Special Publication No. 03-06

Recreational Halibut Fishery Statistics for Southcentral Alaska (Regulatory Area 3A), 1995-1999

A Report to the International Pacific Halibut Commission

by

Scott C. Meyer

October 2003

Alaska Department of Fish and Game **Division of Sport Fish**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

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

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A REPORT TO THE INTERNATIONAL PACIFIC HALIBUT COMMISSION

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October 2003

This investigation was partially financed by the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K) under Projects F-10-11 through F-10-15, Job B-2-1.

The Special Publications series was established in 1991 for the publication of techniques and procedures manuals, informational pamphlets, special subject reports to decision-making bodies, symposia and workshop proceedings, application software documentation, in-house lectures, and other documents that do not fit in another publication series of the Division of Sport Fish. Special Publications are intended for fishery and other technical professionals. Special Publications are available through the Alaska State Library and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm This publication has undergone editorial and peer review.

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This document should be cited as:
Meyer, S. C. 2003. Recreational halibut fishery statistics for Southcentral Alaska (Regulatory Area 3A), 1995-1999. A report to the International Pacific Halibut Commission. Alaska Department of Fish and Game, Special Publication No. 03-06, Anchorage.

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ABSTRACT

Age, length, and sex composition, average length and weight, harvest biomass, and other fishery statistics were estimated for the recreational harvest of Pacific halibut *Hippoglossus stenolepis* from International Pacific Halibut Commission Regulatory Area 3A in the Gulf of Alaska during the period 1995-1999. Data on length, age, or sex were collected from 28,530 halibut and interviews were obtained for 11,194 vessel-trips that targeted halibut or caught halibut while targeting other species. Ages of harvested fish ranged from 3 to 26 years and the 1987 and 1988 year classes contributed significantly to the harvest all years. Average lengths and weights were greatest in the Kodiak, Valdez, and Yakutat fisheries. The estimated annual recreational harvest biomass for Area 3A ranged from 4.2 to 5.5 million pounds net weight (headed and gutted). Females made up 74% to 83% of the sport harvest. Fleets at several of the ports fished very large areas, traveling up to 176 km to reach fishing spots on day trips.

Key words: Pacific halibut, *Hippoglossus stenolepis*, recreational fishery, sport fishery, charter, harvest, effort, otolith, age, length, sex, mean length, mean weight, Kodiak, Deep Creek, Anchor Point, Homer, Seward, Whittier, Valdez, Cordova, Yakutat, Gulf of Alaska, Chiniak Bay, Cook Inlet, Kachemak Bay, North Gulf Coast, Resurrection Bay, Prince William Sound, Yakutat Bay.

INTRODUCTION

FISHERY DESCRIPTION

The coastal waters of the Gulf of Alaska support the world's largest recreational fishery for Pacific halibut *Hippoglossus stenolepis*. The fishery has developed largely in the last 25 years. In the mid-1970s, Skud (1975) estimated the total Alaska sport harvest at about 10,000 fish, and at that time, the sport fishery was not thought to be a critical factor in determining fluctuations in the abundance of the stock. It was difficult at the time to separate the catch of subsistence and sport fishermen in Alaska because subsistence users were allowed to fish with sport gear. By 1999 the statewide harvest had grown to 333,000 halibut (Howe et al. 2001d). The halibut fishery is now an important recreational activity and food source for residents and tourists.

The fishery is also of vital economic importance to the region and the state. Halibut fishing draws large numbers of tourists and local derbies raise money for community projects and organizations (Denny 1990). In 1986, guided and unguided anglers spent an estimated $18.5 million in Southcentral Alaska (excluding Kodiak area waters) in pursuit of halibut, and indicated a willingness to pay an additional $25 million to ensure the continued availability of halibut fishing opportunity (Jones and Stokes Associates Inc. 1987). Charter boats are a primary means of providing access to the fishery for residents and nonresidents, and nearly all communities have charter fleets ranging from a dozen to more than 100 boats. The Homer halibut charter fishery generated an estimated $9.1 million in gross income and the equivalent of 64 year-round jobs in the Homer economy in 1986 (Coughenower 1986). The most recent estimates indicate that about $19.3 million was spent in Alaska by Cook Inlet charter boat clients in 1998, with $15 million of that spent in the Cook Inlet area (North Pacific Fishery Management Council 2001; page 71).

International Pacific Halibut Commission (IPHC) Regulatory Area 3A encompasses waters from the west end of Kodiak Island to Cape Spencer (Figure 1). Within this area, the primary ports of sport halibut harvest are Kodiak, Homer, beaches at Anchor Point and Deep Creek, Seward, Whittier, Valdez, Cordova, and Yakutat. Area 3A also accounts for the largest share of the commercial halibut harvest, with Kodiak, Homer, and Seward making up the majority of landings. Commercial landings have long accounted for the majority of removals in Area 3A. Commercial catch in 1999 represented about 80% of Area 3A total removals (Clark and Parma 2000).

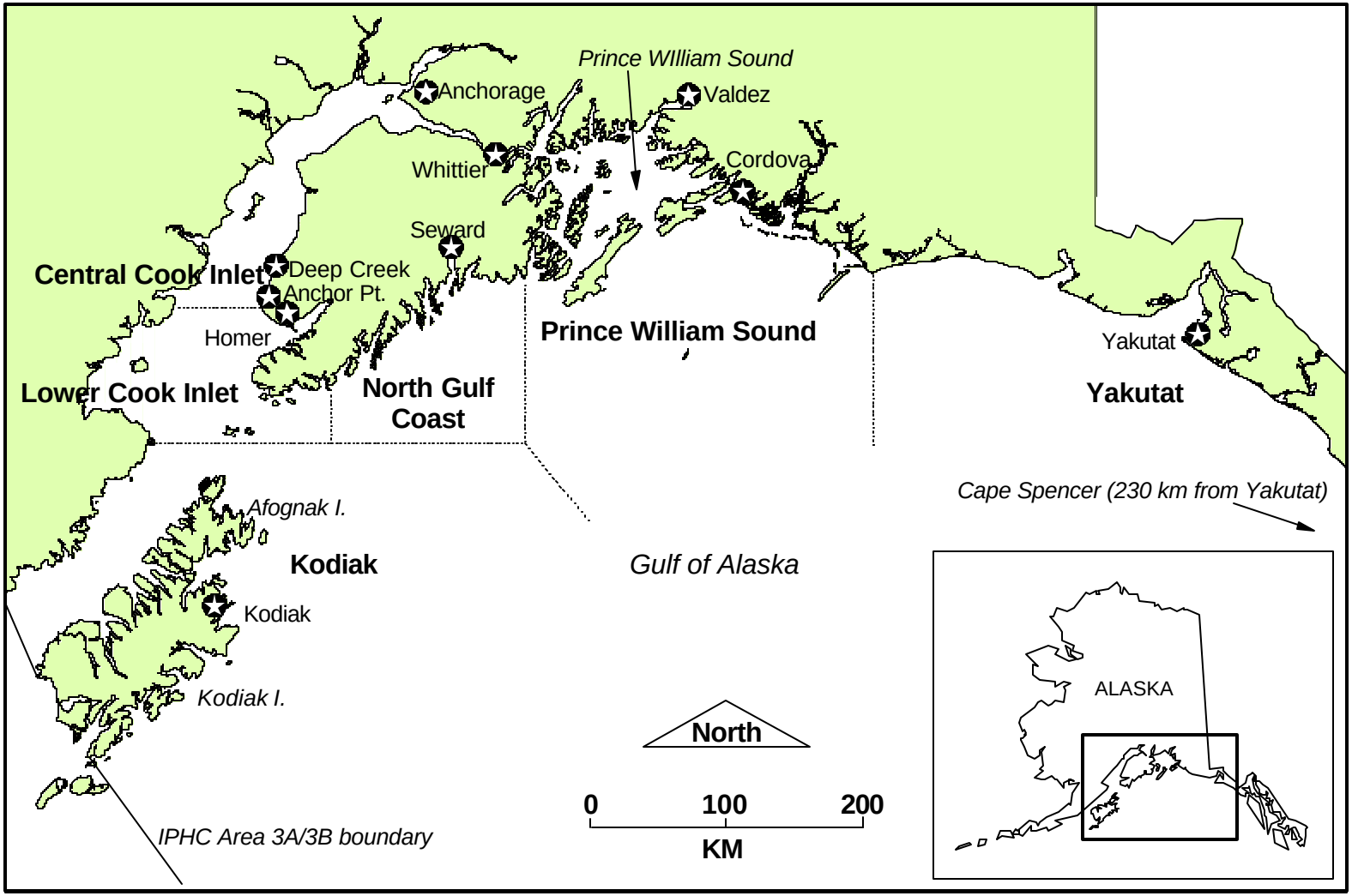

Figure 1.-Primary ports of recreational halibut harvest, and subareas used for compilation of sport harvest statistics (bold text) in IPHC Regulatory Area 3A.

The recreational halibut fishery is managed under IPHC regulations adopted by the Alaska Board of Fisheries (BOF). The daily bag limit (per calendar day) is two halibut per person, and the possession limit is four halibut throughout Area 3A. Under state law, the bag limit applies to the angler that hooks the fish. The fishery is open February 1 through December 31. A State of Alaska sport fishing license or legal substitute is required for all resident and nonresident anglers age 16 and older. Residents 60 years of age and over are required to possess a free permanent identification in lieu of a license.

Recreational halibut harvest has been estimated annually by the Alaska Department of Fish and Game (ADF&G) through the Statewide Harvest Survey (SWHS) program since 1977 (Mills 1979-1994; Howe et al. 1995 and 1996, 2001a, b, c, d; Walker et al. 2003). Survey questionnaires are mailed to a large random sample of households (47,000 in 1998) containing at least one licensed resident or nonresident angler. Survey estimates in recent years are corrected for nonresponse bias through multiple mailings. Effort is estimated for all species combined, so effort specifically for halibut is not separable. The survey has also provided estimates of halibut catch (fish kept and released) since 1990 and harvest by guided and unguided anglers on the Kenai Peninsula since 1986.

Estimated sport harvest of halibut in Area 3A rose steadily from about 18,000 fish in 1977 to about 272,000 fish in 1997, then dropped off somewhat in 1998 and 1999 (Figure 2). Cook Inlet fisheries have historically accounted for the majority of harvest in Area 3A, and Area 3A has accounted for about 70% of the statewide halibut harvest in numbers of fish over the last 5 years. Charter anglers accounted for 56%-59% of the annual sport harvest in Area 3A (in number of fish) during the period 1995-1999 (Table 1).

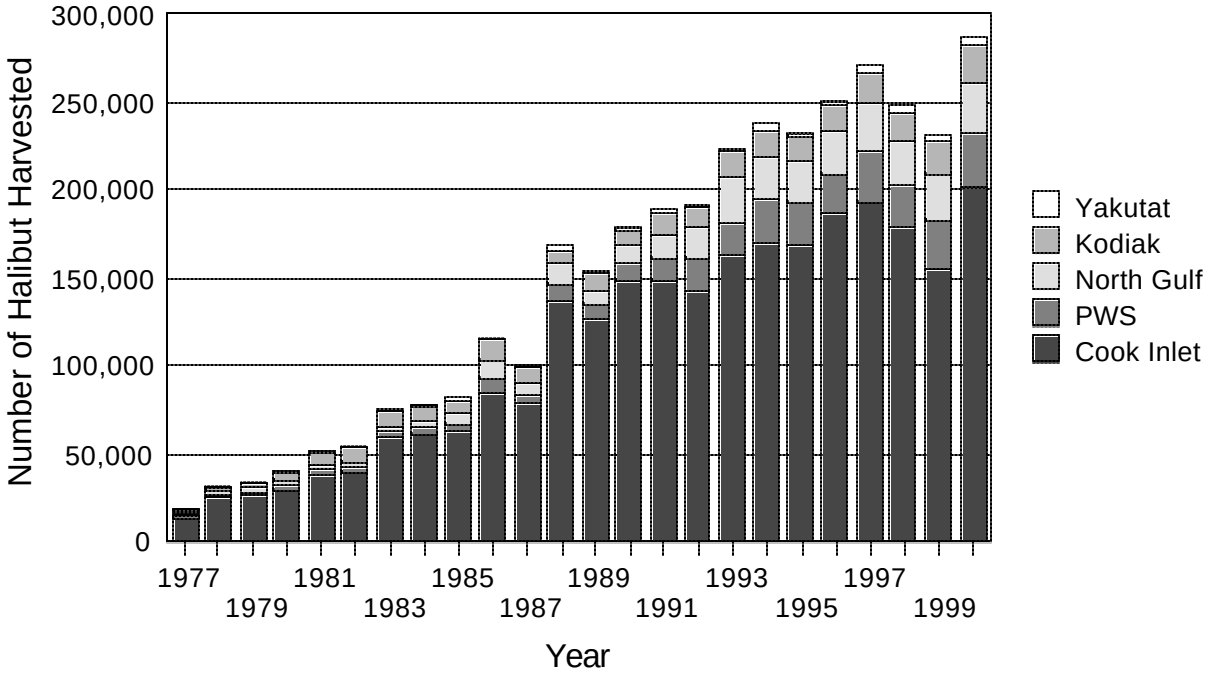

Figure 2.-Recreational harvest of Pacific halibut, as estimated by the ADF&G statewide harvest survey, 1977-2000.

Table 1.-Estimated halibut harvest (numbers of fish) by charter and non-charter anglers in IPHC Area 3A, 1995-1999.

Year/Subarea	Charter	Non-charter	Total	Percent Charter
1995				
Yakutat	1,828	628	2,456	74%
Prince William Sound	12,474	12,297	24,771	50%
North Gulf	16,331	7,348	23,679	69%
Lower Cook Inlet	56,114	30,719	86,833	65%
Central Cook Inlet	44,584	36,737	81,321	55%
Kodiak	6,512	7,477	13,989	47%
Total Area 3A	137,843	95,206	233,049	59%
1996				
Yakutat	2,914	322	3,236	90%
Prince William Sound	9,897	12,433	22,330	44%
North Gulf	15,421	8,802	24,223	64%
Lower Cook Inlet	67,997	37,971	105,968	64%
Central Cook Inlet	41,573	40,234	81,807	51%
Kodiak	5,155	9,050	14,205	36%
Total Area 3A	142,957	108,812	251,769	57%
1997				
Yakutat	4,161	765	4,926	84%
Prince William Sound	13,883	14,573	28,456	49%
North Gulf	17,633	10,203	27,836	63%
Lower Cook Inlet	67,923	37,723	105,646	64%
Central Cook Inlet	43,442	44,828	88,270	49%
Kodiak	5,814	11,418	17,232	34%
Total Area 3A	152,856	119,510	272,366	56%
1998				
Yakutat	4,274	892	5,166	83%
Prince William Sound	13,086	11,215	24,301	54%
North Gulf	16,486	8,254	24,740	67%
Lower Cook Inlet	60,823	33,395	94,218	65%
Central Cook Inlet	43,780	41,371	85,151	51%
Kodiak	4,919	10,749	15,668	31%
Total Area 3A	143,368	105,876	249,244	58%
1999				
Yakutat	2,437	1,208	3,645	67%
Prince William Sound	14,204	13,396	27,600	51%
North Gulf	15,088	10,789	25,877	58%
Lower Cook Inlet	53,321	32,931	86,252	62%
Central Cook Inlet	38,654	30,601	69,255	56%
Kodiak	8,022	10,573	18,595	43%
Total Area 3A	131,726	99,498	231,224	57%

Source: Alaska Statewide Harvest Survey (Howe et al. 1996, 2001a, b, c, d), but estimates for the North Gulf, Lower Cook Inlet, and Central Cook Inlet subareas were re-aggregated from published Kenai Peninsula and West Cook Inlet estimates using unpublished, detailed harvest data tables.

True removals by the sport fishery are greater than harvest estimates alone due to mortality of released fish. Anglers in Area 3A released almost as many fish as they kept (Table 2). Most sport-caught halibut in Area 3A are taken on circle hooks and therefore not deeply hooked. Fish are usually brought to the boat quickly, and small fish are often released without bringing them on board. Results of tagging studies by the IPHC suggest that the mortality rate of longline-caught and tagged halibut ranges from 2% to 5% (Peltonen 1969). The IPHC currently assumes a mortality rate of 3.5% for halibut caught on longline gear using circle hooks and released in excellent condition (Kaimmer and Trumble 1998). Assuming the 3.5% mortality rate for sport-caught halibut, an estimated 6,200-9,600 halibut died annually after release in Area 3A during the years 1995-1999 (Table 2). Total sport removals, including this release mortality component, are therefore about 3% higher (in number of fish) than the harvest estimates. Accurate translation of these estimates to poundage is not possible because there is no information available on the size composition of released halibut. Although large halibut (e.g., over 100 pounds) are occasionally released in Area 3A, large halibut make up a very small proportion of the catch. Therefore, released fish are likely smaller on average than retained fish.

Table 2.-Estimated mortality of released halibut (number of fish) and total removals in Area 3A assuming a 3.5% mortality rate, 1995-1999.

Year	Number Kept	Number Released	Release Mortality	Total Removals
1995	233,049	206,627	7,232	240,281
1996	251,769	242,812	8,498	260,267
1997	272,366	273,368	9,568	281,934
1998	249,244	226,601	7,931	257,175
1999	231,224	177,890	6,226	237,450

Source: For estimates of numbers of fish kept and released is the Alaska Statewide Harvest Survey (Howe et al. 1996, 2001a, b, c, d).

STOCK STATUS AND MANAGEMENT ISSUES

The IPHC has managed the halibut fishery since 1923 under treaty between the United States and Canada. The current treaty, the 1953 Halibut Convention, as amended by the 1979 Protocol, mandates that the IPHC manage the stock on the basis of optimum yield (McCaughran and Hoag 1992). The IPHC conducts research on halibut population dynamics throughout the range of the stock, establishes a harvest strategy, and sets allowable levels of harvest in each of ten regulatory areas.

Since 1982 the IPHC has been estimating stock size using an age-structured model. There have been numerous changes in the stock assessment model since the mid-1990s (Clark and Hare 2003). Before 1995 the model was fitted to catch-at-age and catch per unit effort (CPUE) data

from the commercial fishery. Since then the model has incorporated catch-at-age and CPUE data from the commercial fishery and IPHC surveys. Catch-at-age from the sport fishery is not included because age data are not available for all regulatory areas. Stock assessment and quota recommendations have been based on two models with alternative assumptions regarding survey selectivity; one as a function of length and the other as a function of age. In recent years, the standard population model has been fitted assuming constant selectivity by age, even though size at age has been declining. Recent retrospective analyses of this model have put that assumption in doubt. Alternative models that allowed for variable age-specific selectivity or length-specific selectivity provided estimates of exploitable biomass that were 16%-27% higher than the estimates from the standard model when fitted to data through 2002 (Clark and Hare 2003).

As of January 2003, the standard assessment indicated that the exploitable biomass of halibut in Area 3A was about 80% of the peak abundance observed in 1997, and well above the average level (Clark and Hare 2003). The halibut stock is anticipated to decline, however, as a series of weak year classes replaces a series of strong ones.

The North Pacific Fishery Management Council (NPFMC) is responsible for allocation of the halibut resource in state and federal waters adjacent to Alaska under the Magnuson-Stevens Fishery Management and Conservation Act. The Council historically has not allocated between recreational and other users. Instead, the quota for the directed longline fishery has been set after removals by all other sources (including the sport fishery) were deducted from the allowable harvest.

A proposal was introduced to the Council in September 1993 to control recreational harvest of halibut in the charter boat fishery only. In February 2000, the Council took final action to implement a guideline harvest level (GHL) for the charter fishery in Areas 2C (Southeast Alaska) and 3A. They also established a matrix of management measures that would be implemented or lifted to adjust the GHL in response to changes in estimated abundance. The Area 3A GHL was set at 3.91 million pounds (net weight), which represented 125% of the average of the 1995-1999 halibut removals by the charter fishery. The estimates for 1995-1998 were preliminary and the 1999 estimate was a projection based on 1994-1998 estimates. All of the figures were based in part on Statewide Harvest Survey (SWHS) estimates of the number of halibut harvested.

Following the GHL decision, the ADF&G performed a thorough review of all computer programs and procedures used by the SWHS to estimate harvest and effort. Computer programs were found to contain errors that altered some anglers' reported catch and harvest and did not properly account for non-response bias in estimates of effort. The errors did not affect all species or locations equally. ADF&G staff also decided to apply non-response bias in a consistent manner each year. As a result, ADF&G revised estimates of halibut harvest and effort for 1996-1998 (Howe et al. 2001a, b, c). The 1995 estimates contain the same errors but could not be revised because the original data could not be restored. All harvest estimates presented in this report are based on the revised or most current estimates.

Immediately following the GHL decision in February 2000, the NPFMC formed an industry committee to develop a list of elements and options to incorporate halibut charter operators into the current individual fishery quota (IFQ) program. The committee developed a list of alternatives for defining qualification, transfer of quota share, basis and amount of initial issuance, mechanics of reporting and management, and other considerations. The Council

revised this list of elements and added an option to set aside quota shares for Gulf coastal communities. In April 2001 the NPFMC approved a motion to incorporate the Area 3A and 2C charter fleets into the existing halibut IFQ program. The amount of initial issuance had the same basis as the GHL motion passed earlier (125% of the 1995-1999 average harvest), but was now based on revised harvest estimates from ADF&G. The motion would allocate to the charter sector 13.05% of the Area 2C and 14.11% of the Area 3A combined longline/charter quota to the charter sector. As of February 2003, the rules and procedures for catch reporting had not yet been determined, nor had a charter IFQ Proposed Rule been published in the Federal Register.

The original GHL motion was essentially suspended during development of the IFQ motion. Upon revision of the 1996-1998 harvest estimates, the GHLs were updated to the same criteria as for IFQ initial issuance. The GHLs would be set at 1.432 million pounds in Area 2C and 3.650 million pounds in Area 3A. The Final Rule for GHL regulations may be published in early 2003. If and when a charter IFQ fishery is authorized, it will replace the GHL.

Many of the halibut allocation issues address nearshore depletion and overcapitalization of the charter fleet. In February 1998 the BOF and the NPFMC adopted a joint protocol to guide the development of local area management plans (LAMPs) for halibut and related fisheries that could address these types of issues. The LAMP process was designed around the successful development of a management plan for the Sitka Sound halibut fishery (Code of Federal Regulations, 50 CFR Part 300, effective October 29, 1999). With respect to LAMPs, the Council's authority is for halibut and species covered under federal fishery management plans. The BOF lacks authority for Pacific halibut fisheries but asked for authority to screen LAMP proposals to ensure viability of state-managed fisheries that may be affected by halibut fishery regulations. Under the protocol, once proposals are approved by the BOF they are forwarded to the NPFMC for technical and legal analysis, public review, and final action.

A number of LAMP proposals have been submitted, particularly in Southcentral and Southeast Alaska. Most proposals deal with moratoria on halibut charter vessels or perceived conflicts between sport and commercial users in nearshore halibut or rockfish fisheries. Although the Council did not approve areawide moratoria as a mechanism to control harvest in the charter fishery in February 2000, they did recommend development of moratoria as part of LAMPs where necessary. The BOF has yet to approve any LAMP proposals for further action by the Council.

RECREATIONAL HARVEST ASSESSMENT PROGRAM–GOALS AND OBJECTIVES

The State of Alaska does not have management authority for halibut and therefore has no regulatory responsibility to collect information from the fishery. Nevertheless, the ADF&G Sport Fish Division collects and analyzes data from the recreational halibut fishery in Areas 2C and 3A because the state has an interest in the management and allocation decisions of the IPHC and NPFMC. Since 1991 data have been collected in Southcentral Alaska (waters west of Cape Suckling) as part of a broader study to characterize recreational groundfish harvest. Since the IPHC lacked any sampling program for the recreational fishery, the state offered to collect halibut information to ensure that all regulatory decisions made for biological or allocative reasons utilized current and accurate information. Halibut statistics have previously been reported for the Area 3A recreational fishery for 1991-1994 (Meyer 1992-1994, 1996). The Sport Fish Division in Yakutat has also collected halibut data since 1998 as a component of the area management program (Johnson 2001).

With respect to halibut, the primary goal was to provide the IPHC with sport fishery information needed to conduct annual stock assessments and set longline fishery quotas. The information required initially was annual estimates of sport harvest biomass. With development of allocation issues relating to the charter boat fishery, estimates have been stratified by user group. For the period covered by this report, specific objectives were to estimate:

1. Mean length and weight of the sport harvest by user group and port;
2. Sport harvest biomass, or yield in pounds net weight, by user group and subarea (defined later) of IPHC Area 3A;
3. Age, length, and sex composition of the sport harvest by port; and
4. Spatial distribution of halibut effort and harvest by user group and port.

Estimation of age composition was dropped as an objective in 1999 due to state budget constraints, but otoliths were collected for age determination by the IPHC. The Yakutat sampling program only collected data to address objectives 1 and 2.

In some ports a significant proportion of the sport harvest is cleaned at sea, and the carcasses are disposed of before the boat returns to port. If the fish available for sampling in each port are not representative of the harvest, estimates of mean weight and harvest biomass can be biased. The proportions of harvest cleaned at sea (and carcasses discarded at sea) were therefore estimated for each port. Sampling procedures and estimates of mean length, mean weight, and harvest biomass for the Lower Cook Inlet (Homer) fishery explicitly took this into account, as detailed in the following section. At other ports, the proportion of halibut cleaned at sea was monitored but the sampling designs addressed this concern in alternate ways.

METHODS

STUDY DESIGN AND SAMPLING PROCEDURES

It was not cost-effective to sample all ports of landing for sport-caught halibut throughout Area 3A. Instead, major ports of landing in each of six subareas (Figure 1) were sampled and the composition of harvest at these ports was assumed to be representative of the entire subarea. This assumption was probably valid because these ports account for well over 90% of sport halibut landings in Area 3A. The six subareas, sampled ports, and years of coverage during the period 1995-1999 are presented in Table 3.

One fishery technician was stationed at each port, except that a single technician covered the Deep Creek and Anchor Point beaches. Sampling was conducted at harbors, boat ramps, beach launching sites, and military recreation facilities. Data collection generally extended from late-May through early September, with the duration of the fishing season varying by port. Effort and harvest were assumed to be negligible after Labor Day weekend. Dates of coverage by port (excluding Yakutat) during 1995-1999 are presented in Table 4.

Sampling consisted of two parts. First, biological sampling provided data on length, weight, age, and sex of harvested halibut (Objectives 1 and 3). Second, angler interviews were used to estimate the proportion of the charter-caught halibut harvest that was cleaned and discarded at sea at Homer (needed to address Objectives 1 and 2), and to estimate the geographic distribution of effort and harvest at all ports (Objective 4). No interviews were conducted in Yakutat.

Table 3.-Subareas, sampled ports, and years of sampling in Area 3A, 1995-1999.

Subarea	Ports/Sites Sampled	Years Sampled
Kodiak	Kodiak city	1995-1999
Central Cook Inlet (CCI)	Deep Creek	1995-1999
	Anchor Point	1995-1999
Lower Cook Inlet (LCI)	Homer	1995-1999
North Gulf	Seward	1995-1999
Prince William Sound (PWS)	Valdez	1995-1999
	Whittier	1998-1999
	Cordova	1999
Yakutat	Yakutat	1998-1999

At Homer, Anchor Point, Deep Creek, Seward, and Valdez, biological sampling and interviews were conducted on separate days. This design simplified sampling at these busy ports and allowed technicians to gather more complete data. Biological sampling and interviews were conducted simultaneously at Kodiak and Whittier because effort and harvest were relatively lower than at other ports and both tasks could be handled simultaneously.

Past analyses indicated that the proportions of effort and harvest by private anglers typically increased on weekends, and that the spatial distribution of effort (and possibly harvest) differed significantly between weekends and weekdays for all user groups at all ports. To avoid bias from non-representative sampling by user group, and to avoid bias in estimation of the spatial distribution of effort and harvest, 5 workdays per week were selected at random subject to the constraint that 2 days off must be consecutive. Three biological and two interview sampling days per week were selected at random such that each type was distributed proportionally between weekends and weekdays. Biological and interview sampling effort varied by port each year due to differences in the length of the season, inseason schedule changes, and personnel vacancies. The numbers of days actually sampled for biological (B) and interview (I) data at Southcentral Alaska ports (excluding Yakutat) are presented in Table 5.

Holidays were given no special treatment in terms of sampling effort because previous analyses showed no significant difference in effort or harvest between holidays and non-holidays. Five days per week (Wednesday-Sunday) were sampled at Yakutat in 1998 and 1999 (Johnson 2001).

Kodiak

Biological sampling and angler interviews were conducted at St. Paul's Harbor, St. Herman's Harbor (Dog Bay), and the U.S. Coast Guard Base. Starting at approximately 1530 hrs, the technician chose the first site at random, and then rotated through the three sites, staying long enough to interview returning anglers and sample available fish. Each site was visited 2-3 times

Table 4.-Dates of sampling by port (excluding Yakutat) in Area 3A, 1995-1999.

Year	Kodiak	Homer	Central Cook Inlet	Seward	Whittier	Valdez	Cordova
1995	5/22-9/12	5/16-9/08	5/08-8/27	5/25-9/08	not sampled	5/25-9/03	not sampled
1996	5/30-8/27	5/20-9/12	5/25-8/25	6/13-9/15	not sampled	5/25-6/10 7/11-9/7	not sampled
1997	5/22-8/26	5/16-9/14	5/16-8/24	5/24-9/13	not sampled	5/24-9/05	not sampled
1998	5/21-9/07	5/18-9/07	5/18-8/30	6/04-9/07	8/03-9/07	6/26-9/06	not sampled
1999	5/21-9/07	5/17-9/10	5/17-8/26	5/27-9/06	5/29-9/06	5/27-9/06	6/26-8/31

per day on average using this design. Because of restrictions on fish carcass disposal in the Kodiak harbor, a substantial portion of halibut taken on larger charter boats were cleaned at sea. Most charter operators voluntarily retained carcasses of all halibut cleaned at sea and provided them to the port sampler. There was no apparent reason to believe that these fish were not representative of the charter harvest. Technicians were also instructed not to sample any fish from a boat unless all carcasses or fish were available to be sampled.

Homer

The Homer fishery was sampled only on the Homer Spit. Biological sampling generally started at 1400 hours, but the technician was free to begin sampling earlier on weekends or bad weather days in order to intercept the majority of landings. The technician distributed sampling effort between the public fish cleaning station, boat ramp, and charter cleaning facilities. Increased sampling effort was directed at obtaining data from private-caught fish because of their relatively lower availability. Because of the high volume of charter-caught fish, three to five charter boats were selected at random for sampling each day. Carcasses of charter-caught halibut were collected throughout the shift but not worked up until the end to allow more sampling of the private harvest.

Table 5.-Number of days sampled for biological and interview data at Southcentral Alaska ports (excluding Yakutat), 1995-1999.

	Kodiak	Homer		Central Cook Inlet		Seward		Whittier	Valdez		Cordova	
Year	B & I	B	I	B	I	B	I	B & I	B	I	B	I
1995	78	51	33	45	31	47	30	not sampled	41	29	not sampled	
1996	66	50	32	38	26	40	26	not sampled	30	21	not sampled	
1997	69	48	32	43	28	46	33	not sampled	45	29	not sampled	
1998	71	47	32	41	28	42	26	26	31	21	not sampled	
1999	74	47	33	43	30	45	30	71	43	28	28	24

Notes: B = biological;
I = interview.

As in Kodiak, a substantial number of charter boats cleaned all or a portion of their catch at sea to expedite shore operations. Previous work indicated that halibut cleaned at sea were smaller and contained a higher percentage of males (Meyer 1996). Because the number of charter boats cleaning fish at sea is consistently higher than at other ports, biological sampling included a component for obtaining carcasses of fish cleaned at sea. On the day before each biological sampling day, the technician contacted one to three charter boats chosen at random from a list of boats that clean at sea, and requested the skipper to retain carcasses. These fish were picked up and sampled the following day.

Prior to 1996, interviews were not conducted before 1400 hours. In 1996, interviews were conducted in two shifts during the period 1000-2200 hours, because it was suspected that significant numbers of private boats returned to port earlier in the day. However, a review of 1996 data indicated there was no advantage to interviewing over this 12-hour period, and that most anglers exited between 1400 and 2100 hours. Spreading sampling effort out over 12 hours also reduced the total sample size and precision that could have been achieved. There was no functional difference in the geographic distribution of harvest between estimates that were based on all 12 hours and estimates that were based only on the period 1400-2100 hours. Therefore, interviews were conducted during the period 1400-2100 hours all years after 1996.

The Homer harbor was too large and effort was too great to contact all returning boats. The harbor was therefore divided into four (1995-1997) or five (1998-1999) areas with comparable numbers of recreational boats. Interviews were conducted for 1 hour in each area. The initial order of areas was assigned randomly then "rotated" systematically, repeating the first, second, and third areas sampled each day in order to fill out a 7-hour shift. Under this design all areas and hours received equal sampling effort during the season. The technician contacted and obtained interviews from all vessels tying up or offloading in the assigned area.

Deep Creek and Anchor Point

The mouths of Deep Creek and Anchor River are the primary access areas and account for the vast majority of halibut landings from the Central Cook Inlet (CCI) fishery. Work shifts were restricted to the period 0800-2400 hours in 1995 and 0900-2200 hours in subsequent years. Shifts were selected as follows: (a) if high tide fell in the first 30 minutes of an hour, the work shift began at the top of the next hour; otherwise the shift began at the top of the next hour + 1; (b) the work shift began at 0900 hrs if high tide occurred before 0800 hours, and (c) the shift began at 1600 hours if high tide fell after 1530 hours. From 1995 through 1998, approximately 20% of the CCI biological and interview sampling effort was allocated to the Anchor Point beach based on relative harvest levels estimated by McKinley (1995). In 1999, 37% of the interview effort was allocated to Anchor Point in an attempt to ensure that interviewed anglers accounted for 20% of the reported number of harvested fish.

Biological sampling procedures differed by user group. Fish harvested by private anglers were generally sampled soon after landing on the beach or at private campgrounds or cleaning tables in Anchor Point or Ninilchik. Charter-caught fish were sampled at three to five charter facilities drawn at random each sampling day from a list of companies in the Ninilchik-Anchor Point area. Halibut harvested by anglers on charter boats based in the Kenai-Soldotna area were not sampled because they typically transported their fish home for cleaning. Fish sampled at Anchor Point and Ninilchik were assumed to be representative of the overall charter harvest. Cleaning of halibut at sea is rare in this fishery, so no special sampling procedures were needed to account for possible bias introduced by it.

The Deep Creek beach was too large for one technician to intercept all returning anglers during most of the season. The beach was divided into three sub-areas: (1) the boat ramp and beach north of the tractor launch, (2) the tractor launch area (including skidders), and (3) the beach south of the tractor launch area. Interviews were conducted in each area for 2 hours, with the order determined at random and "rotated" systematically as for Homer. Under this scheme all areas received approximately equal sampling effort. In 1998 and 1999, the beach was stratified only in May, June, and July; the technician attempted to obtain interviews from all returning boats in August. When sampling at Anchor Point, the entire shift was spent intercepting anglers exiting the beach near the tractor launch.

Seward

The Seward fishery was sampled at the city harbor and at the Army and Air Force recreation camps. Biological sampling generally started at 1600 hours, but the technician was free to begin sampling earlier on weekends or bad weather days in order to intercept the majority of landings. No specific accommodations were made to sample charter-caught halibut cleaned at sea. Most charter operators that routinely cleaned fish at sea voluntarily returned the carcasses to the harbor for sampling.

The technician divided sampling effort between the public fish cleaning stations, boat ramps, and military camp cleaning facilities such that data were drawn from throughout the day's landings. Sampling also alternated between cleaning sites throughout the shift to spread samples over time and avoid selecting for early or late-returning boats.

Interviews were conducted during the period 1500-2200 hours before 1998, and during the period 1400-2100 hours in 1998 and 1999. A number of designs for subdividing the harbor were employed to maximize the number of interviews obtained. These included dividing the harbor into three, four, or five areas, and sampling each area for 30-105 minutes. Each design attempted to distribute sampling effort equally among areas. Technicians attempted to obtain an interview for every vessel (including military) docking in the assigned area.

Whittier

Whittier was sampled only in August and September of 1998 but throughout the summer season in 1999. Interviews and biological sampling were conducted concurrently because of the relatively low volume of effort. Whittier was accessible to the road system only by train, which influenced most sampling considerations. Wednesdays and Thursdays were scheduled days off because a later train schedule resulted in less effort on these days. Because prior information was inadequate to design the schedule, technicians were free to structure their sampling shifts in response to the pattern of exiting anglers. Sampling was done primarily between 1200 and 2200 hours in 1998, and between 1300 and 2100 hours in 1999.

Valdez

All sampling was conducted in the small boat harbor. Biological sampling was generally conducted during the period 1600-2200 hours. Fish were sampled by simply roving among the fish cleaning stations. Because the harbor is of modest size, this design probably resulted in a relatively high proportion of available fish being sampled. Interviews were conducted throughout the harbor during the period 1500-2200 hours.

Cordova

Biological sampling and interviews were conducted in the Cordova harbor in 1999 primarily to obtain information on rockfish. Sampling was conducted 2 or 3 days per week in a 6–7 hour

shift generally starting around 1400 hours. Interviews were of individual anglers rather than vessel-trip interviews (Miller 2001).

Yakutat

Length measurements were obtained from halibut harvested in Yakutat in 1998 and 1999. User group information was recorded in 1999 only, and no interviews were conducted either year (Johnson 2001).

Biological Data Collection

Unstable marine weather and seasonal trends in tourism generate substantial daily and monthly variation in halibut harvest and effort. Sample sizes were not proportional to the total harvest over time by each user group because samplers were saturated during most of the season. Only a small proportion of the total harvest was sampled during peak harvest periods. In some instances, the numbers of fish available to the sampler were not proportional to the harvest by each user group because some landing sites were not sampled, fish were cleaned and carcasses dumped at sea or in the harbor, or the fish were kept on the boat and taken home to be cleaned later. To address non-proportional availability, sampling goals were established for each user group at each port. This allowed samplers to allocate more sampling effort toward user groups whose harvest was underrepresented.

Most fish available for sampling were already filleted, with viscera and skin intact. If anglers intended to leave the site of landing or sampling before cleaning their fish, whole fish were measured. The fork length was recorded to the nearest millimeter, although some samplers occasionally rounded length to the nearest 5 mm. At all ports except Yakutat, the left otolith (saggitae) was removed, hand-cleaned in water, and stored in a labeled coin envelope. The user group (charter, private, military, etc.) and ADF&G groundfish statistical (stat) area of capture were recorded whenever possible. No stat areas were recorded in Yakutat, and user group was recorded in 1999 only. All data were recorded on Mark Sense Standard Age-Weight-Length forms (Version 1.1).

Interview Procedures

Interviews were conducted with willing anglers or skippers of any vessel that targeted halibut (regardless of success) or caught halibut while targeting other species. The following information was recorded for each boat-trip: the hour of the interview, harbor interview area, user group (charter, private, or military for Seward only), whether a single or multiple-day trip, the primary ADF&G groundfish statistical area(s) fished, number of anglers that fished (including crew), target species, the number of halibut kept and released, the number of halibut cleaned at sea, and similar information on other groundfish species. When anglers were asked what species they were targeting, their response was categorized as either halibut only, rockfish only, lingcod only, any combination of halibut or other groundfishes ("bottomfish"), halibut or other bottomfish in conjunction with salmon ("bottomfish and salmon"), or salmon only. The Commercial Fisheries Entry Commission vessel license number was recorded for charter boats in 1998 and 1999. Whenever possible, interviews were conducted with the most knowledgeable anglers on board. Skippers or crewmen on charter boats were interviewed (rather than clients) to obtain accurate reporting of statistical areas and species. Anglers and charter operators were usually unable to accurately separate their effort or harvest by statistical area if they fished in multiple areas or for multiple species in a day. Interview data were recorded on Mark Sense Marine Interview forms (Version 1.0).

DATA HANDLING

The project leader and technicians examined data forms and otolith envelopes for errors at regular intervals throughout each season. At the end of each field season, clean batches of forms were sent to Division of Sport Fish, Research and Technical Services (RTS) for optical scanning and generation of frequency reports and data listings. Biological and interview data files were checked for missing, invalid, or unlikely data, and corrected if possible from field data. In some cases, charter logbook data were used to resolve questions with interview data. Following preparation of this report, copies of all data files, field specification forms, and analysis programs will be archived with ADF&G Sport Fish Division, Research and Technical Services, in Anchorage (Appendix A1).

DATA ANALYSIS

Use of SWHS Estimates

Estimation of sport harvest biomass, or yield, required integrating port sampling estimates of average weight with harvest estimates from the SWHS. Some assumptions are necessary because boundaries of several SWHS reporting areas do not correspond with waters fished by the fleets at each sampled port. For example, the SWHS provides estimates of catch and harvest for the entire Kenai Peninsula (Area P) and for the western side of Cook Inlet (Area N). Vessels originating from beaches between Ninilchik and Anchor Point fish both sides of Cook Inlet (Areas P and N). Vessels originating from Homer and other Kenai Peninsula sites south of Anchor Point fish both sides of Cook Inlet, as far south as Shuyak Island (Area Q), and occasionally as far east as Gore Point. Vessels originating from Seward rarely fish west of Gore Point but do venture into the southwestern part of Prince William Sound (Area J).

The SWHS provides harvest estimates for numerous specific sites, and these estimates are aggregated to obtain the estimates of total harvest for each reporting area. In order to obtain harvest estimates that correspond with estimates from port sampling, the site-specific harvest estimates were re-aggregated based on the most logical port of landing. Kodiak and Lower Cook Inlet harvest is separated by the latitude of Cape Douglas. Within SWHS Area P, the latitude of Anchor Point is used to separate Central and Lower Cook Inlet estimates, with Anchor Point included in the former. The longitude of Gore Point separates Lower Cook Inlet and North Gulf subarea harvest. Within Area N, Central and Lower Cook Inlet harvest is separated by the latitude of Chinitna Point. In 1999, Area J was split into three areas corresponding with harvest at Whittier, Valdez, and Cordova.

