Fishery Data Series No. 95-34

Angler Effort and Harvest of Chinook Salmon and Pacific Halibut in the Marine Recreational Fishery of Central Cook Inlet, 1994

by

Timothy R. McKinley

November 1995

Alaska Department of Fish and Game

Division of Sport Fish

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

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

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

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

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
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
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

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	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
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.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
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
standard length	SL
total length	TL
variance	Var

FISHERY DATA SERIES NO. 95-34

ANGLER EFFORT AND HARVEST OF CHINOOK SALMON AND PACIFIC HALIBUT IN THE MARINE RECREATIONAL FISHERY OF CENTRAL COOK INLET, 1994

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ABSTRACT

Direct expansion creel surveys were conducted from 1 May through 31 July at three separate public beaches (Deep Creek marine, Whiskey Gulch, and Anchor Point) that provide access to the Central Cook Inlet marine recreational fishery. Boat parties that had completed fishing were interviewed as they exited the fishery; data recorded were trip type (guided/private), number of rods fished, number of chinook salmon *Oncorhynchus tshawytscha* kept and/or released, and the number of Pacific halibut *Hippoglossus stenolepis* kept and/or released. No biological samples were collected. In addition, total harvest and effort information was collected from fishing lodges that operate from a private, closed access beach.

Two distinct runs of chinook salmon occur in this fishery. The early run fishery is a mixed stock fishery that likely harvests chinook returning to streams in several drainages of Cook Inlet. The late run fishery is presumed to harvest primarily late run Kenai River fish, and to a lesser extent late run Kasilof River fish, the only late run stocks known in Cook Inlet. For 1994, the early run was considered to be from 1 May-22 June, and the late run from 23 June-31 July. The estimated harvest of chinook salmon was 7,446 (SE = 300), with 5,577 (SE = 237) harvested during the early run, and 1,869 (SE = 124) during the late run. An estimated 63,831 (SE = 2,229) Pacific halibut were harvested. Total effort for the fishery during this time frame, for all species combined, was 62,292 angler days (SE = 1,796). Guided anglers accounted for 37% of the fishing effort, 49% of the chinook salmon harvest, and 54% of the Pacific halibut harvest. Anglers released 10% of the chinook salmon landed and 42% of the halibut landed.

Although some harvest and effort occurs in this fishery outside of our sampling time frame, as well as from two other access sites, the additional harvest of chinook salmon is considered negligible. However, a considerable amount of fishing effort for Pacific halibut does occur after 31 July.

KEY WORDS: Creel survey, angler effort and harvest, chinook salmon, *Oncorhynchus tshawytscha*, Pacific halibut, *Hippoglossus stenolepis*, mixed stock fishery, early run, late run, Central Cook Inlet.

INTRODUCTION

The central Cook Inlet marine chinook salmon *Oncorhynchus tshawytscha* recreational fishery has been expanding in recent years, with the greatest effort occurring in the Deep Creek marine area (Figure 1). The Cook Inlet marine fishery for chinook salmon began in the early 1970s and remained fairly stable through the late 1980s (Nelson 1994). However, increased marketing by the sport fish guiding and tourism industries, availability of commercial boat launching services that accommodate the use of larger vessels, development of sport fishing lodges along Cook Inlet beaches, and restrictions in the Kenai River fishery following implementation of the Kenai River Chinook Salmon Management Plan, have resulted in recent growth in this fishery, most notably the guided segment. As this fishery expanded, controversy surrounding the increasing harvest and fishing effort, and the stock of origin of chinook salmon in the catch, also increased significantly.

The Cook Inlet marine recreational fishery is assumed to harvest mixed stocks of chinook salmon that migrate along the east coast of central Cook Inlet from late April through early August (Hammarstrom et al. 1987). Early-run (late April through late June) fish are believed to originate from several small lower Kenai Peninsula drainages adjacent to the fishery (Stariski Creek, Deep Creek, Anchor River, Ninilchik River), and larger drainages in Upper and Northern Cook Inlet (Kasilof, Kenai, and Susitna rivers). The majority of late-run (late June through early August) fish are presumed to originate from the Kenai River and, to a lesser extent, the Kasilof River. A conservation concern is the proximity of the fishery to the natal streams of the small contributing stocks of the lower Kenai Peninsula. An allocative concern is the potential harvest of chinook salmon of already

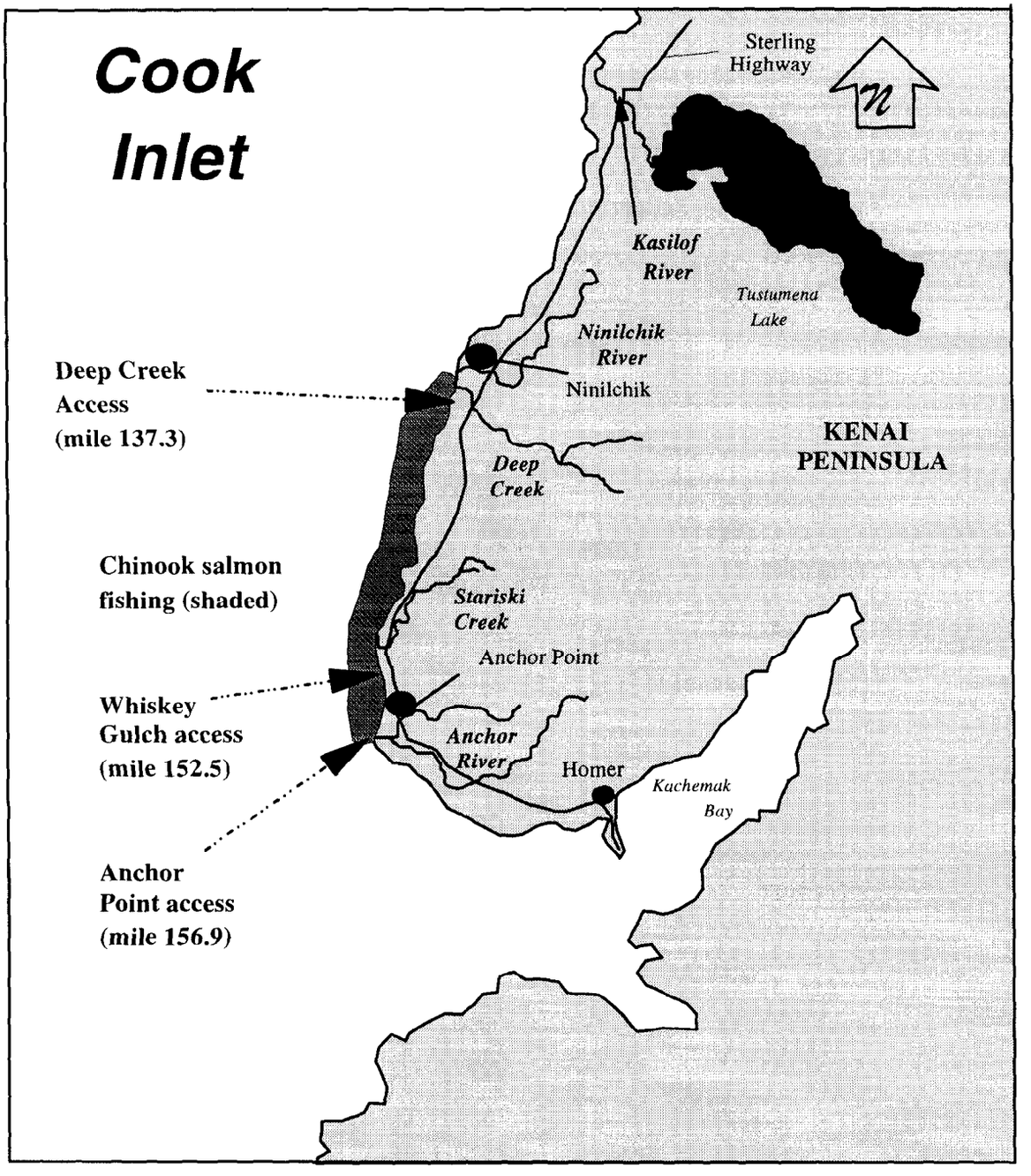

Figure 1.-Map of the central Cook Inlet marine chinook salmon recreational fishery.

fully-exploited stocks from the Kenai Peninsula and Upper/Northern Cook Inlet.

