson 1995) for ASL sampling. ASL samples were collected the same manner as those for the creel survey. Captured Chinook salmon were tagged with individually numbered grey spaghetti tags just below the dorsal fin. Use of spaghetti tags prevented resampling of fish for ASL. Chinook salmon were also checked for an adipose finclip before release. If an adipose fin was absent, the fish was sacrificed and the head removed to recover the coded wire tag. Injuries sustained by Chinook salmon during the capture and handling process were also recorded. Gillnet samples were stratified into two 3-week time periods during each run. The goal was to collect 150 fish for each stratum. Strata for the early run were 16 May-6 June and 7-30 June; strata for the late run were 1-20 July and 21 July-10 August.

Captured sockeye salmon were measured for MEF length every other day. Sockeye salmon length distribution was used as one variable in a mixture model to evaluate species composition at the sonar site (Fleischman and Burwen 2003).

A small piece of the dorsal fin was removed from Chinook salmon captured in gillnets on days when sockeye salmon lengths were not 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. Future analysis is dependent on additional funding.

Since 2002, age, sex, and length composition estimates have been generated from Chinook captured in the 5.0 and 7.5 in mesh gillnets combined. Before 2002, only 7.5 in mesh gillnets were used to estimate age, sex, and length composition.

DATA ANALYSIS

Angler 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 by:

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

where:

x_{hig} = the number of anglers observed in count g 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 by:

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

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

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

where:

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

The within-day variance of effort was estimated by:

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

The mean effort of stratum h was estimated by:

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

where:

d_h = number of days sampled in stratum h.

The sample variance of daily effort for stratum h was estimated by:

$$S_1^2(E)_h = \frac{\sum_{i=1}^{d_h} \left(\hat{E}_{hi} - \bar{E}_h\right)^2}{(d_h - 1)}. \quad (6)$$

Total effort of stratum h was estimated by:

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

where:

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

The variance of total effort for each stratum in a two-stage design, omitting the finite population correction factor for the second stage, was estimated by (Cochran 1977):

$$\hat{V}\left(\hat{E}_h\right) = (1-f)D_h^2 \frac{S_1^2(E)_h}{d_h} + fD_h^2 \frac{\sum_{i=1}^{d_h} \hat{V}\left(\hat{E}_{hi}\right)}{d_h^2}, \quad (8)$$

where:

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

Catch and Harvest

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

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

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:

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

and the bias corrected mean was:

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

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 by:

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

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

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

and the variance by (Goodman 1960):

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

HPUE was estimated by substituting angler harvest for angler catch in equations (9) through (12). Harvest during sample day *i* was estimated by substituting the $HPUE_{hi}$ 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 an angler type were obtained for a particular day, we lacked CPUE and HPUE estimates to pair with angler counts. For these days we substituted (imputed) pooled estimates of CPUE and HPUE calculated from interviews obtained during the remaining days within the stratum, or similar strata. 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 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 post-stratified by angler type. Ignoring this lack of independence between strata can cause underestimation of variances. However, the bias in variance estimates is small.

Angler Effort, Catch, and Harvest on Mondays

The fishery has been restricted to unguided drift boats on Mondays since 2002. Monday harvests have historically comprised less than 2.5% of the total harvest (Reimer 2003; Reimer et al. 2002). Due to budgetary constraints we did not interview anglers on Mondays, but did conduct one index angler count during the middle of the day (0800 to 1400 hours). We then used the following ad hoc estimation procedure:

1. We used 2001 angler counts to estimate the relationship between index counts and mean angler counts on Mondays. The mean angler count was approximately 78% of the index count.
2. To estimate angler effort, we multiplied the mean angler count by the length of the unguided angler day (20 hours).
3. To estimate CPUE and HPUE, we plotted C/HPUE vs. time and subjectively imputed a value for Mondays.

4. Catch and harvest were estimated as the product of the imputed values of C/HPUE and the angler effort estimate derived from the index count.

Although the above procedure lacked statistical rigor, it is sufficient to demonstrate that angler effort, harvest, and catch estimates on Mondays remained a small fraction of the total.

Inriver Gillnetting CPUE

Drift gillnetting was conducted using 5.0 and 7.5 in mesh gillnets. Two drifts (one starting on each bank *k*) were completed using one gear-size, and then the sequence was repeated using the other gear-size. A repetition *j* consisted of a complete set of four such drifts. Daily catch per unit effort (CPUE) *r* of species *s* in mesh *m* for day *i* was estimated as follows:

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

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

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

Proportion of Chinook Salmon Captured by Inriver Gillnetting

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

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

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

where:

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

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

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

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

Only data from repetitions with at least one drift with each mesh size were used to estimate 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/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 fish of age/sex group *b* sampled during stratum *t*, and

n_t = the number of legible scales read from Chinook salmon sampled during stratum *t*.

The variance of $\hat{p}_{bt}$ was estimated as (Scheaffer et al. 1979):

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

If age/sex composition did not differ significantly ($P < 0.05$) among strata, the proportion of Chinook salmon in age/sex group *b* during an entire run, and its variance, were estimated by pooling data across strata (equations 20-21, ignoring stratum subscripts *t*).

The harvest of each age/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*.

If age/sex composition differed ($P < 0.05$) among strata, a weighted proportion was calculated:

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

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

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 return R of age and sex group b was estimated as the sum of the age/sex specific sonar passage N_b and harvest below the sonar H_{2b},

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

Age, Sex, and Length Comparisons

An analysis-of-variance (ANOVA) model was used to test for differences ($P < 0.05$) in mean length-at-age by sex, run, and sample type (creel survey or gillnetting project) for the 1.2, 1.3 and 1.4 age classes. A separate ANOVA was conducted for each age class.

RESULTS

Kenai River water clarity was below average at rm 15.3 for most of both runs while stream flow was above average for most of June and July (Figure 6).

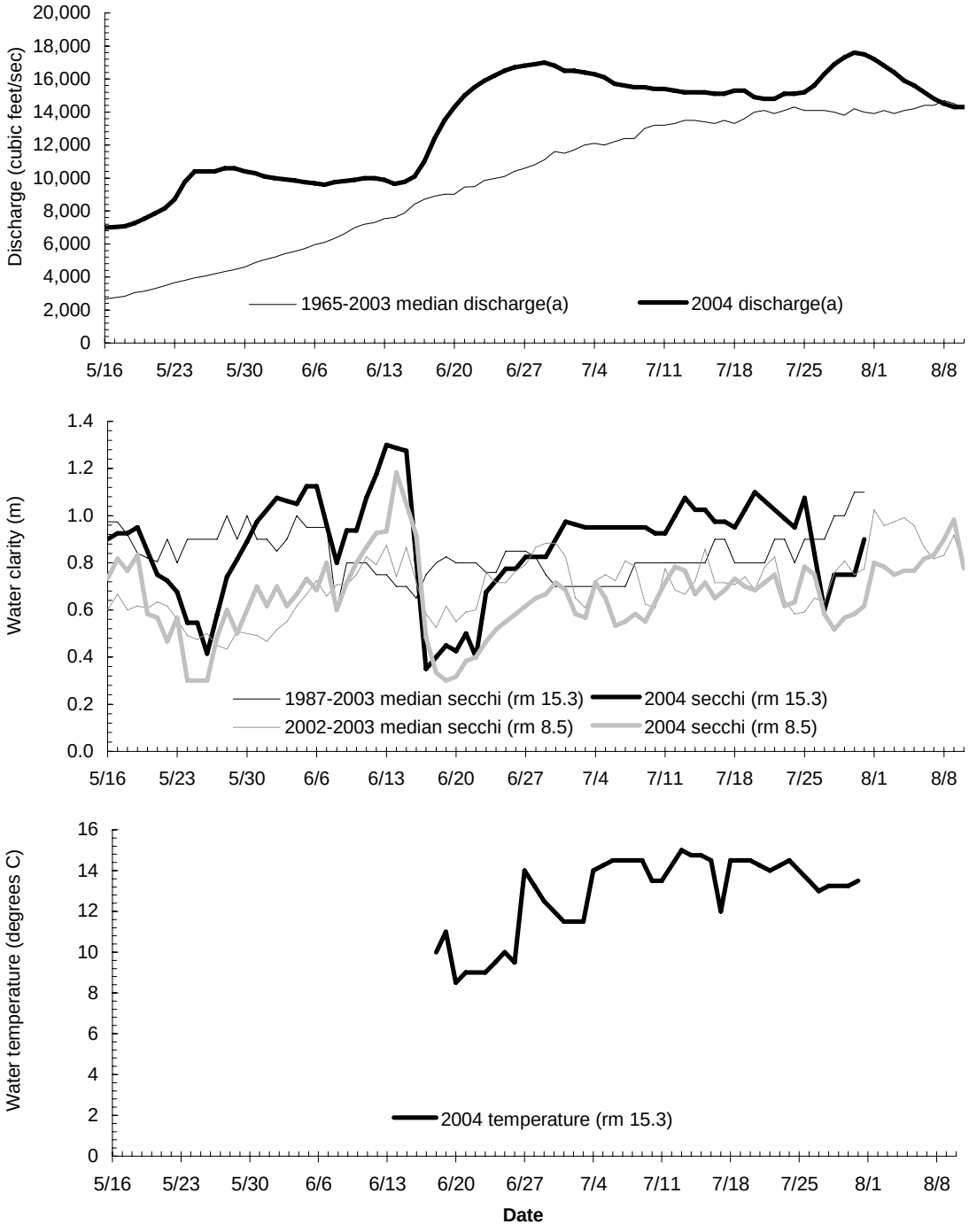
CREEL SURVEY

The creel survey ran from 16 May to 31 July. During the early run, the creel survey sampled 26 of the 46 days the fishery was open to unguided anglers and 20 of the 34 days the fishery was open to guided anglers (Table 1). During the late run, the creel survey sampled 18 of the 31 days the fishery was open to unguided anglers and 14 of the 23 days the fishery was open to guided anglers (Table 2). A total of 2,673 angler interviews were conducted, 916 during the early run and 1,757 during the late run (Tables 1 and 2).

During the early run, angler counts ranged from 0 to 219 for unguided anglers and from 0 to 260 for guided anglers (Appendix A1). The largest count occurred on 13 June for unguided anglers and on 25 June for guided anglers. During the late run, angler counts ranged from 56 to 645 for unguided anglers and from 144 to 623 for guided anglers (Appendix A2). The largest counts occurred on 25 July for unguided anglers and on 20 July for guided anglers.

Effort was 65,291 (SE = 3,272) angler-hours during the early run (Table 1) and 238,415 (SE = 8,139) angler-hours during the late run (Table 2). The precision of the effort estimates for both the early (±9.8%) and late (±6.7%) runs satisfied the project objective (within 10% or 5,000 angler-hours of the true values 95% of the time). Guided anglers accounted for 53% of the early-run effort and 46% of the late-run effort.

During both runs, catch rates were generally higher for guided anglers than for unguided anglers. Daily catch rates of early-run Chinook salmon ranged from 0 to 0.143 (SE = 0.048) fish per hour



(a) 2003 and 2004 discharge data downloaded from USGS 15266300 KENAI R AT SOLDOTNA AK PROVISIONAL DATA SUBJECT TO REVISION http://nwis.waterdata.usgs.gov/nwis/dv/?site_no=15266300&agency_cd=USGS on December 14, 2004. 1965-2001 discharge data downloaded from Daily Streamflow for the Nation USGS 15266300 KENAI R AT SOLDOTNA AK at http://nwis.waterdata.usgs.gov/usa/nwis/discharge/?site_no=15266300&agency _cd=USGS downloaded December 14, 2004.

Figure 6.-Kenai River discharge, water clarity and temperature.

Table 1.-Angler effort, catch, and harvest estimates for the early-run Kenai River Chinook salmon fishery between the Soldotna Bridge and the Warren Ames Bridge, 2004.

				Effort		Catch		Harvest	
	n[a]	N[b]	Int.[c]	Est.	SE	Est.	SE	Est.	SE
16 May									
Guided weekend	1	1	7	132	132	5	5	5	5
Unguided weekends	1	1	18	227	76	4	4	0	0
18-23 May									
Guided weekdays	2	4	4	612	172	39	22	39	22
Guided weekend	1	1	0	522	66	34	38	34	38
Unguided weekdays	2	4	28	1,047	152	90	48	31	21
Unguided weekends	2	2	70	780	160	15	7	2	2
25-31 May									
Guided weekdays	2	4	7	912	480	15	47	15	47
Guided weekend/holiday	1	2	4	824	86	14	56	14	56
Unguided weekdays	2	4	17	840	268	71	49	0	0
Unguided weekends/holiday	2	3	42	2,730	468	205	99	147	67
1-6 June									
Guided weekdays	2	4	36	2,912	759	167	59	96	33
Guided weekend	1	1	5	992	280	142	77	78	71
Unguided weekdays	2	4	52	2,210	319	113	41	92	30
Unguided weekends	2	2	78	2,570	289	97	28	73	25
8-13 June									
Guided weekdays	2	4	60	6,504	908	980	274	640	216
Guided weekend	1	1	15	1,524	396	189	73	93	42
Unguided weekdays	2	4	54	3,200	509	204	44	138	40
Unguided weekends	2	2	78	3,930	945	160	68	150	66
15-20 June									
Guided weekdays	2	4	47	5,036	1,596	241	178	126	96
Guided weekend	1	1	14	1,206	172	17	16	17	16
Unguided weekdays	2	4	37	2,620	591	72	35	72	35
Unguided weekends	2	2	55	2,375	504	0	0	0	0
22-27 June									
Guided weekdays	2	4	31	7,656	1,153	148	141	119	150
Guided weekend	1	1	43	1,940	461	89	31	54	22
Unguided weekdays	2	4	29	3,440	654	26	28	26	28
Unguided weekends	2	2	46	2,955	440	82	47	12	11
29-30 June									
Guided weekdays	1	2	22	3,996	1,281	287	105	181	71
Unguided weekdays	1	2	17	1,600	338	29	20	29	20
Day Type Subtotals									
Guided weekdays	13	26	207	27,628	2,679	1,877	379	1,216	296
Guided weekends/holiday	7	8	88	7,140	712	488	131	295	110
Unguided weekdays	13	26	234	14,957	1,160	605	104	388	72
Unguided weekends/holiday	13	14	387	15,567	1,294	563	133	385	98
Angler Type Subtotals									
Guided	20	34	295	34,768	2,772	2,366	401	1,512	316
% Guided			32%	53%		67%		66%	
Unguided[d]	26	40	621	30,523	1,738	1,168	168	773	122
% Unguided			68%	47%		33%		34%	
Early-run Total[d]			916	65,291	3,272	3,534	435	2,285	338

[a] Number of days sampled

[b] Number of days fishery was open

[c] Number of interviews conducted

[d] Unguided angler estimates are biased low because 6 Mondays were not sampled.

Table 2.-Angler effort, catch, and harvest estimates for the late-run Kenai River Chinook salmon fishery between the Soldotna Bridge and the Warren Ames Bridge, 2004.

				Effort		Catch		Harvest	
	n[a]	N[b]	Int.[c]	Est.	SE	Est.	SE	Est.	SE
1-4 July									
Guided weekdays	1	2	57	9,336	995	1,328	198	773	136
Guided weekend/holiday	1	1	34	2,968	528	238	65	110	45
Unguided weekdays	1	2	54	6,640	1,013	524	127	275	69
Unguided weekends/holiday	2	2	110	8,600	749	473	106	146	56
6-11 July									
Guided weekdays	2	4	103	19,560	3,231	2,003	662	1,298	457
Guided weekend	1	1	37	4,596	503	685	154	451	109
Unguided weekdays	2	4	106	12,100	1,704	691	287	463	140
Unguided weekends	2	2	111	11,345	894	808	153	479	106
13-18 July									
Guided weekdays	2	4	146	20,892	2,254	3,853	731	2,413	303
Guided weekend	1	1	59	4,566	952	778	186	499	122
Unguided weekdays	2	4	168	18,110	2,723	1,517	571	1,107	485
Unguided weekends	2	2	164	14,175	1,373	957	170	537	118
20-25 July									
Guided weekdays	2	4	88	22,492	3,257	2,168	517	1,649	316
Guided weekend	1	1	26	3,488	956	604	206	424	143
Unguided weekdays	2	4	111	22,530	3,300	1,013	163	625	134
Unguided weekends	2	2	92	12,045	2,371	303	126	303	126
27-30 July									
Guided weekdays	2	4	104	19,116	1,581	2,417	296	1,709	281
Guided weekend	1	1	41	3,676	782	256	75	165	56
Unguided weekdays	2	4	87	15,760	1,533	1,461	337	889	272
Unguided weekends	1	1	59	6,420	455	379	123	179	59
Day Type Subtotals									
Guided weekdays	9	18	498	91,396	5,442	11,768	1,169	7,842	706
Guided weekends/holiday	5	5	197	19,294	1,721	2,561	332	1,649	229
Unguided weekdays	9	18	526	75,140	4,958	5,206	752	3,359	593
Unguided weekends/holiday	9	9	536	52,585	3,013	2,920	308	1,644	218
Angler Type Subtotals									
Guided	14	23	695	110,690	5,707	14,329	1,215	9,491	742
% Guided			40%	46%		64%		65%	
Unguided[d]	18	27	1,062	127,725	5,802	8,126	813	5,003	632
% Unguided			60%	54%		36%		35%	
Late-run Total[d]			1,757	238,415	8,139	22,456	1,462	14,493	975

[a] Number of days sampled

[b] Number of days fishery was open

[c] Number of interviews conducted

[d] Unguided angler estimates are biased low because 4 Mondays were not sampled.

for unguided anglers and from 0 to 0.188 (SE = 0.054) fish per hour for guided anglers (Appendices B1 and B2). Highest daily catch rates of early-run Chinook salmon occurred on 31 May for unguided anglers and on 11 June for guided anglers. Daily catch rates of late-run Chinook salmon ranged from 0.006 (SE = 0.006) to 0.126 (SE = 0.029) fish per hour for unguided anglers and from 0.062 (SE = 0.012) to 0.233 (SE = 0.027) fish per hour for guided anglers (Appendices B3 and B4). Highest daily catch rates of late-run Chinook salmon occurred on 29 July for unguided anglers and 13 July for guided anglers.