The accuracy of this approach depends on the degree with which SWHS respondents report their harvest by the port of landing. In general, respondents report most harvest under rather general sites listed in the survey questionnaire. For example, even though information from interviews consistently indicates that the majority of halibut landed at Seward are taken outside Resurrection Bay, 91% of the 1999 SWHS Area P harvest east of Gore Point was reported on the questionnaire under the site "Resurrection Bay (Seward)." In the same year, the generic sites "Anchor River, Whiskey Gulch, Deep Creek, and Ninilchik River areas," "Other Kachemak Bay," and "Homer Spit" accounted for 64% of the Area P harvest west of Gore Point.

Average Length and Weight and Harvest Biomass

Average Length and Weight

Average lengths for each user group were generally computed as the simple arithmetic mean. Stratified estimates of mean weight were computed for charter harvest at Homer, for charter and

private harvest at Seward, and for charter and private harvest for PWS using equations outlined in the next section.

Since most fish could not be weighed, the IPHC length-weight relationship was employed to estimate the mean net weight (headed and gutted) and round weight of all measured halibut (Objective 1). Mean net and round weight were estimated for each user group component of the harvest as the mean of the predicted weights of all n sampled fish (Neilsen and Schoch 1980):

$$\overline{w} = \frac{\sum_{i=1}^{n} aL_i^b}{n}, \quad (1)$$

where L_i = the observed length of the i^{th} fish (rounded to the nearest cm), a = 6.921 X 10^{-6} for net weight in pounds and 9.205 X 10^{-6} for round weight in pounds, and b = 3.24 (Clark 1992). Variances of the mean predicted weights were estimated using standard normal procedures but should be considered minimum estimates because variation inherent in the length-weight relationship was not incorporated. Mean weight estimates are presented in pounds rather than kilograms because that is the standard unit used by halibut management agencies.

This approach to estimating mean weight assumes that fish are measured accurately, that the fish measured are representative of the sport harvest, and that the IPHC length-weight relationship is representative of sport-caught halibut taken during the sampling period.

Harvest Biomass—General Approach

For each subarea, harvest biomass (Objective 2) was generally estimated separately for charter and private user groups (B_i) as the product of harvest in numbers of fish and average weight:

$$\hat{B}_i = \hat{H}_i \overline{w}_i, \quad (2)$$

where

$\hat{H}_i$ = the SWHS estimate of halibut harvest (in number of fish) by user group i, and

$\overline{w}_i$ = the estimated mean weight of halibut harvested by user group i.

The variance of the harvest biomass was estimated for each user group using (Goodman 1960):

$$\hat{v}(\hat{B}_i) = \hat{H}_i^2 \hat{v}(\overline{w}_i) + \hat{v}(\hat{H}_i)\overline{w}_i^2 - \hat{v}(\hat{H}_i)\hat{v}(\overline{w}_i). \quad (3)$$

The estimates of halibut harvest ($\hat{H}_i$) and associated standard errors used in these calculations are listed in Appendix B1. Harvest biomass point estimates and variances for Area 3A were simply summed across user groups or subareas. Variance of 1995 harvest biomass estimates could not be calculated because the original 1995 statewide harvest survey data could not be restored from tape.

Estimates of harvest in numbers of fish were available only for two user groups, charter and private. Fish of unknown user group were not included in calculations of mean weight, but the fish from identified user groups were assumed to be representative. In some cases, however, data were collected on subsets of a user group or on additional user groups in an effort to reduce bias. In those cases, additional calculations, detailed below, were necessary to derive charter or private average weights.

Lower Cook Inlet (Homer)

Charter harvest samples from Homer were designated either charter-caught cleaned in port or charter-caught cleaned at sea. Harvest biomass was estimated using equations 1 and 2, except that the mean weight and variance for the charter sector ($\overline{w}_C$) were estimated by:

$$\overline{w}_C = (\overline{w}_{CS}\hat{p}_{CS}) + (\overline{w}_{CP}\hat{p}_{CP}), \tag{4a}$$

$$= (\overline{w}_{CS}\hat{p}_{CS}) + (\overline{w}_{CP}(1-\hat{p}_{CS})), \tag{4b}$$

$$= (\overline{w}_{CS}\hat{p}_{CS}) + \overline{w}_{CP} - (\overline{w}_{CP}\hat{p}_{CS}), \tag{4c}$$

where:

$\overline{w}_{CS}$ = the estimated mean weight of charter-caught fish cleaned at sea,

$\hat{p}_{CS}$ = the estimated proportion of charter-caught fish cleaned at sea,

$\overline{w}_{CP}$ = the estimated mean weight of charter-caught fish cleaned in port, and

$\hat{p}_{CP}$ = the estimated proportion of charter-caught fish cleaned in port.

The proportion $\hat{p}_{CS}$ was estimated using completed-trip interview data as:

$$\hat{p}_{CS} = \frac{n_{CS}}{n}, \text{ with estimated variance} \tag{5}$$

$$\hat{v}(\hat{p}_{CS}) = \frac{\hat{p}_{CS}(1-\hat{p}_{CS})}{n-1}, \tag{6}$$

where n_{CS} = the number of halibut cleaned at sea on interviewed charter vessels, and n = the number of halibut kept by interviewed charter vessels. The variance of the mean weight for charter-caught halibut was then (Goodman 1960):

$$\hat{v}(\overline{w}_C) = \hat{v}(\overline{w}_{CS}\hat{p}_{CS}) + \hat{v}(\overline{w}_{CP}) + \hat{v}(\overline{w}_{CP}\hat{p}_{CS}) - 2\mathrm{Cov}(\overline{w}_{CS}\hat{p}_{CS}, \overline{w}_{CP}\hat{p}_{CS}) - 2\mathrm{Cov}(\overline{w}_{CP}, \overline{w}_{CP}\hat{p}_{CS}), \tag{7}$$

where:

$$\hat{v}(\overline{w}_{CS}\hat{p}_{CS}) = \left[\overline{w}_{CS}^2\hat{v}(\hat{p}_{CS}) + \hat{v}(\overline{w}_{CS})\hat{p}_{CS}^2 - \hat{v}(\overline{w}_{CS})\hat{v}(\hat{p}_{CS})\right],$$

$$\hat{v}(\overline{w}_{CP}\hat{p}_{CS}) = \left[\overline{w}_{CP}^2\hat{v}(\hat{p}_{CS}) + \hat{v}(\overline{w}_{CP})\hat{p}_{CP}^2 - \hat{v}(\overline{w}_{CP})\hat{v}(\hat{p}_{CS})\right],$$

$$\mathrm{Cov}(\overline{w}_{CS}\hat{p}_{CS}, \overline{w}_{CP}\hat{p}_{CS}) = \hat{\overline{w}}_{CS}\,\hat{\overline{w}}_{CP}\,\hat{v}(\hat{p}_{CS}), \text{ and}$$

$$\mathrm{Cov}(\overline{w}_{CP}, \overline{w}_{CP}\hat{p}_{CS}) = \hat{p}_{CS}\hat{v}(\overline{w}_{CP}).$$

North Gulf (Seward)

Estimating mean weights at Seward was more complex. Biological data from harvested halibut were classified into three user groups: private, charter, and military (Army and Air Force vessels); however, the SWHS does not explicitly estimate military camp harvest. In order to

estimate harvest biomass using equations 1 and 2, the private and charter estimated mean weights had to incorporate the military camp data.

Military boats consisted of lottery boats and pay/premier boats. Lottery boats were classified as private because anglers were drawn from a lottery and paid no fees for services. Likewise, pay/premier boats were considered charter because the anglers paid fees in exchange for services. Military boat anglers may not have used the same rules when classifying their harvest as private or charter when responding to the SWHS because the proportion of private effort and harvest observed in Seward was lower than reported in the SWHS. Therefore, in 1996 we surveyed 134 military boat anglers and asked whether they fished on a lottery or pay/premier boat, and whether they would classify their fishing trip as "private" or "charter." In all, 59% (SE = 0.2%) indicated their trip was private and 41% indicated charter. Responses were similar for anglers on lottery and pay/premier boats (χ^2 = 0.11, df = 1, P = 0.75). The number of halibut taken on military vessels was available for 1995-1997 from voluntary logbooks. In 1998 and 1999, all lottery and pay/premier vessels reported harvest in the State of Alaska Saltwater Charter Vessel Logbook, so their harvest was separable into the private and charter categories.

Average weight estimates for 1995-1997 were derived using military vessel angler survey results from 1996 along with other data. A necessary assumption was that anglers on military boats harvested the same number and sizes of fish on average, whether they considered their trip private or charter. Even if that assumption was incorrect, estimates of harvest biomass for Area 3A would not be significantly biased because military camp harvest was small relative to the total harvest.

Mean weight was estimated similarly for charter and private user groups. For example, the mean weight for private-caught halibut was estimated by:

$$\overline{w}_P = \left(\overline{w}_{NP}\hat{p}_{NP}\right) + \left(\overline{w}_M\hat{p}_{MP}\right), \tag{8a}$$

$$= \left(\overline{w}_{NP}\hat{p}_{NP}\right) + \left(\overline{w}_M\left(1-\hat{p}_{NP}\right)\right), \tag{8b}$$

$$= \left(\overline{w}_{NP}\hat{p}_{NP}\right) + \overline{w}_M - \left(\overline{w}_M\hat{p}_{NP}\right), \tag{8c}$$

where:

$\overline{w}_{NP}$ = average weight of halibut harvested by non-military private anglers,

$\hat{p}_{NP}$ = the proportion of private harvest taken by non-military anglers,

$\overline{w}_M$ = average weight of halibut harvested by military camp anglers, and

$\hat{p}_{MP}$ = the proportion of private harvest taken by military camp anglers.

The proportion of private harvest taken by military anglers was obtained by:

$$\hat{p}_{MP} = \frac{\hat{r}_P H_M}{\hat{H}_P}, \tag{9}$$

where:

$\hat{H}_P$ = SWHS estimate of private harvest (number of fish),

H_M = total military camp halibut harvest (number of fish) entered in voluntary logbooks (a constant), and

$\hat{r}_P$ = proportion of military camp anglers that classified their trip as private, with variance $\hat{r}_P(1-\hat{r}_P)/n-1$, where n is the number of anglers interviewed.

The non-military private harvest was the difference between the total private harvest and the portion considered military, or

$$\hat{p}_{NP} = 1 - \hat{p}_{MP}. \tag{10}$$

The variance of $\hat{p}_{MP}$ and $\hat{p}_{NP}$ was estimated by:

$$\hat{v}(\hat{p}_{MP}) = \hat{v}(\hat{p}_{NP}) = (\hat{H}_M \hat{r}_P)^2 \left(\frac{1}{\hat{H}_P^4}\hat{v}[\hat{H}_P]\right) + \left(\frac{1}{\hat{H}_P}\right)^2 \left(H_M^2 \hat{v}[\hat{r}_P]\right) - \left(H_M^2 \hat{v}[\hat{r}_P]\right)\left(\frac{1}{\hat{H}_P^4}\hat{v}[\hat{H}_P]\right). \tag{11}$$

Finally, the variance of the mean weight for private-caught halibut was then (Goodman 1960):

$$\hat{v}(\overline{w}_P) = \hat{v}(\overline{w}_{NP}\hat{p}_{NP}) + \hat{v}(\overline{w}_M) + \hat{v}(\overline{w}_M\hat{p}_{NP}) - 2\mathrm{Cov}(\overline{w}_{NP}\hat{p}_{NP}, \overline{w}_M\hat{p}_{NP}) - 2\mathrm{Cov}(\overline{w}_M, \overline{w}_M\hat{p}_{NP}), \tag{12}$$

where:

$$\hat{v}(\overline{w}_{NP}\hat{p}_{NP}) = \left[\overline{w}_{NP}^2 \hat{v}(\hat{p}_{NP}) + \hat{v}(\overline{w}_{NP})\hat{p}_{NP}^2 - \hat{v}(\overline{w}_{NP})\hat{v}(\hat{p}_{NP})\right],$$

$$\hat{v}(\overline{w}_M\hat{p}_{NP}) = \left[\overline{w}_M^2 \hat{v}(\hat{p}_{NP}) + \hat{v}(\overline{w}_M)\hat{p}_{NP}^2 - \hat{v}(\overline{w}_M)\hat{v}(\hat{p}_{NP})\right],$$

$$\mathrm{Cov}(\overline{w}_{NP}\hat{p}_{NP}, \overline{w}_M\hat{p}_{NP}) = \hat{\overline{w}}_{NP}\,\hat{\overline{w}}_M\,\hat{v}(\hat{p}_{NP}), \text{ and}$$

$$\mathrm{Cov}(\overline{w}_M, \overline{w}_M\hat{p}_{NP}) = \hat{p}_{NP}\hat{v}(\overline{w}_M).$$

For 1998 and 1999, military vessel logbook data were explicitly classified as either private (lottery) or charter (pay/premier). Because explicit numbers (constants) were used rather than attempting to classify harvest based on a survey of users, estimates were simplified somewhat. The mean weight of private-caught fish was estimated using equation 8 but with

$$\hat{p}_{MP} = \frac{H_{MP}}{\hat{H}_P}, \tag{13}$$

$$\hat{p}_{NP} = \frac{\hat{H}_P - H_{MP}}{\hat{H}_P} = 1 - \frac{H_{MP}}{\hat{H}_P}, \text{ and} \tag{14}$$

$$\hat{v}(\hat{p}_{NP}) = \frac{H_{MP}^2 \hat{v}(\hat{H}_P)}{\hat{H}_P^4}. \tag{15}$$

The variance of the mean weight for private-caught halibut was estimated using equation 12, substituting equation 15 for equation 11. For all years 1995-1999, the mean weight of charter-caught halibut was estimated using equations 8-15, substituting "charter" for "private."

Variances could not be estimated for mean weights in 1995 because variances of harvest estimates from the SWHS were not available by user group.

Prince William Sound

Valdez was the only PWS port with adequate length data for the years 1995-1998. A pilot sampling program was conducted in Whittier during August and September of 1998, but the sample was inadequate to be considered representative. Therefore, the 1995-1998 mean weight estimates for each user group in PWS were based on Valdez data only. In 1999, sampling was conducted in Whittier and Valdez, and through a separate project, in Cordova as well. Since the data were available and collected in a comparable manner at each port, it was desirable to incorporate data from all ports in the 1999 estimates of mean weight. Mean weight was estimated for each user group by weighting the means from each port by the estimated proportion of PWS harvest taken in the corresponding areas fished by each fleet. For example, the mean weight of fish harvested by private anglers was estimated using:

$$\overline{w}_P = (\overline{w}_{PW}\hat{p}_W) + (\overline{w}_{PV}\hat{p}_V) + (\overline{w}_{PC}\hat{p}_C), \quad (16)$$

where $\overline{w}_{PW}, \overline{w}_{PV}$, and $\overline{w}_{PC}$ are the estimated mean weights of halibut landed by private anglers at Whittier, Valdez, and Cordova, and $\hat{p}_W, \hat{p}_V, \hat{p}_C$ are the estimated proportions of total harvest (private and charter) that occurred in each portion of PWS. The proportions used for 1999 were 0.222 for Whittier, 0.624 for Valdez, and 0.154 for Cordova. These proportions were determined by assigning each reported site of harvest from the SWHS standard survey (unknown sites excluded) to one of these three ports, based on a subjective opinion of the most likely port of landing (Appendix B2). This approach assumed that private and charter harvests were distributed similarly and that there was no overlap of fleets (fish from each site landed at only one port). Although neither of those assumptions were likely to have been true, this approach was felt to be the best use of available data. It very likely provides a more accurate estimate than assuming that Valdez is representative of the entire sound.

Because the SWHS estimates for PWS were based on a large number of responses (1,403 in 1999), the variance of the proportions of harvest landed at each port were considered negligible. The variance of mean weight was therefore estimated by:

$$\hat{v}(\overline{w}_P) = \hat{p}_W^2\hat{v}(\overline{w}_{PW}) + \hat{p}_V^2\hat{v}(\overline{w}_{PV}) + \hat{p}_C^2\hat{v}(\overline{w}_{PC}). \quad (17)$$

Calculations were done similarly for fish taken by charter boat anglers by substitution of charter for private data in equations 16 and 17.

Yakutat

For the Yakutat fishery, no length data were collected before 1998. Mean weights and variances for Valdez (the nearest port) were therefore substituted in all calculations for the years 1995-1997. Sampling in Yakutat in 1998 and 1999 produced mean weight estimates significantly higher than those from Valdez, so earlier use of Valdez data very likely resulted in underestimated harvest biomass before 1998. The overall effect on Area 3A harvest biomass would have been very small because Yakutat accounts for a very small proportion of total Area 3A harvest. The Yakutat harvest was sampled in 1998 but user group information was not recorded. The sample was believed to have been dominated by charter-caught fish but roughly representative of both user groups (Robert Johnson, ADF&G, Yakutat, personal

communication). Therefore, the pooled mean weight estimate was used in 1998 to estimate harvest biomass for both user groups using equations 2 and 3. Although there may have been differences in sizes of fish caught by charter and private anglers, this approach was felt to be more accurate than substituting data from Valdez. Data collected in 1999 allowed explicit estimation of mean weight and variance for each user group using standard statistical procedures assuming normally-distributed means.

Age, Length, and Sex Composition

The number of otoliths collected often exceeded the number necessary to meet the desired level of precision. In these instances, subsamples of at least 510 otoliths were selected at random such that the numbers in each user group were proportional to the estimated harvest by each user group. The number 510 was chosen to provide estimates of age composition that were within 5% of the true proportions for each age class with confidence of 95% (Thompson 1992, page 39).

Otoliths were cleared by soaking for at least three weeks in a 1:1 mixture of glycerin and distilled water. Thymol was added some years as an antiseptic. Ages were generally determined by surface reading. In 1995, 1996, and 1997, otoliths initially assigned an age of 15 or greater were broken and burned (Chilton and Beamish 1982) to determine the final assigned age. All otoliths that were difficult to surface-read were broken and burned in 1998. Each year a subset of otoliths was exchanged with the IPHC to maintain consistency between agencies in assigned ages. Ages assigned by ADF&G and IPHC readers had a high percentage of agreement and differences were distributed symmetrically (Meyer 2000).

Age composition was estimated (Objective 3) for each port and year by:

$$\hat{p}_i = \frac{n_i}{n}, \tag{18}$$

where:

$\hat{p}_i$ = the estimated proportion of fish of age i in the harvest,

n_i = the number of fish of assigned age i, and

n = the total number of fish with assigned ages.

The variance of each proportion was estimated by:

$$\hat{v}(\hat{p}_i) = \frac{\hat{p}_i(1-\hat{p}_i)}{n-1}. \tag{19}$$

The finite population correction factor to the estimated variance was ignored because sample sizes were small relative to the number of fish harvested (Thompson 1992, page 15). Observed frequencies from all user groups were pooled to derive overall age composition because, in most cases, the sample size was proportional to the harvest by each group. In the worst case, the 1996 Valdez sample, weighted and unweighted estimates of age composition differed by a maximum of only 4.4% for any one age class. The overall weighted and unweighted age distributions for this sample were not significantly different ($\chi^2 = 8.83$, $P = 0.64$, $df = 11$).

Length and sex composition were also estimated (Objective 3) using equations 18 and 19, by substituting length or sex for age. Estimates of length composition were grouped by 2-cm

intervals and presented as cumulative frequencies for each user group and port. Estimates of sex composition were also made using data from all user groups combined. Even though sex composition of the halibut harvest often differed significantly by user group, sample sizes for each user group were generally proportional to harvest by each user group. In the worst case, the 1997 Kodiak sample, weighted and unweighted estimates of the percent females in the harvest differed by only 3.4%.

Spatial Distribution of Effort and Harvest

The proportion of halibut effort (in angler-days) and harvest (in number of fish) in each ADF&G groundfish statistical (stat) area were also estimated (Objective 4) by equations 18 and 19, substituting statistical area for age group. Estimations were made separately for each user group. An angler-day was tallied for each stat area in which an angler spent any portion of the day targeting halibut. Effort targeting halibut was defined as effort for "halibut only," "bottomfish," or "bottomfish and salmon." The proportions of harvest by stat area were calculated regardless of the target species indicated.

The estimates of spatial distribution of effort and harvest apply to the fleets returning to the sampled ports and generally cannot be applied to entire subareas. For example, estimates obtained from boats interviewed in Kodiak city obviously cannot apply to the entire Kodiak area, nor do estimates for the Whittier or Valdez fleets represent the effort or harvest distribution throughout PWS.

RESULTS

SAMPLING SUMMARY

Data on length, age, or sex were collected from 28,530 halibut throughout Area 3A during the period 1995-1999 (Table 6). Sample sizes ranged from 4,394 to 6,860 fish per year, but data were obtained in Yakutat in 1998 and 1999 only. The 1998 Whittier sample was only 106 halibut due to very limited sampling late in the season. The number of halibut sampled from the portion of the Homer harvest that was cleaned at sea ranged from 101 to 295 (Table 7). Anchor Point accounted for samples of 64 to 208 halibut per year, or 6% to 24% of the Central Cook Inlet sample during the period (Table 8).

Interviews were obtained for 11,194 vessel trips that either targeted halibut, targeted halibut in conjunction with other bottomfish, or otherwise caught halibut between 1995 and 1999 (Table 9). The total number of interviews obtained each year ranged from 1,635 to 2,987. Variation in the number of interviews obtained among ports, user groups, or years was caused by differences in sampling design, staff turnover, and unwillingness of some charter operators to participate in interviews, and does not necessarily indicate changes in effort.

The fraction of the halibut harvest that was cleaned at sea varied widely among ports and user groups (Table 10). In general, charter operators were more likely to clean halibut at sea than unguided anglers. A substantial portion of the Homer charter harvest was cleaned at sea (11%-36%), usually to expedite shore operations. A major factor influencing this decision at other ports is the availability of cleaning facilities in the boat harbors. About 51% of the charter-caught halibut harvest from the Kodiak fishery was cleaned at sea in 1998 (Table 10) because fish cleaning facilities were temporarily removed during construction of harbor improvements. The percentage dropped in 1999 but many charter operators continued to clean fish at sea for convenience. A large percentage of private anglers fishing out of Whittier (Table 10) chose to

Table 6.-Pacific halibut biological (length, age, sex) sample sizes, by port, 1995-1999.

Port	Year					Total
	1995	1996	1997	1998	1999	
Kodiak	1,063	1,036	648	1,394	1,265	5,406
Homer	1,330	1,923	1,245	1,163	965	6,626
Deep Crk/ Anchor Pt. Beaches	1,233	1,041	1,055	884	863	5,076
Seward	805	638	517	556	695	3,211
Whittier[a]				106	727	833
Valdez	761	657	929	599	1,125	4,071
Cordova[b]					357	357
Yakutat[c]				2.087	863	2.950
Total	5,192	5,295	4,394	6,789	6,860	28,530

[a] No sampling was conducted in Whittier in 1995-1997.

[b] No sampling was conducted in Cordova in 1995-1998.

[c] No sampling was conducted in Yakutat in 1995-1997.

Table 7.-Numbers of halibut sampled from the sport harvest at Homer that were cleaned in port and cleaned at sea, 1995-1999.

Type	Year					Total
	1995	1996	1997	1998	1999	
Cleaned in port	1,035	1,822	1,112	956	858	6,827
Cleaned at sea	295	101	133	207	107	1,046
Total	1,330	1,923	1,245	1,163	965	7,873

Table 8.-Numbers of halibut sampled from the sport harvest in Central Cook Inlet that were landed at Deep Creek beach and Anchor Point beach, 1995-1999.

Location	Year					Total
	1995	1996	1997	1998	1999	
Deep Creek	1,085	977	891	720	655	4,328
Anchor Point	148	64	164	164	208	748
Total	1,233	1,041	1,055	884	863	5,076

Table 9.-Number of vessel-trip interviews obtained, by port, from anglers that targeted halibut or caught halibut while targeting other species, 1995-1999.

Port	User Group	1995	1996	1997	1998	1999	Total
Kodiak	Charter	88	99	92	284	114	677
	Private	313	251	238	385	219	1,406
	Unknown	1	0	5	0	0	6
	SubTotal	402	350	335	669	333	2,089
Deep Crk/	Charter	277	215	282	221	306	1,301
Anchor Pt. Beaches	Private	458	387	376	365	377	1,963
	SubTotal	735	602	658	586	683	3,264
Homer	Charter	181	123	261	379	397	1,341
	Private	131	120	194	233	257	935
	SubTotal	312	243	455	612	654	2,276
Seward	Charter	146	57	48	97	255	603
	Military	95	60	44	75	50	324
	Private	161	75	90	128	225	679
	SubTotal	402	192	182	300	530	1,606
Whittier[a]	Charter				27	190	217
	Private				36	103	139
	SubTotal				63	293	356
Valdez	Charter	163	138	174	125	242	842
	Private	140	108	179	78	118	623
	Unknown	2	2	0	0	0	4
	SubTotal	305	248	353	203	360	1,469
Cordova[b]	Charter					38	38
	Private					96	96
	SubTotal					134	134
Totals	Charter	855	632	857	1,133	1,542	5,019
	Military	95	60	44	75	50	324
	Private	1,203	941	1,077	1,225	1,395	5,841
	Unknown	3	2	5	0	0	10
	Grand Total	2,156	1,635	1,983	2,433	2,987	11,194

[a] Sampling not conducted in Whittier in 1995-1997.

[b] Sampling not conducted in Cordova in 1995-1998.

Note: Included are any vessel-trips where the anglers indicated they targeted halibut only, halibut in conjunction with other bottomfish, other bottomfish, or bottomfish and salmon.

Table 10.-Estimated percentage of the halibut harvest that was cleaned (and carcass disposed of) at sea by all user groups at each Southcentral Alaska port, 1995-1999.

Port	User Group	1995	1996	1997	1998	1999
Kodiak						
	Charter	0.0	0.2	1.7	51.4	27.8
	Private	0.0	0.7	0.5	4.4	6.4
	Overall	0.0	0.4	1.1	35.4	17.7
Deep Crk./Anchor Pt. Beaches						
	Charter	0.0	0.0	0.2	0.7	0.4
	Private	0.0	0.0	0.0	0.2	0.0
	Overall	0.0	0.0	0.2	0.5	0.2
Homer						
	Charter	36.0	10.7	23.0	31.8	31.1
	Private	6.1	3.6	6.5	3.7	0.5
	Overall	32.1	8.6	20.2	27.3	26.0
Seward						
	Charter	11.8	3.0	18.8	9.0	3.4
	Military	0.0	0.0	0.0	1.1	0.0
	Private	1.1	0.0	0.0	4.7	1.4
	Overall	7.3	1.4	10.4	5.5	2.4
Whittier						
	Charter	[a]	[a]	[a]	44.7	[b]
	Private	[a]	[a]	[a]	84.5	[b]
	Overall	[a]	[a]	[a]	58.4	[b]
Valdez						
	Charter	4.1	12.7	13.7	19.2	21.8
	Private	0.3	6.8	3.4	19.0	5.5
	Overall	3.1	11.9	11.7	19.2	19.5

[a] No sampling conducted.

[b] No estimate made.

Note: Estimates were from interview data.

clean their fish at sea either because the harbor lacked adequate fish cleaning and carcass disposal facilities, or because they were out for multiple-day trips and cleaned fish each day. Charter operators, however, were more willing to return carcasses to port for sampling because they made mostly day trips and had adequate deck space to store carcasses. No estimate was obtained in 1999 in Whittier due to a sampling oversight, but the percentage remained high.

AVERAGE LENGTH AND WEIGHT AND HARVEST BIOMASS (OBJECTIVES 1 AND 2)

Average length, weight, and sample sizes for each port and user group (including unknown) are summarized in Appendices C1-C6. Estimates of average length and weight by subarea are presented in Tables 11 and 12. Average length and weight were estimated from measurements of 24,777 fish (around 5,000 per year) for which the user group was known.

The average lengths of harvested halibut (Objective 1) were generally greatest in the Kodiak, PWS, or Yakutat subareas, and the smallest fish on average were generally landed in the Cook Inlet and North Gulf fisheries. For example, average length for charter-caught halibut ranged from 88 to 92 cm in Cook Inlet but exceeded 100 cm most years in the Kodiak, PWS, and Yakutat subareas (Table 11). The standard error of estimates of average length ranged from 0.6 to 3.1 cm, corresponding with 95% confidence bounds for average length that ranged from ±1.2 to ±6.1 cm. Halibut taken by charter anglers were generally longer on average than halibut taken by unguided anglers.

The average weights of harvested halibut (Objective 1) were also generally higher in Kodiak, PWS, and Yakutat subareas and lower in Cook Inlet and the North Gulf (Table 12). Average weights for charter harvest ranged from 15.8 lb in the North Gulf fishery in 1996 to 43.3 lb at Yakutat in 1999. Average weights for private harvest ranged from 13.0 lb in the Lower Cook Inlet fishery in 1996 and 1998 to 36.3 lb in the PWS fishery (Valdez) in 1996. The standard error of mean weight estimates ranged from 0.4 to 2.9 lb, corresponding with 95% confidence bounds for average weight that ranged from ±0.8 to ±5.7 lb.

Estimated harvest biomass or yield (Objective 2) from the sport fishery for Area 3A climbed from about 4.5 million lb in 1995 to 5.5 million lb in 1997, then declined to about 4.2 million lb in 1999 (Table 13). Charter anglers harvested from 2.5 to 3.4 million lb, while private anglers took from 1.7 to 2.1 million lb. The relative precision (95% error bound relative to the estimate) of harvest biomass estimates for particular user group-subarea combinations was relatively poor, in the range of 10%-36% for charter harvest and 13%-95% for private harvest, but improved considerably when user groups or subareas were combined (Table 14). Ultimately, the relative precision of estimates of sport yield for all of Area 3A were within the range ± 4.9%-5.2% during the period 1995-1999. Most of the variance in estimates of harvest biomass was due to variance in estimates of the number of fish harvested (Appendix B1), rather than variance in estimates of average weight.

AGE, LENGTH, AND SEX COMPOSITION (OBJECTIVE 3)

Age Composition

Halibut harvested in the sport fishery ranged from 3 to 26 years of age, but most were between 5 and 15 years old (Appendix C7). Most notable in the plots of age composition for each port each year was the dominance of the 1987 and 1988 year classes, which were ages 8 and 7 in 1995 (Figures 3-7). These two cohorts accounted for 30%-53% of the sport harvest among the various

Table 11.-Estimated average lengths and standard errors of halibut harvested by charter and private anglers in the Kodiak, Central Cook Inlet, Lower Cook Inlet, North Gulf Coast, Prince William Sound, and Yakutat subareas of Area 3A, 1995-1999.

Year	Kodiak	Central Cook Inlet	Lower Cook Inlet	North Gulf Coast	Prince William Sound	Yakutat
			Estimate of Average Length (cm)			
Charter						
1995	99.8	89.0	94.6	92.8	103.3	103.3
1996	104.5	88.4	94.7	88.3	100.9	100.9
1997	106.2	87.5	96.4	101.1	111.6	111.6
1998	101.3	91.5	91.5	93.9	102.5	111.3
1999	100.6	88.9	89.7	93.5	95.9	116.4
Private						
1995	100.9	81.2	88.2	84.3	93.9	93.9
1996	96.1	82.9	82.0	86.4	108.8	108.8
1997	101.4	85.3	85.4	83.4	100.5	100.5
1998	99.2	82.7	82.7	86.8	96.0	111.3
1999	95.3	86.2	83.3	86.4	93.3	93.6
			SE (cm) of Average Length			
Charter						
1995	1.6	0.7	0.7	[a]	1.1	1.1
1996	1.4	0.7	0.7	0.7	1.1	1.1
1997	1.5	0.7	0.8	1.3	0.9	0.9
1998	1.0	0.9	0.9	1.2	1.3	0.6
1999	1.4	0.9	0.8	1.0	0.7	1.1
Private						
1995	1.4	1.2	1.8	[a]	2.7	2.7
1996	1.4	1.3	0.7	1.6	3.1	3.1
1997	1.5	0.9	0.9	1.6	2.0	2.0
1998	1.0	0.9	0.8	1.8	2.5	0.6
1999	1.0	1.1	0.9	1.6	1.3	2.7

[a] Not estimated because the military component of the variance could not be estimated.

Notes: Yakutat was not sampled in 1995-1997, so values are assumed to be the same as Valdez (PWS). User group was not recorded in Valdez in 1998, so the same estimates were applied to each user group.

Table 12.-Estimated average weights and standard errors of halibut harvested by charter and private anglers in the Kodiak, Central Cook Inlet, Lower Cook Inlet, North Gulf Coast, Prince William Sound, and Yakutat subareas of Area 3A, 1995-1999.

Year	Kodiak	Central Cook Inlet	Lower Cook Inlet	North Gulf Coast	Prince William Sound	Yakutat
			Estimate of Average Weight (lb net)			
Charter						
1995	27.2	17.3	20.4	20.4	29.3	29.3
1996	30.8	16.9	20.2	15.8	26.8	26.8
1997	30.4	15.9	21.3	26.4	35.1	35.1
1998	27.1	18.8	18.7	22.3	28.4	35.5
1999	27.5	17.4	16.5	20.9	23.9	43.3
Private						
1995	27.8	13.3	17.7	16.8	23.4	23.4
1996	25.7	14.6	13.0	16.1	36.3	36.3
1997	26.6	15.0	15.0	14.9	26.5	26.5
1998	25.9	13.2	13.0	16.9	25.6	35.5
1999	23.4	16.0	13.8	16.8	22.0	22.6
			SE of Average Weight (lb net)			
Charter						
1995	1.9	0.5	0.6	[a]	1.2	1.2
1996	1.8	0.6	0.7	0.6	1.2	1.2
1997	1.6	0.7	0.8	1.3	0.9	0.9
1998	1.0	0.8	0.9	1.2	1.4	0.6
1999	1.6	0.7	0.6	1.0	0.7	1.5
Private						
1995	1.4	0.9	1.6	[a]	2.2	2.2
1996	1.5	1.2	0.4	1.3	2.9	2.9
1997	1.4	0.6	0.8	1.2	1.8	1.8
1998	1.0	0.6	0.6	1.5	2.4	0.6
1999	0.9	0.8	0.6	1.4	1.0	2.3

[a] Not estimated because the military component of the variance could not be estimated.

Notes: Yakutat was not sampled in 1995-1997, so values are assumed to be the same as Valdez (PWS). User group was not recorded in Valdez in 1998, so the same estimates were applied to each user group.

Table 13.-Estimated sport harvest biomass and standard errors of halibut by charter and private anglers in the Kodiak, Central Cook Inlet, Lower Cook Inlet, North Gulf Coast, Prince William Sound, and Yakutat subareas of Area 3A, 1995-1999.

Year	Kodiak	Central Cook Inlet	Lower Cook Inlet	North Gulf Coast	Prince William Sound	Yakutat	Total Area 3A
			Estimate of Harvest Biomass (lb net weight)				
Charter							
1995	177,126	771,303	1,144,726	333,152	365,488	53,560	2,845,355
1996	158,774	702,584	1,373,539	243,652	265,240	78,095	2,821,884
1997	176,746	690,728	1,446,760	465,511	487,293	146,051	3,413,089
1998	133,305	823,064	1,137,390	367,638	371,642	151,727	2,984,766
1999	220,605	672,580	879,797	315,339	339,476	105,522	2,533,319
Private							
1995	207,861	488,602	543,726	123,446	287,750	14,695	1,666,080
1996	232,585	587,416	493,623	141,712	451,318	11,689	1,918,343
1997	303,719	672,420	565,845	152,025	386,185	20,273	2,100,467
1998	278,399	546,097	434,135	139,493	287,104	31,666	1,716,894
1999	247,408	489,616	454,448	181,255	294,712	27,301	1,694,740
All							
1995	384,987	1,259,905	1,688,452	456,598	653,238	68,255	4,511,435
1996	391,359	1,290,000	1,867,162	385,364	716,558	89,784	4,740,227
1997	480,465	1,363,148	2,012,605	617,536	873,478	166,324	5,513,556
1998	411,704	1,369,161	1,571,525	507,131	658,746	183,393	4,701,660
1999	468,013	1,162,196	1,334,245	496,594	634,188	132,823	4,228,059
			SE of Harvest Biomass (lb net weight)				
Charter							
1995[a]							
1996	24,788	36,271	67,524	16,552	27,528	11,274	87,455
1997	27,599	44,063	73,008	34,707	42,764	19,056	106,911
1998	19,587	48,777	69,850	29,991	35,836	19,061	100,940
1999	30,384	42,704	45,403	24,888	28,331	19,499	81,305
Private							
1995[a]							
1996	29,128	57,168	33,148	23,541	51,249	5,686	91,806
1997	33,564	48,332	46,797	19,011	41,259	7,837	88,190
1998	31,634	39,235	32,121	17,849	37,654	10,201	73,568
1999	30,570	45,479	33,737	23,381	28,893	8,777	74,830
All							
1995[a]							
1996	38,248	67,703	75,222	28,777	58,174	12,627	126,794
1997	43,453	65,402	86,718	39,573	59,423	20,605	138,591
1998	37,207	62,599	76,882	34,900	51,981	21,619	124,905
1999	43,102	62,385	56,565	34,148	40,465	21,383	110,499

[a] Not estimated in 1995 because the variance of the harvest estimates (in number of fish) could not be estimated.

Table 14.-Percent relative precision (estimated with 95% confidence) of sport harvest biomass estimates by user group and subarea of IPHC Area 3A, 1995-1999.

Year	Kodiak	Central Cook Inlet	Lower Cook Inlet	North Gulf Coast	Prince William Sound	Yakutat	Total Area 3A
Charter							
1995[a]							
1996	30.6	10.1	9.6	13.3	20.3	28.3	6.1
1997	30.6	12.5	9.9	14.6	17.2	25.6	6.1
1998	28.8	11.6	12.0	16.0	18.9	24.6	6.6
1999	27.0	12.4	10.1	15.5	16.4	36.2	6.3
Private							
1995[a]							
1996	24.5	19.1	13.2	32.6	22.3	95.3	9.4
1997	21.7	14.1	16.2	24.5	20.9	75.8	8.2
1998	22.3	14.1	14.5	25.1	25.7	63.1	8.4
1999	24.2	18.2	14.6	25.3	19.2	63.0	8.7
All							
1995[a]							
1996	19.2	10.3	7.9	14.6	15.9	27.6	5.2
1997	17.7	9.4	8.4	12.6	13.3	24.3	4.9
1998	17.7	9.0	9.6	13.5	15.5	23.1	5.2
1999	18.1	10.5	8.3	13.5	12.5	31.6	5.1

[a] Not estimated in 1995.

ports and years, and their contribution was highest in the CCI fishery where they made up more than 50% of the harvest in 1995 and 1996 (Figure 4).

Estimates of age composition for each port and year were based on sample sizes that ranged from 479 to 820 fish. Age composition was also calculated (but not plotted) for a 96-fish sample collected from the Whittier harvest in 1998 (Appendix C7). With the exception of the Whittier sample, standard errors of the estimates of the proportion in each age class did not exceed 0.02, or 2 percentage points.

Length Composition

Cumulative length-frequency distributions of the sport harvest by each user group at each port indicate that, with exceptions, the private harvest was generally composed of smaller fish than the charter harvest (Figures 8-13). There was little practical difference in length composition of the harvest between user groups at Kodiak each year except 1996, when private anglers harvested more halibut under 80 cm in length (Figure 8). In the CCI fishery, the difference in length composition was least pronounced in 1999 (Figure 9). In the Homer fishery, charter-caught fish that were cleaned at sea were smaller than the charter-caught fish cleaned in port (Figure 10). At Seward, the military camp harvest was composed of much smaller fish than the

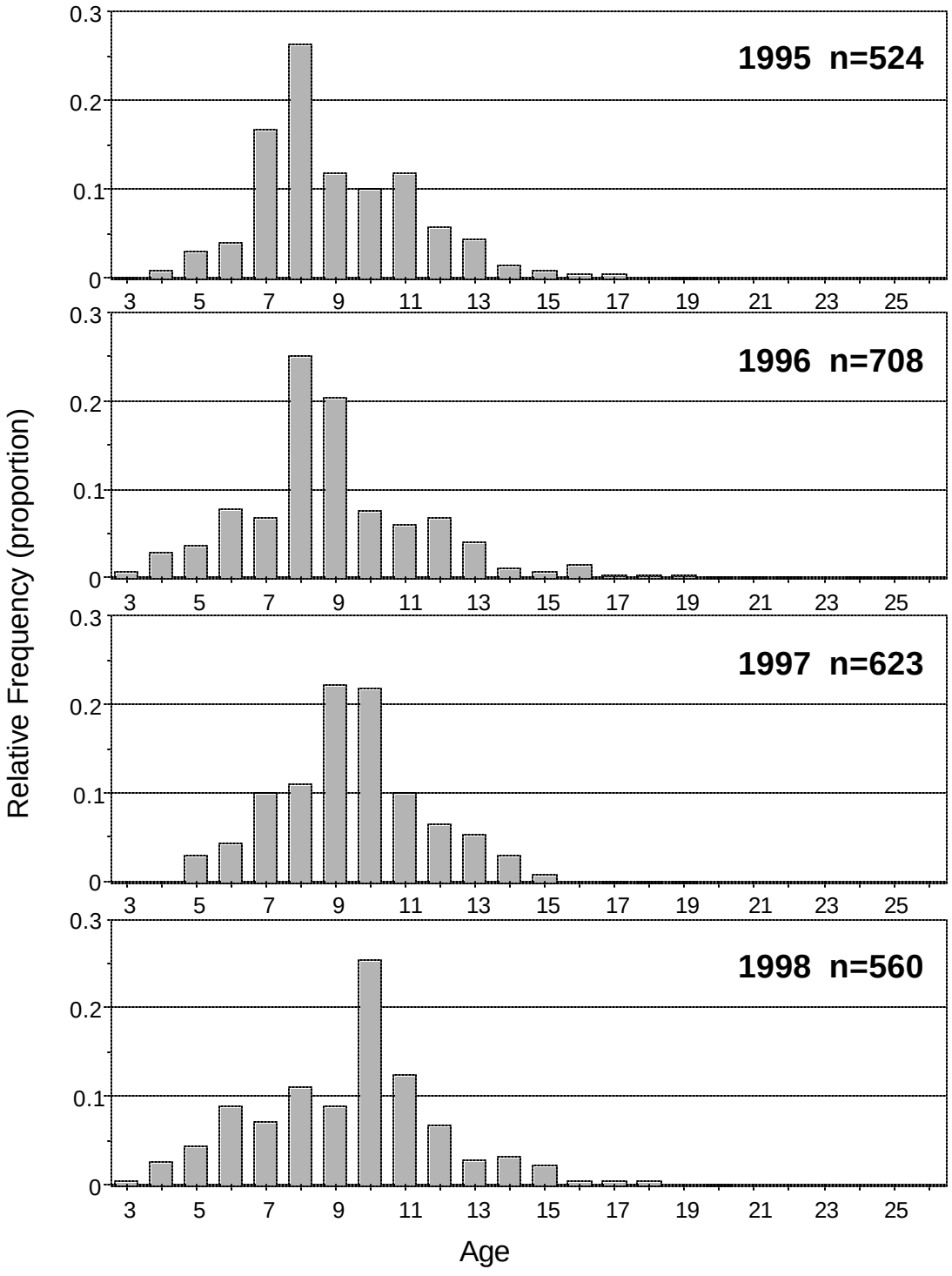

Figure 3.-Estimated age composition of the recreational Pacific halibut harvest landed at Kodiak, 1995-1998.