There is currently a lack of stock-specific harvest information for this fishery. The effects of increased angler participation and harvest on specific chinook salmon stocks remain unknown and are of particular concern to fishery managers.

An annual, onsite creel survey was conducted at Deep Creek from 1972-1986 (Hammarstrom 1974-1981; Hammarstrom and Larson 1982-1984, 1986; and Hammarstrom et al. 1985). Since 1987, estimates of harvest and effort provided by the Statewide Harvest Survey (Mills 1979-1994) have been used to track this fishery. The Statewide Harvest Survey provides estimates of total annual catch, harvest, and effort for this fishery, information that is adequate for managing terminal or single-stock fisheries. However, the mixed-stock nature of this fishery necessitates stock-specific harvest information for better understanding and management. This need has led to the initiation of this project and the related chinook salmon coded wire tagging projects, to monitor the fishery.

Pacific halibut *Hippoglossus stenolepis* are also highly sought after at this time by recreational anglers in Cook Inlet. Anglers fishing for Pacific halibut launch and exit at the same access sites as anglers fishing for chinook salmon, and many anglers fish for both species during the same trip. A conservation concern has been raised about the growing Pacific halibut harvest in Central Cook Inlet and the possibility of localized overfishing (Vincent-Lang 1994). Additionally, the North Pacific Fishery Management Council (NPFMC) recently broached the issue of possibly allocating to the sport charter industry a finite harvest of Pacific halibut. A general lack of knowledge of this growing fishery has impeded efforts at more refined management.

The long-term goal of this study is to estimate the proportional harvest of contributing stocks of chinook salmon in this fishery. When wild stock, coded wire tagged chinook salmon enter the fishery (beginning in 1996, as 2-ocean fish), we can begin to estimate the proportional harvest of marked chinook salmon stocks. However, in this first year of study, our goals are to: (1) test the validity of harvest estimates of chinook salmon already provided in the Statewide Harvest Survey and (2) apportion the harvest of chinook salmon in this fishery between early-run and late-run stocks.

The research objectives for 1994 were to estimate:

1) the total catch and harvest of chinook salmon and Pacific halibut by anglers exiting at the Deep Creek marine wayside area (mile 137.3 Sterling Highway) from 1 May to 31 July 1994;

2) the total catch and harvest of chinook salmon and Pacific halibut by anglers exiting at the Whiskey Gulch marine access area (mile 152.5 Sterling Highway) from 1 May to 31 July 1994;

3) the total catch and harvest of chinook salmon and Pacific halibut by anglers exiting at the Anchor Point marine access area (mile 156.9 Sterling Highway) from 1 May to 31 July 1994; and

4) angler effort by the sport fishery at the access sites in Objectives 1, 2, and 3.

In addition, the following task was addressed in the 1994 survey:

1) to collect total catch, harvest, and effort data of guided anglers accessing

the marine chinook salmon and Pacific halibut fishery via a private beach between the Bluff Point at Homer and the Ninilchik River.

METHODS

In order to meet the above objectives three separate, direct expansion creel surveys were set up at the primary access sites to this fishery (Deep Creek marine wayside, Whiskey Gulch, and Anchor Point; Figure 1). Although there are differences in study design and logistics between the three access sites, the data collection and analysis procedures were similar. The 1994 creel survey designs are based on spatial and temporal boat exit patterns discerned from the 1993 boat exit surveys at the Deep Creek and Whiskey Gulch marine access sites (Appendix A). At each access area the sampling effort was stratified both to derive a more precise estimate (stratification by time of day/tidal state, exit location, and holidays), and to provide separate estimates for management purposes (stratification by early-run/late-run chinook salmon fisheries).

DEEP CREEK MARINE CREEL SURVEY

A two-stage stratified random creel survey was conducted at the Deep Creek marine access site (mile 137.3 Sterling Highway) from 1 May through 31 July. Effort, harvest, and catch of chinook salmon and Pacific halibut in this fishery were estimated. Within the sampling design, days were the first stage units and boat-parties the second stage units. The sampling day ran from 0800 hours to midnight. There were three dimensions of stratification:

1. time of day, separated into a "non-peak" period (0800-1159 hours, 2000-2359 hours) and "peak" period (1200-1959 hours);
2. exit area (harbor, north of tractor launch area, tractor launch area, south of tractor launch area); and
3. seasonal periods (1-27 May, Memorial Day weekend, 30 May-1 July, Fourth of July weekend, and 5-31 July).

The resultant number of strata was 40 (Table 1).

A total of eight personnel were assigned to sample at the Deep Creek marine access area. A minimum of two samples (two daily 8-hour shifts) per stratum were scheduled, with most strata sampled more heavily (Table 1). Both of the holiday weekends (Memorial Day weekend and 4th of July weekend) were virtually censused (i.e. coverage of all exit areas from 0800 hours to midnight each day).

WHISKEY GULCH MARINE CREEL SURVEY

A stratified systematic creel survey was conducted at the Whiskey Gulch access site (mile 152.5 Sterling Highway) from 1 May through 31 July 1994. The sampling design is identical to the Deep Creek design except that the entire beach (approximately 4 miles) was treated as one exit area. Accordingly, the number of strata for the Whiskey Gulch marine access survey was 10 (Table 2). Also, because it was basically a one-person survey, periods to be sampled were selected in a random systematic manner. As with the Deep Creek creel survey, both of the holiday weekends (Memorial Day weekend and Fourth of July weekend) were virtually censused (i.e. complete coverage from 0800 hours to midnight each day).

Table 1.-Summary of strata and sampling schedule for the 1994 marine boat creel survey at the Deep Creek marine access area.

Location	Stratum	Seasonal Period	Time of day	Number of Days in Stratum	Number of Days Sampled
Harbor	1	1 May-27 May	Non-peak: 0800-1159 &	27	9
	2		Peak : 1200-1959	27	8
	3	Memorial Day Weekend:	Non-peak: 0800-1159 &	3	3
	4	28 May-30 May	Peak : 1200-1959	3	3
	5	31 May-1 July	Non-peak: 0800-1159 &	32	6
	6		Peak : 1200-1959	32	9
	7	4th of July Weekend:	Non-peak: 0800-1159 &	3	3
	8		Peak : 1200-1959	3	3
	9	5 July-31 July	Non-peak: 0800-1159 &	27	9
	10		Peak : 1200-1959	27	6
North of Tractors	11	1 May-27 May	Non-peak: 0800-1159 &	27	7
	12		Peak : 1200-1959	27	11
	13	Memorial Day Weekend:	Non-peak: 0800-1159 &	3	3
	14	28 May-30 May	Peak : 1200-1959	3	3
	15	31 May-1 July	Non-peak: 0800-1159 &	32	7
	16		Peak : 1200-1959	32	11
	17	4th of July Weekend:	Non-peak: 0800-1159 &	3	3
	18		Peak : 1200-1959	3	3
	19	5 July-31 July	Non-peak: 0800-1159 &	27	11
	20		Peak : 1200-1959	27	6
Tractors	21	1 May-27 May	Non-peak: 0800-1159 &	27	10
	22		Peak : 1200-1959	27	24
	23	Memorial Day Weekend:	Non-peak: 0800-1159 &	3	3
	24	28 May-30 May	Peak : 1200-1959	3	3
	25	31 May-1 July	Non-peak: 0800-1159 &	32	11
	26		Peak : 1200-1959	32	23
	27	4th of July Weekend:	Non-peak: 0800-1159 &	3	3
	28		Peak : 1200-1959	3	3
	29	5 July-31 July	Non-peak: 0800-1159 &	27	12
	30		Peak : 1200-1959	27	23
South of Tractors	31	1 May-27 May	Non-peak: 0800-1159 &	27	12
	32		Peak : 1200-1959	27	22
	33	Memorial Day Weekend:	Non-peak: 0800-1159 &	3	3
	34	28 May-30 May	Peak : 1200-1959	3	3
	35	31 May-1 July	Non-peak: 0800-1159 &	32	12
	36		Peak : 1200-1959	32	18
	37	4th of July Weekend:	Non-peak: 0800-1159 &	3	3
	38		Peak : 1200-1959	3	3
	39	5 July-31 July	Non-peak: 0800-1159 &	27	13
	40		Peak : 1200-1959	27	15
	Total			736	343

Table 2.-Summary of strata and sampling schedule for the 1994 marine boat creel survey at the Whiskey Gulch marine access area.