The estimated harvest of Chinook salmon during the early run was 2,285 (SE = 338) (Table 1). Unguided anglers accounted for 34% of the harvest compared to 66% for guided anglers. The estimated catch of early-run Chinook was 3,534 (SE = 435), meaning 35% of the catch was released. The precision for total harvest (±29.0% or 662 Chinook salmon) and catch (±24.1% or 853 Chinook salmon) failed to meet the project objective (within 20% or 500 Chinook salmon of the true value 95% of the time).

The estimated harvest of Chinook salmon during the late run was 14,493 (SE = 975) (Table 2). Unguided anglers accounted for 35% of the harvest compared to 65% for guided anglers. The estimated catch of late-run Chinook salmon was 22,456 (SE = 1,462), meaning 35% of the catch was released. The precision for total harvest (±13.2%) and catch (±12.8%) satisfied the project objective (within 20% or 500 Chinook salmon of the true value 95% of the time).

Less than 1% of the early-run effort and 13.6% of the late-run effort occurred downstream of the Chinook salmon sonar site (Appendices C1 and C2). The late-run percentage is high compared to past years. The estimated harvest of late-run Chinook salmon downstream of the Chinook salmon sonar site was 2,386 (SE = 268) (Appendix C2).

Unguided anglers have been allowed to fish from drift boats on Mondays during the late run since 1999. Unguided angler effort has increased each year since 1999 (Figure 7)**,** although the rate of increase slowed in 2004. Catch and harvest appear to have decreased in 2004. Unfortunately, estimates since 2002 lack statistical rigor and should be treated with a high degree of uncertainty. Unguided drift boat angler effort, catch and harvest estimates on Mondays during the early run were monitored but were likely small. Estimates of catch, harvest and effort for unguided drift boat Mondays in 2004 are not included in any of the seasonal totals presented herein.

INRIVER GILLNETTING

During the early run, 932 salmonids greater than 400 mm MEF were captured in gillnets: 456 Chinook salmon, 475 sockeye salmon, and 1 Dolly Varden (Appendices D1 and D2). A total of 188 other fish were captured: all were eulachon *Thaleichthys pacificus*. Daily Chinook salmon CPUE ranged from 0.000 to 0.345 (SE = 0.140) fish per minute (Appendix D3). The ratio of Chinook salmon to total salmon captured ranged from 0.00 to 1.00, with a mean value of 0.55 (Appendix D3). CPUE and Chinook salmon ratios were calculated using only salmonids greater than 400 mm MEF because this approximates the lower size limit detectible by the sonar (Debby Burwen, ADF&G, Division of Sport Fish, Anchorage, personal communication).

During the late run, 2,151 salmonids greater than 400 mm MEF were captured in gillnets: 1,144 Chinook salmon, 777 sockeye salmon, 32 coho salmon, 197 pink salmon and 1 Dolly Varden (Appendix D4 and D5). Two other salmonids less than 400 mm MEF were captured, both were

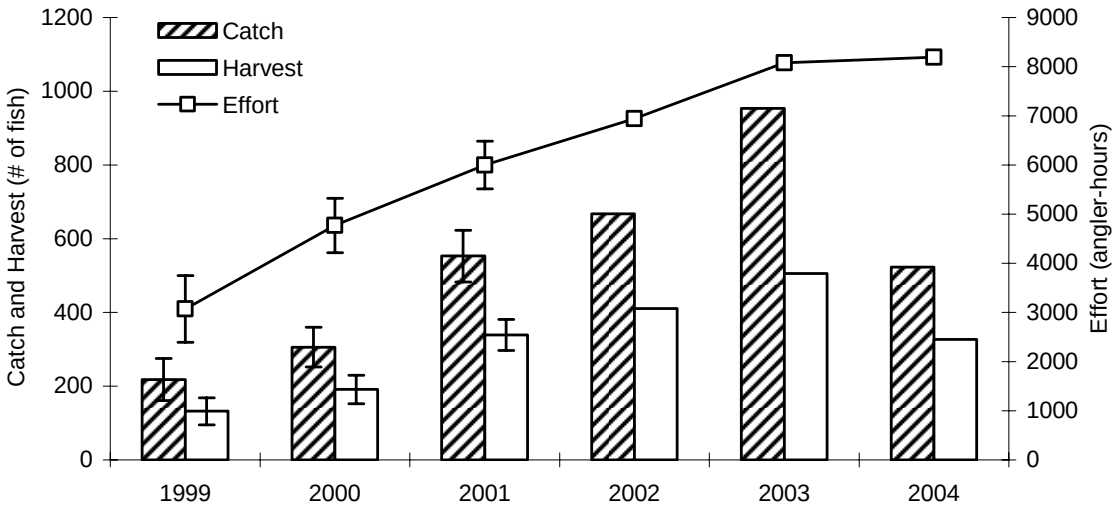


Figure 7.-Unguided angler catch, harvest and effort from drift boats on Mondays in July, 1999-2004.

Chinook salmon. Daily Chinook salmon CPUE ranged from 0.062 (SE = 0.036) to 0.747 (SE = 0.169) fish per minute (Appendix D6). The ratio of Chinook salmon to total salmon captured ranged from 0.13 (SE = 0.04) to 0.90 (SE = 0.06), with a mean of 0.58 (Appendix D6).

Chinook salmon less than 600 mm MEF were more frequently captured in the 5.0 in mesh gillnets than the 7.5 in mesh gillnets (Figure 8). Chinook greater than 600 mm MEF were captured with similar frequency in both mesh sizes. Chinook salmon age composition by mesh size was not statistically different for either the early (χ^2 = .583, df = 2, P < 0.747) or late runs (χ^2 = 2.46, df = 2, P < 0.293) with age-1.2, age-1.3 and age-1.4 fish considered (94.6% of the early-run sample and 97.5% of the late-run sample). The length frequency distributions of sockeye salmon caught in each mesh size were similar, though the 5 in mesh was shifted towards shorter fish (Figure 8).

There were differences in species composition between the 5.0 in and 7.5 in mesh gillnets. The 5.0 in mesh captured more sockeye salmon and fewer Chinook salmon (Appendices D1 and D4) than the 7.5 in mesh, which captured fewer sockeye salmon and more Chinook salmon (Appendices D2 and D5). The species composition between the 5.0 in and 7.5 in mesh gillnets was significantly different in both the early run (χ^2 = 170.3, df = 1, P < 0.001) and the late run (χ^2 = 271.3, df = 1, P < 0.001) considering only Chinook and sockeye salmon (83.1% of the early-run sample and 89.3% of the late-run sample).

In 2004, 12.5% of the early-run Chinook salmon and 10.4% of the late-run Chinook salmon captured by gillnetting were injured. During the early run, ≈54% of the injuries were bleeding gills, ≈32% were scrapes or cuts (generally to the eye, dorsal fin or adipose fin), ≈12% were lethargic upon release (probably from suffocation because the net impeded buccal-opercular movement), and ≈2% were injured in some other way. During the late run, ≈66% of the injuries were bleeding gills, ≈14% were scrapes or cuts, ≈19% were lethargic upon release, and ≈1%

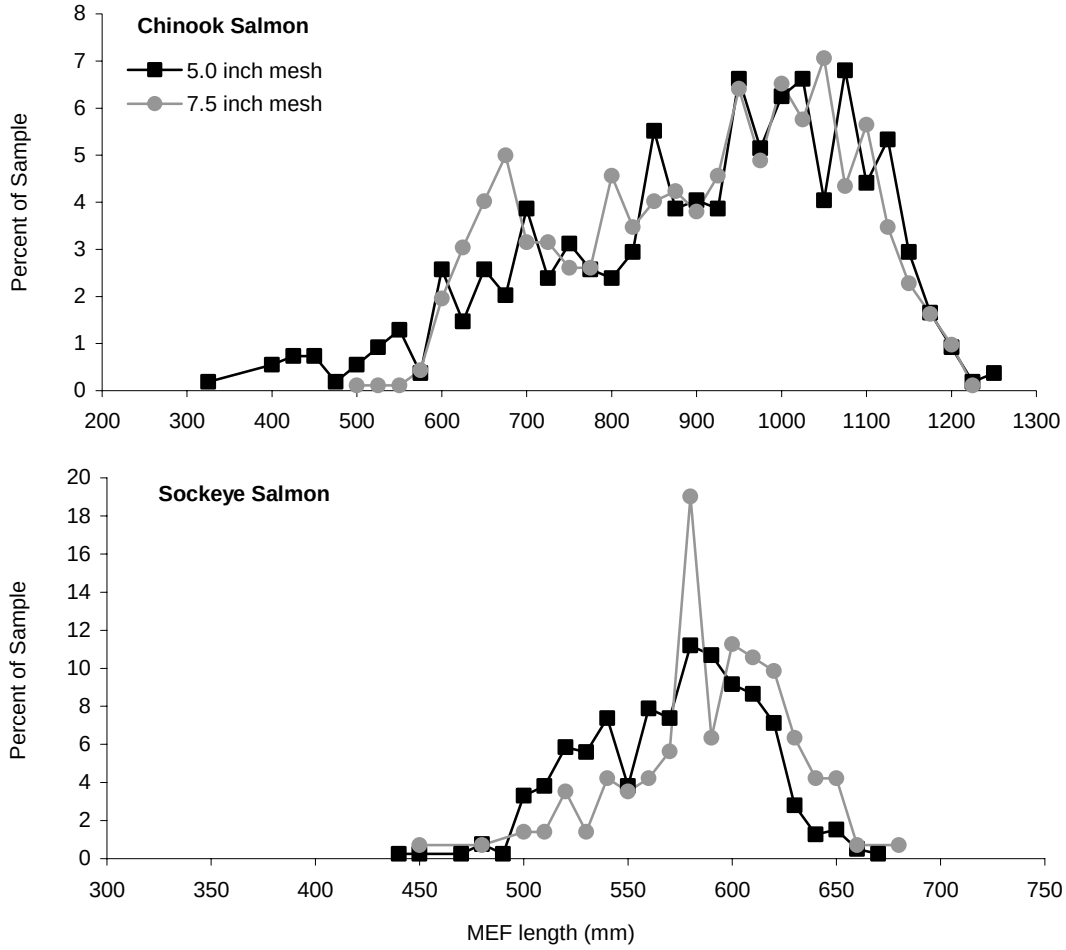


Figure 8.-Length distributions of Kenai River Chinook and sockeye salmon caught with 5.0 and 7.5 in mesh gillnets, 2004.

were injured in some other way. Bleeding gills were more frequent for age-1.2 and -1.3 Chinook salmon than age-1.4 and -1.5, and were more frequently observed in the 7.5 in mesh gillnet than in the 5.0 in mesh. Lethargy was more common in Chinook caught in the 7.5 in mesh gillnet than those caught in the 5.0 in mesh gillnet. The frequency of other injuries was consistent between mesh sizes and ages.

AGE, SEX, AND LENGTH

Creel Survey

The early-run Chinook harvest by age class was 11.0% (SE = 3.1%) age-1.2, 50.0% (SE = 5.0%) age-1.3, and 38.0% (SE = 4.9%) age-1.4 (Table 3). Although the sample size goal of 150 fish per temporal strata (16 May-6 June and 7-30 June) was not achieved, the project objective (within 0.10 or 250 fish of the true value 95% of the time) was met for all age and sex proportion estimates in both strata. The length distribution of the early-run Chinook harvest was truncated at 44 in TL because of the 44-54 in slot limit imposed on the fishery, except for four fish that were illegally harvested (Figure 9).

Table 3.-Harvest estimates by age class of early-run Kenai River Chinook salmon in the sport fishery between the Soldotna Bridge and the Warren Ames Bridge, 2004.

	Age				
Parameter	1.2	1.3	1.4	2.3	Total
Early Run, 16 May-30 June					
Female					
Sample size	1	24	26		51
% sample	1.0%	24.0%	26.0%		51.0%
SE % sample	1.0%	4.3%	4.4%		5.0%
Total Harvest	23	548	594		1,165
SE Total Harvest	23	126	133		207
Male					
Sample size	10	26	12	1	49
% sample	10.0%	26.0%	12.0%	1.0%	49.0%
SE % sample	3.0%	4.4%	3.3%	1.0%	5.0%
Total Harvest	228	594	274	23	1,120
SE Total Harvest	76	133	84	23	201
Combined					
Sample size	11	50	38	1	100
% sample	11.0%	50.0%	38.0%	1.0%	100.0%
SE % sample	3.1%	5.0%	4.9%	1.0%	0.0%
Total Harvest	251	1,142	868	23	2,285
SE Total Harvest	80	204	169	23	338

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

The age composition of the late-run harvest differed (χ^2 = 12.32, df = 2, P = 0.002) between temporal strata (1–17 July, 18-31 July) with age-1.2, age-1.3 and age-1.4 fish considered (95.7% of the sample). Therefore, late-run age composition estimates were weighted by the harvest in each temporal stratum (Appendix E1). Age-1.4 fish were most abundant, comprising 59.3% (SE = 2.8%) of the total harvest, followed by age-1.3 at 27.5% (SE = 2.5%) and age-1.2 at 8.9% (SE = 1.6%) (Table 4). Although the sample size goal of 150 fish was not met for the second temporal strata, the project objective (within 0.10 or 250 fish of the true value 95% of the time) was met for all age and sex proportion estimates in both strata.

Inriver Gillnetting

The early-run Chinook inriver return by age class was 14.8% (SE = 1.9%) age-1.2, 33.3% (SE = 2.5%) age-1.3, and 46.4% (SE = 2.7%) age-1.4 (Table 5). Although the sample size goal of 150 fish per temporal strata (16 May-6 June and 7-30 June) was not achieved for the first temporal strata, the project objective (within 0.10 of the true value 95% of the time) was met for all age and sex proportion estimates in both temporal strata.

During the late run, the age composition of the inriver return differed (χ^2 = 67.80, df = 2, $P < 0.001$) by temporal strata (1-20 July, 21 July-10 August) with age-1.2, age-1.3 and age-1.4 fish considered (97.5% of the sample). Therefore, age composition estimates for Chinook salmon passing by the sonar site were weighted by the sonar passage estimates in each temporal stratum (Appendix E2). Age-1.4 fish were the most abundant, comprising 58.9% (SE = 1.6%) of

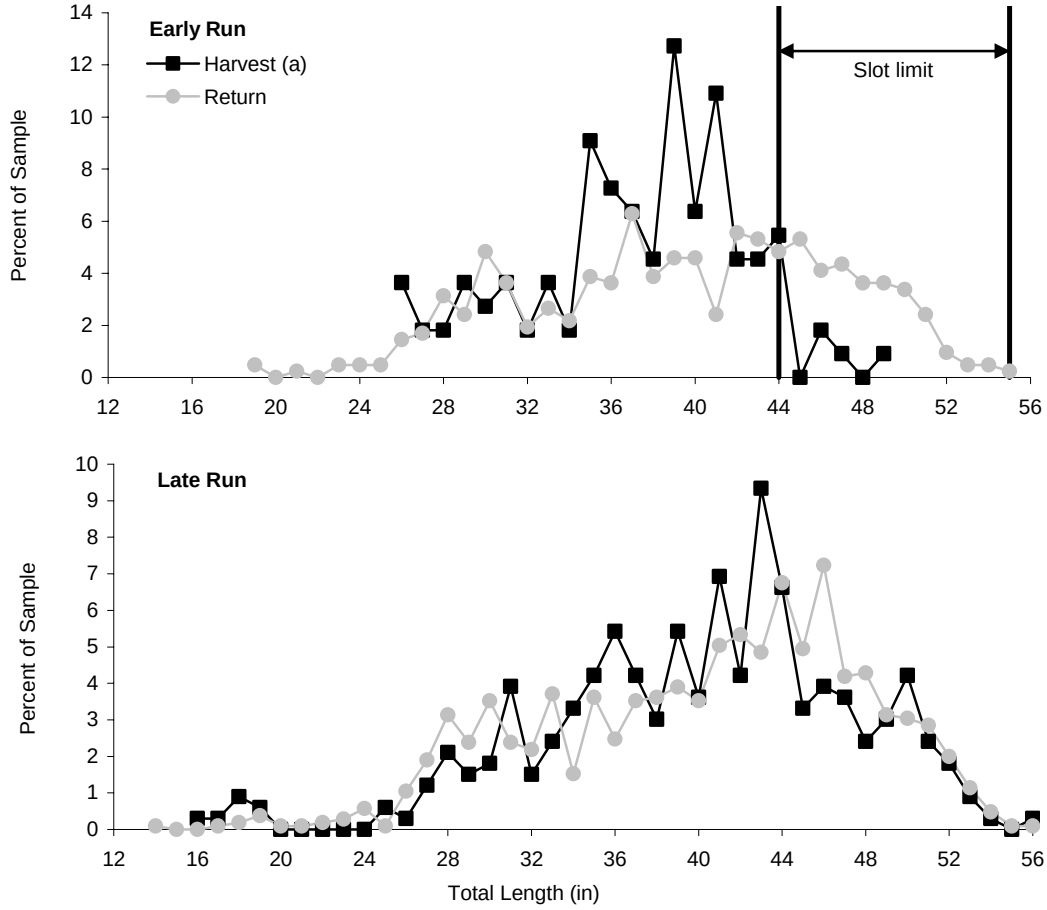


Figure 9.-Length distributions of early- and late-run Kenai River Chinook salmon sampled by the creel survey and the inriver gillnetting project, 2004.

[a] Length distribution of the early run harvest is truncated at 44 in TL due to the 44-55 in slot limit. The non-zero values at 46 in, 47 in and 49 in represent illegally harvested fish.

the total return, followed by age-1.3 at 24.6% (SE = 1.4%) and age-1.2 at 14.0% (SE = 1.1%) (Table 6). The sample size goal of 150 fish and the project objective (within 0.10 of the true value 95% of the time) was met for all age and sex proportion estimates in both temporal strata.

