Fishery Data Series No. 04-32

Chinook Salmon Creel Survey and Inriver Gillnetting Study, Lower Kenai River, Alaska, 2003

by

Adam M. 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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ABSTRACT

A creel survey to estimate angler effort, catch and harvest of Chinook salmon *Oncorhynchus tshawytscha* was conducted on the Kenai River between the Soldotna Bridge and the Warren Ames Bridge from 16 May 2003 through 31 July 2003. For the early run, (16 May through 30 June) angler effort was 59,058 (SE = 2,919) angler-hours and harvest was 1,948 (SE = 399) Chinook salmon. Unguided anglers accounted for 40% of the fishing effort and 32% of the harvest, versus guided anglers who accounted for 60% of the effort and 68% of the harvest. The early-run recreational harvest was composed of 17.8% (SE = 6.2%) age-1.2 fish, 42.7% (SE = 7.3%) age-1.3 fish and 39.5% (SE = 7.2%) age-1.4 fish, whereas early-run Chinook passage at the sonar site was composed of 31.6% (SE = 1.7%) age-1.2 fish, 19.6% (SE = 1.5%) age-1.3 fish and 46.7% (SE = 1.9%) age-1.4 fish. For the late run (July), angler effort was 207,456 (SE = 7,390) angler-hours and harvest was 13,837 (SE = 1,168) Chinook salmon. Unguided anglers accounted for 56% of the effort and 45% of the harvest, versus guided anglers who accounted for 44% of the effort and 55% of harvest. The late-run recreational harvest was composed of 15.0% (SE = 2.0%) age-1.2 fish, 18.5% (SE = 2.2%) age-1.3 fish and 64.0% (SE = 2.7%) age-1.4 fish, whereas the late-run Chinook passage at the sonar site was composed of 29.5% (SE = 1.3%) age-1.2 fish, 19.9% (SE = 1.2%) age-1.3 fish and 48.9% (SE = 1.5%) age-1.4 fish.

The 2003 season marks the fifth year that a standardized inriver gillnetting program was conducted near the Chinook salmon sonar site. The netting program ran from 16 May 2003 through 10 August 2003. During the early run 874 Chinook salmon, 840 sockeye salmon and 11 Dolly Varden were captured. The ratio of Chinook salmon CPUE to all species CPUE ranged from 0.20 to 1.00 and averaged 0.59 in the early run. During the late run 1,446 Chinook salmon, 1,464 sockeye salmon, 81 coho salmon, 5 pink salmon and 7 Dolly Varden were captured. The ratio of Chinook salmon CPUE to all species CPUE ranged from 0.12 to 0.85 and averaged 0.49 in the late run.

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

INTRODUCTION

The Kenai River (Figure 1) supports the largest freshwater recreational fisheries 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 1 July and the late run is defined as all fish entering on or after 1 July. 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, 4 oz) 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 department 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 returns and fishery restrictions (Figures 2 and 3). Early-run effort and harvest have never returned to 1987 and 1988 levels. Late-run effort has been reasonably constant since the mid 1980s, whereas late-run harvest has been near historic maximums the last 5 years. Beginning in 1981, separate effort and harvest estimates have been produced for guided and unguided

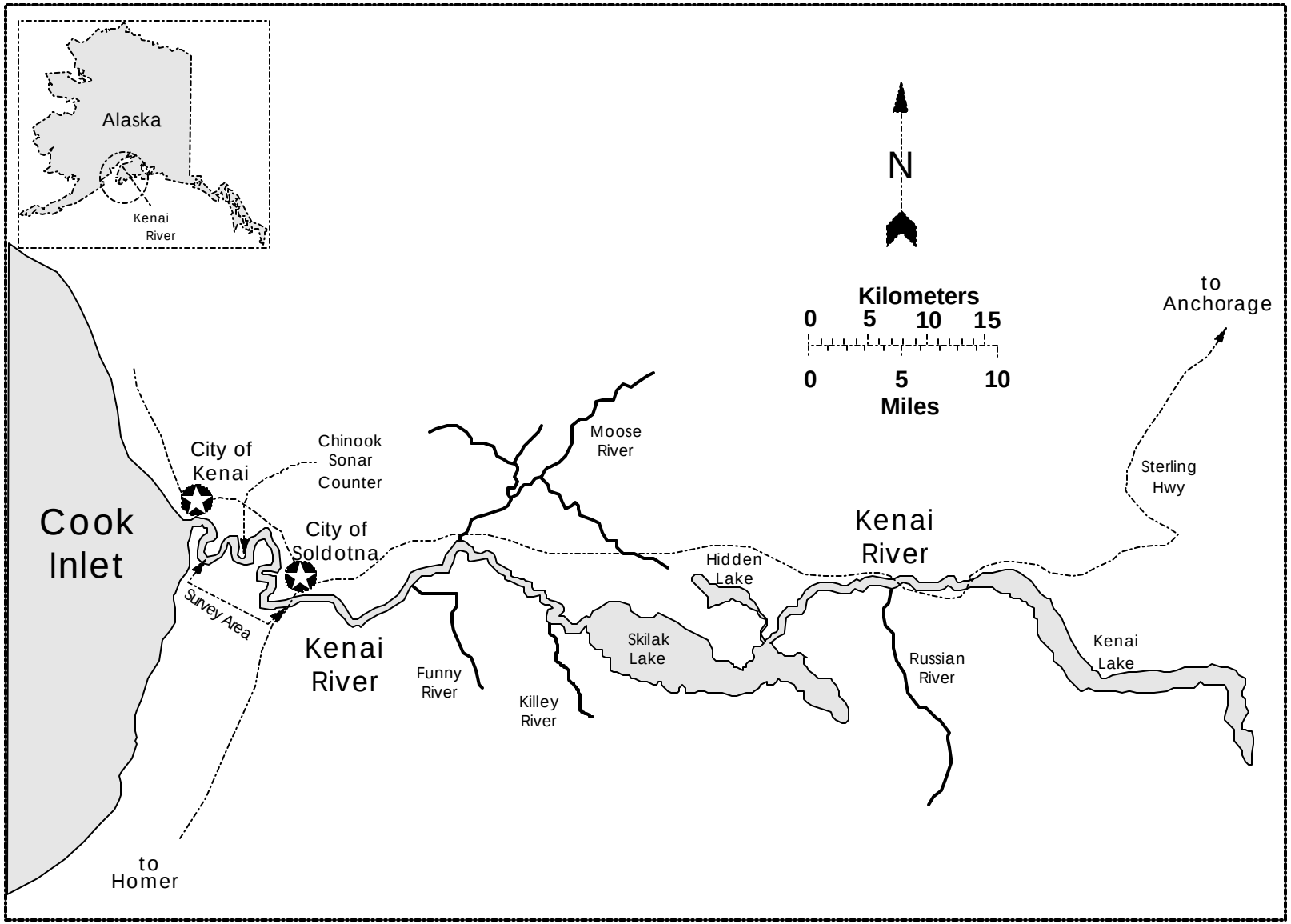


Figure 1.-The Kenai River drainage.

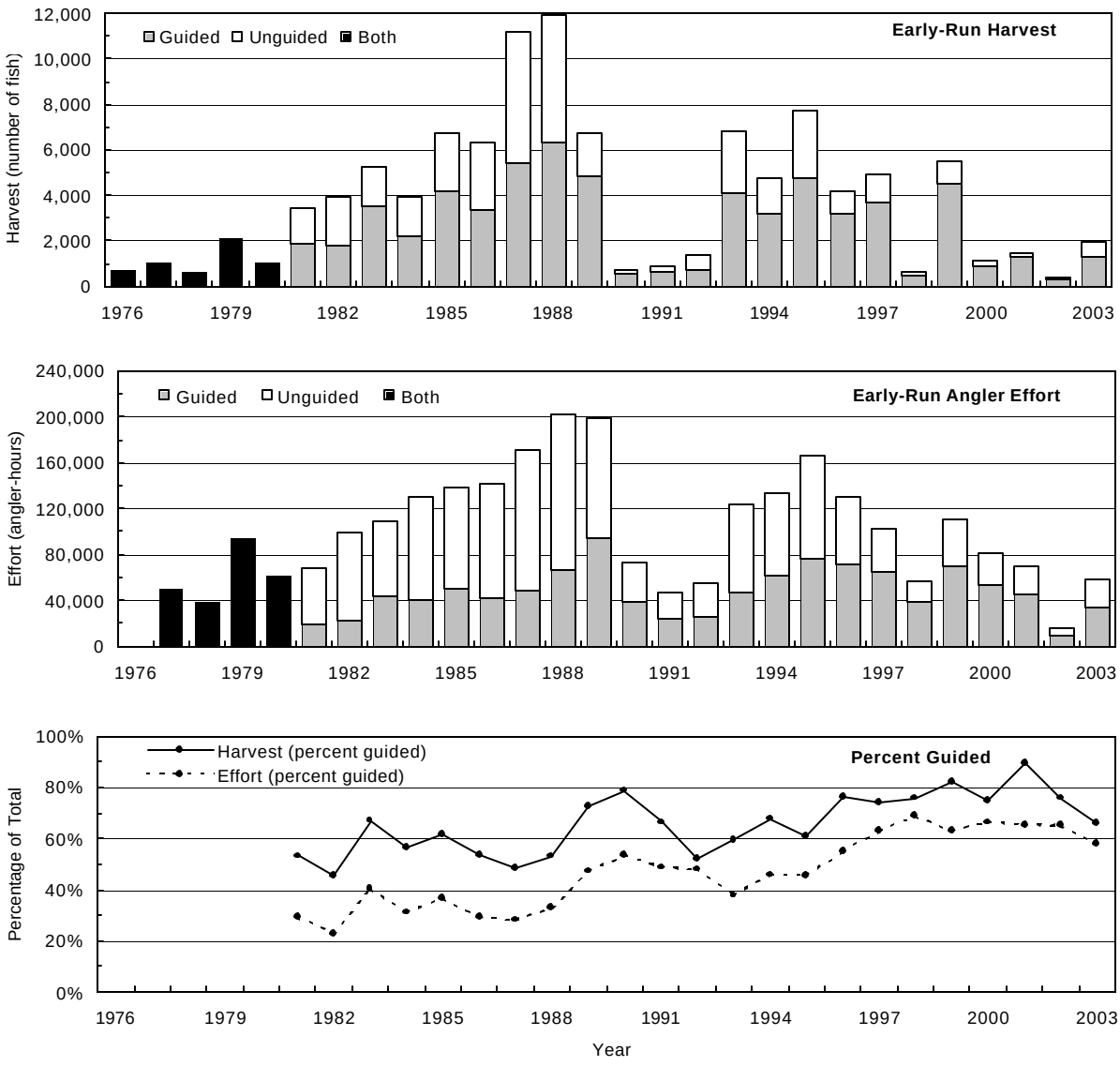


Figure 2.-Historic harvest and angler effort for the early-run Kenai River Chinook salmon fishery between the Soldotna Bridge and the Warren Ames Bridge.

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;

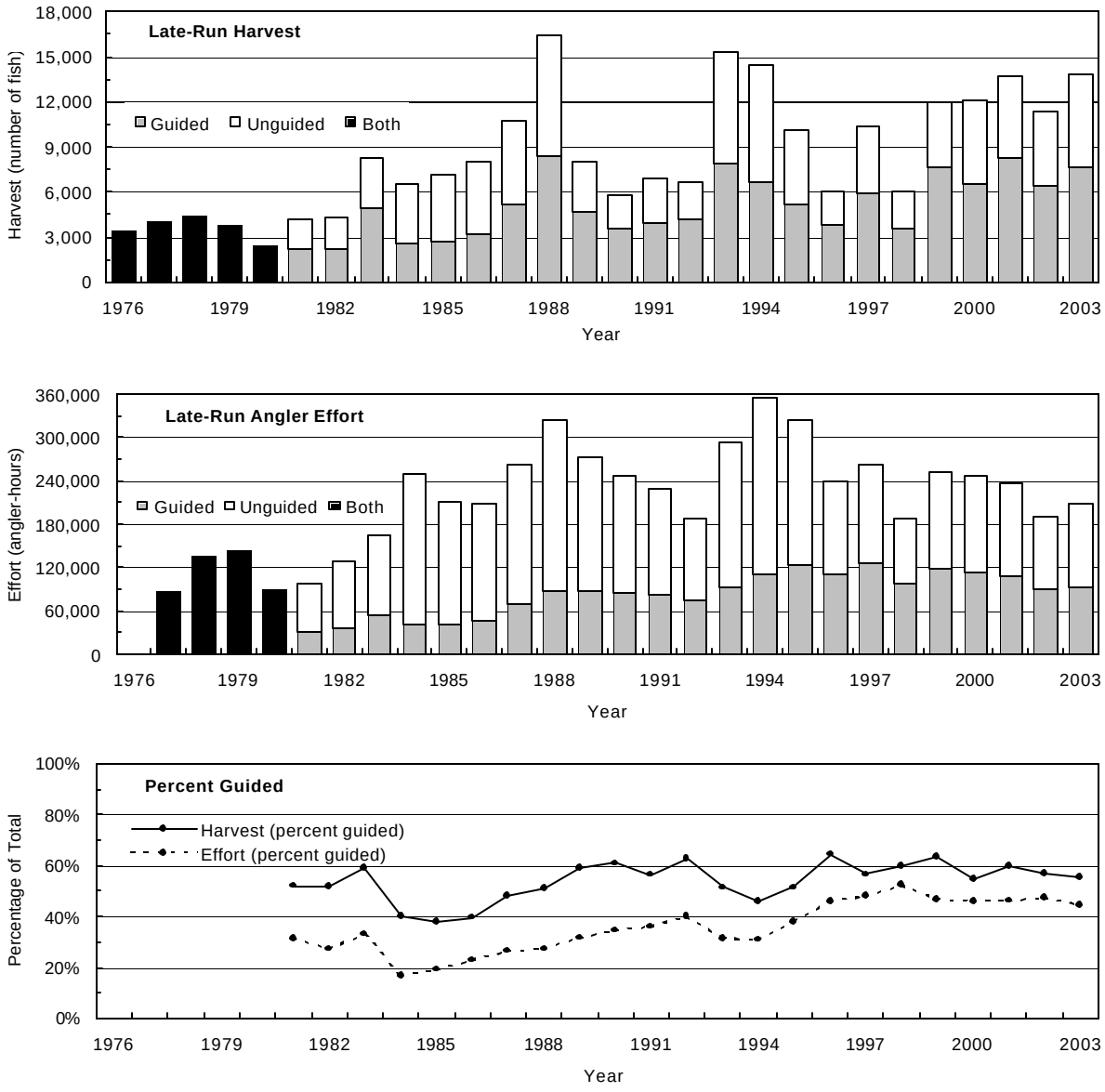


Figure 3.-Historic harvest and angler effort for the late-run Kenai River Chinook salmon fishery between the Soldotna Bridge and the Warren Ames Bridge.

Hammarstrom 1975-1981, 1988-1994; Hammarstrom et al. 1985; Hammarstrom and Larson 1982-1984, 1986; King 1995-1997; Marsh 1999, 2000; Reimer 2003, 2004; Reimer et al. 2002.

In March 2003, the Board of Fisheries met and changed the Kenai River Early-Run Chinook Salmon Management Plan (5 AAC 56.070 updated through register 166, Figure 4) by introducing a slot limit that prohibits harvest of Chinook salmon between 44 inches and 54.99 inches until 1 July below the Soldotna Bridge and until 15 July above the Soldotna Bridge. This change was implemented to protect early-run Chinook salmon that spend 5 years in salt water. The fishery is managed to achieve a

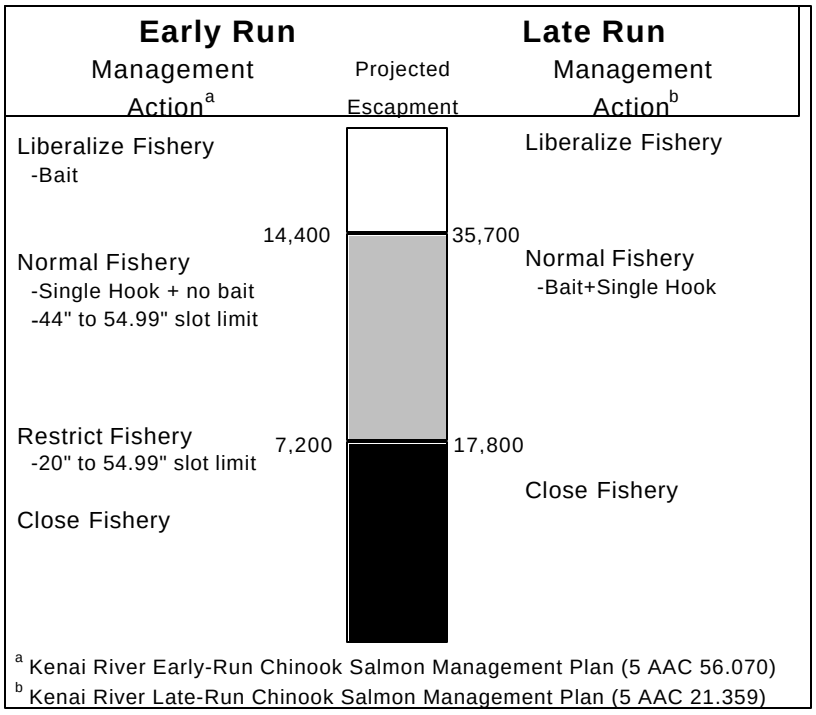


Figure 4.-Escapement levels and inriver management actions for the Kenai River Chinook salmon fisheries.

spawning escapement of 7,200 to 14,400 Chinook salmon. If the projected spawning escapement exceeds 14,400 fish then the fishery will be liberalized to allow bait. If the projected spawning escapement is below 7,200 fish the department will restrict the fishery by prohibiting harvest of Chinook salmon between 20 inches and 54.99 inches or by closing the fishery.

Management of the late-run Chinook salmon sport fishery is more 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 updated through register 166, 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. 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. The river is open to Chinook salmon fishing between the outlet of Skilak Lake and Cook Inlet, with the exception of the confluence areas of Slikok Creek (river mile [rm] 18.9), Funny River (rm 30.4), Moose River (rm 36.4) and the Lower Killey River (rm 44.0) with the Kenai River (Figures 1 and 5). The Slikok Creek and Funny River confluence areas are closed from 1 January to 14 July, the Lower Killey River confluence area is closed from 25 June to 14 July, and the

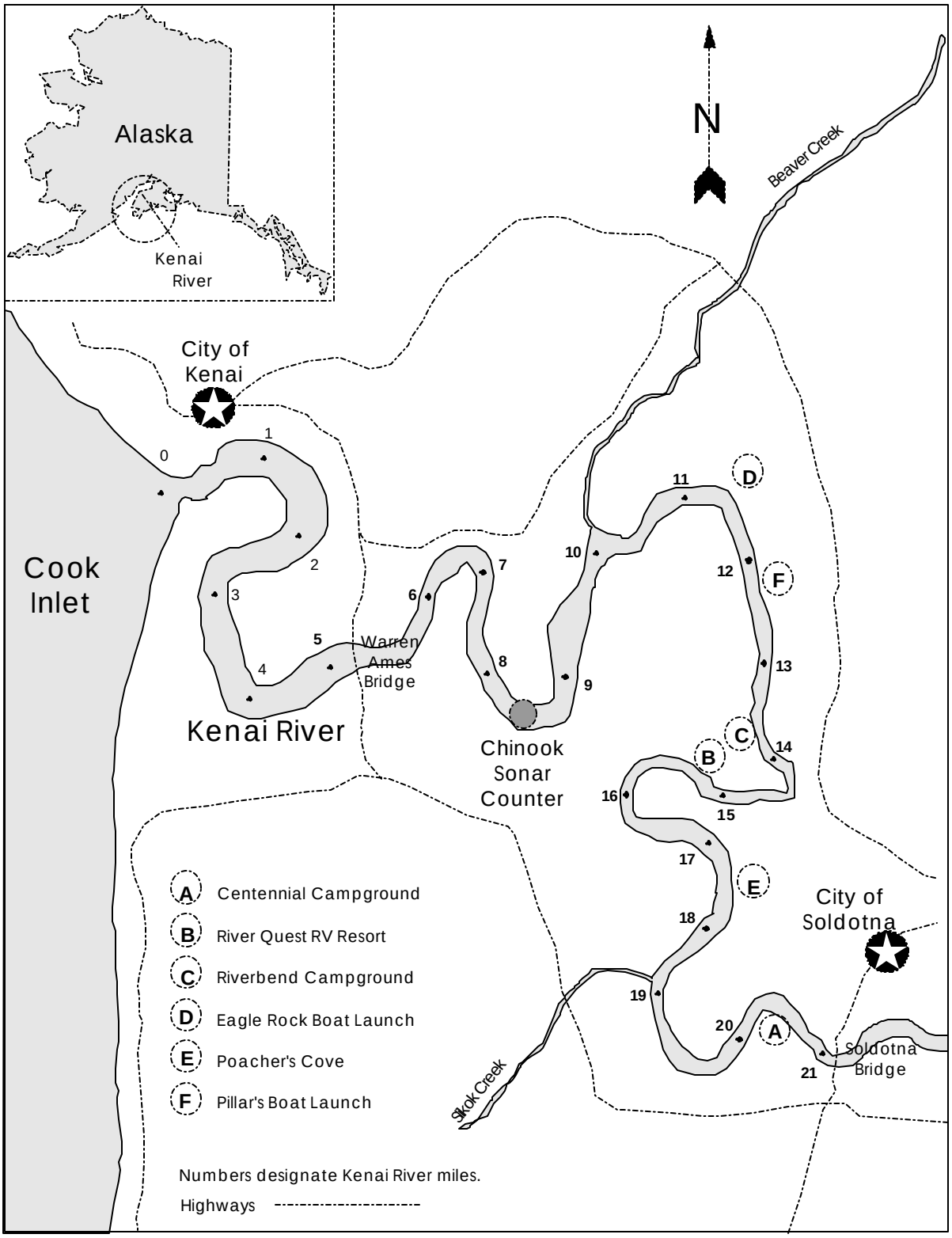


Figure 5.-The Kenai River creel survey study area.