Stratum	Seasonal Period	Time of day	Number of Days in Stratum	Number of Days Sampled
1	1 May-27 May	Non-peak: 0800-1159 & 2000-2359	27	7
2		Peak : 1200-1959	27	13
3	Memorial Day Weekend:	Non-peak: 0800-1159 & 2000-2359	3	3
4	28 May-30 May	Peak : 1200-1959	3	3
5	31 May-1 July	Non-peak: 0800-1159 & 2000-2359	32	9
6		Peak : 1200-1959	32	16
7	4th of July Weekend: 2 July-4 July	Non-peak: 0800-1159 & 2000-2359	3	3
8		Peak : 1200-1959	3	3
9	5 July-31 July	Non-peak: 0800-1159 & 2000-2359	27	7
10		Peak : 1200-1959	27	13
Total			184	77

ANCHOR POINT MARINE CREEL SURVEY

A stratified systematic creel survey was conducted at the Anchor Point access site (mile 156.9 Sterling Highway) from 1 May through 31 July. Unlike the schedule at Deep Creek and Whiskey Gulch, the sampling day ran from 0600 hours to midnight. The daily sampling periods at this site were 0600-1159 hours, 1200-1759hours, and 1800-2359 hours. Most of the boats were presumed to enter and exit the fishery through the Anchor River boat launch at Anchor Point relative to the high tide periods, generally within 3 hours of high tide. In order to stratify sampling between probable high use and low use periods related to the tidal stage, each 6-hour sampling period was classified based on its relation to the daily high tides. A period was classified as "prime" when 2 hours or more of the 6-hour high tide period occurred during that period, or the last 1 hour or more of the high tide period occurred in the middle or late period; and if this time frame occurred during daylight hours. Otherwise, a period was classified as "non-prime." In addition to stratification by type of period (prime or non-prime), the same seasonal strata were used as in the Deep Creek and Whiskey Gulch access areas. The resultant number of strata was 10. Within each strata, periods to be sampled were selected systematically. Minimally, three periods were sampled per strata, otherwise all possible periods were scheduled in strata with less than three periods total (Table 3).

GENERAL DATA COLLECTION

For any selected day within a stratum the entire 8 hours (or 6 hours at Anchor Point) of that stratum was sampled. Boat-parties were interviewed as they exited the fishery at each exit area. Every attempt was made to interview all of the boat-parties that exited the fishery during the scheduled period; when it was not possible to interview every boat-party (during busy periods) non-interviewed boat-parties were counted. In order to avoid

Table 3.-Summary of strata and sampling schedule for the 1994 marine boat creel survey at the Anchor Point marine access area.

Stratum	Seasonal Period	Type of Period	Number of Sampling Periods in Stratum	Number of Sampling Periods Sampled
1	1 May-27 May	Non-prime Tide Periods	27	6
2		Prime Tide Periods	54	27
3	Memorial Day Weekend:	Non-prime Tide Periods	2	2
4	28 May-30 May	Prime Tide Periods	7	3
5	31 May-1 July	Non-prime Tide Periods	32	6
6		Prime Tide Periods	64	32
7	4th of July Weekend: 2 July-4 July	Non-prime Tide Periods	1	1
8		Prime Tide Periods	8	4
9	5 July-31 July	Non-prime Tide Periods	26	5
10		Prime Tide Periods	55	27
Total			276	113

congestion due to the interview process, the interviews were brief and conducted as anglers were securing their boats, gear, etc. for exiting the beach. Data collected from each boat-party included trip type (guided or unguided), maximum number of rods fished at any one time, number of fish kept (by species, chinook salmon and/or Pacific halibut), and the number of fish of these species that were released. In addition, beginning on 1 June, the statistical area in which anglers fished for and/or caught Pacific halibut was also recorded (Figure 2); the edited data were provided to the regional groundfish biologist and are summarized in a separate report. The hour in which the boat-parties exited the fishery was also recorded. No biological sampling was scheduled for the 1994 field season. Interview data were recorded primarily on Marine Interview mark-sense forms (version 1.0).

Log books were provided to each private lodge for recording the same types of fishery information that were collected at the public access sites (Appendix B).

The final data were read into a Statistical Analysis System (SAS) data set using PC SAS for Windows. After final checking of the SAS data set the data were analyzed according to procedures outlined below.

General Data Analysis

Standard procedures outlined in Bernard et al. (*In prep*) were used to calculate estimates of angler effort, and catch and harvest by species for the direct expansion creel surveys at Deep Creek, Whiskey Gulch, and Anchor Point. For the Deep Creek access location, the data were analyzed as a stratified two-stage random sample survey with days and boat-parties as the first and second stage sampling units, respectively. First, the mean harvest of

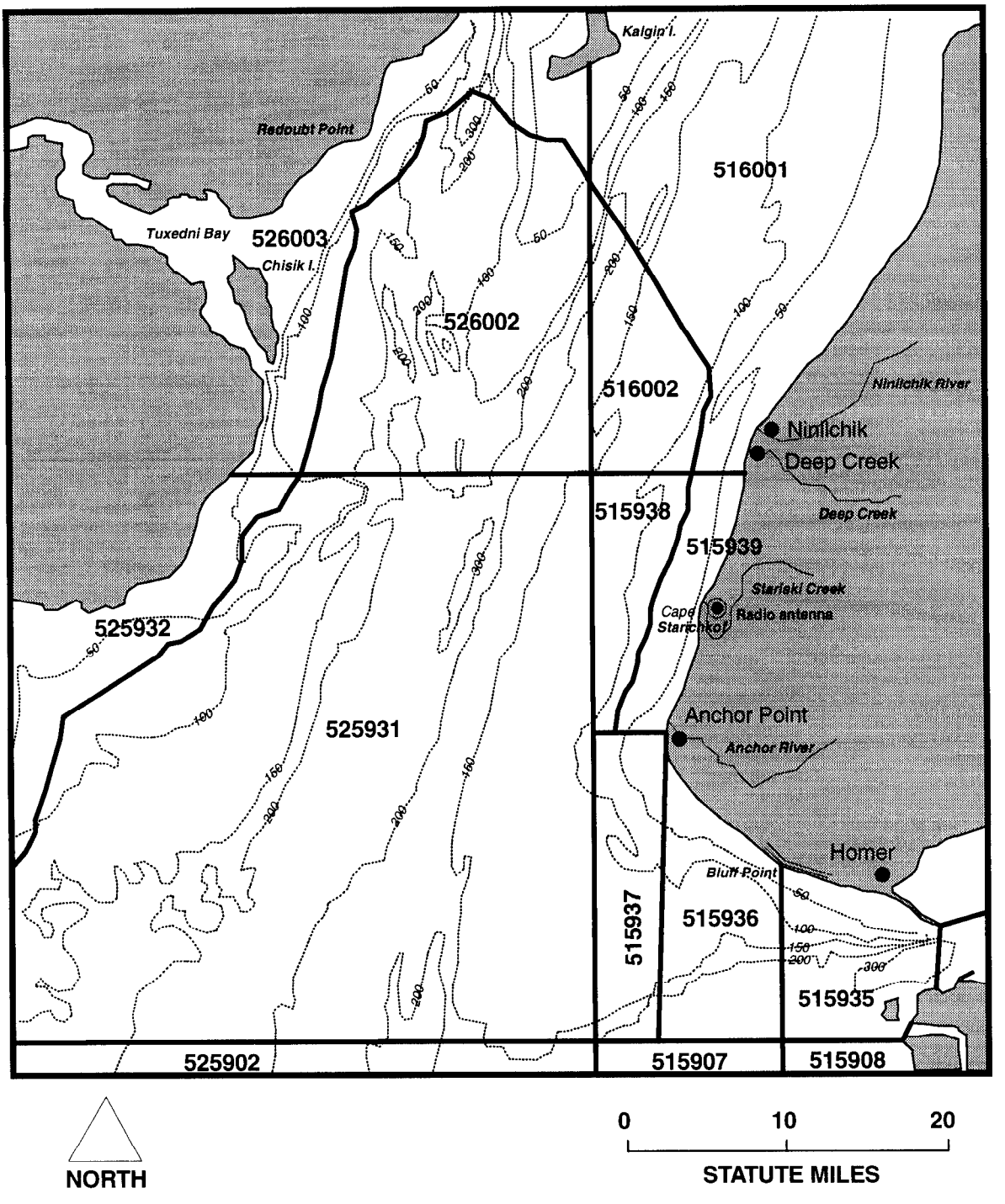

Figure 2.-Map of the groundfish statistical areas for Cook Inlet.