The estimated inriver return age composition using only the catch from the 7.5 in mesh gillnet is shown in Appendices F1 and F2. These estimates are shown for comparison purposes only. Age composition derived from the 7.5 in mesh gillnet was similar to the age composition derived from the 5.0 and 7.5 in mesh gillnets combined.

Age, Sex, and Length Comparisons

The ANOVA model for length-at-age by sex, run, and sample type was not significant for age-1.2 fish. Among age-1.3 fish, females averaged 4.0 cm (SE = 0.7) longer than males.

Table 4.-Harvest estimates, by age class and location, of late-run Kenai River Chinook salmon in the sport fishery between the Soldotna Bridge and the Warren Ames Bridge, 2004.

	Age					
Parameter	1.1	1.2	1.3	1.4	1.5	Total
Late Run, 1 July-31 July						
Female						
Sample size		4	22	102	5	133
Downstream Harvest		31	172	798	39	1,041
SE Downstream Harvest		16	40	110	18	134
Upstream Harvest		144	854	4,173	201	5,371
SE Upstream Harvest		73	189	457	91	535
Total Harvest		175	1,026	4,971	240	6,412
SE Total Harvest		88	223	512	108	592
% Total Harvest		1.2%	7.1%	34.3%	1.7%	44.2%
SE % Total Harvest		0.6%	1.5%	2.7%	0.7%	2.9%
Male						
Sample size	4	24	64	76	4	172
Downstream Harvest	31	188	501	595	31	1,346
SE Downstream Harvest	16	43	81	89	16	167
Upstream Harvest	144	926	2,458	3,033	175	6,736
SE Upstream Harvest	73	198	343	382	88	636
Total Harvest	175	1,113	2,959	3,628	206	8,081
SE Total Harvest	88	233	393	435	103	692
% Total Harvest	1.2%	7.7%	20.4%	25.0%	1.4%	55.8%
SE % Total Harvest	0.6%	1.5%	2.3%	2.5%	0.7%	2.9%
Combined						
Sample size	4	28	86	178	9	305
Downstream Harvest	31	219	673	1,393	70	2,386
SE Downstream Harvest	16	47	100	169	24	268
Upstream Harvest	144	1,070	3,312	7,206	375	12,107
SE Upstream Harvest	73	214	410	642	127	937
Total Harvest	175	1,289	3,985	8,599	446	14,493
SE Total Harvest	88	251	463	696	150	975
% Total Harvest	1.2%	8.9%	27.5%	59.3%	3.1%	100.0%
SE % Total Harvest	0.6%	1.6%	2.5%	2.8%	1.0%	0.0%

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

Downstream is between the Warren Ames Bridge and the Chinook salmon sonar site.

Upstream is between the Chinook salmon sonar site and the Soldotna Bridge. Total harvest is between the Soldotna Bridge and the Warren Ames Bridge.

Angler harvest estimates stratified by date, age class, and location of late-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge, 2004, are presented in Appendix E1.

Table 5.-Sonar passage estimates by age class of early-run Kenai River Chinook salmon, 2004.

Parameter	Age 1.1	1.2	1.3	1.4	1.5	2.3	Total
Early Run, 16 May-30 June							
Female							
Sample size		11	55	80	8		154
% sample		3.1%	15.7%	22.8%	2.3%		43.9%
SE % sample		0.9%	1.9%	2.2%	0.8%		2.7%
Sonar passage estimate		486	2,428	3,532	353		6,800
SE sonar passage estimate		145	304	353	124		427
Male							
Sample size	3	41	62	83	7	1	197
% sample	0.9%	11.7%	17.7%	23.6%	2.0%	0.3%	56.1%
SE % sample	0.5%	1.7%	2.0%	2.3%	0.7%	0.3%	2.7%
Sonar passage estimate	132	1,810	2,738	3,665	309	44	8,698
SE sonar passage estimate	76	268	319	357	116	44	436
Combined							
Sample size	3	52	117	163	15	1	351
% sample	0.9%	14.8%	33.3%	46.4%	4.3%	0.3%	100.0%
SE % sample	0.5%	1.9%	2.5%	2.7%	1.1%	0.3%	0.0%
Sonar passage estimate[a]	132	2,296	5,166	7,197	662	44	15,498
SE sonar passage estimate[a]	76	297	400	431	168	44	261

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

[a] Combined sonar passage estimates and SEs from Jim Miller (Alaska Department of Fish and Game, Division of Sport Fish, Anchorage, personal communication).

Table 6.-Sonar passage estimates by age class of late-run Kenai River Chinook salmon, 2004.

Parameter	Age 1.1	1.2	1.3	1.4	1.5	2.3	Total
Late Run, 1 July-10 August							
Female							
Sample size	1	34	56	280	9	1	381
Sonar passage estimate	57	1,958	3,389	17,167	536	64	23,171
SE sonar passage estimate	57	328	454	1,080	179	64	1,222
% sonar passage	0.1%	3.5%	6.0%	30.5%	1.0%	0.1%	41.2%
SE % sonar passage	0.1%	0.6%	0.8%	1.5%	0.3%	0.1%	1.6%
Male							
Sample size	9	101	176	263	3		552
Sonar passage estimate	522	5,918	10,458	15,950	186		33,034
SE sonar passage estimate	173	562	753	994	108		1,282
% sonar passage	0.9%	10.5%	18.6%	28.4%	0.3%		58.8%
SE % sonar passage	0.3%	1.0%	1.3%	1.5%	0.2%		1.6%
Combined							
Sample size	10	135	232	543	12	1	933
Sonar passage estimate[a]	579	7,877	13,847	33,116	722	64	56,205
SE sonar passage estimate[a]	182	630	869	1,509	209	64	1,735
% sonar passage	1.0%	14.0%	24.6%	58.9%	1.3%	0.1%	100.0%
SE % sonar passage	0.3%	1.1%	1.4%	1.6%	0.4%	0.1%	0.0%

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

Sonar passage estimates by age class and stratified by date for 2004 late-run Kenai River Chinook salmon are presented in Appendix E

[a] Combined sonar passage estimates and SEs from Jim Miller (Alaska Department of Fish and Game, Division of Sport Fish, Anchorage, personal communication).

Among age-1.4 fish, length differed by sex, run, sample type, and the combination of run/sample. Late-run age-1.4 fish averaged 1.1 cm (SE = 0.7) longer than early-run age-1.4 fish, age-1.4 males averaged 4.5 cm (SE = 0.5) longer than age-1.4 females, and age-1.4 fish sampled by gillnets were 1.8 cm (SE = 0.7) longer than age-1.4 fish sampled in the creel. Also, age-1.4 fish from the early-run creel survey were 4.4 cm (SE = 1.6) shorter than the other combinations of run and sample (late creel, early gillnet, late gillnet; see Figure 10). The run, sample, and run/sample effects associated with age-1.4 fish are probably due to the 44-55 in slot limit imposed on the early-run sport fishery. MEF length by age and sex are shown for early-run (Table 7) and late-run (Table 8) Chinook salmon.

The age composition of the early-run harvest and the early-run gillnet catch differed significantly ($\chi^2 = 7.54$, df = 2, $P < 0.02$) with age-1.2, age-1.3 and age-1.4 fish considered (95.7% of the sample). Anglers harvested a larger percentage of the age-1.3 fish and a smaller percentage of the age-1.4 fish than were captured by the gillnetting project during the early run (Tables 3 and 5). These differences probably reflect the fact that some age-1.4 fish are illegal to harvest under the 44-55 in slot limit. The age composition of the late-run harvest and the late-run gillnet catch were not significantly different ($\chi^2 = 5.8$, df = 2, $P < 0.054$) (Tables 4 and 6).

DISCUSSION AND RECOMMENDATIONS

CREEL SURVEY

The 2004 early-run angler effort and harvest downstream of the Soldotna Bridge were below the 1977-2003 historical average, but comparable to the 5-year moving average. The 2004 late-run angler effort downstream of the Soldotna Bridge was similar to the 1977-2003 historical average and the 5-year moving average. Conversely, the 2004 late-run harvest exceeded both the 1977-2003 historical average and the 5-year moving average. Late-run anglers have become more efficient in recent years and the 2004 late-run HPUE was the second highest on record.

Low angler effort has challenged the early-run creel survey, which has had difficulty collecting enough samples to meet project objectives in recent years. The 2004 early run was no exception as project objectives with respect to catch and harvest were not met. The creel survey sampling design has been modified to maximize sampling efficiency, and will likely not attain precision objectives without increased sampling effort.

Early-run unguided angler catch, harvest and effort estimates in 2004 have a small inherent positive bias. During the 2003 and 2004 early runs, non-resident angler fishing was restricted to a 12-hour day between 0600 and 1800 hours. One assumption of the creel survey study design was that the unguided fishing day was 20 hours long (see equation 3). However, the creel survey does not distinguish resident from nonresident anglers. Therefore, the unguided fishing day was effectively less than 20 hours long because some unguided anglers were non-residents and thus restricted to a 12-hour day. The percentage of unguided early-run anglers who were nonresidents is unknown so the magnitude of the positive bias cannot be determined, though it is probably small. Estimates of guided anglers in both runs and unguided anglers in the late run were not affected by the bias.

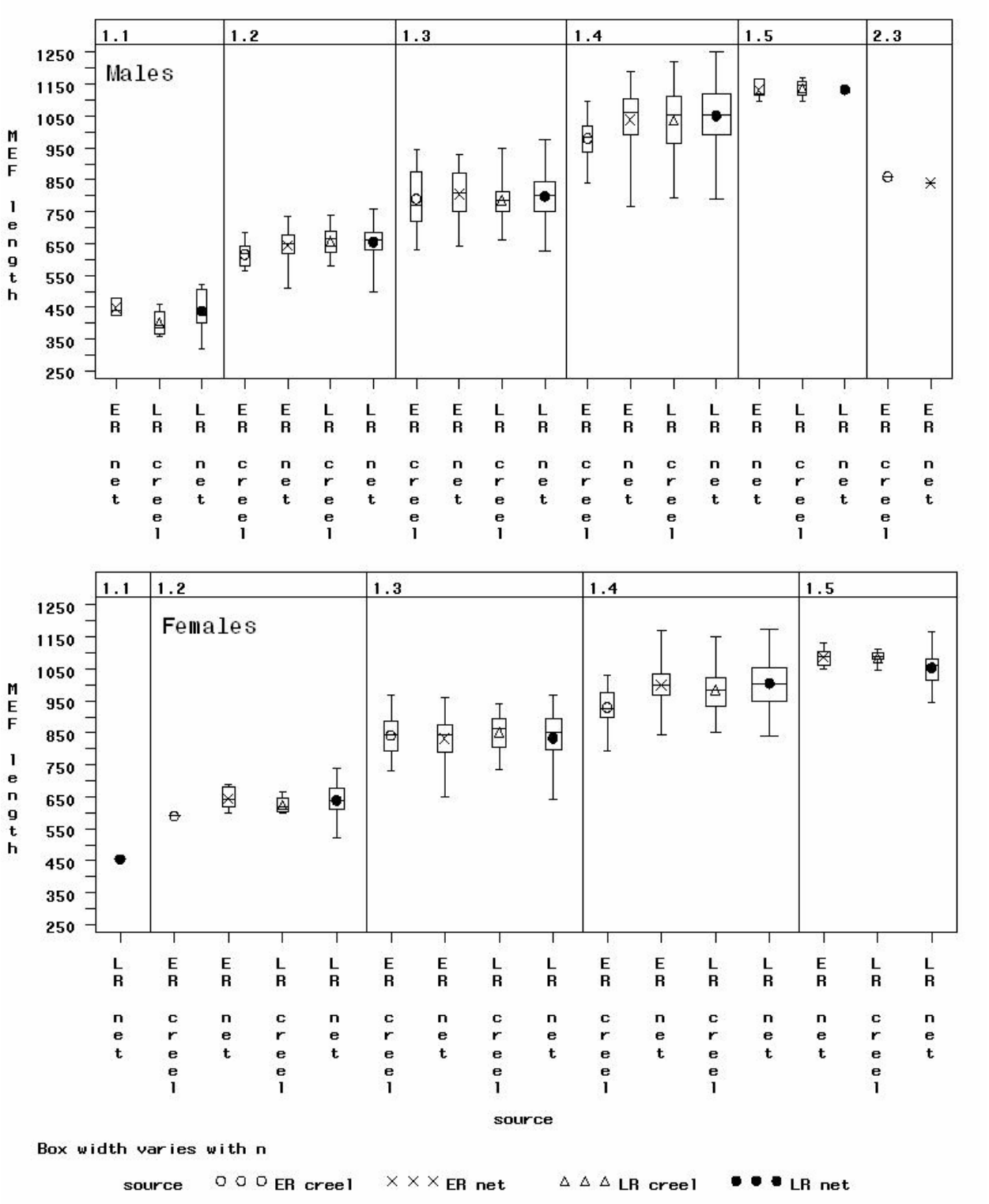


Figure 10.-Length distributions by age class and sex for early- and late-run Kenai River Chinook salmon sampled by the creel survey and the inriver gillnetting project, 2004.

Table 7.-MEF length of early-run Kenai River Chinook salmon, 2004.

Parameter	Age 1.1	1.2	1.3	1.4	1.5	2.3	Combined
Creel Survey							
Females							
Sample size		1	24	26			51
Mean MEF length		590	843	930			882
SE MEF length			12	11			12
Min MEF length		590	730	795			590
Max MEF length		590	970	1,030			1,030
Males							
Sample size		10	26	12		1	49
Mean MEF length		617	791	980		860	803
SE MEF length		13	19	21			21
Min MEF length		565	630	840		860	565
Max MEF length[a]		685	945	1,095		860	1,095
Combined							
Sample size		11	50	38		1	100
Mean MEF length		614	816	946		860	844
SE MEF length		12	12	11			12
Min MEF length		565	630	795		860	565
Max MEF length[a]		685	970	1,095		860	1,095
Inriver Gillnetting Survey							
Females							
Sample size		11	55	80	8		154
Mean MEF length		644	834	1,001	1,077		920
SE MEF length		9	9	6	12		10
Min MEF length		600	650	845	1,020		600
Max MEF length		690	960	1,170	1,130		1,170
Males							
Sample size	3	41	62	83	7	1	197
Mean MEF length	448	645	805	1,034	1,133	840	875
SE MEF length	16	8	9	10	10		13
Min MEF length	425	510	640	765	1,095	840	425
Max MEF length	480	735	930	1,190	1,165	840	1,190
Combined							
Sample size	3	52	117	163	15	1	351
Mean MEF length	448	645	819	1,018	1,103	840	894
SE MEF length	16	7	7	6	11		9
Min MEF length	425	510	640	765	1,020	840	425
Max MEF length	480	735	960	1,190	1,165	840	1,190

[a] The max MEF length fish was an illegally harvested male under the 44-55 in slot limit. The max legally harvested male was 1,025 mm MEF.

Table 8.-MEF length of late-run Kenai River Chinook salmon, 2004.

	Age						
Parameter	1.1	1.2	1.3	1.4	1.5	2.3	Combined
Creel Survey							
Females							
Sample size		4	22	102	5		133
Mean MEF length		625	852	984	1,085		954
SE MEF length		15	12	7	11		9
Min MEF length		600	735	850	1,045		600
Max MEF length		665	940	1,150	1,110		1,150
Males							
Sample size	4	24	64	76	4		172
Mean MEF length	401	658	787	1,038	1,139		879
SE MEF length	23	9	8	11	16		14
Min MEF length	360	580	660	795	1,095		360
Max MEF length	460	740	950	1,220	1,170		1,220
Combined							
Sample size	4	28	86	178	9		305
Mean MEF length	401	653	804	1,007	1,109		912
SE MEF length	23	8	7	6	13		9
Min MEF length	360	580	660	795	1,045		360
Max MEF length	460	740	950	1,220	1,170		1,220
Inriver Gillnetting Survey							
Females							
Sample size	1	34	56	280	9	1	381
Mean MEF length	455	639	834	1,005	1,066	945	947
SE MEF length		8	11	4	18		7
Min MEF length	455	520	640	840	990	945	455
Max MEF length	455	740	970	1,175	1,165	945	1,175
Males							
Sample size	9	101	176	263	3		552
Mean MEF length	438	655	799	1,051	1,133		889
SE MEF length	22	5	5	5	4		8
Min MEF length	320	500	625	790	1,125		320
Max MEF length	520	760	975	1,250	1,140		1,250
Combined							
Sample size	10	135	232	543	12	1	933
Mean MEF length	440	651	808	1,028	1,083	945	913
SE MEF length	20	5	5	4	16		6
Min MEF length	320	500	625	790	990	945	320
Max MEF length	520	760	975	1,250	1,165	945	1,250

Conversely, unguided angler effort, catch and harvest estimates from both runs have a small negative bias associated with not sampling unguided drift boats on Mondays. This bias is likely negligible in the early run and less than 4% in the late run.

The 44-55 in slot limit has been in place during the early-run sport fishery since 2003. The slot limit has been effective at protecting age-1.5 Chinook salmon (Figure 11). The slot limit has also reversed anglers long standing tendency to preferentially harvest age-1.4 Chinook salmon, because it protects some larger age-1.4 fish as well (Figure 11).