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 1 January, although fish do not enter the river in harvestable numbers until mid-May, and closes on 31 July.

The daily bag and possession limit is one Chinook salmon per day 20 in long or longer; the seasonal limit is two Chinook salmon 20 in long or longer. Fish that are between 44 inches and 54.99 inches may not be retained prior to 1 July below the Soldotna Bridge or prior to 15 July above the Soldotna Bridge. 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 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. On Mondays, boat anglers may only fish from unguided drift boat boats downstream of the outlet of Skilak Lake.

There are further restrictions for fishing guides, guided anglers and non-resident anglers. Guided anglers are only allowed to fish from 0600 to 1800 hours. Guided anglers are prohibited from fishing on Sundays and Mondays with the exception of the last two Sundays in May (for charitable purposes) and Memorial Day (Monday, 27 May). Guides are prohibited from personally engaging in fishing while conducting clients. Lastly, nonresident anglers are only allowed to fish from a boat downstream of Skilak Lake between 0600 to 1800 hours in May and June.

OBJECTIVES

Objectives for the 2003 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 16 May through 30 June (early run) and from 1 July through 31 July (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 16 May through 30 June (early run) and 1 July through 31 July (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 the Chinook salmon population entering the Kenai River from 16 May through 10 August such that all age-proportion estimates, during each sampling stratum, are within 10 percentage points of the true values 95% of the time.
4. 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.

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. Collect dorsal finclips from early-run Kenai River Chinook salmon sampled from the inriver return for possible future genetic analysis.
3. 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). The creel survey was conducted from 16 May 2003 through 31 July 2003. First-stage sampling units were days. The unguided angler day was assumed to be 20 h long (0400 to 2400 hours) while the guided angler day was 12 h long (0600 to 1800 hours) by regulation. Daily catch and harvest[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.

Stratification accounted for the geographical, temporal and regulatory factors affecting the fishery. Since significant harvest below the sonar site would affect inriver return and escapement estimates, angler counts were geographically stratified into two areas: (1) between the Soldotna Bridge and the Chinook salmon sonar site, and (2) between the Chinook salmon sonar site and the Warren Ames Bridge. Angler interviews did not include this level of stratification because past attempts to estimate catch and harvest below the sonar site using geographically stratified angler interviews were ineffective (Reimer et al. 2002). Thus, estimates of catch and harvest below the sonar site are based only on estimated effort below the sonar site while assuming CPUE and HPUE are constant throughout the study area.

Harvest and catch rates can differ by time intervals and between weekdays and weekend/holidays (J. Hasbrouck, ADF&G, Sport Fish Division, 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 Division, 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:

[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.

Stratum	Number of Strata	Description
Geographic:	2 strata	Upstream and downstream of the Chinook salmon sonar site (angler counts only)
Temporal:	7 strata	Early Run: 16-18 May, 19-26 May, 27 May-1 June, 2-8 June, 9-15 June, 16-22 June, 23-29 June
	5 strata	Late Run: 1-6 July, 7-13 July, 14-20 July, 21-27 July, 28-31 July
Day Type:	2 strata	Weekdays and weekends/holidays
Angler Type:	2 strata	Guided and unguided

Two of the four available weekdays and both weekend days were sampled each week. Exceptions were the weeks of 19-26 May and 1-6 July 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. Thus, the early run was composed of 28 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/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 purposes.

Because the unguided drift boat fishery on Mondays in July is a new and evolving fishery, one boat count was completed between 0800-1400 hours as an index of effort. While unguided drift boat fishing on Mondays was legal in May and June during 2003, effort was so low that index counts were not conducted.

Angler Interviews

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

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

Interviews were conducted only at Pillar's Boat Launch when the creel survey began on 16 May. Each launch was added to the sampling schedule immediately after significant boat traffic was observed there. River Quest RV Resort was added to the sampling schedule on 26 May, Poacher's Cove and Riverbend Campground were added on 10 June, and Centennial Campground was added on 13 June. 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 probability 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, and a possible 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 downstream of the Soldotna Bridge by species, (6) number of fish released downstream of the Soldotna Bridge by species, and (7) whether released Chinook salmon were less than 44 in, 44 in-54.99 in, or 55 in or greater. 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.

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 two 3-week strata in the early run (16 May-8 June and 9-30 June) and two 2-week strata in the late run (1-13 July and 14-31 July). The sample goal for the late run was 150 fish for each stratum, sufficient to achieve the desired relative precision assuming 15%

of the scales could not be aged (Thompson 1987). Because of the slot limit a sample size goal of 150 fish per stratum was believed unrealistic for the early run although preseason analysis indicated the objective 4 would be satisfied under the absolute precision objective.

Additionally, harvested fish were inspected for an adipose finclip indicating the fish had received a coded wire tag as a juvenile. Coded wire tags help estimate the Upper Cook Inlet marine sport harvest of Kenai River Chinook salmon (King and Breakfield 2002). If an adipose 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).

Analysis using net selectivity estimates from other projects indicated that use of a 5 in mesh gillnet and a 7.5 in mesh gillnet, fished with equal frequency, would provide a relatively flat composite selectivity curve (S. Fleischman, ADF&G, Division of Sport Fish, Research and Technical Services, Anchorage, personal communication). Another advantage of these net sizes is that they are slightly small for most fish present and therefore 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 to produce ASL estimates, CPUE estimates and species composition estimates. Mesh type and color were also changed in 2002. The project used dark green 'cable lay' nylon nets, typical 1960s era commercial fishing gear, in previous years. In 2002, the project used clear-steel blue 'multifiber' nylon nets typical of modern day commercial gear.

The changes enacted in 2002 proved beneficial. Multifiber nets, though less durable and more abrasive to fish, were also much more effective (Bue 1986, Reimer 2003, 2004). The new nets sampled a 2-8 fold greater fraction of the inriver return, without excessive injury rates (Reimer 2004). Also, species composition differed between the 5.0 in and the 7.5 in mesh but Chinook salmon age composition did not (Reimer 2004). These results were encouraging because the 5.0 in mesh was introduced to help differentiate species; however, comparability with historic age composition estimates (generated from the catch in a 7.5 in gillnet only) was a concern. Given the favorable results, all changes were retained in 2003.

Specifications of the nets used in 2003 are shown below:

1. 5.0 in (stretched mesh) multifiber, 70 or 80 meshes deep, 10 fathoms long, Shade 1 (clear-steel blue), MS50 or MS73 (10 or 14 strand, respectively) twine.
2. 7.5 in (stretched mesh) multifiber, 55 meshes deep, 10 fathoms long, Shade 1, MS93 (18 strand) twine.

Inriver sampling was scheduled for 8 hours daily from 16 May until 10 August. 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 (approximately 15 m offshore from the right-bank transducer to 10 m offshore from the left-bank transducer). The drift area began immediately downstream from the sonar transducers (rm 8.6) and ended 0.4 mi downstream (rm 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 either: (1) the crew believed five fish were in the net, (2) the net was drifting off the thalweg, or (3) the end of the drift area was reached. Successive drifts always began at the upstream end of the study area. For each set the start and stop times (to the nearest five seconds) were recorded. When fish were caught the numbers captured by species were recorded. Two drifts (one starting on each bank) were completed with each mesh size before switching to the other mesh size.

Water clarity and level were recorded at the beginning, midpoint, and end 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 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. 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 sacrificed 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 16 May-8 June and 9-30 June; strata for the late run were 1-20 July and 21 July-10 August.

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

Dorsal finclips were collected from returning Chinook salmon captured by the inriver gillnets on days when sockeye salmon lengths were not being recorded. The finclips were placed in 2 ml plastic tubes and immersed in an alcohol buffer. Each tube had a unique number and was stored at the ADF&G's gene conservation laboratory for future analysis. Future analysis is dependent on additional funding to sample spawning areas and analyze samples.

Estimates of the age, sex, and length composition in 2003 were generated using the Chinook catches from 5.0 in + 7.5 in gillnets combined.

DATA ANALYSIS

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

Angler Effort

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

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

Total effort of stratum h was estimated by:

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

where:

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

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

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

where:

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

Catch and Harvest

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

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

where:

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

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

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

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

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

and the bias corrected mean was:

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

where:

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

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

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

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

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

and the variance by (Goodman 1960):

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

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

When no interviews from a particular angler type were obtained during a particular day, 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 2003, as in past years, the fishery was restricted to unguided drift boats on Mondays. Monday late-run harvests have historically comprised a small percent (<4%) of the total late-run harvest. Due to budgetary constraints in 2003, we did not interview anglers on Mondays but 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 on Mondays remained a small fraction of the total.

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 h)
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:

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

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

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

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:

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

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

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,

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

Age and Sex Composition

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

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

where:

n_{bt} = the number of fish of age/sex group b sampled during stratum t, and

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

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

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

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

The total harvest in each age/sex group, by geographic stratum g (above and below the sonar), was estimated by:

$$\hat{H}_{gbt} = \hat{H}_{gt}\hat{p}_{bt}, \quad (22)$$

with variance (Goodman 1960):

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

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:

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

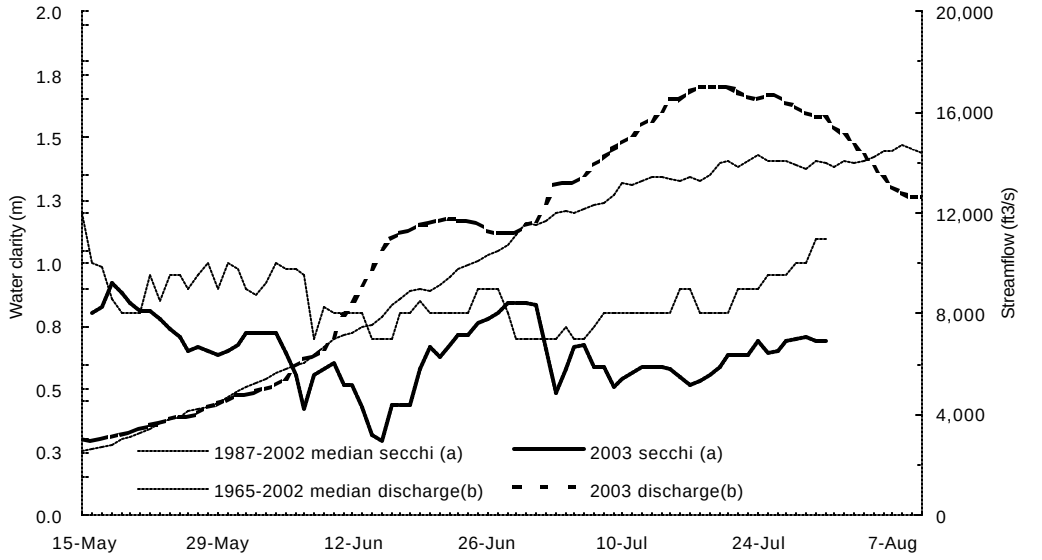
$$\hat{V}(\hat{p}_{gb}) = \frac{1}{\hat{H}_g^2}\left[\frac{\hat{v}(\hat{H}_{g1})\left[\hat{p}_{b1}\hat{H}_{g2} - \hat{H}_{gb2}\right]}{\hat{H}_g^2} + \frac{v(\hat{H}_{g2})\left[\hat{p}_{b2}\hat{H}_{g1} - \hat{H}_{gb1}\right]}{\hat{H}_g^2} + \hat{v}(\hat{p}_{b1})\hat{H}_{g1} + \hat{v}(\hat{p}_{b2})\hat{H}_{g2}\right].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

The number of Chinook salmon passing the sonar N was apportioned by age and sex similarly, using equations 20-24, ignoring geographic stratum subscript g, substituting N for H, and using the net-captured Chinook salmon to estimate p. The inriver 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},

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

RESULTS

Kenai River water clarity was below average for most of both runs while streamflow was above average for most of June and July (Figure 6).



(a) measured at Kenai rm 15.3.
(b) 2002 and 2003 data downloaded from USGS 15266300 KENAI R AT SOLDOTNA AK PROVISIONAL DATA SUBJECT TO REVISION http://waterdata.usgs.gov/ak/nwis/dv?format=pre&period=730&site_no=15266300 on September 4, 2003. 1965-2001 data downloaded from Daily Streamflow for the Nation USGS 15266300 KENAI R AT SOLDOTNA AK http://waterdata.usgs.gov/nwis/discharge/?site_no=15266300&agency_cd=USGS on January 13, 2003.

Figure 6.-Kenai River water clarity and streamflow.

CREEL SURVEY

The creel survey ran from 16 May to 31 July. During the early run, the creel survey sampled 27 of the 46 days the fishery was open to unguided anglers and 21 of the 34 days the fishery was open to guided anglers[1] (Table 1). During the late run, the creel survey sampled 18 of the 31 days the fishery was open to unguided anglers and 14 of the 23 days the fishery was open to guided anglers[2] (Table 2). A total of 2,686 angler interviews was conducted, 1,058 during the early run and 1,628 during the late run (Tables 1 and 2).

During the early run, angler counts ranged from 0 to 145 for unguided anglers and from 14 to 251 for guided anglers (Appendix A1). The largest count occurred on 29 June for unguided anglers and on 25 June for guided anglers. During the late run, angler counts ranged from 28 to 549 for unguided anglers and from 176 to 492 for guided anglers (Appendix A2). The largest counts occurred on 27 July for unguided anglers and on 25 July for guided anglers.

Estimated effort was 59,058 (SE = 2,919) angler-hours during the early run (Table 1) and 207,456 (SE = 7,390) angler-hours during the late run (Table 2). The precision of both the early-(±9.7%) and late-(±7.0%) 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 60% of the early-run effort and 44% of the late-run effort.

[1] There were an additional 6 unguided drift boat Mondays in the early run that were not sampled.

[2] There were an additional 4 unguided drift boat Mondays in the late run that were not sampled.

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, 2003.

				Effort		Catch		Harvest	
	n[a]	N[b]	Int.[c]	Est.	SE	Est.	SE	Est.	SE
16-18 May									
Guided weekdays	1	1	10	210	42	4	4	0	0
Guided weekend	2	2	13	654	142	22	16	10	11
Unguided weekdays	1	1	4	60	44	0	0	0	0
Unguided weekends	2	2	29	280	95	23	12	13	7
19-26 May									
Guided weekdays	2	4	24	1,300	360	92	49	60	29
Guided weekend/holiday	1	2	17	688	68	31	10	16	8
Unguided weekdays	2	4	27	840	298	36	17	18	10
Unguided weekends/holiday	2	3	81	2,400	624	64	27	31	14
27 May-1 June									
Guided weekdays	2	4	32	2,356	330	131	38	49	31
Guided weekend	1	1	3	1,068	188	50	37	14	24
Unguided weekdays	2	4	57	1,160	285	34	10	17	14
Unguided weekends	2	2	119	1,505	210	65	17	33	11
2-8 June									
Guided weekdays	2	4	45	4,092	987	205	173	173	172
Guided weekend	1	1	40	1,412	308	17	10	12	8
Unguided weekdays	2	4	56	1,620	266	159	66	129	63
Unguided weekends	2	2	124	2,045	423	29	14	8	6
9-15 June									
Guided weekdays	2	4	51	6,080	1,158	468	288	381	256
Guided weekend	1	1	7	1,260	168	0	0	0	0
Unguided weekdays	2	4	16	1,990	263	0	0	0	0
Unguided weekends	2	2	42	1,495	347	0	0	0	0
16-22 June									
Guided weekdays	2	4	39	5,552	878	189	76	189	76
Guided weekend	1	1	40	1,494	558	34	19	34	19
Unguided weekdays	2	4	20	2,230	292	191	151	191	151
Unguided weekends	2	2	51	2,715	457	74	42	28	37
23-29 June									
Guided weekdays	2	4	22	7,748	1,637	518	268	330	147
Guided weekend	1	1	0	1,304	285	81	50	54	33
Unguided weekdays	2	4	30	2,350	309	169	50	100	52
Unguided weekends	2	2	59	3,150	705	133	44	61	30
Day Type Subtotals									
Guided weekdays	13	25	223	27,338	2,451	1,605	441	1,181	353
Guided weekends/holiday	8	9	120	7,880	759	235	69	139	48
Unguided weekdays	13	25	210	10,250	702	589	173	454	172
Unguided weekends/holiday	14	15	505	13,590	1,203	388	71	173	51
Angler Type Subtotals									
Guided	21	34	343	35,218	2,565	1,840	447	1,320	356
% Guided			32%	60%		65%		68%	
Unguided[d]	27	40	715	23,840	1,393	977	187	628	180
% Unguided			68%	40%		35%		32%	
Early-run Total[d]			1,058	59,058	2,919	2,817	484	1,948	399

[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] Six unguided drift boat Mondays were not included in the sampling design.

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, 2003.

				Effort		Catch		Harvest	
	n[a]	N[b]	Int.[c]	Est.	SE	Est.	SE	Est.	SE
1-6 July									
Guided weekdays	2	3	54	11,421	2,441	1,224	663	739	359
Guided weekend/holiday	1	2	41	6,192	1,168	859	202	714	169
Unguided weekdays	2	3	120	6,495	1,271	334	169	168	80
Unguided weekends/holiday	2	3	184	12,938	2,144	1,569	397	589	137
7-13 July									
Guided weekdays	2	4	93	17,172	1,078	4,043	577	1,293	449
Guided weekend	1	1	10	3,744	792	865	362	357	115
Unguided weekdays	2	4	84	10,900	2,001	1,059	385	477	139
Unguided weekends	2	2	141	11,120	1,163	1,357	264	601	144
14-20 July									
Guided weekdays	2	4	96	17,580	2,356	4,698	926	2,214	735
Guided weekend	1	1	51	4,950	188	835	161	353	79
Unguided weekdays	2	4	82	19,120	3,210	2,619	561	1,283	225
Unguided weekends	2	2	118	13,355	1,078	1,568	282	801	175
21-27 July									
Guided weekdays	2	4	88	16,156	1,455	2,145	291	1,058	258
Guided weekend	1	1	28	3,024	372	269	87	191	66
Unguided weekdays	2	4	79	16,520	1,182	1,932	294	1,036	388
Unguided weekends	2	2	145	10,630	1,940	780	173	386	106
28-31 July									
Guided weekdays	2	3	89	11,529	2,438	1,178	288	717	176
Unguided weekdays	2	3	125	14,610	1,876	1,435	363	858	185
Day Type Subtotals									
Guided weekdays	10	18	420	73,858	4,554	13,288	1,341	6,021	984
Guided weekends/holiday	4	5	130	17,910	1,472	2,829	453	1,616	229
Unguided weekdays	10	18	490	67,645	4,565	7,379	842	3,823	511
Unguided weekends/holiday	8	9	588	48,043	3,298	5,273	580	2,377	285
Angler Type Subtotals									
Guided	14	23	550	91,768	4,786	16,117	1,415	7,637	1,011
% Guided			34%	44%		56%		55%	
Unguided[a]	18	27	1,078	115,688	5,631	12,653	1,022	6,200	585
% Unguided			66%	56%		44%		45%	
Late-run Total[d]			1,628	207,456	7,390	28,769	1,746	13,837	1,168

[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] Four unguided drift boat Mondays were not included in the sampling design.

