Fishery Data Series No. 04-28

Chinook Salmon Creel Survey and Inriver Gillnetting Study, Lower Kenai River, Alaska, 2002

by

Adam Reimer

December 2004

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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TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

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 May 16, 2002 through June 9, 2002 and from July 1, 2002 through July 31, 2002. The fishery was closed between the Soldotna Bridge and the Warren Ames Bridge from June 11, 2002 through June 30, 2002 by emergency order. For the early run, (May 16 through June 9) angler effort was 15,012 (SE = 937) angler-hours and harvest was 376 (SE = 85) Chinook salmon. Unguided anglers accounted for 35% of the fishing effort and 24% of the harvest, versus guided anglers who accounted for 65% of the effort and 76% of the harvest. The early-run recreational harvest was composed of 41.9% (SE = 9.0%) age-1.3 fish and 45.2% (SE = 9.1%) age-1.4 fish, whereas the Chinook passage at the sonar site was composed of 37.3% (SE = 2.8%) age-1.3 fish and 39.5% (SE = 2.8%) age-1.4 fish. For the late run (July), angler effort was 192,780 (SE = 6,824) angler-hours and harvest was 11,483 (SE = 682) Chinook salmon. Unguided anglers accounted for 52% of the effort and 43% of the harvest, versus guided anglers who accounted for 48% of the effort and 57% of harvest. The late-run recreational harvest was composed of 23.1% (SE = 2.5%) age-1.3 fish and 67.6% (SE = 2.8%) age-1.4 fish, whereas the Chinook passage at the sonar site was composed of 18.5% (SE = 1.2%) age-1.3 fish and 58.5% (SE = 1.6%) age-1.4 fish.

The 2002 season marks the fifth year that a standardized inriver gillnetting program was conducted near the Chinook salmon sonar site. The netting program ran from May 16, 2002 through August 5, 2002. During the early run, from May 16–June 30, 369 Chinook salmon, 662 sockeye salmon and 11 Dolly Varden were captured. The ratio of Chinook salmon CPUE to all species CPUE ranged from 0 (SE = 0.0%) to 1 (SE = 0.0%) and averaged 0.39 in the early run. During the late run, July 1–August 5, 1,171 Chinook salmon, 1,915 sockeye salmon, 27 coho salmon, 287 pink salmon and 10 Dolly Varden were captured. The ratio of Chinook salmon CPUE to all species CPUE ranged from 0.12 (SE = 0.03) to 0.77 (SE = 0.04) and averaged 0.37 in the late run. The use of multi-fiber gillnets and the addition of 5.0 in mesh this year greatly increased CPUE for all species without introducing unacceptable injury rates for captured fish.

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

INTRODUCTION

The Kenai River (Figure 1) supports the largest freshwater recreational fishery in Alaska. Anglers fish for Chinook salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, sockeye salmon *O. nerka*, pink salmon *O. gorbuscha*, Dolly Varden *Salvelinus malma*, and rainbow trout *O. mykiss*. The Kenai River Chinook salmon fishery between the Soldotna Bridge and Warren Ames Bridge is the subject of this report.

Chinook salmon return to the Kenai River in two periods: an early run, early May until late June, and a late run, late June through early August. For management purposes the early run is defined as all Chinook salmon entering the river prior to July 1 and the late run is defined as all fish entering on or after July 1. Recreational anglers value fish from both runs due to their large size; average weight is about 40 lb and some fish exceed 80 lb. Late-run fish are generally larger at age than early-run fish; however, the world record sport-caught Chinook salmon (97 lb) was harvested from the Kenai River in May 1985.

Prior to 1970, participation in the recreational fishery in the Kenai River was primarily by shorebased anglers targeting sockeye salmon in July and coho salmon in August and September. The Alaska Department of Fish and Game (ADF&G) 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 small Chinook salmon runs and fishery restrictions (Figure 2 and Figure 3). Effort and harvest have never returned to 1987 and 1988 levels in the early run (Figure 2), but have been similar to historical averages in the late run since 1992

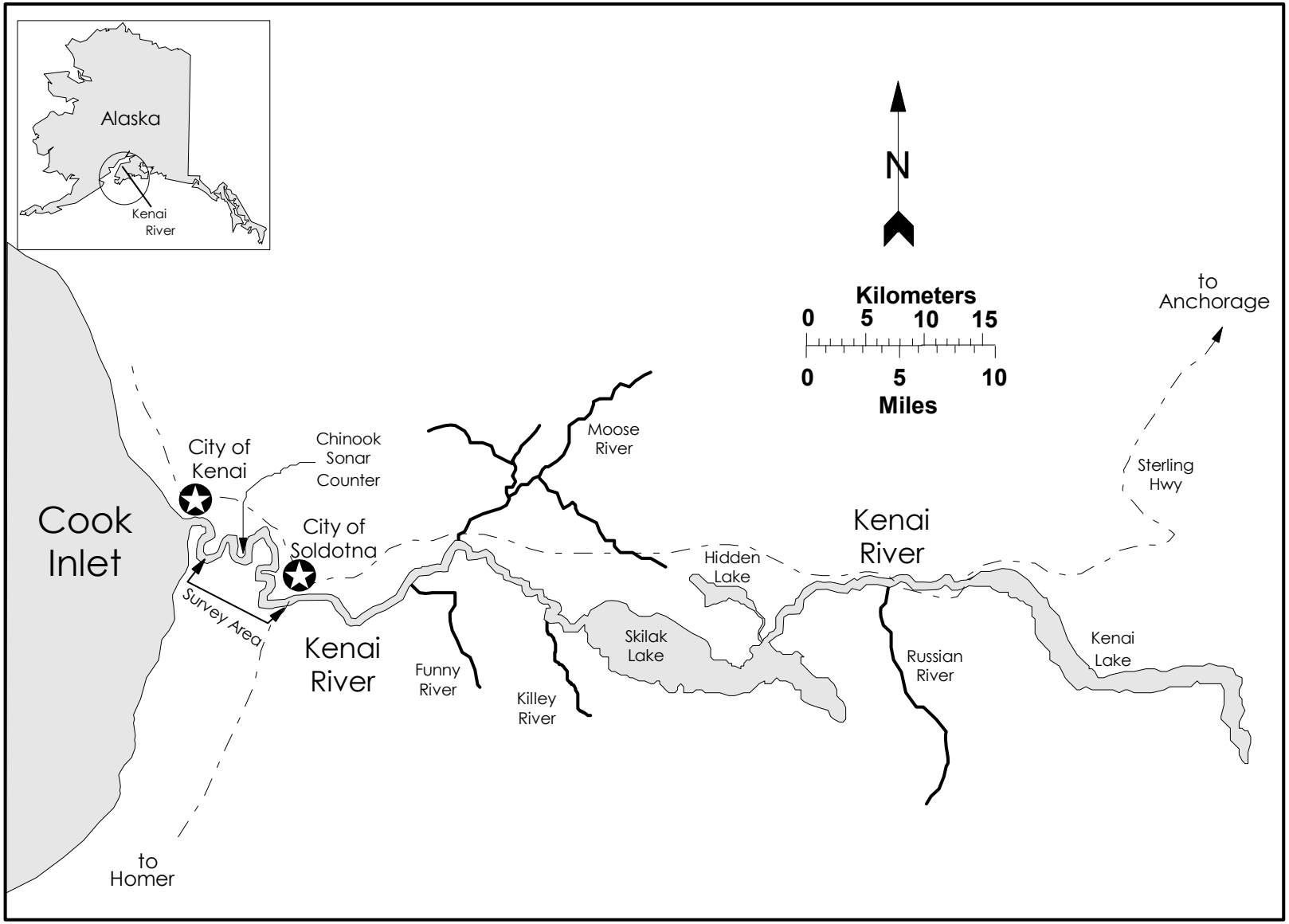

Figure 1.-The Kenai River drainage.

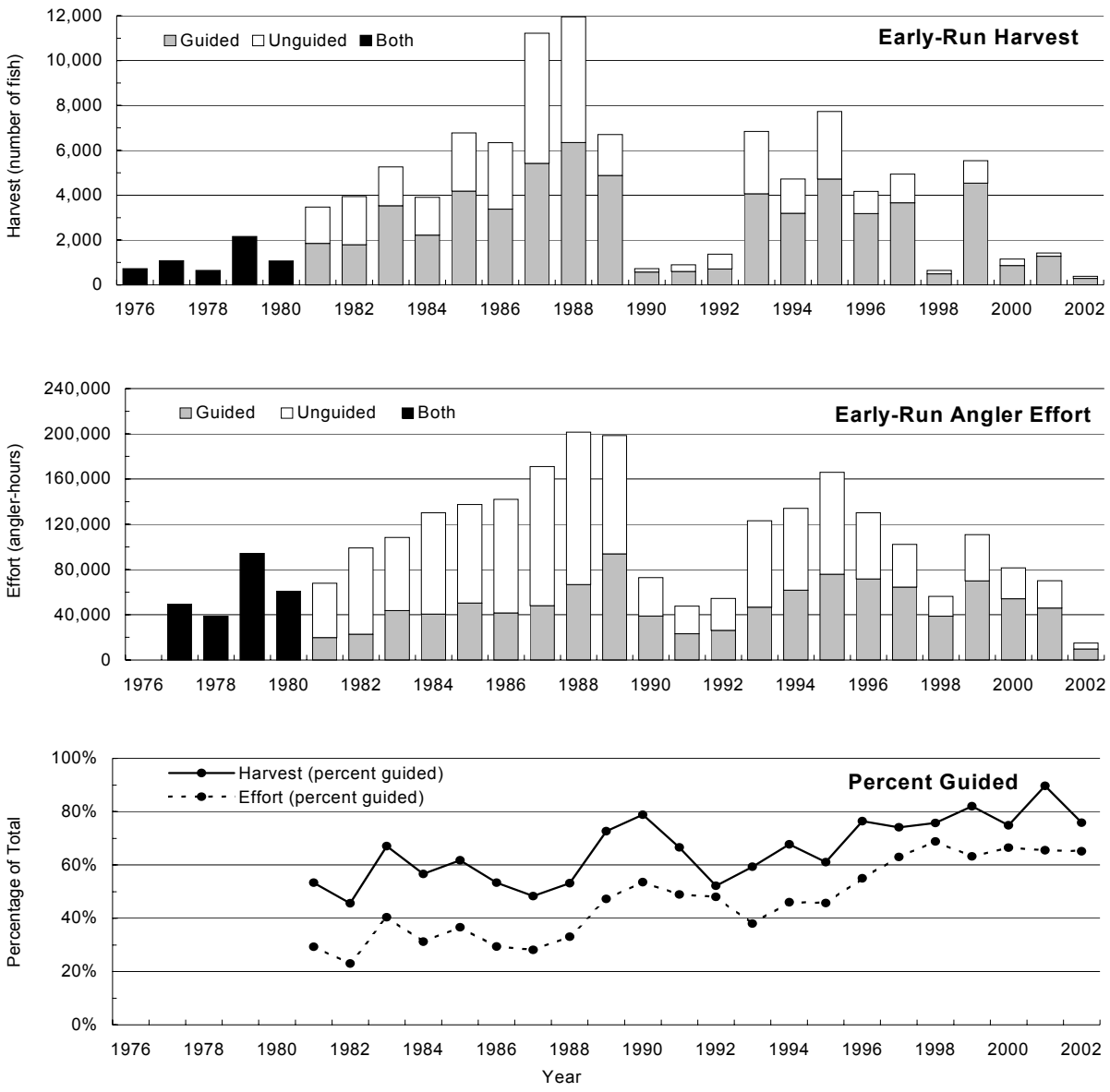

Figure 2.-Historic harvest and angler effort for the early-run Kenai River Chinook salmon fishery between the Soldotna Bridge and the Warren Ames Bridge.

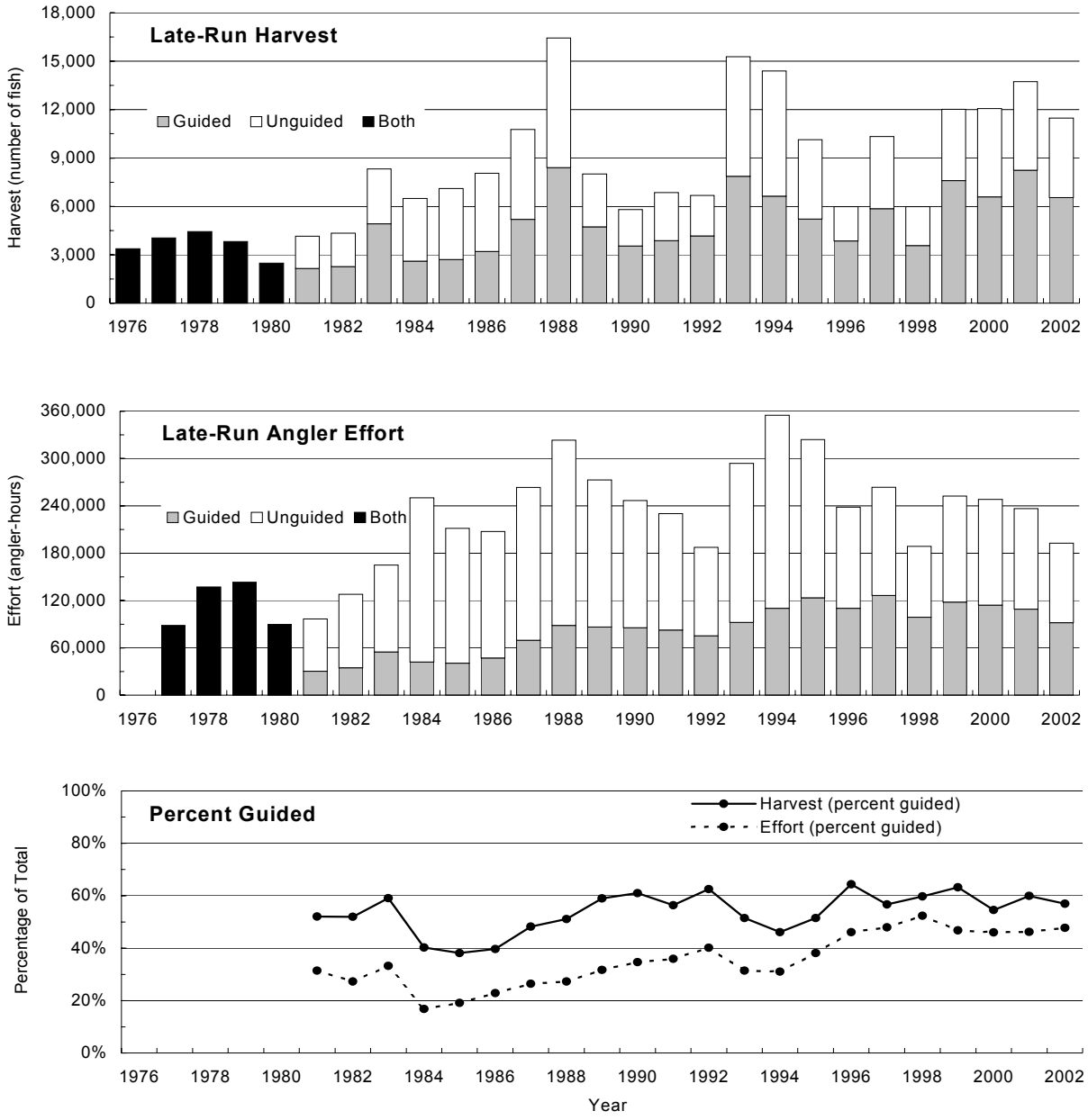

Figure 3.-Historic harvest and angler effort for the late-run Kenai River Chinook salmon fishery between the Soldotna Bridge and the Warren Ames Bridge.

(Figure 3). Beginning in 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 (Figures 2 and 3).

MANAGEMENT PLANS

The early- and late-run Kenai River Chinook salmon returns have separate inseason management plans adopted by the Board of Fisheries. Management within these plans utilizes estimates of inriver return and harvest. Estimates of inriver return are obtained with inriver sonar (Miller et al. 2003) while estimates of harvest are obtained from the creel survey described herein. Previous information on the Kenai River Chinook salmon creel survey was published by 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; Reimer et al. 2002.

In February 2002, the Board of Fisheries met and made significant changes to the Kenai River Early-Run Chinook Salmon Management Plan. The only biologically significant change introduced a slot limit (no retention of fish 44-54.99 inches) that attempted to protect Chinook salmon which spend 5 years in salt water. The Board of Fisheries combined this biologically significant change with a catch-and-release fishery that was heavily lobbied for by some stakeholders. The end product (Kenai River Early-Run Chinook Salmon Management Plan, 5 AAC 56.070 updated through register 162)[1] created so much public controversy that the Board of Fisheries decided to rescind the catch-and-release portion of the plan. Even so, protection for 5-ocean Chinook was never fulfilled because the 2002 Kenai River Early-Run Chinook Salmon Management Plan had not finished the legal review process by the time the fishing season started. While the 2002 Kenai River Early-Run Chinook Salmon Management Plan became effective on June 22, 2002, the fishery had already closed on June 11, 2002. Thus, the 2002 early-run Kenai River Chinook salmon season was managed under the same management plan as the 2000-2001 seasons.

The Kenai River Early-Run Chinook Salmon Management Plan (5 AAC 56.070 updated through register 154, Figure 4) mandates the fishery be managed to achieve a spawning escapement of 7,200 to 14,400 Chinook salmon. Bait, multiple hooks, and fishing from boats on Mondays are prohibited unless an estimated spawning escapement exceeding 14,400 fish is projected. If the projected spawning escapement is below 7,200 fish, then the department will restrict the fishery to trophy fishing[2] or close the fishery until July 1 downstream of the Funny River and July 10 upstream of the Funny River (river mile [rm] 30.4, Figure 1).

Management of the late-run Chinook salmon sport fishery is complicated because Chinook salmon are harvested by the commercial sockeye salmon 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 Chinook Salmon Management Plan (5 AAC 21.359, Figure 4). The Kenai River Late-Run Chinook Salmon Management Plan mandates the sport fishery be managed to achieve a spawning escapement of 17,800 to 35,700 Chinook salmon. Bait and one single hook are permitted as long as

[1] Referred to as the 2002 Kenai River Early-Run Chinook Salmon Management Plan hereafter.

[2] Catch-and-release of fish less than 132 cm (52 in).

the spawning escapement is projected to be above 17,800. If the projected spawning escapement falls below 17,800 then the sport fishery will be closed.

FISHING REGULATIONS

Regulations for the Chinook salmon fishery in the Kenai River are among the most restrictive of any open water in Alaska because of intense angling pressure. 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 (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 (Figure 1). The Slikok Creek and Funny River confluence areas are closed from January 1 to July 14, the Lower Killey River confluence area is closed from June 25 to July 14, and the Moose River closure is in effect for the entire Chinook salmon fishing season. In addition, the area between Centennial Campground (rm 20.3) and the Soldotna Bridge (rm 21.1) is closed to fishing from boats for the entire Chinook salmon fishing season (Figure 5). The Chinook salmon season legally begins on January 1, although fish do not enter the river in harvestable numbers until May, and normally closes on July 31.