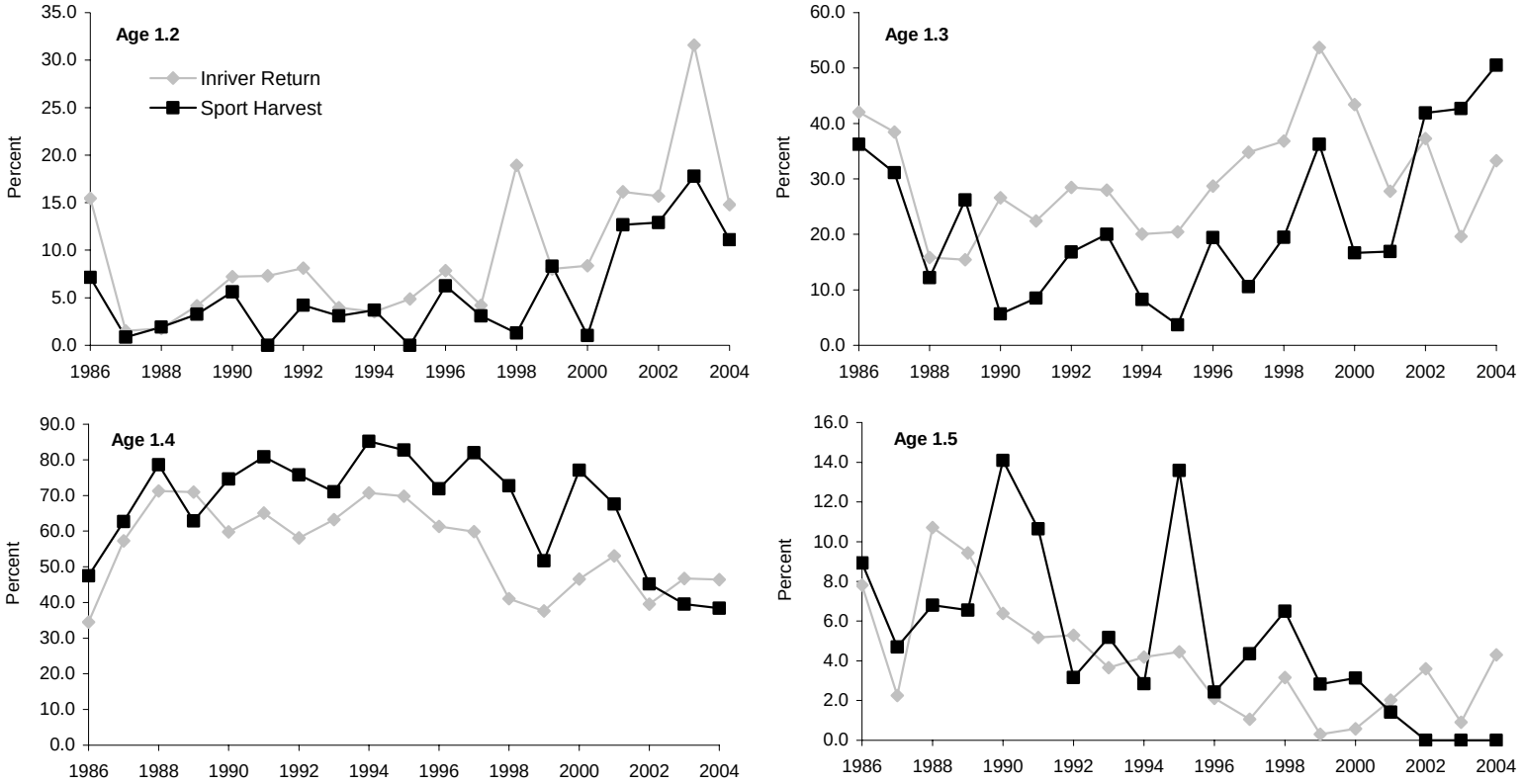


Figure 11.-Early-run Kenai River Chinook salmon sport harvest versus inriver return by age class, 1986-2004.

Note: A 44-55 in slot limit has been implemented during the early-run Kenai River Chinook salmon sport fishery since 2003.

INRIVER GILLNETTING

The use of multifiber mesh gillnets in 2002-2004 has increased the sampling efficiency of the inriver gillnetting project (proportion of Chinook salmon passage captured) compared to years when cable lay mesh was used (Figure 12). A primary concern regarding the changes in mesh material was a possible increase in the number of injured fish. Before 2002, Chinook salmon were only recorded as injured if they were observed with bleeding gills. Using cable lay nylon mesh in 2000 and 2001, 3.7% and 3.8% of early-run Chinook salmon and 1.1% and 5.5% of late-run Chinook salmon, respectively, were recorded with bleeding gills. Using multifiber nets in 2002, there was little increase in the frequency of bleeding gills (3.5% of early-run and 6.1% of late-run Chinook salmon). However, in 2003 and 2004 there was a increase in bleeding gills observed using multifiber nets. In 2003, 6.3% of the early-run Chinook salmon and 7.7% of the late-run Chinook salmon were observed with bleeding gills. In 2004, 6.8% of the early-run Chinook salmon and 6.9% of the late-run Chinook salmon were observed with bleeding gills.

Several programmatic changes were instituted along with the changes in mesh material. One of the most stressful on captured fish was changing the criteria for ending a drift. Before 2002, the net was pulled after the first Chinook salmon was caught. Since 2002, the net was pulled when the crew believed five fish were caught. The change is critical to the project's ability to calculate the ratio of Chinook salmon to total salmon captured. Unfortunately, this change increases handling time and may increase the likelihood of a capture-related injury. One way to reduce handling time while continuing to achieve project objectives would be to subsample the Chinook salmon captured. Fish selected for ASL sampling would be placed in the tagging cradle as usual, and fish omitted from ASL sampling would be counted and released.

One other concern with the programmatic changes instituted in 2002 pertains to the historic age composition estimates. Specifically, are age composition estimates generated before 2002 (using only the 7.5 in mesh) comparable with estimates generated since 2002 (using a combination of the 5.0 and 7.5 in meshes). The results from 2004 are similar to previous years (Reimer 2004a, 2004b) in that estimates of age composition for each mesh size show only small differences.

ACKNOWLEDGEMENTS

Thanks are due to those individuals involved with the continued success of this project. Tim McKinley oversaw the project as well as the Kenai River Chinook salmon fishery as a whole. The creel crew for 2004 was Stacie Mallette and Ivan Karic. The netting crew for 2004 was Amy Breakfield, Matt King, and Oralee Nudson. Steve Fleischman provided biometric assistance.

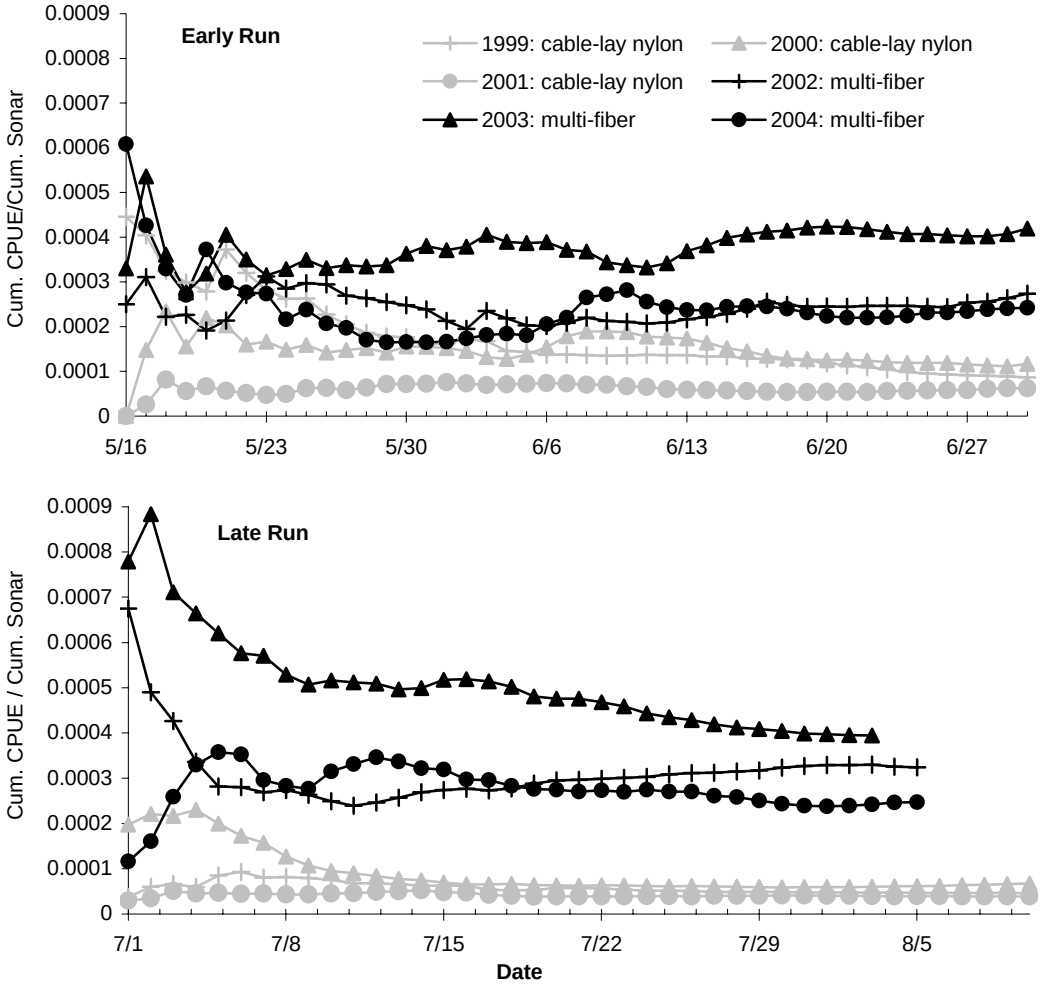


Figure 12.-Cumulative sampling efficiency (proportion of Chinook salmon passage captured) for the Kenai River Chinook salmon gillnetting project, 1999-2004.

Note: Changed from using dark green cable lay nylon to clear-steel blue multifiber nylon mesh nets in 2002.

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APPENDIX A. BOAT ANGLER COUNTS DURING THE KENAI RIVER CHINOOK SALMON SPORT FISHERY, 2004

Appendix A1.-Guided and unguided boat angler counts by location during the early-run Kenai River Chinook salmon sport fishery, 2004.

		Downstream[a]								Upstream[a]								Combined Strata							
	Day	Unguided Anglers				Guided Anglers				Unguided Anglers				Guided Anglers				Unguided Anglers				Guided Anglers			
Date	Type[b]	A[c]	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
5/16/2004	we/hol	0	0	0		0	0			17	15	2		22	0			17	15	2		22	0		
5/19/2004	wd	0	0	0		0	0			20	9	12		21	2			20	9	12		21	2		
5/21/2004	wd	0	0	0	0	0	0	0		23	5	13	9	17	17	8		23	5	13	9	17	17	8	
5/22/2004	we/hol	0	0	0		0	0			41	11	24	13	49	38			41	11	24		49	38		
5/23/2004	we/hol	0	0	0	0					21	28	13	5					21	28	13	5				
5/26/2004	wd	0	0	0	0		0	0		4	19	6	0		7	7		4	19	6	0		7	7	
5/28/2004	wd	0	2	0	0		0	0		0	22	25	6		46	16		0	24	25	6		46	16	
5/30/2004	we/hol	0	0	0	0					65	98	30	10					65	98	30	10				
5/31/2004	monday	0	0	0	0	0	0	0		66	57	31	7	47	30	26	4	66	57	31	7	47	30	26	
6/2/2004	wd	0	0	0	0	0	0	0		13	29	37	15	69	42	22		13	29	37	15	69	42	22	
6/4/2004	wd	0	0	3	0		0	0		7	32	35	50		106	48		7	32	38	50		106	48	
6/5/2004	we/hol	0	0	5	0	0	0	0		62	77	46	56	143	71	34		62	77	51	56	143	71	34	
6/6/2004	we/hol	0	3	3	0					66	99	69	28					66	102	72	28				
6/8/2004	wd	0	0	0	0		0	0		38	38	25	30		174	87		38	38	25	30		174	87	
6/11/2004	wd	0	0	0	0	0	0			68	77	35	9	170	111			68	77	35	9	170	111		
6/12/2004	we/hol	0	4	0	0		0	0		18	83	146	72		160	94		18	87	146	72		160	94	
6/13/2004	we/hol	2	2	0	0					59	217	138	45					61	219	138	45				
6/15/2004	wd	0	0	0	0	0	11	0		73	34	47	10	259	115	48		73	34	47	10	259	126	48	
6/18/2004	wd	0	0	1	0		0	0		5	31	32	29		98	33		5	31	33	29		98	33	
6/19/2004	we/hol	0	5	0	0	0	14			84	80	53	12	106	81			84	85	53	12	106	95		
6/20/2004	we/hol	0	0	6	0					7	108	81	39					7	108	87	39				
6/23/2004	wd	0	0	0	0		0	3		8	34	57	32		204	103		8	34	57	32		204	106	
6/25/2004	wd	0	2	0	0	2	0	0		66	74	38	33	258	183	49		66	76	38	33	260	183	49	
6/26/2004	we/hol	1	0	7	4	0	0	0		84	104	65	33	254	165	66		85	104	72	37	254	165	66	
6/27/2004	we/hol	0	2	5	0					94	128	54	10					94	130	59	10				
6/29/2004	wd	0	0	0	0		0	0		21	70	40	29		242	91		21	70	40	29		242	91	
	Minimum		0				0				0				0				0				0		
	Mean		1				1				43				84				43				87		
	Maximum		7				14				217				259				219				260		

[a] Downstream = Warren Ames Bridge to the Chinook salmon sonar site, Upstream = Chinook salmon sonar site to the Soldotna Bridge.

[b] wd = weekday, we/hol = weekend/holiday.

[c] A = 0400-0859 hours, B = 0900-1359 hours, C = 1400-1959 hours, D = 2000-2359 hours.

Appendix A2.-Guided and unguided boat angler counts by location during the late-run Kenai River Chinook salmon sport fishery, 2004.

		Downstream[a]								Upstream[a]								Combined Strata							
	Day	Unguided Anglers				Guided Anglers				Unguided Anglers				Guided Anglers				Unguided Anglers				Guided Anglers			
Date	Type[b]	A[c]	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
7/1/2004	wd	3	9		0	11	18			199	104		183	433	316			202	113		183	444	334		
7/3/2004	we/hol	4	11	0	6	4	7	0		199	171	222	103	356	231	144		203	182	222	109	360	238	144	
7/4/2004	we/hol	5	8	6	0					340	303	208	134					345	311	214	134				
7/6/2004	wd	2	4	14	0		2	33		152	217	95	157		481	260		154	221	109	157		483	293	
7/9/2004	wd	0	13	7	43		103	53		59	202	85	160		487	211		59	215	92	203		590	264	
7/10/2004	we/hol	33	37	8	6	113	43			220	230	120	147	282	328			253	267	128	153	395	371		
7/11/2004	we/hol	38	89	28	22					393	410	244	244					431	499	272	266				
7/13/2004	wd	0	31	30	8		144	91		275	291	237	203		345	280		275	322	267	211		489	371	
7/16/2004	wd	0	66	24	6		237	161		84	164	204	188		294	189		84	230	228	194		531	350	
7/17/2004	we/hol	2	79	17	7		224	76		135	290	202	302		259	202		137	369	219	309		483	278	
7/18/2004	we/hol	20	64	32	9					559	520	284	313					579	584	316	322				
7/20/2004	wd	90	35	19		124	150			532	262	309	26	499	366			622	297	328		623	516		
7/22/2004	wd	12	15	36	8	24	48	84		314	144	168	235	552	186	209		326	159	204	243	576	234	293	
7/24/2004	we/hol	43	20	35	4	77	24	41		307	278	168	276	427	157	146		350	298	203	280	504	181	187	
7/25/2004	we/hol	0	113	64	33					56	532	294	186					56	645	358	219				
7/27/2004	wd	0	49	29	25		106	68		157	277	208	113		280	342		157	326	237	138		386	410	
7/29/2004	wd	4	12	13	0	35	45			266	143	184	96	412	305			270	155	197	96	447	350		
7/31/2004	we/hol	14	38	11	16	10	9	4		284	259	281	381	460	238	198		298	297	292	397	470	247	202	
	Minimum		0				0				26				144				56				144		
	Mean		22				68				229				309				254				376		
	Maximum		113				237				559				552				645				623		

[a] Downstream = Warren Ames Bridge to the Chinook salmon sonar site, Upstream = Chinook salmon sonar site to the Soldotna Bridge.

[b] wd = weekday, we/hol = weekend/holiday.

[c] A = 0400-0859 hours, B = 0900-1359 hours, C = 1400-1959 hours, D = 2000-2359 hours.

APPENDIX B. ANGLER EFFORT, CATCH AND HARVEST ESTIMATES BY LOCATION DURING THE KENAI RIVER CHINOOK SALMON SPORT FISHERY, 2004

Appendix B1.-Daily unguided boat angler CPUE, HPUE, effort, catch and harvest estimates by location during the early-run Kenai River Chinook salmon sport fishery, 2004.