Estimated daily catch rates of early-run Chinook salmon ranged from 0 to 0.166 (SE = 0.058) fish per hour for unguided anglers and from 0 to 0.118 (SE = 0.048) fish per hour for guided anglers (Appendices B1 and B2). Peak daily catch rates of early-run Chinook salmon occurred on 4 June for unguided anglers and on 10 June for guided anglers. Estimated daily catch rates of late-run Chinook salmon ranged from 0.011 (SE = 0.006) to 0.203 (SE = 0.051) fish per hour for unguided anglers and from 0.021 (SE = 0.013) to 0.347 (SE = 0.149) fish per hour for guided anglers (Appendices B3 and

B4). Peak daily catch rates of late-run Chinook salmon occurred on 17 July for both angler types. During both runs, catch rates were generally higher for guided anglers than for unguided anglers.

An estimated 1,948 (SE = 399) Chinook salmon were harvested during the early run (Table 1). Unguided anglers accounted for 32% of the harvest compared to 68% for guided anglers. The estimated catch of early-run Chinook was 2,817 (SE = 484), meaning 31% of the catch was released. The precision for total harvest and catch (±40% or 782 Chinook salmon and ±34% or 949 Chinook salmon, respectively) failed to meet the project objectives (within 20% or 500 Chinook salmon of the true value 95% of the time).

An estimated 13,837 (SE = 1,168) Chinook salmon were harvested during the late run (Table 2). Unguided anglers accounted for 45% of the harvest compared to 55% for guided anglers. The estimated catch of late-run Chinook salmon was 28,769 (SE = 1,746), meaning 52% of the catch was released. The relative precision for total harvest and catch (±16.5% and ±11.9%, respectively) satisfied the project objectives (within 20% or 500 Chinook salmon of the true value 95% of the time).

Less than 1% of the early-run effort and 5.9% of the late-run effort occurred downstream of the Chinook salmon sonar site (Appendices C1 and C2). The late-run percentage is small compared to the years 1999-2002. The estimate of late-run harvest below the Chinook salmon sonar site was 823 (SE = 134) Chinook salmon.

The 2003 season marks the fifth year that unguided anglers have been allowed to fish from drift boats on Mondays in July. Catch, harvest and effort have increased each year (Figure 7)**,** but still represent less than 4% of the late-run totals. The estimates presented for 2002 and 2003 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 1,727 salmonids greater than 400 mm long with gillnets: 874 Chinook salmon, 840 sockeye salmon, 1 pink salmon, 1 chum salmon *O. nerka* 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 Division, Anchorage, personal communication). A total of 96 other fish were captured: 70 eulachon *Thaleichthys pacificus*, 22 starry flounder *Platichthys stellatus*, 1 Chinook salmon less than 400 mm MEF length and 3 Dolly Varden less than 400 mm total length. Daily Chinook salmon CPUE ranged from 0.011 (SE = 0.006) to 0.364 (SE = 0.025) Chinook salmon per minute drifted (Appendix D3). The ratio of Chinook salmon to total salmon captured ranged from 0.20 (SE = 0.04) to 1.00, the mean value was 0.59 (Appendix D3).

During the late run, we captured a total of 3,003 salmonids greater than 400 mm long with inriver gillnets: 1,446 Chinook salmon, 1,464 sockeye salmon, 81 coho salmon, 5 pink salmon and 7 Dolly Varden (Appendix D6). A total of 18 other salmonids less than 400 mm total length were captured during the late run: 10 Chinook salmon, 3 sockeye salmon, 1 coho salmon, 1 pink salmon, and 3 Dolly Varden. Daily Chinook salmon CPUE ranged from 0.026 (SE = 0.012) to 1.073 (SE = 0.267)

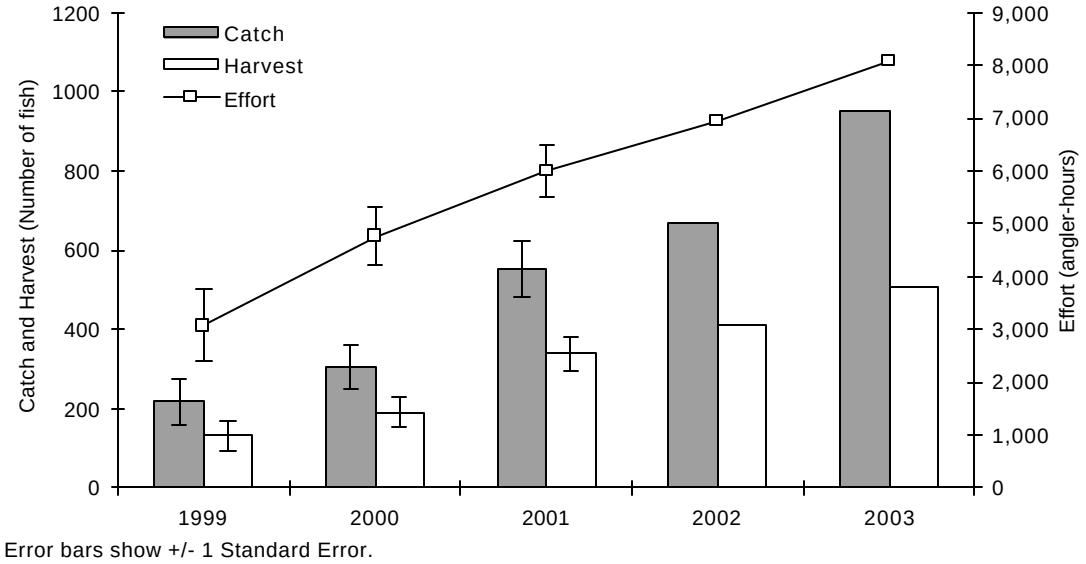


Figure 7.-Monday unguided drift boat catch, harvest and angler effort, 1999-2003.

Chinook salmon per minute drifted (Appendix D6). The ratio of Chinook salmon to total salmon captured ranged from 0.12 (SE = 0.03) to 0.85 (SE = 0.06), the mean value was 0.49 (Appendix D6).

Catch from the 5.0 in and the 7.5 in gillnets were compared to assess possible age, size and/or species selectivity bias in the catch data. The 5.0 in and the 7.5 in gillnets are compared for statistical reasons, as the more relevant comparison (7.5 in vs. 5.0 in +7.5 in combined) is not statistically valid. The comparison between 7.5 in vs. 5.0 in +7.5 in combined is more relevant since the inriver return ASL sample has been catches of 7.5 in mesh alone historically while the combined catches from 5.0 in +7.5 in combined have been used since 2002.

The length distribution of Chinook salmon in each mesh show that fish less than 625 mm were much more abundant in the 5.0 in mesh whereas fish between 625 mm and 1,025 mm were slightly more abundant in the 7.5 in mesh (Figure 8). These differences lead to significantly different age composition estimates for both the early ($\chi^2 = 7.66$, df = 2, $P < 0.022$) and the late runs ($\chi^2 = 32.6$, df = 2, $P < 0.001$) with age-1.2, age-1.3 and age-1.4 fish considered (99.1% of the early-run sample and 98.2% of the late-run sample). The length frequency of sockeye salmon caught in the 5.0 in and the 7.5 in mesh were nearly identical (Figure 8).

The 5.0 in and 7.5 in gillnets also showed a 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 ($\chi^2 = 190.6$, df = 1, $P < 0.001$) and the late run ($\chi^2 = 359.6$, df = 1, $P < 0.001$) with only Chinook and sockeye salmon considered (94.8% of the early-run sample and 96.8% of the late-run sample).

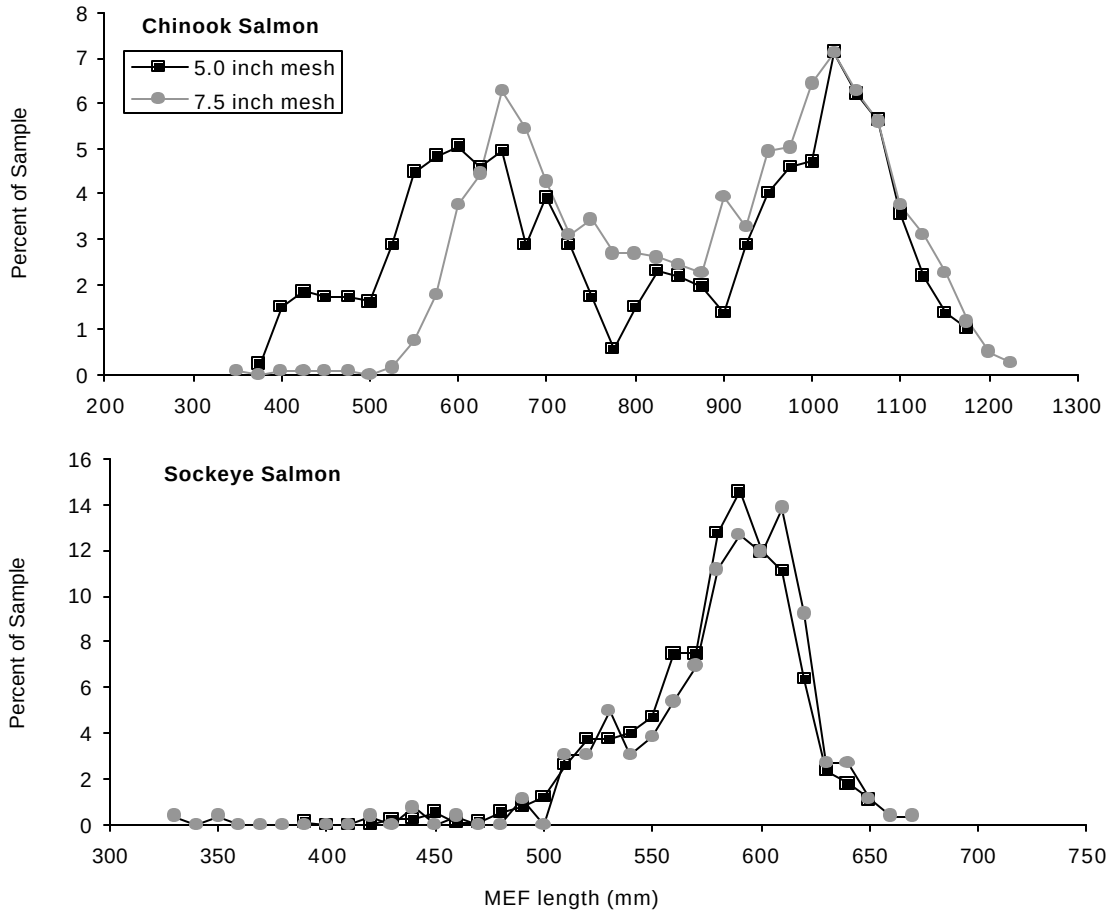


Figure 8.-Length distribution of Kenai River Chinook and sockeye salmon caught with 5.0 in and 7.5 in mesh gillnets, 2003.

In 2003, 12.9% of the early-run Chinook salmon and 14.8% of the late-run Chinook salmon captured by the inriver gillnetting program were injured in some manner. During the early run, ~49% of the injuries were bleeding gills, ~29% were scrapes or cuts (generally to the eye, dorsal fin or adipose fin), ~20% were lethargic upon release (probably from suffocation because the net impeded buccal-opercular movement), and ~2% were injured in some other way. During the late run, ~52% of the injuries were bleeding gills, ~34% were scrapes or cuts, ~13% were lethargic upon release and ~1% were injured in some other way. Bleeding gills were more frequent for ages 1.2 and 1.3 than 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. Cut or scrapes were more common in ages 1.4 and 1.5 than in ages 1.2 and 1.3. The frequency of other maladies was consistent between mesh sizes and ages.

AGE, SEX, AND LENGTH

Creel Survey

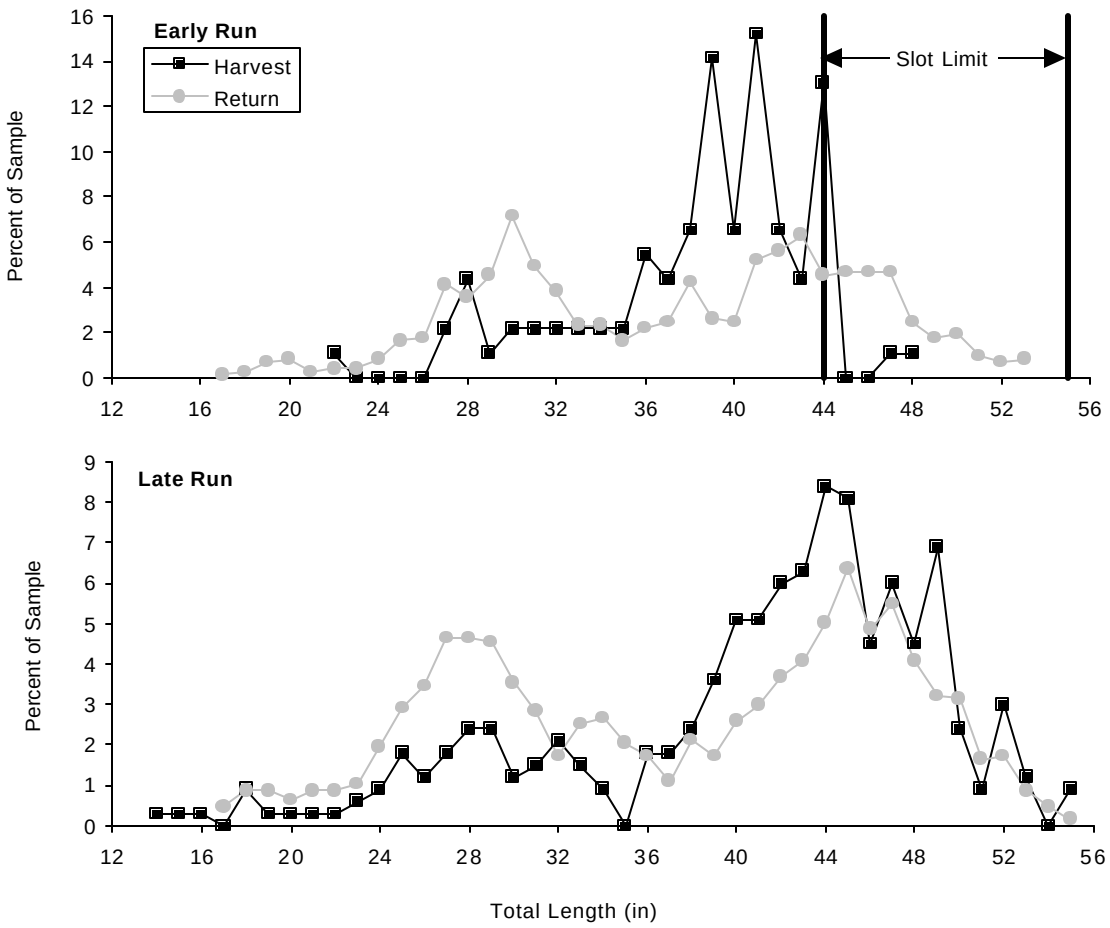
The age composition of the early-run harvest differed ($\chi^2 = 8.54$, df = 2, P = 0.014) between temporal strata (16 May-8 June, 9-30 June). Therefore, early-run age composition estimates were weighted by the harvest in each temporal stratum (Table 3 and Appendix E1). Age-1.3 fish were most abundant, comprising 42.7% (SE = 7.3%) of the total harvest, followed by age-1.4 fish at 39.5% (SE = 7.2%) and age 1.2 fish at 17.8% (SE = 6.2%). The sample size goals were not met for any strata; however, some absolute precision goals were met in the first sampling strata. The slot limit implemented in 2003 truncated the early-run harvest length composition at 44 in, except for two fish within the slot limit that were illegally harvested (Figure 9).

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, 2003.

	Age			
Parameter	1.2	1.3	1.4	Total
Early Run, both strata (16 May - 30 June)				
Female				
Sample size	3	16	35	54
Total Harvest	116	421	622	1,159
SE Total Harvest	76	145	175	271
% Total Harvest	5.9%	21.6%	31.9%	59.5%
SE % Total Harvest	3.8%	6.1%	6.8%	7.4%
Male				
Sample size	6	15	6	27
Total Harvest	231	410	147	789
SE Total Harvest	111	144	79	217
% Total Harvest	11.9%	21.1%	7.6%	40.5%
SE % Total Harvest	5.2%	6.1%	3.9%	7.4%
Combined				
Sample size	9	31	41	81
Total Harvest	347	831	769	1,948
SE Total Harvest	139	221	203	399
% Total Harvest	17.8%	42.7%	39.5%	100.0%
SE % Total Harvest	6.2%	7.3%	7.2%	0.0%

Note: Temporally stratified age composition and estimated harvest, by age class, for the sport harvest of 2003 early-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge is presented in Appendix E1.

The age composition of the late-run harvest differed ($\chi^2 = 13.72$, df = 2, P = 0.001) between temporal strata (1–13 July, 14-31 July) with age-1.2, age-1.3 and age-1.4 fish considered (97.4% of the sample). Therefore, late-run age composition estimates were weighted by the harvest in each temporal stratum (Table 4 and Appendix E2). Age-1.4 fish were most abundant, comprising 64.0% (SE = 2.7%) of the total harvest, followed by age-1.3 fish at 18.5% (SE = 2.2%) and age 1.2 fish at 15.0%



Note: Length distribution of the early-run harvest is truncated at 44 in due to the 44-55 in slot limit. The non-zero values at 47 in and 48 in represent illegally harvested fish.

Figure 9.-MEF length of Kenai River Chinook salmon by sex, run and sample, 2003.

(SE = 2.0%). The 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

During the early run, the age composition of the inriver return differed between time strata (χ^2 = 8.14, df = 2, P < 0.017) with age-1.2, age-1.3 and age-1.4 fish considered (97.9% of the sample). Therefore, early-run age composition estimates for Chinook salmon passing by the sonar site were weighted by the sonar passage estimates in each temporal stratum (Table 5 and Appendix E3). The most abundant age was age-1.4 fish, which comprised 46.7% (SE = 1.9%), followed by age-1.2 fish at 31.6% (SE = 1.7%) and age-1.3 fish at 19.6% (SE = 1.5%). The sample size goals and relative precision goals were met in both strata for all ages and sexes sampled.

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, 2003.

	Age					
Parameter	1.1	1.2	1.3	1.4	1.5	Total
Late Run, both strata (1 July- 31 July)						
Female						
Sample size	1	6	34	106		147
Downstream Harvest	3	14	89	287		394
SE Downstream Harvest	3	6	20	55		70
Upstream Harvest	44	237	1,419	4,496		6,196
SE Upstream Harvest	44	99	261	541		669
Total Harvest	47	251	1,508	4,784		6,589
SE Total Harvest	47	104	275	558		685
% Total Harvest	0.3%	1.8%	10.9%	34.6%		47.6%
SE % Total Harvest	0.3%	0.7%	1.8%	2.7%		2.8%
Male						
Sample size	4	42	24	91	3	164
Downstream Harvest	9	107	62	243	7	429
SE Downstream Harvest	5	22	15	46	4	72
Upstream Harvest	154	1,722	990	3,832	121	6,818
SE Upstream Harvest	78	291	213	482	70	708
Total Harvest	163	1,829	1,052	4,075	128	7,247
SE Total Harvest	83	305	224	499	75	724
% Total Harvest	1.2%	13.2%	7.6%	29.5%	0.9%	52.4%
SE % Total Harvest	0.6%	1.9%	1.5%	2.6%	0.5%	2.8%
Combined						
Sample size	5	48	58	197	3	311
Downstream Harvest	12	121	151	531	7	823
SE Downstream Harvest	6	25	30	94	4	134
Upstream Harvest	198	1,958	2,408	8,328	121	13,014
SE Upstream Harvest	90	315	356	834	70	1,160
Total Harvest	210	2,079	2,560	8,859	128	13,837
SE Total Harvest	95	329	372	849	75	1,168
% Total Harvest	1.5%	15.0%	18.5%	64.0%	0.9%	100.0%
SE % Total Harvest	0.7%	2.0%	2.2%	2.7%	0.5%	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 2003 late-run Kenai River Chinook salmon between the Soldotna Bridge and the Warren Ames Bridge is presented in Appendix E2.

Table 5.-Age composition and estimated sonar passage by age class for early-run Kenai River Chinook salmon, 2003.