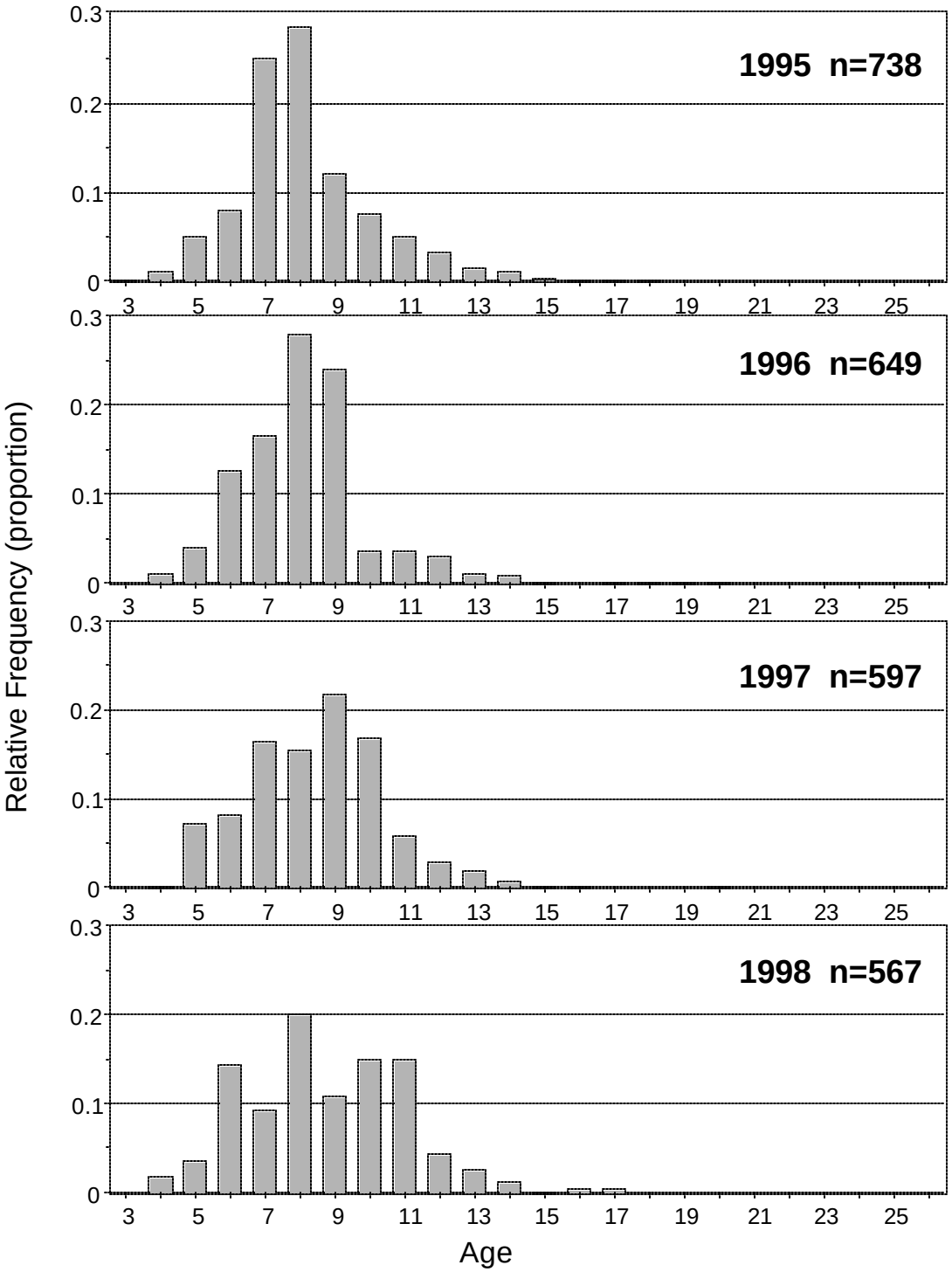

Figure 4.-Estimated age composition of the recreational Pacific halibut harvest landed at the Deep Creek and Anchor Point beaches, 1995-1998.

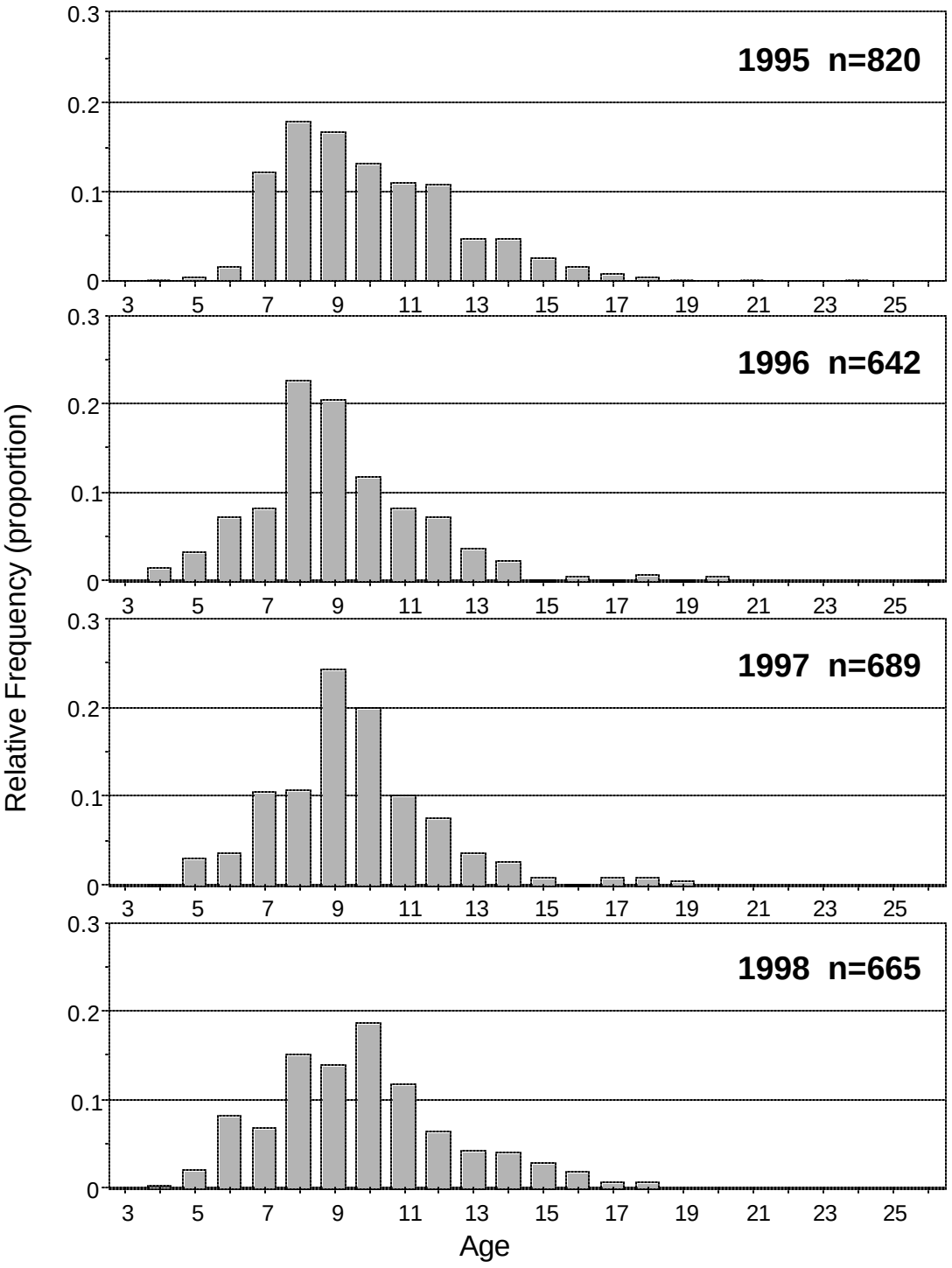

Figure 5.-Estimated age composition of the recreational Pacific halibut harvest landed at Homer, 1995-1998.

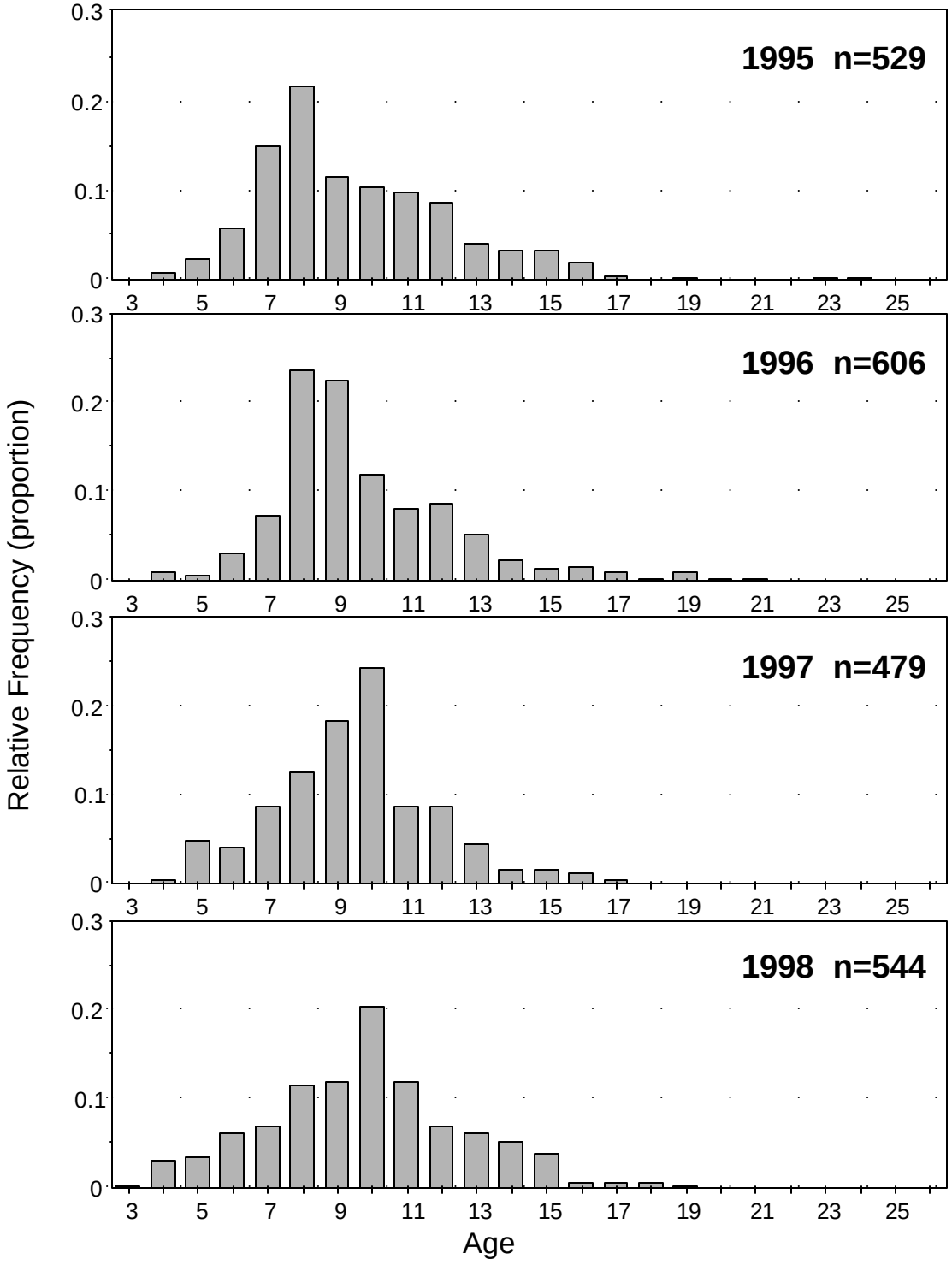

Figure 6.-Estimated age composition of the recreational Pacific halibut harvest landed at Seward, 1995-1998.

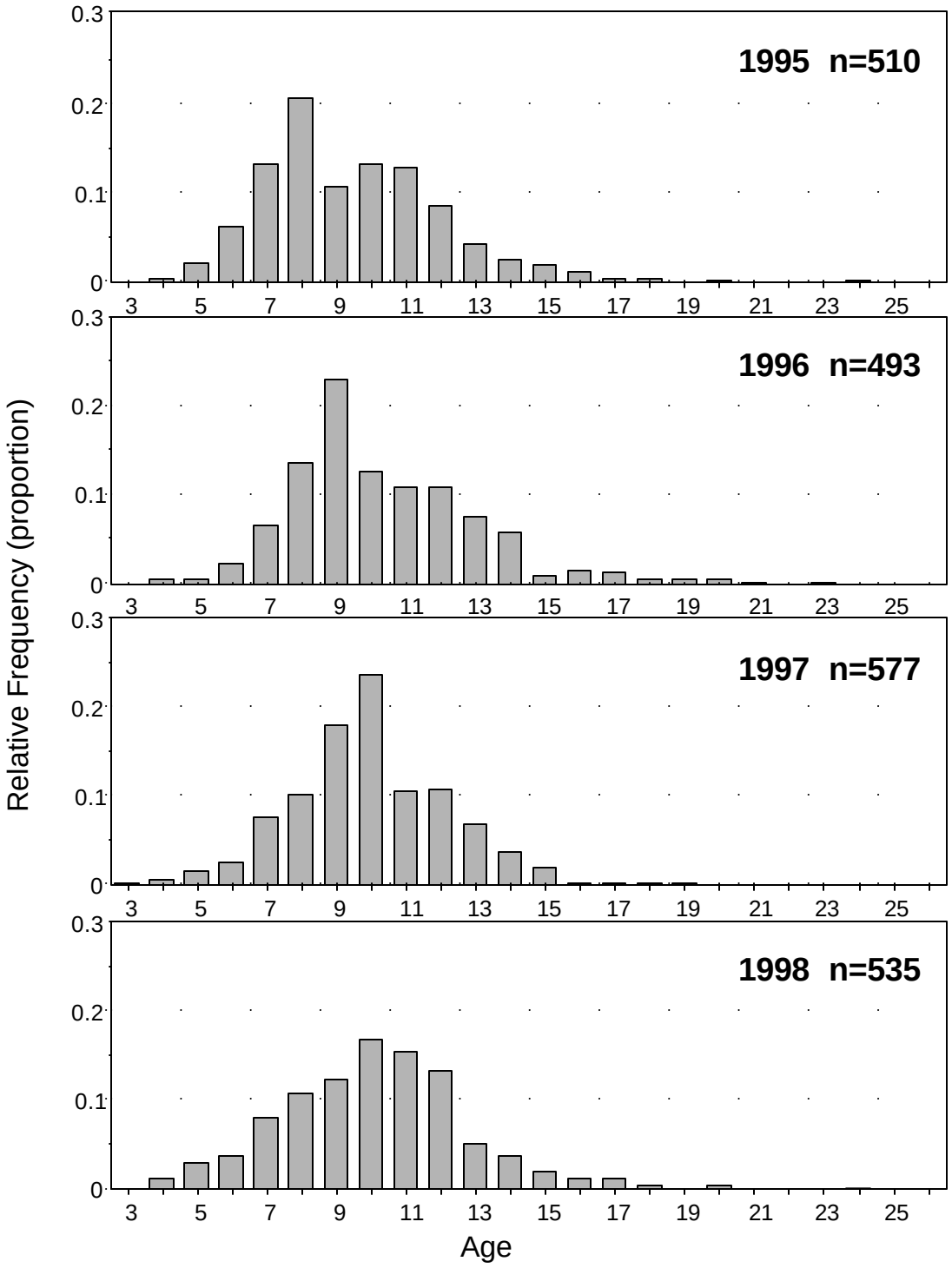

Figure 7.-Estimated age composition of the recreational Pacific halibut harvest landed at Valdez, 1995-1998.

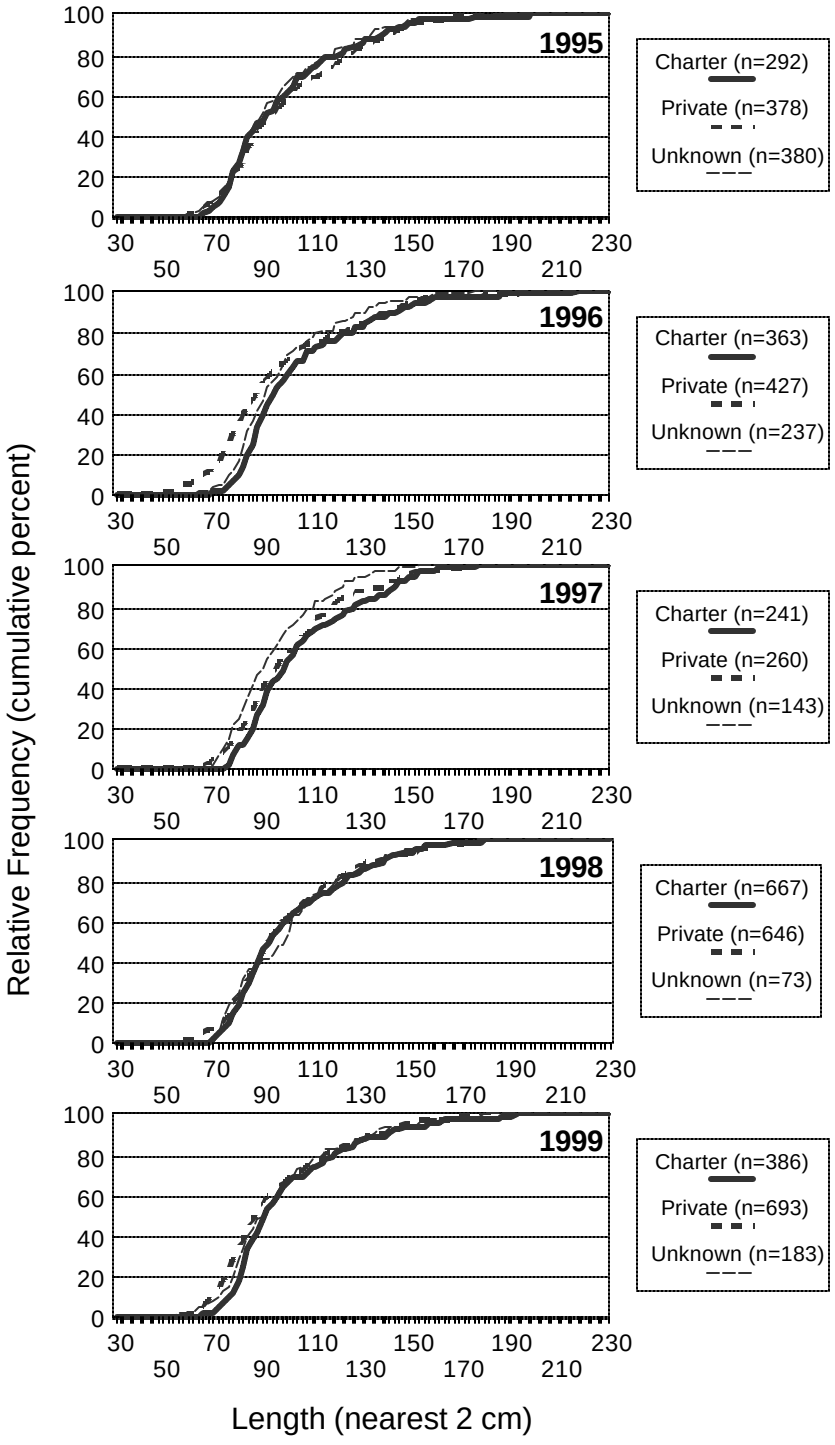

Figure 8.-Cumulative length frequency distribution, by user group, of the recreational Pacific halibut harvest landed at Kodiak, 1995-1999.

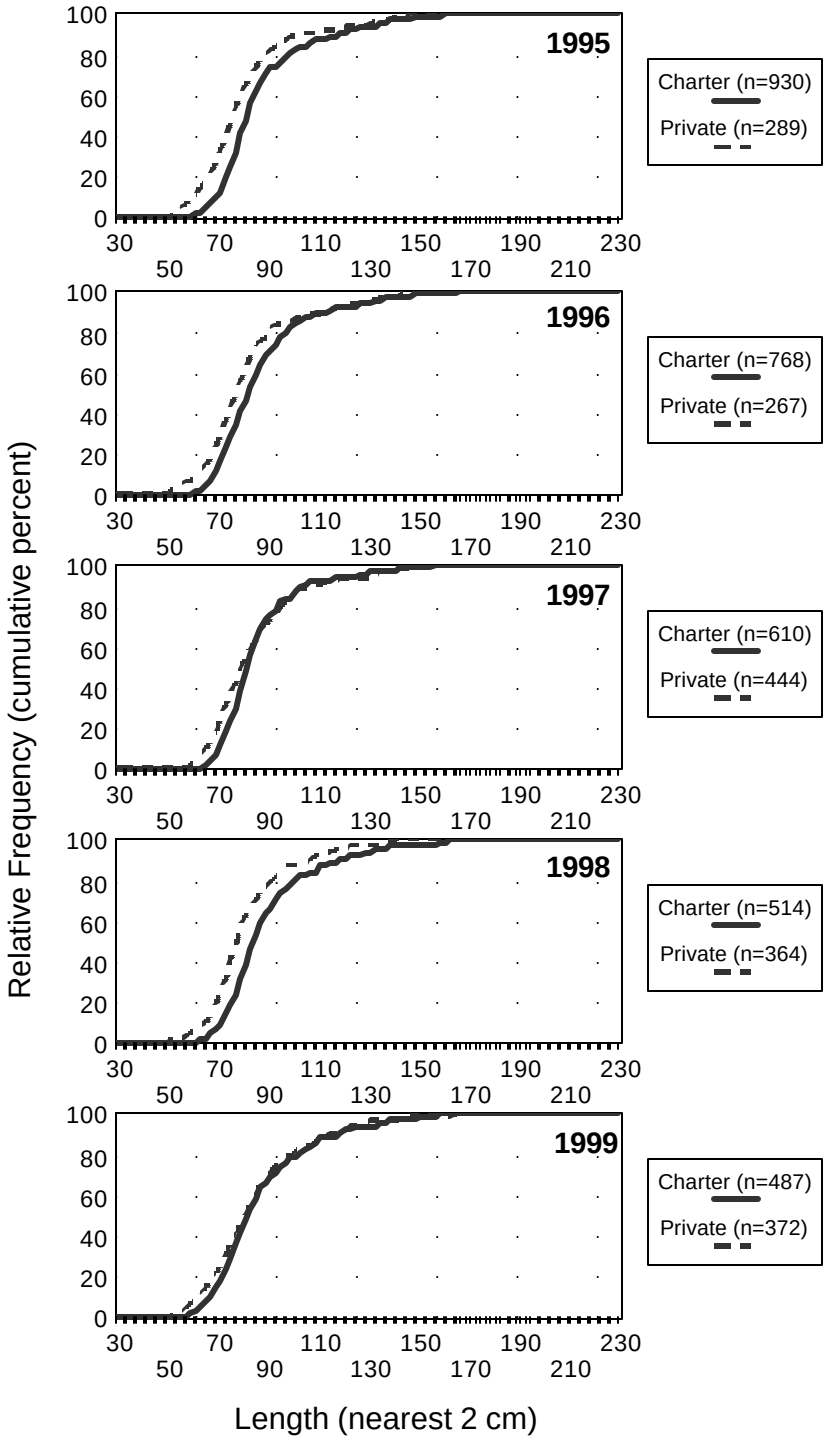

Figure 9.-Cumulative length frequency distribution, by user group, of the recreational Pacific halibut harvest landed at the Deep Creek and Anchor Point beaches, 1995-1999.

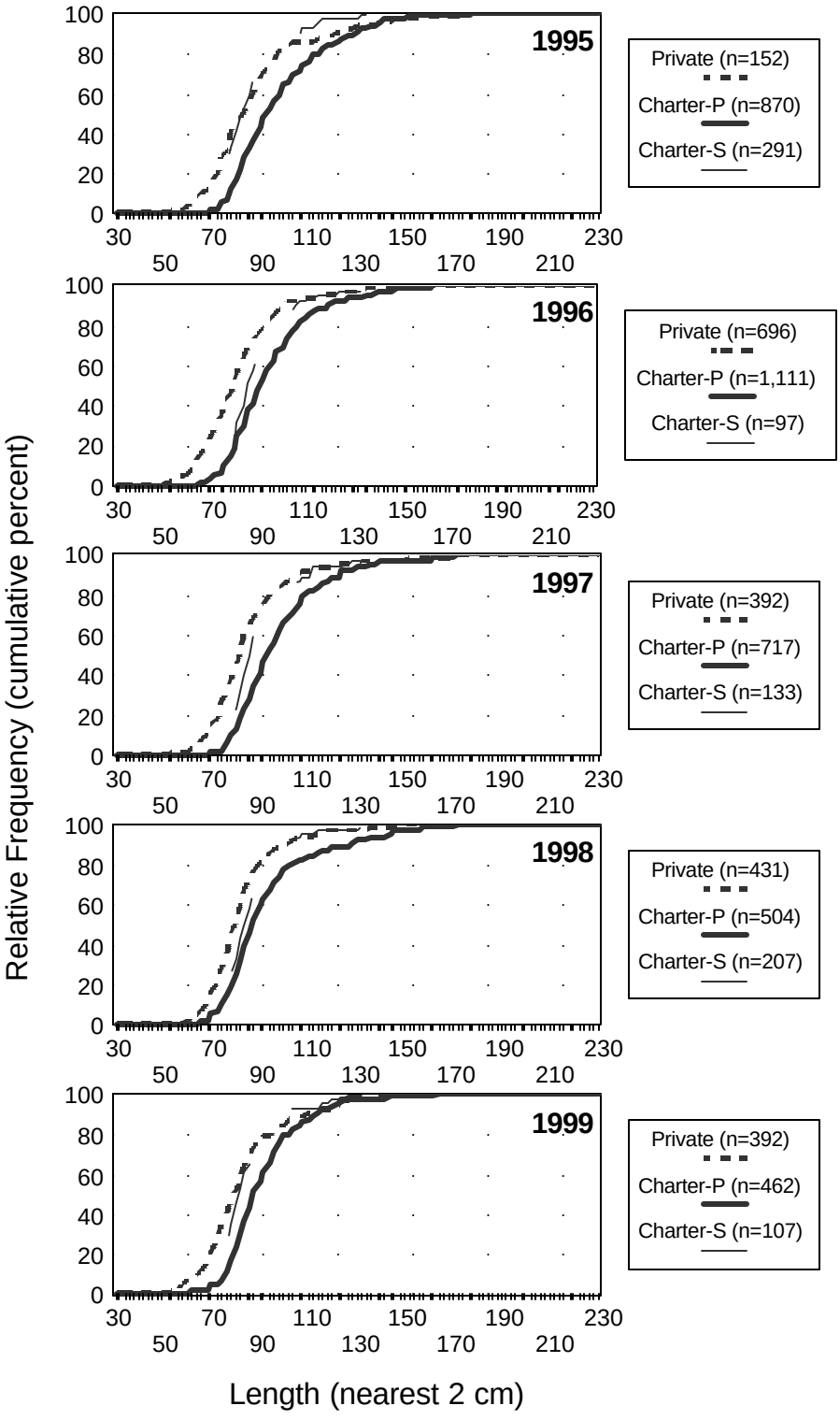

Figure 10.-Cumulative length frequency distribution, by user group, of the recreational Pacific halibut harvest landed at Homer, 1995-1999. Charter-P is charter harvest cleaned at port; Charter-S is charter harvest cleaned at sea.

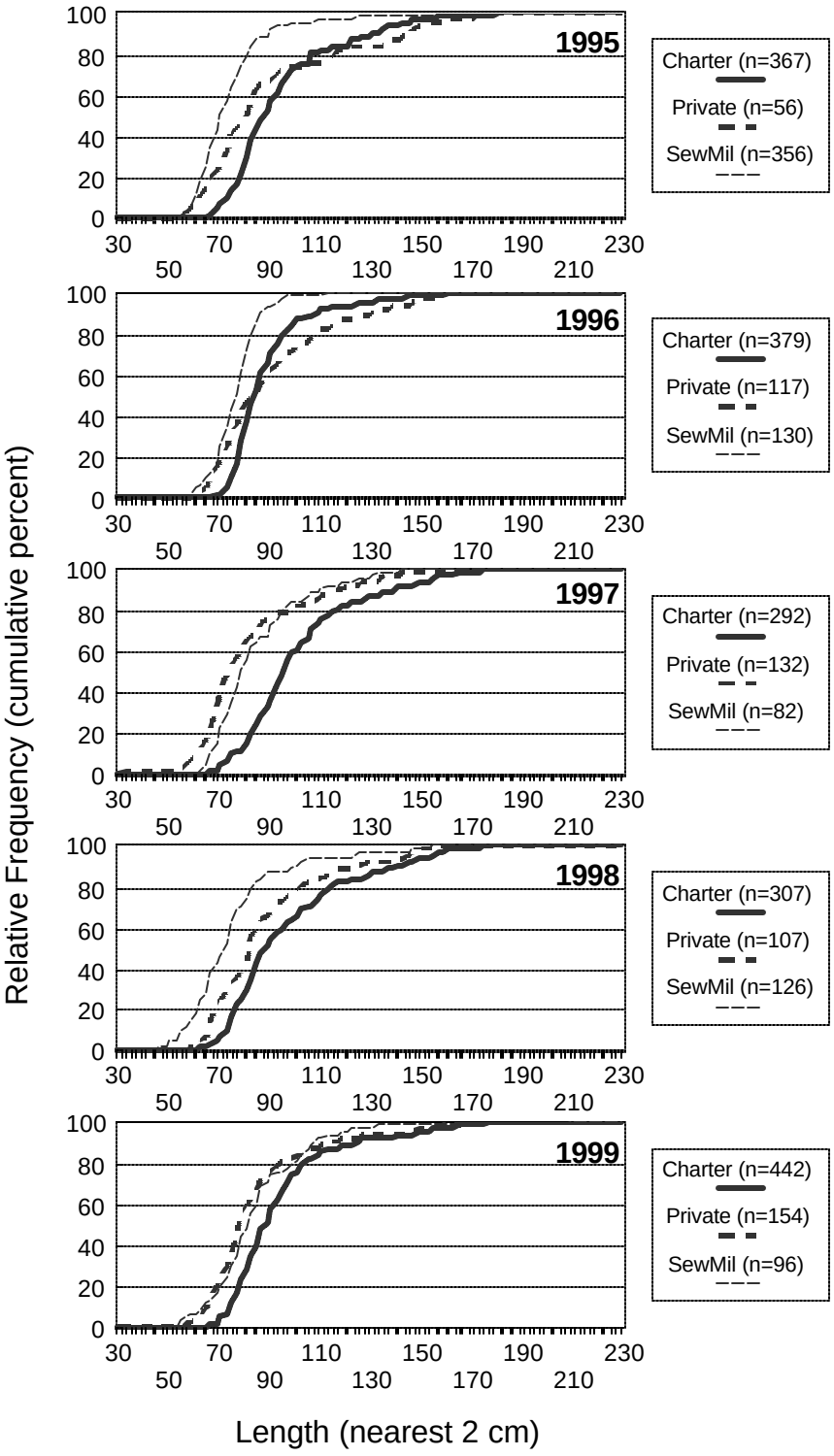

Figure 11.-Cumulative length frequency distribution, by user group, of the recreational Pacific halibut harvest landed at Seward, 1995-1999. SewMil is harvest by military anglers.

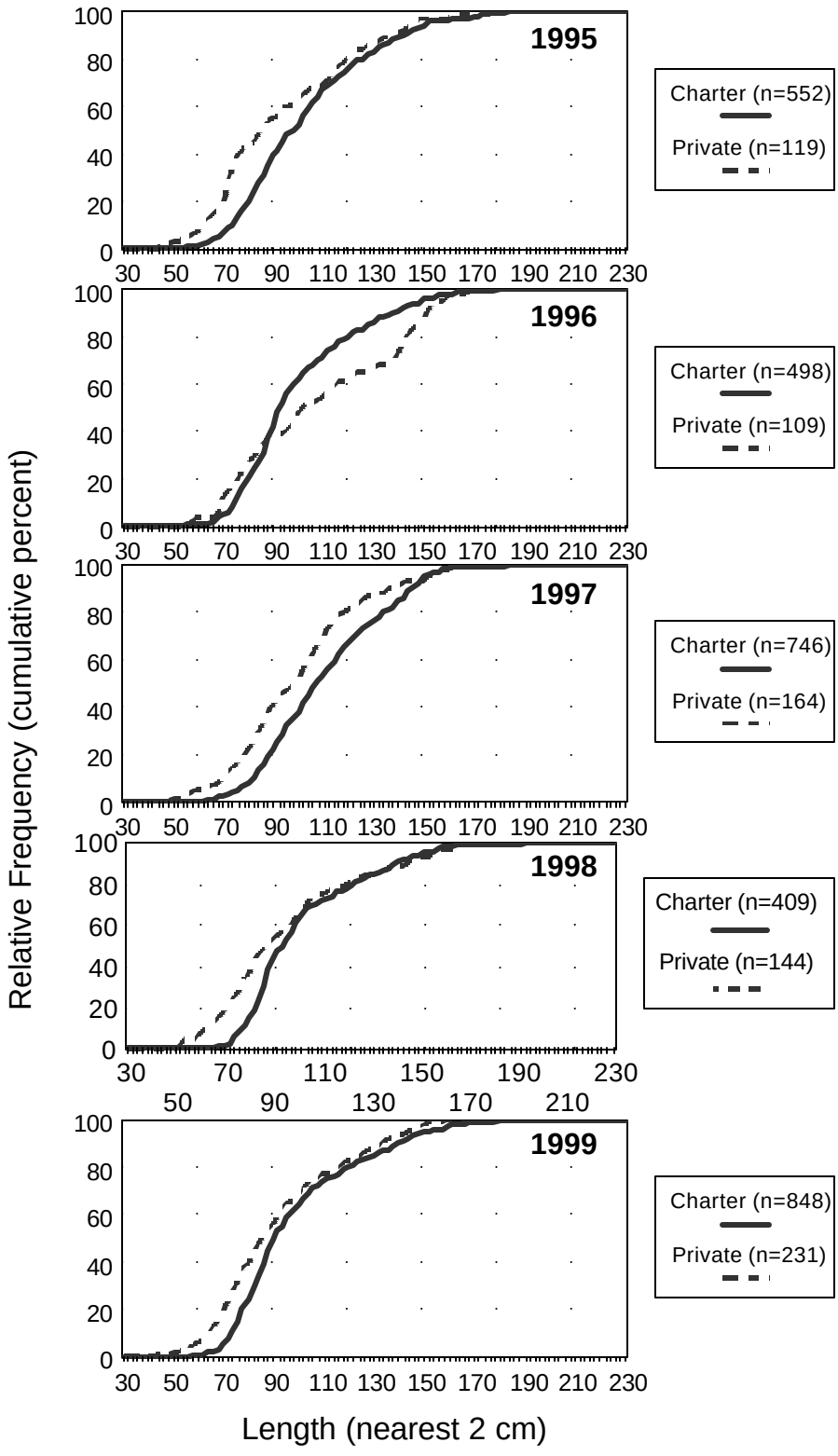

Figure 12.-Cumulative length frequency distribution, by user group, of the recreational Pacific halibut harvest landed at Valdez, 1995-1999.

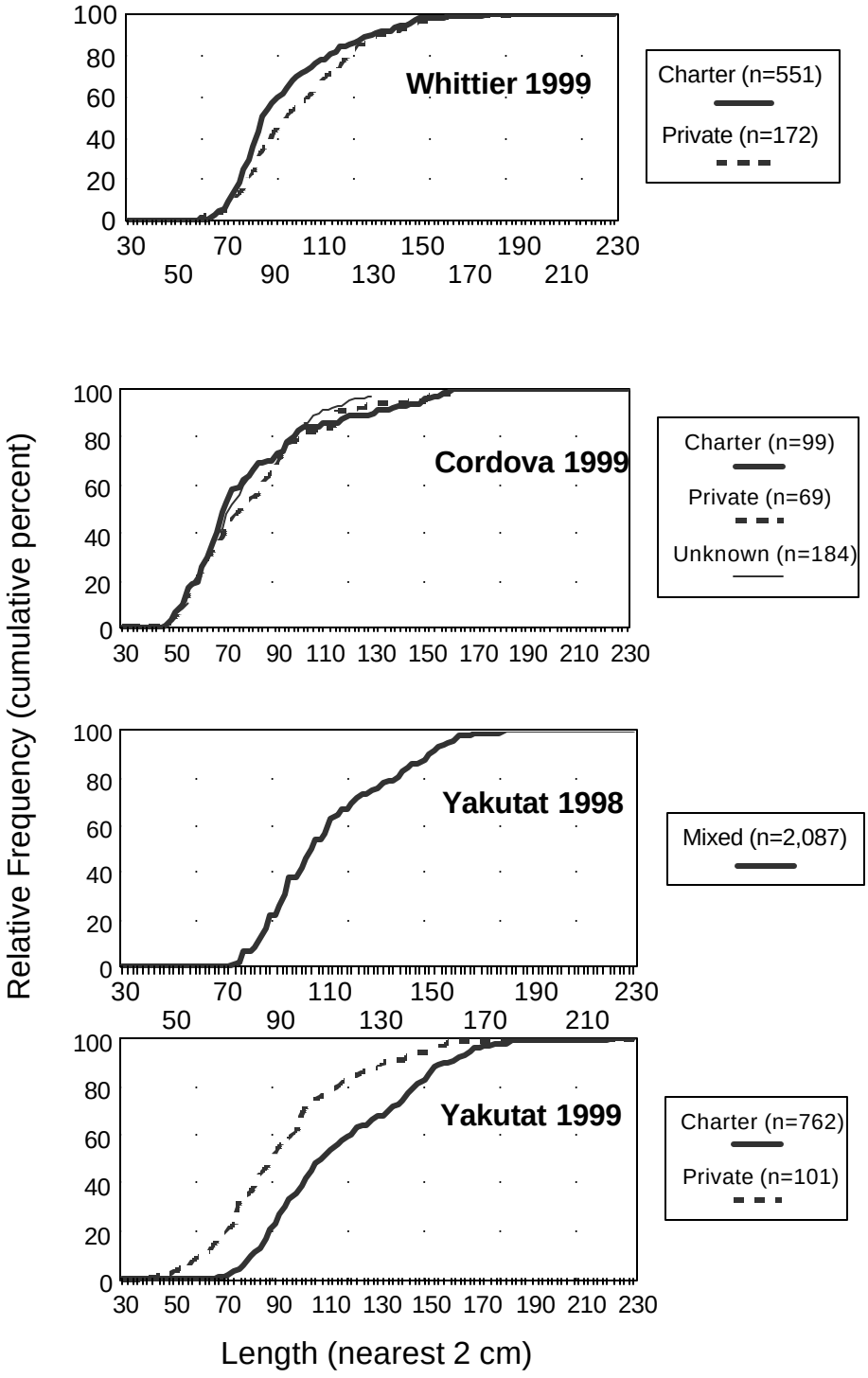

Figure 13.-Cumulative length frequency distribution, by user group, of the recreational Pacific halibut harvest landed at Whittier and Cordova in 1999, and Yakutat in 1998 and 1999.

harvest by other users in 1995, 1996, and 1998, and in 1995 and 1996 the military harvest covered a narrow size range (Figure 11). Very large fish made up a greater percentage of the Seward private harvest than the charter harvest in 1995 and 1996. In the Valdez fishery, the private harvest contained a relatively lower percentage of halibut in the 80-140 cm range and relatively more in the 140-160 cm range in 1996 (Figure 12). The private harvest at Whittier was composed of larger fish than the charter harvest in 1999, but there was practically no difference in length composition of the harvest between user groups in Cordova (Figure 13). Halibut landed by charter boat anglers at Yakutat were considerably larger than those taken by private anglers in 1999 (Figure 13). The Yakutat harvest was considerably larger than the harvest from any other port, with about 60% of the fish exceeding 1 meter in length.

Comparing the cumulative percentage plots, it appears that the harvests at Valdez, Whittier, and Yakutat were generally more evenly distributed over a wider range of lengths than the other ports. There was little variation in length composition of the entire Area 3A harvest over the period 1995-1999 (Figure 14). About 35%-42% of the annual harvest (in number) in Area 3A was shorter than the commercial fishery minimum size limit of 81 cm.