		Angler interview[a]					Angler count[a]													
							Downstream[b]								Upstream[b]					
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Type[c]	n	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
5/16/2004	we/hol	18	0.018	0.018	0.000	0.000	3	0.0	0	0	0	0	0	0	3	11.3	227	76	4	4	0	0
5/19/2004	wd	10	0.131	0.071	0.041	0.045	3	0.0	0	0	0	0	0	0	3	13.7	273	66	36	21	11	12
5/21/2004	wd	18	0.037	0.027	0.018	0.019	4	0.0	0	0	0	0	0	0	4	12.5	250	82	9	7	5	5
5/22/2004	we/hol	45	0.016	0.009	0.005	0.005	3	0.0	0	0	0	0	0	0	4	22.3	445	141	7	4	2	2
5/23/2004	we/hol	25	0.022	0.015	0.000	0.000	4	0.0	0	0	0	0	0	0	4	16.8	335	75	7	5	0	0
5/26/2004	wd	10	0.018	0.018	0.000	0.000	4	0.0	0	0	0	0	0	0	4	7.3	145	85	3	3	0	0
5/28/2004	wd	7	0.119	0.050	0.000	0.000	4	0.5	10	12	1	1	0	0	4	13.3	265	119	32	19	0	0
5/30/2004	we/hol	22	0.021	0.015	0.021	0.015	4	0.0	0	0	0	0	0	0	4	50.8	1,015	319	22	16	22	16
5/31/2004	we/hol	20	0.143	0.048	0.095	0.041	4	0.0	0	0	0	0	0	0	4	40.3	805	149	115	44	76	35
6/2/2004	wd	21	0.034	0.020	0.034	0.020	4	0.0	0	0	0	0	0	0	4	23.5	470	116	16	10	16	10
6/4/2004	wd	31	0.064	0.021	0.048	0.019	4	0.8	15	17	1	1	1	1	4	31.0	620	120	39	15	30	13
6/5/2004	we/hol	33	0.024	0.014	0.016	0.011	4	1.3	25	29	1	1	0	0	4	60.3	1,205	146	29	17	19	14
6/6/2004	we/hol	45	0.050	0.015	0.040	0.014	4	1.5	30	17	2	1	1	1	4	65.5	1,310	247	66	23	52	21
6/8/2004	wd	20	0.076	0.037	0.061	0.033	4	0.0	0	0	0	0	0	0	4	32.8	655	57	50	24	40	22
6/11/2004	wd	34	0.055	0.016	0.030	0.013	4	0.0	0	0	0	0	0	0	4	47.3	945	205	52	19	29	14
6/12/2004	we/hol	17	0.041	0.032	0.041	0.032	4	1.0	20	23	1	1	1	1	4	79.8	1,595	477	66	53	66	53
6/13/2004	we/hol	61	0.040	0.013	0.036	0.012	4	1.0	20	8	1	0	1	0	4	114.8	2,295	815	93	43	82	40
6/15/2004	wd	26	0.031	0.019	0.031	0.019	4	0.0	0	0	0	0	0	0	4	41.0	820	226	25	17	25	17
6/18/2004	wd	11	0.022	0.022	0.022	0.022	4	0.3	5	6	0	0	0	0	4	24.3	485	107	11	11	11	11
6/19/2004	we/hol	26	0.000	0.000	0.000	0.000	4	1.3	25	29	0	0	0	0	4	57.3	1,145	201	0	0	0	0
6/20/2004	we/hol	29	0.000	0.000	0.000	0.000	4	1.5	30	35	0	0	0	0	4	58.8	1,175	460	0	0	0	0
6/23/2004	wd	13	0.020	0.022	0.020	0.022	4	0.0	0	0	0	0	0	0	4	32.8	655	175	13	14	13	14
6/25/2004	wd	16	0.000	0.000	0.000	0.000	4	0.5	10	12	0	0	0	0	4	52.8	1,055	152	0	0	0	0
6/26/2004	we/hol	12	0.031	0.030	0.000	0.000	4	3.0	60	31	2	2	0	0	4	71.5	1,430	222	45	43	0	0
6/27/2004	we/hol	34	0.024	0.013	0.008	0.008	4	1.8	35	25	1	1	0	0	4	71.5	1,430	378	34	21	11	11
6/29/2004	wd	17	0.018	0.018	0.018	0.018	4	0.0	0	0	0	0	0	0	4	40.0	800	239	14	14	14	14
Min		7	0.000		0.000		3	0.0	0		0		0		3	7.3	145		0		0	
Mean		24	0.041		0.023		4	0.5	11		0		0		4	42.0	840		30		20	
Max		61	0.143		0.095		4	3.0	60		2		1		4	114.8	2,295		115		82	

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

[b] Downstream = Warren Ames Bridge to the Chinook salmon sonar site, Upstream = Chinook salmon sonar site to the Soldotna Bridge.

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

Appendix B2.-Daily guided boat angler CPUE, HPUE, effort, catch and harvest estimates by location during the early-run Kenai River Chinook salmon sport fishery, 2004.

		Angler interview[a]					Angler count[a]													
							Downstream[b]								Upstream[b]					
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Type[c]	n[d]	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
5/16/2004	we/hol	7	0.036	0.038	0.036	0.038	2	0.0	0	0	0	0	0	0	2	11.0	132	132	5	5	5	5
5/19/2004	wd	0	0.065	0.078	0.065	0.078	2	0.0	0	0	0	0	0	0	2	11.5	138	114	9	10	9	10
5/21/2004	wd	4	0.065	0.078	0.065	0.078	3	0.0	0	0	0	0	0	0	3	14.0	168	31	11	13	11	13
5/22/2004	we/hol	0	0.065	0.078	0.065	0.078	2	0.0	0	0	0	0	0	0	2	43.5	522	66	34	41	34	41
5/26/2004	wd	3	0.017	0.094	0.017	0.094	2	0.0	0	0	0	0	0	0	2	7.0	84	0	1	8	1	8
5/28/2004	wd	4	0.017	0.094	0.017	0.094	2	0.0	0	0	0	0	0	0	2	31.0	372	180	6	31	6	31
5/31/2004	we/hol	4	0.017	0.094	0.017	0.094	3	0.0	0	0	0	0	0	0	3	34.3	412	60	7	38	7	38
6/2/2004	wd	22	0.110	0.024	0.058	0.023	3	0.0	0	0	0	0	0	0	3	44.3	532	116	59	18	31	14
6/4/2004	wd	14	0.027	0.016	0.018	0.013	2	0.0	0	0	0	0	0	0	2	77.0	924	348	25	16	17	13
6/5/2004	we/hol	5	0.143	0.069	0.079	0.071	3	0.0	0	0	0	0	0	0	3	82.7	992	280	142	77	78	71
6/8/2004	wd	42	0.110	0.023	0.067	0.017	2	0.0	0	0	0	0	0	0	2	130.5	1,566	522	173	67	106	43
6/11/2004	wd	18	0.188	0.054	0.127	0.053	2	0.0	0	0	0	0	0	0	2	140.5	1,686	354	317	111	214	99
6/12/2004	we/hol	15	0.124	0.036	0.061	0.023	2	0.0	0	0	0	0	0	0	2	127.0	1,524	396	189	73	93	42
6/15/2004	wd	35	0.070	0.015	0.036	0.012	3	3.7	44	54	3	4	2	2	3	140.7	1,688	550	117	45	62	28
6/18/2004	wd	12	0.000	0.000	0.000	0.000	2	0.0	0	0	0	0	0	0	2	65.5	786	390	0	0	0	0
6/19/2004	we/hol	14	0.014	0.014	0.014	0.014	2	7.0	84	84	1	1	1	1	2	93.5	1,122	150	16	16	16	16
6/23/2004	wd	25	0.008	0.008	0.000	0.000	2	1.5	18	18	0	0	0	0	2	153.5	1,842	606	14	15	0	0
6/25/2004	wd	6	0.030	0.046	0.030	0.046	3	0.7	8	7	0	0	0	0	3	163.3	1,960	532	59	88	59	88
6/26/2004	we/hol	43	0.046	0.012	0.028	0.010	3	0.0	0	0	0	0	0	0	3	161.7	1,940	461	89	31	54	22
6/29/2004	wd	22	0.072	0.020	0.045	0.016	2	0.0	0	0	0	0	0	0	2	166.5	1,998	906	143	74	91	50
Min		0	0.000		0.000		2	0.0	0		0		0		2	7.0	84		0		0	
Mean		15	0.061		0.042		2	0.6	8		0		0		2	85.0	1,019		71		45	
Max		43	0.188		0.127		3	7.0	84		3		2		3	166.5	1,998		317		214	

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

[b] Downstream = Warren Ames Bridge to the Chinook salmon sonar site, Upstream = Chinook salmon sonar site to the Soldotna Bridge.

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

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

Appendix B3.-Daily unguided boat angler CPUE, HPUE, effort, catch and harvest estimates by location during the late-run Kenai River Chinook salmon sport fishery, 2004.

		Angler interview[a]					Angler count[a]													
							Downstream[b]								Upstream[b]					
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Type[c]	n	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
7/1/2004	wd	54	0.079	0.022	0.041	0.012	3	4.0	80	62	6	5	3	3	3	162.0	3,240	713	256	90	134	49
7/3/2004	we/hol	55	0.038	0.012	0.009	0.007	4	5.3	105	59	4	2	1	1	4	173.8	3,475	541	131	47	33	23
7/4/2004	we/hol	55	0.067	0.018	0.022	0.010	4	4.8	95	29	6	3	2	1	4	246.3	4,925	514	332	95	110	51
7/6/2004	wd	68	0.082	0.018	0.047	0.014	4	5.0	100	71	8	6	5	3	4	155.3	3,105	619	256	75	146	51
7/9/2004	wd	38	0.029	0.014	0.029	0.014	4	15.8	315	158	9	6	9	6	4	126.5	2,530	814	72	41	72	41
7/10/2004	we/hol	33	0.044	0.018	0.044	0.018	4	21.0	420	120	19	9	19	9	4	179.3	3,585	464	159	68	159	68
7/11/2004	we/hol	78	0.086	0.019	0.041	0.012	4	44.3	885	326	76	32	36	16	4	322.8	6,455	681	554	133	265	80
7/13/2004	wd	92	0.108	0.021	0.084	0.016	4	17.3	345	155	37	18	29	14	4	251.5	5,030	269	542	107	420	85
7/16/2004	wd	76	0.049	0.014	0.028	0.011	4	24.0	480	328	23	17	14	10	4	160.0	3,200	371	156	47	91	36
7/17/2004	we/hol	38	0.106	0.024	0.053	0.019	4	26.3	525	406	55	44	28	22	4	232.3	4,645	834	491	139	245	95
7/18/2004	we/hol	126	0.046	0.009	0.029	0.007	4	31.3	625	241	29	12	18	8	4	419.0	8,380	984	382	87	245	65
7/20/2004	wd	72	0.037	0.008	0.028	0.008	3	48.0	960	331	36	14	27	12	4	282.3	5,645	1,608	210	75	157	62
7/22/2004	wd	39	0.056	0.015	0.028	0.013	4	17.8	355	143	20	9	10	6	4	215.3	4,305	752	241	78	119	57
7/24/2004	we/hol	34	0.006	0.006	0.006	0.006	4	25.5	510	169	3	3	3	3	4	257.3	5,145	640	29	30	29	30
7/25/2004	we/hol	58	0.042	0.015	0.042	0.015	4	52.5	1,050	519	45	26	45	26	4	267.0	5,340	2,217	226	120	226	120
7/27/2004	wd	49	0.065	0.013	0.034	0.011	4	25.8	515	217	33	15	17	9	4	188.8	3,775	685	244	65	127	47
7/29/2004	wd	38	0.126	0.029	0.084	0.023	4	7.3	145	62	18	9	12	6	4	172.3	3,445	640	435	126	288	94
7/31/2004	we/hol	59	0.059	0.020	0.028	0.009	4	19.8	395	149	23	11	11	5	4	301.3	6,025	430	356	122	168	58
Min		33	0.006		0.006		3	4.0	80		3		1		3	126.5	2,530		29		29	
Mean		59	0.062		0.038		4	22.0	439		25		16		4	228.5	4,569		282		169	
Max		126	0.126		0.084		4	52.5	1,050		76		45		4	419.0	8,380		554		420	

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

[b] Downstream = Warren Ames Bridge to the Chinook salmon sonar site, Upstream = Chinook salmon sonar site to the Soldotna Bridge.

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

Appendix B4.-Daily guided boat angler CPUE, HPUE, effort, catch and harvest estimates by location during the late-run Kenai River Chinook salmon sport fishery, 2004.

		Angler interview[a]					Angler count[a]													
							Downstream[b]								Upstream[b]					
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Type[c]	n	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
7/1/2004	wd	57	0.142	0.022	0.083	0.017	2	14.5	174	42	25	7	14	5	2	374.5	4,494	702	639	140	372	96
7/3/2004	we/hol	34	0.080	0.017	0.037	0.014	3	3.7	44	26	4	2	2	1	3	243.7	2,924	528	235	65	108	45
7/6/2004	wd	37	0.147	0.025	0.097	0.022	2	17.5	210	186	31	27	20	18	2	370.5	4,446	1,326	654	221	431	159
7/9/2004	wd	66	0.062	0.012	0.039	0.010	2	78.0	936	300	58	21	36	15	2	349.0	4,188	1,656	259	112	161	75
7/10/2004	we/hol	37	0.149	0.036	0.098	0.026	2	78.0	936	420	139	69	92	47	2	305.0	3,660	276	545	138	359	99
7/13/2004	wd	89	0.233	0.027	0.119	0.017	2	117.5	1,410	318	328	83	168	45	2	312.5	3,750	390	872	135	447	79
7/16/2004	wd	57	0.137	0.021	0.112	0.019	2	199.0	2,388	456	328	80	267	68	2	241.5	2,898	630	398	105	324	89
7/17/2004	we/hol	59	0.170	0.029	0.109	0.020	2	150.0	1,800	888	307	158	197	102	2	230.5	2,766	342	472	98	302	67
7/20/2004	wd	45	0.110	0.021	0.075	0.019	2	137.0	1,644	156	180	38	124	34	2	432.5	5,190	798	570	139	391	116
7/22/2004	wd	43	0.076	0.020	0.070	0.020	3	52.0	624	150	47	17	44	16	3	315.7	3,788	1,270	287	121	266	114
7/24/2004	we/hol	26	0.173	0.043	0.121	0.030	3	47.3	568	193	98	41	69	28	3	243.3	2,920	936	506	202	355	140
7/27/2004	wd	69	0.123	0.018	0.080	0.016	2	87.0	1,044	228	128	34	84	25	2	311.0	3,732	372	457	82	299	68
7/29/2004	wd	35	0.130	0.028	0.099	0.027	2	40.0	480	60	63	15	47	14	2	358.5	4,302	642	561	144	424	131
7/31/2004	we/hol	41	0.070	0.015	0.045	0.012	3	7.7	92	18	6	2	4	1	3	298.7	3,584	781	249	75	161	56
Min		26	0.062		0.037		2	3.7	44		4		2		2	230.5	2,766		235		108	
Mean		50	0.129		0.085		2	73.5	882		124		83		2	313.3	3,760		479		314	
Max		89	0.233		0.121		3	199.0	2,388		328		267		3	432.5	5,190		872		447	

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

[b] Downstream = Warren Ames Bridge to the Chinook salmon sonar site, Upstream = Chinook salmon sonar site to the Soldotna Bridge.

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

APPENDIX C. TEMPORALLY STRATIFIED ANGLER EFFORT, CATCH AND HARVEST ESTIMATES BY LOCATION DURING THE KENAI RIVER CHINOOK SALMON SPORT FISHERY, 2004

Appendix C1.-Angler effort, catch, and harvest estimates by location during the early-run Kenai River Chinook salmon sport fishery, 2004.

	Downstream[a] Creel Estimates						Upstream[a] Creel Estimates								
	Effort		Catch		Harvest		Effort		Catch		Harvest		% Downstream		
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Effort	Catch	Harvest
16 May															
Guided weekends	0	0	0	0	0	0	132	132	5	5	5	5	0.0%	0.0%	0.0%
Unguided weekends	0	0	0	0	0	0	227	76	4	4	0	0	0.0%	0.0%	N/A
18-23 May															
Guided weekdays	0	0	0	0	0	0	612	172	39	22	39	22	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	522	66	34	38	34	38	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	1,047	152	90	48	31	21	0.0%	0.0%	0.0%
Unguided weekends	0	0	0	0	0	0	780	160	15	7	2	2	0.0%	0.0%	0.0%
25-31 May															
Guided weekdays	0	0	0	0	0	0	912	480	15	47	15	47	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	824	86	14	56	14	56	0.0%	0.0%	0.0%
Unguided weekdays	20	22	2	3	0	0	820	268	68	49	0	0	2.4%	3.4%	N/A
Unguided weekends	0	0	0	0	0	0	2,730	468	205	99	147	67	0.0%	0.0%	0.0%
1-6 June															
Guided weekdays	0	0	0	0	0	0	2,912	759	167	59	96	33	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	992	280	142	77	78	71	0.0%	0.0%	0.0%
Unguided weekdays	30	32	2	2	1	2	2,180	317	111	41	91	30	1.4%	1.7%	1.1%
Unguided weekends	55	34	2	1	2	1	2,515	287	95	28	71	25	2.1%	2.2%	2.7%
8-13 June															
Guided weekdays	0	0	0	0	0	0	6,504	908	980	274	640	216	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	1,524	396	189	73	93	42	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	3,200	509	204	44	138	40	0.0%	0.0%	0.0%
Unguided weekends	40	24	2	1	2	1	3,890	944	159	68	148	66	1.0%	1.0%	1.3%
15-20 June															
Guided weekdays	88	98	6	7	3	4	4,948	1,593	235	178	123	95	1.7%	2.5%	2.4%
Guided weekends	84	84	1	1	1	1	1,122	150	16	16	16	16	7.0%	7.0%	5.8%
Unguided weekdays	10	11	0	0	0	0	2,610	591	72	35	72	35	0.4%	0.3%	0.3%
Unguided weekends	55	45	0	0	0	0	2,320	502	0	0	0	0	2.3%	N/A	N/A
22-27 June															
Guided weekdays	52	31	1	0	0	1	7,604	1,153	147	141	119	150	0.7%	0.5%	0.4%
Guided weekends	0	0	0	0	0	0	1,940	461	89	31	54	22	0.0%	0.0%	0.0%
Unguided weekdays	20	22	0	0	0	0	3,420	654	26	28	26	28	0.6%	0.0%	0.0%
Unguided weekends	95	40	3	2	0	0	2,860	438	79	47	11	11	3.2%	3.3%	2.4%

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	Downstream Creel Estimates						Upstream Creel Estimates						% Downstream		
	Effort		Catch		Harvest		Effort		Catch		Harvest				
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Effort	Catch	Harvest
29-30 June															
Guided weekdays	0	0	0	0	0	0	3,996	1,281	287	105	181	71	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	1,600	338	29	20	29	20	0.0%	0.0%	0.0%
Day Type Subtotals															
Guided weekdays	140	103	7	7	3	4	27,488	2,677	1,871	379	1,213	296	0.5%	0.4%	0.3%
Guided weekends	84	84	1	1	1	1	7,056	707	487	131	294	110	1.2%	0.2%	0.3%
Unguided weekdays	80	46	5	3	1	2	14,877	1,160	601	104	387	72	0.5%	0.7%	0.3%
Unguided weekends	245	73	6	2	4	1	15,322	1,292	556	132	380	98	1.6%	1.1%	1.1%
Angler Type Subtotals															
Guided	224	133	8	7	4	4	34,544	2,769	2,358	401	1,507	316	0.6%	0.3%	0.3%
% guided	41%		42%		45%		53%		67%		66%				
Unguided	325	87	11	4	5	2	30,198	1,736	1,157	168	768	122	1.1%	0.9%	0.7%
% unguided	59%		58%		55%		47%		33%		34%				
Early-run Total	549	159	19	8	10	4	64,742	3,268	3,515	435	2,275	338	0.8%	0.5%	0.4%

[a] Downstream = Warren Ames Bridge to the Chinook salmon sonar site, Upstream = Chinook salmon sonar site to the Soldotna Bridge

Appendix C2.-Angler effort, catch, and harvest estimates by location during the late-run Kenai River Chinook salmon sport fishery, 2004.