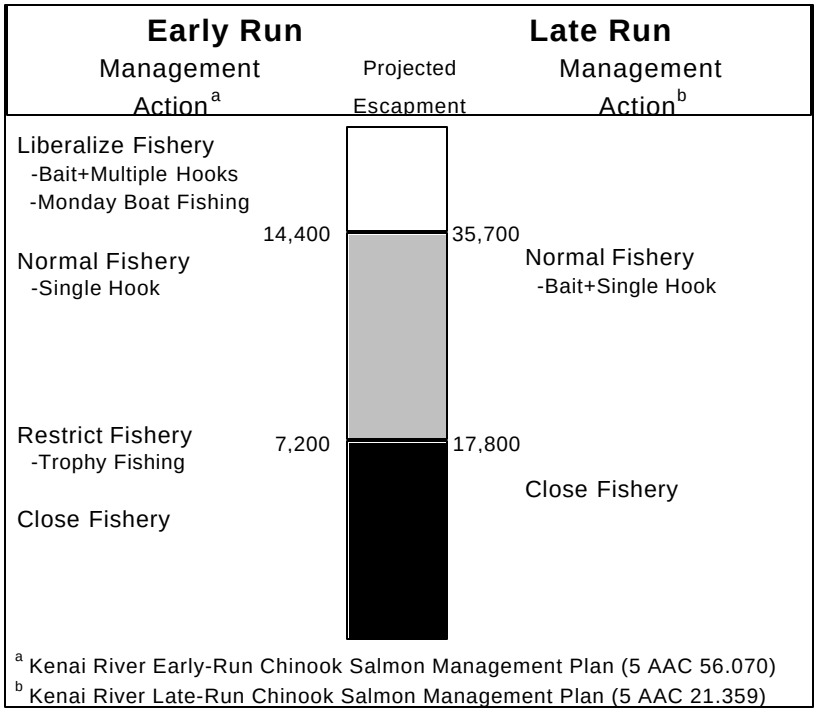

Figure 4.-Escapement levels and inriver management actions for the Kenai River Chinook salmon fisheries.

The daily bag and possession limit is one Chinook salmon per day 20 in long or longer; the seasonal limit is two Chinook salmon 20 in long or longer. Anyone retaining a Chinook salmon 20 in long or longer is prohibited from fishing from a boat in the Kenai River downstream of Skilak Lake for the

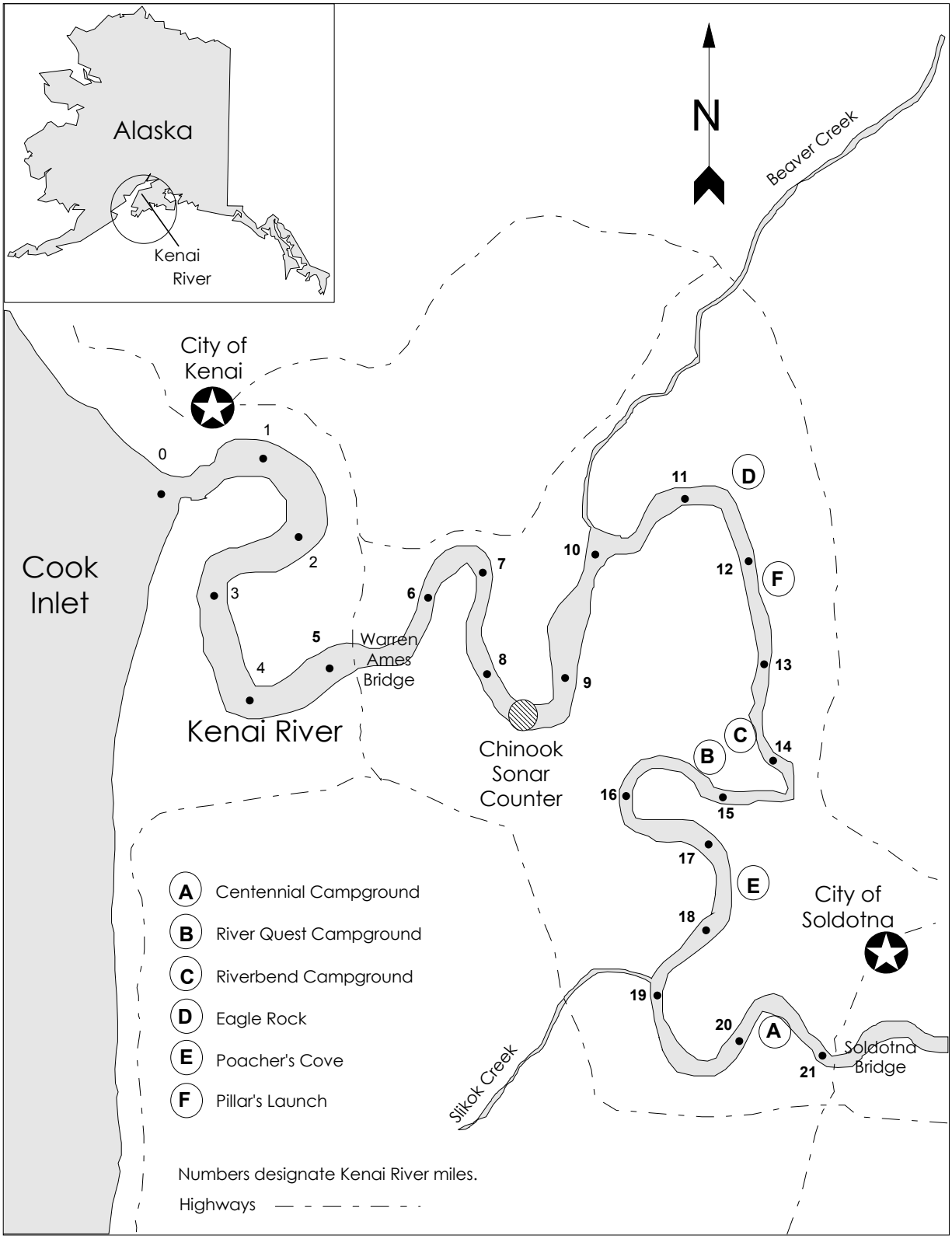

Figure 5.-The Kenai River creel survey study area.

remainder of that day. The early-run fishery is restricted from using bait, multiple hooks, or treble hooks. The late-run fishery is restricted from using multiple hooks and treble hooks. Fishing from boats downstream from the outlet of Skilak Lake is prohibited on Mondays in May and June, except Memorial Day Monday. Mondays in July are open to fishing from unguided drift boats.

There are further restrictions for fishing guides and guided 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 (Monday, May 27 in 2002). Lastly, guides are prohibited from personally engaging in fishing while conducting clients.

OBJECTIVES

This ongoing project provides data needed for inseason management of the fishery.

Objectives for the 2002 study were to:

1. Estimate the total catch and harvest by the sport fishery in the mainstem Kenai River between the Warren Ames and the Soldotna Bridges from May 16 through June 30 (early run) and from July 1 through July 31 (late run). Desired relative precision of the estimates for each run is within 20%, or 500 fish, of the true values 95% of the time.
2. Estimate angler effort by the sport fishery in the mainstem Kenai River between the Warren Ames and the Soldotna Bridges from May 16 through June 30 (early run) and July 1 through July 31 (late run). Desired relative precision of the estimates for each run is within 10%, or 5,000 angler-hours, of the true values 95% of the time.
3. Estimate the proportion, by age and sex, of Chinook salmon harvested by the sport fishery in the mainstem Kenai River between the Warren Ames and the Soldotna bridges such that all age-proportion estimates, during each sampling stratum, are within 10 percentage points of the true values 95% of the time, or alternatively, that estimates of harvest by age are within 250 fish for all age groups 95% of the time.
4. Estimate the proportion, by age and sex, of the Chinook salmon population entering the Kenai River from May 16 through August 15 such that all age-proportion estimates, during each sampling stratum, are within 10 percentage points of the true values 95% of the time.

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

1. Examine Chinook salmon sampled from the sport harvest and the inriver return for presence of the adipose fin.
2. Calculate the ratio of Chinook salmon to total salmon captured in the inriver drift nets.

METHODS

CREEL SURVEY

A stratified, two-stage roving-access creel survey (Bernard et al. 1998a, b) was utilized to estimate sport fishing effort, and catch and harvest of Chinook salmon from the Warren Ames Bridge (rm 5.2) to the Soldotna Bridge (rm 21.1) (Figure 5). Most recreational fishing effort for Chinook salmon occurs

below the Soldotna Bridge. First-stage sampling units were days. The unguided angler day was 20 h long (0400 to 2400 hours) while the guided angler day was 12 h long (0600 to 1800 hrs). Daily catch and harvest[1] were estimated as the product of effort and CPUE or HPUE. Second-stage units for estimating angler effort and CPUE/HPUE were periodic angler counts and angler trips, respectively. Angler trips were sampled by conducting completed-trip angler interviews. The creel survey began on May 16, 2002 and was scheduled to continue through July 31, 2002, but a fishery closure made the creel unnecessary from June 11, 2002 to June 30, 2002.

Stratification accounted for the geographical, temporal and regulatory factors affecting the fishery. Since significant harvest below the sonar site would affect the 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 did not include this level of stratification because past attempts to estimate catch and harvest below the sonar site using stratified angler interviews were ineffective (Reimer et al. 2002). Estimates of catch and harvest below the sonar site based on angler counts were recently calculated for 1999-2001.

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

Although both guided and unguided anglers participate in the Kenai River Chinook salmon fishery, current regulations allow guided anglers to fish only between 0600 to 1800 hours and close the fishery to guided anglers on Sundays and Mondays. Further, catch rates can be significantly different between guided and unguided anglers (J. Hasbrouck, ADF&G, Sport Fish, Anchorage, personal communication). Therefore, both angler counts and angler interviews were post-stratified 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:	4 strata	Early Run: 16-19 May, 20-26 May, 27 May-2 June, 3-9 June
	5 strata	Late Run: 1-7 July, 8-14 July, 15-21 July, 22-28 July, 29-31 July
Day Type:	2 strata	Weekdays and weekends/holidays
Angler Type:	2 strata	Guided and unguided

[1] Harvest refers to fish caught and retained by anglers as part of their creel. 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.

Two of the four available weekdays were sampled from each week and both weekend days were sampled. Exceptions were the weeks of May 27-June 2 and July 1-7 where 2 days were selected randomly from the 3 weekend/holiday days available. Mondays were not sampled although unguided drift boat anglers were fishing on Mondays in July. The fishery was closed from June 11-June 30 below the Soldotna Bridge, and the creel survey was discontinued during this period. Thus, the early run was composed of 16 strata. The late run was composed of 18 strata.

Creel survey staff also took Secchi disc measurements twice daily at rm 15.6 to index water clarity.

Angler Counts

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

Counts were conducted from a boat between the Soldotna Bridge and the Warren Ames Bridge, a distance of 15.9 mi. To maximize interview time, the direction (upstream or downstream) that the technician traveled to conduct angler counts was pre-selected to minimize total distance and travel time. Anglers were counted while driving the boat at a constant rate of speed through the survey area. The entire count usually required about 45 minutes and every effort was made to ensure that the trip was completed 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 the boat contained at least one angler. Nine "tally-whackers" were used to sum the following categories for each geographic stratum: (1) unguided power boats, (2) unguided drift boats, (3) guided power boats, (4) guided drift boats, (5) unguided anglers in power boats, (6) unguided anglers in drift boats, (7) guided anglers in power boats (excluding the guide), (8) guided anglers in drift boats (excluding the guide), and (9) shore anglers. Only counts 5-8 are required for this project; counts numbered 1-4 and 9 are collected as auxiliary information for management and historical purposes.

Angler Interviews

Anglers who had completed fishing were interviewed at the following boat launches:

A) Centennial Campground
B) River Quest RV Park
C) Riverbend Campground
D) Eagle Rock Launch Area
E) Poacher’s Cove
F) Pillar's Launch Area.

Interviews were conducted only at Pillar’s Launch Area when the creel survey began on May 16. Each launch was added to the sampling schedule immediately after significant boat traffic was observed there. River Quest RV Park was added to the sampling schedule on May 31, and Poacher’s Cove was added to the schedule on June 2. Early-run anglers did not use Centennial Campground, Eagle Rock Launch Area, and Riverbend Campground before the fishery closed on June 11th, and these locations were not

sampled during the 2002 early-run. Interviews were collected at all boat launches during the entire 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 possibility of introducing length-of-stay bias (Bernard et al. 1998a) is small because 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).

There were three or four time intervals per day during which interviews could be conducted, three intervals between consecutive angler counts, plus an additional interval after the last count. During the early run, when there were more interview periods than active boat launches, each launch was chosen 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 (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 by species, and (6) number of fish released by species. Hours spent fishing included time when their line was in the water or being rigged but not travel time or time after an angler had harvested a fish.

In summary, this year's study design differed from the 2001 study design in that: (1) interviews did not begin until after the first boat count of the day, (2) interview locations were added to the schedule based on use, (3) angler count direction was pre-selected based on travel distance, (4) only 4 days per week were sampled, and (5) Mondays were not sampled in July[1]. These changes were implemented as a cost savings measure, but preseason analysis indicated that the changes should not significantly bias the estimates or cause the project to fail to meet sampling objectives (Reimer 2003). Because the unguided drift boat fishery on Mondays in July is a new and evolving fishery, one boat count was completed between the hours of 0800-1400 as an index of effort.

Age, Sex, and Length of the Recreational Harvest

Harvested Chinook salmon were sampled for age, sex, and length (ASL) during angler interviews. Sex was identified from external characteristics. MEF length was measured to the nearest half centimeter. Three scales were removed from the preferred area of each fish and placed on an adhesive coated card (Clutter and Whitesel 1956; Welander 1940). Acetate impressions of the scales were read with a microfiche reader to age the fish.

Sport-harvest ASL samples were stratified into one 3-week strata in the early run (May 16-June 9) and into two 2-week strata in the late run (July 1-14 and July 15-31). The sample goal was 150 fish for each stratum, sufficient to achieve the desired relative precision assuming 15% of the scales could not be aged (Thompson 1987).

[1] In 2001, interviews were collected starting at 0400 hours regardless of the boat count schedule, interview locations were added to the schedule as soon as the area was accessible by boat, angler count direction was randomly chosen each day, and 6 days per week (including Mondays in July) were sampled.

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 finclip was found, and permission was granted from the angler, the fish's head was removed for coded wire tag recovery.

INRIVER GILLNETTING

The inriver gillnetting program has been modified several times to meet the changing needs of the Kenai River Chinook salmon fishery. The program 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 and the program continued in this capacity until 1989, when the sample sizes were reduced and the program emphasis was switched to collection of ASL samples from returning Chinook salmon. In 1998, the program was standardized with respect to drift location and procedures, and the task of estimating the daily netting CPUE, by species, was added to the ASL objective. After the 2000 season, 3 years (1998-2000) of netting data and corresponding sonar data were analyzed and it was concluded that the netting data were better suited to determine the species composition within the insonified zone than for abundance estimation (Reimer et al. 2002). At the beginning of the 2001 season, species composition of the driftnet catches was thought to reflect the species composition in the insonified zone of the river. During the 2001 season however, it became clear that more than one mesh size would be required to obtain less biased estimates of species composition. A pilot study conducted in August 2001 concluded that deployment of two mesh sizes was logistically feasible (Reimer 2003). An analysis using net selectivity estimates from other projects indicated that use of a 5.0 in mesh gillnet and a 7.5 in mesh gillnet, fished with equal frequency, would provide a relatively flat composite selectivity curve. Another advantage of these net sizes is that they are slightly small for most fish present and are less likely to slip behind the operculum and damage the gill filaments of captured fish (Hammarstrom and Larson 1984). In 2002, the project used 5.0 in and 7.5 in mesh gillnets for ASL estimates, CPUE estimates and species composition estimates.

In addition to using two mesh sizes, mesh type and color were also changed. The project used 'cable lay' nylon nets, typical commercial fishing gear in the 1960s-1970s, in previous years. In 2002, the project used 'multi-fiber' nylon nets typical of modern day commercial gear. This material is less durable and more abrasive to fish, but also more effective at capturing fish (Bue 1986; Reimer 2003). Specifications of the nets are shown below:

1. 5.0 in (stretched mesh) multi-fiber, 70 meshes deep, 10 fathoms long, R44 color (clear-steel blue), MS50 twine.
2. 7.5 in (stretched mesh) multi-fiber, 55 meshes deep, 10 fathoms long, R44 color, MS93 twine.

Inriver sampling was scheduled for 8 hours daily from May 16 until August 5. The daily sampling schedule was constrained by the tidal influence at the study site, which makes drifting the net unfeasible during rising and high tide stages. Therefore, sampling took place 4 hours before to 4 hours after low tide, excluding hours of darkness (2300-0400 hours). During each day, one low tide was sampled.

Each drift was positioned to sample fish that would pass through the insonified river channel (i.e. 15 m offshore from the right-bank transducer to 10 m offshore from the left-bank transducer). The drift area began immediately downstream from the sonar transducers (river mile 8.6) and ended 0.4 mi

downstream (river mile 8.2). As the boat drifted downstream from the sonar transducers, and the effective insonified area became difficult to define, the net was drifted near the thalweg. Drifts were terminated when: (1) the crew believed five fish were in the net, or (2) the net was drifting too far from the thalweg, or (3) the end of the drift area was reached. Successive drifts always began at the upstream end of the study area. For each set the start and stop time (to the nearest five seconds) was recorded. When fish were caught the number captured by species was recorded. Two drifts (one starting on each bank) were completed with each mesh size before switching to the other mesh size.

In summary, this year's study design differed from the 2001 study design in that: (1) two mesh sizes were used, (2) multi-fiber mesh was used, (3) the mesh color matched the river color, (4) drifts began alternately from each bank, (5) the net was not pulled after the first Chinook salmon was noted, and (6) each drift started at the upstream end of the drift zone[1]. A primary concern was the potential for increased fish mortality due to changes in the materials and methods. Multi-fiber material is considerably more abrasive than cable-lay material, and with increased catch comes increased time to pick the net and increased stress for the fish. Thus the project was challenged to consistently pick the net when it had captured a representative sample of fish, without letting the net get too full. Inseason, it was decided that sampling time was too long if more than five fish were captured in one drift. This goal was relatively easy to meet for Chinook salmon, but was often overshot if a school of sockeye salmon engaged the net simultaneously.

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

Age, Sex, and Length of the Inriver Return

Chinook salmon captured in gillnets were untangled from the net and placed in a tagging cradle (Larson 1995) for ASL sampling prior to release. Inriver return ASL samples were handled and recorded in the same manner as those from the creel survey. To prevent resampling recaptured fish, a hole punch was used to place a mark in the caudal or dorsal fin. Fish captured by the inriver gillnetting program were also checked for adipose finclips. If an adipose finclip was found, the fish was killed and the head removed for coded wire tag recovery. Samples were stratified into two 3-week strata during each run with a 150 fish sample-size goal for each stratum. Strata for the early run were May 16-June 8 and June 9-30; strata for the late run were July 1-23 and July 24-August 15. Sockeye salmon were also measured for MEF length on even numbered days.

Estimates of the age, sex, and length composition in 2002 are generated using the Chinook catches from both 5.0 in and 7.5 in gillnets.

DATA ANALYSIS

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

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[1] In 2001, only 7.5 in cable-lay nylon mesh (dark green color) was used, no sampling pattern with regard to riverbank was utilized, the net was pulled immediately after a chinook salmon was captured, and drifts that were terminated before reaching the downstream end of the drift zone were reset at the approximate river mile where the previous drift ended.

Angler Effort

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

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

where:

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

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

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

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

where:

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

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

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

where:

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

Catch and Harvest

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

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

where:

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

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

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

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

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

and the bias corrected mean was:

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

where:

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

The variance of the jackknife estimate of CPUE was estimated 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):

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

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

When no interviews from a particular angler type were obtained during a particular day, we lacked CPUE and HPUE estimates to pair with angler count data. On such days, we substituted 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.

The estimate of total effort, catch, and harvest, 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 estimates were post-stratified by angler type. Ignoring this lack of independence between strata can cause underestimation of variances. However, in this case, the bias in variance estimates is small.