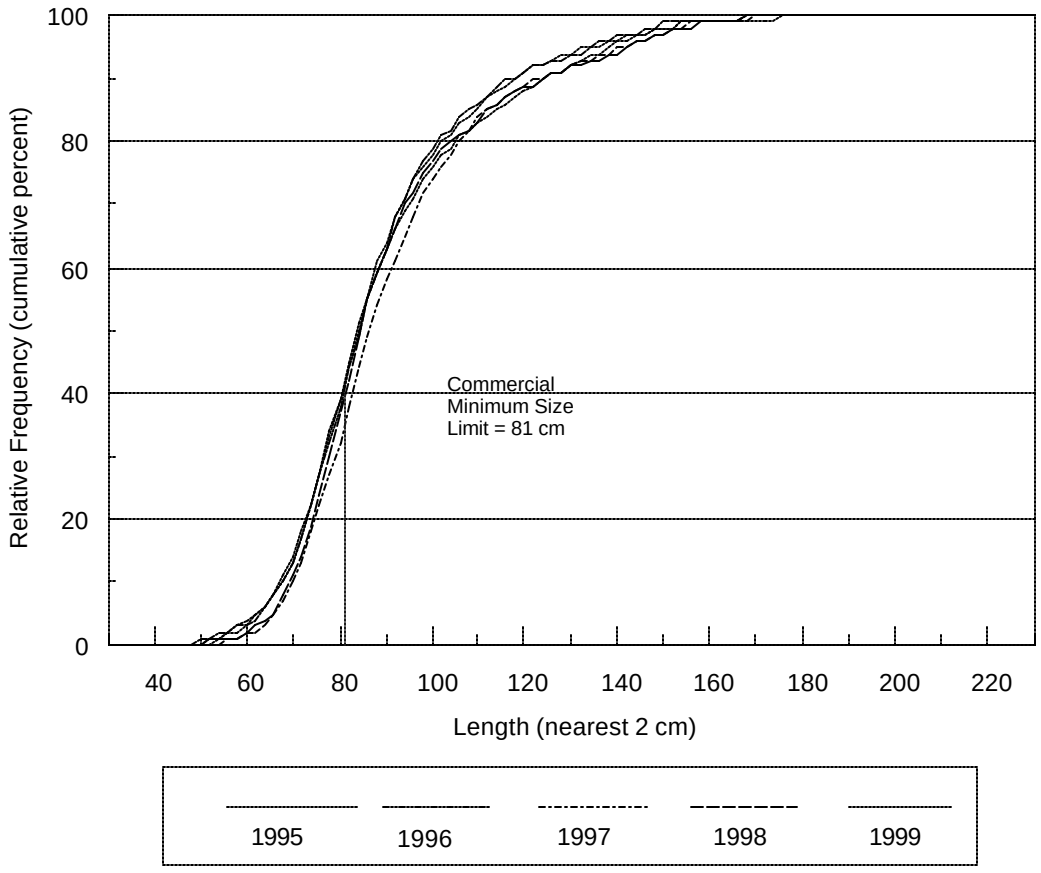

Figure 14.-Cumulative length frequency distribution of the overall Area 3A recreational halibut harvest, 1995-1999.

Sex Composition

Females made up the majority of the sport harvest each year at each port (Table 15). The fraction of females in the harvest ranged from 62% to 91%, depending on port and year. Among all ports, Seward had the lowest percentage of females each year. The percentage of females appeared to decline somewhat during the period 1995-1999 at Kodiak, CCI, Homer, and Valdez. The estimated percentage of females in the entire Area 3A sport harvest ranged from 74% to 83%, with a slight decrease over the 5-year period.

Most estimates of sex composition were based on large sample sizes and were relatively precise. Standard errors of the estimated percentage of each sex ranged from 0.9% to 2.5% (Table 15), corresponding to error bounds of about ±2-5 percentage points with 95% confidence.

SPATIAL DISTRIBUTION OF EFFORT AND HARVEST (OBJECTIVE 4)

Kodiak

Chiniak Bay and nearshore waters near Cape Chiniak (stat area 525733) accounted for 71%-87% of the charter effort and 67%-80% of the private effort (Figures 15 and 16). Most of the remaining effort was in the stat area immediately northwest of Chiniak Bay (stat area 525731). Halibut harvest was distributed in proportion to effort, with Chiniak Bay accounting for 73%-83% of the charter harvest and 56%-77% of the private harvest (Figures 17 and 18). Despite the high precision indicated by the relatively low standard errors (Appendix C8), many anglers reported fishing near, or on both sides of, the line separating stat areas 525731 and 525733. Although some reporting errors would have been offsetting, these estimates may be slightly biased. Anglers interviewed at Kodiak reportedly spent 1,112 to 2,377 angler-days of effort and harvested 1,133 to 2,519 halibut annually during the period 1995-1999 (Appendix C8).

Central Cook Inlet

Charter boat effort and harvest were concentrated in the center of Cook Inlet, in stat area 525931. This stat area accounted for 73%-89% of the charter effort for halibut and 76%-89% of the charter halibut harvest annually (Figures 19 and 21, Appendix C9). By contrast, this stat area only accounted for 22%-33% of the private effort and 27%-43% of the private harvest, which was more concentrated in waters closer to shore between Anchor Point and Ninilchik (Figures 20 and 22). Stat area 525939, or waters within 3 miles of shore between Ninilchik and Anchor Point, accounted for a steadily declining percentage of private effort and harvest from 1995 to 1999. Anglers interviewed in the Central Cook Inlet fishery reportedly spent 2,268 to 2,814 angler-days of effort and harvested 2,985 to 4,237 halibut annually during the period 1995-1999 (Appendix C9).

Homer

Effort and harvest by anglers interviewed in Homer were spread over a large area, from upper Kachemak Bay, north and west to the center of Cook Inlet, south to Shuyak Island, and eastward along the outer Gulf of Alaska to Port Dick (Figures 23-26). The two main stat areas in the center of Cook Inlet together accounted for 42%-58% of the charter effort and 46%-58% of charter harvest annually. Most of the remainder of the charter effort and harvest was south of Point Adam, around the Barren Islands and Chugach Islands (Figures 23 and 25). Private effort and harvest, on the other hand, were distributed closer to the port of Homer (Figures 24 and 26). With the exception of a modest amount of effort and harvest around the Barren Islands in 1996, there was little private boat fishing south of Point Adam. The majority of private fishing was in Kachemak Bay (east of the longitude of Anchor Point), but there was a gradual increase in

Table 15.-Sex composition (percent female), by port, of the Area 3A recreational halibut harvest, 1995-1999.

Year	Sample Size	Number Female	Percent Female	SE(%)
Kodiak				
1995	1,049	938	89.4	1.0
1996	1,007	901	89.5	1.0
1997	629	558	88.7	1.3
1998	1,365	1,099	80.5	1.1
1999	1,245	950	76.3	1.2
Deep Crk/Anchor Pt. Beaches				
1995	1,205	1,037	86.1	1.0
1996	1,025	882	86.0	1.1
1997	1,048	859	82.0	1.2
1998	855	657	76.8	1.4
1999	821	650	79.2	1.4
Homer				
1995	1,232	1,036	84.1	1.0
1996	1,838	1,539	83.7	0.9
1997	1,215	976	80.3	1.1
1998	1,156	816	70.6	1.3
1999	959	724	75.5	1.4
Seward				
1995	790	487	61.6	1.7
1996	594	389	65.5	2.0
1997	474	372	78.5	1.9
1998	543	350	64.5	2.1
1999	693	428	61.8	1.8
Whittier				
1999	712	489	68.7	1.7
Valdez				
1995	738	647	87.7	1.2
1996	639	531	83.1	1.5
1997	923	842	91.2	0.9
1998	580	454	78.3	1.7
1999	1,097	801	73.0	1.3
Cordova				
1999	341	229	67.2	2.5

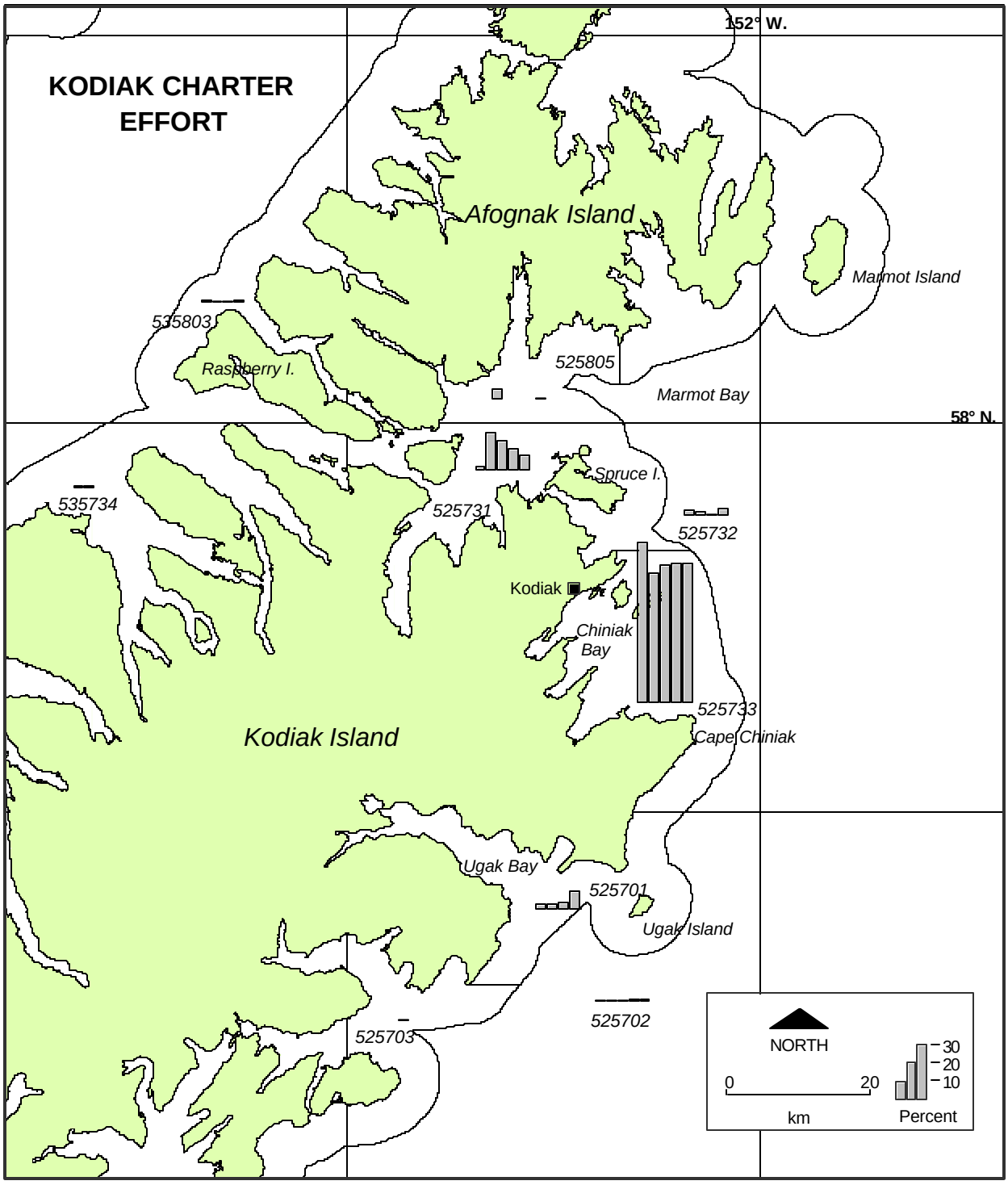

Figure 15.-The distribution of sport halibut fishing effort by charter anglers interviewed at Kodiak. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

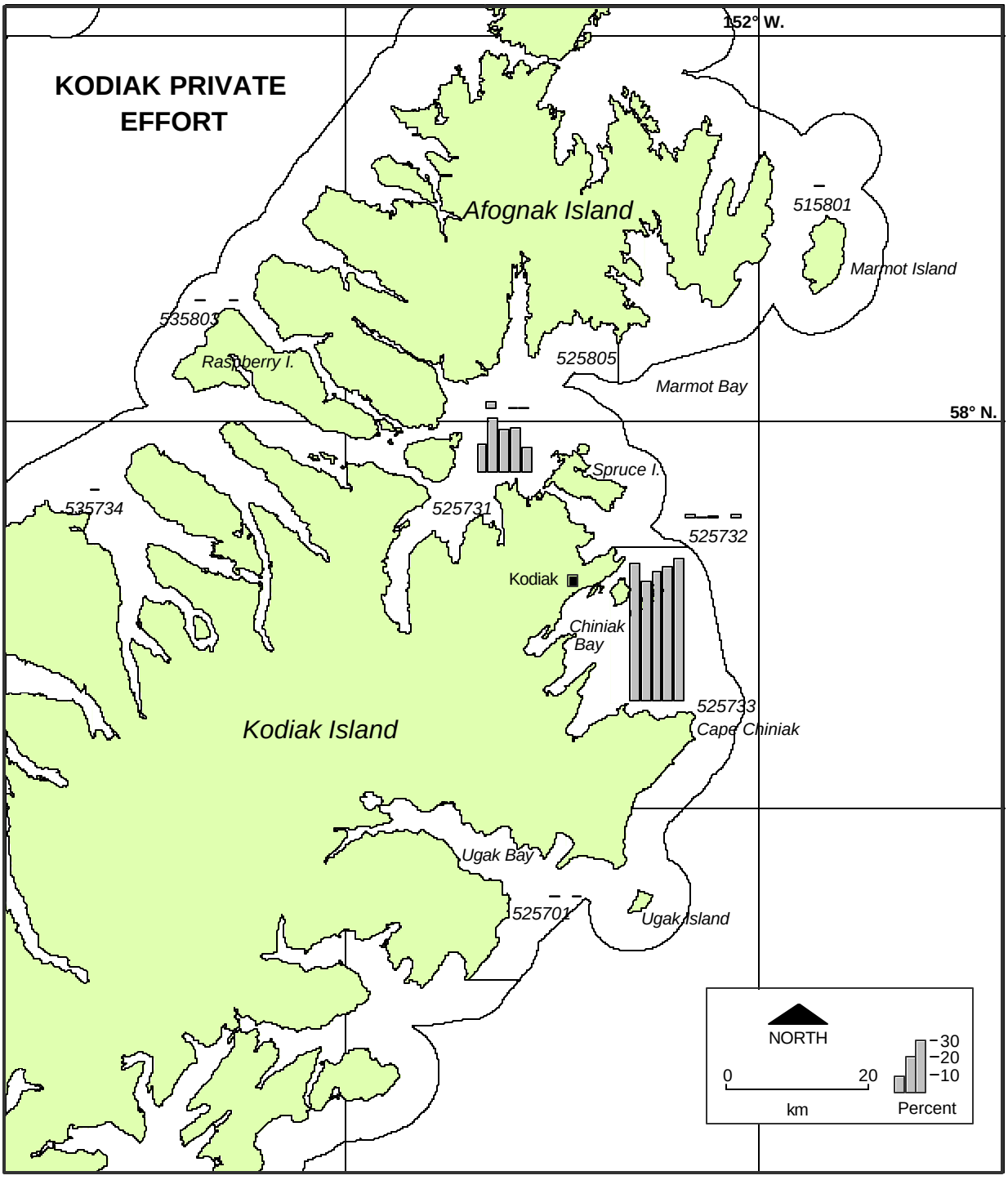

Figure 16.-The distribution of sport halibut fishing effort by private anglers interviewed at Kodiak. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

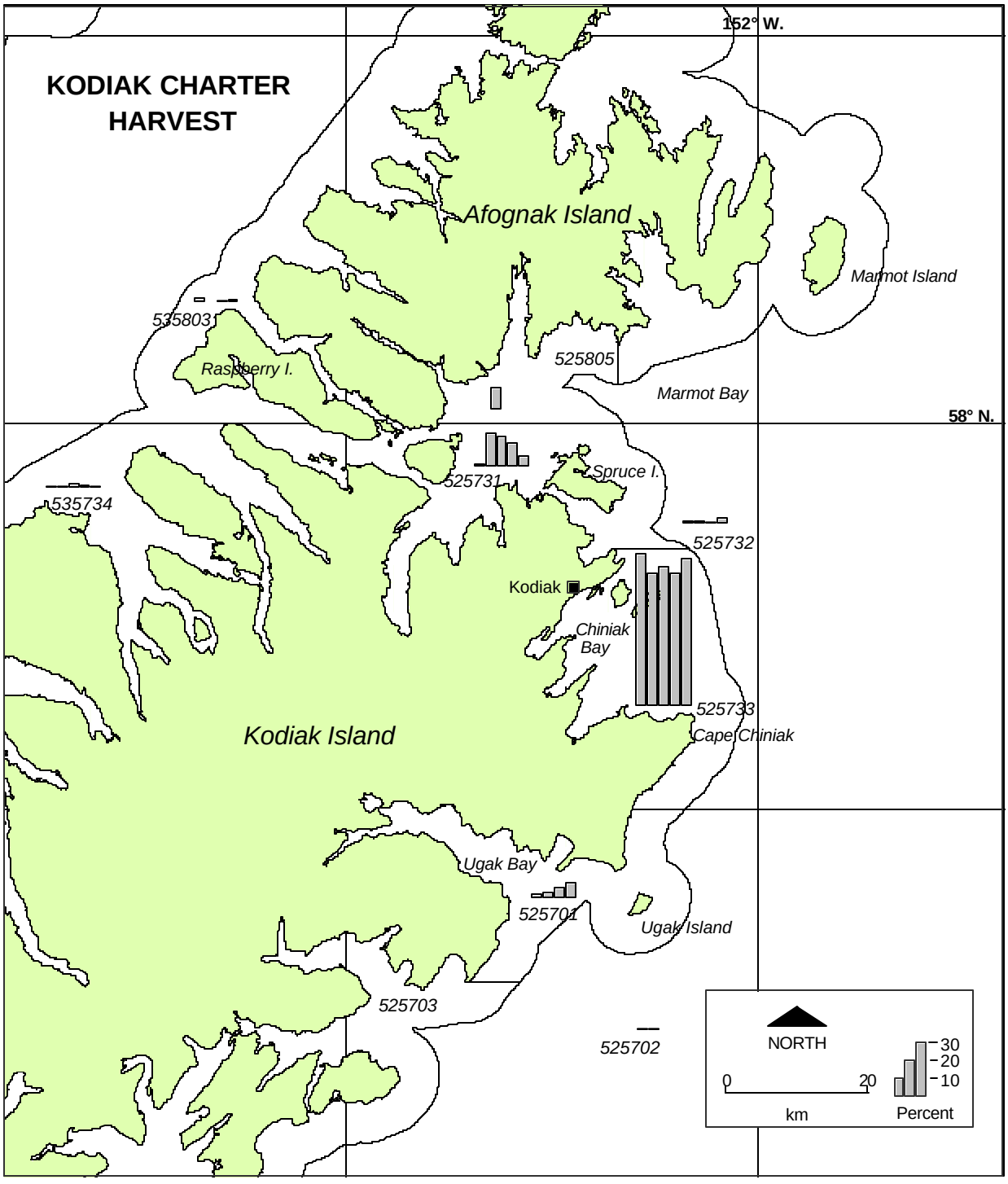

Figure 17.-The distribution of sport halibut harvest by charter anglers interviewed at Kodiak. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

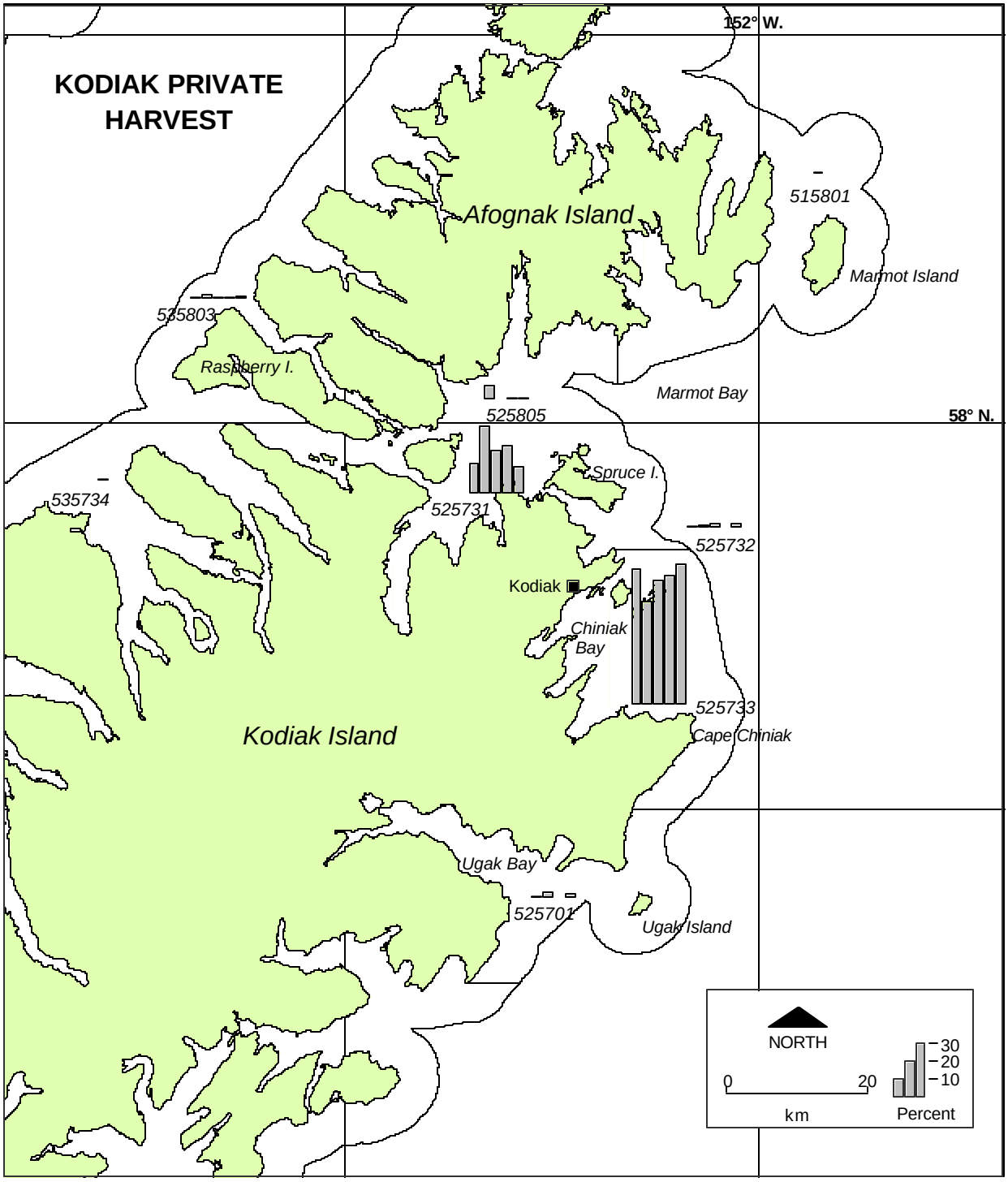

Figure 18.-The distribution of sport halibut harvest by private anglers interviewed at Kodiak. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

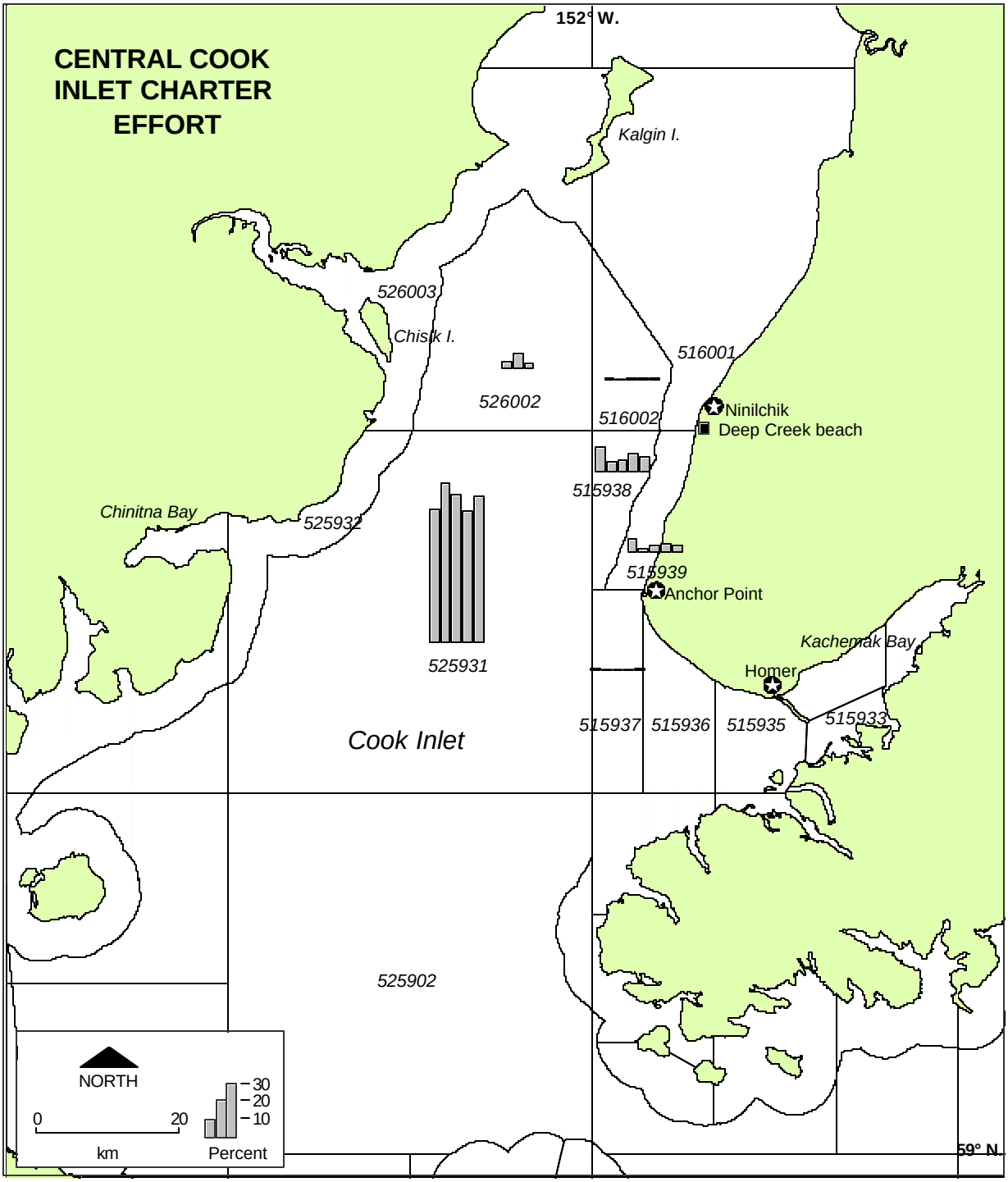

Figure 19.-The distribution of sport halibut fishing effort by charter anglers interviewed at the Deep Creek and Anchor Point beaches. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

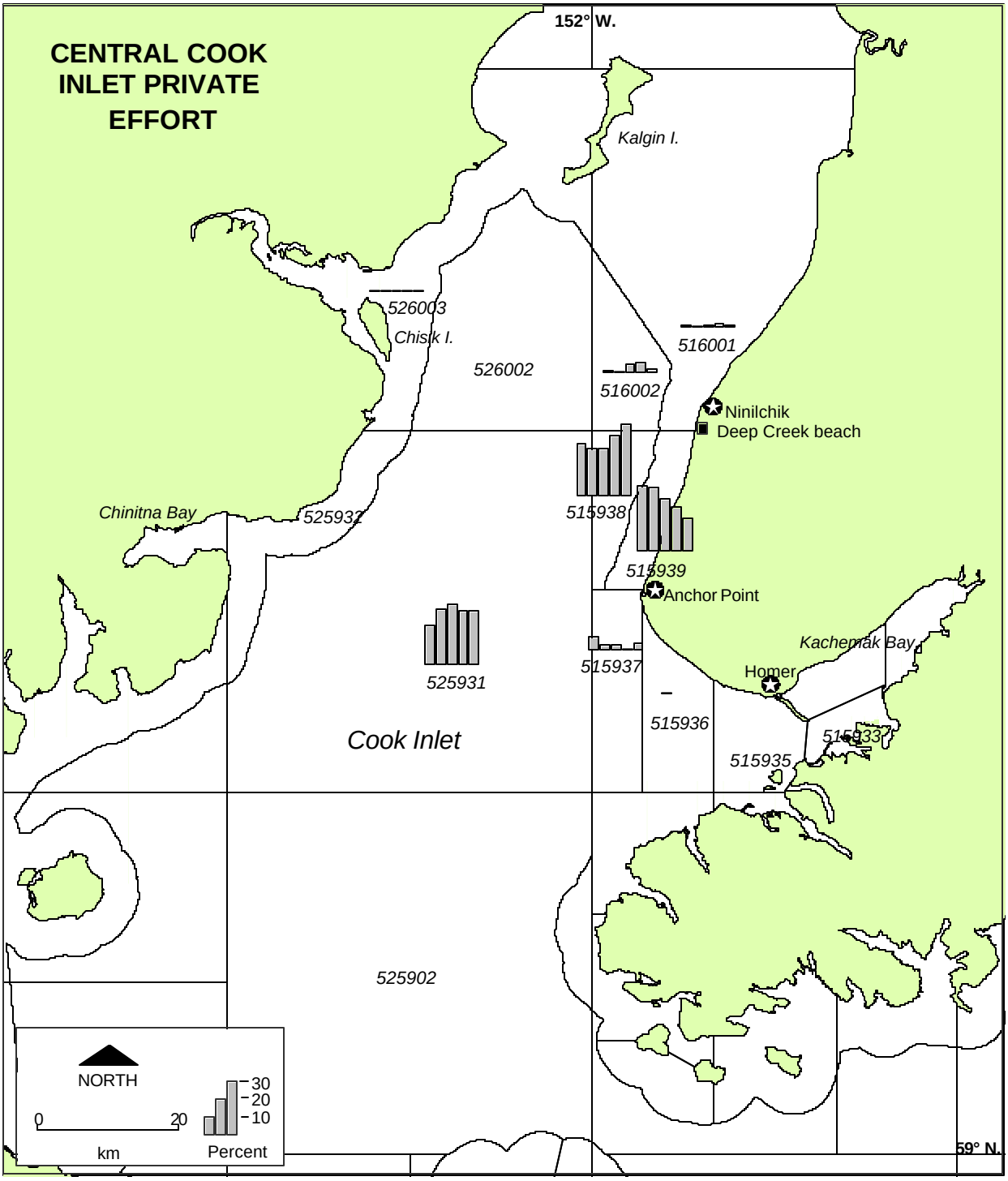

Figure 20.-The distribution of sport halibut fishing effort by private anglers interviewed at the Deep Creek and Anchor Point beaches. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

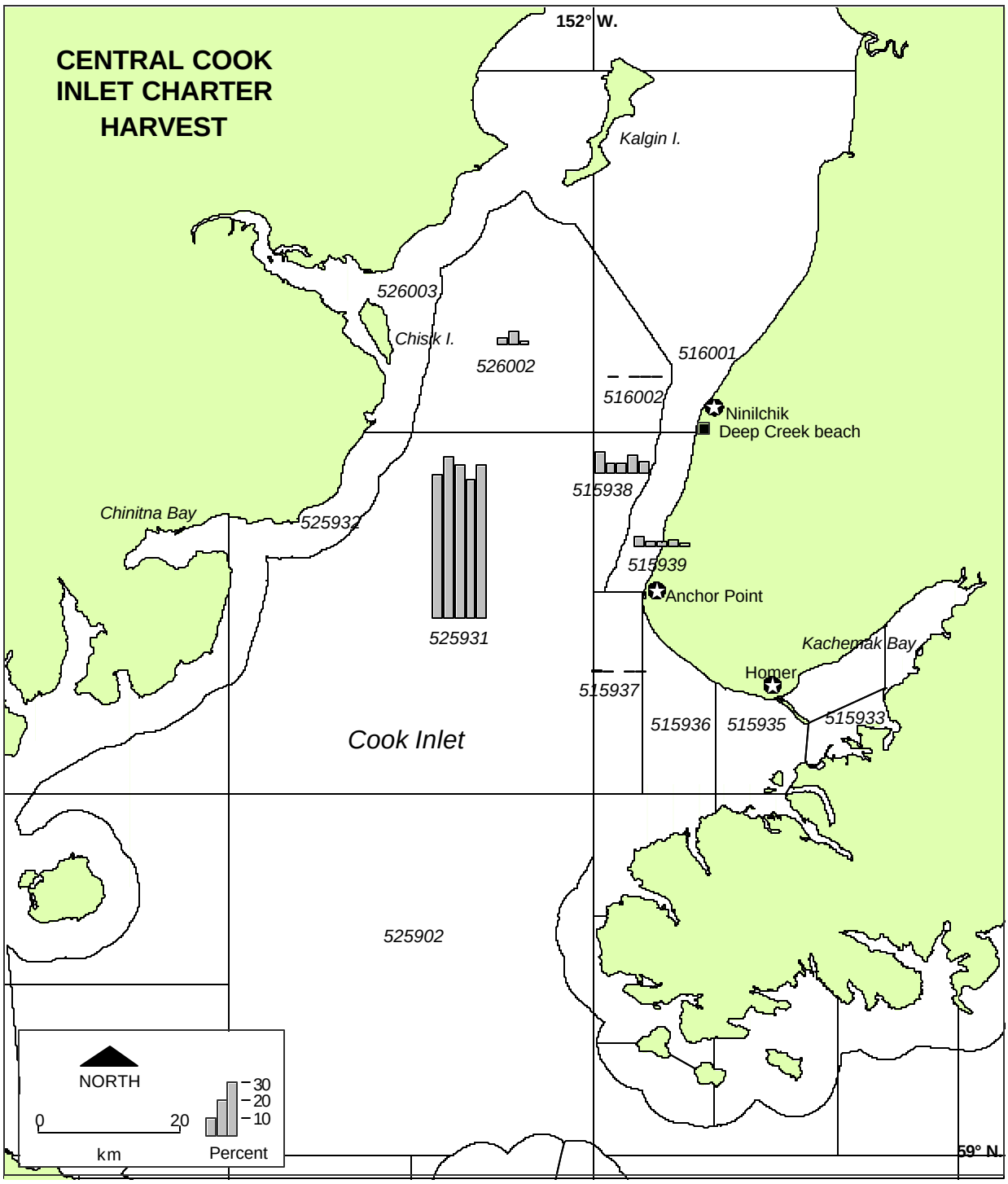

Figure 21.-The distribution of sport halibut harvest by charter anglers interviewed at the Deep Creek and Anchor Point beaches. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

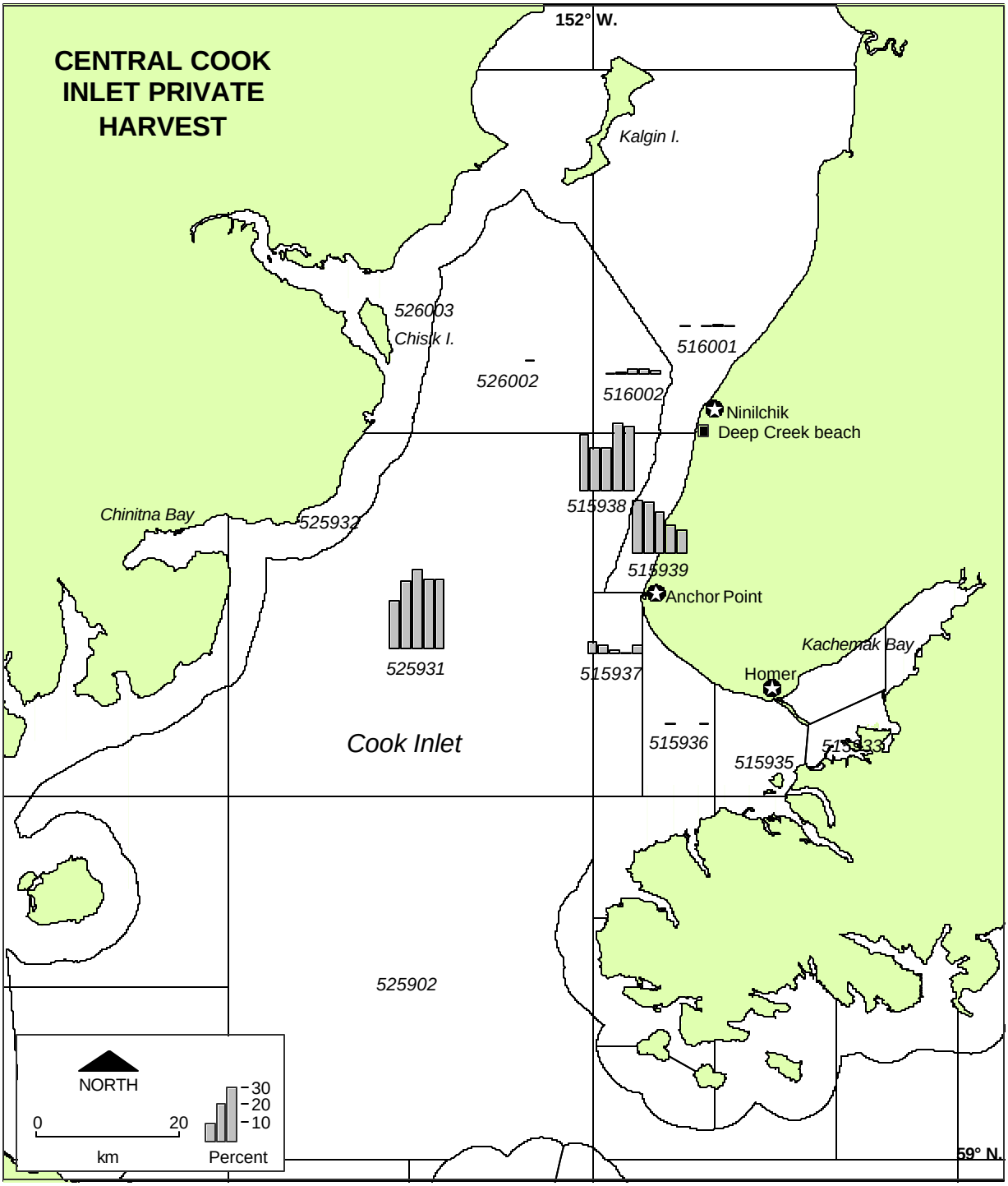

Figure 22.-The distribution of sport halibut harvest by private anglers interviewed at the Deep Creek and Anchor Point beaches. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

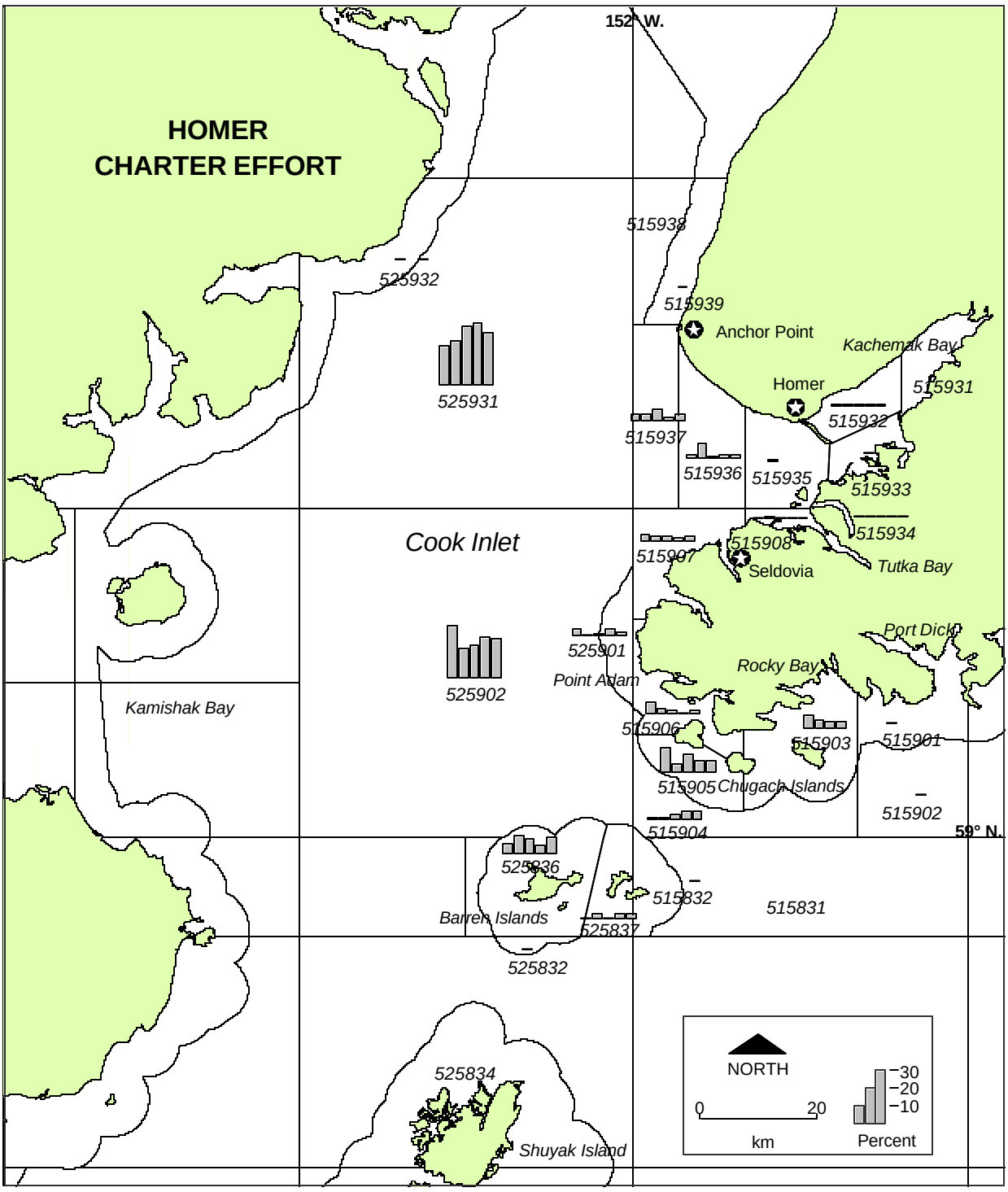

Figure 23.-The distribution of sport halibut fishing effort by charter anglers interviewed at Homer. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