	Age						
Parameter	0.3	1.1	1.2	1.3	1.4	1.5	Total
Early Run, both strata (16 May- 30 June)							
Female							
Sample size			34	35	221	1	291
Sonar passage estimate[a]			640	643	4,055	18	5,356
SE sonar passage estimate			107	107	236	18	256
% sonar passage			4.8%	4.8%	30.4%	0.1%	40.2%
SE % sonar passage			0.8%	0.8%	1.7%	0.1%	1.8%
Male							
Sample size	1	7	193	108	118	6	433
Sonar passage estimate[a]	19	134	3,564	1,975	2,169	108	7,969
SE sonar passage estimate	19	50	226	178	186	44	271
% sonar passage	0.1%	1.0%	26.7%	14.8%	16.3%	0.8%	59.8%
SE % sonar passage	0.1%	0.4%	1.6%	1.3%	1.4%	0.3%	1.8%
Combined							
Sample size	1	7	227	143	339	7	724
Sonar passage estimate[a]	19	134	4,204	2,618	6,224	126	13,325
SE sonar passage estimate	19	50	239	200	264	47	199
% sonar passage	0.1%	1.0%	31.6%	19.6%	46.7%	0.9%	100.0%
SE % sonar passage	0.1%	0.4%	1.7%	1.5%	1.9%	0.4%	0.0%

[a] Temporally stratified estimates of age composition and sonar passage by age class for 2003 early-run Kenai River Chinook salmon are presented in Appendix E3.

During the late run, the age composition of the inriver return differed between time strata ($\chi^2 = 47.05$, df = 2, $P < 0.001$) with age-1.2, age-1.3 and age-1.4 fish considered (98.2% 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 E4). The most abundant age was age-1.4 fish, which comprised 48.9% (SE = 1.5%), followed by age-1.2 fish at 29.5% (SE = 1.3%) and age-1.3 fish at 19.9% (SE = 1.2%). The sample size goals and relative precision goals were met in both strata for all ages and sexes sampled.

The estimated inriver return age composition using only the catch from the 7.5 in gillnet is shown in Appendices F1 and F2. These estimates are shown for comparison purposes only. Age composition estimates derived from 7.5 in mesh tend to estimate a smaller proportion of age 1.2 and a larger proportion of age 1.3, age 1.4, and age 1.5 than the age composition estimates derived from the 5.0 in + 7.5 in mesh combined.

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, early-run fish averaged 3.3 cm (SE = 0.5) longer than late-run fish, and creel sampled fish averaged 2.0 cm (SE = 0.9) longer than net sampled fish. Among age-1.3 fish, females averaged 5.8 cm (SE = 0.7) longer than males. Among age-1.4 fish,

length differed by sex, run, sample and by the combination of run and sample[1]. Late-run age-1.4 fish averaged 3.0 cm (SE = 0.4) longer than early-run age-1.4 fish, age-1.4 males averaged 4.7 cm (SE = 0.4) longer than age-1.4 females and age-1.4 fish sampled by the gillnets were 1.2 cm (SE = 0.5) longer than age-1.4 fish sampled in the creel. Also, age-1.4 fish sampled during the early-run creel were 4.1 cm (SE = 1.2) shorter than the other three combinations of run and sample (late creel, early gillnet, late gillnet; see Figure 10).

Table 6.-Age composition and estimated sonar passage by age class for the inriver return of late-run Kenai River Chinook salmon, 2003.

	Age					
Parameter	1.1	1.2	1.3	1.4	1.5	Total
Late Run, both strata (1 July- 10 August)						
Female						
Sample size		105	63	285	3	456
Sonar passage estimate[a]		3,762	2,439	10,786	120	17,107
SE sonar passage estimate		350	299	561	69	642
% sonar passage		9.0%	5.9%	25.9%	0.3%	41.1%
SE % sonar passage		0.8%	0.7%	1.3%	0.2%	1.5%
Male						
Sample size	15	233	157	251	2	658
Sonar passage estimate[a]	541	8,539	5,830	9,572	70	24,552
SE sonar passage estimate	139	507	438	537	50	669
% sonar passage	1.3%	20.5%	14.0%	23.0%	0.2%	58.9%
SE % sonar passage	0.3%	1.2%	1.0%	1.3%	0.1%	1.5%
Combined						
Sample size	15	338	220	536	5	1,114
Sonar passage estimate[a]	541	12,301	8,269	20,358	190	41,659
SE sonar passage estimate	139	571	508	653	85	435
% sonar passage	1.3%	29.5%	19.9%	48.9%	0.5%	100.0%
SE % sonar passage	0.3%	1.3%	1.2%	1.5%	0.2%	0.0%

[a] Temporally stratified estimates of age composition and sonar passage by age class for 2003 late-run Kenai River Chinook salmon are presented in Appendix E4.

The age composition of the early-run harvest and the early-run driftnet catch differed significantly (χ^2 = 21.57, df = 2, P < 0.001) with age-1.2, age-1.3 and age-1.4 fish considered (98.1% of the sample). Anglers harvested a smaller percentage of the age-1.2 fish and a larger percentage of the age-1.3 fish than were captured by the drift-netting program during the early run (Tables 3 and 5). The age composition of the late-run harvest and the late-run driftnet catch also differed significantly (χ^2 = 31.2, df = 2, P < 0.001) with age-1.2, age-1.3 and age-1.4 fish considered (98.0% of the sample). Anglers harvested a smaller percentage of the age-1.2 fish and a larger percentage of the age-1.4 fish than were captured by the drift-netting program during the late run (Tables 4 and 6).

[1] The run, sample, and run/sample effects associated with age-1.4 fish are probably due to the 44-55 in slot limit imposed on the early-run recreational fishery.

Table 7.-MEF length of Chinook salmon sampled during the early-run Kenai River Chinook salmon fishery, 2003.

		Age						
Sample	Parameter	0.3	1.1	1.2	1.3	1.4	1.5	Combined
Creel Survey								
Females	sample size			3	16	35		54
	mean MEF length			663	832	940		893
	SE MEF length			23	16	9		13
	min MEF length			620	700	840		620
	max MEF length			700	950	1,050[a]		1,050
Males	sample size			6	15	6		27
	mean MEF length			640	805	983		801
	SE MEF length			11	21	26		26
	min MEF length			600	655	885		600
	max MEF length			670	945	1,040[a]		1,040
Combined	sample size			9	31	41		81
	mean MEF length			648	819	945		864
	SE MEF length			10	13	9		13
	min MEF length			600	655	840		600
	max MEF length			700	950	1,050		1,050
Inriver Gillnetting Study								
Females	sample size			34	35	221	1	291
	mean MEF length			639	860	994	1,020	936
	SE MEF length			10	9	4		8
	min MEF length			490	700	760	1,020	490
	max MEF length			715	955	1,150	1,020	1,150
Males	sample size	1	7	193	108	118	6	433
	mean MEF length	860	414	645	804	1,038	1,117	793
	SE MEF length		7	4	6	8	23	9
	min MEF length	860	385	420	640	805	1,025	385
	max MEF length	860	440	740	960	1,190	1,170	1,190
Combined	sample size	1	7	227	143	339	7	724
	mean MEF length	860	414	644	818	1,009	1,103	851
	SE MEF length		7	4	6	4	24	7
	min MEF length	860	385	420	640	760	1,020	385
	max MEF length	860	440	740	960	1,190	1,170	1,190

[a] The max MEF length fish was between 44 in and 55 in total length and was illegally harvested under the 44-55 in slot limit. The max legally harvested MEF length was 1,005 mm for males and 1,020 mm for females.

DISCUSSION AND RECOMMENDATIONS

CREEL SURVEY

The 2003 early-run angler effort and harvest below the Soldotna Bridge were well below the 1977-2003 historical averages and comparable to the 5-year moving averages. The 2003 late-run angler effort below the Soldotna Bridge was comparable to the 1977-2003 historical average and the 5-year moving average. Conversely, 2003 late-run harvest exceeded both the 1977-2003 historical average and the 5-year moving average. Late-run anglers have become very efficient in recent years; 2003 late-run HPUE was the highest on record.

Table 8.-MEF length of Chinook salmon sampled during the late-run Kenai River Chinook salmon fishery, 2003.

		Age					
Sample	Parameter	1.1	1.2	1.3	1.4	1.5	Combined
Creel Survey							
Females	sample size	1	6	34	106		147
	mean MEF length	440	655	863	1,011		959
	SE MEF length		12	10	6		10
	min MEF length	440	620	725	850		440
	max MEF length	440	695	940	1,150		1,150
Males	sample size	4	42	24	91	3	164
	mean MEF length	384	630	829	1,059	1,155	900
	SE MEF length	19	10	14	7	30	17
	min MEF length	345	475	710	915	1,120	345
	max MEF length	430	750	920	1,240	1,215	1,240
Combined	sample size	5	48	58	197	3	311
	mean MEF length	395	633	850	1,032	1,155	928
	SE MEF length	18	9	8	5	30	10
	min MEF length	345	475	710	850	1,120	345
	max MEF length	440	750	940	1,240	1,215	1,240
Inriver Gillnetting Study							
Females	sample size		15	63	285	3	456
	mean MEF length		600	866	1,023	1,162	903
	SE MEF length		5	10	3	30	9
	min MEF length		505	705	910	1,120	505
	max MEF length		725	990	1,155	1,220	1,220
Males	sample size	15	233	157	251	2	658
	mean MEF length	407	615	796	1,071	1,158	828
	SE MEF length	6	5	5	4	33	9
	min MEF length	360	415	655	845	1,125	360
	max MEF length	440	755	945	1,225	1,190	1,225
Combined	sample size	15	338	220	536	5	1,114
	mean MEF length	407	610	816	1,045	1,160	859
	SE MEF length	6	4	5	3	19	6
	min MEF length	360	415	655	845	1,120	360
	max MEF length	440	755	990	1,225	1,220	1,225

Low early-run angler effort has challenged the creel survey, which has had difficulty meeting project objectives in recent years. The 2003 early run was no exception as precision objectives with respect to harvest, catch and most harvest age/sex composition combinations were not met. The creel survey sampling design has been modified to maximize sampling efficiency. However the primary problem, low and spotty early-run angler effort/harvest, is uncontrollable.

Estimates of 2003 early-run unguided catch, harvest and effort presented herein have a small inherent positive bias. During the 2003 early run, non-resident angler fishing time was restricted to 0600 and 1800 hours, for a 12-hour fishing day. One of the assumptions of the creel survey study design was that the unguided fishing day was 20 hours long (see equation 3). Unfortunately, we do not distinguish

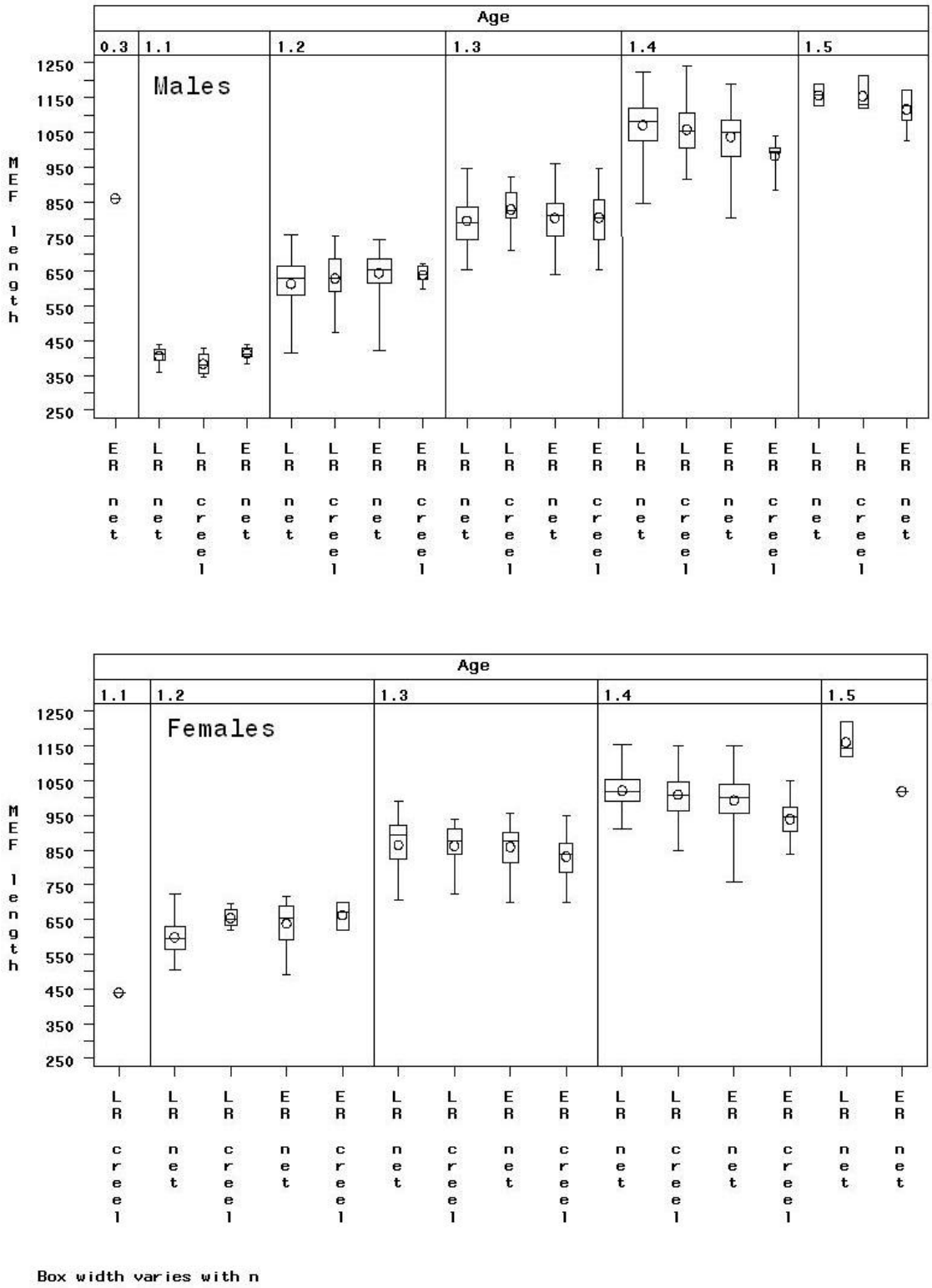


Figure 10.-Length distribution of early- and late-run Kenai River Chinook salmon sampled by the creel survey and the inriver netting program, 2003.

resident from nonresident anglers in the creel survey. Therefore, the unguided fishing day was effectively less than 20 hours long because a fraction of unguided anglers were non-residents and were restricted to a 12-hour day. Unfortunately, the percentage of unguided early-run anglers who were nonresidents is unknown so the magnitude of the error cannot be estimated, although we believe it to be small. Guided angler estimates in either run and nonguided angler estimates in the late run were not affected.

INRIVER GILLNETTING

The use of multifiber mesh gillnets in 2002 and 2003 increased the sampling efficiency of the inriver gillnetting program (proportion of Chinook salmon passage captured) compared to years when cable-lay nylon mesh was used (Figure 11). A primary concern regarding the changes in mesh material was a possible increase in the number of injured fish. Before 2002, Chinook salmon were only considered injured if they were observed with bleeding gills. While using cable-lay nylon mesh in 2000 and 2001, 3.7% and 3.8% of early-run Chinook salmon and 1.1% and 5.5% of late-run Chinook salmon, respectively, were recorded as injured. Using multifiber nets in 2002, there was little or no evidence of an increase in the frequency of bleeding gills (3.5% of early-run and 6.1% of late-run Chinook salmon). However, using multifiber nets in 2003, 6.3% of the early-run Chinook salmon and 7.7% of the late-run Chinook salmon were observed with bleeding gills.

There can be no doubt that 5.0 in and 7.5 in gillnets have different size selectivity curves and Division of Sport Fish staff are currently developing a methodology to estimate the degree to which gillnet capture probabilities differ by mesh size, length and age of Chinook. This technique would also allow for direct comparison between the 7.5 in selectivity curve and the 5.0 in + 7.5 in combined selectivity curve which is the relevant comparison with respect to the historic inriver return ASL database. For now, gillnet size-selectivity can be assessed by comparing the length distribution of Chinook caught in the 5.0 in and the 7.5 in mesh (Figure 8). For Chinook salmon greater than 625 mm MEF, the 5.0 in mesh was slightly less efficient. For Chinook salmon less than 625 mm MEF, the 5.0 in mesh was far more effective than the 7.5 in mesh. This result was similar to that obtained in 2002 (Reimer 2004). Size selectivity differences between the two mesh sizes may not result in statistically significant differences to age composition estimates. Curiously, the 2003 inriver return age composition differed by mesh size, while the 2002 inriver return age composition did not. The effect of using the catch from both the 5.0 in + 7.5 in mesh combined to calculate the inriver return age composition (in comparison to using just the 7.5 in mesh as has been done historically) will be smaller than any qualitative or quantitative differences detected between each mesh size.

Both the increased injury rate and age composition differences by mesh size could be explained by the unusually large return of Chinook salmon less than 625 mm MEF in 2003. Eleven and one half percent of the early-run return and 20.1% of the late-run return was less than 625 mm MEF in 2003. The percentage of Chinook salmon in the return less than 625 mm MEF has only exceeded 5% on two occasions for each run from 1986-2002. Since Chinook salmon less than 625 mm MEF are age 1.2 or younger (see Tables 7 and 8) and since bleeding gills are more common in younger fish, the increased occurrence of bleeding gills in 2003 may be a result of an unusually large return of young fish. Likewise, the differences in age composition between the 5.0 in mesh and the 7.5 in mesh were driven by differences in age-1.2 and age-1.3 fish, which may have been magnified given the unusually large return of young fish which are more susceptible to differences in size selectivity between the two mesh sizes.

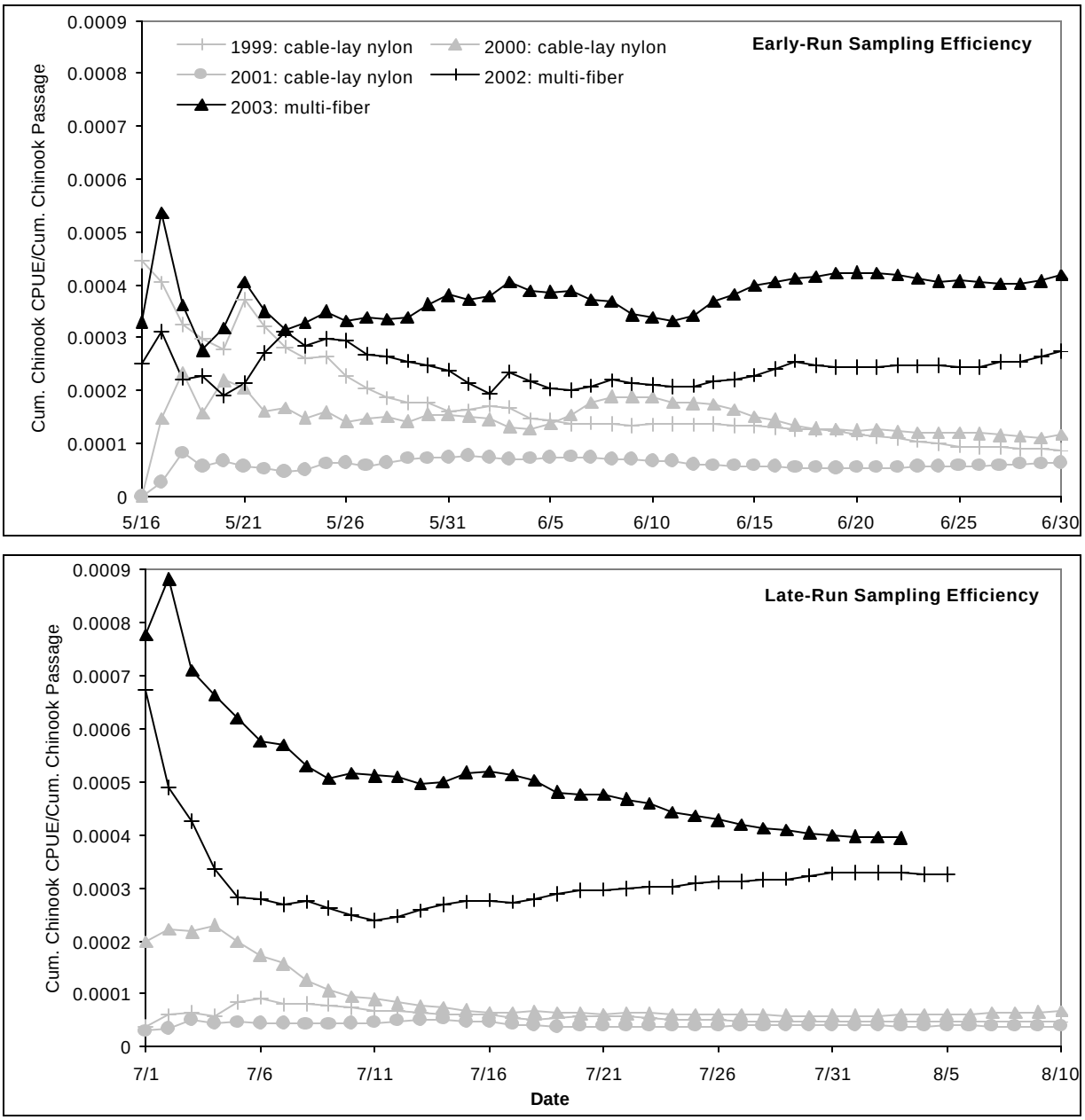


Figure 11.-Cumulative sampling efficiency for the Kenai River Chinook salmon netting project, 1999-2003.