Angler Effort, Catch, and Harvest on Mondays

In 2002, as in past years, the fishery was restricted to unguided drift boats on Mondays. As a result, Monday harvests have historically comprised only a very small fraction (<3%) of the total. Due to budgetary constraints in 2002, we eliminated interviews of anglers on Mondays and conducted only one "index" angler count, during the middle of the day (0800 to 1400 hours). We then used the following

ad hoc estimation procedure. Although the resulting estimates lacked rigor, they were sufficient to confirm that angler effort, harvest, and catch remained low on Mondays in 2002.

1. We used 2001 angler count data to estimate the relationship between index counts and mean counts on Mondays. The mean number of anglers was approximately 78% of the number counted during the "index" period.
2. To get an estimate of angler hours of effort E, we multiplied the estimated mean count by the length of the unguided angler day (20 hours)
3. To estimate CPUE and HPUE on Mondays without the benefit of angler interviews, we exploited the tendency for angler success to exhibit an autocorrelated time trend. 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 estimate of E derived from the index count.

CPUE from Inriver Gillnetting

Gillnets of two sizes were deployed: 5.0 in and 7.5 in. Two drifts were conducted with one gear-size, originating from each side (k) of the river; then the sequence repeated with 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:

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

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

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 (1977:66).

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:

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

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

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 i of day j is estimated as the mean of the CPUEs, pooled across bank, for each mesh size,

$\hat{r}_{ij} = \sum_{s} \hat{r}_{sij}$ 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 on each bank were used for estimation of species proportions.

Age and Sex Composition

Age and sex composition of the Chinook salmon harvest was 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):

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

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, was estimated by pooling data across strata (equations 20 and 21 ignoring stratum subscripts t).

The total harvest in each age/sex group, by 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:

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

Variance of the weighted proportion was estimated with a parametric bootstrap procedure (Efron and Tibshirani 1993).

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},

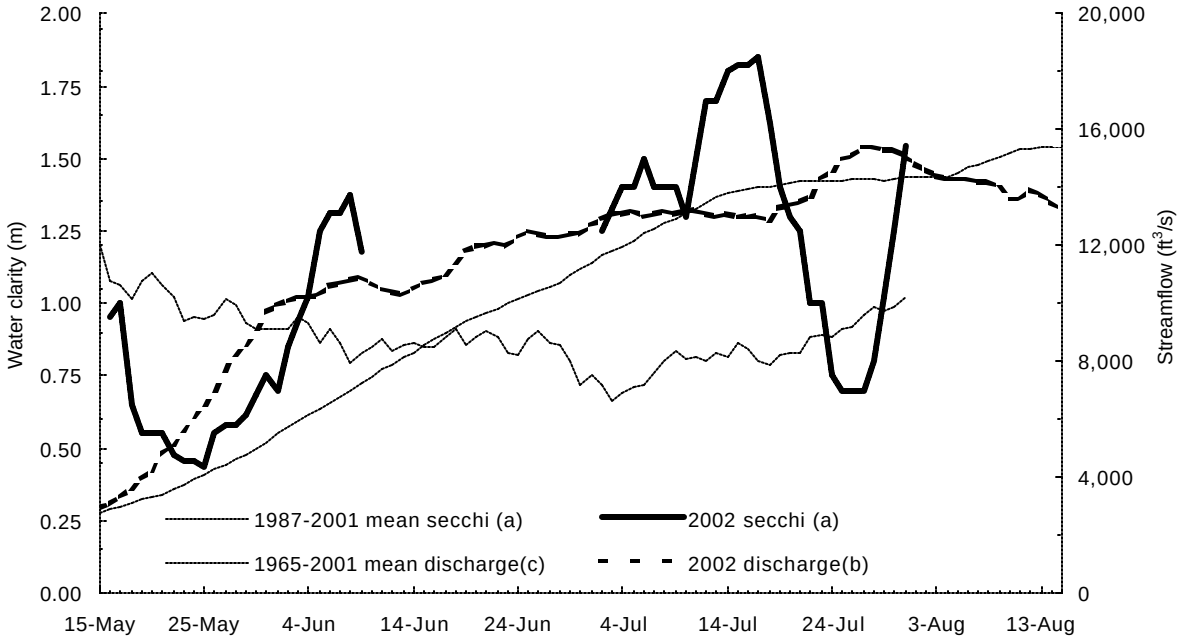
$$\hat{R}_b = \hat{N}_b + \hat{H}_{2b}. \tag{25}$$

RESULTS

Kenai River water clarity was very high for most of the late run (Figure 6). Kenai River streamflow was above average for all of May and June and near average in July (Figure 6).

CREEL SURVEY

The creel survey ran from May 16 to June 9, 2002 and from July 1-31, 2002. During the early-run, the creel survey sampled 16 of the 23 days the fishery was open to unguided anglers and 12 of the 19 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 15 of the 22 days the fishery was open to guided anglers (Table 2). A total of 2,233 angler interviews were conducted, 414 during the early run and 1,819 during the late run (Tables 1 and 2).



(a) measured at Kenai rm 15.3.
(b) USGS 15266300 KENAI R AT SOLDOTNA AK PROVISIONAL DATA SUBJECT TO REVISION
http://waterdata.usgs.gov/ak/nwis/dv?format=rdb&period=360&site_no=15266300, downloaded on January 13, 2003.
(c) Daily Streamflow for the Nation USGS 15266300 KENAI R AT SOLDOTNA AK
http://waterdata.usgs.gov/nwis/discharge/?site_no=15266300&agency_cd=USGS downloaded January 13, 2003.

Figure 6.-Kenai River water clarity and streamflow.

During the early run, angler counts ranged from 0 to 80 for unguided anglers and from 0 to 139 for guided anglers (Appendix A1). The largest count occurred on June 9 for unguided anglers and on June 5 for guided anglers. During the late run, angler counts ranged from 34 to 619 for unguided anglers and from 114 to 525 for guided anglers (Appendix A2). The largest counts occurred on July 14 for unguided anglers and on July 13 for guided anglers.

Estimated effort was 15,012 (SE = 937) angler-hours during the early run (Table 1) and 192,780 (SE = 6,824) angler-hours during the late run (Table 2). The precision of both the early (±1,837 angler hours) and late (±6.9%) run effort estimates satisfied the project objectives (within 10% of the true value or 5,000 angler hours 95% of the time). Guided anglers accounted for 65% of the early-run effort and 48% of the late-run effort.

Estimated daily catch rates of early-run Chinook salmon ranged from 0 to 0.069 (SE = 0.034) fish per hour for unguided anglers and from 0 to 0.088 (SE = 0.031) fish per hour for guided anglers (Appendices B1 and B2). Peak daily catch rates of early-run Chinook salmon occurred on June 8 for both angler types. Estimated daily catch rates of late-run Chinook salmon ranged from 0.008 (SE = 0.005) to 0.179 (SE = 0.069) fish per hour for unguided anglers and from 0.045 (SE = 0.010) to 0.168 (SE = 0.029) fish per hour for guided anglers (Appendices B3 and B4). Peak daily catch rates of late-run Chinook salmon occurred on July 2 for unguided anglers and on July 6 for guided anglers. During both runs, catch rates were generally higher for guided anglers than for unguided anglers.

Table 1.-Estimated effort, catch, and harvest between the Soldotna Bridge and the Warren Ames Bridge during the early-run Kenai River Chinook salmon fishery, 2002.

				Effort		Catch		Harvest	
	n[a]	N[b]	Int.[c]	Est.	SE	Est.	SE	Est.	SE
16-19 May									
Guided weekdays	2	2	9	298	69	0	0	0	0
Guided weekend	1	1	19	234	198	0	0	0	0
Unguided weekdays	2	2	18	180	55	0	0	0	0
Unguided weekends	2	2	47	458	111	0	0	0	0
20-26 May									
Guided weekdays	2	4	31	1,032	202	23	11	23	11
Guided weekend/holiday	1	2	7	864	48	0	0	0	0
Unguided weekdays	2	4	15	210	110	9	7	0	0
Unguided weekends/holiday	2	3	40	835	208	0	0	0	0
27 May-2 June									
Guided weekdays	2	4	11	1,376	330	0	0	0	0
Guided weekend	1	1	13	570	54	11	9	11	9
Unguided weekdays	2	4	9	353	115	0	0	0	0
Unguided weekends	2	2	24	650	183	12	19	12	19
3-9 June									
Guided weekdays	2	4	68	4,620	499	191	62	182	67
Guided weekend	1	1	24	786	342	69	37	69	37
Unguided weekdays	2	4	32	970	271	9	8	5	4
Unguided weekends	2	2	47	1,575	349	95	32	75	27
Day Type Subtotals									
Guided weekdays	8	14	119	7,326	635	214	63	205	68
Guided weekends/holiday	4	5	63	2,454	402	80	38	80	38
Unguided weekdays	8	14	74	1,713	319	18	11	5	4
Unguided weekends/holiday	8	9	158	3,518	460	107	38	87	33
Angler Type Subtotals									
Guided	12	19	182	9,780	752	294	74	285	78
% Guided			44%	65%		70%		76%	
Unguided	16	23	232	5,232	559	125	39	91	33
% Unguided			56%	35%		30%		24%	
Early-run Total			414	15,012	937	419	84	376	85

[a] Number of days sampled.

[b] Number of days fishery was open.

[c] Number of interviews conducted during stratum.

An estimated 376 (SE = 85) Chinook salmon were harvested during the early run (Table 1). Unguided anglers accounted for 24% of the harvest compared to 76% for guided anglers. The estimated catch of early-run Chinook was 419 (SE = 84), meaning 10% of the catch was released. The absolute precision for total harvest and catch (±167 Chinook salmon and ±165 Chinook salmon, respectively) satisfied the project objectives (within 20% or 500 Chinook salmon of the true value 95% of the time).

An estimated 11,483 (SE = 682) Chinook salmon were harvested during the late run (Table 2). Unguided anglers accounted for 43% of the harvest compared to 57% for guided anglers. The estimated catch of late-run Chinook salmon was 16,866 (SE = 1,028), meaning 32% of the catch was released. The relative precision for total harvest and catch (±11.6% and ±11.9%, respectively) satisfied the project objectives (within 20% or 500 Chinook salmon of the true value 95% of the time).

Table 2.-Estimated effort, catch, and harvest between the Soldotna Bridge and the Warren Ames Bridge during the late-run Kenai River Chinook salmon fishery, 2002.

	n[a]	N[b]	Int.[c]	Effort		Catch		Harvest	
				Est.	SE	Est.	SE	Est.	SE
1-7 July									
Guided weekdays	2	3	88	12,408	2,119	1,782	476	1,076	197
Guided weekend/holiday	2	2	74	5,372	715	872	142	535	98
Unguided weekdays	2	3	93	8,243	795	751	398	346	171
Unguided weekends/holiday	2	3	109	8,415	620	673	194	313	64
8-14 July									
Guided weekdays	2	4	152	17,212	2,694	1,418	245	1,044	180
Guided weekend	1	1	47	4,248	1,158	511	164	244	87
Unguided weekdays	2	4	48	11,570	2,457	571	301	571	301
Unguided weekends	2	2	110	12,500	2,248	1,623	376	1,103	276
15-21 July									
Guided weekdays	2	4	126	18,192	2,004	2,297	303	1,660	215
Guided weekend	1	1	64	3,380	632	309	74	298	73
Unguided weekdays	2	4	115	14,970	1,120	814	123	652	125
Unguided weekends	2	2	144	12,450	1,631	936	160	534	107
22-28 July									
Guided weekdays	2	4	74	18,360	1,934	1,703	284	1,129	200
Guided weekend	1	1	44	4,308	820	248	72	181	60
Unguided weekdays	2	4	121	11,870	2,003	834	198	605	181
Unguided weekends	2	2	154	11,905	1,739	697	146	484	110
29-31 July									
Guided weekdays	2	2	108	8,492	723	443	76	371	70
Unguided weekdays	2	2	148	8,885	749	383	80	337	73
Day Type Subtotals									
Guided weekdays	10	17	548	74,664	4,475	7,643	681	5,279	403
Guided weekends/holiday	5	5	229	17,308	1,710	1,940	241	1,258	161
Unguided weekdays	10	17	525	55,538	3,535	3,353	556	2,511	416
Unguided weekends/holiday	8	9	517	45,270	3,335	3,930	475	2,434	322
Angler Type Subtotals									
Guided	15	22	777	91,972	4,791	9,584	723	6,537	434
% Guided			43%	48%		57%		57%	
Unguided[d]	18	26	1,042	100,808	4,860	7,282	732	4,945	527
% Unguided			57%	52%		43%		43%	
Late-run Total[e]			1,819	192,780	6,824	16,866	1,028	11,483	682

[a] Number of days sampled in each stratum.

[b] Number of days fishery was open in each stratum.

[c] Number of interviews conducted during stratum.

[d] Harvest, catch and effort estimates for unguided anglers are biased low because there are five unguided drift boat Mondays which were not included in the sampling design.

Less than 1% of the early-run effort and 15.8% of the late-run effort occurred downstream of the Chinook salmon sonar site (Appendices C1 and C2). The percentage of anglers downstream of the sonar in the late run was 2-3 times larger than it has been in 1997-2001, necessitating estimates of angler effort, catch and harvest by geographic strata (Appendices C1 and C2). The estimate of late-run harvest below the Chinook salmon sonar site was 1,929 Chinook salmon. This number represents 4.6% of the late-run sonar passage estimate and warrants inclusion of downstream harvest in the estimates of inriver return and escapement.

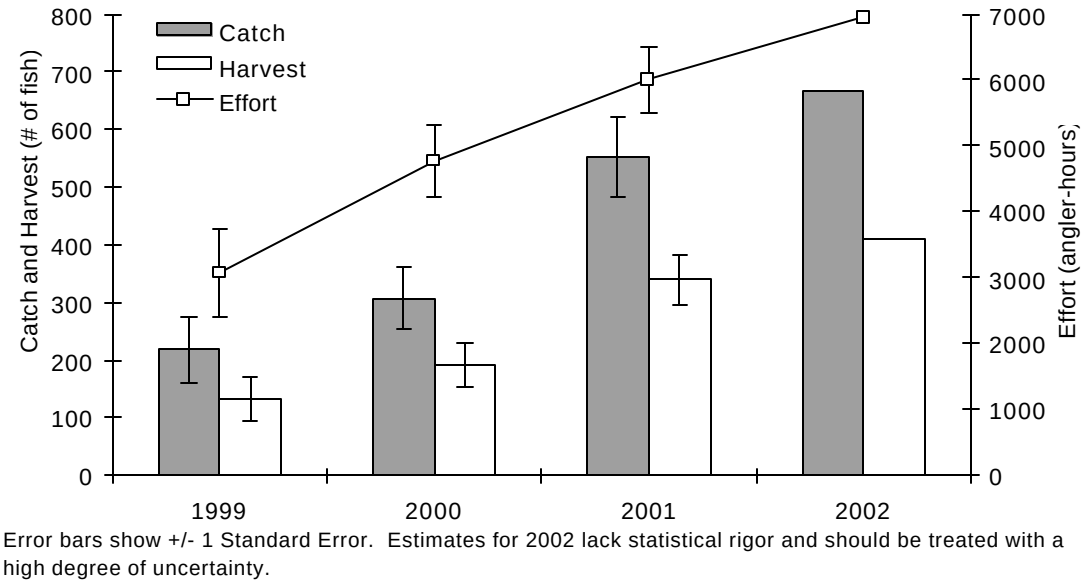


Figure 7.-Monday unguided drift boat catch, harvest and angler effort, 1999-2002.

The 2002 season marks the fourth year that unguided anglers have been allowed to fish from drift boats on Mondays in July. For this group of anglers catch, harvest and effort have increased each year (Figure 7), but still represented less than 4% of the late-run totals in 2002. The estimates presented for 2002 lack the statistical rigor of the estimates for 1999-2001 and should be treated with a high degree of uncertainty. Consequently, estimates of catch, harvest and effort for unguided drift boat Mondays are not included in any of the seasonal totals presented herein.

INRIVER GILLNETTING

During the early run, we captured 1,042 salmonids greater than 400 mm long with inriver gillnets; 369 Chinook salmon, 662 sockeye salmon and 11 Dolly Varden (Appendix D3). CPUE and Chinook salmon ratios were calculated using only salmonids greater than 400 mm because this length approximates the lower size limit detectible by the sonar (Debby Burwen, ADF&G, Sport Fish, Anchorage, personal communication). A total of 550 other fish were captured; 545 eulachon *Thaleichthys pacificus*, 3 starry flounder *Platichthys stellatus*, 1 Chinook salmon less than 400 mm MEF length and 1 Dolly Varden less than 400 mm total length. Daily Chinook salmon CPUE ranged from 0 to 0.151 (SE = 0.024) Chinook salmon per minute drifted (Appendix D3). The ratio of Chinook salmon to total salmon captured ranged from 0 to 1.00, the mean value was 0.39 (Appendix D3).

During the late run a total of 3,410 salmonids greater than 400 mm long were captured with inriver gillnets; 1,171 Chinook salmon, 1,915 sockeye salmon, 27 coho salmon, 287 pink salmon and 10 Dolly Varden (Appendix D6). A total of 16 other fish were captured during the late run; 9 Chinook salmon less than 400 mm MEF length and 7 Dolly Varden less than 400 mm total length. Daily CPUE ranged from 0.152 (SE = 0.016) to 0.910 (SE = 0.125) Chinook salmon per minute drifted (Appendix D6).

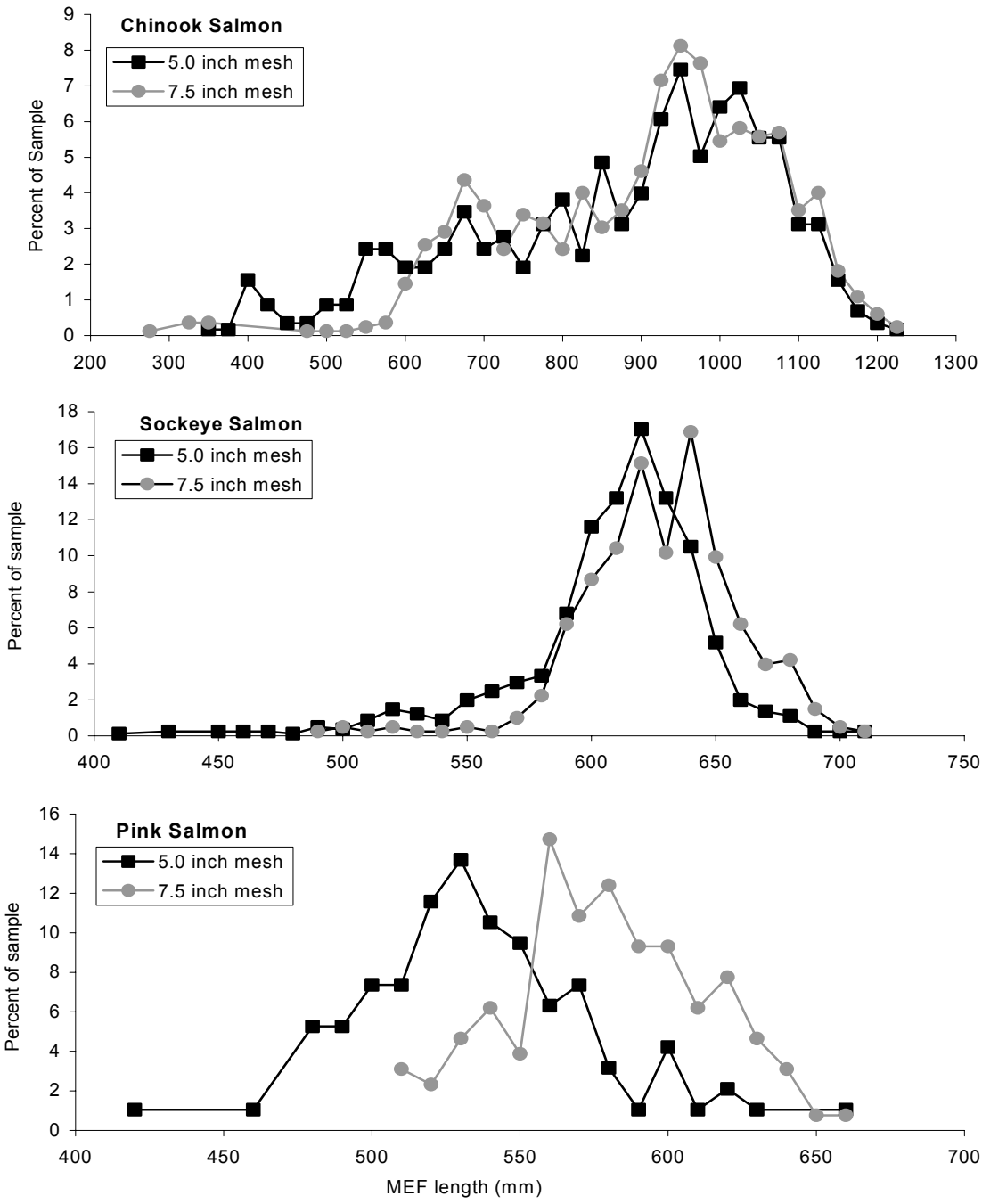


Figure 8.-Length distribution of Kenai River Chinook salmon, sockeye salmon and pink salmon caught with 5.0 in and 7.5 in mesh gillnets, 2002.

age composition estimates generated using the 5.0 in and 7.5 in gillnets did not differ significantly for either the early or the late run. Gillnet size selectivity was more pronounced for other species. For pink salmon (Figure 8), the 5.0 in and the 7.5 in length distributions are similar in shape, but the 5.0 in distribution is shifted toward shorter fish. For sockeye salmon (Figure 8), fish less than 580 mm were captured more often in the 5.0 in mesh, and the entire 5.0 in distribution is shifted towards shorter fish.