each species was obtained over all boat-parties interviewed during each sampled day:

$$\bar{y}_{hi} = \frac{\sum_{j=1}^{m_{hi}} y_{hij}}{m_{hi}} \quad (1)$$

where: y_{hij} was the number of fish harvested by interviewed boat-party j on sampled day i within stratum h; and m_{hi} was the number of boat-parties interviewed in stratum h during day i.

Then the mean estimate was expanded over all counted boat-parties to obtain the harvest estimate for each sampled day:

$$\hat{Y}_{hi} = M_{hi}\bar{y}_{hi} \quad (2)$$

where: M_{hi} equaled the number of boat-parties counted during day i within stratum h.

Then, the mean harvest by species was obtained over all sampled days within stratum h:

$$\bar{Y}_h = \frac{\sum_{i=1}^{d_h} \hat{Y}_{hi}}{d_h} \quad (3)$$

where: d_h was the number of days sampled within stratum h.

Finally, the estimated total harvest within stratum h was obtained by expanding for days:

$$\hat{Y}_h = D_h\bar{Y}_h \quad (4)$$

where: D_h equaled the number of days within stratum h.

Estimates of the catch of each species, as well as effort in angler-days, were obtained by substituting the appropriate catch and effort statistics into equations (1) through (4) above.

The sample design for estimation of the number of boats was single-stage, stratified random. Estimates of the number of boats fishing were obtained by letting y_{hij} in equation (1) equal one for each boat interviewed.

The variance of the stratum estimates of harvest was obtained as follows (adapted from Cochran 1977):

$$v[\hat{Y}_h] = (1-f_{1h})D_h^2\frac{s_{1h}^2}{d_h} + f_{1h}D_h^2\frac{1}{d_h}\frac{\sum_{i=1}^{d_h'} M_{hi}^2(1-f_{2hi})\frac{s_{2hi}^2}{m_{hi}}}{d_h'} \quad (5)$$

where: f_{1h}, and f_{2hi} were the sampling fractions for days and boat-parties, respectively (i.e., $f_{1h} = d_h/D_h$ and $f_{2hi} = m_{hi}/M_{hi}$); s_{1h}^2 was the among-day variance component:

$$s_{1h}^2 = \frac{\sum_{i=1}^{d_h}\left(\hat{Y}_{hi} - \bar{Y}_h\right)^2}{d_h - 1}; \quad (6)$$

s_{2hi}^2 was the among-boat variance component:

$$s_{2hi}^2 = \frac{\sum_{j=1}^{m_{hi}}\left(y_{hij} - \bar{y}_{hi}\right)^2}{m_{hi} - 1}; \quad (7)$$

and d_h' was the number of days sampled within stratum h in which s_{2hi}^2 could be calculated (days in which m_{hi} was 2 or greater).

Variances of stratum estimates of catch and angler effort, and number of boats were obtained similarly, by substituting the appropriate catch, effort, and boat statistics into equations (5) through (7) above. The second term of equation (5) drops out (it is zero) for the variance of the estimated number of boats.

Estimates of angler effort, catch and harvest by species, and their variances across all strata were obtained by summing the individual stratum estimates. Standard errors were obtained by taking the square root of the variance estimates.

For the Whiskey Gulch survey, the first-stage sampling units (days) were selected systematically. Therefore equation (6) did not apply, and the among-day variance component was estimated as follows:

$$s_{1h}^2 = \frac{\sum_{i=2}^{d_h} \left(\hat{Y}_{hi} - \hat{Y}_{h,i-1}\right)^2}{2\,(d_h - 1)}. \qquad (8)$$

For the Anchor Point survey, estimates were obtained using the same procedures as the Whiskey Gulch survey, except that periods (instead of days) were the first-stage units.

Harvest and effort data collected from the private lodges were treated as though they came from a census, not a sample survey. For simplicity these data were combined with the estimates of harvest and effort for the Deep Creek access site.

RESULTS

ESTIMATES OF EFFORT, HARVEST, AND CATCH

Between 1 May and 31 July, fishing effort and harvest information was collected during 9,945 boat interviews of 35,461 anglers participating in the Central Cook Inlet marine recreational fishery. Creel technicians were present for at least part of the day for 91 of the 92 days of the survey at Deep Creek, 71 days at Whiskey Gulch, and 86 days at Anchor Point. Bad weather kept all boats from fishing from the Deep Creek access location on 5 May, 18 June, and 25 June. Interviewed anglers reported harvesting 4,663 chinook salmon and 38,068 halibut. During these surveys, we documented 57% of the estimated total effort, 63% of the estimated chinook salmon harvest, and 60% of the estimated halibut harvest for the fishery.

Total estimated effort for all locations was 62,292 angler days (SE = 1,796) (Table 4). An estimated 12,393 boats (SE = 419) exited at the Deep Creek marine access location from 1 May-31 July. Total estimated chinook salmon harvest for all locations was 7,446 (SE = 300): 5,577 (SE = 237) from the early run, and 1,869 (SE = 124) from the late run (Table 4). Total estimated Pacific halibut harvest was 63,831 (SE = 2,229) (Table 4).

The Deep Creek location (including private lodges) accounted for roughly three-quarters of the harvest and effort in this fishery, with most of the remaining harvest and effort occurring out of Anchor Point (Tables 4-8). The Whiskey Gulch location accounted for roughly 5% of the harvest and effort (Tables 4 and 9).

For all locations combined, guided anglers represented 37% of the fishing effort, but harvested approximately half of the chinook salmon and halibut (Figure 3). The guided component of the harvest and effort varied considerably between locations. Approximately 90% of the guided effort and harvest occurred at the Deep Creek access location. At the Deep Creek access location, guided anglers accounted for 47% of the fishing effort, 56% of the chinook salmon harvest, and 64% of the halibut harvest.(Figure 3). Roughly one-third of boats exiting at the Deep Creek access location were charter boats. The remainder of the guided effort occurred at Anchor Point (there was no guided effort observed during our sampling at Whiskey Gulch). At the Anchor Point access location, guided anglers accounted for 15% of the fishing effort, 33% of the chinook salmon harvest, and 21% of the halibut harvest (Figure 3).

For all locations combined, anglers released 10% (796 fish) of the chinook salmon landed and 42% (45,773 fish) of the halibut landed. At the Deep Creek access location, anglers released 6% of the chinook salmon landed and

Table 4.-Summary of estimates of effort and harvest of chinook salmon and Pacific halibut for the Central Cook Inlet marine recreational fishery, 1 May-31 July 1994.

	Deep Creek	SE	Whiskey Gulch	SE	Anchor Point	SE	Total	SE	Relative Precision
Chinook Salmon Harvest									
Early run[a]	4,404	261	180	24	993	78	5,577	237	8.3%
Late run[b]	1,337	107	77	29	455	55	1,869	124	13.0%
Total	5,741	282	257	38	1,448	96	7,446	300	7.9%
Pacific Halibut Harvest									
1 May-31 July	50,008	1,408	2,630	240	11,193	1,290	63,831	2,229	6.8%
Fishing Effort (angler-days)									
Early run[a]	22,819	1,008	1,795	159	6,832	783	31,446	1,288	8.0%
Late run[b]	22,803	975	1,424	177	6,619	769	30,846	1,254	8.0%
Total	45,622	1,402	3,219	238	13,451	1,097	62,292	1,796	5.7%

[a] 1 May-22 June.