A significant difference between the age composition of the creel sample and the age composition of the inriver gillnetting sample was detected in both runs. Anglers harvested a larger percentage of older fish relative to the gillnet catch in both runs. This pattern is likely a result of size-selective releases by anglers. During the early run (when regulation mandated that all fish between 44 in and 54.99 in are released), 50% were shorter than the 44 in and 50% were between 44 in and 54.99 in. During the late run, (when regulation allowed harvest of any size fish), 97.5% were shorter than the 44 in lower slot limit boundary.

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APPENDIX A. BOAT ANGLER COUNTS DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2003

Appendix A1.-Guided and unguided boat angler counts, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 2003.

		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
5/16/2003	wd	0	0	0	0	0	0			2	9	1	0	21	14			2	9	1	0	21	14		
5/17/2003	we/hol	0	0	0	0	0	0			9	5	13	0	43	24			9	5	13	0	43	24		
5/18/2003	we/hol	0	0	0	0	0	0			15	2	10	2	28	14			15	2	10	2	28	14		
5/20/2003	wd	0	0	0	0	0	0	0		12	4	0	7	20	14	19		12	4	0	7	20	14	19	
5/23/2003	wd	0	0	0	0	0	0			25	13	5	18	46	27			25	13	5	18	46	27		
5/25/2003	we/hol	0	0	0	0					22	93	73	19					22	93	73	19				
5/26/2003	monday	0	0	0	0	0	0	0		30	43	26	14	39	27	20		30	43	26	14	39	27	20	
5/27/2003	wd	0	0	0	0	0	0	0		8	19	11	5	78	58	31		8	19	11	5	78	58	31	
5/29/2003	wd	0	0	0	0		0	0		4	30	26	13		53	32		4	30	26	13		53	32	
5/31/2003	we/hol	0	0	0	0	0	0	0		34	29	45	20	117	101	49		34	29	45	20	117	101	49	
6/1/2003	we/hol	0	4	0	0					73	61	23	12					73	65	23	12				
6/4/2003	wd	0	0	0	0		0	0		9	28	10	23		101	26		9	28	10	23		101	26	
6/6/2003	wd	0	0	0	0	0	0			42	26	20	4	116	98			42	26	20	4	116	98		
6/7/2003	we/hol	0	1	0	0	0	0	0		52	77	39	53	155	143	55		52	78	39	53	155	143	55	
6/8/2003	we/hol	0	0	0	0					14	89	66	18					14	89	66	18				
6/10/2003	wd	3	0	0	0	2	0	0		60	35	9	0	235	145	57		63	35	9	0	237	145	57	
6/13/2003	wd	0	0	0	0	0	2			26	35	23	8	148	64			26	35	23	8	148	66		
6/14/2003	we/hol	0	3	0	0	0	0			78	31	37	2	119	91			78	34	37	2	119	91		
6/15/2003	we/hol	0	0	0	0					84	32	32	0					84	32	32	0				
6/19/2003	wd	0	0	0	0	4	0	0		16	52	25	12	136	79	68		16	52	25	12	140	79	68	
6/20/2003	wd	0	0	0	0	0	0	0		33	36	26	23	190	149	68		33	36	26	23	190	149	68	
6/21/2003	we/hol	0	0	0	1		0	0		24	41	56	63		171	78		24	41	56	64		171	78	
6/22/2003	we/hol	0	0	0	0					44	109	143	62					44	109	143	62				
6/25/2003	wd	0	0	0	0	0	5			32	27	24	11	251	143			32	27	24	11	251	148		
6/27/2003	wd	0	4	3	0	0	2	0		40	28	31	35	196	118	54		40	32	34	35	196	120	54	
6/28/2003	we/hol	0	9	0	0	0	3	0		76	85	80	58	161	115	47		76	94	80	58	161	118	47	
6/29/2003	we/hol	0	3	4	0					20	142	136	17					20	145	140	17				
	Minimum		0				0				0				14				0				14		
	Average		0				0				33				86				33				86		
	Maximum		9				5				143				251				145				251		

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, 2003.

		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
7/1/2003	wd	3	0	0	0	3	25			148	55	91	28	483	282			151	55	91	28	486	307		
7/3/2003	wd	0	10	16	4		3	21		148	115	56	192		297	155		148	125	72	196		300	176	
7/5/2003	we/hol	0	0	14	6		0	27		36	256	204	190		312	177		36	256	218	196		312	204	
7/6/2003	we/hol	8	18	17	0					162	378	234	202					170	396	251	202				
7/9/2003	wd	6	3	8	0	70	0			144	77	114	48	319	351			150	80	122	48	389	351		
7/11/2003	wd	1	13	10	17		24	15		117	154	175	203		373	279		118	167	185	220		397	294	
7/12/2003	we/hol	11	52	5	6	14	60	0		286	208	202	114	442	230	190		297	260	207	120	456	290	190	
7/13/2003	we/hol	9	90	3	3					496	392	225	122					505	482	228	125				
7/15/2003	wd	2	3	17	3		14	59		448	308	132	238		473	306		450	311	149	241		487	365	
7/17/2003	wd	0	6	22	0		0	29		204	180	123	226		332	252		204	186	145	226		332	281	
7/19/2003	we/hol	8	20	40	29	16	7			338	303	213	117	386	416			346	323	253	146	402	423		
7/20/2003	we/hol	38	24	19	3					478	511	304	226					516	535	323	229				
7/24/2003	wd	4	16	10	13		41	24		235	121	191	171		330	286		239	137	201	184		371	310	
7/25/2003	wd	7	30	6	16	24	36	9		179	204	237	212	468	195	266		186	234	243	228	492	231	275	
7/26/2003	we/hol	0	22	20	22		30	8		261	200	259	242		262	204		261	222	279	264		292	212	
7/27/2003	we/hol	0	58	7	5					100	491	271	168					100	549	278	173				
7/29/2003	wd	0	19	31	6		3	80		462	256	125	201		359	212		462	275	156	207		362	292	
7/30/2003	wd	0	9	6	0		10	19		209	238	116	270		441	157		209	247	122	270		451	176	
	Minimum		0				0				28				155				28				176		
	Average		12				22				213				308				225				330		
	Maximum		90				80				511				483				549				492		

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, 2003

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, 2003.

		Angler interview data[a]					Downstream								Upstream							
			Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Day Type[b]	n[c]	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
5/16/2003	wd	4	0.000	0.000	0.000	0.000	4	0.0	0	0	0	0	0	0	4	3.0	60	44	0	0	0	0
5/17/2003	we/hol	16	0.045	0.034	0.045	0.034	4	0.0	0	0	0	0	0	0	4	6.8	135	64	6	5	6	5
5/18/2003	we/hol	13	0.115	0.064	0.045	0.035	4	0.0	0	0	0	0	0	0	4	7.3	145	70	17	11	7	5
5/20/2003	wd	4	0.038	0.025	0.019	0.016	4	0.0	0	0	0	0	0	0	4	5.8	115	46	4	3	2	2
5/23/2003	wd	23	0.045	0.019	0.022	0.016	4	0.0	0	0	0	0	0	0	4	15.3	305	79	14	7	7	5
5/25/2003	we/hol	41	0.030	0.012	0.012	0.008	4	0.0	0	0	0	0	0	0	4	51.8	1,035	373	31	16	12	9
5/26/2003	we/hol	40	0.022	0.012	0.015	0.010	4	0.0	0	0	0	0	0	0	4	28.3	565	100	12	7	8	6
5/27/2003	wd	22	0.040	0.017	0.000	0.000	4	0.0	0	0	0	0	0	0	4	10.8	215	61	8	4	0	0
5/29/2003	wd	35	0.023	0.014	0.023	0.014	4	0.0	0	0	0	0	0	0	4	18.3	365	120	8	5	8	5
5/31/2003	we/hol	50	0.022	0.012	0.017	0.010	4	0.0	0	0	0	0	0	0	4	32.0	640	123	14	8	11	7
6/1/2003	we/hol	69	0.059	0.014	0.026	0.009	4	1.0	20	23	1	1	1	1	4	42.3	845	169	50	16	22	9
6/4/2003	wd	20	0.166	0.058	0.144	0.058	4	0.0	0	0	0	0	0	0	4	17.5	350	119	58	28	50	26
6/6/2003	wd	36	0.047	0.019	0.031	0.015	4	0.0	0	0	0	0	0	0	4	23.0	460	96	21	9	14	7
6/7/2003	we/hol	67	0.004	0.004	0.000	0.000	4	0.3	5	6	0	0	0	0	4	55.3	1,105	194	4	4	0	0
6/8/2003	we/hol	57	0.026	0.010	0.009	0.006	4	0.0	0	0	0	0	0	0	4	46.8	935	375	24	13	8	6
6/10/2003	wd	0	0.000	0.000	0.000	0.000	4	0.8	15	12	0	0	0	0	4	26.0	520	152	0	0	0	0
6/13/2003	wd	16	0.000	0.000	0.000	0.000	4	0.0	0	0	0	0	0	0	4	23.0	460	87	0	0	0	0
6/14/2003	we/hol	17	0.000	0.000	0.000	0.000	4	0.8	15	17	0	0	0	0	4	37.0	740	240	0	0	0	0
6/15/2003	we/hol	25	0.000	0.000	0.000	0.000	4	0.0	0	0	0	0	0	0	4	37.0	740	249	0	0	0	0
6/19/2003	wd	13	0.022	0.024	0.022	0.024	4	0.0	0	0	0	0	0	0	4	26.3	525	191	11	12	11	12
6/20/2003	wd	7	0.142	0.130	0.142	0.130	4	0.0	0	0	0	0	0	0	4	29.5	590	44	84	77	84	77
6/21/2003	we/hol	5	0.030	0.040	0.030	0.040	4	0.3	5	4	0	0	0	0	4	46.0	920	97	28	37	28	37
6/22/2003	we/hol	46	0.026	0.010	0.000	0.000	4	0.0	0	0	0	0	0	0	4	89.5	1,790	446	46	21	0	0
6/25/2003	wd	14	0.066	0.034	0.022	0.022	4	0.0	0	0	0	0	0	0	4	23.5	470	58	31	16	10	10
6/27/2003	wd	16	0.076	0.036	0.056	0.033	4	1.8	35	21	3	2	2	1	4	33.5	670	53	51	24	37	22
6/28/2003	we/hol	21	0.058	0.023	0.019	0.014	4	2.3	45	52	3	3	1	1	4	74.8	1,495	99	87	35	28	21
6/29/2003	we/hol	38	0.027	0.013	0.020	0.012	4	1.8	35	21	1	1	1	1	4	78.8	1,575	696	43	26	32	22
Min		0	0.000		0.000		4	0.0	0		0		0		4	3.0	60		0		0	
Mean		26	0.042		0.027		4	0.3	6		0		0		4	32.9	658		24		14	
Max		69	0.166		0.144		4	2.3	45		3		2		4	89.5	1,790		87		84	

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

Appendix B2.-Daily estimates of guided boat angler CPUE, HPUE, angler effort, catch and harvest, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 2003.

		Angler interview data[a]					Downstream								Upstream							
			Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Day Type[b]	n[c]	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
5/16/2003	wd	10	0.018	0.017	0.000	0.000	2	0.0	0	0	0	0	0	0	2	17.5	210	42	4	4	0	0
5/17/2003	we/hol	9	0.054	0.039	0.025	0.029	2	0.0	0	0	0	0	0	0	2	33.5	402	114	22	16	10	11
5/18/2003	we/hol	4	0.000	0.000	0.000	0.000	2	0.0	0	0	0	0	0	0	2	21.0	252	84	0	0	0	0
5/20/2003	wd	6	0.035	0.036	0.035	0.036	3	0.0	0	0	0	0	0	0	3	17.7	212	27	7	8	7	8
5/23/2003	wd	18	0.088	0.021	0.052	0.021	2	0.0	0	0	0	0	0	0	2	36.5	438	114	38	13	23	11
5/26/2003	we/hol	17	0.046	0.020	0.023	0.015	3	0.0	0	0	0	0	0	0	3	28.7	344	48	16	7	8	5
5/27/2003	wd	22	0.036	0.014	0.006	0.006	3	0.0	0	0	0	0	0	0	3	55.7	668	116	24	10	4	4
5/29/2003	wd	10	0.081	0.030	0.040	0.026	2	0.0	0	0	0	0	0	0	2	42.5	510	126	41	18	21	14
5/31/2003	we/hol	3	0.047	0.034	0.013	0.023	3	0.0	0	0	0	0	0	0	3	89.0	1,068	188	50	37	14	24
6/4/2003	wd	2	0.038	0.181	0.032	0.184	2	0.0	0	0	0	0	0	0	2	63.5	762	450	29	112	24	114
6/6/2003	wd	43	0.057	0.015	0.048	0.014	2	0.0	0	0	0	0	0	0	2	107.0	1,284	108	74	20	62	19
6/7/2003	we/hol	40	0.012	0.007	0.008	0.006	3	0.0	0	0	0	0	0	0	3	117.7	1,412	308	17	10	12	8
6/10/2003	wd	14	0.118	0.048	0.101	0.039	3	0.7	8	7	1	1	1	1	3	145.7	1,748	436	206	97	176	80
6/13/2003	wd	37	0.021	0.010	0.011	0.007	2	1.0	12	12	0	0	0	0	2	106.0	1,272	504	27	16	13	10
6/14/2003	we/hol	7	0.000	0.000	0.000	0.000	2	0.0	0	0	0	0	0	0	2	105.0	1,260	168	0	0	0	0
6/19/2003	wd	14	0.024	0.017	0.024	0.017	3	1.3	16	14	0	0	0	0	3	94.3	1,132	201	27	20	27	20
6/20/2003	wd	25	0.041	0.017	0.041	0.017	3	0.0	0	0	0	0	0	0	3	135.7	1,628	314	67	31	67	31
6/21/2003	we/hol	40	0.023	0.010	0.023	0.010	2	0.0	0	0	0	0	0	0	2	124.5	1,494	558	34	19	34	19
6/25/2003	wd	11	0.090	0.021	0.051	0.023	2	2.5	30	30	3	3	2	2	2	197.0	2,364	648	213	76	121	62
6/27/2003	wd	11	0.029	0.020	0.029	0.020	3	0.7	8	10	0	0	0	0	3	122.7	1,472	350	42	30	42	30
6/28/2003	we/hol	0	0.062	0.038	0.041	0.024	3	1.0	12	15	1	1	0	1	3	107.7	1,292	284	80	50	53	33
Min		0	0.000		0.000		2	0.0	0		0		0		2	17.5	210		0		0	
Mean		16	0.044		0.029		2	0.3	4		0		0		2	84.2	1,011		48		34	
Max		43	0.118		0.101		3	2.5	30		3		2		3	197.0	2,364		213		176	

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 less than 5 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, 2003.

		Angler interview data[a]					Downstream								Upstream							
			Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Day Type[b]	n	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
7/1/2003	wd	51	0.119	0.028	0.057	0.016	4	0.8	15	12	2	1	1	1	4	80.5	1,610	482	192	71	92	36
7/3/2003	wd	69	0.011	0.006	0.007	0.005	4	7.5	150	68	2	1	1	1	4	127.8	2,555	620	27	17	18	14
7/5/2003	we/hol	90	0.098	0.021	0.041	0.010	4	5.0	100	66	10	7	4	3	4	171.5	3,430	925	337	115	141	51
7/6/2003	we/hol	94	0.137	0.026	0.049	0.010	4	10.8	215	81	29	12	10	4	4	244.0	4,880	1,068	669	191	237	71
7/9/2003	wd	35	0.193	0.052	0.079	0.022	4	4.3	85	40	16	9	7	4	4	95.8	1,915	413	370	125	151	53
7/11/2003	wd	49	0.041	0.015	0.024	0.012	4	10.3	205	58	8	4	5	3	4	162.3	3,245	208	134	49	77	38
7/12/2003	we/hol	89	0.114	0.026	0.045	0.013	4	18.5	370	255	42	30	16	12	4	202.5	4,050	481	461	117	180	55
7/13/2003	we/hol	52	0.127	0.032	0.060	0.019	4	26.3	525	485	67	62	32	30	4	308.8	6,175	907	787	226	372	129
7/15/2003	wd	40	0.093	0.042	0.050	0.018	4	6.3	125	81	12	9	6	4	4	281.5	5,630	1,015	524	250	283	113
7/17/2003	wd	42	0.203	0.051	0.093	0.023	4	7.0	140	114	28	24	13	11	4	183.3	3,665	490	745	212	339	96
7/19/2003	we/hol	66	0.116	0.025	0.056	0.014	4	24.3	485	105	56	17	27	9	4	242.8	4,855	556	565	135	272	76
7/20/2003	we/hol	52	0.118	0.029	0.063	0.019	4	21.0	420	89	50	16	26	10	4	379.8	7,595	913	896	247	476	157
7/24/2003	wd	43	0.143	0.031	0.102	0.026	4	10.8	215	56	31	10	22	8	4	179.5	3,590	552	514	137	367	109
7/25/2003	wd	36	0.095	0.023	0.029	0.013	4	14.8	295	142	28	15	9	5	4	208.0	4,160	197	393	97	121	54
7/26/2003	we/hol	67	0.073	0.015	0.032	0.010	4	16.0	320	91	23	8	10	4	4	240.5	4,810	353	353	75	153	48
7/27/2003	we/hol	78	0.073	0.014	0.040	0.011	4	17.5	350	315	26	23	14	13	4	257.5	5,150	1,879	378	154	209	93
7/29/2003	wd	91	0.066	0.014	0.054	0.013	4	14.0	280	137	18	10	15	8	4	261.0	5,220	1,044	345	99	284	86
7/30/2003	wd	34	0.140	0.047	0.064	0.027	4	3.8	75	46	11	7	5	3	4	208.3	4,165	811	583	222	268	123
Min		34	0.011		0.007		4	1	15		2		1		4	81	1,610		27		18	
Mean		60	0.109		0.052		4	12	243		26		12		4	213	4,261		460		224	
Max		94	0.203		0.102		4	26	525		67		32		4	380	7,595		896		476	

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, 2003.

		Angler interview data[a]					Downstream								Upstream							
			Catch		Harvest		Counts		Effort		Catch		Harvest		Counts		Effort		Catch		Harvest	
Date	Day Type[b]	n	CPUE	SE	HPUE	SE	n	mean	Est.	SE	Est.	SE	Est.	SE	n	mean	Est.	SE	Est.	SE	Est.	SE
7/1/2003	wd	30	0.159	0.039	0.091	0.020	2	14.0	168	132	27	21	15	12	2	382.5	4,590	1,206	728	257	416	142
7/3/2003	wd	24	0.021	0.013	0.021	0.013	2	12.0	144	108	3	3	3	3	2	226.0	2,712	852	58	37	58	37
7/5/2003	we/hol	41	0.139	0.030	0.115	0.026	2	13.5	162	162	22	22	19	19	2	244.5	2,934	810	407	141	339	118
7/9/2003	wd	26	0.265	0.052	0.038	0.015	2	35.0	420	420	111	111	16	16	2	335.0	4,020	192	1,067	216	155	61
7/11/2003	wd	67	0.203	0.033	0.115	0.020	2	19.5	234	54	48	13	27	8	2	326.0	3,912	564	796	173	449	101
7/12/2003	we/hol	10	0.231	0.093	0.095	0.026	3	24.7	296	262	68	62	28	25	3	287.3	3,448	747	797	356	329	112
7/15/2003	wd	59	0.210	0.034	0.160	0.024	2	36.5	438	270	92	58	70	44	2	389.5	4,674	1,002	979	260	747	193
7/17/2003	wd	37	0.347	0.149	0.079	0.020	2	14.5	174	174	60	60	14	14	2	292.0	3,504	480	1,217	545	276	79
7/19/2003	we/hol	51	0.169	0.033	0.071	0.016	2	11.5	138	54	23	10	10	4	2	401.0	4,812	180	812	161	343	79
7/24/2003	wd	52	0.144	0.026	0.047	0.013	2	32.5	390	102	56	18	18	7	2	308.0	3,696	264	531	103	175	48
7/25/2003	wd	36	0.122	0.028	0.084	0.020	3	23.0	276	102	34	14	23	10	3	309.7	3,716	977	452	156	312	110
7/26/2003	we/hol	28	0.089	0.029	0.063	0.022	2	19.0	228	132	20	13	14	9	2	233.0	2,796	348	249	86	177	65
7/29/2003	wd	50	0.094	0.018	0.067	0.016	2	41.5	498	462	47	44	34	31	2	285.5	3,426	882	322	103	231	80
7/30/2003	wd	39	0.111	0.020	0.057	0.018	2	14.5	174	54	19	7	10	4	2	299.0	3,588	1,704	397	199	204	112
Min		10	0.021		0.021		2	11.5	138		3		3		2	226.0	2,712		58		58	
Mean		39	0.165		0.079		2	22.3	267		45		22		2	308.5	3,702		629		301	
Max		67	0.347		0.160		3	41.5	498		111		70		3	401.0	4,812		1,217		747	

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. EFFORT, CATCH AND HARVEST ESTIMATES BY TEMPORAL AND GEOGRAPHIC STRATA DURING THE KENAI RIVER CHINOOK SALMON FISHERY, 2003

Appendix C1.-Estimated effort, catch, and harvest, by geographic strata, during the early-run Kenai River Chinook salmon fishery, 2003.