The 5.0 in and 7.5 in gillnets did show a large difference in species composition. 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 of the 5.0 in and the 7.5 in gillnets was significantly different in both the early run ($\chi^2 = 78.07$, df = 4, $P < 0.001$) and the late run ($\chi^2 = 193.57$, df = 4, $P < 0.001$). These tests considered all species that were captured although the core analysis considering only Chinook and sockeye salmon yielded similar results.

In 2002, 6.4% of the early-run Chinook salmon and 9.4% of the late-run Chinook salmon captured by the inriver gillnetting program were injured in some manner. During the early run, ~54% of the injuries were bleeding gills, ~38% were scrapes or cuts (generally to the eye, dorsal fin or adipose fin) and ~8% were lethargic upon release (probably from suffocation because the net impeded buccal-opercular movement). During the late run, ~65% of the injuries were bleeding gills, ~23% were scrapes or cuts, and ~10% were lethargic upon release. Bleeding gills were more frequent for ages 1.2 and 1.3 than it was in ages 1.4 and 1.5 and were more frequent for fish caught in the 7.5 in mesh than for fish caught in the 5.0 in mesh. The frequency of other maladies was consistent between mesh sizes and ages.

AGE, SEX, AND LENGTH

Creel Survey

The early-run harvest was 12.9% (SE = 6.1%) age-1.2 fish, 41.9% (SE = 9.0%) age-1.3 fish, and 45.2% (SE = 9.1%) age-1.4 fish (Table 3). The sample size goal was not met; however, the absolute precision goals were met for all ages and sexes.

The age composition of the late-run harvest differed ($\chi^2 = 16.28$, df = 2, $P = 0.0003$) between temporal strata (July 1-14, July 15-31) 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 (Table 4 and Appendix E1). Age-1.4 fish were most abundant, comprising 67.6% (SE = 2.8%) of the total harvest, followed by age-1.3 fish at 23.1% (SE = 2.5%) and age 1.2 fish at 5.0% (SE = 1.3%) (Table 4). The sample size and relative precision goals for estimates of age and sex proportions were met for all ages and sexes in both strata of the late-run harvest.

Inriver Gillnetting

For the early-run inriver return, there was no significant difference in the age composition between temporal strata ($\chi^2 = 0.27$, df = 2, $P = 0.88$) with age-1.2, age-1.3 and age-1.4 fish considered (92.5% of the sample). The most abundant age class was age-1.4 fish, which made up 39.5% (SE = 2.8%) of the inriver return (Table 5). Age-1.3 (37.3%, SE = 2.8%) and age-1.2 (15.7%, SE = 2.1%) were the next largest contributors. The sample size goal was not met for the first strata of the early-run inriver return; however, the relative precision goals were satisfied for all ages and sexes sampled in both strata.

Table 3.-Age composition and estimated harvest by age class for the sport harvest of early-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge, 2002.

	Age			
Parameter	1.2	1.3	1.4	Total
Female				
Sample size	1	6	10	17
% sample	3.2%	19.4%	32.3%	54.8%
SE % sample	3.2%	7.2%	8.5%	9.1%
Total Harvest	12	73	121	206
SE Total Harvest	12	31	41	57
Male				
Sample size	3	7	4	14
% sample	9.7%	22.6%	12.9%	45.2%
SE % sample	5.4%	7.6%	6.1%	9.1%
Total Harvest	36	85	49	170
SE Total Harvest	21	34	25	51
Combined				
Sample size	4	13	14	31
% sample	12.9%	41.9%	45.2%	100.0%
SE % sample	6.1%	9.0%	9.1%	0.0%
Total Harvest	49	158	170	376
SE Total Harvest	25	48	51	85

Inriver Gillnetting

For the early-run inriver return, there was no significant difference in the age composition between temporal strata (χ^2 = 0.27, df = 2, P = 0.88) with age-1.2, age-1.3 and age-1.4 fish considered (92.5% of the sample). The most abundant age class was age-1.4 fish, which made up 39.5% (SE = 2.8%) of the inriver return (Table 5). Age-1.3 (37.3%, SE = 2.8%) and age-1.2 (15.7%, SE = 2.1%) were the next largest contributors. The sample size goal was not met for the first strata of the early-run inriver return; however, the relative precision goals were satisfied for all ages and sexes sampled in both strata.

During the late run, the age composition of the inriver return differed between time strata (χ^2 = 57.36, df = 2, P < 0.001) with age-1.2, age-1.3 and age-1.4 fish considered (94.7% 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 (Table 6 and Appendix E2). The most abundant age was age-1.4 fish, which comprised 58.5% (SE = 1.6%), followed by age-1.3 fish at 18.5% (SE = 1.2%) and age-1.2 fish at 17.7% (SE = 1.2%). The sample size goal was met in both strata as were the relative precision goals for all ages and sexes sampled.

Age, Sex, and Length Comparisons

MEF length by age and sex are shown for early-run (Table 7) and late-run (Table 8) Chinook salmon. Analysis-of-variance (ANOVA) was used to test for differences in mean length-at-age by sex, run, and sample (creel survey or inriver gillnet) for the 1.2, 1.3 and 1.4 age classes. A separate ANOVA was conducted for each age class. Among age-1.2 fish, late-run fish averaged 2.5 cm (SE = 1.0) longer

Table 4.-Age composition and estimated harvest, by age class and geographic strata, for the sport harvest of late-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge, 2002.

	Age						
Parameter	1.1	1.2	1.3	1.4	1.5	2.3	Total
Late Run, both strata (1 July- 31 July)							
Female							
Sample size		2	31	105	1	1	140
Downstream Harvest		13	211	754	6	8	992
SE Downstream Harvest		9	44	97	6	8	120
Upstream Harvest		68	1,071	3,665	34	35	4,874
SE Upstream Harvest		48	199	360	34	35	429
Total Harvest		81	1,282	4,419	41	43	5,865
SE Total Harvest		57	233	412	41	43	481
% Total Harvest		0.7%	11.2%	38.5%	0.4%	0.4%	51.1%
SE % Total Harvest		0.5%	1.9%	3.5%	0.4%	0.4%	4.0%
Male							
Sample size	6	12	33	80	4		135
Downstream Harvest	38	81	226	564	27		937
SE Downstream Harvest	17	25	46	80	14		120
Upstream Harvest	205	414	1,141	2,782	138		4,680
SE Upstream Harvest	85	121	205	320	69		439
Total Harvest	243	496	1,368	3,346	164		5,617
SE Total Harvest	100	144	240	370	82		491
% Total Harvest	2.1%	4.3%	11.9%	29.1%	1.4%		48.9%
SE % Total Harvest	0.9%	1.2%	2.0%	3.3%	0.7%		3.6%
Combined							
Sample size	6	14	64	185	5	1	275
Downstream Harvest	38	94	438	1,317	33	8	1929
SE Downstream Harvest	17	27	71	149	15	8	210
Upstream Harvest	205	482	2,212	6,448	172	35	9,554
SE Upstream Harvest	85	131	294	492	77	35	649
Total Harvest	243	577	2,650	7,765	205	43	11,483
SE Total Harvest	100	155	339	539	92	43	682
% Total Harvest	2.1%	5.0%	23.1%	67.6%	1.8%	0.4%	100.0%
SE % Total Harvest	0.9%	1.3%	2.5%	2.8%	0.8%	0.4%	0.0%

Notes: 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.

Temporally stratified age composition and estimated harvest, by age class and geographic strata, for the sport harvest of 2002 late-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge is presented in Appendix E1.

than early-run fish. Among age-1.3 fish, females averaged 2.9 cm (SE = 0.7) longer than males. Among age-1.4 fish, length differed by sex, and by the combination of run and sample. Age-1.4 males averaged 4.6 cm (SE = 0.5) longer than age-1.4 females. Also, age-1.4 fish harvested by anglers during the early-run averaged 5.2 cm shorter (SE = 2.0) than the other three combinations of run and sample (late creel, early gillnet, late gillnet; see Figure 9).

Table 5.-Age composition and estimated sonar passage by age class for early-run Kenai River Chinook salmon, 2002.

	Age							
Parameter	0.2	1.1	1.2	1.3	1.4	1.5	2.3	Total
Female								
Sample size		1	7	53	75	4	1	141
% sample		0.3%	2.3%	17.3%	24.5%	1.3%	0.3%	46.1%
SE % sample		0.3%	0.9%	2.2%	2.5%	0.7%	0.3%	2.9%
Sonar passage estimate		23	164	1,240	1,755	94	23	3,300
SE sonar passage estimate		23	61	158	181	47	23	219
Male								
Sample size	2	8	41	61	46	7		165
% sample	0.7%	2.6%	13.4%	19.9%	15.0%	2.3%		53.9%
SE % sample	0.5%	0.9%	2.0%	2.3%	2.0%	0.9%		2.9%
Sonar passage estimate	47	187	960	1,428	1,077	164		3,862
SE sonar passage estimate	33	66	141	167	149	61		224
Combined								
Sample size	2	9	48	114	121	11	1	306
% sample	0.7%	2.9%	15.7%	37.3%	39.5%	3.6%	0.3%	100.0%
SE % sample	0.5%	1.0%	2.1%	2.8%	2.8%	1.1%	0.3%	0.0%
Sonar passage estimate[a]	47	211	1,123	2,668	2,832	257	23	7,162
SE sonar passage estimate	33	69	151	208	211	77	23	169

[a] Combined total sonar passage estimate and SE from Miller et al. 2004.

Table 6.-Age composition and estimated sonar passage by age class for the inriver return of late-run Kenai River Chinook salmon, 2002.

	Age							
Parameter	0.2	0.3	1.1	1.2	1.3	1.4	1.5	Total
Late Run, both strata (1 July- 10 August)								
Female								
Sample size	1		1	42	40	331	10	425
Sonar passage estimate[a]	47		47	1,961	1,811	14,329	419	18,614
SE sonar passage estimate	47		47	295	284	875	134	960
% sonar passage	0.1%		0.1%	4.7%	4.3%	34.3%	1.0%	44.5%
SE % sonar passage	0.2%		0.2%	0.7%	0.6%	1.5%	0.3%	1.6%
Male								
Sample size		4	12	118	132	232	22	520
Sonar passage estimate[a]		180	568	5,422	5,938	10,116	968	23,193
SE sonar passage estimate		90	163	473	503	699	208	954
% sonar passage		0.4%	1.4%	13.0%	14.2%	24.2%	2.3%	55.5%
SE % sonar passage		0.2%	0.4%	1.1%	1.1%	1.3%	0.5%	1.6%
Combined								
Sample size	1	4	13	160	172	563	32	945
Sonar passage estimate[a]	47	180	615	7,382	7,750	24,445	1,387	41,807
SE sonar passage estimate	47	90	169	536	567	1,190	249	1,353
% sonar passage	0.1%	0.4%	1.5%	17.7%	18.5%	58.5%	3.3%	100.0%
SE % sonar passage	0.2%	0.2%	0.4%	1.2%	1.2%	1.6%	0.6%	0.0%

[a] Temporally stratified estimates of age composition and sonar passage by age class for 2002 late-run Kenai River Chinook salmon are presented in Appendix E2.

Table 7.-MEF length of Chinook salmon sampled during the early-run Kenai River Chinook salmon fishery, 2002.

		Age								
Sample	Parameter	0.2	0.3	1.1	1.2	1.3	1.4	1.5	2.3	Combined
Creel Survey										
Females	MEF length				553	802	946			872
	SE MEF length					28	18			30
	min MEF length				553	745	820			553
	max MEF length				553	920	995			995
	sample size				1	6	10			17
Males	MEF length				648	811	951			816
	SE MEF length				32	25	20			33
	min MEF length				585	723	930			585
	max MEF length				680	917	1,010			1,010
	sample size				3	7	4			14
Combined	MEF length				625	807	948			847
	SE MEF length				33	18	14			22
	min MEF length				553	723	820			553
	max MEF length				680	920	1,010			1,010
	sample size				4	13	14			31
Inriver Gillnetting Study										
Females	MEF length			420	623	836	985	1,054	785	908
	SE MEF length				19	7	7	29		10
	min MEF length			420	560	705	835	970	785	420
	max MEF length			420	690	925	1,145	1,100	785	1,145
	sample size			1	7	53	75	4	1	141
Males	MEF length	620		406	621	809	1,048	1,113		820
	SE MEF length	0		9	8	7	11	18		16
	min MEF length	620		355	500	675	885	1,045		355
	max MEF length	620		440	720	933	1,199	1,190		1,199
	sample size	2		8	41	61	46	7		165
Combined	MEF length	620		407	622	822	1,009	1,091	785	860
	SE MEF length	0		8	7	5	7	17		10
	min MEF length	620		355	500	675	835	970	785	355
	max MEF length	620		440	720	933	1,199	1,190	785	1,199
	sample size	2		9	48	114	121	11	1	306

The age composition of the late-run harvest and the late run driftnet catch differed significantly (χ^2 = 25.67, df = 1, P < 0.001) with age-1.2, age-1.3 and age-1.4 fish considered (94.9% of the sample). Anglers harvested a smaller percentage of the age-1.2 fish and a larger percentage of the age-1.3 and age-1.4 fish than were captured by the drift-netting program. The same pattern was present for early-run fish; however, the differences were not statistically significant.

DISCUSSION AND RECOMMENDATIONS

CREEL SURVEY

During the 2002 early run, angler effort below the Soldotna Bridge was the lowest ever recorded, 15,015 angler hours, compared to the 1977-2001 historical average of 105,991 angler hours. Likewise, harvest below the Soldotna Bridge was also the lowest on record, 376 Chinook salmon,

Table 8.-MEF length of Chinook salmon sampled during the late-run Kenai River Chinook salmon fishery, 2002.

		Age								
Sample	Parameter	0.2	0.3	1.1	1.2	1.3	1.4	1.5	2.3	Combined
Creel Survey										
Females	MEF length				673	856	987	1,157	915	954
	SE MEF length				19	11	5			7
	min MEF length				654	715	865	1,157	915	654
	max MEF length				692	932	1,125	1,157	915	1,157
	sample size				2	31	105	1	1	140
Males	MEF length			380	671	816	1,019	1,150		914
	SE MEF length			37	15	13	9	37		16
	min MEF length			310	529	664	868	1,069		310
	max MEF length			505	735	910	1,250	1,235		1,250
	sample size			6	12	33	80	4		135
Combined	MEF length			380	671	835	1,001	1,151	915	934
	SE MEF length			37	13	9	5	29		9
	min MEF length			310	529	664	865	1,069	915	310
	max MEF length			505	735	932	1,250	1,235	915	1,250
	sample size			6	14	64	185	5	1	275
Inriver Gillnetting Study										
Females	MEF length		783	365	645	804	1,033	1,157		875
	SE MEF length		26	12	6	5	5	8		9
	min MEF length		750	285	405	670	825	1,085		285
	max MEF length		860	430	730	930	1,230	1,215		1,230
	sample size		4	12	118	132	232	22		520
Males	MEF length	680		335	645	827	985	1,097		937
	SE MEF length				8	12	3	10		6
	min MEF length	680		335	505	675	855	1,055		335
	max MEF length	680		335	730	950	1,175	1,140		1,175
	sample size	1		1	42	40	331	10		425
Combined	MEF length	680	783	362	645	809	1,005	1,138		903
	SE MEF length		26	12	5	5	3	8		6
	min MEF length	680	750	285	405	670	825	1,055		285
	max MEF length	680	860	430	730	950	1,230	1,215		1,230
	sample size	1	4	13	160	172	563	32		945

versus the 1976-2001 historical average of 4,053 Chinook salmon. While this result is largely due to the fishery closure from June 11-June 30, the 2002 early-run sonar passage was the lowest on record (Miller et al. 2004).

During the 2002 late run, angler effort below the Soldotna Bridge was less than the 1977-2001 historical average of 217,679 angler hours by 11%. Harvest below the Soldotna Bridge was 41% more than the 1976-2001 historical average of 8,119 Chinook salmon, but only 6% more than the 1997-2001 average of 10,829 Chinook salmon.