[b] 23 June-31 July.

Table 5.-Summary of estimates of catch and harvest of chinook salmon and Pacific halibut for the Deep Creek marine access location, 1 May-31 July 1994.

Dates	Catch by Guided Anglers	SE	Catch by Unguided Anglers	SE	Total Catch	SE	Harvest by Guided Anglers	SE	Harvest by Unguided Anglers	SE	Total Harvest	SE
Chinook Salmon												
1 May-27 May	1,643	173	1,289	120	2,932	247	1,508	157	1,196	111	2,704	220
28 May-30 May	371	2	335	1	706	2	354	2	312	1	666	2
31 May-22 June	677	77	432	84	1,109	130	638	74	391	82	1,029	126
2 July-4 July	32	<1	9	<1	41	1	32	<1	8	<1	40	1
23 June-1 July, 5 July-31 July	669	42	667	97	1,336	111	662	41	636	93	1,298	107
Total	3,392	194	2,732	176	6,126[a]	300	3,194	179	2,543	166	5,741[a]	282
Pacific Halibut												
1 May-27 May	5,977	521	4,004	379	9,981	814	4,152	421	2,884	282	7,036	650
28 May-30 May	1,885	9	1,221	6	3,106	10	1,246	6	904	4	2,150	6
31 May-22 June	15,605	1,356	7,632	769	23,237	1,834	8,399	674	4,991	481	13,390	984
2 July-4 July	1,664	7	667	7	2,331	9	1,001	4	431	4	1,432	5
23 June-1 July, 5 July-31 July	28,724	1,424	13,509	949	42,233	2,057	17,162	824	8,748	599	25,910	1,226
Total	53,855	2,034	27,033	1,279	81,020[a]	2,873	31,960	1,145	17,958	819	50,008[a]	1,701

[a] Class (whether guided or unguided) was not recorded for some boats, so the grand total is greater than the sum of both.

Table 6.-Summary of estimates of fishing effort (angler-days) for the Deep Creek marine access location, 1 May-31 July 1994.

Dates	Effort by Guided Anglers	SE	Effort by Unguided Anglers	SE	Total Effort	SE
1 May-27 May	3,839	320	6,141	549	9,980	756
28 May-30 May	989	5	1,756	5	2,745	4
31 May-22 June	5,083	362	4,983	442	10,066	667
2 July-4 July	722	5	663	4	1,385	4
23 June-1 July, 5 July-31 July	10,603	481	10,740	680	21,343	975
Total	21,236	682	24,283	980	45,621[a]	1,402

[a] Class (whether guided or unguided) was not recorded for some boats, so the grand total is greater than the sum of both.

Table 7.-Summary of catch and harvest estimates of chinook salmon and Pacific halibut for the Anchor Point marine access location, 1 May-31 July 1994.

Dates	Catch by Guided Anglers	SE	Catch by Unguided Anglers	SE	Total Catch	SE	Harvest by Guided Anglers	SE	Harvest by Unguided Anglers	SE	Total Harvest	SE
Chinook Salmon												
1 May-27 May	282	64	509	76	791	94	181	43	376	55	557	57
28 May-30 May	23	27	98	33	121	24	21	22	83	27	104	23
31 May-22 June	173	33	224	40	397	59	154	23	177	30	331	48
2 July-4 July	4	3	8	1	12	4	4	2	6	0	10	3
23 June-1 July, 5 July-31 July	122	42	376	53	498	60	122	34	323	45	445	55
Total	604	88	1,215	106	1,820[a]	129	482	63	965	82	1,449[a]	96
Pacific Halibut												
1 May-27 May	423	164	726	180	1,149	236	251	95	592	104	843	131
28 May-30 May	307	136	926	185	1,233	145	98	128	493	134	591	84
31 May-22 June	2,205	1,645	8,098	1,759	10,303	3,381	736	788	3,802	746	4,538	1,222
2 July-4 July	84	142	370	13	454	239	42	80	209	6	251	129
23 June-1 July, 5 July-31 July	2,551	661	6,927	932	9,478	1,406	1,144	388	3,692	486	4,836	701
Total	5,570	1,791	17,047	2,007	23,183[a]	3,679	2,271	896	8,788	906	11,193[a]	1,423

[a] Class (whether guided or unguided) was not recorded for some boats, so the grand total is greater than the sum of both.

Table 8.-Summary of estimates of fishing effort for the Anchor Point marine access location, 1 May-31 July 1994.

Dates	Effort by Guided Anglers	SE	Effort by Unguided Anglers	SE	Total Effort	SE
1 May-27 May	396	234	1,712	258	2,108	272
28 May-30 May	92	307	933	306	1,025	220
31 May-22 June	465	531	3,169	486	3,634	700
2 July-4 July	68	169	461	43	529	179
23 June-1 July, 5 July-31 July	980	516	5,102	615	6,082	748
Total	2,001	852	11,377	881	13,451[a]	1,097

[a] Class (whether guided or unguided) was not recorded for some boats, so the grand total is greater than the sum of both.

Table 9.-Summary of fishery parameter estimates for the Whiskey Gulch marine access location, 1 May-31 July 1994. During our sampling, there was no guided fishing at Whiskey Gulch.

Dates	Chinook Salmon Catch	SE	Chinook Salmon Harvest	SE	Halibut Catch	SE	Halibut Harvest	SE	Angler Effort (Angler days)	SE
1 May-27 May	71	18	71	18	626	205	332	77	518	91
28 May-30 May	46	3	38	2	627	23	345	9	528	4
31 May-22 June	94	30	71	17	1,740	815	729	159	749	130
2 July-4 July	8	<1	7	<1	333	8	172	3	220	1
23 June-1 July, 5 July-31 July	77	29	69	29	2,076	470	1,052	162	1,204	177
Total	296	46	256	38	5,401	963	2,630	240	3,219	238