	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
16-18 May															
Guided weekdays	0	0	0	0	0	0	210	42	4	4	0	0	0.0%	0.0%	N/A
Guided weekends	0	0	0	0	0	0	654	142	22	16	10	11	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	60	44	0	0	0	0	0.0%	N/A	N/A
Unguided weekends	0	0	0	0	0	0	280	95	23	12	13	7	0.0%	0.0%	0.0%
19-26 May															
Guided weekdays	0	0	0	0	0	0	1,300	360	92	49	60	29	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	688	68	31	10	16	8	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	840	298	36	17	18	10	0.0%	0.0%	0.0%
Unguided weekends	0	0	0	0	0	0	2,400	624	64	27	31	14	0.0%	0.0%	0.0%
27 May-1 June															
Guided weekdays	0	0	0	0	0	0	2,356	330	131	38	49	31	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	1,068	188	50	37	14	24	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	1,160	285	34	10	17	14	0.0%	0.0%	0.0%
Unguided weekends	20	23	1	1	1	1	1,485	209	64	17	33	11	1.3%	1.8%	1.6%
2-8 June															
Guided weekdays	0	0	0	0	0	0	4,092	987	205	173	173	172	0.0%	0.0%	0.0%
Guided weekends	0	0	0	0	0	0	1,412	308	17	10	12	8	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	1,620	266	159	66	129	63	0.0%	0.0%	0.0%
Unguided weekends	5	6	0	0	0	0	2,040	423	29	14	8	6	0.2%	0.1%	0.0%
9-15 June															
Guided weekdays	40	20	2	2	2	1	6,040	1,158	465	288	379	256	0.7%	0.5%	0.5%
Guided weekends	0	0	0	0	0	0	1,260	168	0	0	0	0	0.0%	N/A	N/A
Unguided weekdays	30	27	0	0	0	0	1,960	261	0	0	0	0	1.5%	N/A	N/A
Unguided weekends	15	17	0	0	0	0	1,480	346	0	0	0	0	1.0%	N/A	N/A
16-22 June															
Guided weekdays	32	30	1	1	1	1	5,520	878	188	76	188	76	0.6%	0.4%	0.4%
Guided weekends	0	0	0	0	0	0	1,494	558	34	19	34	19	0.0%	0.0%	0.0%
Unguided weekdays	0	0	0	0	0	0	2,230	292	191	151	191	151	0.0%	0.0%	0.0%
Unguided weekends	5	4	0	0	0	0	2,710	457	73	42	28	37	0.2%	0.2%	0.5%

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	Downstream Creel Estimates						Upstream Creel Estimates						% Downstream		
	Effort		Catch		Harvest		Effort		Catch		Harvest				
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Effort	Catch	Harvest
23-29 June															
Guided weekdays	76	54	6	5	4	3	7,672	1,636	512	268	326	147	1.0%	1.1%	1.1%
Guided weekends	12	15	1	1	0	1	1,292	284	80	50	53	33	0.9%	0.9%	0.9%
Unguided weekdays	70	58	5	5	4	3	2,280	304	164	50	96	52	3.0%	3.1%	3.9%
Unguided weekends	80	56	4	3	2	1	3,070	703	129	44	59	30	2.5%	2.7%	2.5%
Day Type Subtotals															
Guided weekdays	148	65	9	5	6	3	27,190	2,450	1,596	441	1,175	353	0.5%	0.6%	0.5%
Guided weekends	12	15	1	1	0	1	7,868	759	234	69	138	48	0.2%	0.3%	0.4%
Unguided weekdays	100	64	5	5	4	3	10,150	699	584	173	451	172	1.0%	0.9%	0.9%
Unguided weekends	125	63	5	3	2	1	13,465	1,202	383	71	171	51	0.9%	1.3%	1.3%
Angler Type Subtotals															
Guided	160	95	10	8	7	5	35,058	3,627	1,830	632	1,313	504	0.5%	0.5%	0.5%
% guided	42%		49%		52%		60%		65%		68%				
Unguided	225	127	10	8	6	5	23,615	1,966	967	265	621	254	0.9%	1.0%	1.0%
% unguided	58%		51%		48%		40%		35%		32%				
Early-run Total	385	112	20	8	13	5	58,673	2,917	2,797	484	1,935	399	0.7%	0.7%	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, 2003.

	Downstream Creel Estimates						Upstream Creel Estimates						% Downstream		
	Effort		Catch		Harvest		Effort		Catch		Harvest				
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Effort	Catch	Harvest
1-6 July															
Guided weekdays	468	210	45	33	27	19	10,953	2,432	1,180	662	711	359	4.1%	3.6%	3.7%
Guided weekends	324	229	45	32	37	26	5,868	1,146	814	199	677	167	5.2%	5.2%	5.2%
Unguided weekdays	248	145	5	2	3	1	6,248	1,263	329	169	165	80	3.8%	1.5%	1.7%
Unguided weekends	473	162	59	24	22	8	12,465	2,138	1,510	396	567	136	3.7%	3.8%	3.7%
7-13 July															
Guided weekdays	1,308	654	318	183	86	29	15,864	856	3,725	548	1,207	448	7.6%	7.9%	6.7%
Guided weekends	296	262	68	62	28	25	3,448	747	797	356	329	112	7.9%	7.9%	7.9%
Unguided weekdays	580	197	50	18	23	7	10,320	1,991	1,009	384	454	139	5.3%	4.7%	4.8%
Unguided weekends	895	548	109	69	48	32	10,225	1,026	1,248	254	553	141	8.0%	8.0%	8.0%
14-20 July															
Guided weekdays	1,224	588	304	126	167	103	16,356	2,282	4,393	917	2,047	728	7.0%	6.5%	7.6%
Guided weekends	138	54	23	10	10	4	4,812	180	812	161	343	79	2.8%	2.8%	2.8%
Unguided weekdays	530	199	80	43	38	19	18,590	3,204	2,539	559	1,245	224	2.8%	3.1%	3.0%
Unguided weekends	905	138	106	23	53	13	12,450	1,069	1,462	281	748	175	6.8%	6.8%	6.7%
21-27 July															
Guided weekdays	1,332	260	179	45	83	18	14,824	1,432	1,966	287	974	257	8.2%	8.4%	7.9%
Guided weekends	228	132	20	13	14	9	2,796	348	249	86	177	65	7.5%	7.5%	7.5%
Unguided weekdays	1,020	243	117	26	61	23	15,500	1,157	1,815	292	975	387	6.2%	6.1%	5.9%
Unguided weekends	670	328	49	25	24	14	9,960	1,912	731	171	361	105	6.3%	6.3%	6.3%
28-31 July															
Guided weekdays	1,008	635	99	59	65	44	10,521	2,354	1,078	282	652	170	8.7%	8.4%	9.1%
Unguided weekdays	533	251	43	16	30	14	14,078	1,859	1,392	362	828	184	3.6%	3.0%	3.5%
Day Type Subtotals															
Guided weekdays	5,340	1,135	945	236	429	118	68,518	4,410	12,342	1,320	5,592	977	7.2%	7.1%	7.1%
Guided weekends	986	376	157	71	90	38	16,924	1,423	2,672	447	1,526	226	5.5%	5.5%	5.6%
Unguided weekdays	2,910	470	296	55	156	34	64,735	4,540	7,083	840	3,667	510	4.3%	4.0%	4.1%
Unguided weekends	2,943	673	323	80	148	38	45,100	3,228	4,950	574	2,229	283	6.1%	6.1%	6.2%
Angler Type Subtotals															
Guided	6,326	1,196	1,102	247	519	124	85,442	4,634	15,015	1,393	7,118	1,003	6.9%	6.8%	6.8%
% Guided	51.9%		64.0%		63.1%		43.8%		55.5%		54.7%				
Unguided	5,853	821	619	98	303	51	109,835	5,571	12,033	1,017	5,896	583	5.1%	4.9%	4.9%
% Unguided	48.1%		36.0%		36.9%		56.2%		44.5%		45.3%				
Late-run Total	12,179	1,451	1,722	266	823	134	195,277	7,246	27,048	1,725	13,014	1,160	5.9%	6.0%	5.9%

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, 2003

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, 2003.

			Total	Chinook			Sockeye			Dolly Varden			Chinook/	
Date	Drifts	Minutes	Catch[a]	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[b]	SE
5/16/2003	10	92	2	1	0.011	0.011	1	0.011	0.011	0	0.000	0.000	0.50	0.37
5/17/2003	12	113	2	2	0.018	0.013	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/18/2003	10	97	1	1	0.010	0.010	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/19/2003	12	131	4	2	0.015	0.010	2	0.015	0.010	0	0.000	0.000	0.50	0.18
5/20/2003	10	120	5	4	0.033	0.013	1	0.008	0.008	0	0.000	0.000	0.80	0.15
5/21/2003	10	109	13	11	0.101	0.046	2	0.018	0.013	0	0.000	0.000	0.85	0.10
5/22/2003	10	133	8	5	0.038	0.013	3	0.023	0.012	0	0.000	0.000	0.63	0.13
5/23/2003	8	92	6	4	0.044	0.017	2	0.022	0.021	0	0.000	0.000	0.67	0.27
5/24/2003	8	109	7	5	0.046	0.025	2	0.018	0.018	0	0.000	0.000	0.71	0.25
5/25/2003	8	95	13	6	0.063	0.035	7	0.073	0.033	0	0.000	0.000	0.46	0.19
5/26/2003	10	115	9	4	0.035	0.020	5	0.043	0.019	0	0.000	0.000	0.44	0.19
5/27/2003	8	97	10	5	0.052	0.028	5	0.052	0.022	0	0.000	0.000	0.50	0.15
5/28/2003	8	90	4	1	0.011	0.011	3	0.033	0.017	0	0.000	0.000	0.25	0.16
5/29/2003	14	117	22	8	0.068	0.020	14	0.120	0.032	0	0.000	0.000	0.36	0.11
5/30/2003	8	93	14	9	0.097	0.019	5	0.054	0.033	0	0.000	0.000	0.64	0.15
5/31/2003	10	105	27	13	0.124	0.033	14	0.134	0.038	0	0.000	0.000	0.48	0.10
6/1/2003	10	96	18	8	0.084	0.029	10	0.105	0.030	0	0.000	0.000	0.44	0.13
6/2/2003	10	106	23	11	0.104	0.029	12	0.113	0.044	0	0.000	0.000	0.48	0.08
6/3/2003	8	79	16	10	0.127	0.040	6	0.076	0.040	0	0.000	0.000	0.63	0.15
6/4/2003	8	84	9	5	0.060	0.027	4	0.048	0.024	0	0.000	0.000	0.56	0.18
6/5/2003	10	98	32	12	0.123	0.032	20	0.205	0.053	0	0.000	0.000	0.38	0.08
6/6/2003	8	85	31	8	0.095	0.029	23	0.272	0.072	0	0.000	0.000	0.26	0.08
6/7/2003	10	88	48	5	0.057	0.017	42	0.480	0.113	1	0.011	0.015	0.10	0.04
6/8/2003	10	88	48	20	0.229	0.053	28	0.320	0.088	0	0.000	0.000	0.42	0.09
6/9/2003	10	86	42	5	0.058	0.022	37	0.431	0.122	0	0.000	0.000	0.12	0.02
6/10/2003	10	86	30	7	0.081	0.029	23	0.267	0.046	0	0.000	0.000	0.23	0.08
6/11/2003	10	76	46	6	0.079	0.035	40	0.525	0.131	0	0.000	0.000	0.13	0.06
6/12/2003	10	79	50	11	0.139	0.058	38	0.479	0.095	1	0.013	0.013	0.22	0.09
6/13/2003	8	55	34	12	0.217	0.113	22	0.398	0.095	0	0.000	0.000	0.35	0.13
6/14/2003	8	62	31	14	0.227	0.041	16	0.259	0.042	1	0.016	0.022	0.45	0.07
6/15/2003	8	58	52	10	0.173	0.032	42	0.726	0.151	0	0.000	0.000	0.19	0.05
6/16/2003	10	69	39	8	0.117	0.030	31	0.453	0.149	0	0.000	0.000	0.21	0.06
6/17/2003	12	87	34	9	0.103	0.042	25	0.287	0.070	0	0.000	0.000	0.26	0.09
6/18/2003	10	76	17	5	0.066	0.031	11	0.144	0.066	1	0.013	0.018	0.29	0.12
6/19/2003	10	71	37	9	0.128	0.026	28	0.397	0.134	0	0.000	0.000	0.24	0.08
6/20/2003	10	77	15	11	0.143	0.035	3	0.039	0.019	1	0.013	0.018	0.73	0.08
6/21/2003	8	60	36	11	0.182	0.075	25	0.414	0.103	0	0.000	0.000	0.31	0.12
6/22/2003	10	78	33	9	0.115	0.041	24	0.307	0.078	0	0.000	0.000	0.27	0.08
6/23/2003	12	92	26	9	0.098	0.029	13	0.141	0.057	3	0.033	0.035	0.35	0.11
6/24/2003	8	65	19	10	0.153	0.048	9	0.138	0.029	0	0.000	0.000	0.53	0.09
6/25/2003	10	85	23	13	0.152	0.058	10	0.117	0.043	0	0.000	0.000	0.57	0.11
6/26/2003	10	79	21	8	0.101	0.032	12	0.151	0.044	0	0.000	0.000	0.38	0.12
6/27/2003	12	88	18	5	0.057	0.026	12	0.136	0.047	1	0.011	0.016	0.28	0.07
6/28/2003	10	79	11	8	0.101	0.025	3	0.038	0.027	0	0.000	0.000	0.73	0.13
6/29/2003	8	62	23	17	0.273	0.080	6	0.096	0.052	0	0.000	0.000	0.74	0.14
6/30/2003	8	64	30	27	0.422	0.102	3	0.047	0.033	0	0.000	0.000	0.90	0.07
Total	442	4,063	1,039	384	4.828		644	8.236		9	0.110			
Min	8	55	1	1	0.010		0	0.000		0	0.000		0.10	
Mean	10	88	23	8	0.105		14	0.179		0	0.002		0.47	
Max	14	133	52	27	0.422		42	0.726		3	0.033		1.00	

[a] Includes 1 pink salmon and 1 chum salmon.

[b] 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, 2003.

			Total	Chinook			Sockeye			Dolly Varden			Chinook/	
Date	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
5/16/2003	10	100	1	1	0.010	0.010	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/17/2003	12	106	2	2	0.019	0.013	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/18/2003	10	101	1	1	0.010	0.010	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/19/2003	12	123	1	1	0.008	0.008	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/20/2003	10	110	6	6	0.054	0.047	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/21/2003	10	120	9	8	0.067	0.034	1	0.008	0.008	0	0.000	0.000	0.89	0.12
5/22/2003	10	126	6	4	0.032	0.017	2	0.016	0.010	0	0.000	0.000	0.67	0.22
5/23/2003	8	102	5	5	0.049	0.025	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/24/2003	8	109	11	9	0.082	0.023	2	0.018	0.012	0	0.000	0.000	0.82	0.11
5/25/2003	8	111	6	5	0.045	0.020	1	0.009	0.009	0	0.000	0.000	0.83	0.17
5/26/2003	10	116	5	5	0.043	0.015	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/27/2003	8	96	12	9	0.094	0.031	3	0.031	0.022	0	0.000	0.000	0.75	0.17
5/28/2003	8	89	10	9	0.101	0.033	1	0.011	0.011	0	0.000	0.000	0.90	0.11
5/29/2003	14	107	14	11	0.103	0.037	3	0.028	0.020	0	0.000	0.000	0.79	0.14
5/30/2003	8	94	17	13	0.139	0.036	4	0.043	0.023	0	0.000	0.000	0.76	0.13
5/31/2003	10	104	14	11	0.106	0.032	3	0.029	0.014	0	0.000	0.000	0.79	0.12
6/1/2003	10	102	16	10	0.099	0.024	6	0.059	0.022	0	0.000	0.000	0.63	0.10
6/2/2003	10	109	12	8	0.073	0.036	4	0.037	0.020	0	0.000	0.000	0.67	0.19
6/3/2003	7	71	26	21	0.297	0.028	5	0.071	0.025	0	0.000	0.000	0.81	0.07
6/4/2003	8	87	19	13	0.149	0.037	6	0.069	0.043	0	0.000	0.000	0.68	0.16
6/5/2003	10	99	25	14	0.142	0.055	11	0.111	0.037	0	0.000	0.000	0.56	0.06
6/6/2003	8	89	36	24	0.269	0.065	12	0.134	0.032	0	0.000	0.000	0.67	0.08
6/7/2003	10	84	17	9	0.107	0.040	8	0.095	0.033	0	0.000	0.000	0.53	0.13
6/8/2003	10	92	29	17	0.184	0.042	12	0.130	0.038	0	0.000	0.000	0.59	0.09
6/9/2003	10	98	19	8	0.081	0.029	11	0.112	0.041	0	0.000	0.000	0.42	0.11
6/10/2003	10	96	18	10	0.104	0.022	8	0.084	0.031	0	0.000	0.000	0.56	0.10
6/11/2003	10	81	23	12	0.148	0.047	11	0.136	0.055	0	0.000	0.000	0.52	0.12
6/12/2003	10	80	25	15	0.188	0.030	10	0.125	0.043	0	0.000	0.000	0.60	0.07
6/13/2003	8	67	24	19	0.284	0.071	5	0.075	0.044	0	0.000	0.000	0.79	0.08
6/14/2003	8	62	19	12	0.194	0.044	7	0.113	0.051	0	0.000	0.000	0.63	0.13
6/15/2003	8	62	37	19	0.309	0.044	18	0.293	0.082	0	0.000	0.000	0.51	0.06
6/16/2003	10	73	25	13	0.177	0.051	12	0.164	0.068	0	0.000	0.000	0.52	0.13
6/17/2003	12	91	17	15	0.166	0.059	2	0.022	0.015	0	0.000	0.000	0.88	0.06
6/18/2003	10	79	12	7	0.089	0.038	3	0.038	0.027	2	0.025	0.035	0.58	0.19
6/19/2003	10	67	18	17	0.255	0.037	1	0.015	0.015	0	0.000	0.000	0.94	0.05
6/20/2003	10	75	17	15	0.201	0.055	2	0.027	0.026	0	0.000	0.000	0.88	0.10
6/21/2003	8	60	17	12	0.199	0.061	5	0.083	0.050	0	0.000	0.000	0.71	0.17
6/22/2003	10	71	15	12	0.168	0.039	3	0.042	0.029	0	0.000	0.000	0.80	0.12
6/23/2003	12	93	14	9	0.097	0.035	5	0.054	0.037	0	0.000	0.000	0.64	0.20
6/24/2003	8	65	10	10	0.155	0.052	0	0.000	0.000	0	0.000	0.000	1.00	0.00
6/25/2003	10	70	21	16	0.229	0.051	5	0.072	0.038	0	0.000	0.000	0.76	0.12
6/26/2003	10	80	15	13	0.164	0.040	2	0.025	0.017	0	0.000	0.000	0.87	0.09
6/27/2003	12	84	9	8	0.096	0.026	1	0.012	0.012	0	0.000	0.000	0.89	0.11
6/28/2003	10	76	6	6	0.079	0.035	0	0.000	0.000	0	0.000	0.000	1.00	0.00
6/29/2003	8	60	10	9	0.151	0.050	1	0.017	0.018	0	0.000	0.000	0.90	0.11
6/30/2003	8	58	17	17	0.294	0.083	0	0.000	0.000	0	0.000	0.000	1.00	0.00
Total	441	4091	688	490	6.109		196	2.407		2	0.025			
Min	7	58	1	1	0.008		0	0.000		0	0.000		0.42	
Mean	10	89	15	11	0.133		4	0.052		0	0.001		0.78	
Max	14	126	37	24	0.309		18	0.293		2	0.025		1.00	

[a] Chinook Salmon CPUE/All Species CPUE.

Appendix D3.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught the 5.0 in and 7.5 in gillnets during the early-run Kenai River Chinook salmon fishery, 2003.