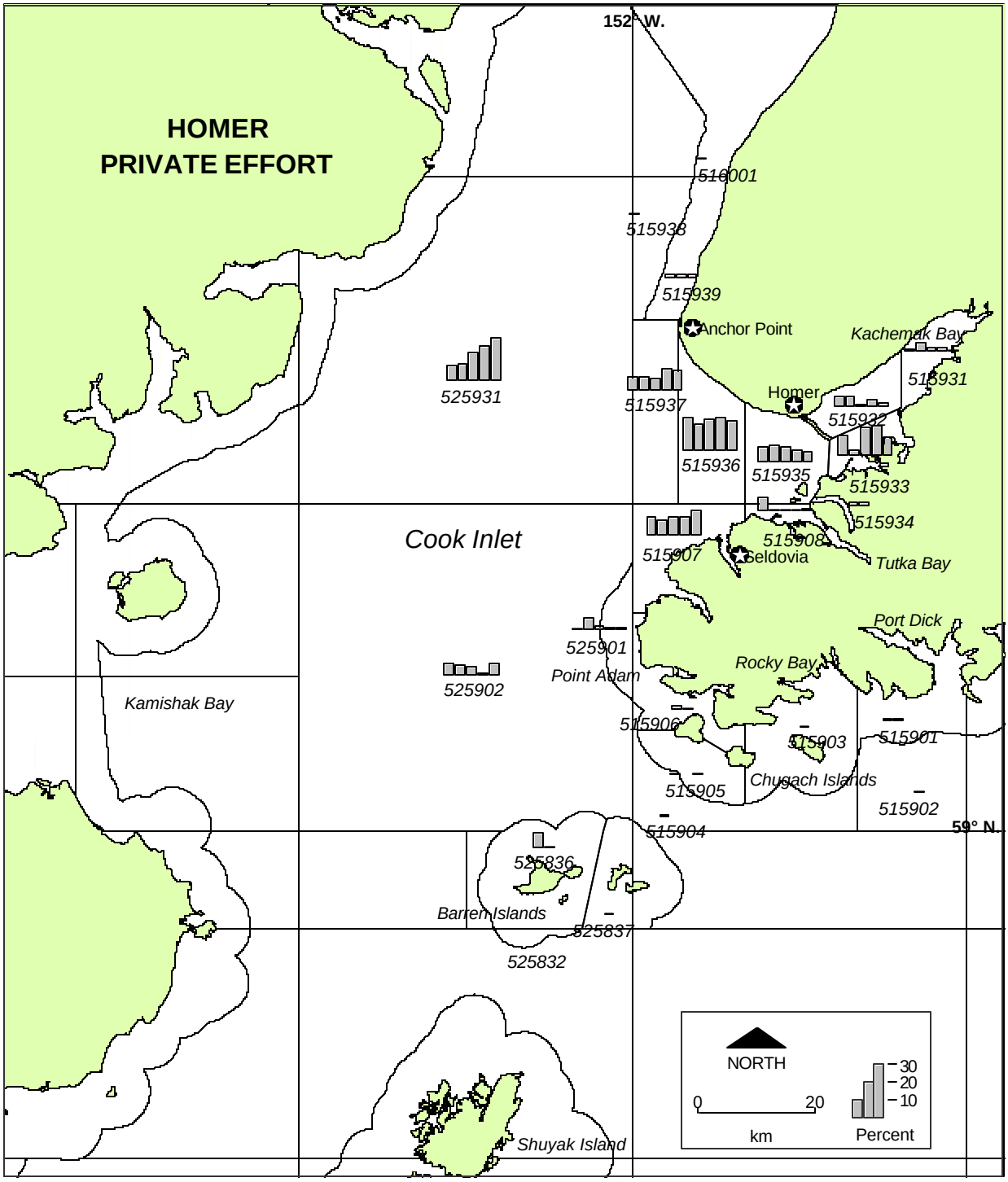

Figure 24.-The distribution of sport halibut fishing effort by private anglers interviewed at Homer. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

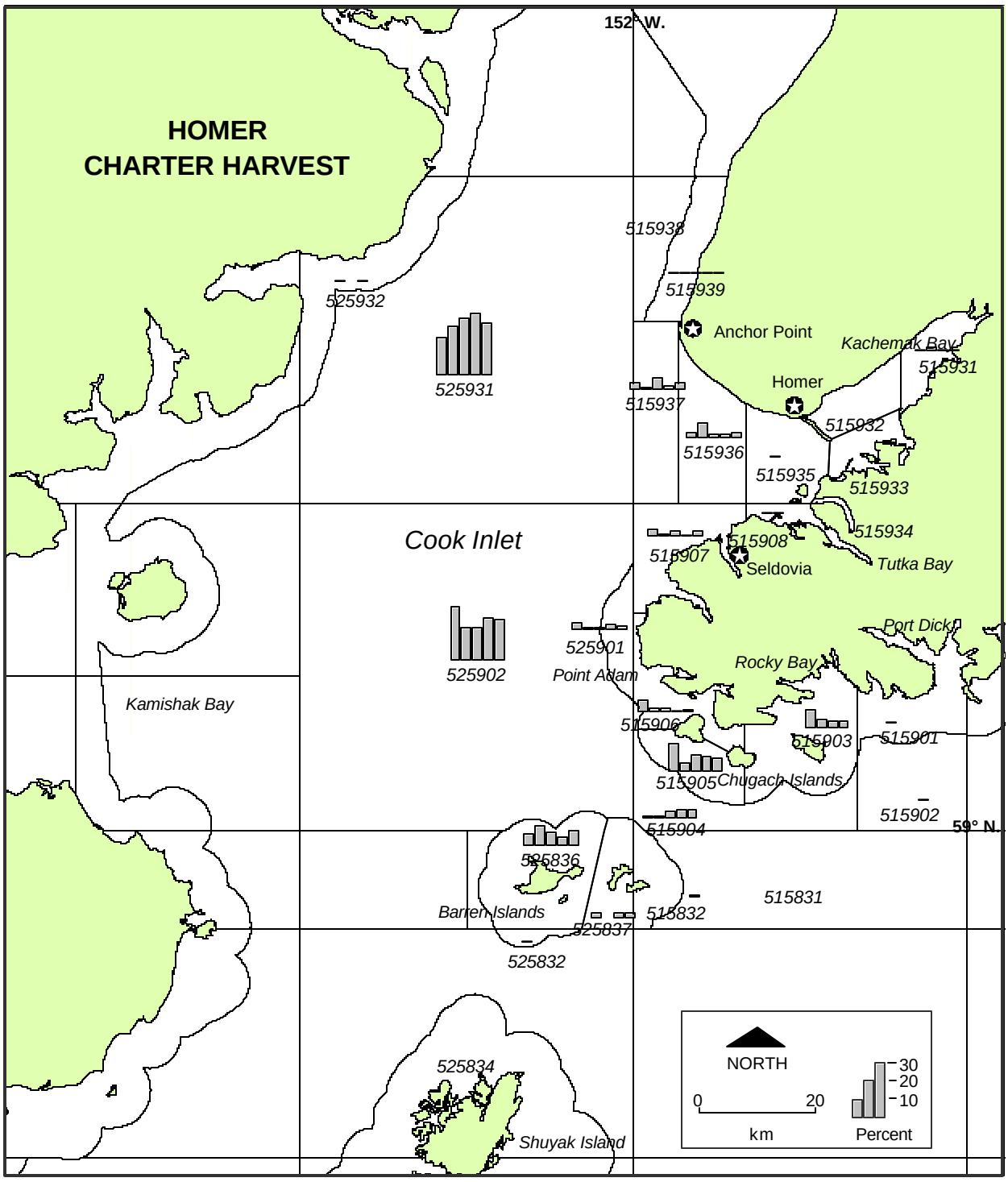

Figure 25.-The distribution of sport halibut harvest by charter anglers interviewed at Homer. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

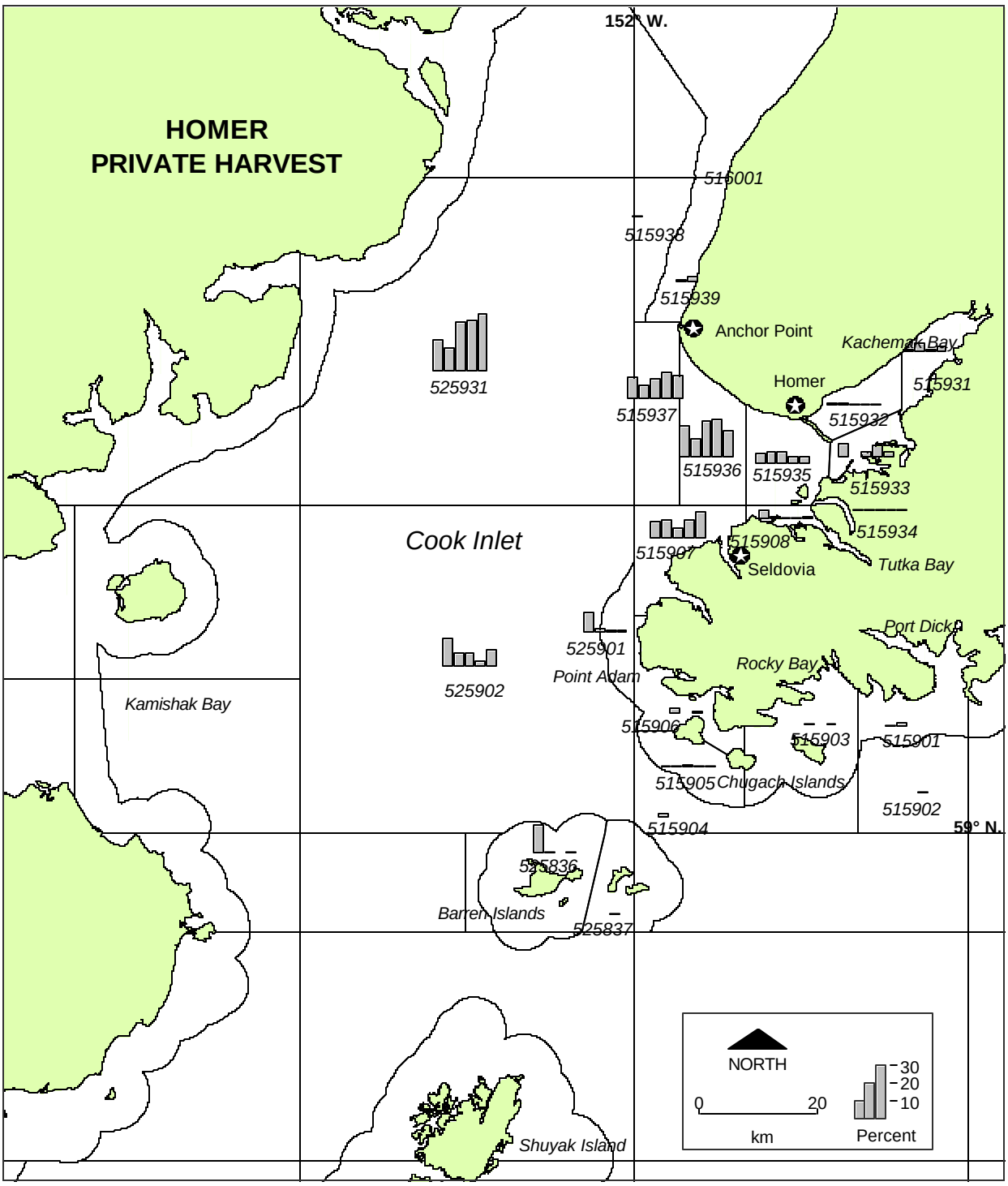

Figure 26.-The distribution of sport halibut harvest by private anglers interviewed at Homer. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

private effort and harvest in the center of Cook Inlet (stat area 525931). Anglers interviewed at Homer reportedly spent 1,235 to 3,679 angler-days of effort and harvested 1,855 to 6,250 halibut annually during the period 1995-1999 (Appendix C10).

Seward

Fishing by the Seward fleet was spread from Nuka Island eastward to Montague Strait (Figures 27-32). Charter effort and harvest were dispersed mostly between lower Resurrection Bay and the Chiswell Islands eastward to Montague Strait (Figures 27 and 30). The hotbed of charter activity during the period was the southwestern entrances to PWS, in the vicinity of Cape Puget and Cape Cleare. Private effort and harvest were concentrated in Resurrection Bay and the Chiswell Islands and in stat areas 485933 and 485935 to the east of Resurrection Bay (Figures 28 and 31). The heavier use of Resurrection Bay is not unexpected because private boats are typically smaller and less seaworthy than charter vessels. Private boats that made the long trip east toward Cape Puget were rewarded, as stat area 485935 accounted for 9%-24% of the harvest but only 5%-13% of the effort (Appendix C11). The pattern of military effort and harvest was essentially intermediate between that of the charter and private fleet. Military anglers fished the Chiswell Islands and Cape Aialik areas (stat area 495932) as well as waters near Cape Puget, Cape Cleare, and to the west in stat area 505932 (Figure 29). Military harvest was distributed similar to effort (Figure 32). Anglers interviewed at Seward reported spending 845 to 2,941 angler-days of effort and harvesting 692 to 3,456 halibut annually during the period 1995-1999 (Appendix C11).

Whittier

Because interviews were only conducted in Whittier for one month during 1998, those data were not felt to be representative. Therefore, only the 1999 data are plotted (Figures 33-36). Charter and private anglers confined the majority of their effort and harvest to the western half of PWS, but the charter harvest was more dispersed. Charter anglers fished as far east as the outer coast of Hinchinbrook Island and as far south and west as Cape Cleare and Montague Strait, and their harvest was distributed proportionally to their effort (Figures 33 and 35). Private angler effort and harvest were concentrated in northwestern PWS, in Port Wells and waters around Perry Island (Figures 34 and 36). Anglers interviewed in Whittier in 1998 and 1999 reportedly expended 292 and 1,170 angler-days of effort and harvested 237 and 1,338 halibut, respectively (Appendix C12).

Valdez

Charter and private anglers based in Valdez ranged throughout much of PWS (Figures 37-40). Effort and harvest by both user groups was heaviest in a north-south corridor from Valdez Arm to Hinchinbrook Entrance, but only the charter fleet had significant effort and halibut harvest in the outside waters off Hinchinbrook and Montague Islands (Figures 37 and 39). The private fleet tended to fish the northern end of that corridor, concentrating effort in Valdez Arm, in the vicinity of Bligh Island, and south to Hinchinbrook Entrance (Figures 38 and 40). A small number of trips were recorded by anglers as far out as Wessels Reef, approximately 176 km (95 nautical miles) from the port of Valdez, in 1998 and 1999. Anglers interviewed at Valdez reported spending 1,065 to 2,267 angler-days of effort and harvesting 1,208 to 2,705 halibut annually during the period 1995-1999 (Appendix C13).

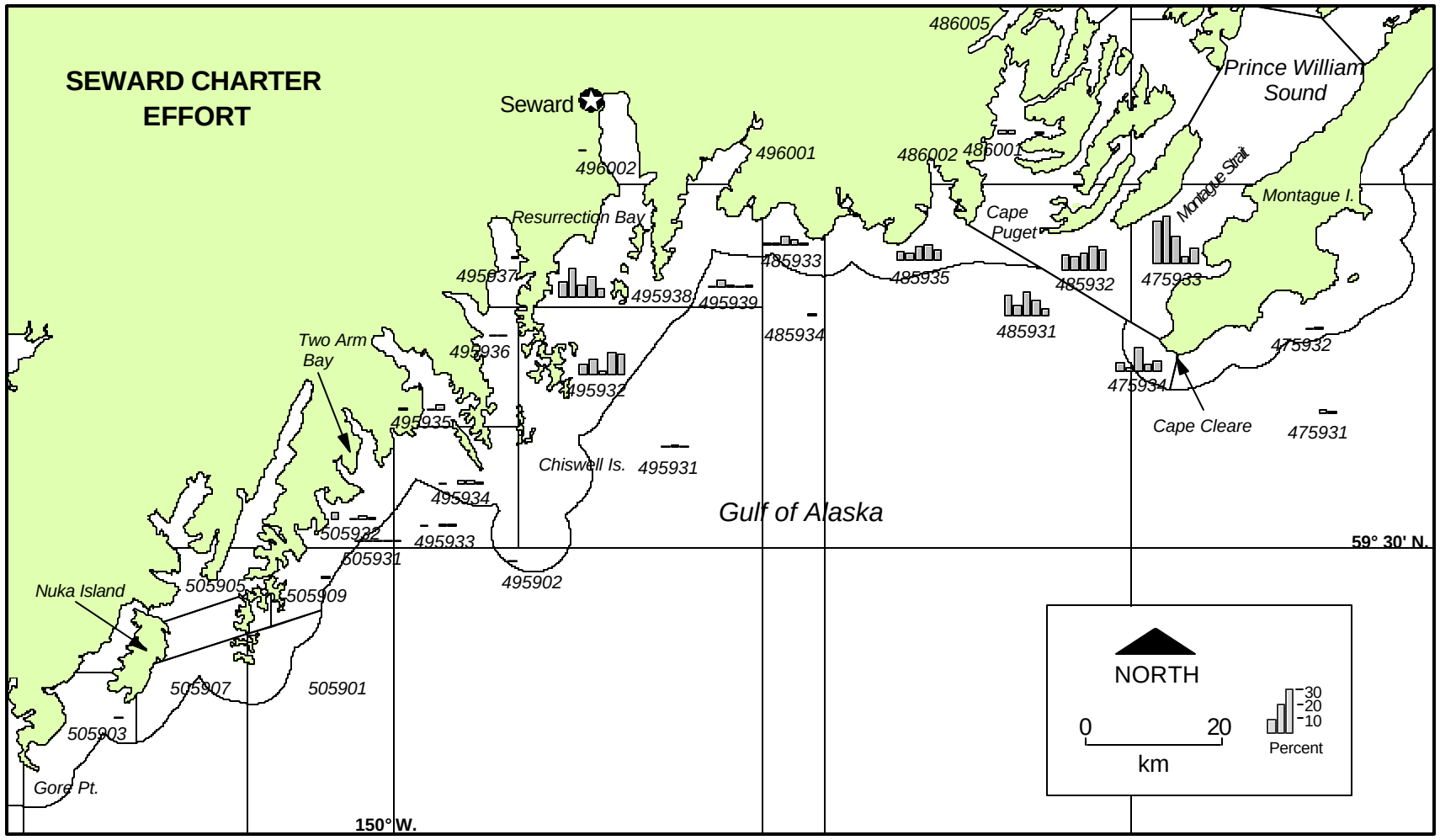

Figure 27.-The distribution of sport halibut fishing effort by charter anglers interviewed at Seward. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

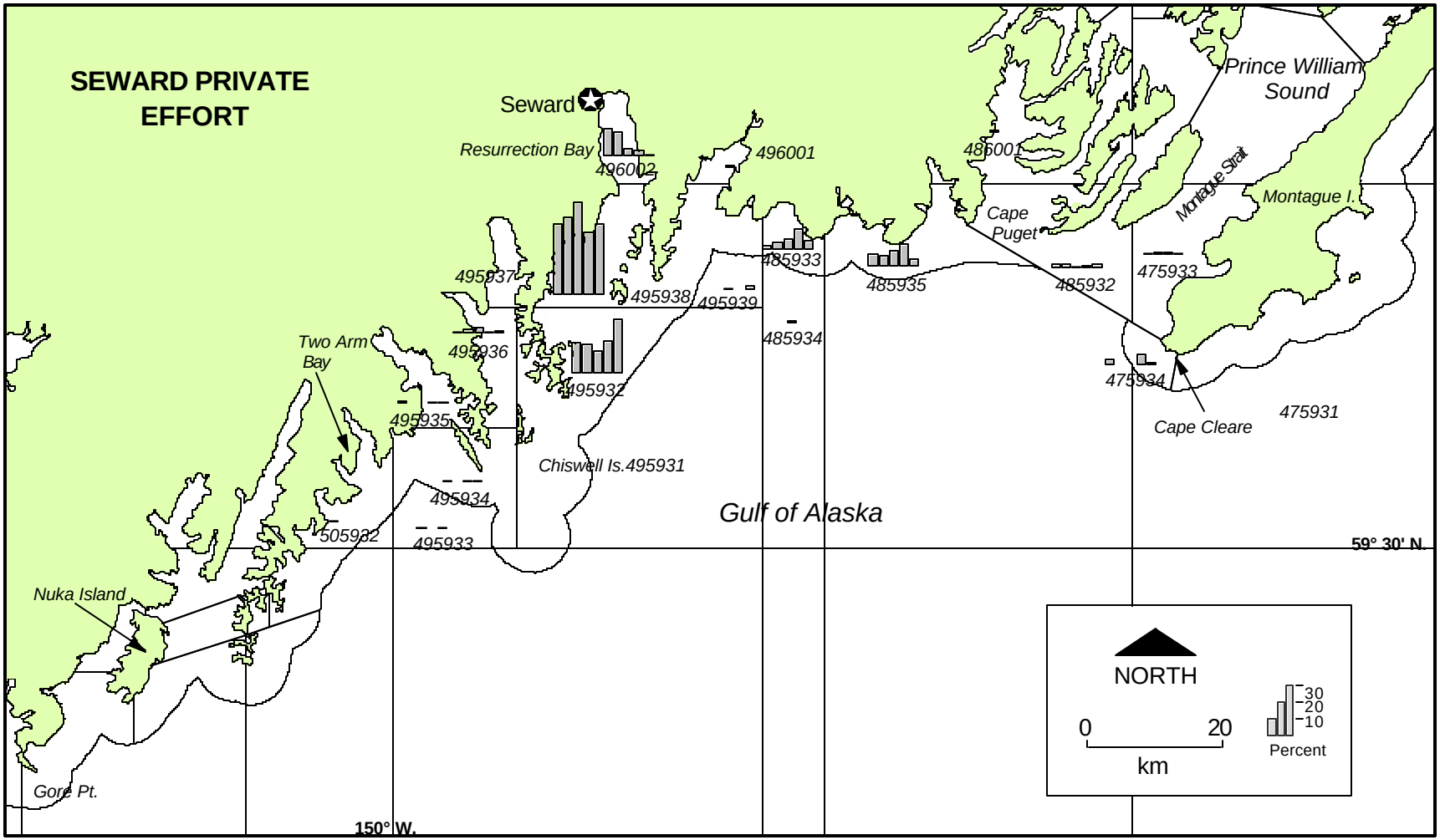

Figure 28.-The distribution of sport halibut fishing effort by private anglers interviewed at Seward. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

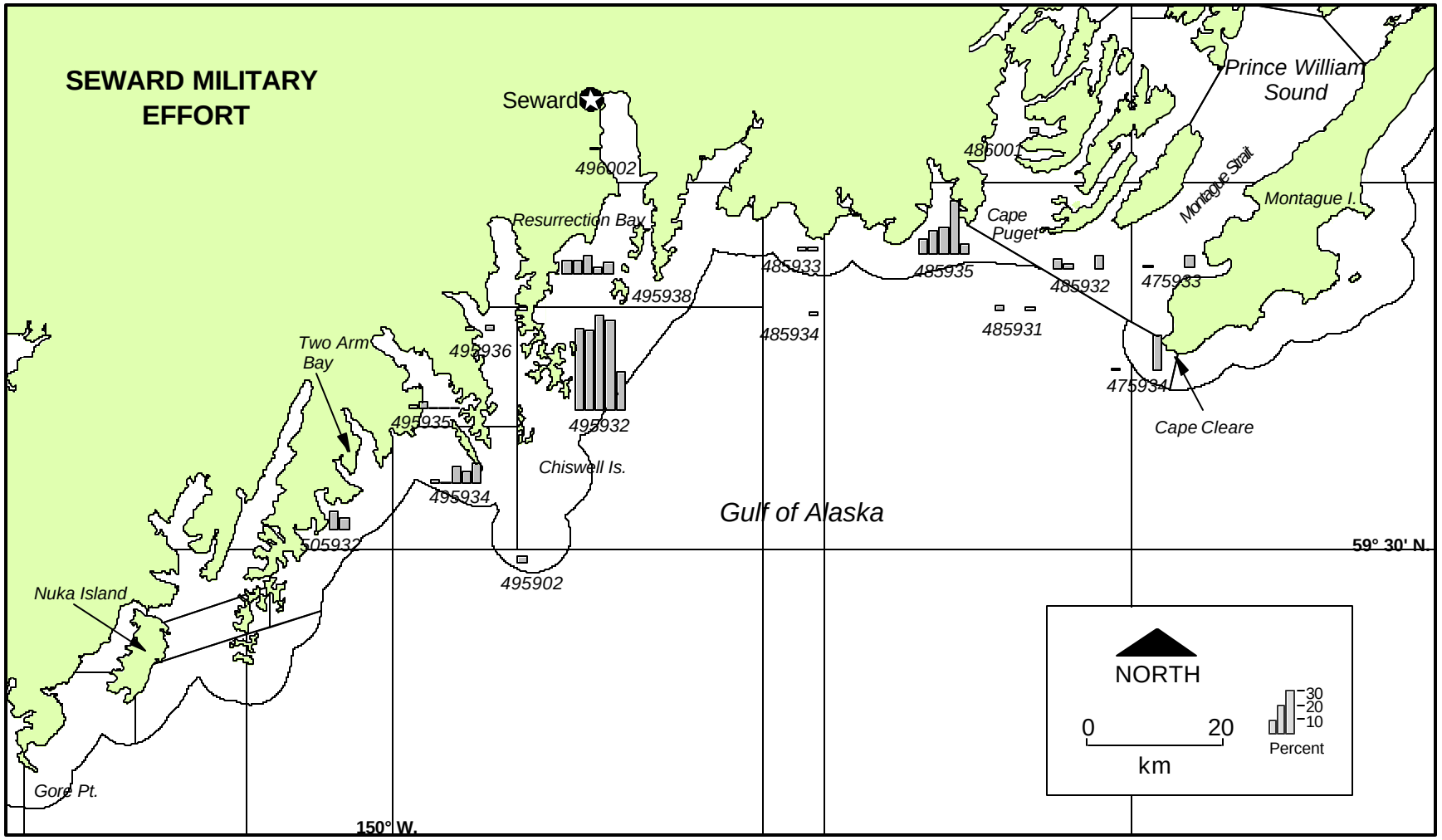

Figure 29.-The distribution of sport halibut fishing effort by military recreation camp anglers interviewed at Seward. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

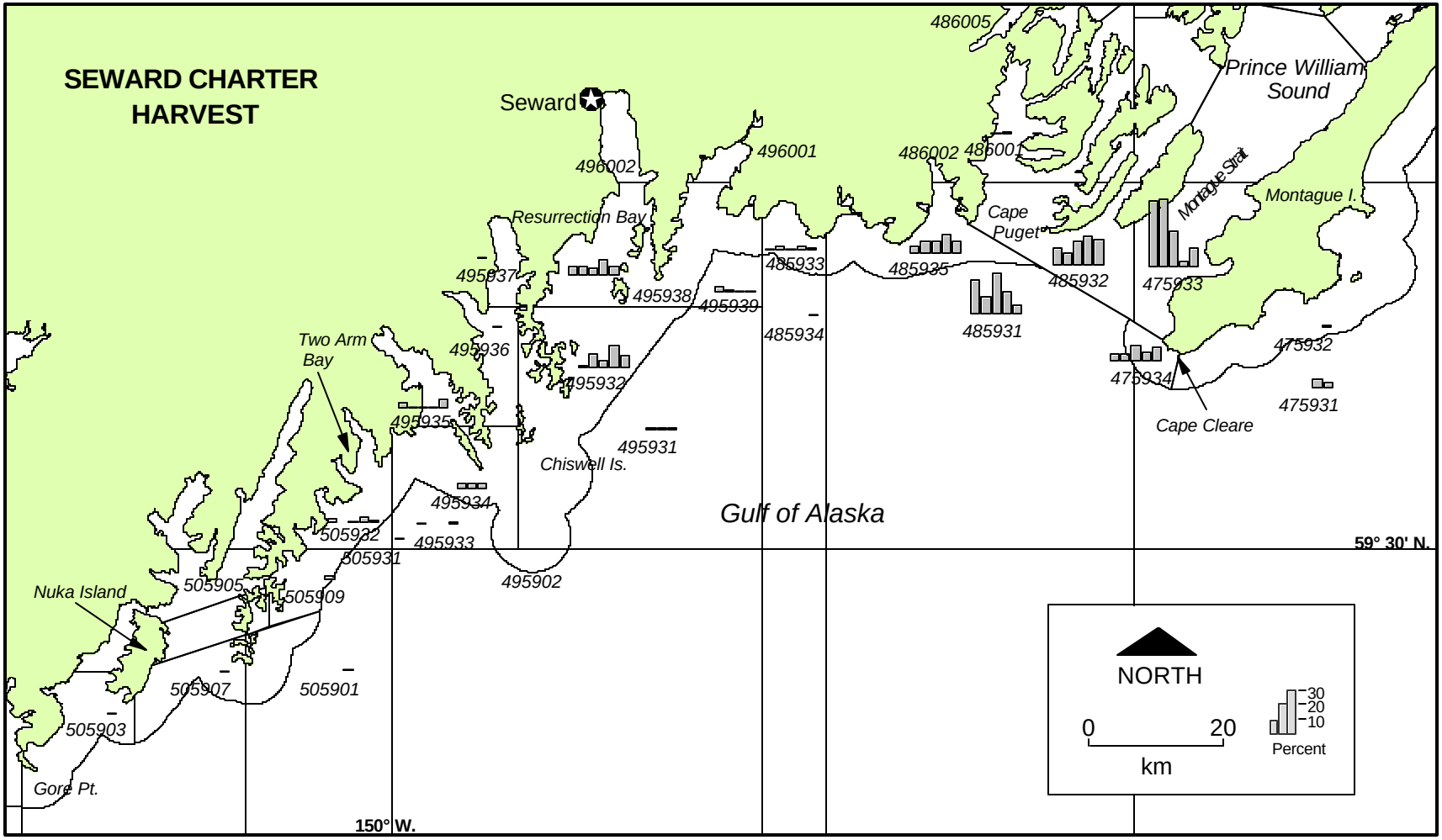

Figure 30.-The distribution of sport halibut harvest by charter anglers interviewed at Seward. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

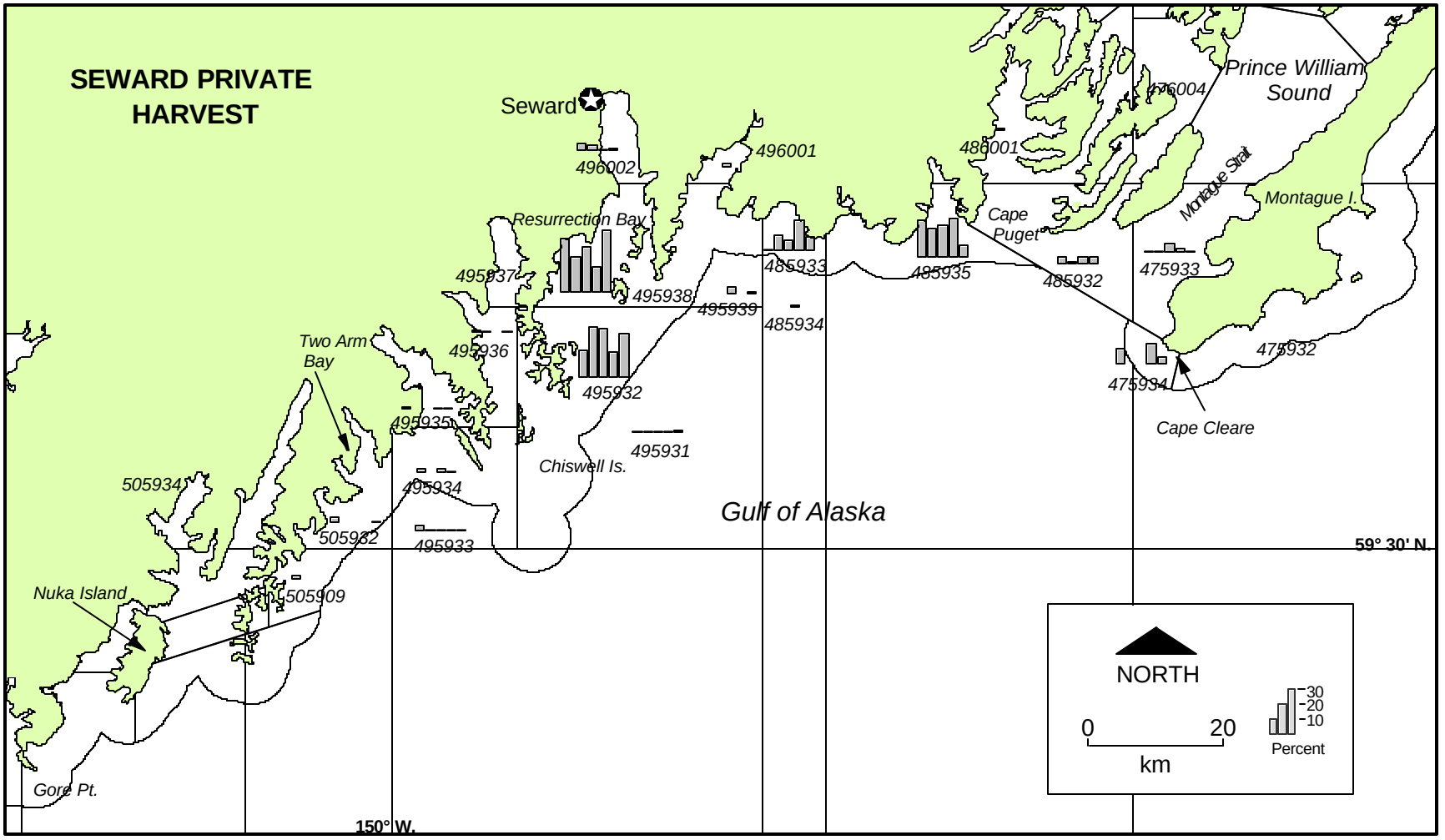

Figure 31.-The distribution of sport halibut harvest by private anglers interviewed at Seward. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

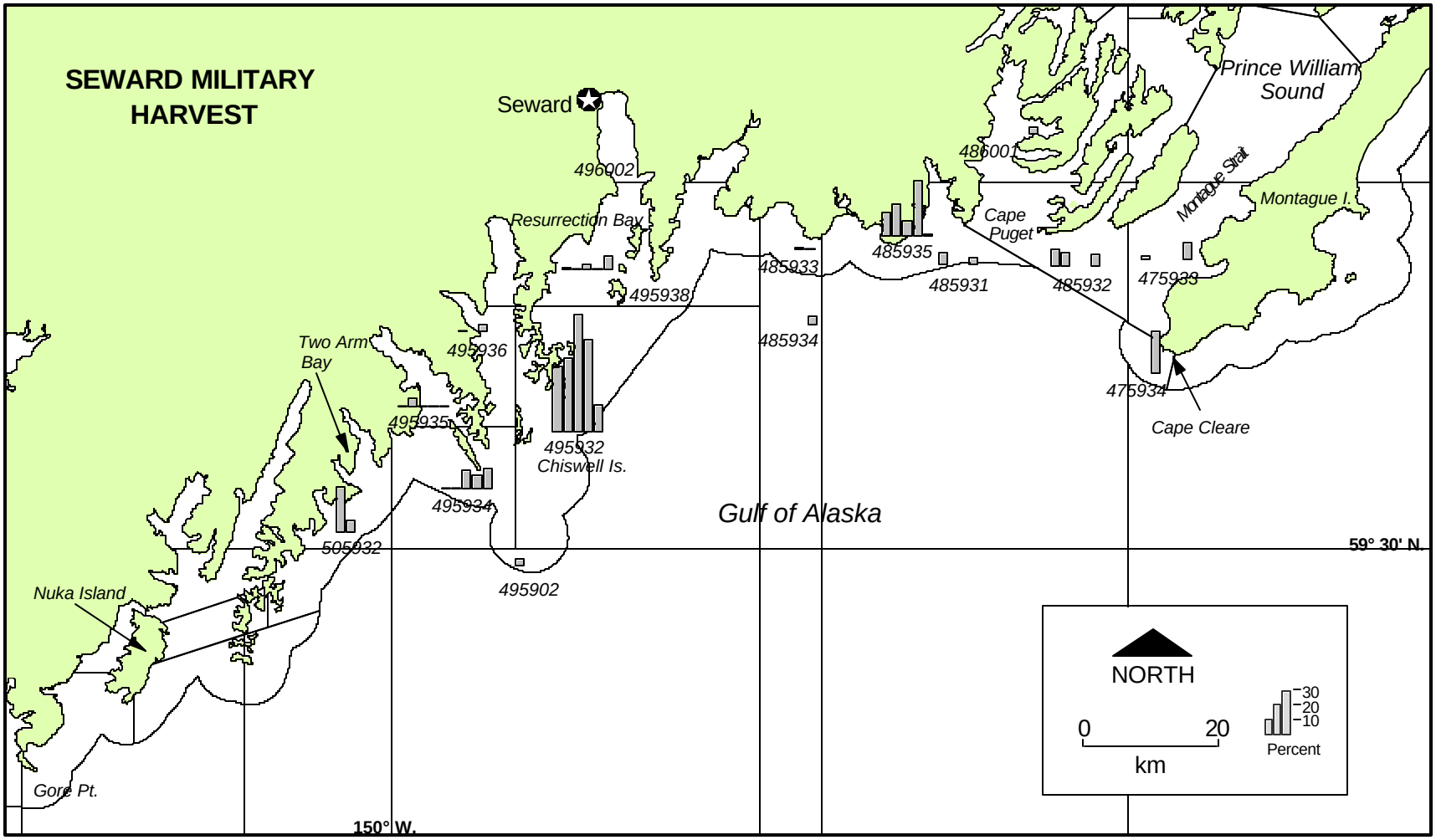

Figure 32.-The distribution of sport halibut harvest by military recreation camp anglers interviewed at Seward. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

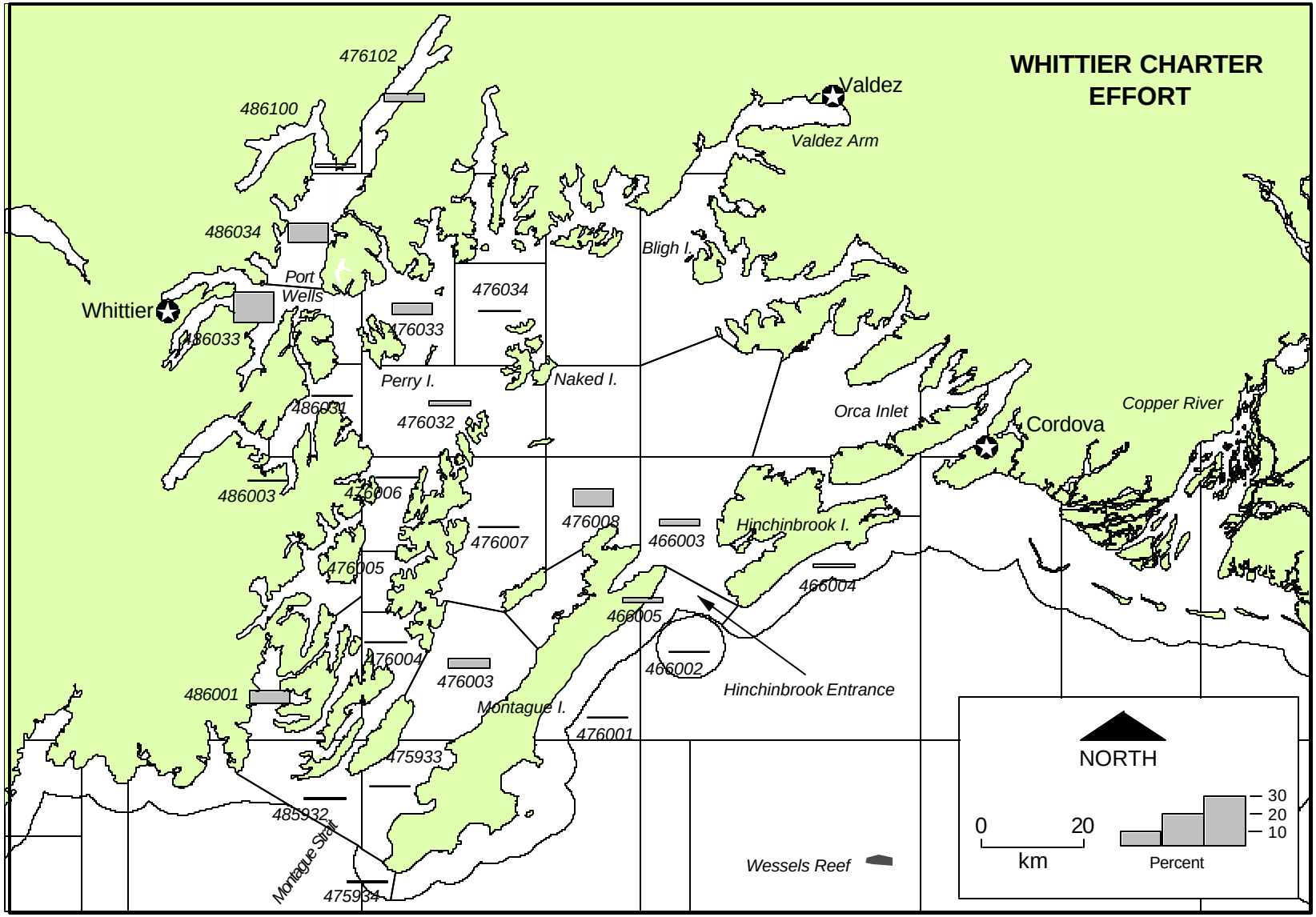

Figure 33.-The distribution of sport halibut fishing effort by charter anglers interviewed at Whittier in 1999. Vertical bars represent the percentage of angler-days of effort in each stat area.