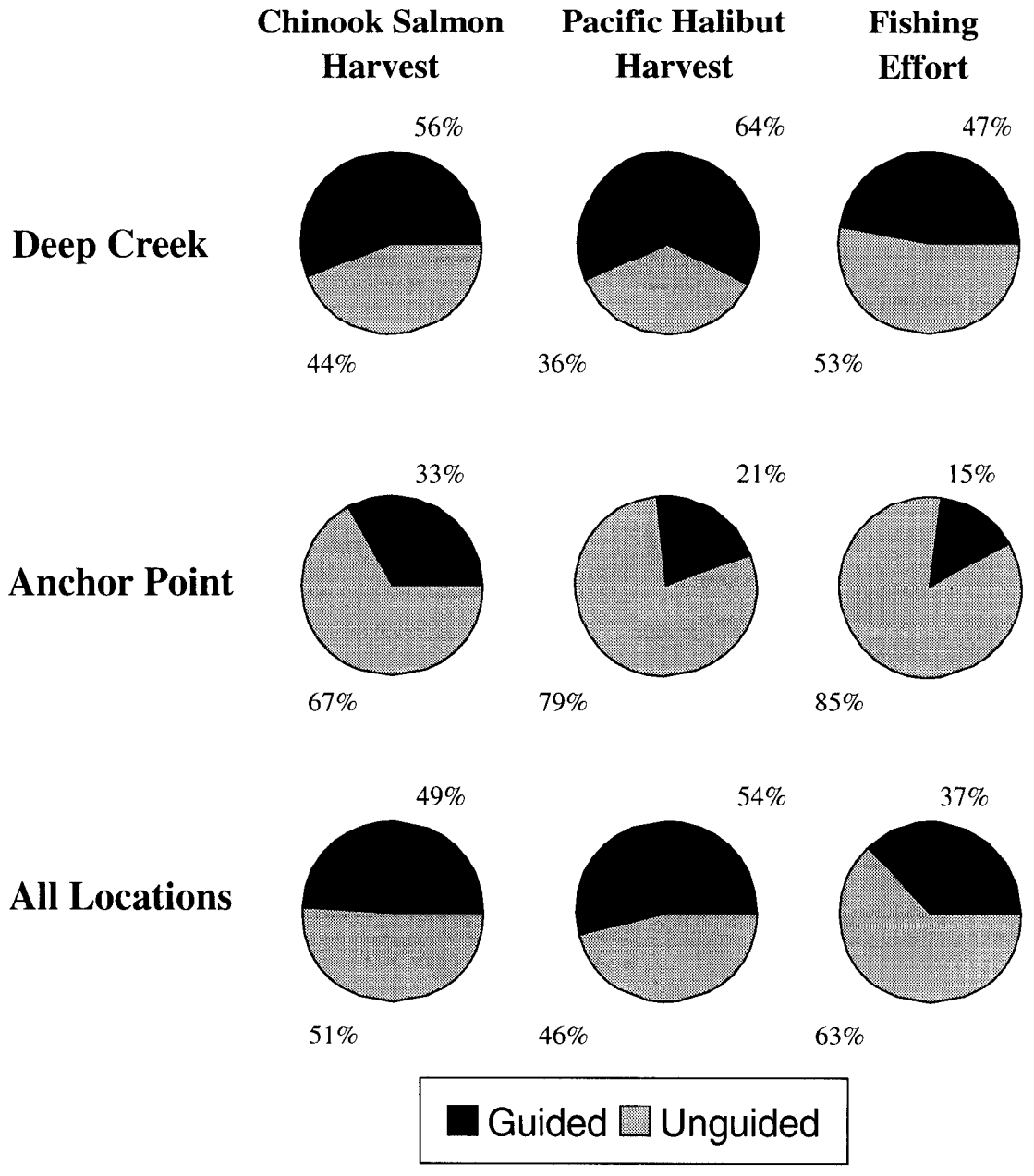

Figure 3.-Guided and unguided proportions of the chinook salmon harvest, Pacific halibut harvest, and fishing effort for the Central Cook Inlet marine recreational fishery, 1 May-31 July 1994.

Point anglers released 20% of the chinook salmon landed and 52% of the halibut landed (Table 8). At Whiskey Gulch, 14% of the chinook salmon landed were released as were 51% of the halibut landed (Table 9). Guided anglers released similar fractions of the catch as unguided anglers.

Results of the data on halibut harvest by statistical area are summarized in Meyer (*In prep*).

EARLY-RUN/LATE-RUN CHINOOK SALMON HARVEST

The reported harvest of chinook salmon by interviewed anglers for the Deep Creek access location peaked in late May and again in mid-July (Figure 4). These numbers are probably affected by weather, fishing pressure, and the amount of sampling effort that day, as well as the abundance of chinook salmon passing through the fishery. However these data likely serve as a good index for separating the harvest between early and late runs of chinook salmon. Based on these data 1 May-22 June was classified as the "early run" of the marine chinook salmon fishery and June 23-July 31 was classified as the "late run." These dates are somewhat arbitrary, and are likely to vary from year-to-year as run timing and catch rate patterns vary.

Although fishing effort (measured in angler-days) was split nearly evenly between early- and late-run periods (1 May-22 June, 23 June-31 July, respectively), 75% of the chinook salmon harvest occurred in the early run. It should be noted that there are 53 calendar days in the early-run period, and 39 calendar days in the late run. Of the late-run chinook salmon harvest, 72% occurred at Deep Creek, 24% at Anchor Point, and 4% at Whiskey Gulch (Table 4). Guided anglers accounted for 51% of the early-run chinook salmon harvest, and 44% of the late-run harvest (Tables 5, 7, and 8).

DISCUSSION

SURVEY ACCURACY

The creel surveys described in this report were designed primarily to estimate the total recreational harvest of chinook salmon in the marine waters of Central Cook Inlet. However, due to reasonable time and budget constraints, our sampling was restricted to a 16-hour day, at the access sites described, from 1 May through 31 July. Our sampling did not estimate the harvest and effort of: (1) anglers that exit before or after our sampling day begins; (2) anglers that exit at other locations (Ninilchik River access, Homer small boat harbor); and (3) anglers that fished before 1 May or after 31 July. Because of this, our estimates of chinook salmon and halibut harvest should not be treated as a season total.

One of the short-term goals of this project is the validation (or invalidation) of the Statewide Harvest Survey as an accurate tool for estimating chinook salmon harvest in this fishery. As expected, the estimate of chinook salmon harvest from the on-site creel is less than the estimate from the SWHS (by about 19%; Table 10). The estimates of harvest from the SWHS are probably more accurate because sampling design does not have the time/area/seasonal restrictions of the on-site creel.

TRENDS IN THE FISHERY

The Central Cook Inlet Marine recreational fishery has grown steadily in recent years, with most of the growth occurring in the guided segment of the fishery (Mills 1988-1994). Between 1987 and 1994, the harvest of chinook salmon increased by 93% (4,422 fish), while the guided fraction of the chinook salmon harvest increased from 5% to 45% (Table 11). During these same years, the harvest of halibut in this fishery has increased by 149 (approximately 47,000 fish).

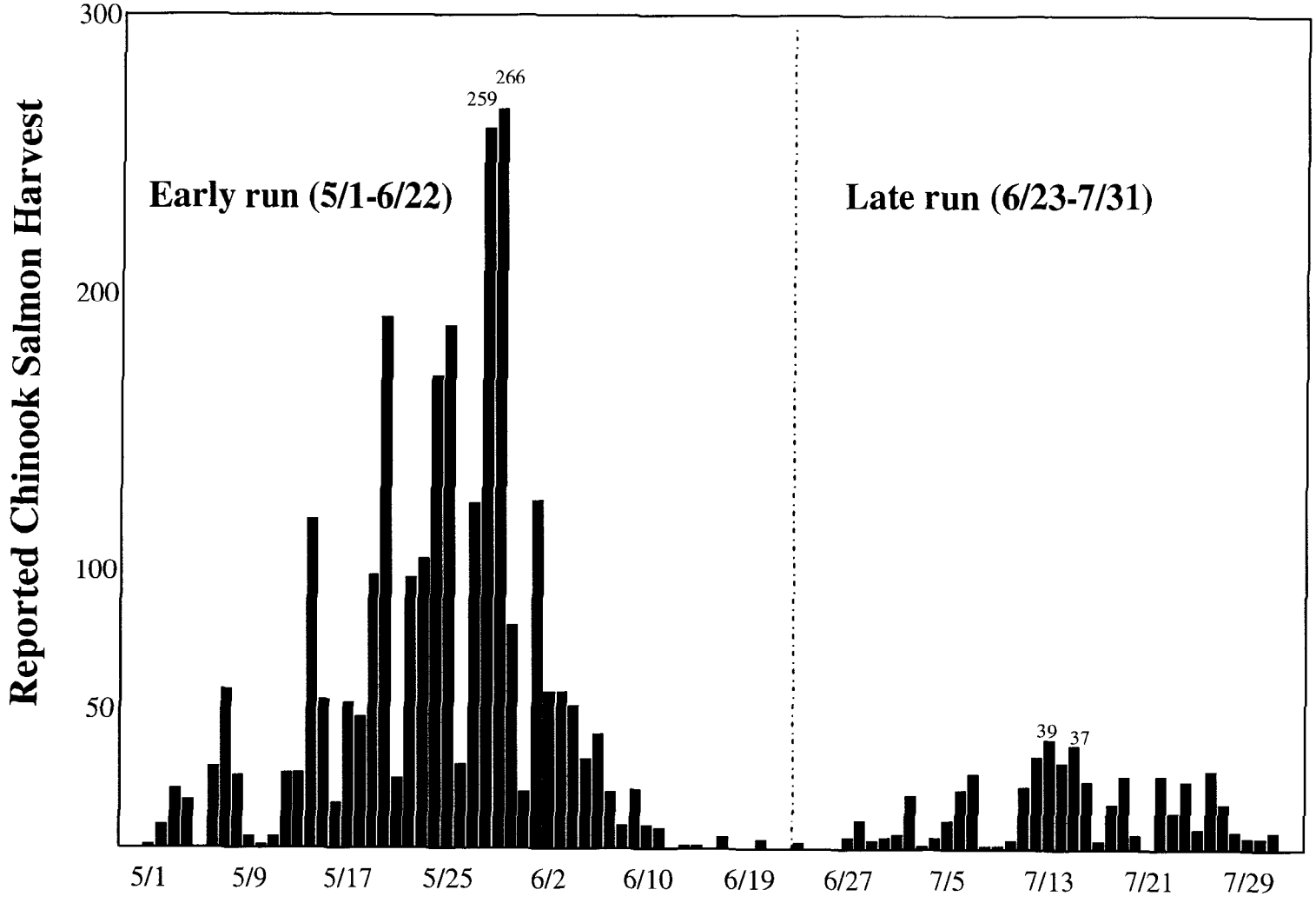

Figure 4.-Chinook salmon harvest reported by interviewed anglers by date at the Deep Creek marine access location, 1994.