				Total	Chinook			Sockeye			Dolly Varden			Chinook/	
Date	Reps	Drifts	Minutes	Catch[a]	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[b]	SE
5/16/2003	5	20	192	3	2	0.012	0.007	1	0.005	0.005	0	0.000	0.000	0.71	0.17
5/17/2003	6	24	220	4	4	0.026	0.017	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/18/2003	5	20	197	2	2	0.011	0.006	0	0.000	0.000	0	0.000	0.000	1.00	0.00
5/19/2003	6	24	254	5	3	0.011	0.008	2	0.008	0.005	0	0.000	0.000	0.59	0.24
5/20/2003	5	20	230	11	10	0.048	0.029	1	0.005	0.005	0	0.000	0.000	0.91	0.04
5/21/2003	5	20	229	22	19	0.095	0.027	3	0.019	0.011	0	0.000	0.000	0.83	0.09
5/22/2003	5	20	259	14	9	0.033	0.010	5	0.019	0.008	0	0.000	0.000	0.64	0.15
5/23/2003	4	16	193	11	9	0.051	0.021	2	0.009	0.009	0	0.000	0.000	0.85	0.12
5/24/2003	4	16	219	18	14	0.068	0.018	4	0.017	0.017	0	0.000	0.000	0.80	0.19
5/25/2003	4	16	206	19	11	0.068	0.040	8	0.041	0.024	0	0.000	0.000	0.63	0.20
5/26/2003	5	20	231	14	9	0.042	0.018	5	0.022	0.007	0	0.000	0.000	0.66	0.10
5/27/2003	4	16	192	22	14	0.073	0.025	8	0.042	0.014	0	0.000	0.000	0.64	0.13
5/28/2003	4	16	179	14	10	0.057	0.015	4	0.023	0.009	0	0.000	0.000	0.71	0.12
5/29/2003	7	28	224	36	19	0.089	0.023	17	0.072	0.022	0	0.000	0.000	0.55	0.12
5/30/2003	4	16	186	31	22	0.118	0.010	9	0.049	0.014	0	0.000	0.000	0.71	0.05
5/31/2003	5	20	209	41	24	0.124	0.035	17	0.088	0.020	0	0.000	0.000	0.59	0.10
6/1/2003	5	20	197	34	18	0.086	0.030	16	0.081	0.004	0	0.000	0.000	0.51	0.08
6/2/2003	5	20	215	35	19	0.095	0.040	16	0.078	0.027	0	0.000	0.000	0.55	0.09
6/3/2003	4	15	150	42	31	0.237	0.045	11	0.062	0.035	0	0.000	0.000	0.79	0.11
6/4/2003	4	16	171	28	18	0.116	0.025	10	0.055	0.019	0	0.000	0.000	0.68	0.11
6/5/2003	5	20	197	57	26	0.137	0.045	31	0.150	0.048	0	0.000	0.000	0.48	0.08
6/6/2003	4	16	174	67	32	0.189	0.023	35	0.208	0.060	0	0.000	0.000	0.48	0.06
6/7/2003	5	20	172	65	14	0.078	0.033	50	0.285	0.052	1	0.005	0.005	0.21	0.07
6/8/2003	5	20	180	77	37	0.208	0.032	40	0.239	0.080	0	0.000	0.000	0.47	0.10
6/9/2003	5	20	184	61	13	0.071	0.011	48	0.287	0.076	0	0.000	0.000	0.20	0.04
6/10/2003	5	20	182	48	17	0.094	0.012	31	0.172	0.044	0	0.000	0.000	0.35	0.09
6/11/2003	5	20	157	69	18	0.116	0.017	51	0.339	0.130	0	0.000	0.000	0.25	0.08
6/12/2003	5	20	159	75	26	0.163	0.048	48	0.304	0.050	1	0.006	0.006	0.34	0.10
6/13/2003	4	16	122	58	31	0.257	0.075	27	0.244	0.040	0	0.000	0.000	0.51	0.09
6/14/2003	4	16	124	50	26	0.210	0.009	23	0.185	0.026	1	0.008	0.008	0.52	0.05
6/15/2003	4	16	119	89	29	0.241	0.029	60	0.511	0.153	0	0.000	0.000	0.32	0.06
6/16/2003	5	20	142	64	21	0.147	0.019	43	0.305	0.112	0	0.000	0.000	0.32	0.09
6/17/2003	6	24	178	51	24	0.134	0.050	27	0.154	0.048	0	0.000	0.000	0.47	0.10
6/18/2003	5	20	155	29	12	0.079	0.025	14	0.091	0.052	3	0.020	0.013	0.42	0.15
6/19/2003	5	20	137	55	26	0.191	0.026	29	0.199	0.088	0	0.000	0.000	0.49	0.13
6/20/2003	5	20	151	32	26	0.172	0.047	5	0.030	0.023	1	0.007	0.007	0.82	0.08
6/21/2003	4	16	121	53	23	0.195	0.053	30	0.242	0.083	0	0.000	0.000	0.45	0.14
6/22/2003	5	20	149	48	21	0.144	0.027	27	0.173	0.027	0	0.000	0.000	0.45	0.06
6/23/2003	6	24	186	40	18	0.097	0.010	18	0.093	0.034	3	0.016	0.007	0.47	0.09
6/24/2003	4	16	130	29	20	0.158	0.035	9	0.070	0.016	0	0.000	0.000	0.69	0.04
6/25/2003	5	20	155	44	29	0.196	0.035	15	0.103	0.040	0	0.000	0.000	0.65	0.11
6/26/2003	5	20	159	36	21	0.133	0.037	14	0.088	0.019	0	0.000	0.000	0.59	0.10
6/27/2003	6	24	172	27	13	0.070	0.018	13	0.075	0.012	1	0.004	0.004	0.47	0.07
6/28/2003	5	20	155	17	14	0.088	0.019	3	0.017	0.017	0	0.000	0.000	0.84	0.12
6/29/2003	4	16	122	33	26	0.215	0.064	7	0.057	0.037	0	0.000	0.000	0.79	0.14
6/30/2003	4	16	122	47	44	0.364	0.025	3	0.024	0.015	0	0.000	0.000	0.94	0.04
Total	221	883	8,154	1,727	874	5.604		840	5.340		11	0.066			
Min	4	15	119	2	2	0.011		0	0.000		0	0.000		0.20	
Mean	5	19	177	38	19	0.122		18	0.116		0	0.001		0.59	
Max	7	28	259	89	44	0.364		60	0.511		3	0.020		1.00	

[a] Includes 1 pink salmon and 1 chum salmon.

[b] 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, 2003.

			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
7/1/2003	8	57	38	30	0.526	0.060	5	0.088	0.036	0	0.000	0.000	0	0.000	0.000	3	0.053	0.055	0.79	0.06
7/2/2003	8	46	44	30	0.659	0.129	14	0.308	0.095	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.68	0.08
7/3/2003	6	42	60	19	0.455	0.087	39	0.934	0.196	0	0.000	0.000	2	0.048	0.052	0	0.000	0.000	0.32	0.07
7/4/2003	8	46	60	32	0.699	0.112	28	0.612	0.153	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.53	0.09
7/5/2003	8	35	58	38	1.094	0.185	20	0.576	0.138	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.66	0.06
7/6/2003	8	49	57	26	0.528	0.090	30	0.609	0.160	0	0.000	0.000	0	0.000	0.000	1	0.020	0.028	0.46	0.08
7/7/2003	8	41	56	24	0.585	0.142	32	0.780	0.260	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.43	0.09
7/8/2003	8	47	60	25	0.529	0.113	35	0.741	0.150	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.42	0.07
7/9/2003	10	54	48	21	0.389	0.050	27	0.500	0.132	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.44	0.06
7/10/2003	8	25	51	30	1.200	0.209	20	0.800	0.303	0	0.000	0.000	1	0.040	0.055	0	0.000	0.000	0.59	0.08
7/11/2003	8	43	64	30	0.694	0.119	34	0.786	0.258	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.47	0.09
7/12/2003	8	36	89	27	0.750	0.174	62	1.722	0.661	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.30	0.10
7/13/2003	8	28	38	9	0.327	0.116	29	1.055	0.458	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.24	0.08
7/14/2003	10	54	28	14	0.259	0.039	14	0.259	0.110	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.50	0.11
7/15/2003	8	34	85	33	0.971	0.153	52	1.529	0.608	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.39	0.10
7/16/2003	8	21	122	6	0.286	0.109	116	5.524	2.099	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.05	0.02
7/17/2003	8	19	89	10	0.519	0.169	79	4.100	0.855	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.11	0.04
7/18/2003	8	35	42	9	0.257	0.133	33	0.943	0.349	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.21	0.08
7/19/2003	8	48	45	17	0.352	0.103	28	0.580	0.111	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.38	0.06
7/20/2003	8	41	24	14	0.341	0.100	10	0.244	0.062	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.58	0.08
7/21/2003	8	48	68	18	0.378	0.118	50	1.049	0.199	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.26	0.08
7/22/2003	8	30	47	26	0.860	0.137	20	0.661	0.267	0	0.000	0.000	0	0.000	0.000	1	0.033	0.042	0.55	0.10
7/23/2003	10	44	57	12	0.275	0.075	45	1.031	0.234	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.21	0.06
7/24/2003	10	57	33	11	0.195	0.036	21	0.372	0.079	0	0.000	0.000	1	0.018	0.025	0	0.000	0.000	0.33	0.07
7/25/2003	8	49	35	11	0.226	0.050	24	0.492	0.128	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.31	0.07
7/26/2003	8	57	30	10	0.175	0.047	20	0.351	0.122	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.33	0.10
7/27/2003	8	52	41	11	0.211	0.062	29	0.555	0.202	0	0.000	0.000	0	0.000	0.000	1	0.019	0.026	0.27	0.10
7/28/2003	12	77	29	6	0.078	0.033	23	0.298	0.091	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.21	0.08
7/29/2003	10	64	72	9	0.141	0.082	63	0.984	0.316	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.13	0.07
7/30/2003	12	79	34	6	0.076	0.036	27	0.342	0.088	1	0.013	0.017	0	0.000	0.000	0	0.000	0.000	0.18	0.06
7/31/2003	10	60	43	3	0.050	0.025	40	0.672	0.164	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.07	0.04
8/1/2003	10	66	13	9	0.137	0.049	4	0.061	0.034	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.69	0.15
8/2/2003	10	74	12	6	0.081	0.020	6	0.081	0.051	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.50	0.15
8/3/2003	10	66	9	6	0.091	0.034	2	0.030	0.020	0	0.000	0.000	0	0.000	0.000	1	0.015	0.021	0.67	0.16
8/4/2003	12	82	10	4	0.049	0.029	5	0.061	0.028	1	0.012	0.017	0	0.000	0.000	0	0.000	0.000	0.40	0.18
8/5/2003	10	69	30	11	0.159	0.048	14	0.203	0.099	5	0.072	0.072	0	0.000	0.000	0	0.000	0.000	0.37	0.09
8/6/2003	10	71	23	3	0.042	0.031	11	0.154	0.123	9	0.126	0.123	0	0.000	0.000	0	0.000	0.000	0.13	0.11
8/7/2003	12	90	21	4	0.044	0.019	7	0.077	0.034	10	0.111	0.112	0	0.000	0.000	0	0.000	0.000	0.19	0.08
8/8/2003	16	118	21	2	0.017	0.012	9	0.076	0.033	10	0.085	0.090	0	0.000	0.000	0	0.000	0.000	0.10	0.07
8/9/2003	12	91	22	5	0.055	0.020	8	0.088	0.035	9	0.099	0.099	0	0.000	0.000	0	0.000	0.000	0.23	0.09
8/10/2003	12	93	14	4	0.043	0.019	1	0.011	0.011	9	0.097	0.098	0	0.000	0.000	0	0.000	0.000	0.29	0.11
Total	380	2,236	1,822	621	14.804		1,136	30.341		54	0.615		4	0.106		7	0.140			
Min	6	19	9	2	0.017		1	0.011		0	0.000		0	0.000		0	0.000		0.05	
Mean	9	55	44	15	0.361		28	0.740		1	0.015		0	0.003		0	0.003		0.36	
Max	16	118	122	38	1.200		116	5.524		10	0.126		2	0.048		3	0.053		0.79	

[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, 2003.

			Total	Chinook			Sockeye			Coho			Pink			Chinook/	
Date	Drifts	Minutes	Catch	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	#	CPUE	SE	Total[a]	SE
7/1/2003	8	48	30	28	0.589	0.154	2	0.042	0.029	0	0.000	0.000	0	0.000	0.000	0.93	0.04
7/2/2003	8	44	34	32	0.723	0.097	2	0.045	0.045	0	0.000	0.000	0	0.000	0.000	0.94	0.05
7/3/2003	6	44	25	19	0.432	0.105	5	0.114	0.056	0	0.000	0.000	1	0.023	0.030	0.76	0.08
7/4/2003	8	41	37	28	0.679	0.097	9	0.218	0.084	0	0.000	0.000	0	0.000	0.000	0.76	0.08
7/5/2003	8	27	25	16	0.598	0.172	9	0.336	0.132	0	0.000	0.000	0	0.000	0.000	0.64	0.14
7/6/2003	8	43	40	30	0.694	0.069	10	0.231	0.099	0	0.000	0.000	0	0.000	0.000	0.75	0.09
7/7/2003	8	36	33	29	0.817	0.189	4	0.113	0.051	0	0.000	0.000	0	0.000	0.000	0.88	0.05
7/8/2003	8	60	32	26	0.432	0.155	6	0.100	0.038	0	0.000	0.000	0	0.000	0.000	0.81	0.06
7/9/2003	10	69	29	25	0.362	0.052	4	0.058	0.034	0	0.000	0.000	0	0.000	0.000	0.86	0.07
7/10/2003	8	35	43	38	1.101	0.250	5	0.145	0.094	0	0.000	0.000	0	0.000	0.000	0.88	0.08
7/11/2003	8	34	46	33	0.971	0.137	13	0.382	0.136	0	0.000	0.000	0	0.000	0.000	0.72	0.06
7/12/2003	8	45	47	25	0.562	0.122	22	0.494	0.160	0	0.000	0.000	0	0.000	0.000	0.53	0.09
7/13/2003	8	49	28	24	0.487	0.096	4	0.081	0.042	0	0.000	0.000	0	0.000	0.000	0.86	0.05
7/14/2003	10	57	36	30	0.526	0.103	6	0.105	0.073	0	0.000	0.000	0	0.000	0.000	0.83	0.08
7/15/2003	8	33	39	26	0.788	0.145	13	0.394	0.229	0	0.000	0.000	0	0.000	0.000	0.67	0.12
7/16/2003	8	29	74	22	0.772	0.177	52	1.825	0.393	0	0.000	0.000	0	0.000	0.000	0.30	0.04
7/17/2003	8	26	30	21	0.808	0.169	9	0.346	0.123	0	0.000	0.000	0	0.000	0.000	0.70	0.08
7/18/2003	8	45	46	36	0.804	0.160	10	0.223	0.087	0	0.000	0.000	0	0.000	0.000	0.78	0.08
7/19/2003	8	50	23	16	0.321	0.099	7	0.140	0.055	0	0.000	0.000	0	0.000	0.000	0.70	0.11
7/20/2003	8	51	40	37	0.725	0.180	3	0.059	0.041	0	0.000	0.000	0	0.000	0.000	0.93	0.05
7/21/2003	8	42	30	27	0.643	0.114	3	0.071	0.070	0	0.000	0.000	0	0.000	0.000	0.90	0.10
7/22/2003	8	37	35	31	0.849	0.188	4	0.110	0.060	0	0.000	0.000	0	0.000	0.000	0.89	0.06
7/23/2003	10	54	60	38	0.707	0.101	22	0.409	0.123	0	0.000	0.000	0	0.000	0.000	0.63	0.07
7/24/2003	10	63	35	24	0.379	0.059	11	0.174	0.063	0	0.000	0.000	0	0.000	0.000	0.69	0.09
7/25/2003	8	44	37	25	0.565	0.092	12	0.271	0.106	0	0.000	0.000	0	0.000	0.000	0.68	0.08
7/26/2003	8	52	26	18	0.344	0.054	8	0.153	0.066	0	0.000	0.000	0	0.000	0.000	0.69	0.10
7/27/2003	8	54	28	19	0.352	0.072	9	0.167	0.095	0	0.000	0.000	0	0.000	0.000	0.68	0.10
7/28/2003	12	80	14	10	0.126	0.041	4	0.050	0.028	0	0.000	0.000	0	0.000	0.000	0.71	0.12
7/29/2003	10	63	30	17	0.271	0.072	13	0.207	0.126	0	0.000	0.000	0	0.000	0.000	0.57	0.18
7/30/2003	12	87	22	9	0.104	0.038	13	0.150	0.072	0	0.000	0.000	0	0.000	0.000	0.41	0.14
7/31/2003	10	62	20	8	0.129	0.037	12	0.193	0.085	0	0.000	0.000	0	0.000	0.000	0.40	0.09
8/1/2003	10	65	7	5	0.077	0.033	2	0.031	0.031	0	0.000	0.000	0	0.000	0.000	0.71	0.24
8/2/2003	10	62	6	4	0.065	0.025	2	0.032	0.021	0	0.000	0.000	0	0.000	0.000	0.67	0.17
8/3/2003	10	72	10	10	0.139	0.030	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	1.00	0.00
8/4/2003	12	83	10	4	0.048	0.020	4	0.048	0.048	2	0.024	0.028	0	0.000	0.000	0.40	0.24
8/5/2003	10	73	16	11	0.151	0.040	3	0.041	0.028	2	0.027	0.031	0	0.000	0.000	0.69	0.15
8/6/2003	10	76	21	5	0.066	0.023	6	0.079	0.047	10	0.131	0.127	0	0.000	0.000	0.24	0.10
8/7/2003	12	87	8	5	0.058	0.032	1	0.012	0.011	2	0.023	0.027	0	0.000	0.000	0.63	0.18
8/8/2003	16	115	7	4	0.035	0.020	2	0.017	0.012	1	0.009	0.012	0	0.000	0.000	0.57	0.21
8/9/2003	12	92	12	7	0.077	0.025	1	0.011	0.011	4	0.044	0.045	0	0.000	0.000	0.58	0.12
8/10/2003	12	52	10	3	0.058	0.063	1	0.019	0.021	6	0.116	0.147	0	0.000	0.000	0.30	0.19
Total	380	2,277	1,181	825	18.432		328	7.698		27	0.374		1	0.023			
Min	6	26	6	3	0.035		0	0.000		0	0.000		0	0.000		0.24	
Mean	9	56	29	20	0.450		8	0.188		1	0.009		0	0.001		0.69	
Max	16	115	74	38	1.101		52	1.825		10	0.131		1	0.023		1.00	

[a] Chinook Salmon CPUE/All Species CPUE.

Appendix D6.-Inriver gillnetting catch, CPUE and proportion of Chinook salmon caught in the 5.0 in and 7.5 in gillnets during the late-run Kenai River Chinook salmon fishery, 2003.