	Downstream[a] Creel Estimates						Upstream[a] Creel Estimates						% Downstream		
	Effort		Catch		Harvest		Effort		Catch		Harvest				
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Effort	Catch	Harvest
1-4 July															
Guided weekdays	348	59	49	10	29	6	8,988	993	1,278	198	744	136	3.7%	3.7%	3.7%
Guided weekends	44	26	4	2	2	1	2,924	528	235	65	108	45	1.5%	1.5%	1.5%
Unguided weekdays	160	88	13	7	7	4	6,480	1,009	511	127	268	69	2.4%	2.4%	2.4%
Unguided weekends	200	65	10	4	3	1	8,400	746	463	106	143	56	2.3%	2.2%	2.1%
6-11 July															
Guided weekdays	2,292	1,142	178	62	113	40	17,268	3,022	1,826	659	1,185	456	11.7%	8.9%	8.7%
Guided weekends	936	420	139	69	92	47	3,660	276	545	138	359	99	20.4%	20.4%	20.4%
Unguided weekdays	830	390	34	12	27	11	11,270	1,659	657	287	436	139	6.9%	5.0%	5.9%
Unguided weekends	1,305	347	95	33	55	19	10,040	824	713	150	424	105	11.5%	11.7%	11.5%
13-18 July															
Guided weekdays	7,596	1,591	1,312	162	870	181	13,296	1,597	2,541	712	1,542	242	36.4%	34.1%	36.1%
Guided weekends	1,800	888	307	158	197	102	2,766	342	472	98	302	67	39.4%	39.4%	39.4%
Unguided weekdays	1,650	547	121	40	85	32	16,460	2,668	1,396	570	1,022	484	9.1%	8.0%	7.7%
Unguided weekends	1,150	472	84	45	46	24	13,025	1,290	873	164	491	115	8.1%	8.8%	8.6%
20-25 July															
Guided weekdays	4,536	1,475	455	197	335	125	17,956	2,904	1,712	477	1,314	290	20.2%	21.0%	20.3%
Guided weekends	568	193	98	41	69	28	2,920	936	506	202	355	140	16.3%	16.3%	16.3%
Unguided weekdays	2,630	996	111	33	73	30	19,900	3,146	902	159	552	131	11.7%	11.0%	11.7%
Unguided weekends	1,560	545	47	26	47	26	10,485	2,308	255	123	255	123	13.0%	15.7%	15.7%
27-31 July															
Guided weekdays	3,048	864	381	106	262	65	16,068	1,323	2,036	276	1,447	274	15.9%	15.8%	15.3%
Guided weekends	92	18	6	2	4	1	3,584	781	249	75	161	56	2.5%	2.5%	2.5%
Unguided weekdays	1,320	613	103	33	59	17	14,440	1,406	1,358	336	830	271	8.4%	7.1%	6.6%
Unguided weekends	395	149	23	11	11	5	6,025	430	356	122	168	58	6.2%	6.2%	6.2%
Day Type Subtotals															
Guided weekdays	17,820	2,600	2,375	284	1,609	233	73,576	4,780	9,393	1,134	6,232	666	19.5%	20.2%	20.5%
Guided weekends	3,440	1,002	555	177	363	116	15,854	1,399	2,007	281	1,286	198	17.8%	21.7%	22.0%
Unguided weekdays	6,590	1,352	383	63	251	49	68,550	4,771	4,824	749	3,108	591	8.8%	7.4%	7.5%
Unguided weekends	4,610	817	260	63	163	40	47,975	2,900	2,660	301	1,481	214	8.8%	8.9%	9.9%
Angler Type Subtotals															
Guided	21,260	2,786	2,930	335	1,973	260	89,430	4,981	11,399	1,168	7,518	695	19.2%	20.4%	20.8%
% Guided	65.5%		82.0%		82.7%		43.4%		60.4%		62.1%				
Unguided	11,200	1,579	642	89	413	63	116,525	5,583	7,484	808	4,589	629	8.8%	7.9%	8.3%
% Unguided	34.5%		18.0%		17.3%		56.6%		39.6%		37.9%				
Late-run Total	32,460	3,203	3,572	346	2,386	268	205,955	7,482	18,883	1,420	12,107	937	13.6%	15.9%	16.5%

[a] Downstream = Warren Ames Bridge to the Chinook salmon sonar site, Upstream = Chinook salmon sonar site to the Soldotna Bridge.

APPENDIX D. INRIVER GILLNETTING CATCH, CPUE, AND SPECIES PROPORTION DURING THE KENAI RIVER CHINOOK SALMON SPORT FISHERY, 2004

Appendix D1.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 5.0 in mesh gillnet during the early-run Kenai River Chinook salmon sport fishery, 2004.

			Total	Chinook			Sockeye			Dolly Varden			Chinook/	
Date	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
5/16/2004	12	104	3	3	0.029	0.015	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/17/2004	14	176	1	1	0.006	0.006	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/18/2004	10	94	2	1	0.011	0.011	1	0.011	0.011	0	0.000	0.000	0.50	0.37
5/19/2004	10	90	1	1	0.011	0.011	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/20/2004	10	93	3	2	0.022	0.014	1	0.011	0.011	0	0.000	0.000	0.67	0.29
5/21/2004	10	91	4	2	0.022	0.015	2	0.022	0.015	0	0.000	0.000	0.50	0.19
5/22/2004	10	91	3	2	0.022	0.022	1	0.011	0.011	0	0.000	0.000	0.67	0.33
5/23/2004	8	67	3	3	0.045	0.021	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/24/2004	12	100	7	0	0.000	0.000	7	0.070	0.049	0	0.000	0.000	0.00	0.00
5/25/2004	10	75	9	4	0.054	0.021	5	0.067	0.030	0	0.000	0.000	0.44	0.17
5/26/2004	8	63	5	1	0.016	0.016	4	0.064	0.025	0	0.000	0.000	0.20	0.15
5/27/2004	8	65	16	4	0.061	0.033	12	0.184	0.040	0	0.000	0.000	0.25	0.12
5/28/2004	10	72	9	0	0.000	0.000	9	0.125	0.073	0	0.000	0.000	0.00	0.00
5/29/2004	10	72	7	2	0.028	0.019	5	0.070	0.031	0	0.000	0.000	0.29	0.19
5/30/2004	12	86	8	1	0.012	0.012	7	0.081	0.031	0	0.000	0.000	0.13	0.11
5/31/2004	12	93	7	2	0.022	0.014	5	0.054	0.028	0	0.000	0.000	0.29	0.14
6/1/2004	12	87	18	4	0.046	0.019	14	0.160	0.056	0	0.000	0.000	0.22	0.08
6/2/2004	8	67	7	1	0.015	0.015	6	0.089	0.039	0	0.000	0.000	0.14	0.15
6/3/2004	10	80	1	1	0.012	0.013	0	0.000	0.000	0	0.000	0.000	1.00	0.00
6/4/2004	8	61	4	0	0.000	0.000	4	0.066	0.024	0	0.000	0.000	0.00	0.00
6/5/2004	10	83	11	2	0.024	0.015	9	0.108	0.054	0	0.000	0.000	0.18	0.10
6/6/2004	8	62	40	7	0.112	0.060	33	0.530	0.257	0	0.000	0.000	0.18	0.08
6/7/2004	6	47	5	4	0.085	0.042	1	0.021	0.021	0	0.000	0.000	0.80	0.16
6/8/2004	6	46	19	11	0.238	0.081	8	0.173	0.080	0	0.000	0.000	0.58	0.11
6/9/2004	6	55	13	6	0.109	0.039	7	0.128	0.048	0	0.000	0.000	0.46	0.12
6/10/2004	6	47	7	4	0.085	0.045	3	0.064	0.028	0	0.000	0.000	0.57	0.20
6/11/2004	12	88	22	3	0.034	0.018	19	0.215	0.067	0	0.000	0.000	0.14	0.06
6/12/2004	8	63	4	1	0.016	0.016	3	0.048	0.023	0	0.000	0.000	0.25	0.23
6/13/2004	10	80	10	4	0.050	0.028	6	0.075	0.034	0	0.000	0.000	0.40	0.16
6/14/2004	10	78	4	3	0.039	0.020	0	0.000	0.000	1	0.013	0.018	0.75	0.16
6/15/2004	6	46	10	9	0.194	0.094	1	0.022	0.022	0	0.000	0.000	0.90	0.05
6/16/2004	10	75	9	5	0.067	0.023	4	0.054	0.030	0	0.000	0.000	0.56	0.14
6/17/2004	10	77	15	6	0.078	0.035	9	0.117	0.056	0	0.000	0.000	0.40	0.18
6/18/2004	11	77	14	2	0.026	0.017	12	0.156	0.044	0	0.000	0.000	0.14	0.08
6/19/2004	10	74	19	4	0.054	0.022	15	0.203	0.066	0	0.000	0.000	0.21	0.06
6/20/2004	12	81	14	0	0.000	0.000	14	0.172	0.039	0	0.000	0.000	0.00	0.00
6/21/2004	10	66	26	4	0.060	0.033	22	0.332	0.072	0	0.000	0.000	0.15	0.08
6/22/2004	8	57	19	4	0.070	0.037	15	0.264	0.043	0	0.000	0.000	0.21	0.10
6/23/2004	10	64	32	4	0.063	0.035	28	0.439	0.100	0	0.000	0.000	0.13	0.06
6/24/2004	8	56	21	8	0.144	0.045	13	0.233	0.064	0	0.000	0.000	0.38	0.11
6/25/2004	9	58	43	10	0.171	0.028	33	0.564	0.138	0	0.000	0.000	0.23	0.06
6/26/2004	12	81	14	3	0.037	0.020	11	0.136	0.029	0	0.000	0.000	0.21	0.08
6/27/2004	10	57	7	6	0.105	0.046	1	0.018	0.018	0	0.000	0.000	0.86	0.15
6/28/2004	8	56	8	8	0.143	0.047	0	0.000	0.000	0	0.000	0.000	1.00	0.00
6/29/2004	11	68	32	11	0.163	0.039	21	0.311	0.083	0	0.000	0.000	0.34	0.09
6/30/2004	8	54	14	7	0.131	0.063	7	0.131	0.049	0	0.000	0.000	0.50	0.15
Total	439	3,422	550	171	2.731		378	5.597		1	0.013			
Min	6	46	1	0	0.000		0	0.000		0	0.000		0.00	
Mean	10	74	12	4	0.059		8	0.122		0	0.000		0.43	
Max	14	176	43	11	0.238		33	0.564		1	0.013		1.00	

[a] Chinook salmon CPUE / all species CPUE.

Appendix D2.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 7.5 in mesh gillnet during the early-run Kenai River Chinook salmon sport fishery, 2004.

			Total	Chinook			Sockeye			Chinook/	
Date	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
5/16/2004	12	101	0	0	0.000	0.000	0	0.000	0.000		
5/17/2004	14	115	1	1	0.009	0.009	0	0.000	0.000	1.00	0.00
5/18/2004	10	96	0	0	0.000	0.000	0	0.000	0.000		
5/19/2004	10	93	2	1	0.011	0.011	1	0.011	0.011	0.50	0.37
5/20/2004	10	95	5	4	0.042	0.017	1	0.011	0.011	0.80	0.15
5/21/2004	10	95	0	0	0.000	0.000	0	0.000	0.000		
5/22/2004	10	92	0	0	0.000	0.000	0	0.000	0.000		
5/23/2004	8	67	3	3	0.044	0.030	0	0.000	0.000	1.00	0.00
5/24/2004	12	99	1	0	0.000	0.000	1	0.010	0.010	0.00	0.00
5/25/2004	10	68	3	2	0.030	0.022	1	0.015	0.015	0.67	0.29
5/26/2004	8	60	2	2	0.033	0.022	0	0.000	0.000	1.00	0.00
5/27/2004	8	65	4	3	0.046	0.022	1	0.015	0.016	0.75	0.23
5/28/2004	9	68	7	6	0.088	0.033	1	0.015	0.015	0.86	0.12
5/29/2004	12	90	4	3	0.033	0.017	1	0.011	0.011	0.75	0.23
5/30/2004	12	92	5	4	0.043	0.024	1	0.011	0.011	0.80	0.20
5/31/2004	12	89	3	2	0.022	0.023	1	0.011	0.011	0.67	0.33
6/1/2004	10	74	6	0	0.000	0.000	6	0.081	0.045	0.00	0.00
6/2/2004	10	87	7	6	0.069	0.026	1	0.011	0.011	0.86	0.12
6/3/2004	10	73	4	3	0.041	0.032	1	0.014	0.014	0.75	0.25
6/4/2004	9	72	7	4	0.055	0.031	3	0.041	0.030	0.57	0.23
6/5/2004	8	65	7	5	0.077	0.041	2	0.031	0.021	0.71	0.11
6/6/2004	8	65	14	9	0.138	0.048	5	0.077	0.033	0.64	0.12
6/7/2004	6	49	13	11	0.223	0.073	2	0.041	0.041	0.85	0.10
6/8/2004	6	45	23	20	0.445	0.165	3	0.067	0.029	0.87	0.09
6/9/2004	5	41	16	14	0.345	0.124	2	0.049	0.031	0.88	0.09
6/10/2004	6	49	24	22	0.446	0.090	2	0.041	0.025	0.92	0.05
6/11/2004	11	83	8	4	0.048	0.020	4	0.048	0.021	0.50	0.16
6/12/2004	10	84	8	6	0.071	0.038	2	0.024	0.016	0.75	0.18
6/13/2004	10	84	5	5	0.060	0.027	0	0.000	0.000	1.00	0.00
6/14/2004	10	81	8	7	0.086	0.026	1	0.012	0.012	0.88	0.11
6/15/2004	6	47	10	7	0.148	0.056	3	0.063	0.043	0.70	0.11
6/16/2004	10	78	13	13	0.166	0.058	0	0.000	0.000	1.00	0.00
6/17/2004	9	70	8	7	0.099	0.029	1	0.014	0.014	0.88	0.11
6/18/2004	12	83	10	6	0.073	0.028	4	0.048	0.027	0.60	0.13
6/19/2004	10	75	6	4	0.053	0.040	2	0.027	0.018	0.67	0.25
6/20/2004	12	86	8	4	0.046	0.025	4	0.046	0.027	0.50	0.21
6/21/2004	10	70	7	5	0.071	0.033	2	0.028	0.018	0.71	0.19
6/22/2004	8	59	13	9	0.152	0.038	4	0.068	0.026	0.69	0.11
6/23/2004	10	67	20	14	0.211	0.058	6	0.090	0.034	0.70	0.08
6/24/2004	8	52	17	12	0.231	0.050	5	0.096	0.041	0.71	0.11
6/25/2004	8	52	22	13	0.251	0.069	9	0.174	0.070	0.59	0.14
6/26/2004	12	79	10	6	0.076	0.029	4	0.050	0.022	0.60	0.12
6/27/2004	10	63	8	7	0.111	0.031	1	0.016	0.015	0.88	0.09
6/28/2004	10	68	12	11	0.161	0.062	1	0.015	0.015	0.92	0.09
6/29/2004	10	61	15	9	0.147	0.045	6	0.098	0.035	0.60	0.12
6/30/2004	8	59	13	11	0.187	0.083	2	0.034	0.021	0.85	0.07
Total	439	3,407	382	285	4.690		97	1.514			
Min	5	41	0	0	0.000		0	0.000		0.00	
Mean	10	74	8	6	0.102		2	0.033		0.73	
Max	14	115	24	22	0.446		9	0.174		1.00	

[a] Chinook salmon CPUE / all species CPUE.

Appendix D3.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 5.0 and 7.5 in mesh gillnets during the early-run Kenai River Chinook salmon sport fishery, 2004.