Table 10.-Comparison between fishery parameter estimates from an onsite creel survey and the Statewide Harvest Survey (Howe et al. 1995) for the Central Cook Inlet marine recreational fishery in 1994.

Source	Chinook salmon harvest	SE	Guided component
Onsite creel survey	7,446	300	49%
Statewide Harvest Survey	9,168	464	45%

This level of harvest approaches the level of the Homer halibut fishery in numbers of halibut harvested, but AWL sampling conducted in 1994 showed that halibut harvested in Homer are typically older and larger than those harvested at Deep Creek and Anchor Point (Meyer *In prep*).

Between 1993 and 1994, the number of boats that exited the fishery at the Deep Creek access site increased by 18% (10,480 boats vs. 12,393, respectively). Concurrent with the increase in boats, however, the chinook salmon harvest actually decreased by 34% (11,336 chinook in 1993 vs. 7,446 in 1994). Participants in the fishery claim that there were an unusually high number of good weather days (making it possible to fish) during 1993; this may help explain the large harvest of chinook salmon in 1993 relative to 1994 and the previous years.

Because the Deep Creek access location is a state campground, business vendors (such as fishing guides) operating at this location need a permit from the Department of Natural Resources-Alaska State Parks. The permit for Deep Creek costs $200 for residents and $500 for nonresidents (less than half of the cost for a Kenai River permit). In 1993, 135 guide boats were issued permits for operating out of Deep Creek marine; only 26 of these were registered exclusively for the Deep Creek site. In 1994, 219 guide boats were issued permits for Deep Creek; only 32 of these were registered exclusively for the Deep Creek site. The remainder of the guide boats registered for Deep Creek (109 boats in 1993 and 187 boats in 1994) were actually registered Kenai River guides that are allowed to register at Deep Creek also for no additional fee. Thus, although over 200 guide boats were registered to use Deep Creek in 1994, on average approximately 50 guide boats fished per day at the Deep Creek site. Apparently, only a small percentage of the guide boats registered fished consistently or at all at Deep Creek.

EARLY RUN CHINOOK SALMON STOCK OF ORIGIN

The data presented in Table 12 summarize all of the information that exist on the stock of origin of the early-run chinook salmon harvest in this fishery. After expansion for marking fractions, these tag returns account for only 0.5% (124 of 23,426) of the fish harvested in the early run of this fishery between 1991 and 1994.

RECOMMENDATIONS

The level of chinook salmon harvest at the Whiskey Gulch access site is small, and the relative sampling error is similar to that of the estimated harvest at Deep Creek; therefore, I recommend that the Whiskey Gulch creel survey be dropped for the 1995 surveys.

The Anchor Point creel design for 1994 was based on the assumption that all boats would exit the fishery within 3 hours of the high tide. Beginning in mid-May a tractor launch service was begun at Anchor Point for the first time, allowing anglers to launch and exit the fishery regardless of the tidal state. The 1995 Anchor Point creel sampling schedule

Table 11.-Recent harvest and effort estimates for the Central Cook Inlet marine recreational fishery.

Year	Chinook Harvest		Halibut Harvest		Effort	
	Total	% Guided	Total	% Guided	Total	% Guided
1987[a]	4,746	5	31,276	2	78,869	1
1988[a]	5,674	4	41,691	5	54,128	3
1989[a]	5,356	6	48,761	5	61,879	3
1990[a]	6,194	8	51,639	8	80,825	4
1991[a]	6,367	35	55,732	17	82,938	14
1992[a]	7,796	39	58,971	40	91,173	30
1993[a]	11,336	43	63,952	43	81,707	35
1994[a]	9,168	45	77,845	50	109,726	40
1994[b]	7,446	49	63,831	54	62,292	37

[a] Estimates for the entire calendar year from the Statewide Harvest Survey (Mills 1988-1994, Howe et al. 1995).

[b] 1994 estimates from this project.

Table 12.-Summary of voluntary coded wire tag returns for the Central Cook Inlet marine recreational fishery, 1991-1994.

Recovery Date	Head Number	Tag Code	BR YR	Release Site	Release State	Number Marked	Number Released	l/theta	Date of Release	District-Sub district	length (mm)
05/12/91	48413	025329	87	ROBERTSON CREEK	BC	25,951	522,172	20	05/31/88	244-10	
05/15/91	48418	311742	86	CROOKED CR 244-30	AK	34,326	206,179	6	06/04/87	244-10	
05/20/91	48421	311758	87	DECEPTION CR 247-41	AK	20,936	201,091	10	07/12/88	244-10	
05/20/91	48420	024810	87	ROBERTSON CREEK	BC	29,060	330,595	11	05/31/88	244-10	
06/10/91	49256	024810	87	ROBERTSON CREEK	BC	29,060	330,595	11	05/31/88	244-10	
05/11/92	09303	311735	89	NINILCHIK R 244-20	AK	39,513	215,804	5	05/30/90	244-10	
05/11/92	09305	311762	87	NINILCHIK R 244-20	AK	30,944	248,586	8	07/06/88	244-10	
05/11/92	09304	024810	87	ROBERTSON CREEK	BC	29,060	330,595	11	05/31/88	244-10	
05/18/92	01017	311762	87	NINILCHIK R 244-20	AK	30,944	248,586	8	07/06/88	244	
05/07/93	64449	020247	89	ATNARKO RIVER UPPER	BC	23,906	360,467	15	06/08/90	244-70	737
05/22/93	64460	025962	88	RIVERS INLET SEAPENS	BC	26,389	126,659	5	07/07/89	244-70	1041
05/26/93	64454	311854	89	CROOKED CR 244-30	AK	26,475	234,019	9	06/06/90	244-20	
05/23/94	26505	311734	89	DECEPTION CR 247-41	AK	40,531	219,362	5	05/23/90	244-70	

should be based on the 1994 boat exit patterns, which showed a tendency of anglers to exit with the falling tide.

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APPENDIX A. RESULTS OF THE 1993 BOAT EXIT SURVEY AT DEEP CREEK AND WHISKEY GULCH

Appendix A1.-Memo describing the results of the 1993 boat exit surveys at Deep Creek and Whiskey Gulch.

MEMORANDUM **STATE OF ALASKA**

TO: Doug McBride
Research Coordinator

Sport Fish Division
Anchorage

DATE: January 4, 1994

FILE NO:

THRU: Larry Larson
Fisheries Biologist
Sport Fish Division
Soldotna

TELEPHONE NO: 262-9368

FROM: Tim McKinley
Fisheries Biologist
Marine
Sport Fish Division
Soldotna

SUBJECT: Results of 1993 Deep Creek Exit survey

Following is a summary of the information collected this past summer on the central Cook Inlet marine chinook salmon fishery at the Deep Creek and Whiskey Gulch access sites. I've laid out the results as the completion of "tasks" that were formulated in the operational plan "Central Cook Inlet Marine Chinook Salmon Fishery". The task of designing next year's creel survey is ongoing. Allen Bingham has been instrumental in designing the creel survey for next season.