				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
7/1/2003	4	16	105	68	58	0.566	0.127	7	0.069	0.033	0	0.000	0.000	0	0.000	0.000	3	0.028	0.018	0.85	0.06
7/2/2003	4	16	90	78	62	0.725	0.114	16	0.190	0.035	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.79	0.01
7/3/2003	3	12	86	85	38	0.445	0.097	44	0.528	0.101	0	0.000	0.000	3	0.034	0.019	0	0.000	0.000	0.44	0.07
7/4/2003	4	16	87	97	60	0.691	0.072	37	0.402	0.115	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.63	0.08
7/5/2003	4	16	62	83	54	0.884	0.158	29	0.375	0.133	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.70	0.09
7/6/2003	4	16	93	97	56	0.610	0.053	40	0.435	0.118	0	0.000	0.000	0	0.000	0.000	1	0.010	0.010	0.58	0.07
7/7/2003	4	16	77	89	53	0.714	0.086	36	0.419	0.182	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.63	0.10
7/8/2003	4	16	108	92	51	0.542	0.136	41	0.407	0.106	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.57	0.09
7/9/2003	5	20	123	77	46	0.384	0.027	31	0.281	0.089	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.58	0.07
7/10/2003	4	16	60	94	68	1.073	0.267	25	0.501	0.171	0	0.000	0.000	1	0.022	0.022	0	0.000	0.000	0.67	0.06
7/11/2003	4	16	77	110	63	0.813	0.116	47	0.549	0.233	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.60	0.07
7/12/2003	4	16	81	136	52	0.613	0.191	84	1.285	0.536	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.32	0.11
7/13/2003	4	16	77	66	33	0.413	0.116	33	0.593	0.325	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.41	0.08
7/14/2003	5	20	111	64	44	0.398	0.050	20	0.204	0.112	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.66	0.11
7/15/2003	4	16	67	124	59	0.947	0.057	65	0.957	0.521	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.50	0.14
7/16/2003	4	16	50	196	28	0.604	0.112	168	4.465	1.335	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.12	0.03
7/17/2003	4	16	45	119	31	0.667	0.119	88	2.074	0.483	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.24	0.05
7/18/2003	4	16	80	88	45	0.603	0.198	43	0.819	0.376	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.42	0.03
7/19/2003	4	16	98	68	33	0.364	0.122	35	0.375	0.065	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.49	0.05
7/20/2003	4	16	92	64	51	0.536	0.042	13	0.156	0.004	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.77	0.01
7/21/2003	4	16	90	98	45	0.548	0.099	53	0.554	0.131	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.50	0.10
7/22/2003	4	16	67	82	57	0.790	0.176	24	0.425	0.105	0	0.000	0.000	0	0.000	0.000	1	0.011	0.011	0.64	0.06
7/23/2003	5	20	97	117	50	0.501	0.048	67	0.851	0.303	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.37	0.08
7/24/2003	5	20	120	68	35	0.297	0.039	32	0.272	0.041	0	0.000	0.000	1	0.018	0.018	0	0.000	0.000	0.51	0.06
7/25/2003	4	16	93	72	36	0.389	0.050	36	0.385	0.117	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.50	0.06
7/26/2003	4	16	109	56	28	0.256	0.024	28	0.263	0.128	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.49	0.13
7/27/2003	4	16	106	69	30	0.290	0.068	38	0.350	0.200	0	0.000	0.000	0	0.000	0.000	1	0.011	0.011	0.45	0.11
7/28/2003	6	24	157	43	16	0.103	0.018	27	0.180	0.079	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.36	0.08
7/29/2003	5	20	127	102	26	0.204	0.060	76	0.584	0.227	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.26	0.07
7/30/2003	6	24	166	56	15	0.092	0.029	40	0.243	0.098	1	0.006	0.006	0	0.000	0.000	0	0.000	0.000	0.27	0.06
7/31/2003	5	20	122	63	11	0.085	0.034	52	0.389	0.166	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.18	0.07
8/1/2003	5	20	131	20	14	0.105	0.038	6	0.048	0.015	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.69	0.09
8/2/2003	5	20	136	18	10	0.069	0.017	8	0.048	0.039	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0.59	0.16
8/3/2003	5	20	138	19	16	0.115	0.015	2	0.014	0.014	0	0.000	0.000	0	0.000	0.000	1	0.007	0.007	0.85	0.08
8/4/2003	6	24	165	20	8	0.050	0.012	9	0.054	0.021	3	0.018	0.008	0	0.000	0.000	0	0.000	0.000	0.41	0.12
8/5/2003	5	20	142	46	22	0.162	0.031	17	0.104	0.045	7	0.051	0.015	0	0.000	0.000	0	0.000	0.000	0.51	0.11
8/6/2003	5	20	148	44	8	0.057	0.016	17	0.102	0.085	19	0.118	0.037	0	0.000	0.000	0	0.000	0.000	0.21	0.12
8/7/2003	6	24	177	29	9	0.052	0.020	8	0.045	0.021	12	0.069	0.031	0	0.000	0.000	0	0.000	0.000	0.31	0.08
8/8/2003	8	32	234	28	6	0.026	0.012	11	0.048	0.015	11	0.047	0.017	0	0.000	0.000	0	0.000	0.000	0.22	0.11
8/9/2003	6	24	182	34	12	0.067	0.015	9	0.049	0.021	13	0.071	0.021	0	0.000	0.000	0	0.000	0.000	0.36	0.10
8/10/2003	6	24	145	24	7	0.030	0.014	2	0.010	0.007	15	0.065	0.029	0	0.000	0.000	0	0.000	0.000	0.28	0.12
Total	190	760	4,513	3,003	1,446	16.880		1,464	20.104		81	0.445		5	0.074		7	0.067			
Min	3	12	45	18	6	0.026		2	0.010		0	0.000		0	0.000		0	0.000		0.12	
Mean	5	19	110	73	35	0.412		36	0.490		2	0.011		0	0.002		0	0.002		0.49	
Max	8	32	234	196	68	1.073		168	4.465		19	0.118		3	0.034		3	0.028		0.85	

[a] Chinook Salmon CPUE/All Species CPUE.

APPENDIX E. TEMPORALLY STRATIFIED AGE COMPOSITION ESTIMATES FOR THE KENAI RIVER CHINOOK SALMON FISHERY, 2003

Appendix E1.-Temporally stratified 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, 2003.

	Age			
Parameter	1.2	1.3	1.4	Total
	16 May - 8 June			
Female				
Sample size	1	10	29	40
% sample	1.8%	18.2%	52.7%	72.7%
SE % sample	1.8%	5.2%	6.8%	6.1%
Total Harvest	11	106	307	423
SE Total Harvest	11	45	108	143
Male				
Sample size	2	9	4	15
% sample	3.6%	16.4%	7.3%	27.3%
SE % sample	2.5%	5.0%	3.5%	6.1%
Total Harvest	21	95	42	159
SE Total Harvest	16	42	24	62
Combined				
Sample size	3	19	33	55
% sample	5.5%	34.5%	60.0%	100.0%
SE % sample	3.1%	6.5%	6.7%	0.0%
Total Harvest	32	201	349	582
SE Total Harvest	20	75	121	192
	9 - 30 June			
Female				
Sample size	2	6	6	14
% sample	7.7%	23.1%	23.1%	53.8%
SE % sample	5.3%	8.4%	8.4%	10.0%
Total Harvest	105	315	315	736
SE Total Harvest	75	137	137	230
Male				
Sample size	4	6	2	12
% sample	15.4%	23.1%	7.7%	46.2%
SE % sample	7.2%	8.4%	5.3%	10.0%
Total Harvest	210	315	105	630
SE Total Harvest	109	137	75	208
Combined				
Sample size	6	12	8	26
% sample	23.1%	46.2%	30.8%	100.0%
SE % sample	8.4%	10.0%	9.2%	0.0%
Total Harvest	315	630	420	1,366
SE Total Harvest	137	208	163	350

Appendix E2.-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, 2003.

	Age					
Parameter	1.1	1.2	1.3	1.4	1.5	Total
		1 July - 13 July				
Female						
Sample size		5	14	30		49
% sample		4.1%	11.6%	24.8%		40.5%
SE % sample		1.8%	2.9%	3.9%		4.5%
Downstream Harvest		11	32	68		111
SE Downstream Harvest		5	11	18		27
Upstream Harvest		193	540	1,156		1,889
SE Upstream Harvest		88	155	245		338
Total Harvest		204	571	1,224		2,000
SE Total Harvest		93	162	253		346
Male						
Sample size	4	23	12	31	2	72
% sample	3.3%	19.0%	9.9%	25.6%	1.7%	59.5%
SE % sample	1.6%	3.6%	2.7%	4.0%	1.2%	4.5%
Downstream Harvest	9	52	27	70	5	164
SE Downstream Harvest	5	15	9	19	3	38
Upstream Harvest	154	886	463	1,195	77	2,775
SE Upstream Harvest	78	207	142	250	55	443
Total Harvest	163	939	490	1,265	82	2,939
SE Total Harvest	83	216	149	258	58	451
Combined						
Sample size	4	28	26	61	2	121
% sample	3.3%	23.1%	21.5%	50.4%	1.7%	100.0%
SE % sample	1.6%	3.8%	3.7%	4.6%	1.2%	0.0%
Downstream Harvest	9	64	59	139	5	275
SE Downstream Harvest	5	17	16	33	3	61
Upstream Harvest	154	1,079	1,002	2,351	77	4,664
SE Upstream Harvest	78	234	224	393	55	659
Total Harvest	163	1,143	1,061	2,490	82	4,939
SE Total Harvest	83	243	232	401	58	662

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Parameter	Age 1.1	1.2	1.3	1.4	1.5	Total
			14 July - 31 July			
Female						
Sample size	1	1	20	76		98
% sample	0.5%	0.5%	10.5%	40.0%		51.6%
SE % sample	0.5%	0.5%	2.2%	3.6%		3.6%
Downstream Harvest	3	3	58	219		282
SE Downstream Harvest	3	3	17	52		65
Upstream Harvest	44	44	879	3,340		4,307
SE Upstream Harvest	44	44	211	483		578
Total Harvest	47	47	937	3,559		4,589
SE Total Harvest	47	47	222	498		591
Male						
Sample size		19	12	60	1	92
% sample		10.0%	6.3%	31.6%	0.5%	48.4%
SE % sample		2.2%	1.8%	3.4%	0.5%	3.6%
Downstream Harvest		55	35	173	3	265
SE Downstream Harvest		17	12	42	3	61
Upstream Harvest		835	527	2,637	44	4,043
SE Upstream Harvest		205	159	412	44	552
Total Harvest		890	562	2,810	47	4,308
SE Total Harvest		216	168	426	47	566
Combined						
Sample size	1	20	32	136	1	190
% sample	0.5%	10.5%	16.8%	71.6%	0.5%	100.0%
SE % sample	0.5%	2.2%	2.7%	3.3%	0.5%	0.0%
Downstream Harvest	3	58	92	392	3	548
SE Downstream Harvest	3	17	25	88	3	120
Upstream Harvest	44	879	1,406	5,977	44	8,350
SE Upstream Harvest	44	211	277	736	44	955
Total Harvest	47	937	1,499	6,369	47	8,898
SE Total Harvest	47	222	290	748	47	962

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 E3.-Temporally stratified estimates of age composition and sonar passage by age class for early-run Kenai River Chinook salmon, 2003.

Parameter	Age 0.3	1.1	1.2	1.3	1.4	1.5	Total
16 May - 8 June							
Female							
Sample size			6	16	106	1	129
% sample			1.9%	5.0%	33.0%	0.3%	40.2%
SE % sample			0.8%	1.2%	2.6%	0.3%	2.7%
Sonar passage estimate			105	280	1,857	18	2,261
SE sonar passage estimate			43	69	154	18	162
Male							
Sample size			78	56	54	4	192
% sample			24.3%	17.4%	16.8%	1.2%	59.8%
SE % sample			2.4%	2.1%	2.1%	0.6%	2.7%
Sonar passage estimate			1,367	981	946	70	3,364
SE sonar passage estimate			138	121	119	35	172
Combined							
Sample size			84	72	160	5	321
% sample			26.2%	22.4%	49.8%	1.6%	100.0%
SE % sample			2.5%	2.3%	2.8%	0.7%	0.0%
Sonar passage estimate[a]			1,472	1,262	2,804	88	5,625
SE sonar passage estimate			142	134	169	39	126
9 June - 30 June							
Female							
Sample size			28	19	115		162
% sample			6.9%	4.7%	28.5%		40.2%
SE % sample			1.3%	1.1%	2.3%		2.4%
Sonar passage estimate			535	363	2,197		3,095
SE sonar passage estimate			98	82	179		198
Male							
Sample size	1	7	115	52	64	2	241
% sample	0.2%	1.7%	28.5%	12.9%	15.9%	0.5%	59.8%
SE % sample	0.2%	0.7%	2.3%	1.7%	1.8%	0.4%	2.4%
Sonar passage estimate	19	134	2,197	994	1,223	38	4,605
SE sonar passage estimate	19	50	179	130	142	27	210
Combined							
Sample size	1	7	143	71	179	2	403
% sample	0.2%	1.7%	35.5%	17.6%	44.4%	0.5%	100.0%
SE % sample	0.2%	0.7%	2.4%	1.9%	2.5%	0.4%	0.0%
Sonar passage estimate[a]	19	134	2,732	1,357	3,420	38	7,700
SE sonar passage estimate	19	50	192	149	203	27	154

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

Appendix E4.-Temporally stratified estimates of age composition and sonar passage by age class for late-run Kenai River Chinook salmon, 2003.

Parameter	Age 1.1	1.2	1.3	1.4	1.5	Total
1 July - 20 July						
Female						
Sample size		94	31	175	1	301
% sample		12.5%	4.1%	23.2%	0.1%	39.9%
SE % sample		1.2%	0.7%	1.5%	0.1%	1.8%
Sonar passage estimate		3,297	1,087	6,138	35	10,558
SE sonar passage estimate		322	192	415	35	493
Male						
Sample size	13	182	112	144	2	453
% sample	1.7%	24.1%	14.9%	19.1%	0.3%	60.1%
SE % sample	0.5%	1.6%	1.3%	1.4%	0.2%	1.8%
Sonar passage estimate	456	6,384	3,929	5,051	70	15,890
SE sonar passage estimate	126	421	347	385	50	519
Combined						
Sample size	13	276	143	319	3	754
% sample	1.7%	36.6%	19.0%	42.3%	0.4%	100.0%
SE % sample	0.5%	1.8%	1.4%	1.8%	0.2%	0.0%
Sonar passage estimate[a]	456	9,681	5,016	11,190	105	26,448
SE sonar passage estimate	126	483	384	500	61	360
21 July - 10 August						
Female						
Sample size		11	32	110	2	155
% sample		3.1%	8.9%	30.6%	0.6%	43.1%
SE % sample		0.9%	1.5%	2.4%	0.4%	2.6%
Sonar passage estimate		465	1,352	4,648	85	6,549
SE sonar passage estimate		138	229	377	60	411
Male						
Sample size	2	51	45	107		205
% sample	0.6%	14.2%	12.5%	29.7%		56.9%
SE % sample	0.4%	1.8%	1.7%	2.4%		2.6%
Sonar passage estimate	85	2,155	1,901	4,521		8,662
SE sonar passage estimate	60	282	267	374		421
Combined						
Sample size	2	62	77	217	2	360
% sample	0.6%	17.2%	21.4%	60.3%	0.6%	100.0%
SE % sample	0.4%	2.0%	2.2%	2.6%	0.4%	0.0%
Sonar passage estimate[a]	85	2,620	3,253	9,169	85	15,211
SE sonar passage estimate	60	306	333	420	60	244

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

APPENDIX F. AGE COMPOSITION ESTIMATES FOR THE KENAI RIVER CHINOOK SALMON INRIVER RETURN USING CATCH FROM 7.5 IN GILLNET, 2003

Appendix F1.-Age composition and estimated sonar passage by age class for the inriver return of early-run Kenai River Chinook salmon estimated from catches in a 7.5 in gillnet, 2003.

Parameter	1.2	1.3	1.4	1.5	Total
		16 May - 8 June			
Female					
Sample size	3	11	60		74
% sample	1.6%	5.8%	31.6%		38.9%
SE % sample	0.9%	1.7%	3.4%		3.5%
Sonar passage estimate	89	326	1,776		2,191
SE sonar passage estimate	51	96	194		205
Male					
Sample size	45	43	24	4	116
% sample	23.7%	22.6%	12.6%	2.1%	61.1%
SE % sample	3.1%	3.0%	2.4%	1.0%	3.5%
Sonar passage estimate	1,332	1,273	711	118	3,434
SE sonar passage estimate	176	174	137	59	214
Combined					
Sample size	48	54	84	4	190
% sample	25.3%	28.4%	44.2%	2.1%	100.0%
SE % sample	3.2%	3.3%	3.6%	1.0%	0.0%
Sonar passage estimate[a]	1,421	1,599	2,487	118	5,625
SE sonar passage estimate[a]	181	188	211	59	126
		9 June - 30 June			
Female					
Sample size	10	13	76		99
% sample	4.3%	5.6%	32.8%		42.7%
SE % sample	1.3%	1.5%	3.1%		3.3%
Sonar passage estimate	332	431	2,522		3,286
SE sonar passage estimate	103	117	243		259
Male					
Sample size	63	30	38	2	133
% sample	27.2%	12.9%	16.4%	0.9%	57.3%
SE % sample	2.9%	2.2%	2.4%	0.6%	3.3%
Sonar passage estimate	2,091	996	1,261	66	4,414
SE sonar passage estimate	229	171	189	47	266
Combined					
Sample size	73	43	114	2	232
% sample	31.5%	18.5%	49.1%	0.9%	100.0%
SE % sample	3.1%	2.6%	3.3%	0.6%	0.0%
Sonar passage estimate[a]	2,423	1,427	3,784	66	7,700
SE sonar passage estimate[a]	240	199	264	47	154

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Parameter	1.2	1.3	1.4	1.5	Total
	Early Run, both strata (16 May- 30 June)				
Female					
Sample size	13	24	136		173
Sonar passage estimate	421	757	4,299		5,477
SE sonar passage estimate	115	151	311		331
% sonar passage	3.2%	5.7%	32.3%		41.1%
SE % sonar passage	0.9%	1.1%	2.3%		2.4%
Male					
Sample size	108	73	62	6	249
Sonar passage estimate	3,423	2,269	1,972	185	7,848
SE sonar passage estimate	289	244	233	75	341
% sonar passage	25.7%	17.0%	14.8%	1.4%	58.9%
SE % sonar passage	2.1%	1.8%	1.7%	0.6%	2.4%
Combined					
Sample size	121	97	198	6	422
Sonar passage estimate[a]	3,844	3,026	6,270	185	13,325
SE sonar passage estimate[a]	300	274	338	75	199
% sonar passage	28.8%	22.7%	47.1%	1.4%	100.0%
SE % sonar passage	2.2%	2.0%	2.4%	0.6%	0.0%

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

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

Appendix F2.-Age composition and estimated sonar passage by age class for the inriver return of late-run Kenai River Chinook salmon estimated from catches in a 7.5 in gillnet, 2003.

	Age					
Parameter	1.1	1.2	1.3	1.4	1.5	Total
			1 July - 20 July			
Female						
Sample size		36	23	106	1	166
% sample		8.4%	5.4%	24.8%	0.2%	38.9%
SE % sample		1.3%	1.1%	2.1%	0.2%	2.4%
Sonar passage estimate		2,230	1,425	6,566	62	10,282
SE sonar passage estimate		357	290	561	62	640
Male						
Sample size	2	87	71	99	2	261
% sample	0.5%	20.4%	16.6%	23.2%	0.5%	61.1%
SE % sample	0.3%	2.0%	1.8%	2.0%	0.3%	2.4%
Sonar passage estimate	124	5,389	4,398	6,132	124	16,166
SE sonar passage estimate	88	521	481	547	88	662
Combined						
Sample size	2	123	94	205	3	427
% sample	0.5%	28.8%	22.0%	48.0%	0.7%	100.0%
SE % sample	0.3%	2.2%	2.0%	2.4%	0.4%	0.0%
Sonar passage estimate[a]	124	7,619	5,822	12,698	186	26,448
SE sonar passage estimate[a]	88	589	537	663	107	360
			21 July - 10 August			
Female						
Sample size		6	25	71	2	104
% sample		2.6%	10.8%	30.6%	0.9%	44.8%
SE % sample		1.0%	2.0%	3.0%	0.6%	3.3%
Sonar passage estimate		393	1,639	4,655	131	6,819
SE sonar passage estimate		159	311	467	93	510
Male						
Sample size		31	33	64		128
% sample		13.4%	14.2%	27.6%		55.2%
SE % sample		2.2%	2.3%	2.9%		3.3%
Sonar passage estimate		2,033	2,164	4,196		8,392
SE sonar passage estimate		342	351	452		516
Combined						
Sample size		37	58	135	2	232
% sample		15.9%	25.0%	58.2%	0.9%	100.0%
SE % sample		2.4%	2.8%	3.2%	0.6%	0.0%
Sonar passage estimate[a]		2,426	3,803	8,851	131	15,211
SE sonar passage estimate[a]		368	438	514	93	244

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Parameter	Age 1.1	1.2	1.3	1.4	1.5	Total
Late Run, both strata (1 July- 10 August)						
Female						
Sample size		42	48	177	3	270
Sonar passage estimate		2,623	3,064	11,221	193	17,101
SE sonar passage estimate		391	425	730	111	818
% sonar passage		6.3%	7.4%	26.9%	0.5%	41.0%
SE % sonar passage		0.9%	1.0%	1.7%	0.3%	1.9%
Male						
Sample size	2	118	104	163	2	389
Sonar passage estimate	124	7,421	6,561	10,328	124	24,558
SE sonar passage estimate	88	623	595	710	88	839
% sonar passage	0.3%	17.8%	15.8%	24.8%	0.3%	59.0%
SE % sonar passage	0.2%	1.5%	1.4%	1.7%	0.2%	1.9%
Combined						
Sample size	2	160	152	340	5	659
Sonar passage estimate[a]	124	10,044	9,625	21,549	317	41,659
SE sonar passage estimate[a]	88	695	693	839	141	435
% sonar passage	0.3%	24.1%	23.1%	51.7%	0.8%	100.0%
SE % sonar passage	0.2%	1.6%	1.6%	1.9%	0.3%	0.0%

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

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