				Total	Chinook			Sockeye			Dolly Varden			Chinook/	
Date	Reps	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
5/16/2004	6	24	205	3	3	0.015	0.010	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/17/2004	7	28	291	2	2	0.008	0.005	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/18/2004	5	20	190	2	1	0.005	0.005	1	0.006	0.006	0	0.000	0.000	0.47	0.39
5/19/2004	5	20	182	3	2	0.010	0.006	1	0.005	0.005	0	0.000	0.000	0.66	0.31
5/20/2004	5	20	187	8	6	0.032	0.013	2	0.011	0.011	0	0.000	0.000	0.74	0.17
5/21/2004	5	20	185	4	2	0.011	0.007	2	0.011	0.006	0	0.000	0.000	0.51	0.20
5/22/2004	5	20	183	3	2	0.011	0.011	1	0.005	0.005	0	0.000	0.000	0.67	0.35
5/23/2004	4	16	134	6	6	0.041	0.032	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/24/2004	6	24	199	8	0	0.000	0.000	8	0.038	0.022	0	0.000	0.000	0.00	0.00
5/25/2004	5	20	142	12	6	0.046	0.018	6	0.041	0.020	0	0.000	0.000	0.53	0.18
5/26/2004	4	16	123	7	3	0.026	0.009	4	0.032	0.000	0	0.000	0.000	0.45	0.08
5/27/2004	4	16	130	20	7	0.053	0.016	13	0.102	0.028	0	0.000	0.000	0.34	0.11
5/28/2004	5	19	140	16	6	0.042	0.020	10	0.066	0.026	0	0.000	0.000	0.39	0.13
5/29/2004	5	20	142	10	4	0.028	0.007	6	0.042	0.013	0	0.000	0.000	0.40	0.08
5/30/2004	6	24	178	13	5	0.027	0.013	8	0.045	0.017	0	0.000	0.000	0.37	0.10
5/31/2004	6	24	182	10	4	0.021	0.016	6	0.030	0.019	0	0.000	0.000	0.41	0.26
6/1/2004	5	20	149	21	4	0.027	0.007	17	0.114	0.064	0	0.000	0.000	0.19	0.08
6/2/2004	4	16	139	12	5	0.034	0.007	7	0.054	0.019	0	0.000	0.000	0.39	0.13
6/3/2004	5	20	153	5	4	0.033	0.021	1	0.006	0.006	0	0.000	0.000	0.84	0.18
6/4/2004	4	16	126	11	4	0.032	0.023	7	0.056	0.015	0	0.000	0.000	0.37	0.21
6/5/2004	4	16	131	14	6	0.046	0.015	8	0.061	0.031	0	0.000	0.000	0.43	0.13
6/6/2004	4	16	127	54	16	0.123	0.033	38	0.291	0.140	0	0.000	0.000	0.30	0.06
6/7/2004	3	12	96	18	15	0.153	0.064	3	0.031	0.031	0	0.000	0.000	0.83	0.09
6/8/2004	3	12	91	42	31	0.345	0.140	11	0.119	0.028	0	0.000	0.000	0.74	0.07
6/9/2004	3	11	95	29	20	0.232	0.018	9	0.080	0.050	0	0.000	0.000	0.74	0.13
6/10/2004	3	12	96	31	26	0.267	0.064	5	0.050	0.026	0	0.000	0.000	0.84	0.09
6/11/2004	6	23	171	30	7	0.041	0.014	23	0.131	0.026	0	0.000	0.000	0.24	0.07
6/12/2004	4	16	129	11	6	0.048	0.030	5	0.039	0.015	0	0.000	0.000	0.55	0.24
6/13/2004	5	20	164	15	9	0.055	0.020	6	0.037	0.012	0	0.000	0.000	0.60	0.08
6/14/2004	5	20	158	12	10	0.062	0.014	1	0.006	0.006	1	0.006	0.006	0.83	0.12
6/15/2004	3	12	94	20	16	0.173	0.077	4	0.044	0.029	0	0.000	0.000	0.80	0.04
6/16/2004	5	20	153	22	18	0.118	0.028	4	0.028	0.013	0	0.000	0.000	0.81	0.06
6/17/2004	5	19	147	23	13	0.097	0.024	10	0.062	0.035	0	0.000	0.000	0.61	0.18
6/18/2004	6	23	160	24	8	0.048	0.011	16	0.095	0.028	0	0.000	0.000	0.33	0.07
6/19/2004	5	20	149	25	8	0.051	0.015	17	0.115	0.043	0	0.000	0.000	0.31	0.09
6/20/2004	6	24	168	22	4	0.022	0.010	18	0.107	0.024	0	0.000	0.000	0.17	0.08
6/21/2004	5	20	136	33	9	0.065	0.025	24	0.181	0.030	0	0.000	0.000	0.27	0.09
6/22/2004	4	16	116	32	13	0.111	0.029	19	0.166	0.015	0	0.000	0.000	0.40	0.05
6/23/2004	5	20	130	52	18	0.137	0.019	34	0.262	0.060	0	0.000	0.000	0.34	0.06
6/24/2004	4	16	108	38	20	0.186	0.024	18	0.164	0.006	0	0.000	0.000	0.53	0.03
6/25/2004	4	16	104	57	22	0.215	0.037	35	0.331	0.107	0	0.000	0.000	0.39	0.12
6/26/2004	6	24	160	24	9	0.057	0.012	15	0.095	0.024	0	0.000	0.000	0.37	0.06
6/27/2004	5	20	120	15	13	0.103	0.009	2	0.015	0.009	0	0.000	0.000	0.87	0.06
6/28/2004	4	16	112	18	18	0.158	0.068	0	0.000	0.000	0	0.000	0.000	1.00	0.00
6/29/2004	5	20	122	45	19	0.156	0.025	26	0.213	0.048	0	0.000	0.000	0.42	0.07
6/30/2004	4	16	112	27	18	0.178	0.053	9	0.081	0.030	0	0.000	0.000	0.69	0.04
Total	217	863	6,713	909	448	3.751		460	3.468		1	0.006			
Min	3	11	91	2	0	0.000		0	0.000		0	0.000		0.00	
Mean	5	19	146	20	10	0.082		10	0.075		0	0.000		0.55	
Max	7	28	291	57	31	0.345		38	0.331		1	0.006		1.00	

Note: A rep consists of four drifts (two mesh sizes, two banks). Only reps that had at least one drift from each mesh size were used in this table.

[a] Chinook salmon CPUE / all species CPUE.

Appendix D4.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 5.0 in mesh gillnet during the late-run Kenai River Chinook salmon sport fishery, 2004.

			Total	Chinook			Sockeye			Coho			Pink			Dolly Varden			Chinook/	
Date	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
7/1/2004	8	52	29	16	0.310	0.067	13	0.252	0.110	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.55	0.10
7/2/2004	7	49	29	7	0.143	0.051	22	0.449	0.195	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.24	0.07
7/3/2004	7	45	40	8	0.179	0.043	32	0.717	0.158	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.20	0.06
7/4/2004	10	62	17	6	0.096	0.042	11	0.177	0.037	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.35	0.11
7/5/2004	8	56	20	12	0.216	0.063	8	0.144	0.027	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.60	0.07
7/6/2004	6	38	18	13	0.344	0.105	5	0.132	0.039	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.72	0.11
7/7/2004	6	37	38	19	0.509	0.130	18	0.483	0.112	0	0.000	0.000	0	0.000	0.000	1	0.027	0.026	0.50	0.09
7/8/2004	6	30	16	10	0.335	0.077	6	0.201	0.087	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.63	0.10
7/9/2004	8	53	18	13	0.243	0.063	3	0.056	0.039	0	0.000	0.000	2	0.037	0.037	0	0.000	0.000	0.72	0.08
7/10/2004	8	46	17	8	0.175	0.040	9	0.197	0.083	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.47	0.13
7/11/2004	8	49	13	7	0.144	0.047	6	0.124	0.048	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.54	0.09
7/12/2004	8	56	10	8	0.143	0.050	2	0.036	0.023	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.80	0.14
7/13/2004	6	42	31	22	0.527	0.114	9	0.215	0.070	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.71	0.09
7/14/2004	4	18	57	9	0.499	0.115	48	2.662	1.641	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.16	0.11
7/15/2004	8	41	46	18	0.443	0.088	28	0.689	0.224	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.39	0.11
7/16/2004	6	21	20	11	0.530	0.094	9	0.433	0.127	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.55	0.08
7/17/2004	8	34	23	16	0.467	0.157	7	0.204	0.098	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.70	0.11
7/18/2004	6	31	16	11	0.358	0.111	5	0.163	0.065	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.69	0.07
7/19/2004	8	48	20	14	0.290	0.083	6	0.124	0.071	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.70	0.11
7/20/2004	8	39	30	24	0.620	0.126	6	0.155	0.033	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.80	0.04
7/21/2004	10	38	88	12	0.313	0.086	75	1.959	0.396	0	0.000	0.000	1	0.026	0.036	0	0.000	0.000	0.14	0.03
7/22/2004	8	49	41	13	0.265	0.060	28	0.570	0.089	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.32	0.06
7/23/2004	8	48	60	11	0.229	0.051	49	1.021	0.202	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.18	0.05
7/24/2004	6	35	29	12	0.338	0.092	17	0.479	0.117	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.41	0.11
7/25/2004	8	41	30	12	0.294	0.049	18	0.441	0.154	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.40	0.11
7/26/2004	7	47	14	7	0.150	0.033	7	0.150	0.067	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.50	0.12
7/27/2004	8	35	47	17	0.482	0.113	29	0.823	0.222	0	0.000	0.000	1	0.028	0.037	0	0.000	0.000	0.36	0.11
7/28/2004	10	56	33	5	0.089	0.055	27	0.482	0.144	0	0.000	0.000	1	0.018	0.025	0	0.000	0.000	0.15	0.08
7/29/2004	8	47	25	7	0.150	0.050	15	0.321	0.072	1	0.021	0.029	2	0.043	0.046	0	0.000	0.000	0.28	0.09
7/30/2004	8	48	23	6	0.126	0.028	17	0.356	0.120	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.26	0.08
7/31/2004	8	44	17	7	0.160	0.073	4	0.091	0.050	0	0.000	0.000	6	0.137	0.141	0	0.000	0.000	0.41	0.10
8/1/2004	8	52	8	5	0.096	0.042	1	0.019	0.019	0	0.000	0.000	2	0.038	0.041	0	0.000	0.000	0.63	0.12
8/2/2004	10	66	13	6	0.090	0.039	5	0.075	0.034	0	0.000	0.000	2	0.030	0.041	0	0.000	0.000	0.46	0.17
8/3/2004	8	58	6	4	0.070	0.025	1	0.017	0.018	0	0.000	0.000	1	0.017	0.017	0	0.000	0.000	0.67	0.12
8/4/2004	7	44	14	5	0.113	0.024	6	0.136	0.077	1	0.023	0.030	2	0.045	0.062	0	0.000	0.000	0.36	0.16
8/5/2004	8	55	30	8	0.144	0.062	10	0.180	0.052	4	0.072	0.072	8	0.144	0.140	0	0.000	0.000	0.27	0.11
8/6/2004	8	55	31	10	0.183	0.059	7	0.128	0.033	2	0.037	0.042	12	0.220	0.234	0	0.000	0.000	0.32	0.12
8/7/2004	6	39	26	12	0.305	0.060	2	0.051	0.033	2	0.051	0.056	10	0.255	0.268	0	0.000	0.000	0.46	0.04
8/8/2004	6	44	46	8	0.182	0.054	8	0.182	0.058	9	0.205	0.202	21	0.479	0.478	0	0.000	0.000	0.17	0.04
8/9/2004	5	37	29	5	0.134	0.060	3	0.081	0.082	5	0.134	0.136	16	0.430	0.424	0	0.000	0.000	0.17	0.02
8/10/2004	6	54	72	8	0.149	0.022	9	0.168	0.070	1	0.019	0.025	54	1.008	0.938	0	0.000	0.000	0.11	0.02
Total	305	1,837	1,190	432	10.636		591	15.344		25	0.562		141	2.956		1	0.027			
Min	4	18	6	4	0.070		1	0.017		0	0.000		0	0.000		0	0.000		0.11	
Mean	7	45	29	11	0.259		14	0.374		1	0.014		3	0.072		0	0.001		0.44	
Max	10	66	88	24	0.620		75	2.662		9	0.205		54	1.008		1	0.027		0.80	

[a] Chinook salmon CPUE / all species CPUE.

Appendix D5.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 7.5 in mesh gillnet during the late-run Kenai River Chinook salmon sport fishery, 2004.

			Total	Chinook			Sockeye			Coho			Pink			Chinook/	
Date	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
7/1/2004	6	38	21	21	0.547	0.140	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	1.00	0.00
7/2/2004	8	55	22	13	0.235	0.099	9	0.162	0.056	0	0.000	0.000	0	0.000	0.000	0.59	0.12
7/3/2004	6	38	20	12	0.315	0.078	8	0.210	0.082	0	0.000	0.000	0	0.000	0.000	0.60	0.11
7/4/2004	10	63	16	11	0.175	0.046	5	0.080	0.026	0	0.000	0.000	0	0.000	0.000	0.69	0.08
7/5/2004	8	53	13	13	0.246	0.092	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	1.00	0.00
7/6/2004	6	40	31	27	0.679	0.085	4	0.101	0.073	0	0.000	0.000	0	0.000	0.000	0.87	0.07
7/7/2004	6	34	21	19	0.567	0.137	2	0.060	0.040	0	0.000	0.000	0	0.000	0.000	0.90	0.07
7/8/2004	8	41	22	18	0.434	0.147	4	0.097	0.050	0	0.000	0.000	0	0.000	0.000	0.82	0.07
7/9/2004	6	40	27	23	0.582	0.071	4	0.101	0.051	0	0.000	0.000	0	0.000	0.000	0.85	0.07
7/10/2004	10	59	18	16	0.269	0.075	2	0.034	0.023	0	0.000	0.000	0	0.000	0.000	0.89	0.07
7/11/2004	8	49	22	19	0.386	0.071	3	0.061	0.042	0	0.000	0.000	0	0.000	0.000	0.86	0.07
7/12/2004	8	55	11	11	0.199	0.053	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	1.00	0.00
7/13/2004	5	31	27	23	0.738	0.089	4	0.128	0.083	0	0.000	0.000	0	0.000	0.000	0.85	0.09
7/14/2004	6	32	38	24	0.750	0.214	14	0.437	0.355	0	0.000	0.000	0	0.000	0.000	0.63	0.24
7/15/2004	7	36	32	27	0.760	0.107	5	0.141	0.053	0	0.000	0.000	0	0.000	0.000	0.84	0.05
7/16/2004	8	37	42	39	1.068	0.201	3	0.082	0.038	0	0.000	0.000	0	0.000	0.000	0.93	0.03
7/17/2004	8	34	28	26	0.764	0.128	2	0.059	0.041	0	0.000	0.000	0	0.000	0.000	0.93	0.05
7/18/2004	6	27	22	20	0.743	0.197	2	0.074	0.048	0	0.000	0.000	0	0.000	0.000	0.91	0.05
7/19/2004	8	50	23	21	0.421	0.080	2	0.040	0.026	0	0.000	0.000	0	0.000	0.000	0.91	0.06
7/20/2004	8	32	19	19	0.594	0.148	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	1.00	0.00
7/21/2004	10	43	32	6	0.140	0.046	26	0.606	0.243	0	0.000	0.000	0	0.000	0.000	0.19	0.07
7/22/2004	8	50	19	15	0.300	0.042	4	0.080	0.053	0	0.000	0.000	0	0.000	0.000	0.79	0.11
7/23/2004	7	36	31	20	0.555	0.095	10	0.277	0.102	0	0.000	0.000	1	0.028	0.038	0.65	0.09
7/24/2004	7	49	35	20	0.406	0.063	14	0.284	0.066	1	0.020	0.028	0	0.000	0.000	0.57	0.05
7/25/2004	7	37	29	24	0.652	0.094	5	0.136	0.078	0	0.000	0.000	0	0.000	0.000	0.83	0.08
7/26/2004	8	49	28	28	0.574	0.063	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	1.00	0.00
7/27/2004	7	25	37	24	0.970	0.256	13	0.525	0.191	0	0.000	0.000	0	0.000	0.000	0.65	0.12
7/28/2004	12	69	30	10	0.144	0.046	18	0.259	0.093	0	0.000	0.000	2	0.029	0.032	0.33	0.10
7/29/2004	6	35	17	13	0.369	0.093	2	0.057	0.035	0	0.000	0.000	2	0.057	0.059	0.76	0.10
7/30/2004	9	52	23	15	0.288	0.071	5	0.096	0.076	0	0.000	0.000	3	0.058	0.060	0.65	0.12
7/31/2004	8	44	13	11	0.251	0.163	1	0.023	0.023	0	0.000	0.000	1	0.023	0.033	0.85	0.11
8/1/2004	10	64	8	6	0.093	0.055	1	0.016	0.015	0	0.000	0.000	1	0.016	0.022	0.75	0.15
8/2/2004	8	56	6	3	0.053	0.025	2	0.036	0.024	0	0.000	0.000	1	0.018	0.024	0.50	0.18
8/3/2004	10	70	17	14	0.199	0.041	2	0.028	0.019	1	0.014	0.019	0	0.000	0.000	0.82	0.09
8/4/2004	6	41	15	11	0.266	0.055	1	0.024	0.025	1	0.024	0.033	2	0.048	0.052	0.73	0.12
8/5/2004	8	56	30	19	0.341	0.134	4	0.072	0.039	0	0.000	0.000	7	0.126	0.139	0.63	0.16
8/6/2004	6	42	17	16	0.377	0.138	1	0.024	0.023	0	0.000	0.000	0	0.000	0.000	0.94	0.07
8/7/2004	7	49	33	23	0.467	0.088	2	0.041	0.028	0	0.000	0.000	8	0.162	0.170	0.70	0.11
8/8/2004	4	29	15	10	0.339	0.102	0	0.000	0.000	2	0.068	0.069	3	0.102	0.102	0.67	0.12
8/9/2004	6	49	23	16	0.327	0.115	2	0.041	0.040	1	0.020	0.028	4	0.082	0.087	0.70	0.15
8/10/2004	4	33	28	6	0.180	0.055	0	0.000	0.000	1	0.030	0.038	21	0.630	0.568	0.21	0.07
Total	304	1,824	961	712	17.762		186	4.490		7	0.177		56	1.377			
Min	4	25	6	3	0.053		0	0.000		0	0.000		0	0.000		0.19	
Mean	7	44	23	17	0.433		5	0.110		0	0.004		1	0.034		0.76	
Max	12	70	42	39	1.068		26	0.606		2	0.068		21	0.630		1.00	

[a] Chinook salmon CPUE / all species CPUE.

Appendix D6.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 5.0 and 7.5 in mesh gillnets during the late-run Kenai River Chinook salmon sport fishery, 2004.