Tasks:

(1). Estimate the total number of boats exiting the Deep Creek marine wayside area from 1 May to 31 July, 1993.

The actual survey period was Monday May 3 through Thursday July 29, 1993. During this time, 7,509 boats were counted as they exited the fishery. A creel clerk was present at Deep Creek Marine access for 71.6% of the 2 daily, 8-hour sampling periods; a direct expansion of the actual count gives an estimate of 10,480 boats. Of the four beach areas (boat harbor, area north of the tractors, tractor launch area, and area south of the tractors) the tractor launch area received the highest boat use. Our estimate of the number of boats exiting the tractor launch area (4,198 boats) is similar to the number reported to DNR by the tractor launch vendor (~ 4,000).

On average, an estimated 119 boats exited at Deep Creek wayside each day during the 88 day survey. The peak exit count occurred on May 29 (Memorial Day weekend) when 341 boats were counted as they exited at Deep Creek wayside.

In order to further characterize the Deep Creek fishery, some descriptive information was also collected as boats exited the fishery. With the exception of the harbor area, where most boats exited within 2 hours of high tide, most boats exited the beach areas irrespective of the tides. Guide boats represented 44.9% of the boats exiting at Deep Creek wayside during the 1993 season. The size of boats in the fishery is relatively small; virtually all of the boats are < 30 feet, and 58% are < 18 feet.

(2). Test the feasibility of utilizing a remote video camera to count boats exiting the Deep Creek wayside area from 1 May to 31 July, 1993.

The use of video cameras was determined to be feasible to count the number of boats exiting the marine fishery, but not very useful in collecting detailed characteristics about the boats or its occupants. When viewing the videotapes that were made from the bluff above the Deep Creek marine wayside, it was possible to discern a boat from a distance of 3/8 to 1/2 mile. However, it was very difficult to discern individuals in the boats, boat size, or to determine whether a boat is a charter boat, even when boats were as close as 1/4 mile distant. We feel this information is best collected by creel personnel rather than video equipment. To use video technology at this time would require a very costly array of camera equipment.

(3). Estimate the proportion of boats exiting the Whiskey Gulch wayside area from 1 May to 31 July, 1993, relative to those exiting the Deep Creek area.

Whiskey Gulch exit counts were conducted simultaneously to a portion of the exit counts at Deep Creek marine access. Although the proportions varied widely between days, overall, 240 boats exited Whiskey Gulch during the same periods that 1,592 boats exited Deep Creek (1:6.6; 15.1%).

(4). Conduct aerial boat counts to index the number of boats participating in the marine chinook salmon fishery between the Bluff Point at Homer and the mouth of the Ninilchik River.

Using fixed-wing aircraft, a total of 2,389 boats were counted within the traditional chinook salmon fishery area between the Bluff Point near Homer and the mouth of the Ninilchik River, between 1 May and 19 July, 1993. Of these, 69.7% were between the mouth of the Ninilchik River and north of the Whiskey Gulch camping area; 10.1% were adjacent to the Whiskey Gulch camping area; and 20.2% were between a point south of the Whiskey Gulch camping area and Bluff Point near Homer. Relating these findings to the simultaneous exit counts done at Whiskey Gulch and Deep Creek (Task #3) gives similar figures for the proportion of boats exiting at Whiskey Gulch: 69.7% x 15.1% = 10.5%.

(5). Monitor activity of anglers at private lodges between Bluff Point near Homer and Ninilchik River.

Prior to the 1993 season it was thought that there were as many as 12 lodges accessing the fishery independent of the public access sites. However, in 1993 there appeared to be only 3 active lodges operating between Bluff Point at Homer and the Ninilchik River. These lodges operate from their own private beach sites, may operate as many as six boats from a single lodge, and generally do not utilize the public beaches for accessing the fishery. Empirically, we feel all lodges combined may be equivalent to the amount of angling activity at Whiskey Gulch. Dave Nelson and Nick Dudiak contacted the lodge owners during the fall of 1993 and they agreed to provide harvest, catch, and effort information during the 1994 season.

We do not believe an additional technician is warranted for monitoring the small number of lodges operating from private beaches at this time. Logbooks may be provided to each lodge for recording catch, harvest, and effort information. This information would then be collected from each lodge periodically throughout the season.

(6). Provide recommendations for designing a creel survey program in 1994.

Although a formal operational plan has not been finalized, using the information collected during 1993 from Deep Creek and Whiskey Gulch we have designed three separate creel surveys for each major access location (Deep Creek, Whiskey Gulch, Anchor Point). The Deep Creek access creel survey utilizes a two-stage stratified design, with days as the first stage and boat parties as the second. The strata will be: time of day (0800-1159, 2000-2359; and 1200-2000); area (harbor, north of tractors, tractors, south of tractors); and season. Mike Mills estimates 11% precision for the Deep Creek marine chinook salmon harvest estimates in the SWHS; using 8 creel technicians, our expected precision is approximately 15% for the same fishery.

The Whiskey Gulch creel survey utilizes a stratified systematic design, using the same daily periods and seasonal periods as the Deep Creek design. The shift schedule at Whiskey Gulch will take 1+ technicians. Most of the shifts will be covered by an access person who is stationed there, with the balance of the shifts covered by myself or one of the Deep Creek technicians on a time available basis.

The design for the Anchor Point creel survey is not completed. The consensus is that most anglers exit the fishery at Anchor Point within 3 hours of high tide. Allen Bingham is designing a survey based on a 6 hour time block around the tides. We anticipate two technicians will be needed to conduct this survey.

The information that will be collected for each of the above surveys is catch, harvest, and fishing effort for chinook salmon and halibut. To facilitate a direct comparison with estimates from the SWHS, effort will be measured in angler days. At this time we still plan on using HP palm top computers for field recording of data, with mark-sense forms as a back-up.

cc: T. Bendock
A. Bingham
K. Delaney
S. Hammarstrom
K. Hepler
S. Meyer
D. Nelson
D. Vincent-Lang

APPENDIX B. VOLUNTARY LOGBOOK FORM FOR THE PRIVATE LODGES

Appendix B1.-Logbook form provided to the fishing lodges accessing the Central Cook Inlet marine recreational fishery via a closed access, private beach.

DATE	TIME AT END OF TRIP	# RODS	KINGS KEPT	KINGS RELEASED	HALIBUT KEPT	HALIBUT RELEASED

Each row represents a day of fishing for a boat of people. Even if someone fishes for only ten minutes, that counts as a day of fishing. If someone goes out more than once in the same day, and fishes for both kings and halibut, we count that as only one rod being fished.

OF RODS — the maximum number of rods that were fished from the boat at any time during the trip (if 3 rods were fished for kings, and then 4 rods for halibut, report 4). The data recorded should reflect how many people actually fished from the boat for either kings or halibut.

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KINGS KEPT	the number of kings that were kept and killed.
KINGS RELEASED	kings that were released after being landed; strikes, or kings that slipped the hook or otherwise escaped before being landed do not count as being released.
HALIBUT KEPT	the number of halibut that were kept and killed.
HALIBUT RELEASED	halibut that were released after being landed; strikes, or halibut that slipped the hook or otherwise escaped before being landed do not count as being released.

Thank you for taking part in our creel survey of the central Cook Inlet chinook salmon fishery. I'd like to assure you that any and all information that you provide the Department will be strictly confidential and not a part of the public record.

APPENDIX C. DATA FILE LISTING

Appendix C1.-Data files used to estimate harvest and effort estimates for the Central Cook Inlet marine recreational fishery, 1994.

Data File	Description
10010M_4.ARC[a]	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) for 1994.
CCIM.XLS[b]	Excel (5.0) worksheet file containing the interview information for 1994 and information collected from the private lodges.

[a] Data file archived at, and are available from, the Alaska Department of Fish and Game, Sport Fish Division, Research and Technical Services, 333 Raspberry Road, Anchorage, 99518-1599.

[b] Data file available from the author: Alaska Department of Fish and Game, Sport Fish Division, 34828 Kalifornsky Beach Road, Soldotna, AK, 99669.