The distribution of angler effort during the 2002 late run was unusual. The fishery was closed below the Soldotna Bridge until Monday, July 1 and all accounts were that the drift boat fishing on that day was excellent. Over the next 2 weeks effort below the Chinook salmon sonar site (Appendix C2) was very high and fishermen were fishing further downstream than is normal. The unusually clear water combined

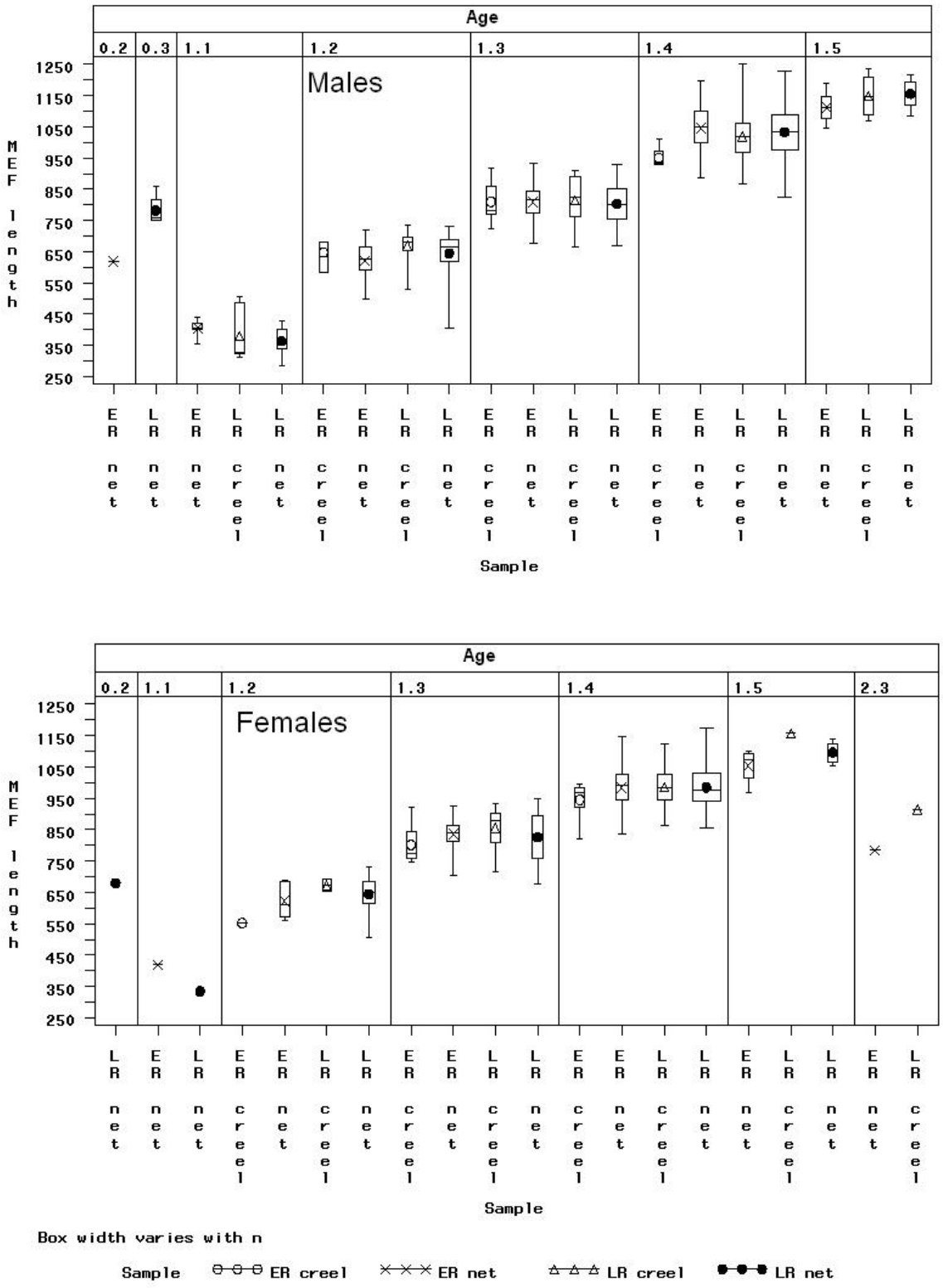


Figure 9.-MEF length of Kenai River Chinook salmon by sex, run and sample, 2002.

general above the Soldotna Bridge was reported as very slow. One explanation is that water clarity altered fish migration routes and fish were not present in the usual fishing areas.

Several sampling changes were incorporated into the creel survey in 2002. The new sampling design increased the efficiency of the project. Even with a reduced crew size, the early-run creel survey obtained 122%, 132% and 101% more interviews per unit of recreational angler effort than it did in 1999, 2000 and 2001, respectively. The late-run creel survey obtained 30%, 25% and 14% more interviews per unit of recreational angler effort than it did in 1999, 2000, and 2001, respectively.

INRIVER GILLNETTING

The change in study design increased the proportion of the Chinook salmon passage that was captured by the inriver gillnetting program by a factor of 2-4 for the early run (Figure 10) and by a factor of 5-8 in the late run (Figure 11). The increase recorded is the cumulative effect of all changes to the sampling design, but the change of mesh type and color are probably the most significant.

A primary concern regarding the changes in mesh material was a possible increase in the number of injured fish. In past years, Chinook salmon were only considered injured if they were observed with bleeding gills. In 2002, 3.5% of the early-run Chinook salmon and 6.1% of the late-run Chinook salmon were observed with bleeding gills. 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 as injured. These numbers indicate that multi-fiber mesh did not lead to a large increase in the tendency for gill filament damage during capture. While the cable-lay nylon nets used in past years did not cause cuts or scrapes on captured fish, careful examination of recaptured fish in 2002 indicated that cuts and scrapes from previous gillnet capture seemed to have little effect on the vitality of the recaptured fish.

Earlier studies have compared the size selectivity of the recreational harvest and the gillnet samples as an attempt to quantify the size selectivity by gillnets. In 1986 and 1987, there was no significant difference in size selectivity between 7.5 in cable-lay nylon gillnets and the recreational fishery due to length (Conrad 1988; Conrad and Larson 1987), while in 1989 there was a significant difference (Carlon and Alexandersdottir 1989). In 2002, a significant difference between the age composition of the creel sample and the age composition of the inriver gillnetting sample was detected in the late run (see Age, Sex, and Length Comparisons above). These differences may be due to selectivity by gillnets and/or selectivity by anglers; very likely both.

Analysis herein focused on comparisons between the 5.0 in and 7.5 in gillnets to examine selectivity. These analyses indicate that the inriver gillnetting program has a small size/age selectivity bias for Chinook salmon suggesting net selectivity curves with relatively flat right hand limbs and steep left hand limbs. Thus, since the average Chinook salmon is longer than the optimum length for both the 5 in (~500 mm) and the 7.5 in (~750 mm) gillnets, only small differences in the age/size composition are noted. In contrast, the average pink and/or sockeye salmon is shorter than the optimum length for the 7.5 in gillnet and near the optimum for the 5 in gillnet, thus larger size composition differences are noted.

The differences in gillnet size selectivity for each species strengthen the argument that an additional gillnet size was needed to estimate species composition of the sonar passage. Thus

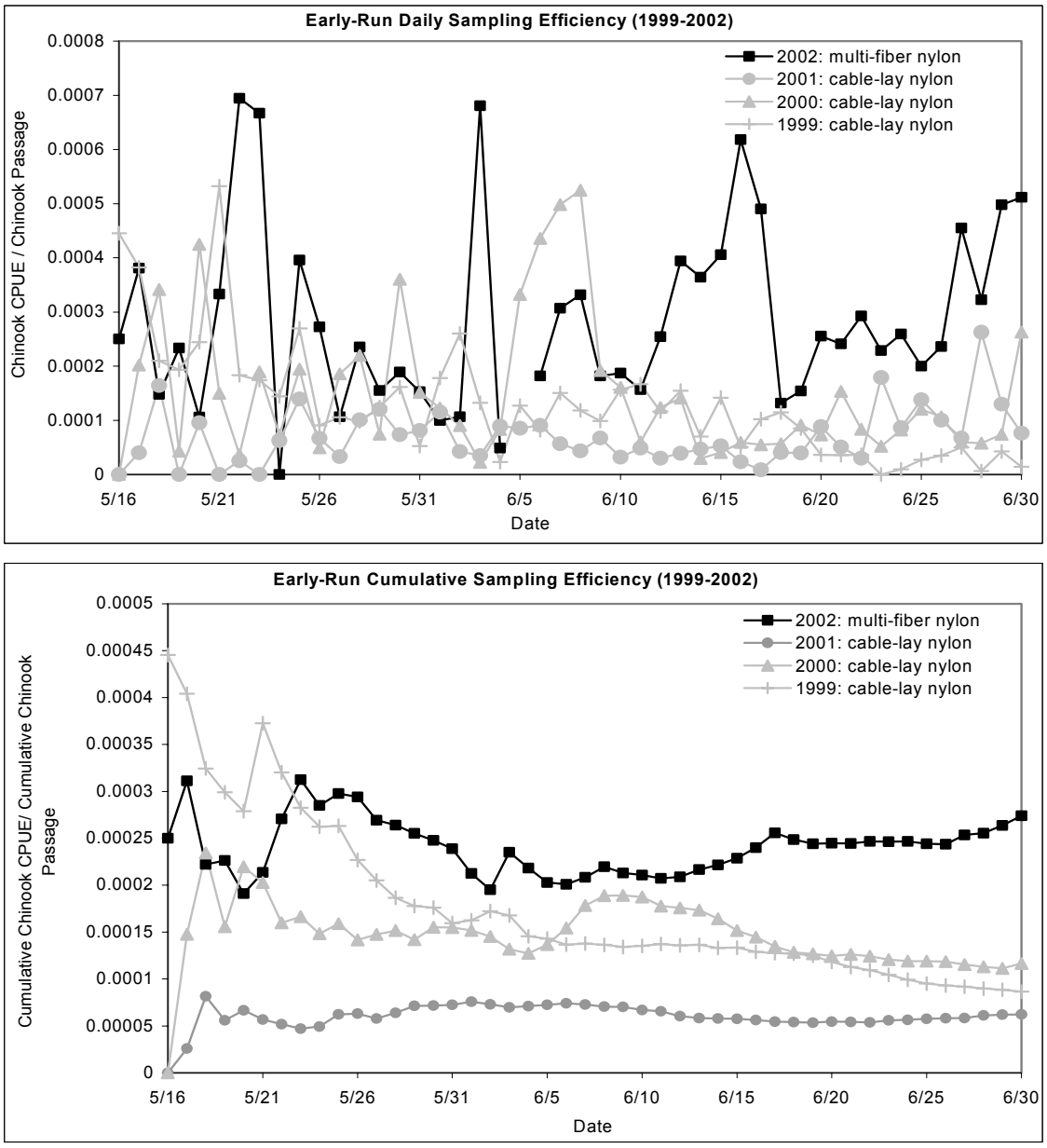


Figure 10.-Early-run sampling efficiency for the Kenai River Chinook salmon netting project, 1999-2002.

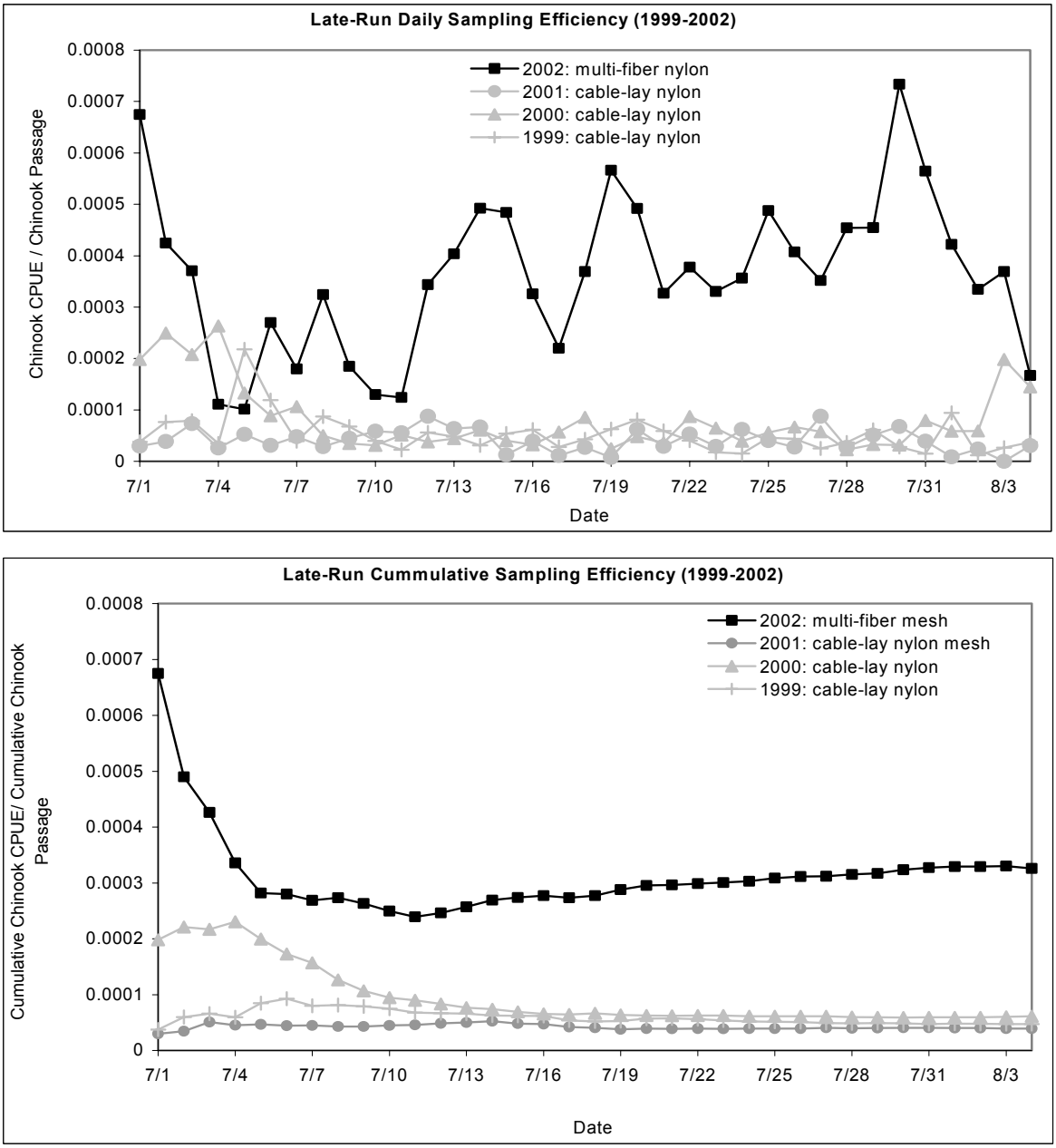


Figure 11.-Late-run sampling efficiency for the Kenai River Chinook salmon netting project, 1999-2002.

with the limited data available the inriver gillnetting program seems well poised to provide reasonably accurate estimates of Chinook salmon ASL and the species composition of the sonar passage.

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APPENDIX A. BOAT ANGLER COUNTS DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2002

Appendix A1.-Guided and unguided boat angler counts, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 2002.

		Downstream								Upstream								Combined Strata							
	Day	Unguided Anglers				Guided Anglers				Unguided Anglers				Guided Anglers				Unguided Anglers				Guided Anglers			
Date	Type[a]	A[b]	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
5/16/2002	wd		0	0	0		0	0			1	4	10		13	10			1	4	10		13	10	
5/17/2002	wd	0	0	0		0	0	0		4	1	7		21	19	0		4	1	7		21	19	0	
5/18/2002	we/hol	0		0	0	0		0		4		10	3	36		3		4		10	3	36		3	
5/19/2002	we/hol	0	0	0	0					20	26	23	0					20	26	23	0				
5/21/2002	wd	0	0	0	0	0	0	0		4	4	6	4	47	23	0		4	4	6	4	47	23	0	
5/22/2002	wd	0	0	0	0	0	0	0		0	0	3	0	32	23	4		0	0	3	0	32	23	4	
5/25/2002	we/hol	0	0		0	0	4			2	6		26	36	32			2	6		26	36	36		
5/26/2002	we/hol	0	0	0	0					14	30	12	10					14	30	12	10				
5/29/2002	wd	0	0	0	0	0	0	0		12	8	0	2	25	23	10		12	8	0	2	25	23	10	
5/31/2002	wd	0			0	0				10			0	38				10			0	38			
6/1/2002	we/hol	0	0	0	0		0	0		0	12	19	19		52	43		0	12	19	19		52	43	
6/2/2002	we/hol		0	0	0					4	41	21	14					4	41	21	14				
6/4/2002	wd	0	0	3	0	0	0			23	25	14	2	122	79			23	25	17	2	122	79		
6/5/2002	wd	0	0	0	0	0	0	0		5	14	5	6	139	82	55		5	14	5	6	139	82	55	
6/8/2002	we/hol	0	0	0	0	0	0			36	23	25	16	94	37			36	23	25	16	94	37		
6/9/2002	we/hol	0	5	4	3					80	38	74	11					80	43	78	14				

Note: 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.

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

[b] Angler count timeframes: 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 geographic strata, during the late-run Kenai River Chinook salmon fishery, 2002.

		Downstream								Upstream								Combined Strata							
	Day	Unguided Anglers				Guided Anglers				Unguided Anglers				Guided Anglers				Unguided Anglers				Guided Anglers			
Date	Type[a]	A[b]	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
7/2/2002	wd	11	9	0	8	6	16	0		146	131	83	120	498	361	338		157	140	83	128	504	377	338	
7/4/2002	wd	2	11	12	20	24	80	20		142	132	102	176	292	151	114		144	143	114	196	316	231	134	
7/5/2002	wd	25	19	13	3	95	13			117	210	132	72	185	273			142	229	145	75	280	286		
7/6/2002	we/hol	19	14	9	5	119	45	22		179	136	84	79	223	161	92		198	150	93	84	342	206	114	
7/10/2002	wd	10	12	12	0	38	144	19		110	68	91	94	471	214	175		120	80	103	94	509	358	194	
7/12/2002	wd	0	32	31	8		150	127		204	134	124	227		316	134		204	166	155	235		466	261	
7/13/2002	we/hol	2	71	14	15	7	129	17		240	273	149	212	518	245	146		242	344	163	227	525	374	163	
7/14/2002	we/hol	73	109	10						546	351	54						619	460	64					
7/17/2002	wd	28	22	24	20	129	54	87		181	126	95	207	394	190	203		209	148	119	227	523	244	290	
7/19/2002	wd	33	39	27	55		178	98		166	133	116	225	401	152	250		199	172	143	280	401	330	348	
7/20/2002	we/hol	27	37	29	32	33	76	27		410	137	200	194	232	161	316		437	174	229	226	265	237	343	
7/21/2002	we/hol	64	124	55	25					378	228	363	187					442	352	418	212				
7/24/2002	wd	23	28	16	4	53	41			106	96	191	30	412	292			129	124	207	34	465	333		
7/25/2002	wd	16	12	10	6	4	4	9		208	129	160	152	504	228	349		224	141	170	158	508	232	358	
7/27/2002	we/hol	16	25	10	3	17	59			263	201	305	74	386	256			279	226	315	77	403	315		
7/28/2002	we/hol			116	15							352	259							468	274				
7/30/2002	wd	26	56	23	15	78	57	140		255	233	152	236	412	278	186		281	289	175	251	490	335	326	
7/31/2002	wd	30	54	45	19	121	76	81		156	100	134	243	295	209	190		186	154	179	262	416	285	271	

Note: 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.

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

[b] Angler count timeframes: A = 0400-0859 hours, B = 0900-1359 hours, C = 1400-1959 hours, D = 2000-2359 hours.

APPENDIX B. EFFORT, CATCH AND HARVEST ESTIMATES BY GEOGRAPHIC STRATA DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2002

Appendix B1.-Daily estimates of unguided boat angler CPUE, HPUE, angler effort, catch and harvest, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 2002.