				Total	Chinook			Sockeye			Coho			Pink			Dolly Varden			Chinook/	
Date	Reps	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
7/1/2004	3	12	78	48	35	0.446	0.064	13	0.160	0.084	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.74	0.11
7/2/2004	4	15	104	51	20	0.188	0.049	31	0.310	0.165	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.38	0.07
7/3/2004	3	12	78	57	19	0.250	0.056	38	0.497	0.187	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.33	0.10
7/4/2004	5	20	125	33	17	0.136	0.043	16	0.129	0.017	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.51	0.08
7/5/2004	4	16	108	33	25	0.232	0.085	8	0.072	0.015	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.76	0.03
7/6/2004	3	12	78	49	40	0.499	0.070	9	0.107	0.035	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.82	0.03
7/7/2004	3	12	71	59	38	0.473	0.182	20	0.262	0.041	0	0.000	0.000	0	0.000	0.000	1	0.011	0.011	0.63	0.06
7/8/2004	3	12	59	33	23	0.413	0.081	10	0.172	0.065	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.71	0.06
7/9/2004	3	12	76	40	32	0.412	0.046	6	0.080	0.040	0	0.000	0.000	2	0.025	0.025	0	0.000	0.000	0.80	0.07
7/10/2004	4	16	94	31	21	0.223	0.037	10	0.107	0.010	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.68	0.05
7/11/2004	4	16	98	35	26	0.261	0.061	9	0.091	0.034	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.74	0.05
7/12/2004	4	16	111	21	19	0.168	0.061	2	0.018	0.010	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.90	0.06
7/13/2004	3	11	73	58	45	0.627	0.058	13	0.200	0.020	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.76	0.03
7/14/2004	2	8	39	82	20	0.529	0.212	62	1.772	1.572	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.23	0.23
7/15/2004	4	15	76	78	45	0.598	0.071	33	0.454	0.141	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.57	0.10
7/16/2004	3	12	48	49	38	0.743	0.158	11	0.265	0.091	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.74	0.05
7/17/2004	4	16	68	51	42	0.600	0.162	9	0.147	0.080	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.80	0.08
7/18/2004	3	12	58	38	31	0.564	0.127	7	0.128	0.083	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.81	0.06
7/19/2004	4	16	98	43	35	0.357	0.060	8	0.088	0.065	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.80	0.11
7/20/2004	4	16	71	49	43	0.646	0.167	6	0.076	0.012	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.89	0.03
7/21/2004	5	20	81	120	18	0.249	0.055	101	1.461	0.479	0	0.000	0.000	1	0.010	0.010	0	0.000	0.000	0.14	0.02
7/22/2004	4	16	99	60	28	0.284	0.050	32	0.325	0.038	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.47	0.03
7/23/2004	4	15	84	91	31	0.384	0.044	59	0.693	0.044	0	0.000	0.000	1	0.013	0.013	0	0.000	0.000	0.35	0.04
7/24/2004	3	12	77	58	28	0.349	0.059	29	0.385	0.070	1	0.012	0.012	0	0.000	0.000	0	0.000	0.000	0.47	0.05
7/25/2004	4	15	78	59	36	0.484	0.018	23	0.324	0.123	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.60	0.10
7/26/2004	4	15	96	42	35	0.363	0.025	7	0.080	0.028	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.82	0.06
7/27/2004	4	15	60	84	41	0.747	0.169	42	0.778	0.270	0	0.000	0.000	1	0.011	0.011	0	0.000	0.000	0.49	0.12
7/28/2004	5	20	113	59	14	0.122	0.030	42	0.378	0.129	0	0.000	0.000	3	0.027	0.017	0	0.000	0.000	0.23	0.08
7/29/2004	3	12	70	38	19	0.272	0.052	14	0.201	0.036	1	0.015	0.015	4	0.056	0.037	0	0.000	0.000	0.50	0.07
7/30/2004	4	16	94	45	20	0.212	0.032	22	0.227	0.122	0	0.000	0.000	3	0.031	0.010	0	0.000	0.000	0.45	0.10
7/31/2004	4	16	88	30	18	0.293	0.185	5	0.056	0.020	0	0.000	0.000	7	0.081	0.015	0	0.000	0.000	0.68	0.12
8/1/2004	4	16	104	13	9	0.087	0.051	2	0.019	0.011	0	0.000	0.000	2	0.019	0.011	0	0.000	0.000	0.70	0.05
8/2/2004	4	16	108	14	7	0.062	0.036	6	0.058	0.026	0	0.000	0.000	1	0.008	0.008	0	0.000	0.000	0.48	0.22
8/3/2004	4	16	114	18	15	0.130	0.013	2	0.018	0.010	0	0.000	0.000	1	0.008	0.008	0	0.000	0.000	0.83	0.08
8/4/2004	3	12	81	24	16	0.193	0.018	4	0.051	0.033	2	0.027	0.014	2	0.024	0.012	0	0.000	0.000	0.65	0.11
8/5/2004	4	16	111	60	27	0.237	0.068	14	0.127	0.025	4	0.036	0.015	15	0.135	0.048	0	0.000	0.000	0.44	0.08
8/6/2004	3	12	80	42	24	0.313	0.103	6	0.078	0.021	1	0.016	0.016	11	0.163	0.090	0	0.000	0.000	0.55	0.10
8/7/2004	3	12	78	50	31	0.396	0.053	4	0.052	0.013	2	0.025	0.013	13	0.160	0.067	0	0.000	0.000	0.63	0.09
8/8/2004	2	8	55	49	15	0.269	0.026	4	0.076	0.076	10	0.194	0.069	20	0.397	0.134	0	0.000	0.000	0.29	0.02
8/9/2004	3	11	86	52	21	0.218	0.066	5	0.052	0.029	6	0.067	0.022	20	0.220	0.127	0	0.000	0.000	0.39	0.08
8/10/2004	2	8	68	76	10	0.148	0.031	5	0.071	0.042	1	0.015	0.015	60	0.875	0.150	0	0.000	0.000	0.13	0.04
Total	146	576	3,434	2,022	1,077	14.176		749	10.646		28	0.407		167	2.264		1	0.011			
Min	2	8	39	13	7	0.062		2	0.018		0	0.000		0	0.000		0	0.000		0.13	
Mean	4	14	84	49	26	0.346		18	0.260		1	0.010		4	0.055		0	0.000		0.58	
Max	5	20	125	120	45	0.747		101	1.772		10	0.194		60	0.875		1	0.011		0.90	

Note: A rep consists of four drifts (two mesh sizes, two banks). Only reps that had at least one drift from each mesh size were used in this table.

[a] Chinook salmon CPUE / all species CPUE.

APPENDIX E. TEMPORALLY STRATIFIED AGE COMPOSITION ESTIMATES FOR THE KENAI RIVER CHINOOK SALMON SPORT FISHERY, 2004

Appendix E1.-Temporally stratified harvest estimates, by age class and location, of late-run Kenai River Chinook salmon in the sport fishery between the Soldotna Bridge and the Warren Ames Bridge, 2004.

	Age					
Parameter	1.1	1.2	1.3	1.4	1.5	Total
			Late Run, 1 July- 17 July			
Female						
Sample size		4	16	53	3	76
% sample		2.1%	8.2%	27.2%	1.5%	39.0%
SE % sample		1.0%	2.0%	3.2%	0.9%	3.5%
Downstream Harvest		31	125	415	23	594
SE Downstream Harvest		16	35	77	14	101
Upstream Harvest		144	576	1,909	108	2,738
SE Upstream Harvest		73	151	305	63	386
Total Harvest		175.4	701.6	2,323.9	131.7	3,332
SE Total Harvest		88	180	348	76	431
Male						
Sample size	4	18	49	47	1	119
% sample	2.1%	9.2%	25.1%	24.1%	0.5%	61.0%
SE % sample	1.0%	2.1%	3.1%	3.1%	0.5%	3.5%
Downstream Harvest	31	141	383	368	8	931
SE Downstream Harvest	16	37	73	71	8	145
Upstream Harvest	144	648	1,765	1,693	36	4,287
SE Upstream Harvest	73	161	290	283	36	528
Total Harvest	175	789	2,149	2,061	44	5,218
SE Total Harvest	88	192	332	325	44	571
Combined						
Sample size	4	22	65	100	4	195
% sample	2.05%	11.3%	33.3%	51.3%	2.05%	100.0%
SE % sample	1.0%	2.3%	3.4%	3.6%	1.0%	0.0%
Downstream Harvest	31	172	508	782	31	1,525
SE Downstream Harvest	16	42	90	126	16	222
Upstream Harvest	144	793	2,342	3,603	144	7,025
SE Upstream Harvest	73	181	348	466	73	766
Total Harvest	175	965	2,850	4,385	175	8,550
SE Total Harvest	88	213	392	511	88	798

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Parameter	Age 1.1	1.2	1.3	1.4	1.5	Total
Late Run, 18 July-31 July						
Female						
Sample size			6	49	2	57
% sample			5.5%	44.5%	1.8%	51.8%
SE % sample			2.2%	4.8%	1.3%	4.8%
Downstream Harvest			47	383	16	446
SE Downstream Harvest			20	78	11	88
Upstream Harvest			277	2,264	92	2,633
SE Upstream Harvest			114	340	65	370
Total Harvest			324	2,647	108	3,080
SE Total Harvest			132	376	76	406
Male						
Sample size		6	15	29	3	53
% sample		5.5%	13.6%	26.4%	2.7%	48.2%
SE % sample		2.2%	3.3%	4.2%	1.6%	4.8%
Downstream Harvest		47	117	227	23	415
SE Downstream Harvest		20	35	53	14	83
Upstream Harvest		277	693	1,340	139	2,449
SE Upstream Harvest		114	182	256	80	355
Total Harvest		324	810	1,567	162	2,863
SE Total Harvest		132	209	290	94	391
Combined						
Sample size		6	21	78	5	110
% sample		5.5%	19.1%	70.9%	4.5%	100.0%
SE % sample		2.2%	3.8%	4.4%	2.0%	0.0%
Downstream Harvest		47	164	610	39	861
SE Downstream Harvest		20	43	113	18	150
Upstream Harvest		277	970	3,604	231	5,082
SE Upstream Harvest		114	216	441	104	540
Total Harvest		324	1,135	4,214	270	5,943
SE Total Harvest		132	247	473	121	560

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

Downstream is between the Warren Ames Bridge and the Chinook salmon sonar site. Upstream is between the Chinook salmon sonar site and the Soldotna Bridge. Total harvest is between the Soldotna Bridge and the Warren Ames Bridge.

Angler harvest estimates by age class and location of late-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge, 2004, is presented in Table 4.

Appendix E2.-Temporally stratified sonar passage estimates, by age class, for late-run Kenai River Chinook salmon, 2004.

Parameter	Age 1.1	1.2	1.3	1.4	1.5	2.3	Total
Late Run, 1 July-20 July							
Female							
Sample size	1	32	30	119	6		188
% sample	0.2%	6.0%	5.6%	22.2%	1.1%		35.1%
SE % sample	0.2%	1.0%	1.0%	1.8%	0.5%		2.1%
Sonar passage estimate	57	1,830	1,715	6,803	343		10,748
SE sonar passage estimate	57	315	306	560	139		654
Male							
Sample size	8	81	121	136	1		347
% sample	1.5%	15.1%	22.6%	25.4%	0.2%		64.9%
SE % sample	0.5%	1.6%	1.8%	1.9%	0.2%		2.1%
Sonar passage estimate	457	4,631	6,918	7,775	57		19,839
SE sonar passage estimate	161	480	564	589	57		703
Combined							
Sample size	9	113	151	255	7		535
% sample	1.7%	21.1%	28.2%	47.7%	1.3%		100.0%
SE % sample	0.6%	1.8%	1.9%	2.2%	0.5%		0.0%
Sonar passage estimate[a]	515	6,460	8,633	14,579	400		30,587
SE sonar passage estimate	170	549	611	699	151		475
Late Run, 21 July-10 August							
Female							
Sample size		2	26	161	3	1	193
% sample		0.5%	6.5%	40.5%	0.8%	0.3%	48.5%
SE % sample		0.4%	1.2%	2.5%	0.4%	0.3%	2.5%
Sonar passage estimate		129	1,674	10,363	193	64	12,423
SE sonar passage estimate		91	335	923	112	64	1,033
Male							
Sample size	1	20	55	127	2		205
% sample	0.3%	5.0%	13.8%	31.9%	0.5%		51.5%
SE % sample	0.3%	1.1%	1.7%	2.3%	0.4%		2.5%
Sonar passage estimate	64	1,287	3,540	8,175	129		13,195
SE sonar passage estimate	64	293	499	801	91		1,072
Combined							
Sample size	1	22	81	288	5	1	398
% sample	0.3%	5.5%	20.4%	72.4%	1.3%	0.3%	100.0%
SE % sample	0.3%	1.1%	2.0%	2.2%	0.6%	0.3%	0.0%
Sonar passage estimate[a]	64	1,416	5,214	18,538	322	64	25,618
SE sonar passage estimate[a]	64	307	618	1,337	144	64	1,669

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

Sonar passage estimates by age class for 2004 late-run Kenai River Chinook salmon are presented in Table 6.

[a] Combined sonar passage estimates and SEs from Jim Miller (Alaska Department of Fish and Game, Division of Sport Fish, Anchorage, personal communication).

APPENDIX F. AGE COMPOSITION ESTIMATES FOR THE KENAI RIVER CHINOOK SALMON INRIVER RETURN USING CATCH FROM A 7.5 IN MESH GILLNET, 2004

Appendix F1.-Sonar passage estimates by age class for early-run Kenai River Chinook salmon using the catch from a 7.5 in mesh gillnet, 2004.

Parameter	Age 1.2	1.3	1.4	1.5	Total
Early Run, 16 May-30 June					
Female					
Sample size	5	36	49	4	94
% sample	2.3%	16.5%	22.5%	1.8%	43.1%
SE % sample	1.0%	2.5%	2.8%	0.9%	3.4%
Sonar passage estimate	355	2,559	3,483	284	6,683
SE sonar passage estimate	158	393	443	141	533
Male					
Sample size	30	40	52	2	124
% sample	13.8%	18.3%	23.9%	0.9%	56.9%
SE % sample	2.3%	2.6%	2.9%	0.6%	3.4%
Sonar passage estimate	2,133	2,844	3,697	142	8,815
SE sonar passage estimate	364	410	453	100	542
Combined					
Sample size	35	76	101	6	218
% sample	16.1%	34.9%	46.3%	2.8%	100.0%
SE % sample	2.5%	3.2%	3.4%	1.1%	0.0%
Sonar passage estimate[a]	2,488	5,403	7,180	427	15,498
SE sonar passage estimate[a]	388	509	538	172	261

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

These estimates are shown to allow comparison with inriver return age composition estimates from 2001 or earlier, when only a 7.5 inch mesh was used.

[a] Combined sonar passage estimates and SEs from Jim Miller (Alaska Department of Fish and Game, Anchorage, personal communication).

Appendix F2.-Sonar passage estimates by age class for late-run Kenai River Chinook salmon using the catch from a 7.5 in mesh gillnet, 2004.

Parameter	Age 1.2	1.3	1.4	1.5	2.3	Total
Late Run, 1 July-20 July						
Female						
Sample size	20	23	82	3		128
% sample	5.8%	6.6%	23.7%	0.9%		37.0%
SE % sample	1.3%	1.3%	2.3%	0.5%		2.6%
Sonar passage estimate	1,768	2,033	7,249	265		11,315
SE sonar passage estimate	385	411	709	153		814
Male						
Sample size	53	82	83			218
% sample	15.3%	23.7%	24.0%			63.0%
SE % sample	1.9%	2.3%	2.3%			2.6%
Sonar passage estimate	4,685	7,249	7,337			19,272
SE sonar passage estimate	597	709	712			849
Combined						
Sample size	73	105	165	3		346
% sample	21.1%	30.3%	47.7%	0.9%		100.0%
SE % sample	2.2%	2.5%	2.7%	0.5%		0.0%
Sonar passage estimate[a]	6,453	9,282	14,586	265		30,587
SE sonar passage estimate[a]	679	771	853	153		475
Late Run, 21 July-10 August						
Female						
Sample size	2	17	102	2	1	124
% sample	0.8%	6.7%	40.2%	0.8%	0.4%	48.8%
SE % sample	0.6%	1.6%	3.1%	0.6%	0.4%	3.1%
Sonar passage estimate	202	1,715	10,288	202	101	12,506
SE sonar passage estimate	143	417	1,034	143	101	1,144
Male						
Sample size	14	38	76	2		130
% sample	5.5%	15.0%	29.9%	0.8%		51.2%
SE % sample	1.4%	2.2%	2.9%	0.6%		3.1%
Sonar passage estimate	1,412	3,833	7,665	202		13,112
SE sonar passage estimate	378	625	889	143		1,173
Combined						
Sample size	16	55	178	4	1	254
% sample	6.3%	21.7%	70.1%	1.6%	0.4%	100.0%
SE % sample	1.5%	2.6%	2.9%	1.1%	0.4%	0.0%
Sonar passage estimate[a]	1,614	5,547	17,953	403	101	25,618
SE sonar passage estimate[a]	404	754	1,382	285	101	1,669

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Parameter	Age 1.2	1.3	1.4	1.5	2.3	Total
Late Run, 1 July-10 August						
Female						
Sample size	22	40	184	5	1	252
Sonar passage estimate	1,970	3,748	17,536	467	101	23,822
SE sonar passage estimate	411	586	1,254	209	101	1,404
% sonar passage	3.5%	6.7%	31.2%	0.8%	0.2%	42.4%
SE % sonar passage	0.7%	1.0%	1.9%	0.4%	0.2%	2.0%
Male						
Sample size	67	120	159	2		348
Sonar passage estimate	6,097	11,082	15,003	202		32,383
SE sonar passage estimate	707	945	1,139	143		1,448
% sonar passage	10.8%	19.7%	26.7%	0.4%		57.6%
SE % sonar passage	1.3%	1.6%	1.8%	0.3%		2.0%
Combined						
Sample size	89	160	343	7	1	600
Sonar passage estimate[a]	8,067	14,829	32,539	669	101	56,205
SE sonar passage estimate[a]	790	1,078	1,624	324	101	1,735
% sonar passage	14.4%	26.4%	57.9%	1.2%	0.2%	100.0%
SE % sonar passage	1.4%	1.8%	2.0%	0.6%	0.2%	0.0%

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

These estimates are shown to allow comparison with inriver return age composition estimates from 2001 or earlier, when only a 7.5 inch mesh was used.

[a] Combined sonar passage estimates and SEs from Jim Miller (Alaska Department of Fish and Game, Anchorage, personal communication).