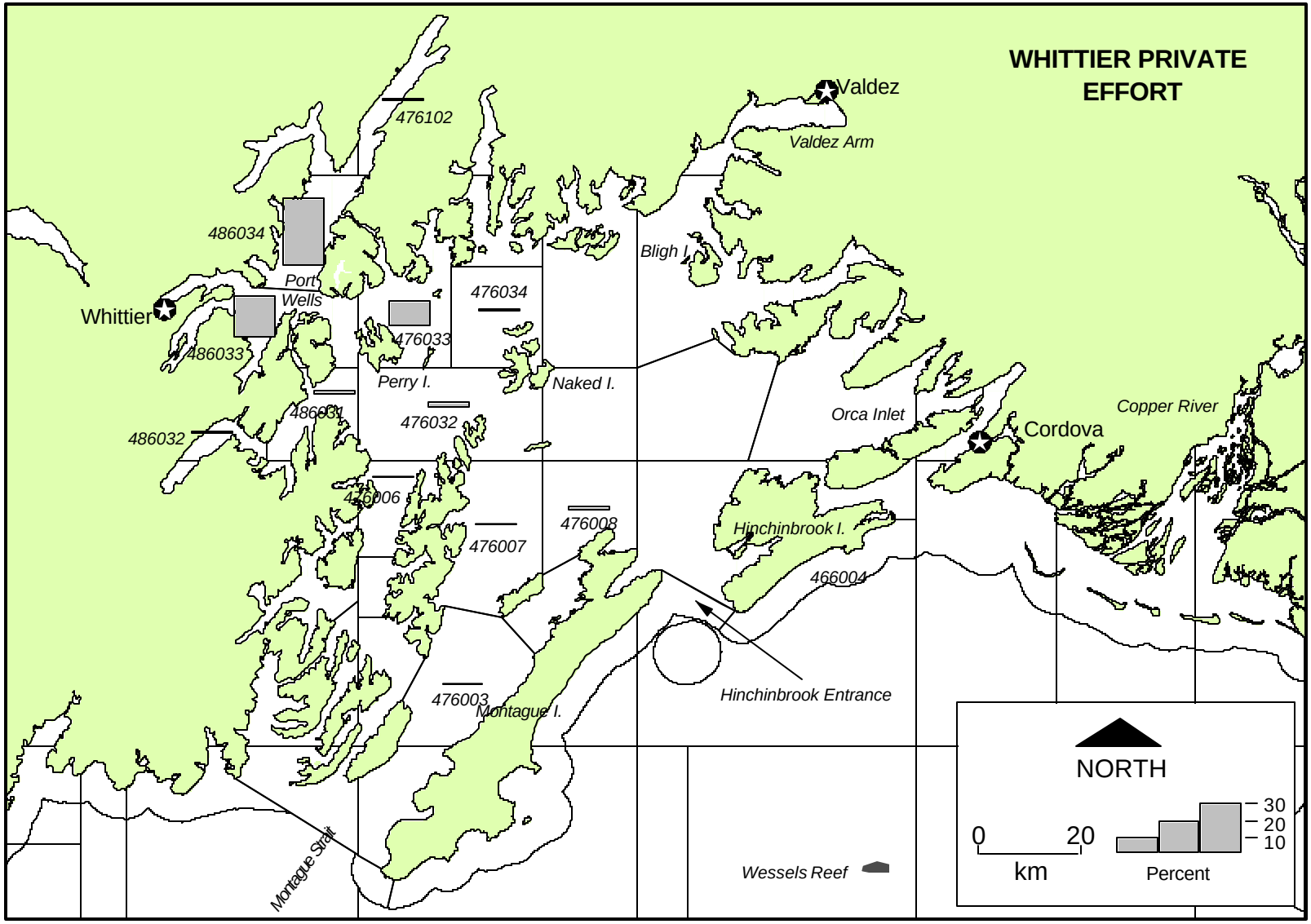

Figure 34.-The distribution of sport halibut fishing effort by private anglers interviewed at Whittier in 1999. Vertical bars represent the percentage of angler-days of effort in each stat area.

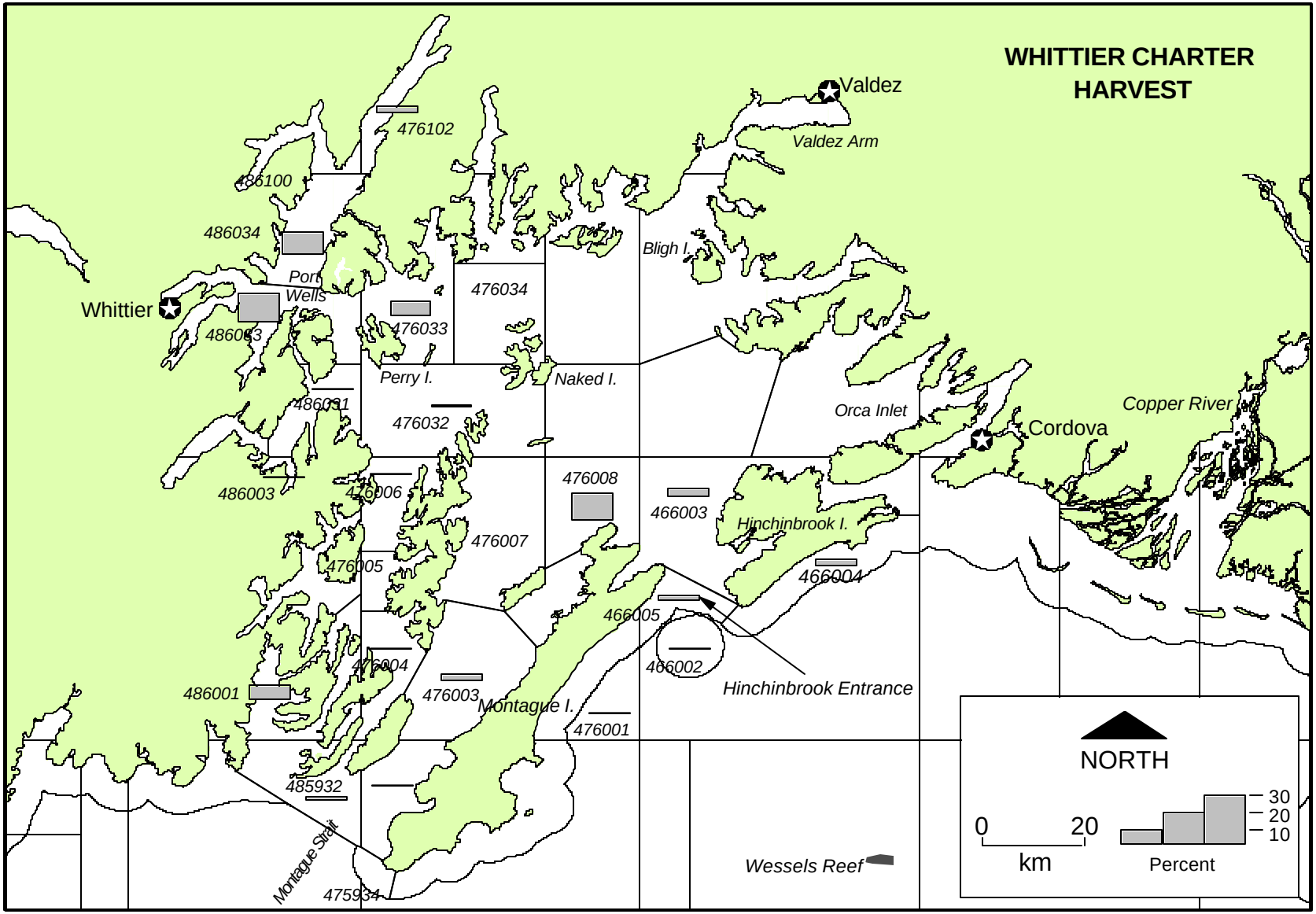

Figure 35.-The distribution of sport halibut harvest by charter anglers interviewed at Whittier in 1999. Vertical bars represent the percentage of the harvest (in number) from each stat area.

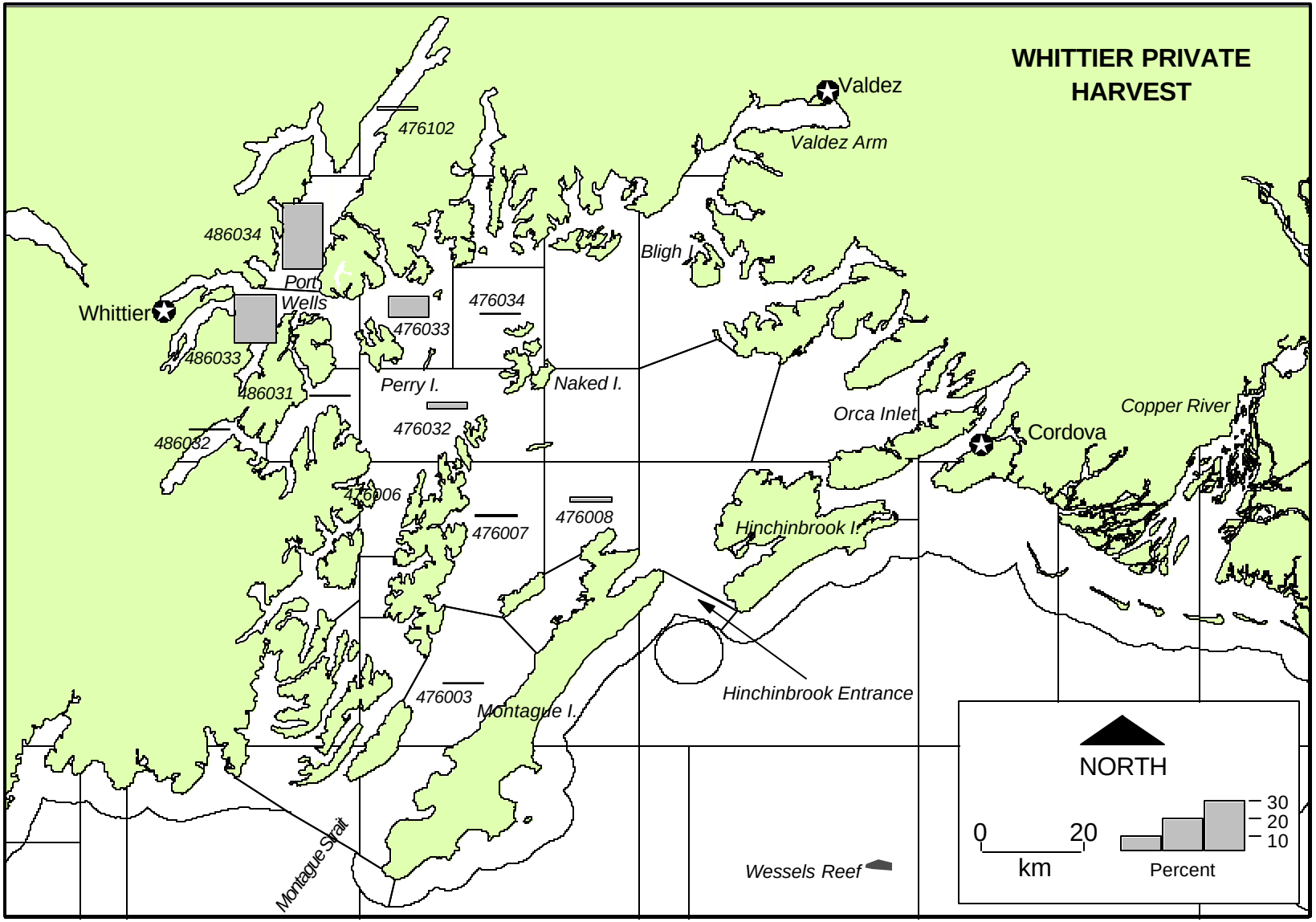

Figure 36.-The distribution of sport halibut harvest by private anglers interviewed at Whittier in 1999. Vertical bars represent the percentage of the harvest (in number) from each stat area.

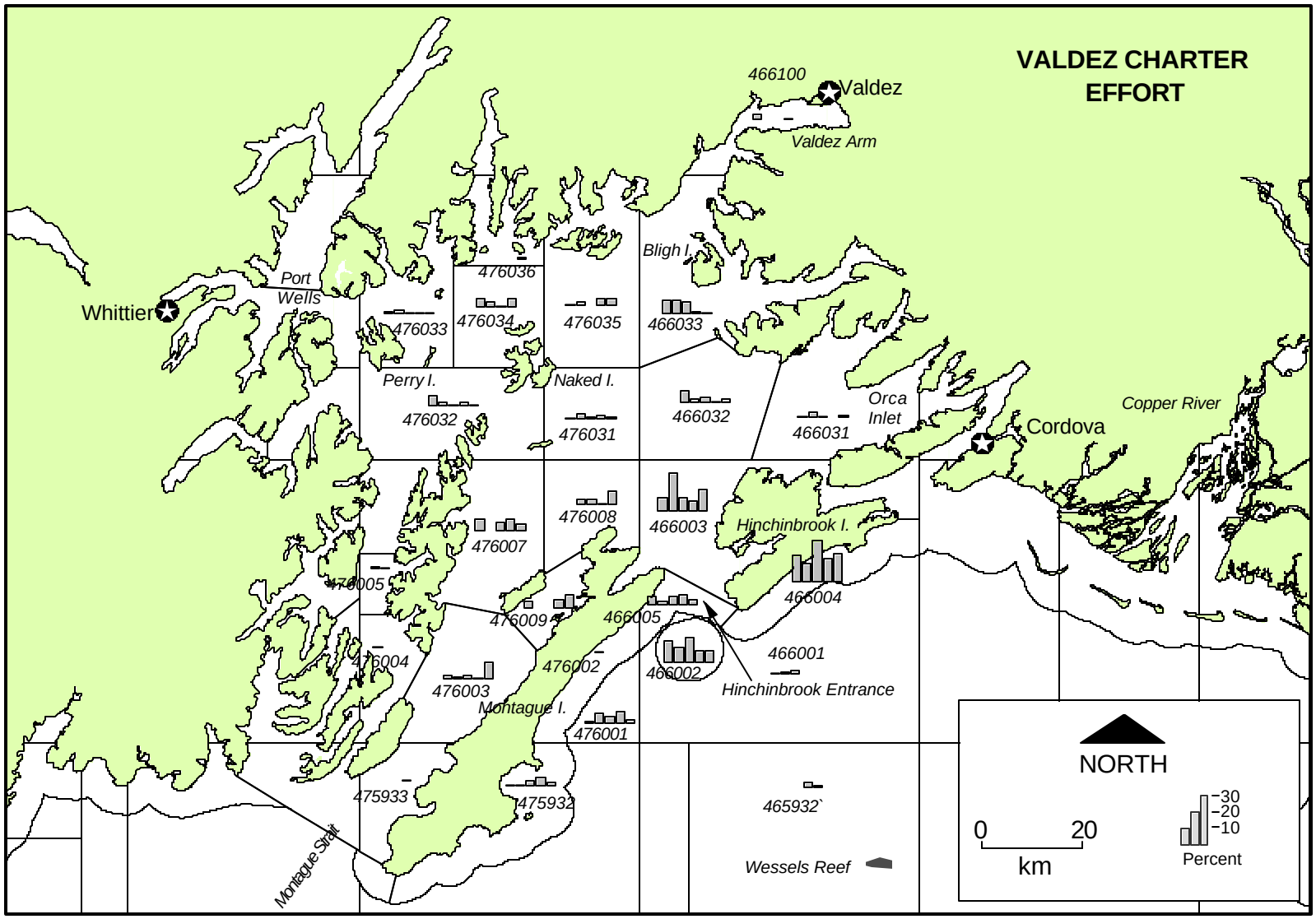

Figure 37.-The distribution of sport halibut fishing effort by charter anglers interviewed at Valdez. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

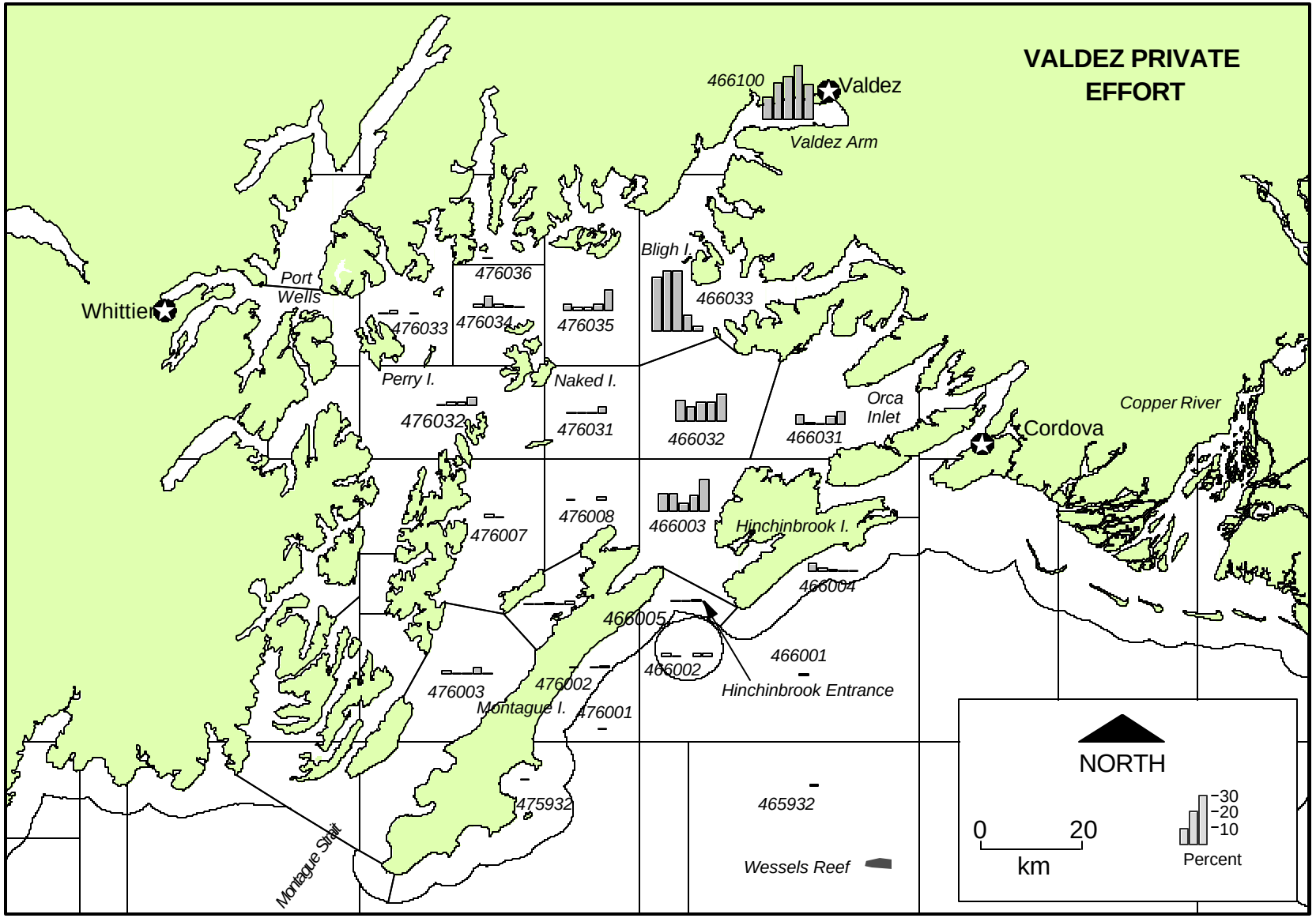

Figure 38.-The distribution of sport halibut fishing effort by private anglers interviewed at Valdez. Vertical bars represent the percentage of angler-days of effort in each stat area each year during the period 1995-1999.

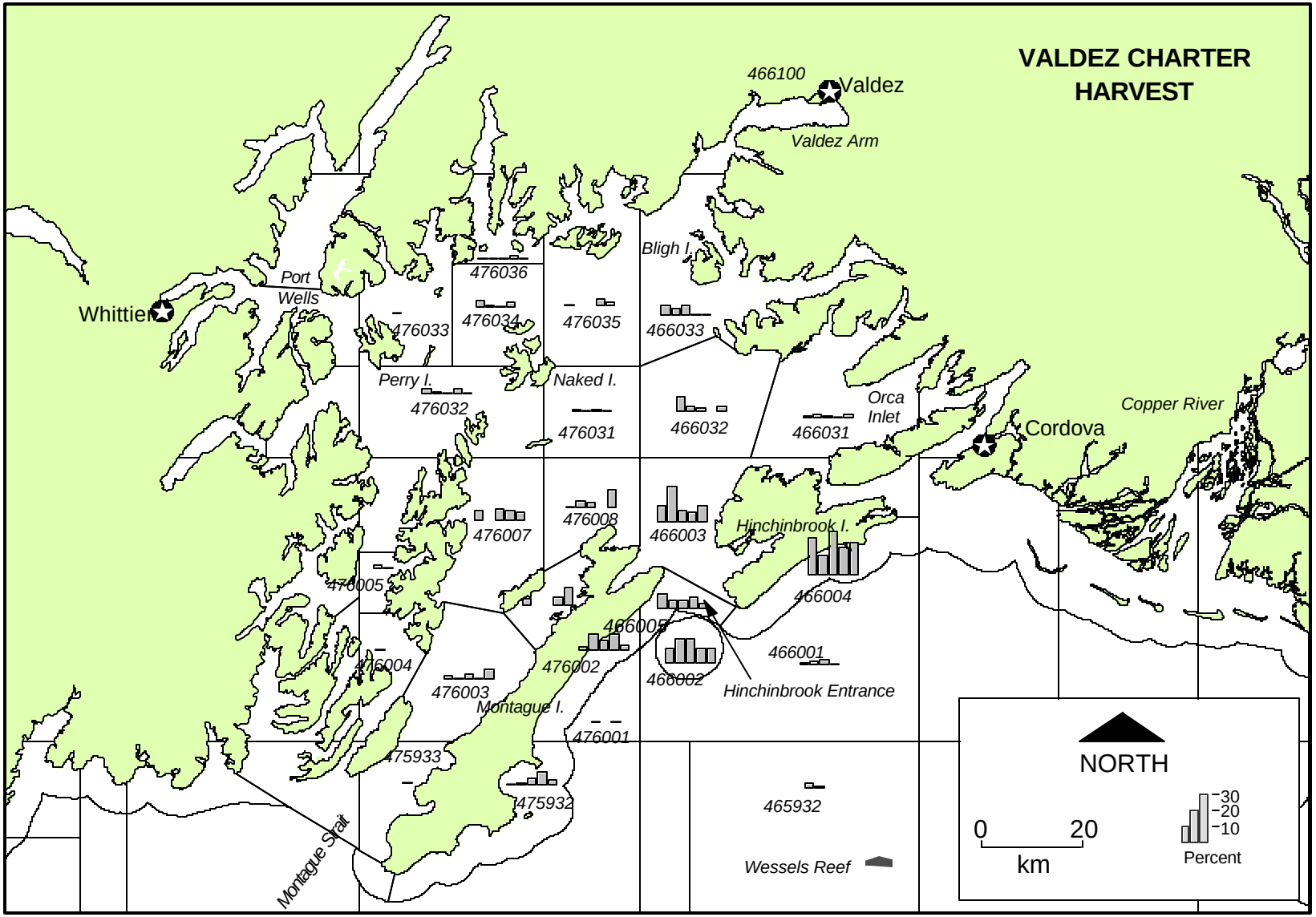

Figure 39.-The distribution of sport halibut harvest by charter anglers interviewed at Valdez. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

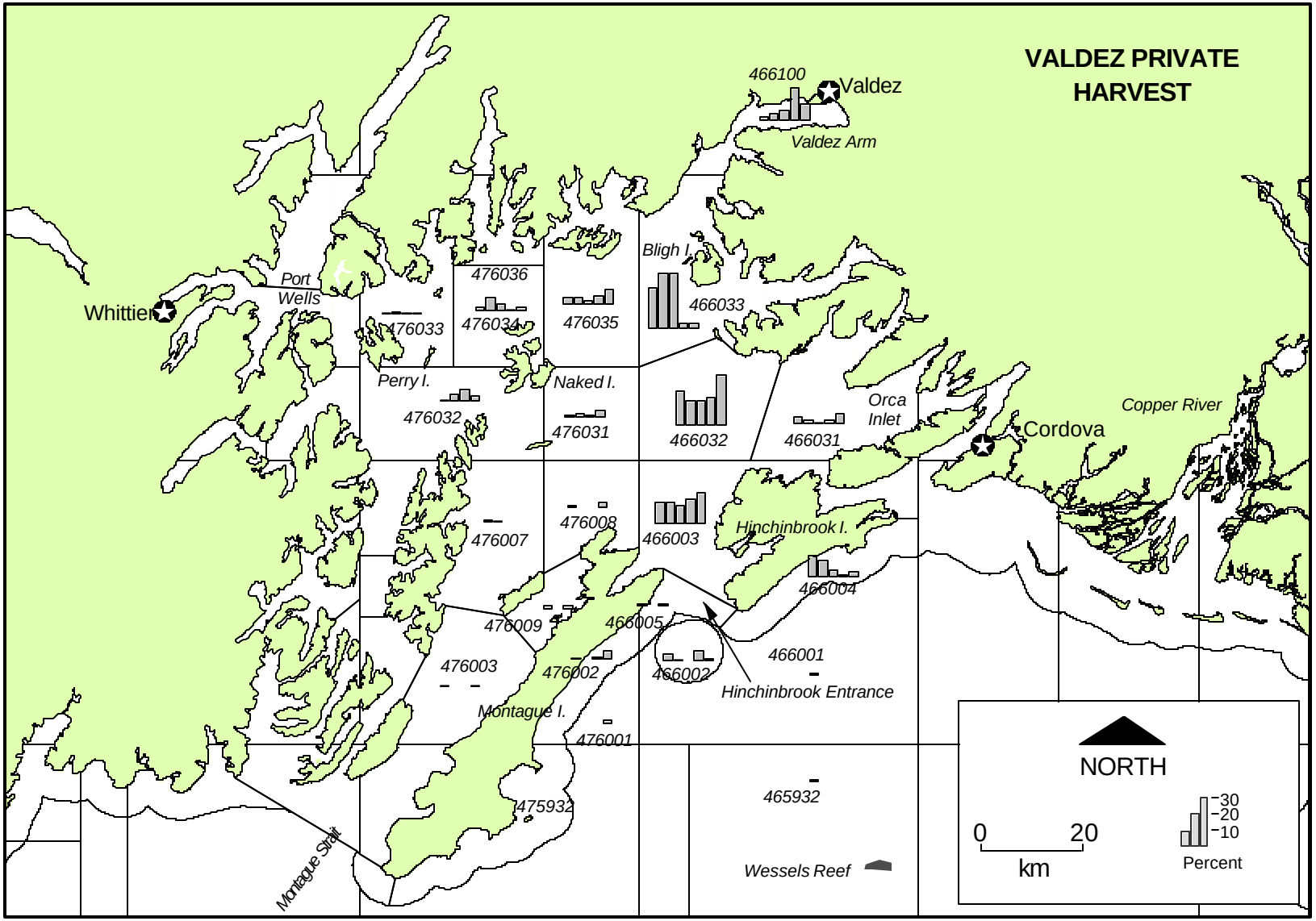

Figure 40.-The distribution of sport halibut harvest by private anglers interviewed at Valdez. Vertical bars represent the percentage of the harvest (in number) from each stat area each year during the period 1995-1999.

Cordova

The Cordova fleet focused fishing effort and harvest by both user groups on the waters of eastern PWS, especially Orca Bay and associated bays and inlets (Figures 41-44). Even in the local area around Cordova, the pattern of charter boats fishing farther from port held true (Figures 41 and 43). Western Orca Bay (stat area 466031) accounted for 52% of the charter effort and 63% of the charter harvest (Appendix C14). Private harvest was concentrated closer to town in eastern Orca Bay and Orca Inlet (Figures 42 and 44), which accounted for 83% of the effort and 72% of the harvest. Anglers interviewed in Cordova in 1999 spent 423 angler-days of effort and harvested 261 halibut (Appendix C14).

DISCUSSION

Estimates of average weight during the years 1995-1999 were similar to previous years (Meyer 1993, 1994, 1996). Because the recreational fishery in Area 3A is not constrained by the 81 cm (32 in) minimum size limit for the commercial fishery, average lengths and weights were considerably lower than the commercial harvest. Average weights in the Area 3A sport fishery (harvest biomass/number of fish) ranged from 18.3 to 20.2 lb compared with about 28 lb in the commercial fishery (Forsberg 1996-1999).

In early 1998 and again in 1999 anglers in Lower and Central Cook Inlet frequently reported catches of emaciated halibut with low muscle tone. Samples from eight fish were sent to the ADF&G Fish Pathology lab in Juneau between June 1998 and August 1999. Most samples that had been correctly prepared revealed "noninfectious progressive degenerative myopathy" (T. Meyers, ADF&G Juneau Fish Pathology Laboratory, personal communication). The pathologist report suggested possible causes such as lactic acid buildup from hook and release or nutritional myopathy. The latter is more common in cultured fish but was a possible consideration given that most of the fish had no indication of prior hooking.

Given the concern over emaciated fish in 1998, we measured and weighed halibut from the Homer and CCI sport harvest to compare the resulting length-weight relationship to the IPHC relationship used to produce the estimates in this report. Data were collected from 90 halibut in the size range 56-162 cm in Homer, and from 83 fish in the range 46-162 cm in the CCI fishery. Halibut were sampled opportunistically, rather than randomly, and no special effort was made to include or exclude emaciated fish. The IPHC length-weight relationship appeared to underestimate the weight of fish smaller than 100 cm from Homer, but fit the CCI data very well. Substituting the length-weight equations from these data for the IPHC length-weight equation would have resulted in harvest biomass estimates that were only 1% lower for Central Cook Inlet and 8% higher for Lower Cook Inlet. Considering that sampling was non-random, that relatively small sample sizes were used to develop the length-weight models for each port, and that the IPHC length-weight equation is used for commercial harvest as well, there wasn't sufficient reason to warrant abandoning use of the IPHC relationship to estimate harvest in the sport fishery.

The age composition information from the sport harvest is not considered crucial to management of the halibut fishery. It is not collected from all regulatory areas, and the time series in Area 3A is not long enough to be incorporated into the stock assessment model. Because the sport fishery tends to select for younger fish than the commercial fishery, age composition estimates from the sport harvest provide a preview of strong age classes to come. Meyer (1996) noted the relative strength of the 1987 and 1988 year classes in the sport harvest as 6- and 7-yr-olds in 1994.

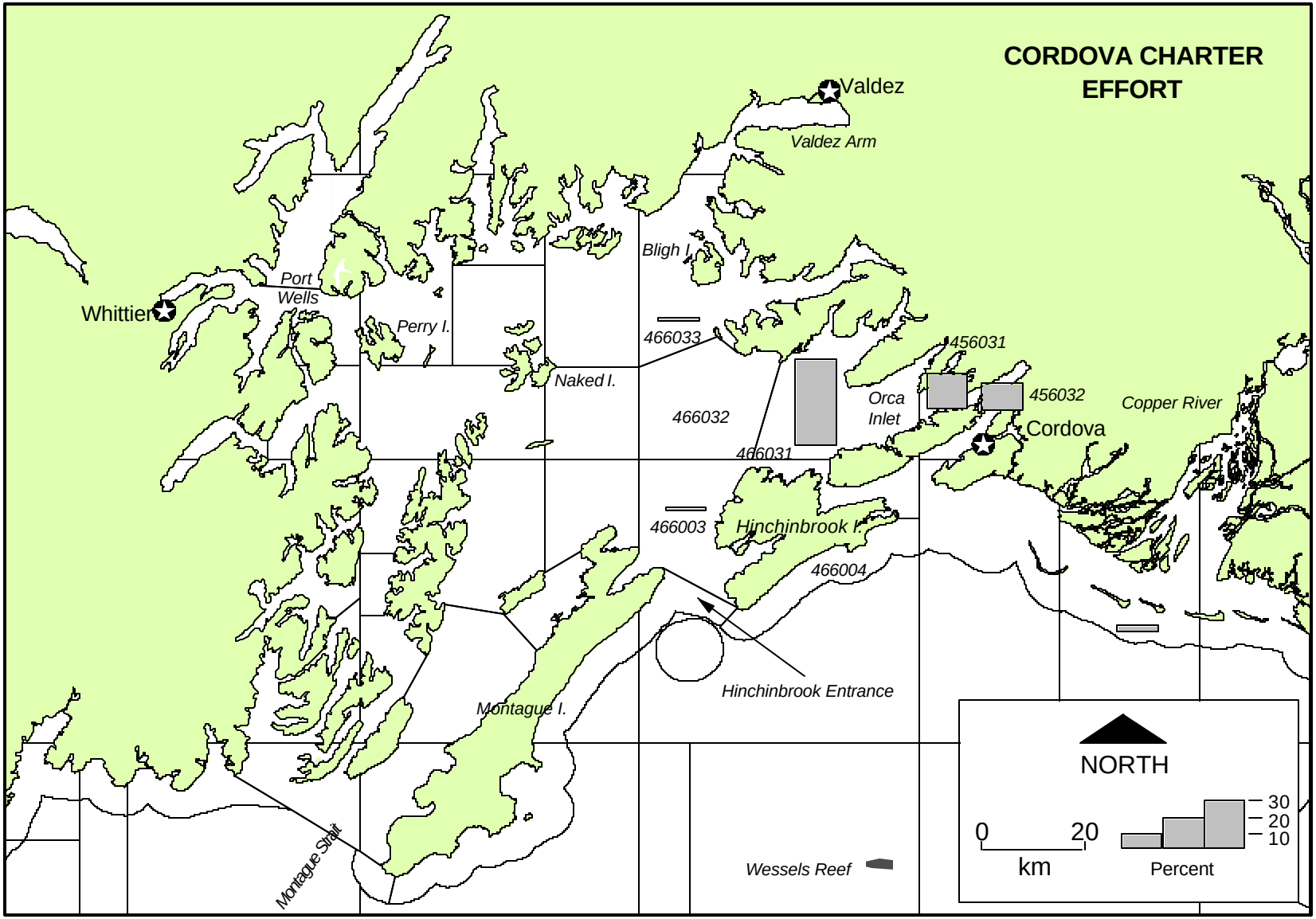

Figure 41.-The distribution of sport halibut fishing effort by charter anglers interviewed at Cordova in 1999. Vertical bars represent the percentage of angler-days of effort in each stat area.

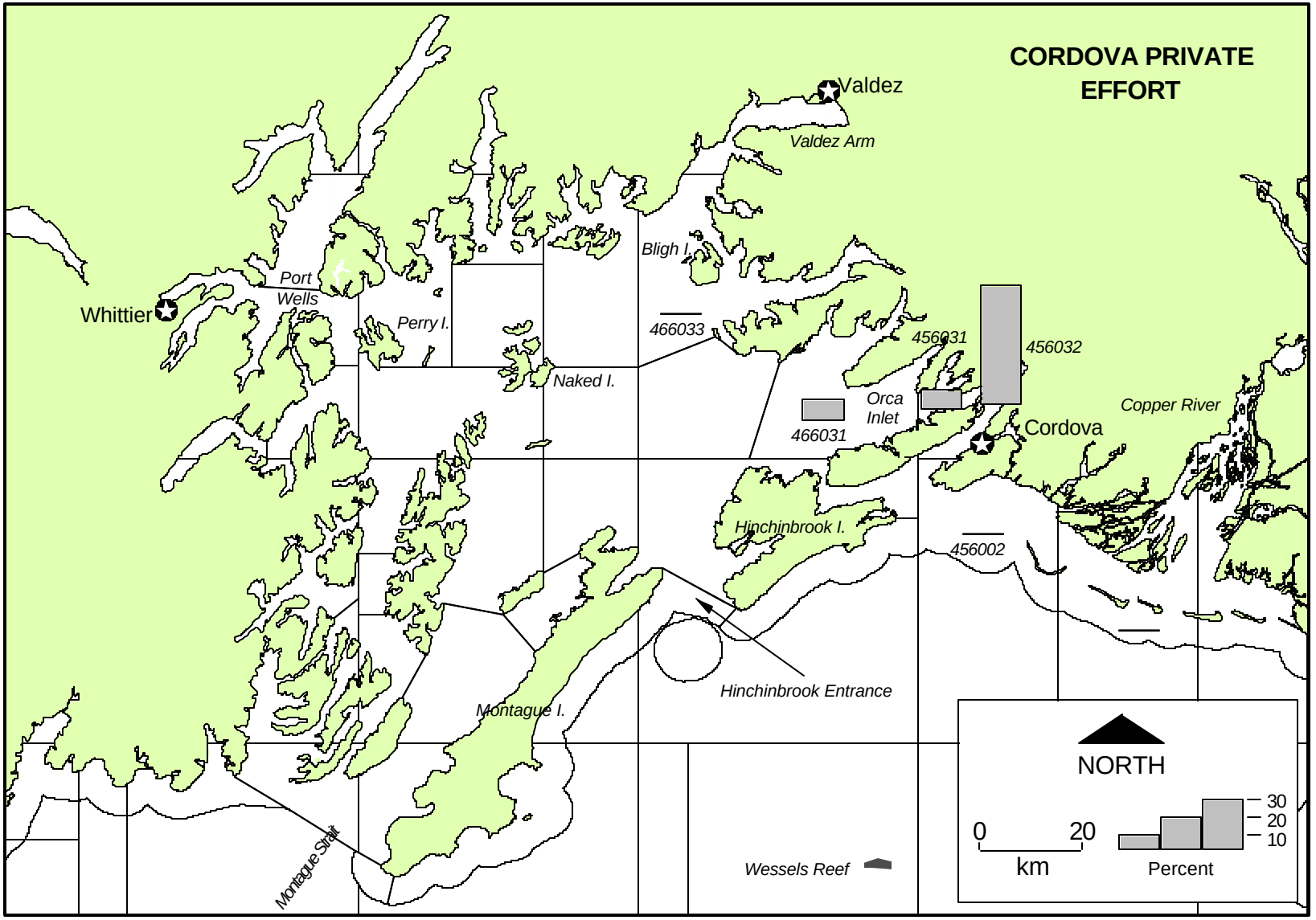

Figure 42.-The distribution of sport halibut fishing effort by private anglers interviewed at Cordova in 1999. Vertical bars represent the percentage of angler-days of effort in each stat area.

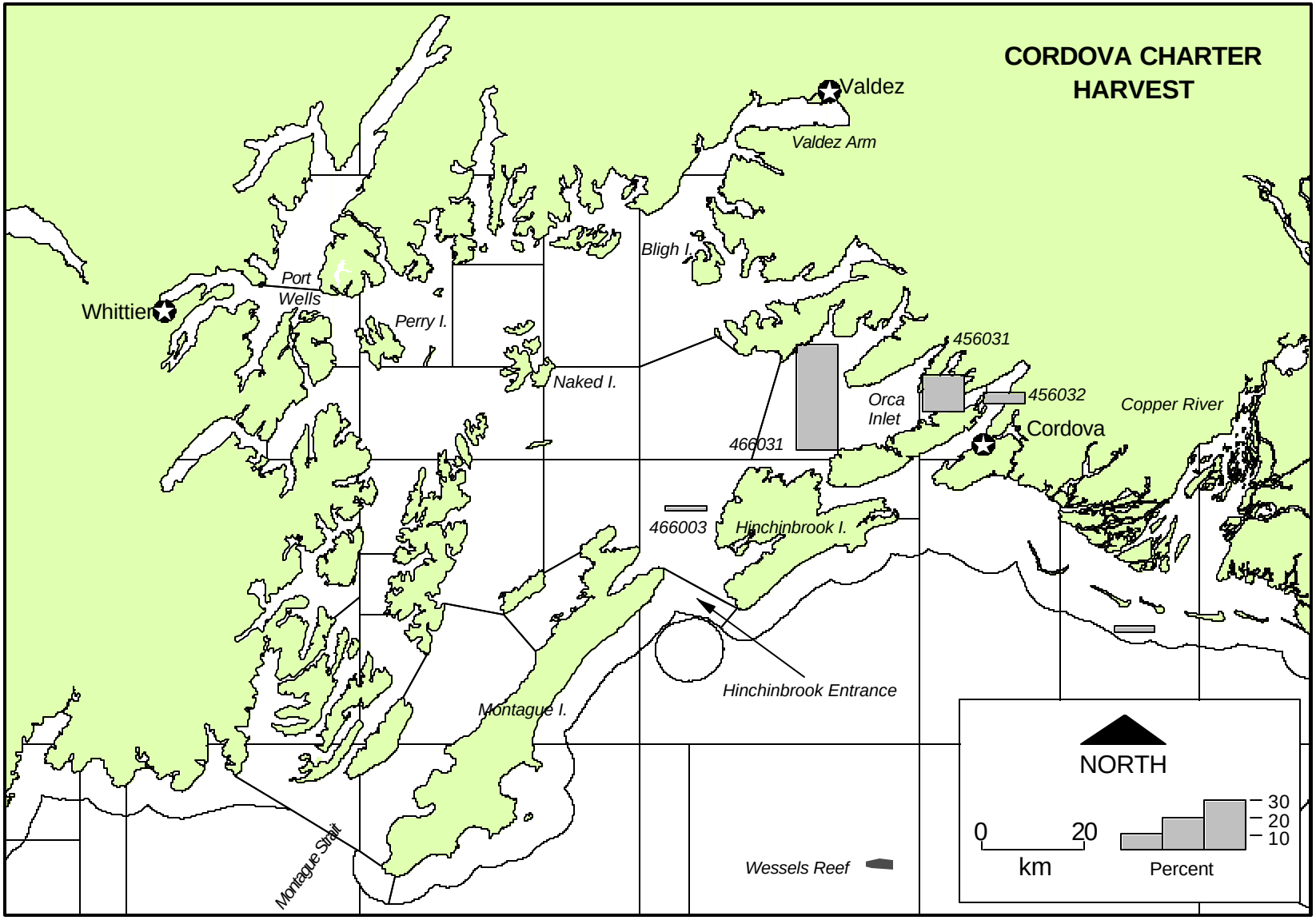

Figure 43.-The distribution of sport halibut harvest by charter anglers interviewed at Cordova in 1999. Vertical bars represent the percentage of the harvest (in number) from each stat area.