		Angler interview data[a]					Downstream								Upstream							
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Type[b]	n	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
5/16/02	wd	5	0.000	0.000	0.000	0.000	3	0.0	0	0	0	0	0	0	3	5.0	100	39	0	0	0	0
5/17/02	wd	13	0.000	0.000	0.000	0.000	3	0.0	0	0	0	0	0	0	3	4.0	80	39	0	0	0	0
5/18/02	we/hol	25	0.000	0.000	0.000	0.000	3	0.0	0	0	0	0	0	0	3	5.7	113	53	0	0	0	0
5/19/02	we/hol	22	0.000	0.000	0.000	0.000	4	0.0	0	0	0	0	0	0	4	17.3	345	98	0	0	0	0
5/21/02	wd	12	0.049	0.032	0.000	0.000	4	0.0	0	0	0	0	0	0	4	4.5	90	12	0	0	4	3
5/22/02	wd	3	0.000	0.000	0.000	0.000	4	0.0	0	0	0	0	0	0	4	0.8	15	17	0	0	0	0
5/25/02	we/hol	22	0.000	0.000	0.000	0.000	3	0.0	0	0	0	0	0	0	3	11.3	227	118	0	0	0	0
5/26/02	we/hol	18	0.000	0.000	0.000	0.000	4	0.0	0	0	0	0	0	0	4	16.5	330	99	0	0	0	0
5/29/02	wd	5	0.000	0.000	0.000	0.000	4	0.0	0	0	0	0	0	0	4	5.5	110	37	0	0	0	0
5/31/02	wd	4	0.000	0.000	0.000	0.000	3	0.0	0	0	0	0	0	0	3	3.3	67	58	0	0	0	0
6/1/02	we/hol	4	0.048	0.079	0.048	0.079	4	0.0	0	0	0	0	0	0	4	12.5	250	57	12	19	12	19
6/2/02	we/hol	20	0.000	0.000	0.000	0.000	3	0.0	0	0	0	0	0	0	4	20.0	400	174	0	0	0	0
6/4/02	wd	22	0.014	0.010	0.007	0.007	4	0.8	15	17	0	0	0	0	4	16.0	320	67	2	2	4	3
6/5/02	wd	10	0.000	0.000	0.000	0.000	4	0.0	0	0	0	0	0	0	4	7.5	150	52	0	0	0	0
6/8/02	we/hol	15	0.069	0.034	0.069	0.034	4	0.0	0	0	0	0	0	0	4	25.0	500	65	35	18	35	18
6/9/02	we/hol	32	0.056	0.020	0.037	0.016	4	3.0	60	21	2	1	3	2	4	50.8	1,015	342	38	20	57	27
Min		3	0.000		0.000		3	0.0	0		0		0		3	0.8	15		0		0	
Mean		15	0.015		0.010		4	0.2	5		0		0		4	12.8	257		5		7	
Max		32	0.069		0.069		4	3.0	60		2		3		4	50.8	1,015		38		57	

Note: 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.

[a] Angler interviews are not geographically stratified, as opposed to angler counts which are geographically stratified.

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

Appendix B2.-Daily estimates of guided boat angler CPUE, HPUE, angler effort, catch and harvest, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 2002.

		Angler interveiw data[a]					Downstream								Upstream							
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Type[b]	n[c]	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
5/16/02	wd	0	0.000	0.000	0.000	0.000	2	0.0	0	0	0	0	0	0	2	11.5	138	18	0	0	0	0
5/17/02	wd	9	0.000	0.000	0.000	0.000	3	0.0	0	0	0	0	0	0	3	13.3	160	66	0	0	0	0
5/18/02	we/hol	19	0.000	0.000	0.000	0.000	2	0.0	0	0	0	0	0	0	2	19.5	234	198	0	0	0	0
5/21/02	wd	8	0.023	0.027	0.023	0.027	3	0.0	0	0	0	0	0	0	3	23.3	280	115	6	7	6	7
5/22/02	wd	23	0.022	0.012	0.022	0.012	3	0.0	0	0	0	0	0	0	3	19.7	236	73	5	3	5	3
5/25/02	we/hol	7	0.000	0.000	0.000	0.000	2	2.0	24	24	0	0	0	0	2	34.0	408	24	0	0	0	0
5/29/02	wd	4	0.000	0.000	0.000	0.000	3	0.0	0	0	0	0	0	0	3	19.3	232	46	0	0	0	0
5/31/02	wd	7	0.000	0.000	0.000	0.000	1	0.0	0		0	0	0	0	1	38.0	456		0		0	
6/1/02	we/hol	13	0.019	0.015	0.019	0.015	2	0.0	0	0	0	0	0	0	2	47.5	570	54	11	9	11	9
6/4/02	wd	42	0.027	0.010	0.023	0.009	2	0.0	0	0	0	0	0	0	2	100.5	1,206	258	28	12	32	14
6/5/02	wd	26	0.057	0.023	0.057	0.023	3	0.0	0	0	0	0	0	0	3	92.0	1,104	218	63	28	63	28
6/8/02	we/hol	24	0.088	0.031	0.088	0.031	2	0.0	0	0	0	0	0	0	2	65.5	786	342	69	37	69	37
Min		0	0.000		0.000		1	0.0	0		0		0		1	11.5	138		0		0	
Mean		15	0.020		0.019		2	0.2	2		0		0		2	40.3	484		15		16	
Max		42	0.088		0.088		3	2.0	24		0		0		3	100.5	1,206		69		69	

Note: 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.

[a] Angler interviews are not geographically stratified, as opposed to angler counts which are geographically stratified.

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

[c] On days with no interviews, pooled estimates of CPUE and HPUE from other days in the stratum were used.

Appendix B3.-Daily estimates of unguided boat angler CPUE, HPUE, angler effort, catch and harvest, by geographic strata, during the late-run Kenai River Chinook salmon fishery, 2002.

		Angler interveiw data[a]					Downstream								Upstream							
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Type[b]	n	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
7/2/02	wd	35	0.179	0.069	0.082	0.023	4	7.0	140	50	11	5	25	13	4	120.0	2,400	255	197	60	430	170
7/4/02	we/hol	59	0.042	0.014	0.033	0.012	4	11.3	225	49	7	3	9	4	4	138.0	2,760	329	90	36	116	40
7/5/02	wd	58	0.015	0.007	0.008	0.005	4	15.0	300	54	2	2	5	2	4	132.8	2,655	553	20	15	41	21
7/6/02	we/hol	50	0.123	0.033	0.042	0.015	4	11.8	235	33	10	4	29	9	4	119.5	2,390	276	101	37	294	86
7/10/02	wd	36	0.028	0.012	0.028	0.012	4	8.5	170	50	5	2	5	2	4	90.8	1,815	196	51	23	51	23
7/12/02	wd	12	0.060	0.040	0.060	0.040	4	17.8	355	161	21	16	21	16	4	172.3	3,445	510	208	140	208	140
7/13/02	we/hol	38	0.107	0.025	0.063	0.021	4	25.5	510	365	32	24	54	40	4	218.5	4,370	584	276	98	467	126
7/14/02	we/hol	72	0.145	0.027	0.104	0.021	3	64.0	1,280	608	133	68	185	93	3	317.0	6,340	2,051	661	248	917	339
7/17/02	wd	40	0.059	0.019	0.052	0.019	4	23.5	470	31	25	9	28	9	4	152.3	3,045	525	160	62	181	65
7/19/02	wd	75	0.050	0.014	0.036	0.012	4	38.5	770	127	27	10	39	13	4	160.0	3,200	470	114	40	160	51
7/20/02	we/hol	49	0.079	0.014	0.039	0.012	4	31.3	625	54	24	8	49	10	4	235.3	4,705	1,144	184	70	370	111
7/21/02	we/hol	95	0.073	0.013	0.046	0.011	4	67.0	1,340	393	61	23	97	33	4	289.0	5,780	1,093	265	78	420	109
7/24/02	wd	76	0.064	0.014	0.040	0.012	4	17.8	355	72	14	5	23	7	4	105.8	2,115	764	84	38	134	56
7/25/02	wd	45	0.075	0.019	0.059	0.018	4	11.0	220	24	13	4	17	5	4	162.3	3,245	348	191	61	243	66
7/27/02	we/hol	52	0.037	0.014	0.032	0.014	4	13.5	270	77	9	4	10	5	4	210.8	4,215	1,065	134	65	157	70
7/28/02	we/hol	102	0.071	0.013	0.046	0.010	2	65.5	1,310	1,010	60	47	94	73	2	305.5	6,110	930	282	74	437	105
7/30/02	wd	70	0.070	0.016	0.061	0.014	4	30.0	600	185	37	14	42	16	4	219.0	4,380	485	268	69	308	77
7/31/02	wd	78	0.008	0.005	0.008	0.005	4	37.0	740	149	6	4	6	4	4	158.3	3,165	519	26	16	26	16
Min		12	0.008		0.008		2	7	140		2		5		2	91	1,815		20		26	
Mean		58	0.071		0.047		4	28	551		28		41		4	184	3,674		184		276	
Max		102	0.179		0.104		4	67	1,340		133		185		4	317	6,340		661		917	

Note: 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.

[a] Angler interviews are not geographically stratified, as opposed to angler counts which are geographically stratified.

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

Appendix B4.-Daily estimates of guided boat angler CPUE, HPUE, angler effort, catch and harvest, by geographic strata, during the late-run Kenai River Chinook salmon fishery, 2002.

		Angler interveiw data[a]					Downstream								Upstream							
	Day		Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Type[b]	n	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
7/2/02	wd	64	0.162	0.028	0.078	0.015	3	7.3	88	65	14	10.7	7	5	3	399.0	4,788	481	776.6	156.2	373.45	79
7/4/02	we/hol	49	0.157	0.027	0.097	0.020	3	41.3	496	284	48	29	78	46	3	185.7	2,228	505	217	65	349	98
7/5/02	wd	24	0.117	0.043	0.099	0.033	2	54.0	648	492	64	51	76	60	2	229.0	2,748	528	272	102	321	131
7/6/02	we/hol	25	0.168	0.029	0.102	0.026	3	62.0	744	268	76	33	125	49	3	158.7	1,904	321	194	59	320	77
7/10/02	wd	79	0.086	0.013	0.062	0.010	3	67.0	804	568	50	36	69	49	3	286.7	3,440	900	213	66	294	88
7/12/02	wd	73	0.079	0.014	0.059	0.011	2	138.5	1,662	138	99	21	132	26	2	225.0	2,700	1,092	161	71	214	93
7/13/02	we/hol	47	0.120	0.025	0.057	0.016	3	51.0	612	574	35	33	74	69	3	303.0	3,636	1,006	209	80	437	149
7/17/02	wd	53	0.146	0.021	0.091	0.017	3	90.0	1,080	284	98	32	157	47	3	262.3	3,148	708	286	84	459	122
7/19/02	wd	73	0.109	0.018	0.092	0.016	2	138.0	1,656	480	152	51	181	59	3	267.7	3,212	927	294	98	351	115
7/20/02	we/hol	64	0.092	0.017	0.088	0.016	3	45.3	544	226	48	22	50	22	3	236.3	2,836	591	250	69	260	71
7/24/02	wd	39	0.103	0.021	0.067	0.019	2	47.0	564	72	38	12	58	14	2	352.0	4,224	720	282	93	436	116
7/25/02	wd	35	0.081	0.023	0.056	0.017	3	5.7	68	17	4	1	6	2	3	360.3	4,324	1,044	241	92	351	129
7/27/02	we/hol	44	0.058	0.015	0.042	0.013	2	38.0	456	252	19	12	26	16	2	321.0	3,852	780	162	58	222	71
7/30/02	wd	41	0.058	0.016	0.050	0.015	3	91.7	1,100	297	55	22	64	24	3	292.0	3,504	563	174	59	203	64
7/31/02	wd	67	0.045	0.010	0.037	0.009	3	92.7	1,112	157	41	11	50	13	3	231.3	2,776	305	102	27	126	30
Min		24	0.045		0.037		2	5.7	68		4		6		2	158.7	1,904		102		126	
Mean		52	0.105		0.072		3	64.6	776		56		77		3	274.0	3,288		256		315	
Max		79	0.168		0.102		3	138.5	1,662		152		181		3	399.0	4,788		777		459	

Note: 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.

[a] Angler interviews are not geographically stratified, as opposed to angler counts which are geographically stratified.

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

APPENDIX C. DAILY EFFORT, CATCH AND HARVEST ESTIMATES BY GEOGRAPHIC STRATA DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2002

Appendix C1.-Estimated effort, catch, and harvest, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 2002.

	Downstream Creel Estimates						Upstream Creel Estimates								
	Effort		Catch		Harvest		Effort		Catch		Harvest		% Downstream		
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Effort	Catch	Harvest
16-19 May															
Guided weekdays	0	0	0	0	0	0	298	69	0	0	0	0	0.0%	-	-
Guided weekends	0	0	0	0	0	0	234	198	0	0	0	0	0.0%	-	-
Unguided weekdays	0	0	0	0	0	0	180	55	0	0	0	0	0.0%	-	-
Unguided weekends	0	0	0	0	0	0	458	111	0	0	0	0	0.0%	-	-
20-26 May															
Guided weekdays	0	0	0	0	0	0	1,032	202	23	11	23	11	0.0%	0.0%	0.0%
Guided weekends	48	34	0	0	0	0	816	34	0	0	0	0	5.6%	-	-
Unguided weekdays	0	0	0	0	0	0	210	110	9	7	0	0	0.0%	0.0%	-
Unguided weekends	0	0	0	0	0	0	835	208	0	0	0	0	0.0%	-	-
27 May-2 June															
Guided weekdays	0	0	0	0	0	0	1,376	330	0	0	0	0	0.0%	-	-
Guided weekends	0	0	0	0	0	0	570	54	11	9	11	9	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	353	115	0	0	0	0	0.0%	-	-
Unguided weekends	0	0	0	0	0	0	650	183	12	19	12	19	0.0%	0.0%	0.0%
3-9 June															
Guided weekdays	0	0	0	0	0	0	4,620	499	191	62	182	67	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	786	342	69	37	69	37	0.0%	0.0%	0.0%
Unguided weekdays	30	32	0	0	0	0	940	269	9	8	4	4	3.1%	4.5%	4.5%
Unguided weekends	60	21	3	2	2	1	1,515	348	92	32	72	27	3.8%	3.6%	3.0%
Day Type Subtotals															
Guided weekdays	0	0	0	0	0	0	7,326	635	214	63	205	68	0.0%	0.0%	0.0%
Guided weekends	48	34	0	0	0	0	2,406	400	80	38	80	38	2.0%	0.0%	0.0%
Unguided weekdays	30	32	0	0	0	0	1,683	317	18	11	4	4	1.8%	2.3%	4.5%
Unguided weekends	60	21	3	2	2	1	3,458	459	104	37	84	33	1.7%	3.2%	2.6%
Angler Type Subtotals															
Guided	48	34	0	0	0	0	9,732	751	294	74	285	78	0.5%	0.0%	0.0%
% guided	35%		0%		0%		65%		71%		76%				
Unguided	90	39	4	2	2	1	5,142	558	121	39	89	33	1.7%	3.0%	2.7%
% unguided	65%		100%		100%		35%		29%		24%				
Early-run Total	138	51	4	2	2	1	14,874	936	415	84	374	85	0.9%	0.9%	0.7%

Note: 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.

Appendix C2.-Estimated effort, catch, and harvest, by geographic strata, during the late-run Kenai River Chinook salmon fishery, 2002.

	Downstream Creel Estimates						Upstream Creel Estimates								
	Effort		Catch		Harvest		Effort		Catch		Harvest		% Downstream		
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Effort	Catch	Harvest
1-7 July															
Guided weekdays	1,104	778	135	92	107	80	11,304	1,971	1,647	467	969	181	8.9%	7.6%	9.9%
Guided weekends	1,240	391	203	67	124	44	4,132	599	669	125	411	88	23.1%	23.3%	23.2%
Unguided weekdays	660	165	45	24	21	10	7,583	778	706	397	326	170	8.0%	5.9%	6.0%
Unguided weekends	690	73	58	20	26	6	7,725	616	615	193	287	63	8.2%	8.6%	8.3%
8-14 July															
Guided weekdays	4,932	1,468	401	119	297	91	12,280	2,259	1,017	214	746	155	28.7%	28.3%	28.5%
Guided weekends	612	574	74	69	35	33	3,636	1,006	437	149	209	80	14.4%	14.4%	14.4%
Unguided weekdays	1,050	354	52	33	52	33	10,520	2,431	519	299	519	299	9.1%	9.2%	9.2%
Unguided weekends	1,790	710	240	101	166	72	10,710	2,133	1,384	362	937	267	14.3%	14.8%	15.0%
15-21 July															
Guided weekdays	5,472	1,134	677	112	500	113	12,720	1,652	1,620	281	1,160	183	30.1%	29.5%	30.1%
Guided weekends	544	226	50	22	48	22	2,836	591	260	71	250	69	16.1%	16.1%	16.1%
Unguided weekdays	2,480	463	133	27	104	19	12,490	1,020	682	120	548	123	16.6%	16.3%	16.0%
Unguided weekends	1,965	397	146	35	86	24	10,485	1,582	790	156	449	105	15.8%	15.6%	16.1%
22-28 July															
Guided weekdays	1,264	709	128	77	83	51	17,096	1,799	1,576	273	1,046	193	6.9%	7.5%	7.3%
Guided weekends	456	252	26	16	19	12	3,852	780	222	71	162	58	10.6%	10.6%	10.6%
Unguided weekdays	1,150	219	78	14	54	9	10,720	1,991	756	197	550	181	9.7%	9.4%	9.0%
Unguided weekends	1,580	1,013	104	73	69	48	10,325	1,414	594	127	415	99	13.3%	14.9%	14.2%
29-31 July															
Guided weekdays	2,212	335	114	27	95	25	6,280	640	329	71	275	65	26.0%	25.8%	25.7%
Unguided weekdays	1,340	238	48	16	43	14	7,545	710	334	78	294	71	15.1%	12.6%	12.7%
Day Type Subtotals															
Guided weekdays	14,984	2,159	1,455	205	1,081	175	59,680	3,920	6,188	650	4,198	363	20.1%	19.0%	20.5%
Guided weekends	2,852	772	352	100	226	60	14,456	1,526	1,588	219	1,032	150	16.5%	18.2%	18.0%
Unguided weekdays	6,680	686	356	53	274	43	48,858	3,468	2,997	554	2,237	414	12.0%	10.6%	10.9%
Unguided weekends	6,025	1,301	547	131	346	90	39,245	3,071	3,382	456	2,088	310	13.3%	13.9%	14.2%
Angler Type Subtotals															
Guided	17,836	2,293	1,807	228	1,308	185	74,136	4,206	7,776	686	5,229	393	19.4%	18.9%	20.0%
% Guided	58.4%		66.7%		67.8%		45.7%		54.9%		54.7%				
Unguided	12,705	1,471	904	142	621	99	88,103	4,632	6,379	718	4,324	517	12.6%	12.4%	12.6%
% Unguided	41.6%		33.3%		32.2%		54.3%		45.1%		45.3%				
Late-run Total	30,541	2,724	2,711	268	1,929	210	162,239	6,257	14,155	993	9,554	649	15.8%	16.1%	16.8%

Note: 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.

APPENDIX D. INRIVER GILLNETTING DAILY CATCH, CPUE, AND SPECIES PROPORTION DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2002

Appendix D1.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 5.0 in gillnet during the early-run Kenai River Chinook salmon fishery, 2002.

			Total	Chinook			Sockeye			Dolly Varden			Chinook/	
Date	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
5/16/02	8	90	1	0	0.000	0.000	1	0.011	0.011	0	0.000	0.000	0.00	0.00
5/17/02	13	128	2	2	0.016	0.011	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/18/02	11	127	4	2	0.016	0.011	1	0.008	0.008	1	0.008	0.011	0.50	0.26
5/19/02	12	141	7	3	0.021	0.011	4	0.028	0.016	0	0.000	0.000	0.43	0.16
5/20/02	14	135	5	1	0.007	0.008	4	0.030	0.017	0	0.000	0.000	0.20	0.19
5/21/02	10	111	5	2	0.018	0.013	3	0.027	0.014	0	0.000	0.000	0.40	0.23
5/22/02	10	114	9	5	0.044	0.022	4	0.035	0.021	0	0.000	0.000	0.56	0.13
5/23/02	11	94	4	2	0.021	0.014	2	0.021	0.021	0	0.000	0.000	0.50	0.32
5/24/02	9	68	2	0	0.000	0.000	2	0.030	0.030	0	0.000	0.000	0.00	0.00
5/25/02	12	123	4	1	0.008	0.008	3	0.024	0.013	0	0.000	0.000	0.25	0.23
5/26/02	11	104	14	3	0.029	0.015	11	0.106	0.029	0	0.000	0.000	0.21	0.09
5/27/02	14	129	12	2	0.016	0.011	10	0.078	0.027	0	0.000	0.000	0.17	0.10
5/28/02	12	117	13	1	0.009	0.009	12	0.103	0.028	0	0.000	0.000	0.08	0.08
5/29/02	12	110	12	1	0.009	0.009	11	0.100	0.045	0	0.000	0.000	0.08	0.05
5/30/02	12	105	14	1	0.010	0.009	13	0.124	0.045	0	0.000	0.000	0.07	0.05
5/31/02	12	105	5	1	0.010	0.010	4	0.038	0.021	0	0.000	0.000	0.20	0.16
6/1/02	14	119	9	2	0.017	0.011	7	0.059	0.019	0	0.000	0.000	0.22	0.11
6/2/02	14	124	16	0	0.000	0.000	16	0.129	0.037	0	0.000	0.000	0.00	0.00
6/3/02	2	18	4	2	0.111	0.001	2	0.111	0.112	0	0.000	0.000	0.50	0.25
6/4/02	14	123	6	2	0.016	0.011	4	0.032	0.019	0	0.000	0.000	0.33	0.22
6/5/02	No sampling due to engine malfunction													
6/6/02	14	118	19	2	0.017	0.017	17	0.144	0.036	0	0.000	0.000	0.11	0.10
6/7/02	10	90	20	3	0.033	0.024	17	0.189	0.051	0	0.000	0.000	0.15	0.10
6/8/02	10	85	19	4	0.047	0.026	15	0.176	0.077	0	0.000	0.000	0.21	0.14
6/9/02	10	84	52	4	0.048	0.027	48	0.571	0.091	0	0.000	0.000	0.08	0.05
6/10/02	10	94	25	4	0.043	0.018	21	0.225	0.123	0	0.000	0.000	0.16	0.10
6/11/02	10	88	7	1	0.011	0.012	6	0.068	0.027	0	0.000	0.000	0.14	0.12
6/12/02	10	80	10	5	0.062	0.038	5	0.062	0.028	0	0.000	0.000	0.50	0.21
6/13/02	14	114	20	9	0.079	0.027	11	0.097	0.065	0	0.000	0.000	0.45	0.17
6/14/02	16	118	4	1	0.008	0.008	2	0.017	0.012	1	0.008	0.012	0.25	0.22
6/15/02	12	107	16	4	0.037	0.021	12	0.112	0.044	0	0.000	0.000	0.25	0.14
6/16/02	10	82	7	3	0.037	0.026	4	0.049	0.027	0	0.000	0.000	0.43	0.23
6/17/02	8	67	11	4	0.060	0.033	5	0.075	0.033	2	0.030	0.033	0.36	0.12
6/18/02	14	120	12	4	0.033	0.015	8	0.067	0.020	0	0.000	0.000	0.33	0.12
6/19/02	10	81	15	3	0.037	0.018	12	0.148	0.051	0	0.000	0.000	0.20	0.10
6/20/02	16	126	24	2	0.016	0.016	19	0.151	0.062	3	0.024	0.026	0.08	0.08
6/21/02	14	115	20	7	0.061	0.030	13	0.113	0.027	0	0.000	0.000	0.35	0.11
6/22/02	14	110	22	6	0.055	0.022	15	0.137	0.050	1	0.009	0.013	0.27	0.12
6/23/02	10	83	15	2	0.024	0.016	11	0.132	0.055	2	0.024	0.028	0.13	0.09
6/24/02	14	104	29	7	0.067	0.034	22	0.211	0.053	0	0.000	0.000	0.24	0.12
6/25/02	14	100	30	7	0.070	0.024	23	0.231	0.052	0	0.000	0.000	0.23	0.07
6/26/02	14	102	28	8	0.078	0.032	20	0.196	0.091	0	0.000	0.000	0.29	0.14
6/27/02	14	98	29	11	0.112	0.027	18	0.184	0.055	0	0.000	0.000	0.38	0.09
6/28/02	10	79	4	2	0.025	0.017	2	0.025	0.017	0	0.000	0.000	0.50	0.19
6/29/02	10	75	11	8	0.107	0.045	3	0.040	0.029	0	0.000	0.000	0.73	0.17
6/30/02	12	92	25	16	0.175	0.043	9	0.098	0.046	0	0.000	0.000	0.64	0.11
Total	527	4,594	622	160	1.721		452	4.613		10	0.103			
Min	2	18	1	0	0.000		0	0.000		0	0.000		0.00	
Mean	12	102	14	4	0.038		10	0.103		0	0.002		0.29	
Max	16	141	52	16	0.175		48	0.571		3	0.030		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 gillnet during the early-run Kenai River Chinook salmon fishery, 2002.

			Total	Chinook			Sockeye			Dolly Varden			Chinook/	
Date	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
5/16/02	10	117	1	1	0.009	0.009	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/17/02	12	115	0	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000		
5/18/02	12	132	0	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000		
5/19/02	11	123	1	1	0.008	0.008	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/20/02	14	132	2	1	0.008	0.008	1	0.008	0.007	0	0.000	0.000	0.50	0.37
5/21/02	10	112	5	1	0.009	0.009	4	0.036	0.024	0	0.000	0.000	0.20	0.21
5/22/02	10	109	5	1	0.009	0.009	4	0.037	0.021	0	0.000	0.000	0.20	0.20
5/23/02	10	90	3	2	0.022	0.015	1	0.011	0.011	0	0.000	0.000	0.67	0.29
5/24/02	10	83	1	0	0.000	0.000	1	0.012	0.012	0	0.000	0.000	0.00	0.00
5/25/02	12	117	6	3	0.026	0.014	3	0.026	0.014	0	0.000	0.000	0.50	0.21
5/26/02	12	121	2	1	0.008	0.008	1	0.008	0.008	0	0.000	0.000	0.50	0.37
5/27/02	14	130	8	0	0.000	0.000	8	0.062	0.024	0	0.000	0.000	0.00	0.00
5/28/02	12	108	5	4	0.037	0.016	1	0.009	0.009	0	0.000	0.000	0.80	0.14
5/29/02	12	108	5	1	0.009	0.009	4	0.037	0.015	0	0.000	0.000	0.20	0.19
5/30/02	13	118	5	3	0.026	0.018	2	0.017	0.012	0	0.000	0.000	0.60	0.26
5/31/02	12	100	5	2	0.020	0.013	3	0.030	0.020	0	0.000	0.000	0.40	0.16
6/1/02	14	116	8	3	0.026	0.014	5	0.043	0.016	0	0.000	0.000	0.38	0.18
6/2/02	14	123	12	6	0.049	0.019	6	0.049	0.016	0	0.000	0.000	0.50	0.15
6/3/02	4	39	4	3	0.077	0.050	1	0.026	0.025	0	0.000	0.000	0.75	0.27
6/4/02	14	122	7	0	0.000	0.000	7	0.058	0.041	0	0.000	0.000	0.00	0.00
6/5/02	No sampling due to engine malfunction													
6/6/02	14	124	11	6	0.049	0.018	5	0.040	0.015	0	0.000	0.000	0.55	0.08
6/7/02	10	84	13	4	0.048	0.028	9	0.108	0.040	0	0.000	0.000	0.31	0.11
6/8/02	10	88	24	8	0.091	0.035	16	0.183	0.086	0	0.000	0.000	0.33	0.16
6/9/02	10	93	42	11	0.118	0.024	30	0.323	0.094	1	0.011	0.015	0.26	0.07
6/10/02	10	86	8	4	0.046	0.026	4	0.046	0.034	0	0.000	0.000	0.50	0.26
6/11/02	10	88	8	5	0.057	0.026	3	0.034	0.025	0	0.000	0.000	0.63	0.14
6/12/02	10	96	2	0	0.000	0.000	2	0.021	0.015	0	0.000	0.000	0.00	0.00
6/13/02	14	111	9	4	0.036	0.015	5	0.045	0.022	0	0.000	0.000	0.44	0.19
6/14/02	14	100	11	7	0.070	0.026	4	0.040	0.028	0	0.000	0.000	0.64	0.18
6/15/02	12	109	11	8	0.074	0.029	3	0.028	0.014	0	0.000	0.000	0.73	0.15
6/16/02	10	83	9	8	0.096	0.026	1	0.012	0.012	0	0.000	0.000	0.89	0.11
6/17/02	8	71	13	13	0.184	0.029	0	0.000	0.000	0	0.000	0.000	1.00	0.00
6/18/02	14	111	6	3	0.027	0.020	3	0.027	0.020	0	0.000	0.000	0.50	0.27
6/19/02	10	79	7	3	0.038	0.019	4	0.050	0.021	0	0.000	0.000	0.43	0.13
6/20/02	16	129	19	10	0.077	0.023	9	0.070	0.043	0	0.000	0.000	0.53	0.15
6/21/02	14	112	7	6	0.054	0.026	1	0.009	0.009	0	0.000	0.000	0.86	0.14
6/22/02	14	109	12	9	0.083	0.027	3	0.028	0.020	0	0.000	0.000	0.75	0.15
6/23/02	10	83	7	4	0.048	0.026	3	0.036	0.019	0	0.000	0.000	0.57	0.12
6/24/02	14	112	15	4	0.036	0.020	11	0.098	0.046	0	0.000	0.000	0.27	0.16
6/25/02	14	103	17	7	0.068	0.019	10	0.097	0.036	0	0.000	0.000	0.41	0.13
6/26/02	14	105	20	10	0.095	0.030	10	0.095	0.041	0	0.000	0.000	0.50	0.14
6/27/02	14	99	27	17	0.171	0.043	10	0.101	0.035	0	0.000	0.000	0.63	0.11
6/28/02	10	77	10	7	0.091	0.022	3	0.039	0.020	0	0.000	0.000	0.70	0.10
6/29/02	10	75	13	9	0.119	0.043	4	0.053	0.029	0	0.000	0.000	0.69	0.12
6/30/02	12	89	17	11	0.124	0.036	6	0.068	0.040	0	0.000	0.000	0.65	0.17
Total	530	4,627	423	211	2.242		211	2.117		1	0.011			
Min	4	39	0	0	0.000		0	0.000		0	0.000		0.00	
Mean	12	103	9	5	0.050		5	0.047		0	0.000		0.51	
Max	16	132	42	17	0.184		30	0.323		1	0.011		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 in and 7.5 in gillnets during the early-run Kenai River Chinook salmon fishery, 2002.

				Total	Chinook			Sockeye			Dolly Varden			Chinook/	
Date	Reps	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
5/16/02	4	16	177	2	1	0.006	0.006	1	0.006	0.006	0	0.000	0.000	0.51	0.41
5/17/02	6	24	233	2	2	0.008	0.005	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/18/02	6	23	259	4	2	0.008	0.008	1	0.003	0.003	1	0.004	0.004	0.54	0.33
5/19/02	6	23	264	8	4	0.014	0.005	4	0.013	0.007	0	0.000	0.000	0.51	0.10
5/20/02	7	28	268	7	2	0.007	0.005	5	0.016	0.008	0	0.000	0.000	0.31	0.15
5/21/02	5	20	224	10	3	0.014	0.010	7	0.029	0.014	0	0.000	0.000	0.33	0.22
5/22/02	5	20	222	14	6	0.025	0.002	8	0.036	0.005	0	0.000	0.000	0.41	0.03
5/23/02	5	20	175	7	4	0.024	0.011	3	0.017	0.012	0	0.000	0.000	0.58	0.25
5/24/02	5	19	150	3	0	0.000	0.000	3	0.019	0.012	0	0.000	0.000	0.00	0.00
5/25/02	6	24	239	10	4	0.019	0.009	6	0.025	0.007	0	0.000	0.000	0.42	0.17
5/26/02	6	23	224	16	4	0.018	0.013	12	0.060	0.017	0	0.000	0.000	0.23	0.13
5/27/02	7	28	258	20	2	0.008	0.005	18	0.069	0.022	0	0.000	0.000	0.11	0.04
5/28/02	6	24	225	18	5	0.024	0.009	13	0.056	0.016	0	0.000	0.000	0.30	0.07
5/29/02	6	24	218	17	2	0.009	0.005	15	0.065	0.024	0	0.000	0.000	0.12	0.07
5/30/02	6	25	223	19	4	0.017	0.010	15	0.071	0.014	0	0.000	0.000	0.20	0.09
5/31/02	6	24	204	10	3	0.013	0.008	7	0.032	0.015	0	0.000	0.000	0.28	0.13
6/1/02	7	28	235	17	5	0.021	0.008	12	0.050	0.007	0	0.000	0.000	0.29	0.07
6/2/02	7	28	247	28	6	0.023	0.010	22	0.090	0.024	0	0.000	0.000	0.21	0.11
6/3/02	1	4	38	5	3	0.081		2	0.056		0	0.000		0.59	
6/4/02	7	28	245	13	2	0.007	0.005	11	0.046	0.022	0	0.000	0.000	0.14	0.06
6/5/02	No sampling due to engine malfunction														
6/6/02	7	28	242	30	8	0.030	0.011	22	0.093	0.024	0	0.000	0.000	0.25	0.07
6/7/02	5	20	174	33	7	0.043	0.030	26	0.152	0.029	0	0.000	0.000	0.22	0.13
6/8/02	5	20	173	43	12	0.067	0.018	31	0.179	0.039	0	0.000	0.000	0.27	0.08
6/9/02	5	20	177	94	15	0.085	0.024	78	0.451	0.059	1	0.006	0.006	0.16	0.04
6/10/02	5	20	180	33	8	0.046	0.015	25	0.137	0.092	0	0.000	0.000	0.25	0.18
6/11/02	5	20	176	15	6	0.033	0.006	9	0.048	0.015	0	0.000	0.000	0.41	0.08
6/12/02	5	20	176	12	5	0.030	0.023	7	0.044	0.021	0	0.000	0.000	0.41	0.25
6/13/02	7	28	225	29	13	0.056	0.013	16	0.087	0.059	0	0.000	0.000	0.39	0.18
6/14/02	7	28	202	15	8	0.043	0.020	6	0.030	0.012	1	0.005	0.005	0.55	0.15
6/15/02	6	24	216	27	12	0.056	0.015	15	0.071	0.020	0	0.000	0.000	0.44	0.12
6/16/02	5	20	165	16	11	0.068	0.012	5	0.031	0.014	0	0.000	0.000	0.69	0.12
6/17/02	4	16	137	24	17	0.123	0.020	5	0.042	0.023	2	0.014	0.008	0.69	0.10
6/18/02	7	28	231	18	7	0.032	0.012	11	0.044	0.009	0	0.000	0.000	0.42	0.13
6/19/02	5	20	161	22	6	0.037	0.005	16	0.098	0.030	0	0.000	0.000	0.27	0.06
6/20/02	8	32	255	43	12	0.048	0.021	28	0.116	0.062	3	0.013	0.006	0.27	0.10
6/21/02	7	28	227	27	13	0.055	0.020	14	0.063	0.008	0	0.000	0.000	0.47	0.09
6/22/02	7	28	219	34	15	0.069	0.014	18	0.083	0.027	1	0.004	0.004	0.44	0.09
6/23/02	5	20	166	22	6	0.035	0.013	14	0.086	0.034	2	0.011	0.011	0.26	0.09
6/24/02	7	28	217	44	11	0.050	0.020	33	0.157	0.047	0	0.000	0.000	0.24	0.11
6/25/02	7	28	202	47	14	0.066	0.014	33	0.161	0.029	0	0.000	0.000	0.29	0.04
6/26/02	7	28	207	48	18	0.090	0.023	30	0.156	0.067	0	0.000	0.000	0.37	0.11
6/27/02	7	28	197	56	28	0.141	0.026	28	0.146	0.043	0	0.000	0.000	0.49	0.08
6/28/02	5	20	156	14	9	0.060	0.013	5	0.033	0.015	0	0.000	0.000	0.64	0.08
6/29/02	5	20	150	24	17	0.115	0.048	7	0.044	0.024	0	0.000	0.000	0.72	0.16
6/30/02	6	24	180	42	27	0.151	0.024	15	0.084	0.024	0	0.000	0.000	0.64	0.07
Total	263	1,049	9,138	1,042	369	1.978		662	3.393		11	0.056			
Min	1	4	38	2	0	0.000		0	0.000		0	0.000		0.00	
Mean	6	23	203	23	8	0.044		15	0.075		0	0.001		0.39	
Max	8	32	268	94	28	0.151		78	0.451		3	0.014		1.00	

[a] Chinook Salmon CPUE/All Species CPUE.

Appendix D4.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 5.0 in gillnet during the late-run Kenai River Chinook salmon fishery, 2002.

			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
7/1/02	10	60	39	20	0.333	0.080	19	0.317	0.085	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.51	0.10
7/2/02	8	44	64	27	0.608	0.096	37	0.833	0.183	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.42	0.06
7/3/02	12	32	75	27	0.835	0.201	47	1.454	0.236	0	0.000	0.000	0	0.000	0.000	1	0.031	0.032	0.36	0.07
7/4/02	10	68	85	14	0.207	0.042	70	1.034	0.194	0	0.000	0.000	0	0.000	0.000	1	0.015	0.020	0.16	0.02
7/5/02	10	65	84	17	0.261	0.074	66	1.013	0.175	0	0.000	0.000	0	0.000	0.000	1	0.015	0.022	0.20	0.05
7/6/02	12	51	88	11	0.216	0.073	77	1.514	0.240	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.13	0.04
7/7/02	12	41	73	10	0.245	0.099	63	1.543	0.352	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.14	0.05
7/8/02	10	55	48	18	0.329	0.099	30	0.548	0.067	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.38	0.08
7/9/02	8	47	50	9	0.191	0.078	41	0.869	0.181	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.18	0.04
7/10/02	10	63	51	13	0.208	0.062	38	0.607	0.138	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.25	0.06
7/11/02	8	49	67	7	0.141	0.073	60	1.213	0.269	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.10	0.05
7/12/02	6	37	56	12	0.329	0.104	44	1.205	0.235	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.21	0.05
7/13/02	8	26	50	12	0.471	0.127	38	1.490	0.658	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.24	0.07
7/14/02	10	47	58	24	0.511	0.126	34	0.723	0.147	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.41	0.08
7/15/02	8	56	28	10	0.178	0.074	18	0.320	0.074	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.36	0.13
7/16/02	6	31	69	10	0.323	0.099	59	1.908	0.220	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.14	0.04
7/17/02	6	36	82	8	0.220	0.054	74	2.037	0.264	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.10	0.03
7/18/02	8	41	121	8	0.196	0.077	113	2.767	1.203	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.07	0.04
7/19/02	10	35	48	12	0.348	0.096	36	1.043	0.319	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.25	0.07
7/20/02	8	24	56	10	0.412	0.186	45	1.856	0.556	1	0.041	0.053	0	0.000	0.000	0	0.000	0.000	0.18	0.09
7/21/02	8	51	41	14	0.276	0.036	27	0.532	0.159	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.34	0.06
7/22/02	8	54	25	19	0.354	0.076	6	0.112	0.051	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.76	0.10
7/23/02	6	43	56	18	0.422	0.101	35	0.820	0.225	1	0.023	0.031	1	0.023	0.024	1	0.023	0.031	0.32	0.10
7/24/02	8	44	53	8	0.182	0.058	43	0.977	0.344	1	0.023	0.023	0	0.000	0.000	1	0.023	0.023	0.15	0.06
7/25/02	8	43	47	13	0.299	0.060	31	0.714	0.190	1	0.023	0.024	2	0.046	0.053	0	0.000	0.000	0.28	0.08
7/26/02	10	54	52	22	0.405	0.121	28	0.515	0.197	0	0.000	0.000	2	0.037	0.042	0	0.000	0.000	0.42	0.13
7/27/02	10	68	33	8	0.117	0.044	21	0.308	0.070	2	0.029	0.032	2	0.029	0.034	0	0.000	0.000	0.24	0.09
7/28/02	6	41	25	9	0.217	0.062	12	0.290	0.074	0	0.000	0.000	4	0.097	0.094	0	0.000	0.000	0.36	0.11
7/29/02	8	51	24	8	0.156	0.051	8	0.156	0.089	4	0.078	0.084	4	0.078	0.078	0	0.000	0.000	0.33	0.14
7/30/02	8	51	41	21	0.415	0.100	5	0.099	0.053	1	0.020	0.026	14	0.277	0.294	0	0.000	0.000	0.51	0.11
7/31/02	8	54	42	19	0.355	0.065	5	0.093	0.041	2	0.037	0.040	16	0.299	0.291	0	0.000	0.000	0.45	0.07
8/1/02	10	62	50	19	0.305	0.067	11	0.176	0.101	1	0.016	0.022	19	0.305	0.295	0	0.000	0.000	0.38	0.08
8/2/02	10	73	25	11	0.152	0.052	5	0.069	0.037	0	0.000	0.000	9	0.124	0.120	0	0.000	0.000	0.44	0.09
8/3/02	8	51	30	14	0.273	0.071	7	0.137	0.057	0	0.000	0.000	9	0.176	0.177	0	0.000	0.000	0.47	0.06
8/4/02	8	56	33	8	0.143	0.040	7	0.126	0.043	5	0.090	0.098	13	0.233	0.232	0	0.000	0.000	0.24	0.07
8/5/02	6	42	47	4	0.094	0.071	7	0.165	0.070	2	0.047	0.045	34	0.802	0.735	0	0.000	0.000	0.09	0.05
Total	310	1,745	1,916	494	10.728		1,267	29.584		21	0.428		129	2.525		5	0.107			
Min	6	24	24	4	0.094		5	0.069		0	0.000		0	0.000		0	0.000		0.07	
Mean	9	48	53	14	0.298		35	0.822		1	0.012		4	0.070		0	0.003		0.29	
Max	12	73	121	27	0.835		113	2.767		5	0.090		34	0.802		1	0.031		0.76	

[a] Chinook Salmon CPUE/All Species CPUE.