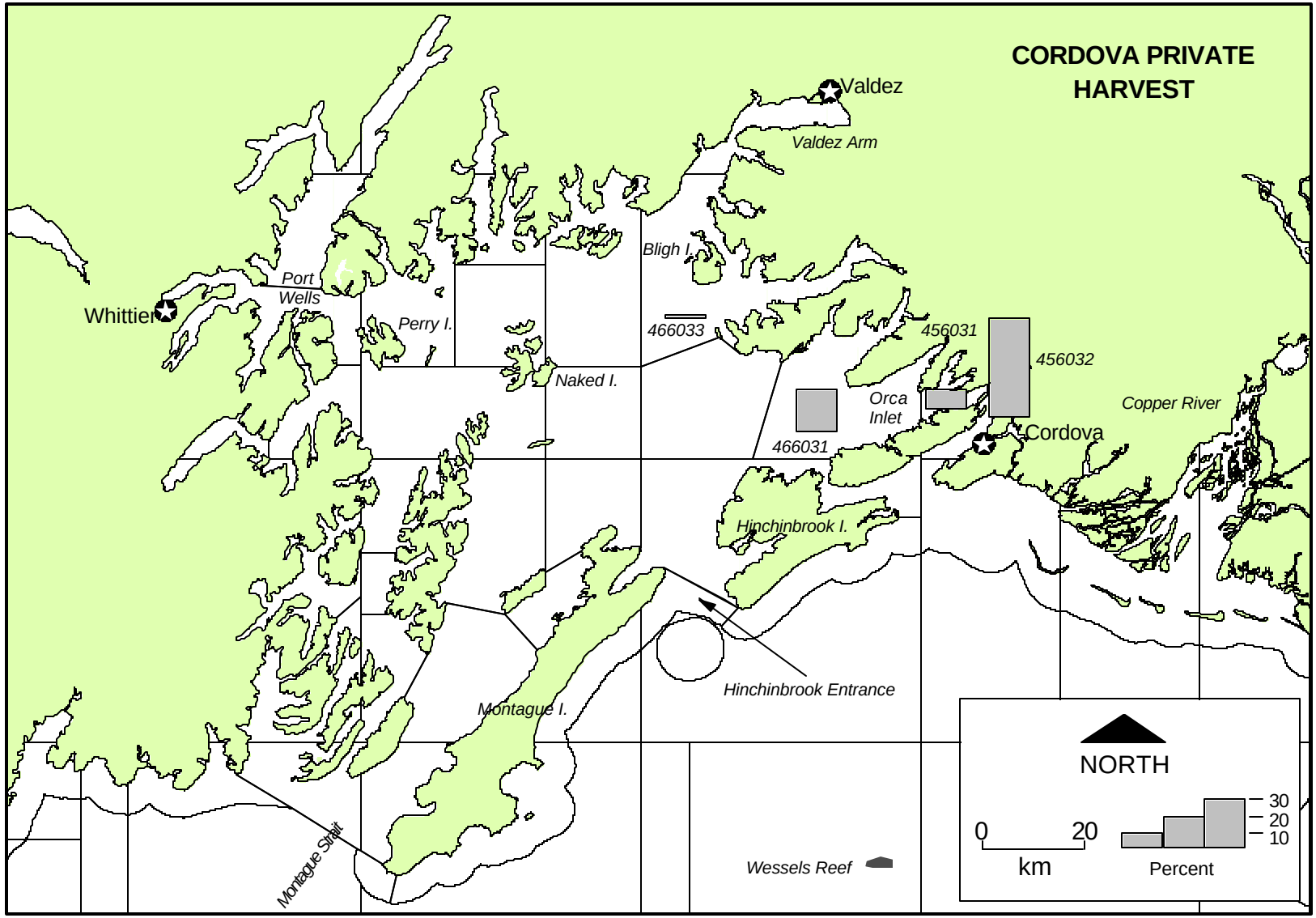

Figure 44.-The distribution of sport halibut harvest by private anglers interviewed at Cordova in 1999. Vertical bars represent the percentage of the harvest (in number) from each stat area.

During the years 1996-1999 the 1987 year class made up the largest portion of commercial catch coastwide: 15.9% in 1996, 21.4% in 1997, 26.7% in 1998, and 24% in 1999. The 1987 year class (12-year-olds) was the most abundant age class in the commercial catch in all regulatory areas in 1999 (Forsberg 1997-1999; Forsberg and Blood 2000). Even though ADF&G no longer reads otoliths or estimates age composition, there are no plans to discontinue collection of otoliths from the sport fishery and they will be provided to the IPHC upon request.

Caution must be exercised when interpreting estimates of effort and harvest by stat area. Although the estimates are based on many interviews and are relatively precise, they pertain only to the ports and times sampled, and do not represent the distribution of all fishing or harvest. Several ports or other origins of fishing trips were not sampled, and interview shifts did not cover the entire angling day. Fishing certainly occurs in stat areas where our estimates were zero, but the effort in those areas was either too low to detect with the level of sampling we expended or boats fishing those waters were not interviewed. Accuracy of reported fishing activity was also an issue. Many anglers and charter operators would revise their report if the technician followed up with detailed questions regarding their distance off shore or depth of the waters fished. Many anglers and some charter operators expressed uncertainty in determining their position when fishing near a stat area boundary, and some were simply unable to accurately read the stat area map. In a few instances, information from other sources would suggest that some charter operators deliberately misreported stat areas.

Nevertheless, the information on the spatial distribution of effort and harvest is useful for indicating broad patterns and trends. The distribution of effort and harvest are important building blocks for local area management plans. Catch and harvest rate information can also be obtained directly from the interview data and should be summarized, along with trends in age and size composition and total removals, in another report. Sport fishery catch rates are not necessarily proportional to abundance because halibut often have a clustered distribution, but the catch rate information could verify or dispute changes perceived by the fleet.

ACKNOWLEDGEMENTS

Numerous ADF&G personnel were instrumental in obtaining and summarizing these data. Port samplers Catherine Coon, Anna Stevens, Jennifer Jones, Tonya Brockman, Michael Parish, Philip Cowan, Lance Hastings, Shannon Keegan, Willy Dunne, William Romberg, Alan Heckart, Charlie Stock, Grace Thornton, Michael Dupes, Shane Hertzog, Matthew Kinney, Jan Peloskey, Matt Miller, and Jeff Milton collected all biological and interview data, reported changes in the fishery, and flagged potential sampling issues. Michael Parish and Philip Cowan prepared and aged halibut otoliths. Biometricians Patricia Hansen and Allen Bingham assisted with harvest biomass estimation formulae and reviewed all data analysis. Kathrin Sundet and Robert Walker provided estimates of harvest from the statewide harvest survey. Supervisors Doug Vincent-Lang, Robert Clark, Craig Whitmore, and Rob Bentz were supportive and patient through the preparation of this report.

Special thanks go to the Seward Military Resort for providing voluntary vessel logbook data and access to fish cleaning facilities, to the various harbormasters for cooperation and assistance in posting informational signs, and to members of the various charter boat and sport fishing associations throughout Southcentral Alaska.

Finally, this project would not have been possible without the cooperation and interest of the angling public and the vast majority of charter boat captains and charter business owners.

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APPENDIX A. LIST OF DATA AND PROGRAM FILES

Appendix A1.-Names and contents of halibut data files, interview data files, and programs used for analysis of data archived with ADF&G, Division of Sport Fish, Anchorage.

File Name	Description	Format[a]
HAL9499.SAS	Imports halibut biological data from files HAL94.DTA, HAL95.DTA,…HAL99.DTA (see below) to make SAS datasets.	SAS 8.X
AllCAS.SAS	Estimates proportions of reported harvest cleaned at sea.	SAS 8.X
H_ALS9499.SAS	Estimates halibut age, length, and sex composition.	SAS 8.X
H_BIOMASS9499.SAS	Estimates average length, weight, and sport fishery yield	SAS 8.X
HOMERCAS9599.SAS	Estimates the proportion and variance of harvest cleaned at sea in Homer and writes output file	SAS 8.X
CAS_P.DAT	Data file needed by H_BIOMASS9499.SAS to estimate mean weights for Homer	ASCII
MIL_P.DAT	Data file needed by H_BIOMASS9499.SAS to estimate mean weights for Seward	ASCII
MIL_P.XLS	Spreadsheet that is basis of MIL_P.DAT	MS Excel 97/00
SWHS9499.DAT	Data file needed by H_BIOMASS9499.SAS to estimate harvest biomass	ASCII
HAWLSummary.SAS	Sample size summaries from biological data.	SAS 8.X
HALSTAT9599.SAS	Estimates proportions of effort and harvest by ADF&G statistical area.	SAS 8.X
HAL9499.SD7	All halibut biological data in SAS dataset.	SAS 8.X
K9299.SAS7BDAT	Kodiak interview data, 1992-1999	SAS 8.X
CCI9499.SAS7BDAT	Central Cook Inlet interview data, 1992-1999	SAS 8.X
H9299.SAS7BDAT	Homer interview data, 1992-1999	SAS 8.X
S9299.SAS7BDAT	Seward interview data, 1992-1999	SAS 8.X
W9899.SAS7BDAT	Whittier interview data, 1992-1999	SAS 8.X
V9299.SAS7BDAT	Valdez interview data, 1992-1999	SAS 8.X
Q7540MA5.DTA	Kodiak interview data 1995-1999	MI
Q7540MA6.DTA		MI
Q7540MAA.DTA		MI
Q-075400M011998.DTA		MI
Q-075400M011999.DTA		MI
19200MA5.DTA	Central Cook Inlet interview data 1995-1999	MI
19200MA6.DTA		MI
19200MAA.DTA		MI
P1092000M011998.DTA		MI
P1092000M011999.DTA		MI
10030MA5.DTA	Homer interview data 1995-1999	MI
10030MA6.DTA		MI
10030MAA.DTA		MI
P1000300M011998.DTA		MI
P1000300M011999.DTA		MI
10020MA5.DTA	Seward interview data 1995-1999	MI
10020MA6.DTA		MI
10020MAA.DTA		MI
P1000200M011998.DTA		MI
P1000200M011999.DTA		MI
J0010MA5.DTA	Valdez interview data 1995-1999	MI
J0010MA6.DTA		MI
J0010MAA.DTA		MI
J-000100M011998.DTA		MI
J-000100M011999.DTA		MI
J-000200M011998.DTA	Whittier interview data 1998-1999	MI
J-000200M011999.DTA		MI

-continued-

Appendix A1.-Page 2 of 2.

File Name	Description	Format[a]
CordovaPortInt99.XLS	Cordova interview data 1999	MS Excel 97/00
Q7540BA4.DTA	Kodiak halibut data 1994-1999	AWL
Q7540BA5.DTA		AWL
Q7540BA6.DTA		AWL
Q7540BAA.DTA		AWL
Q-075400B011998.DTA		AWL
Q-075400B011999.DTA		AWL
19200BA4.DTA	Central Cook Inlet halibut data 1994-1999	AWL
19200BA5.DTA		AWL
19200BA6.DTA		AWL
19200BAA.DTA		AWL
P1092000B011998.DTA		AWL
P1092000B011999.DTA		AWL
10030B_4.DTA	Homer halibut data 1994-1999	AWL
10030BA5.DTA		AWL
10030BA6.DTA		AWL
10030BAA.DTA		AWL
P1000300B011998.DTA		AWL
P1000300B011999.DTA		AWL
10020BA4.DTA	Seward halibut data 1994-1999	AWL
10020BA5.DTA		AWL
10020BA6.DTA		AWL
10020BAA.DTA		AWL
P1000200B011998.DTA		AWL
P1000200B011999.DTA		AWL
J0010BA4.DTA	Valdez halibut data 1994-1999	AWL
J0010BA5.DTA		AWL
J0010BA6.DTA		AWL
J0010BAA.DTA		AWL
J-000100B011998.DTA		AWL
J-000100B011999.DTA		AWL
J-000200B011998.DTA	Whittier halibut data 1998-1999	AWL
J-000200B011999.DTA		AWL
J-072800B011999.DTA	Cordova halibut data 1999	AWL
H-008100A011998.DTA	Yakutat halibut data 1998-1999	ALTAWL
YAKHAL99.PRN		ASCII

[a] ADF&G Mark Sense file formats are as follows:

MI – Marine Interview format Version 1.0

AWL – Biological (age-weight-length) format Version 1.1

ALTAWL – Alternate AWL format version 1.0

APPENDIX B. SPORT FISH SURVEY HARVEST ESTIMATES

Appendix B1.-Estimates of recreational halibut harvest by subarea and user group in IPHC Area 3A, 1995-1999.

		Charter			Private		
Subarea	Year	Number of Fish	SE	95% RP[a]	Number of Fish	SE	95% RP[a]
Kodiak	1995[b]	6,512			7,477		
	1996	5,155	748	28%	9,050	1,004	22%
	1997	5,814	856	29%	11,418	1,102	19%
	1998	4,919	701	28%	10,749	1,149	21%
	1999	8,022	1,008	25%	10,573	1,237	23%
CCI	1995[b]	44,584			36,737		
	1996	41,573	1,558	7%	40,234	2,274	11%
	1997	43,442	2,072	9%	44,828	2,587	11%
	1998	43,780	1,880	8%	41,371	2,366	11%
	1999	38,654	1,822	9%	30,601	2,414	15%
LCI	1995[b]	56,114			30,719		
	1996	67,997	2,411	7%	37,971	2,203	11%
	1997	67,923	2,316	7%	37,723	2,409	13%
	1998	60,823	2,286	7%	33,395	1,990	12%
	1999	53,321	1,911	7%	32,931	1,972	12%
North Gulf	1995[b]	16,331			7,348		
	1996	15,421	843	11%	8,802	1,277	28%
	1997	17,633	996	11%	10,203	1,005	19%
	1998	16,486	1,046	12%	8,254	781	19%
	1999	15,088	940	12%	10,789	1,060	19%
PWS	1995[b]	12,474			12,297		
	1996	9,897	936	19%	12,433	1,002	16%
	1997	13,883	1,163	16%	14,573	1,223	16%
	1998	13,086	1,081	16%	11,215	1,027	18%
	1999	14,204	1,115	15%	13,396	1,161	17%
Yakutat	1995[b]	1,828			628		
	1996	2,914	402	27%	322	155	94%
	1997	4,161	532	25%	765	292	75%
	1998	4,274	532	24%	892	287	63%
	1999	2,437	443	36%	1,208	370	60%

Note: These estimates and standard errors were used to estimate harvest biomass from the Area 3A sport fishery. The relative precision (RP) is the 95% error bound expressed as a percentage of the harvest estimate.

[a] Relative precision.

[b] SE and RP not estimated in 1995.

Appendix B2.-Assignment of 1999 Prince William Sound site-specific harvest estimates from the SWHS to the ports of Whittier (W), Valdez (V), and Cordova (C).

Site	Harvest	Port
Valdez Bay (also Port Valdez) (Boat)	11,221	V
Passage Canal (Whittier) (Boat)	3,282	W
Orca Inlet (Boat)	3,232	C
Nelson Bay (Boat)	102	C
Esther Island Area (Boat)	557	W
Montague Island (Boat)	2,307	V
Hinchinbrook Island (Boat)	496	V
Hinchinbrook Entrance (Boat)	61	V
Bainbridge Pass (Boat)	20	W
Beartrap Bay (0796)	51	C
Bligh Reef (Valdez Arm) (Boat)	164	V
Boat - Other	2,163	Unknown
Campbell Bay (0926)	13	V
Chenega Island (Boat)	20	W
Crafton Island (0912)	32	W
Dangerous Passage (0760)	20	W
Egg Islands (Boat)	25	C
Elrington Island (0920)	31	W
Entrance Island (1000)	20	V
Eshamy Bay (Boat)	10	W
Goose Island (0838)	154	V
Granite Bay (1046)	124	W
Gulf of Alaska (Boat)	61	Unknown
Hawkins Island (Boat)	20	C
Hogg Bay (1082)	10	W
Irish Cove (0946)	10	V
Knight Island (1084)	222	W
Knight Island Passage (Boat)	168	W
Knowles Head (Boat)	133	V
Latouche Island (1032)	51	W
Lone Island (0922)	31	W
Main Bay (Boat)	54	W
Montague Strait (Boat)	269	W
Mummy Bay (Knight I) (0938)	71	W
Naked Island (Boat)	51	V
Port Chalmers (Boat)	20	W
Port Fidalgo (Boat)	69	V
Port Wells (also Golden) (Boat)	41	W
Prince William Sound (Boat)	1,488	Unknown
Seal Island (Boat)	58	W
Sheep Bay (Boat)	48	C
Sheep Point (1040)	13	C
Simpson Bay (0808)	20	C
Strawberry Channel (Boat)	25	C
Unakwik Inlet (Boat)	76	W
Orca Inlet (Shore)	107	C
Valdez Arm (Shore)	107	V
Chenega Island (Shore)	102	W
Evans Island (Shore)	10	W
Latouche Pass (Shore)	10	W
Montague Island (Shore)	51	V
Naked Island (Shore)	51	V
Sheep Bay (Shore)	23	C
Shoreline - Other	25	Unknown
	27,600	

APPENDIX C. DETAILED DATA TABLES

Appendix C1.-Sample size and estimated mean length, net and round weight, and associated standard errors of sport-caught halibut sampled in the Kodiak fishery, by user group, 1995-1999.

Statistic	User Group	Year				
		1995	1996	1997	1998	1999
Sample Size	Charter	292	363	241	667	386
	Private	378	427	260	646	693
	Unknown	380	237	143	73	183
	Total	1,050	1,027	644	1,386	1,262
Mean Length (cm)	Charter	99.8	104.5	106.2	101.3	100.6
	SE	1.6	1.4	1.5	1.0	1.3
	Private	100.9	96.1	101.4	99.2	95.3
	SE	1.4	1.4	1.5	1.0	1.0
	Unknown	97.4	98.0	95.3	100.8	96.7
	SE	1.3	1.5	1.6	2.9	1.9
Mean Net Weight (lb)	Charter	27.2	30.8	30.4	27.1	27.5
	SE	1.9	1.8	1.6	1.0	1.6
	Private	27.8	25.7	26.6	25.9	23.4
	SE	1.4	1.5	1.4	1.0	0.9
	Unknown	24.5	23.7	20.6	26.5	23.8
	SE	1.3	1.4	1.3	2.7	1.8
Mean Round Weight (lb)	Charter	36.2	41.0	40.5	36.1	36.5
	SE	2.5	2.4	2.1	1.3	2.1
	Private	37.0	34.2	35.4	34.5	31.1
	SE	1.9	2.0	1.9	1.3	1.2
	Unknown	32.6	31.5	27.4	35.2	31.7
	SE	1.7	1.8	1.7	3.6	2.3

Note: Standard error estimates are located under each mean. Sample sizes include only fish that were measured, so totals for each port may be lower than the overall sample size.

Appendix C2.-Sample size and estimated mean length, net and round weight, and associated standard errors of sport-caught halibut sampled in the Central Cook Inlet fishery, by user group, 1995-1999.

		Year				
Statistic	User Group	1995	1996	1997	1998	1999
Sample Size	Charter	930	768	610	514	487
	Private	289	267	444	364	372
	Unknown	1	1	0	0	3
	Total	1,220	1,036	1,054	878	862
Mean Length (cm)	Charter	89.0	88.4	87.5	91.5	88.9
	SE	0.7	0.7	0.7	0.9	0.9
	Private	81.2	82.9	85.3	82.7	86.2
	SE	1.2	1.3	0.9	0.9	1.1
	Unknown					80.3
	SE					4.8
Mean Net Weight (lb)	Charter	17.3	16.9	15.9	18.8	17.4
	SE	0.5	0.6	0.7	0.8	0.7
	Private	13.3	14.6	15.0	13.2	16.0
	SE	0.9	1.2	0.6	0.6	0.8
	Unknown					10.5
	SE					1.9
Mean Round Weight (lb)	Charter	23.0	22.5	21.2	24.9	23.1
	SE	0.7	0.8	0.9	1.0	1.0
	Private	17.7	19.4	19.9	17.6	21.3
	SE	1.1	1.5	0.9	0.8	1.0
	Unknown					14.0
	SE					2.5

Note: Standard error estimates are located under each mean. Sample sizes include only fish that were measured, so totals for each port may be lower than the overall sample size.

Appendix C3.-Sample size and estimated mean length, net and round weight, and associated standard errors of sport-caught halibut sampled in the Homer fishery, by user group, 1995-1999.

Statistic	User Group[a]	Year				
		1995	1996	1997	1998	1999
Sample Size	Charter-port	870	1111	717	504	462
	Charter-sea	291	97	133	207	107
	Private	152	696	392	431	392
	Unknown	5	0	0	6	0
	Total	1,318	1,904	1,242	1,148	961
Mean Length (cm)	Charter-port	99.1	95.3	98.1	93.6	91.8
	SE	0.7	0.6	0.7	0.9	0.8
	Charter-sea	86.6	90.0	90.6	86.9	84.9
	SE	0.9	1.4	1.3	0.9	1.3
	Private	88.2	82.0	85.4	82.7	83.3
	SE	1.8	0.7	0.9	0.8	0.9
	Unknown	83.0			98.7	
	SE	6.7			11.0	
Mean Net Weight (lb)	Charter-port	23.7	20.7	22.6	20.6	17.8
	SE	0.7	0.5	0.7	1.0	0.6
	Charter-sea	14.6	16.3	16.8	14.5	13.6
	SE	0.6	1.1	1.0	0.7	0.9
	Private	17.7	13.0	15.0	13.0	13.8
	SE	1.6	0.4	0.8	0.6	0.6
	Unknown	12.5			25.2	
	SE	2.9			11.0	
Mean Round Weight (lb)	Charter-port	31.6	27.5	30.1	27.4	23.7
	SE	0.9	0.7	0.9	1.3	0.8
	Charter-sea	19.4	21.7	22.4	19.3	18.0
	SE	0.8	1.4	1.3	1.0	1.2
	Private	23.5	17.3	20.0	17.2	18.3
	SE	2.1	0.6	1.1	0.8	0.8
	Unknown	16.6			33.5	
	SE	3.8			14.6	

Note: Standard error estimates are located under each mean. Sample sizes include only fish that were measured, so totals for each port may be lower than the overall sample size.

[a] Charter-port: charter harvest cleaned at port
Charter-sea: charter harvest cleaned at sea

Appendix C4.-Sample size and estimated mean length, net and round weight, and associated standard errors of sport-caught halibut sampled in the Seward fishery, by user group, 1995-1999.

Statistic	User Group	Year				
		1995	1996	1997	1998	1999
Sample Size	Charter	367	379	292	307	442
	Private	56	117	132	107	154
	Military	356	130	82	126	96
	Unknown	12	3	2	7	1
	Total	791	629	508	547	693
Mean Length (cm)	Charter	95.8	90.2	102.7	98.7	95.7
	SE	1.2	0.8	1.4	1.5	1.0
	Private	92.0	92.1	82.7	89.2	86.4
	SE	4.0	2.2	2.0	2.2	1.8
	Military	75.7	78.3	85.7	76.8	86.5
	SE	0.8	0.8	1.9	1.7	2.2
	Unknown	88.9	94.3	146.0	106.6	
	SE	5.9	8.1	2.0	6.3	
Mean Net Weight (lb)	Charter	22.2	17.0	27.6	25.4	22.2
	SE	1.1	0.7	1.4	1.4	1.1
	Private	22.9	20.4	14.9	18.3	16.8
	SE	3.7	1.9	1.5	1.8	1.6
	Military	9.9	9.9	14.8	11.3	16.6
	SE	0.6	0.3	1.3	1.2	2.5
	Unknown	17.1	18.2	71.3	27.8	
	SE	4.8	5.2	3.2	6.4	
Mean Round Weight (lb)	Charter	29.5	22.6	36.7	33.8	29.5
	SE	1.4	1.0	1.9	1.9	1.4
	Private	30.4	27.2	19.8	24.4	22.4
	SE	4.9	2.5	1.9	2.4	2.1
	Military	13.2	13.2	19.7	15.1	22.0
	SE	0.8	0.4	1.7	1.5	3.3
	Unknown	22.8	24.3	94.8	37.0	
	SE	6.4	6.9	4.2	8.5	

Note: Standard error estimates are located under each mean. Sample sizes include only fish that were measured, so totals for each port may be lower than the overall sample size.

Appendix C5.-Sample size and estimated mean length, net and round weight, and associated standard errors of sport-caught halibut sampled in the Valdez fishery, by user group, 1995-1999.

Statistic	User Group	Year				
		1995	1996	1997	1998	1999
Sample Size	Charter	552	498	746	409	848
	Private	119	109	164	144	231
	Unknown	80	46	8	36	34
	Total	751	653	918	589	1,113
Mean Length (cm)	Charter	103.3	100.9	111.6	102.5	99.7
	SE	1.1	1.1	0.9	1.3	0.9
	Private	93.9	108.8	100.5	96.0	92.8
	SE	2.7	3.1	2.0	2.5	1.7
	Unknown	86.8	94.8	95.4	98.6	91.2
	SE	3.0	3.6	6.8	5.2	4.0
Mean Net Weight (lb)	Charter	29.3	26.8	35.1	28.4	26.3
	SE	1.2	1.2	0.9	1.4	0.9
	Private	23.4	36.3	26.5	25.6	21.5
	SE	2.2	2.9	1.8	2.4	1.4
	Unknown	18.6	21.9	20.5	28.0	19.4
	SE	2.9	2.8	5.4	5.1	3.1
Mean Round Weight (lb)	Charter	39.0	35.6	46.7	37.8	35.0
	SE	1.5	1.5	1.2	1.9	1.2
	Private	31.2	48.3	35.2	34.1	28.5
	SE	2.9	3.9	2.3	3.2	1.8
	Unknown	24.7	29.2	27.2	37.3	25.8
	SE	3.9	3.7	7.2	6.8	4.1

Note: Standard error estimates are located under each mean. Sample sizes include only fish that were measured, so totals for each port may be lower than the overall sample size.

Appendix C6.-Sample size and estimated mean length, net and round weight, and associated standard errors of sport-caught halibut sampled in the Whittier, Cordova, and Yakutat fisheries, by user group, 1998 and 1999.

		Whittier		Cordova	Yakutat	
Statistic	User Group	1998	1999	1999	1998	1999
Sample Size	Charter	100	551	99	0	762
	Private	0	172	69	0	101
	Unknown	4	0	184	2,087	0
	Total	104	723	352	2,087	863
Mean Length (cm)	Charter	106.0	95.2	81.8		116.4
	SE	2.5	1.0	2.8		1.1
	Private		101.7	83.5		93.6
	SE		1.9	3.2		2.7
	Unknown	127.3		79.5	111.3	
	SE	3.3		1.6	0.6	
Mean Net Weight (lb)	Charter	31.0	22.2	16.4		43.3
	SE	3.0	0.9	2.2		1.5
	Private		27.2	16.6		22.6
	SE		1.8	2.4		2.3
	Unknown	46.0		12.9	35.5	
	SE	3.9		1.0	0.6	
Mean Round Weight (lb)	Charter	41.2	29.6	21.9		57.5
	SE	4.1	1.2	3.0		1.9
	Private		36.1	22.0		30.0
	SE		2.4	3.2		3.1
	Unknown	61.1		17.2	47.2	
	SE	5.1		1.4	0.8	

Note: Standard error estimates are located under each mean. Sample sizes include only fish that were measured, so totals for each port may be lower than the overall sample size.

Appendix C7.-Estimated age composition of halibut harvested in the IPHC Area 3A recreational fishery, by port, 1995-1998.

	1995			1996			1997			1998		
Age	n	p[a]	SE(p)[a]	n	p[a]	SE(p)[a]	n	p[a]	SE(p)[a]	n	p[a]	SE(p)[a]
Kodiak												
3	1	0.002	0.002	6	0.008	0.003	0	0.000		3	0.005	0.003
4	4	0.008	0.004	23	0.032	0.007	0	0.000		15	0.027	0.007
5	17	0.032	0.008	27	0.038	0.007	20	0.032	0.007	24	0.043	0.009
6	22	0.042	0.009	58	0.082	0.010	27	0.043	0.008	51	0.091	0.012
7	88	0.168	0.016	49	0.069	0.010	62	0.100	0.012	41	0.073	0.011
8	140	0.267	0.019	178	0.251	0.016	71	0.114	0.013	64	0.114	0.013
9	62	0.118	0.014	146	0.206	0.015	138	0.222	0.017	51	0.091	0.012
10	54	0.103	0.013	54	0.076	0.010	137	0.220	0.017	143	0.255	0.018
11	62	0.118	0.014	43	0.061	0.009	62	0.100	0.012	70	0.125	0.014
12	31	0.059	0.010	49	0.069	0.010	42	0.067	0.010	38	0.068	0.011
13	23	0.044	0.009	28	0.040	0.007	34	0.055	0.009	18	0.032	0.007
14	8	0.015	0.005	9	0.013	0.004	18	0.029	0.007	19	0.034	0.008
15	5	0.010	0.004	6	0.008	0.003	6	0.010	0.004	13	0.023	0.006
16	3	0.006	0.003	12	0.017	0.005	0	0.000	-	4	0.007	0.004
17	3	0.006	0.003	5	0.007	0.003	2	0.003	0.002	2	0.004	0.003
18	0	0.000		4	0.006	0.003	2	0.003	0.002	3	0.005	0.003
19	1	0.002	0.002	5	0.007	0.003	2	0.003	0.002	0	0.000	
20	0	0.000		1	0.001	0.001	0	0.000		1	0.002	0.002
21	0	0.000		2	0.003	0.002	0	0.000		0	0.000	
22	0	0.000		1	0.001	0.001	0	0.000		0	0.000	
23	0	0.000		0	0.000		0	0.000		0	0.000	
24	0	0.000		1	0.001	0.001	0	0.000		0	0.000	
25	0	0.000		1	0.001	0.001	0	0.000		0	0.000	
26	0	0.000		0	0.000		0	0.000		0	0.000	
Total	524			708			623			560		
Deep Crk and Anchor Pt Beaches												
3	1	0.001	0.001	0	0.000		0	0.000		0	0.000	
4	9	0.012	0.004	8	0.012	0.004	2	0.003	0.002	11	0.019	0.006
5	38	0.051	0.008	26	0.040	0.008	43	0.072	0.011	21	0.037	0.008
6	60	0.081	0.010	82	0.126	0.013	51	0.085	0.011	82	0.145	0.015
7	184	0.249	0.016	107	0.165	0.015	99	0.166	0.015	53	0.093	0.012
8	209	0.283	0.017	181	0.279	0.018	92	0.154	0.015	115	0.203	0.017
9	91	0.123	0.012	156	0.240	0.017	132	0.221	0.017	62	0.109	0.013
10	56	0.076	0.010	25	0.039	0.008	102	0.171	0.015	85	0.150	0.015
11	37	0.050	0.008	24	0.037	0.007	35	0.059	0.010	86	0.152	0.015
12	24	0.033	0.007	20	0.031	0.007	19	0.032	0.007	25	0.044	0.009
13	12	0.016	0.005	8	0.012	0.004	12	0.020	0.006	15	0.026	0.007
14	9	0.012	0.004	5	0.008	0.003	6	0.010	0.004	6	0.011	0.004
15	4	0.005	0.003	2	0.003	0.002	2	0.003	0.002	1	0.002	0.002
16	2	0.003	0.002	0	0.000		1	0.002	0.002	2	0.004	0.002
17	1	0.001	0.001	1	0.002	0.002	0	0.000		3	0.005	0.003
18	1	0.001	0.001	1	0.002	0.002	0	0.000		0	0.000	
19	0	0.000		1	0.002	0.002	0	0.000		0	0.000	
20	0	0.000		2	0.003	0.002	1	0.002	0.002	0	0.000	
21	0	0.000		0	0.000		0	0.000		0	0.000	
22	0	0.000		0	0.000		0	0.000		0	0.000	
23	0	0.000		0	0.000		0	0.000		0	0.000	
24	0	0.000		0	0.000		0	0.000		0	0.000	
25	0	0.000		0	0.000		0	0.000		0	0.000	
26	0	0.000		0	0.000		0	0.000		0	0.000	
Total	738			649			597			567		

-continued-

Appendix C7.-Page 2 of 3.

	1995			1996			1997			1998		
Age	n	p[a]	SE(p)[a]	n	p[a]	SE(p)[a]	n	p[a]	SE(p)[a]	n	p[a]	SE(p)[a]
Homer												
3	0	0.000		0	0.000		0	0.000		0	0.000	
4	1	0.001	0.001	11	0.017	0.005	1	0.001	0.001	4	0.006	0.003
5	4	0.005	0.002	21	0.033	0.007	20	0.029	0.006	16	0.024	0.006
6	12	0.015	0.004	46	0.072	0.010	25	0.036	0.007	56	0.084	0.011
7	98	0.120	0.011	54	0.084	0.011	72	0.104	0.012	47	0.071	0.010
8	146	0.178	0.013	145	0.226	0.017	75	0.109	0.012	100	0.150	0.014
9	137	0.167	0.013	132	0.206	0.016	168	0.244	0.016	94	0.141	0.014
10	110	0.134	0.012	76	0.118	0.013	139	0.202	0.015	125	0.188	0.015
11	92	0.112	0.011	53	0.083	0.011	70	0.102	0.012	80	0.120	0.013
12	89	0.109	0.011	47	0.073	0.010	53	0.077	0.010	43	0.065	0.010
13	40	0.049	0.008	23	0.036	0.007	25	0.036	0.007	30	0.045	0.008
14	40	0.049	0.008	15	0.023	0.006	17	0.025	0.006	27	0.041	0.008
15	22	0.027	0.006	1	0.002	0.002	6	0.009	0.004	19	0.029	0.006
16	13	0.016	0.004	4	0.006	0.003	2	0.003	0.002	13	0.020	0.005
17	8	0.010	0.003	2	0.003	0.002	7	0.010	0.004	5	0.008	0.003
18	4	0.005	0.002	6	0.009	0.004	6	0.009	0.004	6	0.009	0.004
19	1	0.001	0.001	2	0.003	0.002	3	0.004	0.003	0	0.000	
20	0	0.000		3	0.005	0.003	0	0.000		0	0.000	
21	2	0.002	0.002	0	0.000		0	0.000		0	0.000	
22	0	0.000		0	0.000		0	0.000		0	0.000	
23	0	0.000		0	0.000		0	0.000		0	0.000	
24	1	0.001	0.001	0	0.000		0	0.000		0	0.000	
25	0	0.000		0	0.000		0	0.000		0	0.000	
26	0	0.000		1	0.002	0.002	0	0.000		0	0.000	
Total	820			642			689			665		
Seward												
3	0	0.000		0	0.000		0	0.000		1	0.002	0.002
4	4	0.008	0.004	5	0.008	0.004	2	0.004	0.003	16	0.029	0.007
5	12	0.023	0.006	4	0.007	0.003	23	0.048	0.010	19	0.035	0.008
6	31	0.059	0.010	18	0.030	0.007	20	0.042	0.009	35	0.064	0.011
7	80	0.151	0.016	45	0.074	0.011	41	0.086	0.013	37	0.068	0.011
8	115	0.217	0.018	145	0.239	0.017	60	0.125	0.015	63	0.116	0.014
9	61	0.115	0.014	138	0.228	0.017	88	0.184	0.018	65	0.119	0.014
10	55	0.104	0.013	72	0.119	0.013	117	0.244	0.020	112	0.206	0.017
11	52	0.098	0.013	49	0.081	0.011	42	0.088	0.013	65	0.119	0.014
12	46	0.087	0.012	53	0.087	0.011	41	0.086	0.013	38	0.070	0.011
13	22	0.042	0.009	30	0.050	0.009	21	0.044	0.009	34	0.063	0.010
14	17	0.032	0.008	14	0.023	0.006	8	0.017	0.006	27	0.050	0.009
15	18	0.034	0.008	7	0.012	0.004	7	0.015	0.005	20	0.037	0.008
16	10	0.019	0.006	10	0.017	0.005	6	0.013	0.005	3	0.006	0.003
17	3	0.006	0.003	6	0.010	0.004	3	0.006	0.004	4	0.007	0.004
18	0	0.000		2	0.003	0.002	0	0.000		4	0.007	0.004
19	1	0.002	0.002	5	0.008	0.004	0	0.000		1	0.002	0.002
20	0	0.000		2	0.003	0.002	0	0.000		0	0.000	
21	0	0.000		1	0.002	0.002	0	0.000		0	0.000	
22	0	0.000		0	0.000		0	0.000		0	0.000	
23	1	0.002	0.002	0	0.000		0	0.000		0	0.000	
24	1	0.002	0.002	0	0.000		0	0.000		0	0.000	
25	0	0.000		0	0.000		0	0.000		0	0.000	
26	0	0.000		0	0.000		0	0.000		0	0.000	
Total	529			606			479			544		

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Age	1995 n	1995 p[a]	1995 SE(p)[a]	1996 n	1996 p[a]	1996 SE(p)[a]	1997 n	1997 p[a]	1997 SE(p)[a]	1998 n	1998 p[a]	1998 SE(p)[a]
Valdez												
3	0	0.000		0	0.000		1	0.002	0.002	0	0.000	
4	2	0.004	0.003	2	0.004	0.003	3	0.005	0.003	6	0.011	0.005
5	11	0.022	0.006	3	0.006	0.004	10	0.017	0.005	17	0.032	0.008
6	32	0.063	0.011	11	0.022	0.007	16	0.028	0.007	21	0.039	0.008
7	68	0.133	0.015	32	0.065	0.011	43	0.075	0.011	44	0.082	0.012
8	106	0.208	0.018	67	0.136	0.015	59	0.102	0.013	59	0.110	0.014
9	54	0.106	0.014	113	0.229	0.019	104	0.180	0.016	66	0.123	0.014
10	68	0.133	0.015	63	0.128	0.015	138	0.239	0.018	90	0.168	0.016
11	66	0.129	0.015	54	0.110	0.014	61	0.106	0.013	84	0.157	0.016
12	45	0.088	0.013	53	0.108	0.014	63	0.109	0.013	71	0.133	0.015
13	22	0.043	0.009	38	0.077	0.012	40	0.069	0.011	27	0.050	0.009
14	13	0.025	0.007	29	0.059	0.011	21	0.036	0.008	21	0.039	0.008
15	10	0.020	0.006	5	0.010	0.005	12	0.021	0.006	11	0.021	0.006
16	6	0.012	0.005	8	0.016	0.006	1	0.002	0.002	6	0.011	0.005
17	3	0.006	0.003	7	0.014	0.005	2	0.003	0.002	7	0.013	0.005
18	2	0.004	0.003	2	0.004	0.003	2	0.003	0.002	2	0.004	0.003
19	0	0.000		2	0.004	0.003	1	0.002	0.002	0	0.000	
20	1	0.002	0.002	2	0.004	0.003	0	0.000		2	0.004	0.003
21	0	0.000		1	0.002	0.002	0	0.000		0	0.000	
22	0	0.000		0	0.000		0	0.000		0	0.000	
23	0	0.000		1	0.002	0.002	0	0.000		0	0.000	
24	1	0.002	0.002	0	0.000		0	0.000		1	0.002	0.002
25	0	0.000		0	0.000		0	0.000		0	0.000	
26	0	0.000		0	0.000		0	0.000		0	0.000	
Total	510			493			577			535		
Whittier												
3										0	0.000	
4										1	0.010	0.010
5										0	0.000	
6										4	0.042	0.021
7										1	0.010	0.010
8										5	0.052	0.023
9										14	0.146	0.036
10										25	0.260	0.045
11										17	0.177	0.039
12										7	0.073	0.027
13										9	0.094	0.030
14										0	0.000	
15										3	0.031	0.018
16										6	0.063	0.025
17										3	0.031	0.018
18										0	0.000	
19										0	0.000	
20										0	0.000	
21										1	0.010	0.010
22										0	0.000	
23										0	0.000	
24										0	0.000	
25										0	0.000	
26										0	0.000	
Total										96		

[a] Proportion

Appendix C8.-Distribution of halibut effort and harvest by user group and ADF&G statistical area for anglers interviewed at Kodiak, 1995-1999.