Appendix D5.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 7.5 in gillnet during the late-run Kenai River Chinook salmon fishery, 2002.

			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
7/1/02	10	68	36	25	0.369	0.079	11	0.162	0.070	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.69	0.09
7/2/02	8	39	43	25	0.641	0.151	18	0.462	0.145	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.58	0.12
7/3/02	12	39	53	35	0.897	0.138	18	0.462	0.142	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.66	0.10
7/4/02	10	70	65	13	0.186	0.052	52	0.744	0.091	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.20	0.05
7/5/02	10	72	59	8	0.111	0.041	51	0.709	0.112	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.14	0.05
7/6/02	12	59	74	22	0.374	0.069	51	0.868	0.166	0	0.000	0.000	0	0.000	0.000	1	0.017	0.017	0.30	0.05
7/7/02	12	58	60	12	0.207	0.029	48	0.830	0.143	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.20	0.04
7/8/02	10	68	34	22	0.324	0.071	12	0.176	0.058	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.65	0.09
7/9/02	8	53	36	19	0.362	0.092	17	0.324	0.087	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.53	0.11
7/10/02	10	64	52	12	0.188	0.037	39	0.611	0.120	0	0.000	0.000	0	0.000	0.000	1	0.016	0.021	0.23	0.04
7/11/02	8	48	54	10	0.209	0.064	44	0.918	0.177	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.19	0.07
7/12/02	6	43	47	21	0.492	0.176	26	0.609	0.206	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.45	0.13
7/13/02	8	40	38	23	0.580	0.065	15	0.378	0.161	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.61	0.10
7/14/02	10	57	37	28	0.488	0.132	9	0.157	0.039	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.76	0.07
7/15/02	8	56	26	14	0.249	0.062	12	0.213	0.090	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.54	0.11
7/16/02	6	39	29	17	0.437	0.150	12	0.308	0.119	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.59	0.15
7/17/02	6	31	46	14	0.459	0.171	32	1.049	0.340	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.30	0.14
7/18/02	8	39	64	17	0.439	0.110	47	1.213	0.350	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.27	0.07
7/19/02	10	42	42	26	0.622	0.124	16	0.382	0.134	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.62	0.10
7/20/02	8	34	40	19	0.552	0.085	21	0.610	0.179	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.48	0.09
7/21/02	8	50	30	17	0.339	0.084	11	0.219	0.067	0	0.000	0.000	1	0.020	0.027	1	0.020	0.027	0.57	0.11
7/22/02	8	52	20	15	0.290	0.076	3	0.058	0.027	0	0.000	0.000	2	0.039	0.043	0	0.000	0.000	0.75	0.07
7/23/02	6	45	44	29	0.652	0.117	13	0.292	0.134	0	0.000	0.000	1	0.022	0.030	1	0.022	0.023	0.66	0.14
7/24/02	8	45	44	28	0.626	0.154	12	0.268	0.102	0	0.000	0.000	4	0.089	0.090	0	0.000	0.000	0.64	0.12
7/25/02	8	46	46	28	0.614	0.144	12	0.263	0.084	0	0.000	0.000	6	0.132	0.135	0	0.000	0.000	0.61	0.05
7/26/02	10	56	39	20	0.357	0.102	12	0.214	0.083	0	0.000	0.000	7	0.125	0.133	0	0.000	0.000	0.51	0.10
7/27/02	10	70	38	20	0.287	0.085	8	0.115	0.036	0	0.000	0.000	9	0.129	0.132	1	0.014	0.020	0.53	0.08
7/28/02	6	46	33	19	0.411	0.077	4	0.086	0.043	0	0.000	0.000	10	0.216	0.235	0	0.000	0.000	0.58	0.12
7/29/02	7	46	20	14	0.307	0.101	4	0.088	0.044	0	0.000	0.000	2	0.044	0.059	0	0.000	0.000	0.70	0.13
7/30/02	8	50	38	21	0.417	0.099	3	0.060	0.041	0	0.000	0.000	14	0.278	0.279	0	0.000	0.000	0.55	0.11
7/31/02	8	57	47	15	0.261	0.054	1	0.017	0.017	1	0.017	0.024	30	0.522	0.518	0	0.000	0.000	0.32	0.06
8/1/02	10	73	34	18	0.248	0.070	6	0.083	0.043	0	0.000	0.000	10	0.138	0.146	0	0.000	0.000	0.53	0.12
8/2/02	10	78	29	16	0.206	0.077	4	0.052	0.029	0	0.000	0.000	9	0.116	0.122	0	0.000	0.000	0.55	0.13
8/3/02	8	58	29	16	0.275	0.073	2	0.034	0.023	0	0.000	0.000	11	0.189	0.185	0	0.000	0.000	0.55	0.07
8/4/02	8	55	40	10	0.183	0.068	2	0.037	0.024	3	0.055	0.064	25	0.458	0.448	0	0.000	0.000	0.25	0.09
8/5/02	6	44	28	9	0.207	0.032	0	0.000	0.000	2	0.046	0.049	17	0.390	0.370	0	0.000	0.000	0.32	0.04
Total	309	1,885	1,494	677	13.865		648	13.072		6	0.118		158	2.908		5	0.089			
Min	6	31	20	8	0.111		0	0.000		0	0.000		0	0.000		0	0.000		0.14	
Mean	9	52	42	19	0.385		18	0.363		0	0.003		4	0.081		0	0.002		0.49	
Max	12	78	74	35	0.897		52	1.213		3	0.055		30	0.522		1	0.022		0.76	

[a] Chinook Salmon CPUE/All Species CPUE.

Appendix D6.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 5.0 in and 7.5 in gillnets during the late-run Kenai River Chinook salmon fishery, 2002.

				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
7/1/02	5	20	128	75	45	0.380	0.091	30	0.242	0.042	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.61	0.09
7/2/02	4	16	83	107	52	0.678	0.142	55	0.585	0.107	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.54	0.08
7/3/02	6	24	71	128	62	0.910	0.125	65	1.054	0.176	0	0.000	0.000	0	0.000	0.000	1	0.015	0.015	0.46	0.04
7/4/02	5	20	138	150	27	0.206	0.051	122	0.896	0.115	0	0.000	0.000	0	0.000	0.000	1	0.008	0.008	0.19	0.02
7/5/02	5	20	137	143	25	0.198	0.054	117	0.857	0.116	0	0.000	0.000	0	0.000	0.000	1	0.011	0.011	0.19	0.05
7/6/02	6	24	110	162	33	0.325	0.052	128	1.363	0.293	0	0.000	0.000	0	0.000	0.000	1	0.009	0.009	0.19	0.03
7/7/02	6	24	99	133	22	0.223	0.046	111	1.301	0.293	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.15	0.05
7/8/02	5	20	123	82	40	0.347	0.069	42	0.368	0.037	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.49	0.05
7/9/02	4	16	100	86	28	0.299	0.057	58	0.615	0.141	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.33	0.07
7/10/02	5	20	126	103	25	0.199	0.033	77	0.635	0.103	0	0.000	0.000	0	0.000	0.000	1	0.007	0.007	0.24	0.03
7/11/02	4	16	97	121	17	0.170	0.069	104	1.041	0.252	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.14	0.06
7/12/02	3	12	79	103	33	0.428	0.080	70	0.913	0.207	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.32	0.01
7/13/02	4	16	65	88	35	0.520	0.078	53	1.095	0.425	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.32	0.07
7/14/02	5	20	104	95	52	0.509	0.060	43	0.446	0.094	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.53	0.07
7/15/02	4	16	113	54	24	0.218	0.072	30	0.273	0.078	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.44	0.06
7/16/02	3	12	70	98	27	0.409	0.112	71	1.053	0.112	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.28	0.08
7/17/02	3	12	67	128	22	0.326	0.119	106	1.624	0.273	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.17	0.07
7/18/02	4	16	80	185	25	0.370	0.085	160	2.666	1.271	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.12	0.03
7/19/02	5	20	76	90	38	0.518	0.079	52	0.865	0.323	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.37	0.07
7/20/02	4	16	59	96	29	0.474	0.107	66	1.365	0.392	1	0.014	0.014	0	0.000	0.000	0	0.000	0.000	0.26	0.07
7/21/02	4	16	101	71	31	0.317	0.057	38	0.372	0.135	0	0.000	0.000	1	0.010	0.010	1	0.009	0.009	0.45	0.10
7/22/02	4	16	105	45	34	0.319	0.076	9	0.079	0.030	0	0.000	0.000	2	0.019	0.011	0	0.000	0.000	0.77	0.04
7/23/02	3	12	87	100	47	0.541	0.057	48	0.547	0.111	1	0.011	0.011	2	0.023	0.012	2	0.023	0.011	0.47	0.07
7/24/02	4	16	89	97	36	0.419	0.082	55	0.664	0.311	1	0.014	0.014	4	0.046	0.018	1	0.014	0.014	0.36	0.12
7/25/02	4	16	89	93	41	0.475	0.127	43	0.512	0.112	1	0.013	0.013	8	0.089	0.014	0	0.000	0.000	0.44	0.09
7/26/02	5	20	110	91	42	0.379	0.053	40	0.376	0.138	0	0.000	0.000	9	0.085	0.041	0	0.000	0.000	0.45	0.08
7/27/02	5	20	138	71	28	0.208	0.066	29	0.212	0.044	2	0.015	0.009	11	0.082	0.025	1	0.007	0.007	0.40	0.07
7/28/02	3	12	88	58	28	0.321	0.009	16	0.193	0.079	0	0.000	0.000	14	0.171	0.071	0	0.000	0.000	0.47	0.11
7/29/02	4	15	97	44	22	0.276	0.068	12	0.116	0.066	4	0.039	0.028	6	0.058	0.033	0	0.000	0.000	0.56	0.16
7/30/02	4	16	101	79	42	0.419	0.054	8	0.087	0.041	1	0.008	0.008	28	0.301	0.105	0	0.000	0.000	0.51	0.10
7/31/02	4	16	111	89	34	0.305	0.055	6	0.056	0.020	3	0.029	0.019	46	0.407	0.078	0	0.000	0.000	0.38	0.04
8/1/02	5	20	135	84	37	0.271	0.060	17	0.226	0.174	1	0.007	0.007	29	0.217	0.050	0	0.000	0.000	0.38	0.10
8/2/02	5	20	150	54	27	0.185	0.052	9	0.059	0.026	0	0.000	0.000	18	0.113	0.028	0	0.000	0.000	0.52	0.12
8/3/02	4	16	109	59	30	0.278	0.071	9	0.088	0.024	0	0.000	0.000	20	0.184	0.064	0	0.000	0.000	0.51	0.06
8/4/02	4	16	110	73	18	0.166	0.010	9	0.080	0.031	8	0.073	0.022	38	0.345	0.067	0	0.000	0.000	0.25	0.03
8/5/02	3	12	86	75	13	0.152	0.016	7	0.086	0.051	4	0.044	0.028	51	0.607	0.115	0	0.000	0.000	0.17	0.01
Total	155	619	3,631	3,410	1,171	12.737		1,915	23.009		27	0.268		287	2.758		10	0.103			
Min	3	12	59	44	13	0.152		6	0.056		0	0.000		0	0.000		0	0.000		0.12	
Mean	4	17	101	95	33	0.354		53	0.639		1	0.007		8	0.077		0	0.003		0.37	
Max	6	24	150	185	62	0.910		160	2.666		8	0.073		51	0.607		2	0.023		0.77	

[a] Chinook Salmon CPUE/All Species CPUE.

APPENDIX E. TEMPORALLY STRATIFIED AGE COMPOSITION ESTIMATES FOR THE KENAI RIVER CHINOOK SALMON FISHERY, 2002

Appendix E1.-Temporally stratified age composition and estimated harvest, by age class and geographic strata, for the sport harvest of late-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge, 2002.

	Age						
Parameter	1.1	1.2	1.3	1.4	1.5	2.3	Total
			1 July - 14 July				
Female							
Sample size		2	20	34	1		57
% sample		1.6%	15.5%	26.4%	0.8%		44.2%
SE % sample		1.1%	3.2%	3.9%	0.8%		4.4%
Downstream Harvest		13	128	218	6		366
SE Downstream Harvest		9	35	52	6		77
Upstream Harvest		68	683	1,160	34		1,946
SE Upstream Harvest		48	161	218	34		297
Total Harvest		81	811	1,379	41		2,311
SE Total Harvest		57	186	247	41		329
Male							
Sample size	6	8	20	35	3		72
% sample	4.7%	6.2%	15.5%	27.1%	2.3%		55.8%
SE % sample	1.9%	2.1%	3.2%	3.9%	1.3%		4.4%
Downstream Harvest	38	51	128	225	19		462
SE Downstream Harvest	17	20	35	53	11		93
Upstream Harvest	205	273	683	1,195	102		2,457
SE Upstream Harvest	85	99	161	221	59		345
Total Harvest	243	324	811	1,419	122		2,919
SE Total Harvest	100	116	186	251	70		377
Combined							
Sample size	6	10	40	69	4		129
% sample	4.7%	7.8%	31.0%	53.5%	3.1%		100.0%
SE % sample	1.9%	2.4%	4.1%	4.4%	1.5%		0.0%
Downstream Harvest	38	64	257	443	26		828
SE Downstream Harvest	17	23	58	90	13		155
Upstream Harvest	205	341	1,365	2,355	137		4,403
SE Upstream Harvest	85	111	240	336	69		514
Total Harvest	243	405	1,622	2,798	162		5,231
SE Total Harvest	100	130	270	368	81		537

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Appendix E1.-Page 2 of 2.

Parameter	Age 1.1	1.2	1.3	1.4	1.5	2.3	Total
		15 July - 31 July					
Female							
Sample size			11	71		1	83
% sample			7.5%	48.6%		0.7%	56.8%
SE % sample			2.2%	4.2%		0.7%	4.1%
Downstream Harvest			83	535		8	626
SE Downstream Harvest			26	83		8	92
Upstream Harvest			388	2,505		35	2,928
SE Upstream Harvest			116	287		35	309
Total Harvest			471	3,040		43	3,554
SE Total Harvest			140	330		43	351
Male							
Sample size		4	13	45	1		63
% sample		2.7%	8.9%	30.8%	0.7%		43.2%
SE % sample		1.4%	2.4%	3.8%	0.7%		4.1%
Downstream Harvest		30	98	339	8		475
SE Downstream Harvest		15	29	61	8		76
Upstream Harvest		141	459	1,588	35		2,223
SE Upstream Harvest		70	126	232	35		272
Total Harvest		171	557	1,927	43		2,698
SE Total Harvest		85	152	272	43		314
Combined							
Sample size		4	24	116	1	1	146
% sample		2.7%	16.4%	79.5%	0.7%	0.7%	100.0%
SE % sample		1.4%	3.1%	3.4%	0.7%	0.7%	0.0%
Downstream Harvest		30	181	875	8	8	1,101
SE Downstream Harvest		15	41	118	8	8	142
Upstream Harvest		141	847	4,092	35	35	5,151
SE Upstream Harvest		70	171	359	35	35	396
Total Harvest		171	1,028	4,967	43	43	6,252
SE Total Harvest		85	204	394	43	43	421

Note: 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.

Appendix E2.-Temporally stratified age composition and sonar passage by age class for late-run Kenai River Chinook salmon, 2002.

Parameter	Age 0.2	0.3	1.1	1.2	1.3	1.4	1.5	Total
1 July - 23 July								
Female								
Sample size	1		1	39	31	184	4	260
% sample	0.2%		0.2%	6.3%	5.0%	29.5%	0.6%	41.7%
SE % sample	0.2%		0.2%	1.0%	0.9%	1.8%	0.3%	2.0%
Sonar passage estimate	47		47	1,846	1,467	8,710	189	12,307
SE sonar passage estimate	47		47	288	258	555	94	612
Male								
Sample size		3	12	100	98	137	14	364
% sample		0.5%	1.9%	16.0%	15.7%	22.0%	2.2%	58.3%
SE % sample		0.3%	0.6%	1.5%	1.5%	1.7%	0.6%	2.0%
Sonar passage estimate		142	568	4,733	4,639	6,485	663	17,230
SE sonar passage estimate		82	163	440	436	500	176	639
Combined								
Sample size	1	3	13	139	129	321	18	624
% sample	0.2%	0.5%	2.1%	22.3%	20.7%	51.4%	2.9%	100.0%
SE % sample	0.2%	0.3%	0.6%	1.7%	1.6%	2.0%	0.7%	0.0%
Sonar passage estimate[a]	47	142	615	6,580	6,106	15,195	852	29,537
SE sonar passage estimate	47	82	169	502	488	634	198	446
24 July - 10 August								
Female								
Sample size				3	9	147	6	165
% sample				0.9%	2.8%	45.8%	1.9%	51.4%
SE % sample				0.5%	0.9%	2.8%	0.8%	2.8%
Sonar passage estimate				115	344	5,619	229	6,307
SE sonar passage estimate				67	118	676	95	740
Male								
Sample size		1		18	34	95	8	156
% sample		0.3%		5.6%	10.6%	29.6%	2.5%	48.6%
SE % sample		0.3%		1.3%	1.7%	2.6%	0.9%	2.8%
Sonar passage estimate		38		688	1,300	3,631	306	5,963
SE sonar passage estimate		38		173	250	490	111	708
Combined								
Sample size		1		21	43	242	14	321
% sample		0.3%		6.5%	13.4%	75.4%	4.4%	100.0%
SE % sample		0.3%		1.4%	1.9%	2.4%	1.1%	0.0%
Sonar passage estimate[a]		38		803	1,644	9,250	535	12,270
SE sonar passage estimate		38		188	289	1,007	150	1,277

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