User	Stat Area	Number of Angler-Days					Proportion of Angler-Days (p)					SE(p)				
		1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Effort:																
Charter	525701	0	10	14	56	51	0.000	0.028	0.033	0.045	0.104		0.009	0.009	0.006	0.014
	525702	0	0	0	8	4	0.000	0.000	0.000	0.006	0.008				0.002	0.004
	525703	0	0	4	4	0	0.000	0.000	0.009	0.003	0.000			0.005	0.002	
	525731	10	78	70	157	46	0.034	0.218	0.164	0.126	0.094	0.010	0.022	0.018	0.009	0.013
	525732	8	9	6	51	2	0.027	0.025	0.014	0.041	0.004	0.009	0.008	0.006	0.006	0.003
	525733	260	253	321	944	374	0.872	0.709	0.752	0.759	0.763	0.019	0.024	0.021	0.012	0.019
	525805	20	0	0	0	5	0.067	0.000	0.000	0.000	0.010	0.015				0.005
	535734	0	0	6	12	0	0.000	0.000	0.014	0.010	0.000			0.006	0.003	
	535803	0	7	6	11	8	0.000	0.020	0.014	0.009	0.016	0.000	0.007	0.006	0.003	0.006
	Total	298	357	427	1,243	490										
Private	515801	0	0	4	0	0	0.000	0.000	0.006	0.000	0.000			0.003		
	525701	0	4	10	0	10	0.000	0.005	0.014	0.000	0.015		0.003	0.004		0.005
	525731	150	227	168	283	96	0.167	0.301	0.239	0.250	0.145	0.012	0.017	0.016	0.013	0.014
	525732	24	9	14	2	18	0.027	0.012	0.020	0.002	0.027	0.005	0.004	0.005	0.001	0.006
	525733	686	506	502	836	528	0.764	0.670	0.714	0.737	0.796	0.014	0.017	0.017	0.013	0.016
	525805	38	2	5	9	2	0.042	0.003	0.007	0.008	0.003	0.007	0.002	0.003	0.003	0.002
	535734	0	0	0	0	5	0.000	0.000	0.000	0.000	0.008					0.003
	535803	0	7	0	4	4	0.000	0.009	0.000	0.004	0.006		0.003		0.002	0.003
	Total	898	755	703	1,134	663										

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User	Stat Area	Number of Halibut Kept					Proportion of Halibut Harvest (p)					SE(p)				
		1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Harvest:																
Charter	525701	0	18	24	103	71	0.000	0.034	0.040	0.062	0.091		0.008	0.008	0.006	0.010
	525702	0	0	0	16	6	0.000	0.000	0.000	0.010	0.008				0.002	0.003
	525703	0	0	3	2	0	0.000	0.000	0.005	0.001	0.000			0.003	0.001	
	525731	11	99	99	226	50	0.021	0.189	0.167	0.136	0.064	0.006	0.017	0.015	0.008	0.009
	525732	11	12	6	67	2	0.021	0.023	0.010	0.040	0.003	0.006	0.007	0.004	0.005	0.002
	525733	433	380	451	1,206	626	0.830	0.727	0.761	0.725	0.806	0.016	0.020	0.018	0.011	0.014
	525805	67	0	0	0	2	0.128	0.000	0.000	0.000	0.003	0.015				0.002
	535734	0	0	10	24	0	0.000	0.000	0.017	0.014	0.000			0.005	0.003	0.000
	535803	0	14	0	19	20	0.000	0.027	0.000	0.011	0.026		0.007		0.003	0.006
	Total	522	523	593	1,663	777										
Private	515801	0	0	7	0	0	0.000	0.000	0.012	0.000	0.000			0.004		
	525701	0	7	19	0	16	0.000	0.011	0.032	0.000	0.023		0.004	0.007		0.006
	525731	126	232	139	236	108	0.165	0.380	0.235	0.276	0.155	0.013	0.020	0.017	0.015	0.014
	525732	8	16	19	1	20	0.010	0.026	0.032	0.001	0.029	0.004	0.006	0.007	0.001	0.006
	525733	568	342	403	610	539	0.744	0.561	0.682	0.713	0.772	0.016	0.020	0.019	0.015	0.016
	525805	61	1	4	9	2	0.080	0.002	0.007	0.011	0.003	0.010	0.002	0.003	0.003	0.002
	535734	0	0	0	0	7	0.000	0.000	0.000	0.000	0.010					0.004
	535803	0	12	0	0	6	0.000	0.020	0.000	0.000	0.009		0.006			0.003
	Total	763	610	591	856	698										

Appendix C9.-Distribution of halibut effort and harvest by user group and ADF&G statistical area for anglers interviewed in the Central Cook Inlet fishery, 1995-1999.

User	Stat Area	Number of Angler-Days					Proportion of Angler-Days (p)					SE(p)				
		1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Effort:																
Charter	515937	24	13	13	8	27	0.017	0.011	0.009	0.007	0.016	0.003	0.003	0.002	0.002	0.003
	515938	206	74	109	122	145	0.147	0.064	0.073	0.107	0.088	0.009	0.007	0.007	0.009	0.007
	515939	114	32	58	62	67	0.081	0.028	0.039	0.054	0.041	0.007	0.005	0.005	0.007	0.005
	516001	2	3	4	0	3	0.001	0.003	0.003	0.000	0.002	0.001	0.001	0.001		0.001
	516002	8	0	18	14	17	0.006	0.000	0.012	0.012	0.010	0.002	0.000	0.003	0.003	0.003
	525902	0	0	0	6	0	0.000	0.000	0.000	0.005	0.000				0.002	
	525931	1,039	1,031	1,223	838	1,330	0.743	0.890	0.821	0.734	0.811	0.012	0.009	0.010	0.013	0.010
	525932	0	0	5	0	0	0.000	0.000	0.003	0.000	0.000			0.001		
	526002	6	5	60	92	50	0.004	0.004	0.040	0.081	0.031	0.002	0.002	0.005	0.008	0.004
		1,399	1,158	1,490	1,142	1,639										
Private	515933	0	0	0	0	4	0.000	0.000	0.000	0.000	0.003					0.002
	515935	4	0	0	0	2	0.003	0.000	0.000	0.000	0.002	0.001				0.001
	515936	2	9	0	0	5	0.001	0.007	0.000	0.000	0.004	0.001	0.002			0.002
	515937	109	54	42	10	59	0.081	0.045	0.037	0.009	0.050	0.007	0.006	0.006	0.003	0.006
	515938	399	310	304	380	464	0.296	0.256	0.265	0.337	0.395	0.012	0.013	0.013	0.014	0.014
	515939	496	428	335	277	216	0.368	0.353	0.292	0.246	0.184	0.013	0.014	0.013	0.013	0.011
	516001	26	16	23	40	20	0.019	0.013	0.020	0.036	0.017	0.004	0.003	0.004	0.006	0.004
	516002	21	16	61	72	37	0.016	0.013	0.053	0.064	0.031	0.003	0.003	0.007	0.007	0.005
	525931	289	375	378	342	358	0.215	0.309	0.329	0.304	0.305	0.011	0.013	0.014	0.014	0.013
	525932	0	0	0	0	5	0.000	0.000	0.000	0.000	0.004					0.002
	526002	0	0	5	5	5	0.000	0.000	0.004	0.004	0.004			0.002	0.002	0.002
	526003	0	4	0	0	0	0.000	0.003	0.000	0.000	0.000		0.002			
		1,346	1,212	1,148	1,126	1,175										

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User	Stat Area	Number of Halibut Kept 1995	1996	1997	1998	1999	Proportion of Halibut Harvest (p) 1995	1996	1997	1998	1999	SE(p) 1995	1996	1997	1998	1999
Distribution of Halibut Harvest:																
Charter	515937	39	26	13	12	37	0.016	0.014	0.005	0.007	0.013	0.003	0.003	0.001	0.002	0.002
	515938	294	126	159	186	215	0.124	0.066	0.063	0.101	0.076	0.007	0.006	0.005	0.007	0.005
	515939	141	58	89	70	73	0.059	0.030	0.035	0.038	0.026	0.005	0.004	0.004	0.004	0.003
	516001	1	2	1	0	0	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000		
	516002	14	0	27	16	18	0.006	0.000	0.011	0.009	0.006	0.002	0.000	0.002	0.002	0.001
	525902	0	0	0	7	0	0.000	0.000	0.000	0.004	0.000				0.001	
	525931	1,870	1,698	2,120	1,391	2,390	0.789	0.887	0.845	0.757	0.846	0.008	0.007	0.007	0.010	0.007
	525932	0	0	9	0	0	0.000	0.000	0.004	0.000	0.000			0.001		
	526002	12	5	92	156	91	0.005	0.003	0.037	0.085	0.032	0.001	0.001	0.004	0.007	0.003
		2,371	1,915	2,510	1,838	2,824										
Private	515933	0	0	0	0	5	0.000	0.000	0.000	0.000	0.004					0.002
	515935	3	0	0	0	2	0.002	0.000	0.000	0.000	0.001	0.001				0.001
	515936	1	8	0	0	8	0.001	0.006	0.000	0.000	0.006	0.001	0.002			0.002
	515937	112	68	36	10	72	0.073	0.055	0.033	0.009	0.051	0.007	0.006	0.005	0.003	0.006
	515938	487	300	268	435	505	0.317	0.243	0.243	0.379	0.357	0.012	0.012	0.013	0.014	0.013
	515939	471	361	268	189	196	0.307	0.292	0.243	0.165	0.139	0.012	0.013	0.013	0.011	0.009
	516001	23	4	9	19	17	0.015	0.003	0.008	0.017	0.012	0.003	0.002	0.003	0.004	0.003
	516002	19	21	43	53	44	0.012	0.017	0.039	0.046	0.031	0.003	0.004	0.006	0.006	0.005
	525931	418	469	479	438	551	0.272	0.380	0.434	0.382	0.390	0.011	0.014	0.015	0.014	0.013
	525932	0	0	0	0	5	0.000	0.000	0.000	0.000	0.004					0.002
	526002	0	0	1	3	8	0.000	0.000	0.001	0.003	0.006			0.001	0.002	0.002
	526003	0	4	0	0	0	0.000	0.003	0.000	0.000	0.000		0.002			
		1,534	1,235	1,104	1,147	1,413										

Appendix C10.-Distribution of halibut effort and harvest by user group and ADF&G statistical area for anglers interviewed at Homer, 1995-1999.

		Number of Angler-Days					Proportion of Angler-Days (p)					SE(p)				
User	Stat Area	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Effort:																
Charter	515831	0	0	7	0	0	0.000	0.000	0.004	0.000	0.000			0.002		
	515832	0	0	0	5	42	0.000	0.000	0.000	0.002	0.015				0.001	0.002
	515901	11	0	4	7	0	0.008	0.000	0.002	0.003	0.000	0.002		0.001	0.001	
	515902	0	0	0	23	0	0.000	0.000	0.000	0.009	0.000				0.002	
	515903	7	67	89	103	110	0.005	0.085	0.052	0.040	0.039	0.002	0.010	0.005	0.004	0.004
	515904	13	6	61	130	148	0.009	0.008	0.036	0.050	0.053	0.003	0.003	0.005	0.004	0.004
	515905	201	43	177	201	196	0.145	0.054	0.104	0.077	0.070	0.009	0.008	0.007	0.005	0.005
	515906	106	29	57	40	81	0.076	0.037	0.034	0.015	0.029	0.007	0.007	0.004	0.002	0.003
	515907	63	25	54	45	92	0.045	0.032	0.032	0.017	0.033	0.006	0.006	0.004	0.003	0.003
	515908	0	5	5	0	0	0.000	0.006	0.003	0.000	0.000		0.003	0.001		
	515931	8	7	26	29	20	0.006	0.009	0.015	0.011	0.007	0.002	0.003	0.003	0.002	0.002
	515933	0	3	7	16	12	0.000	0.004	0.004	0.006	0.004		0.002	0.002	0.002	0.001
	515934	0	0	0	6	0	0.000	0.000	0.000	0.002	0.000				0.001	
	515935	4	20	0	2	6	0.003	0.025	0.000	0.001	0.002	0.001	0.006		0.001	0.001
	515936	43	77	41	78	79	0.031	0.098	0.024	0.030	0.028	0.005	0.011	0.004	0.003	0.003
	515937	63	36	122	91	124	0.045	0.046	0.072	0.035	0.044	0.006	0.007	0.006	0.004	0.004
	515938	0	0	4	0	0	0.000	0.000	0.002	0.000	0.000			0.001		
	515939	5	6	0	0	4	0.004	0.008	0.000	0.000	0.001	0.002	0.003			0.001
	525832	0	8	0	0	0	0.000	0.010	0.000	0.000	0.000		0.004			
	525834	0	0	0	0	10	0.000	0.000	0.000	0.000	0.004					0.001
	525836	91	84	138	131	256	0.066	0.106	0.081	0.050	0.091	0.007	0.011	0.007	0.004	0.005
	525837	0	25	6	77	84	0.000	0.032	0.004	0.030	0.030		0.006	0.001	0.003	0.003
	525901	63	12	39	101	102	0.045	0.015	0.023	0.039	0.036	0.006	0.004	0.004	0.004	0.004
	525902	399	129	315	595	609	0.288	0.163	0.186	0.229	0.217	0.012	0.013	0.009	0.008	0.008
	525931	309	199	545	897	826	0.223	0.252	0.321	0.346	0.295	0.011	0.015	0.011	0.009	0.009
	525932	0	8	0	18	0	0.000	0.010	0.000	0.007	0.000		0.004		0.002	
		1,386	789	1,697	2,595	2,801										
Private	515901	7	8	0	0	0	0.016	0.018	0.000	0.000	0.000	0.006	0.006			
	515902	0	0	0	7	0	0.000	0.000	0.000	0.009	0.000				0.003	
	515903	0	5	0	3	3	0.000	0.011	0.000	0.004	0.003		0.005		0.002	0.002
	515904	0	7	0	0	0	0.000	0.016	0.000	0.000	0.000		0.006			
	515905	3	0	6	4	0	0.007	0.000	0.009	0.005	0.000	0.004		0.004	0.003	
	515906	2	0	18	8	4	0.005	0.000	0.028	0.010	0.005	0.003		0.006	0.004	0.002
	515907	44	43	65	84	127	0.103	0.096	0.100	0.106	0.145	0.015	0.014	0.012	0.011	0.012
	515908	34	6	4	5	23	0.080	0.013	0.006	0.006	0.026	0.013	0.005	0.003	0.003	0.005
	515931	8	23	22	24	10	0.019	0.052	0.034	0.030	0.011	0.007	0.011	0.007	0.006	0.004
	515932	26	26	16	32	30	0.061	0.058	0.025	0.040	0.034	0.012	0.011	0.006	0.007	0.006
	515933	48	12	99	135	95	0.113	0.027	0.152	0.170	0.108	0.015	0.008	0.014	0.013	0.010
	515934	7	7	2	0	0	0.016	0.016	0.003	0.000	0.000	0.006	0.006	0.002		
	515935	39	47	63	61	54	0.092	0.105	0.097	0.077	0.062	0.014	0.015	0.012	0.009	0.008
	515936	81	64	116	146	143	0.190	0.143	0.178	0.184	0.163	0.019	0.017	0.015	0.014	0.012
	515937	34	39	51	95	98	0.080	0.087	0.078	0.120	0.112	0.013	0.013	0.011	0.012	0.011
	515938	3	0	0	0	0	0.007	0.000	0.000	0.000	0.000	0.004				
	515939	8	7	14	0	0	0.019	0.016	0.021	0.000	0.000	0.007	0.006	0.006		
	516001	4	0	0	0	0	0.009	0.000	0.000	0.000	0.000	0.005				
	525836	0	43	5	0	3	0.000	0.096	0.008	0.000	0.003		0.014	0.003		0.002
	525837	0	0	5	0	0	0.000	0.000	0.008	0.000	0.000			0.003		
	525901	5	35	22	13	18	0.012	0.078	0.034	0.016	0.021	0.005	0.013	0.007	0.004	0.005
	525902	33	26	33	20	61	0.077	0.058	0.051	0.025	0.069	0.013	0.011	0.009	0.006	0.009
	525931	40	48	111	157	209	0.094	0.108	0.170	0.198	0.238	0.014	0.015	0.015	0.014	0.014
		426	446	652	794	878										

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Appendix C10.-Page 2 of 2.

		Number of Halibut Kept					Proportion of Halibut Harvest (p)					SE(p)				
User	Stat Area	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Harvest:																
Charter	515831	0	0	14	0	0	0.000	0.000	0.004	0.000	0.000			0.001		
	515832	0	0	0	10	84	0.000	0.000	0.000	0.002	0.016				0.001	0.002
	515901	22	0	3	14	0	0.009	0.000	0.001	0.003	0.000	0.002		0.001	0.001	
	515902	0	0	0	46	0	0.000	0.000	0.000	0.009	0.000				0.001	
	515903	12	132	173	189	209	0.005	0.100	0.054	0.039	0.040	0.001	0.008	0.004	0.003	0.003
	515904	24	12	121	255	293	0.010	0.009	0.038	0.053	0.056	0.002	0.003	0.003	0.003	0.003
	515905	378	63	295	382	354	0.158	0.048	0.093	0.079	0.068	0.007	0.006	0.005	0.004	0.003
	515906	164	44	111	75	127	0.068	0.033	0.035	0.015	0.024	0.005	0.005	0.003	0.002	0.002
	515907	98	32	106	71	162	0.041	0.024	0.033	0.015	0.031	0.004	0.004	0.003	0.002	0.002
	515908	0	8	18	0	0	0.000	0.006	0.006	0.000	0.000		0.002	0.001		
	515931	13	13	51	50	33	0.005	0.010	0.016	0.010	0.006	0.001	0.003	0.002	0.001	0.001
	515932	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000					
	515933	0	5	5	15	12	0.000	0.004	0.002	0.003	0.002		0.002	0.001	0.001	0.001
	515934	0	0	0	12	0	0.000	0.000	0.000	0.002	0.000				0.001	
	515935	2	14	0	0	1	0.001	0.011	0.000	0.000	0.000	0.001	0.003			0.000
	515936	64	108	77	128	139	0.027	0.082	0.024	0.026	0.027	0.003	0.008	0.003	0.002	0.002
	515937	101	30	238	170	223	0.042	0.023	0.075	0.035	0.043	0.004	0.004	0.005	0.003	0.003
	515938	0	0	7	0	0	0.000	0.000	0.002	0.000	0.000			0.001		
	515939	0	0	2	0	11	0.000	0.000	0.001	0.000	0.002			0.001		0.001
	525832	0	16	0	0	0	0.000	0.012	0.000	0.000	0.000		0.003			
	525834	0	0	0	0	20	0.000	0.000	0.000	0.000	0.004					0.001
	525836	177	155	275	258	477	0.074	0.117	0.086	0.053	0.092	0.005	0.009	0.005	0.003	0.004
	525837	0	40	12	145	168	0.000	0.030	0.004	0.030	0.032		0.005	0.001	0.002	0.002
	525901	112	24	72	182	168	0.047	0.018	0.023	0.038	0.032	0.004	0.004	0.003	0.003	0.002
	525902	719	248	606	1,140	1,185	0.300	0.187	0.190	0.235	0.227	0.009	0.011	0.007	0.006	0.006
	525931	510	364	1,000	1,673	1,544	0.213	0.275	0.314	0.345	0.296	0.008	0.012	0.008	0.007	0.006
	525932	0	15	0	36	0	0.000	0.011	0.000	0.007	0.000		0.003		0.001	
		2,396	1,323	3,186	4,851	5,210										
Private	515901	5	10	0	0	0	0.014	0.019	0.000	0.000	0.000	0.006	0.006			
	515902	0	0	0	14	0	0.000	0.000	0.000	0.015	0.000				0.004	
	515903	0	7	0	6	4	0.000	0.013	0.000	0.007	0.004		0.005		0.003	0.002
	515904	0	14	0	0	0	0.000	0.026	0.000	0.000	0.000		0.007			
	515905	0	0	7	2	0	0.000	0.000	0.011	0.002	0.000			0.004	0.001	
	515906	0	0	22	5	6	0.000	0.000	0.033	0.005	0.006			0.007	0.002	0.002
	515907	33	53	39	91	157	0.091	0.100	0.059	0.099	0.151	0.015	0.013	0.009	0.010	0.011
	515908	18	6	1	4	15	0.050	0.011	0.002	0.004	0.014	0.011	0.005	0.002	0.002	0.004
	515931	9	29	11	37	3	0.025	0.055	0.017	0.040	0.003	0.008	0.010	0.005	0.006	0.002
	515932	6	13	6	12	13	0.017	0.024	0.009	0.013	0.013	0.007	0.007	0.004	0.004	0.004
	515933	32	2	29	66	42	0.088	0.004	0.044	0.072	0.040	0.015	0.003	0.008	0.009	0.006
	515934	0	2	1	0	0	0.000	0.004	0.002	0.000	0.000		0.003	0.002		
	515935	23	37	45	35	45	0.063	0.070	0.068	0.038	0.043	0.013	0.011	0.010	0.006	0.006
	515936	65	55	134	194	150	0.179	0.103	0.202	0.211	0.144	0.020	0.013	0.016	0.013	0.011
	515937	46	44	75	143	141	0.127	0.083	0.113	0.156	0.136	0.018	0.012	0.012	0.012	0.011
	515938	3	0	0	0	0	0.008	0.000	0.000	0.000	0.000	0.005				
	515939	0	9	22	0	0	0.000	0.017	0.033	0.000	0.000		0.006	0.007		
	516001	1	0	0	0	0	0.003	0.000	0.000	0.000	0.000	0.003				
	525836	0	81	10	0	6	0.000	0.152	0.015	0.000	0.006		0.016	0.005		0.002
	525837	0	0	8	0	0	0.000	0.000	0.012	0.000	0.000			0.004		
	525901	0	60	22	16	21	0.000	0.113	0.033	0.017	0.020		0.014	0.007	0.004	0.004
	525902	59	45	56	37	108	0.163	0.085	0.084	0.040	0.104	0.019	0.012	0.011	0.006	0.009
	525931	63	65	177	256	329	0.174	0.122	0.266	0.279	0.316	0.020	0.014	0.017	0.015	0.014
		363	532	665	918	1,040										

Appendix C11.-Distribution of halibut effort and harvest by user group and ADF&G statistical area for anglers interviewed at Seward, 1995-1999.

		Number of Angler-Days					Proportion of Angler-Days (p)					SE(p)				
User	Stat Area	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Effort:																
Charter	475931	0	0	0	24	52	0.000	0.000	0.000	0.041	0.034				0.008	0.005
	475932	0	0	0	4	26	0.000	0.000	0.000	0.007	0.017				0.003	0.003
	475933	394	122	57	28	155	0.283	0.310	0.181	0.047	0.101	0.012	0.023	0.022	0.009	0.008
	475934	85	13	48	28	117	0.061	0.033	0.152	0.047	0.076	0.006	0.009	0.020	0.009	0.007
	485931	185	30	50	60	84	0.133	0.076	0.159	0.102	0.055	0.009	0.013	0.021	0.012	0.006
	485932	143	36	35	92	203	0.103	0.091	0.111	0.156	0.133	0.008	0.015	0.018	0.015	0.009
	485933	26	9	21	25	34	0.019	0.023	0.067	0.042	0.022	0.004	0.008	0.014	0.008	0.004
	485934	0	0	0	0	29	0.000	0.000	0.000	0.000	0.019					0.003
	485935	106	26	33	65	131	0.076	0.066	0.105	0.110	0.086	0.007	0.013	0.017	0.013	0.007
	486001	43	14	0	0	32	0.031	0.036	0.000	0.000	0.021	0.005	0.009			0.004
	486002	0	0	0	0	4	0.000	0.000	0.000	0.000	0.003					0.001
	486005	0	0	0	0	6	0.000	0.000	0.000	0.000	0.004					0.002
	495902	8	0	0	0	6	0.006	0.000	0.000	0.000	0.004	0.002				0.002
	495931	0	0	6	17	32	0.000	0.000	0.019	0.029	0.021			0.008	0.007	0.004
	495932	104	39	10	93	211	0.075	0.099	0.032	0.158	0.138	0.007	0.015	0.010	0.015	0.009
	495933	17	0	5	13	0	0.012	0.000	0.016	0.022	0.000	0.003		0.007	0.006	
	495934	13	0	12	22	46	0.009	0.000	0.038	0.037	0.030	0.003		0.011	0.008	0.004
	495935	36	0	0	4	71	0.026	0.000	0.000	0.007	0.046	0.004			0.003	0.005
	495936	0	0	0	5	9	0.000	0.000	0.000	0.008	0.006				0.004	0.002
	495937	0	8	0	0	0	0.000	0.020	0.000	0.000	0.000		0.007			
	495938	156	76	29	89	116	0.112	0.193	0.092	0.151	0.076	0.008	0.020	0.016	0.015	0.007
	495939	0	21	6	5	30	0.000	0.053	0.019	0.008	0.020		0.011	0.008	0.004	0.004
	496001	0	0	0	0	5	0.000	0.000	0.000	0.000	0.003					0.001
	496002	12	0	0	0	0	0.009	0.000	0.000	0.000	0.000	0.003				
	505901	0	0	0	0	7	0.000	0.000	0.000	0.000	0.005					0.002
	505903	0	0	0	0	20	0.000	0.000	0.000	0.000	0.013					0.003
	505905	0	0	0	0	5	0.000	0.000	0.000	0.000	0.003					0.001
	505907	0	0	0	0	7	0.000	0.000	0.000	0.000	0.005					0.002
	505909	0	0	0	0	38	0.000	0.000	0.000	0.000	0.025					0.004
	505931	0	0	0	0	17	0.000	0.000	0.000	0.000	0.011					0.003
	505932	66	0	3	16	38	0.047	0.000	0.010	0.027	0.025	0.006		0.006	0.007	0.004
		1,394	394	315	590	1,531										
Military	475933	17	0	0	0	42	0.018	0.000	0.000	0.000	0.073	0.004				0.011
	475934	25	0	0	0	126	0.026	0.000	0.000	0.000	0.219	0.005				0.017
	485931	0	21	0	0	17	0.000	0.045	0.000	0.000	0.030		0.010			0.007
	485932	64	20	0	0	47	0.068	0.043	0.000	0.000	0.082	0.008	0.009			0.011
	485933	0	0	0	15	14	0.000	0.000	0.000	0.024	0.024				0.006	0.006
	485934	0	0	0	0	21	0.000	0.000	0.000	0.000	0.036					0.008
	485935	87	70	52	202	34	0.092	0.150	0.170	0.321	0.059	0.009	0.017	0.022	0.019	0.010
	486001	0	0	0	0	21	0.000	0.000	0.000	0.000	0.036					0.008
	495902	0	22	0	0	0	0.000	0.047	0.000	0.000	0.000		0.010			
	495932	464	223	172	334	131	0.491	0.476	0.564	0.531	0.227	0.016	0.023	0.028	0.020	0.017
	495934	33	4	33	46	74	0.035	0.009	0.108	0.073	0.128	0.006	0.004	0.018	0.010	0.014
	495935	16	18	0	0	0	0.017	0.038	0.000	0.000	0.000	0.004	0.009			
	495936	29	0	12	0	0	0.031	0.000	0.039	0.000	0.000	0.006		0.011		
	495938	86	42	36	32	49	0.091	0.090	0.118	0.051	0.085	0.009	0.013	0.019	0.009	0.012
	496002	5	10	0	0	0	0.005	0.021	0.000	0.000	0.000	0.002	0.007			
	505932	119	38	0	0	0	0.126	0.081	0.000	0.000	0.000	0.011	0.013			
		945	468	305	629	576										

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User	Stat Area	Number of Angler-Days					Proportion of Angler-Days (p)					SE(p)				
		1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Effort:																
Private	475931	0	0	0	0	4	0.000	0.000	0.000	0.000	0.005					0.003
	475933	4	4	4	5	3	0.007	0.017	0.018	0.013	0.004	0.003	0.008	0.009	0.006	0.002
	475934	21	0	0	25	20	0.035	0.000	0.000	0.065	0.026	0.007			0.013	0.006
	476004	0	0	0	0	6	0.000	0.000	0.000	0.000	0.008					0.003
	485932	19	7	2	9	24	0.032	0.029	0.009	0.023	0.031	0.007	0.011	0.006	0.008	0.006
	485933	11	11	14	49	41	0.018	0.046	0.062	0.128	0.052	0.005	0.014	0.016	0.017	0.008
	485934	0	0	4	0	3	0.000	0.000	0.018	0.000	0.004			0.009		0.002
	485935	49	18	23	51	39	0.081	0.075	0.102	0.133	0.050	0.011	0.017	0.020	0.017	0.008
	486001	14	0	0	0	0	0.023	0.000	0.000	0.000	0.000	0.006				
	495931	0	0	0	0	2	0.000	0.000	0.000	0.000	0.003					0.002
	495932	113	42	32	74	259	0.188	0.174	0.142	0.193	0.332	0.016	0.024	0.023	0.020	0.017
	495933	6	0	2	0	2	0.010	0.000	0.009	0.000	0.003	0.004		0.006		0.002
	495934	0	2	0	5	12	0.000	0.008	0.000	0.013	0.015		0.006		0.006	0.004
	495935	12	0	0	4	10	0.020	0.000	0.000	0.010	0.013	0.006			0.005	0.004
	495936	0	5	6	2	5	0.000	0.021	0.027	0.005	0.006		0.009	0.011	0.004	0.003
	495937	0	1	0	0	0	0.000	0.004	0.000	0.000	0.000		0.004			
	495938	249	110	124	142	323	0.414	0.456	0.551	0.371	0.414	0.020	0.032	0.033	0.025	0.018
	495939	0	0	3	0	21	0.000	0.000	0.013	0.000	0.027			0.008		0.006
	496001	0	6	0	0	0	0.000	0.025	0.000	0.000	0.000		0.010			
	496002	98	35	11	17	5	0.163	0.145	0.049	0.044	0.006	0.015	0.023	0.014	0.010	0.003
	505932	6	0	0	0	2	0.010	0.000	0.000	0.000	0.003	0.004				0.002
		602	241	225	383	781										

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		Number of Halibut Kept					Proportion of Halibut Harvest (p)					SE(p)				
User	Stat Area	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Harvest:																
Charter	475931	3	0	0	40	95	0.002	0.000	0.000	0.050	0.043	0.001			0.008	0.004
	475932	0	0	0	4	40	0.000	0.000	0.000	0.005	0.018				0.002	0.003
	475933	598	211	85	36	257	0.400	0.411	0.223	0.045	0.116	0.013	0.022	0.021	0.007	0.007
	475934	86	25	41	52	216	0.057	0.049	0.107	0.065	0.097	0.006	0.010	0.016	0.009	0.006
	485931	306	57	96	105	141	0.205	0.111	0.251	0.132	0.063	0.010	0.014	0.022	0.012	0.005
	485932	148	44	57	139	343	0.099	0.086	0.149	0.174	0.154	0.008	0.012	0.018	0.013	0.008
	485933	9	17	4	25	51	0.006	0.033	0.010	0.031	0.023	0.002	0.008	0.005	0.006	0.003
	485934	0	0	0	0	32	0.000	0.000	0.000	0.000	0.014					0.002
	485935	81	44	30	95	191	0.054	0.086	0.079	0.119	0.086	0.006	0.012	0.014	0.011	0.006
	486001	17	12	0	0	31	0.011	0.023	0.000	0.000	0.014	0.003	0.007			0.002
	486002	0	0	0	0	6	0.000	0.000	0.000	0.000	0.003					0.001
	486005	0	0	0	0	7	0.000	0.000	0.000	0.000	0.003					0.001
	495902	0	0	0	0	1	0.000	0.000	0.000	0.000	0.000					0.000
	495931	0	0	7	13	49	0.000	0.000	0.018	0.016	0.022			0.007	0.004	0.003
	495932	32	50	20	109	185	0.021	0.097	0.052	0.137	0.083	0.004	0.013	0.011	0.012	0.006
	495933	9	0	1	16	2	0.006	0.000	0.003	0.020	0.001	0.002		0.003	0.005	0.001
	495934	5	0	11	26	73	0.003	0.000	0.029	0.033	0.033	0.001		0.009	0.006	0.004
	495935	51	0	0	7	113	0.034	0.000	0.000	0.009	0.051	0.005			0.003	0.005
	495936	0	0	0	7	9	0.000	0.000	0.000	0.009	0.004				0.003	0.001
	495937	0	3	0	0	0	0.000	0.006	0.000	0.000	0.000		0.003			
	495938	97	30	19	86	139	0.065	0.058	0.050	0.108	0.063	0.006	0.010	0.011	0.011	0.005
	495939	0	21	7	7	28	0.000	0.041	0.018	0.009	0.013		0.009	0.007	0.003	0.002
	496001	0	0	0	0	3	0.000	0.000	0.000	0.000	0.001					0.001
	496002	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000					
	505901	0	0	0	0	14	0.000	0.000	0.000	0.000	0.006					0.002
	505903	0	0	0	0	33	0.000	0.000	0.000	0.000	0.015					0.003
	505905	0	0	0	0	3	0.000	0.000	0.000	0.000	0.001					0.001
	505907	0	0	0	0	14	0.000	0.000	0.000	0.000	0.006					0.002
	505909	0	0	0	0	70	0.000	0.000	0.000	0.000	0.031					0.004
	505931	0	0	0	0	34	0.000	0.000	0.000	0.000	0.015					0.003
	505932	54	0	4	31	43	0.036	0.000	0.010	0.039	0.019	0.005		0.005	0.007	0.003
		1,496	514	382	798	2,223										
Military	475933	24	0	0	0	79	0.035	0.000	0.000	0.000	0.110	0.007				0.012
	475934	2	0	0	0	179	0.003	0.000	0.000	0.000	0.248	0.002				0.016
	485931	0	41	0	0	34	0.000	0.081	0.000	0.000	0.047		0.012			0.008
	485932	70	40	0	0	55	0.103	0.079	0.000	0.000	0.076	0.012	0.012			0.010
	485933	0	0	0	15	5	0.000	0.000	0.000	0.026	0.007				0.007	0.003
	485934	0	0	0	0	42	0.000	0.000	0.000	0.000	0.058					0.009
	485935	99	102	18	187	15	0.145	0.202	0.094	0.330	0.021	0.013	0.018	0.021	0.020	0.005
	486001	0	0	0	0	41	0.000	0.000	0.000	0.000	0.057					0.009
	495902	0	23	0	0	0	0.000	0.046	0.000	0.000	0.000		0.009			
	495932	271	225	133	316	121	0.397	0.446	0.696	0.557	0.168	0.019	0.022	0.033	0.021	0.014
	495934	6	6	22	45	89	0.009	0.012	0.115	0.079	0.123	0.004	0.005	0.023	0.011	0.012
	495935	1	24	0	0	0	0.001	0.048	0.000	0.000	0.000	0.001	0.010			
	495936	9	0	10	0	0	0.013	0.000	0.052	0.000	0.000	0.004		0.016		
	495938	14	4	8	4	61	0.021	0.008	0.042	0.007	0.085	0.005	0.004	0.015	0.004	0.010
	496002	0	1	0	0	0	0.000	0.002	0.000	0.000	0.000		0.002			
	505932	186	39	0	0	0	0.273	0.077	0.000	0.000	0.000	0.017	0.012			
		682	505	191	567	721										

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Appendix C11.-Page 4 of 4.

User	Stat Area	Number of Halibut Kept					Proportion of Halibut Harvest (p)					SE(p)				
		1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Harvest:																
Private	475931	0	0	0	0	2	0.000	0.000	0.000	0.000	0.004					0.003
	475933	4	1	8	9	5	0.014	0.009	0.067	0.030	0.010	0.007	0.009	0.023	0.010	0.004
	475934	27	0	0	37	26	0.096	0.000	0.000	0.123	0.051	0.018			0.019	0.010
	476004	0	0	0	0	2	0.000	0.000	0.000	0.000	0.004					0.003
	485932	0	6	3	14	28	0.000	0.056	0.025	0.047	0.055		0.022	0.014	0.012	0.010
	485933	2	10	7	56	44	0.007	0.093	0.059	0.186	0.086	0.005	0.028	0.022	0.022	0.012
	485934	0	0	2	0	1	0.000	0.000	0.017	0.000	0.002			0.012		0.002
	485935	63	19	24	72	45	0.225	0.176	0.202	0.239	0.088	0.025	0.037	0.037	0.025	0.013
	486001	6	0	0	0	0	0.021	0.000	0.000	0.000	0.000	0.009				
	495931	0	0	0	0	4	0.000	0.000	0.000	0.000	0.008					0.004
	495932	48	33	35	47	131	0.171	0.306	0.294	0.156	0.256	0.023	0.045	0.042	0.021	0.019
	495933	9	0	0	0	4	0.032	0.000	0.000	0.000	0.008	0.011				0.004
	495934	0	3	0	10	5	0.000	0.028	0.000	0.033	0.010		0.016		0.010	0.004
	495935	5	0	0	2	7	0.018	0.000	0.000	0.007	0.014	0.008			0.005	0.005
	495936	0	2	1	1	3	0.000	0.019	0.008	0.003	0.006		0.013	0.008	0.003	0.003
	495937	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000					
	495938	89	24	32	48	191	0.318	0.222	0.269	0.159	0.373	0.028	0.040	0.041	0.021	0.021
	495939	0	0	6	0	11	0.000	0.000	0.050	0.000	0.021			0.020		0.006
	496001	0	3	0	0	0	0.000	0.028	0.000	0.000	0.000		0.016			
	496002	15	4	1	5	0	0.054	0.037	0.008	0.017	0.000	0.014	0.018	0.008	0.007	
	505909	0	3	0	0	0	0.000	0.028	0.000	0.000	0.000		0.016			
	505932	12	0	0	0	3	0.043	0.000	0.000	0.000	0.006	0.012				0.003
	505934	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000					
		280	108	119	301	512										

Appendix C12.-Distribution of halibut effort and harvest by user group and ADF&G statistical area for anglers interviewed at Whittier, 1998 and 1999.

		Number of Angler-Days		Proportion of Angler-Days (p)		SE(p)	
User	Stat Area	1998	1999	1998	1999	1998	1999
Distribution of Halibut Effort:							
Charter	466002	0	10	0.000	0.012		0.004
	466003	0	36	0.000	0.043		0.007
	466004	0	30	0.000	0.035		0.006
	466005	0	33	0.000	0.039		0.007
	475933	0	7	0.000	0.008		0.003
	475934	0	6	0.000	0.007		0.003
	476001	0	5	0.000	0.006		0.003
	476003	0	53	0.000	0.063		0.008
	476004	0	6	0.000	0.007		0.003
	476006	0	12	0.000	0.014		0.004
	476007	0	6	0.000	0.007		0.003
	476008	0	95	0.000	0.112		0.011
	476009	4	0	0.030	0.000	0.015	
	476032	21	32	0.156	0.038	0.031	0.007
	476033	18	65	0.133	0.077	0.029	0.009
	476034	0	5	0.000	0.006		0.003
	476101	3	0	0.022	0.000	0.013	
	476102	46	40	0.341	0.047	0.041	0.007
	485932	0	22	0.000	0.026		0.005
	486001	12	67	0.089	0.079	0.025	0.009
	486003	0	6	0.000	0.007		0.003
	486031	0	9	0.000	0.011		0.004
	486033	21	170	0.156	0.201	0.031	0.014
	486034	6	109	0.044	0.129	0.018	0.012
	486100	4	23	0.030	0.027	0.015	0.006
		135	847				
Private	476003	8	2	0.051	0.006	0.018	0.004
	476006	0	2	0.000	0.006		0.004
	476007	0	3	0.000	0.009		0.005
	476008	0	9	0.000	0.028		0.009
	476031	6	0	0.038	0.000	0.015	
	476032	9	12	0.057	0.037	0.019	0.011
	476033	9	52	0.057	0.161	0.019	0.020
	476034	22	8	0.140	0.025	0.028	0.009
	476035	8	0	0.051	0.000	0.018	
	476102	4	8	0.025	0.025	0.013	0.009
	486031	13	10	0.083	0.031	0.022	0.010
	486032	0	5	0.000	0.015		0.007
	486033	25	82	0.159	0.254	0.029	0.024
	486034	35	130	0.223	0.402	0.033	0.027
	486100	18	0	0.115	0.000	0.026	
		157	323				

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		Number of Halibut Kept		Proportion of Halibut Harvest (p)		SE(p)	
User	Stat Area	1998	1999	1998	1999	1998	1999
Distribution of Halibut Harvest:							
Charter	466002	0	14	0.000	0.014		0.004
	466003	0	60	0.000	0.058		0.007
	466004	0	38	0.000	0.037		0.006
	466005	0	43	0.000	0.042		0.006
	475933	0	7	0.000	0.007		0.003
	475934	0	2	0.000	0.002		0.001
	476001	0	8	0.000	0.008		0.003
	476003	0	59	0.000	0.057		0.007
	476004	0	1	0.000	0.001		0.001
	476006	0	7	0.000	0.007		0.003
	476007	0	0	0.000	0.000		
	476008	0	170	0.000	0.165		0.012
	476009	7	0	0.045	0.000	0.017	
	476032	10	17	0.065	0.017	0.020	0.004
	476033	20	92	0.130	0.089	0.027	0.009
	476034	0	2	0.000	0.002		0.001
	476101	2	0	0.013	0.000	0.009	
	476102	73	49	0.474	0.048	0.040	0.007
	485932	0	21	0.000	0.020		0.004
	486001	2	99	0.013	0.096	0.009	0.009
	486003	0	9	0.000	0.009		0.003
	486031	0	8	0.000	0.008		0.003
	486033	31	182	0.201	0.177	0.032	0.012
	486034	8	137	0.052	0.133	0.018	0.011
	486100	1	5	0.006	0.005	0.006	0.002
		154	1,030				
Private	476003	7	4	0.084	0.013	0.031	0.006
	476006	0	1	0.000	0.003		0.003
	476007	0	5	0.000	0.016		0.007
	476008	0	12	0.000	0.039		0.011
	476031	6	0	0.072	0.000	0.029	
	476032	8	14	0.096	0.045	0.033	0.012
	476033	5	43	0.060	0.140	0.026	0.020
	476034	11	3	0.133	0.010	0.037	0.006
	476035	0	0	0.000	0.000		
	476036	0	0	0.000	0.000		
	476102	6	9	0.072	0.029	0.029	0.010
	486031	6	4	0.072	0.013	0.029	0.006
	486032	0	3	0.000	0.010		0.006
	486033	5	89	0.060	0.289	0.026	0.026
	486034	25	121	0.301	0.393	0.051	0.028
	486100	4	0	0.048	0.000	0.024	
		83	308				

Appendix C13.-Distribution of halibut effort and harvest by user group and ADF&G statistical area for anglers interviewed at Valdez, 1995-1999.

		Number of Angler-Days					Proportion of Angler-Days (p)					SE(p)				
User	Stat Area	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Effort:																
Charter	465932	0	0	0	35	33	0.000	0.000	0.000	0.046	0.019				0.008	0.003
	466001	0	9	29	27	9	0.000	0.010	0.025	0.035	0.005		0.003	0.005	0.007	0.002
	466002	134	94	182	67	140	0.131	0.109	0.156	0.087	0.082	0.011	0.011	0.011	0.010	0.007
	466003	82	200	100	46	230	0.080	0.232	0.086	0.060	0.135	0.008	0.014	0.008	0.009	0.008
	466004	169	95	288	113	302	0.166	0.110	0.247	0.147	0.177	0.012	0.011	0.013	0.013	0.009
	466005	67	31	75	58	73	0.066	0.036	0.064	0.075	0.043	0.008	0.006	0.007	0.010	0.005
	466031	9	35	13	4	39	0.009	0.041	0.011	0.005	0.023	0.003	0.007	0.003	0.003	0.004
	466032	83	28	43	7	56	0.081	0.032	0.037	0.009	0.033	0.009	0.006	0.006	0.003	0.004
	466033	85	71	91	15	23	0.083	0.082	0.078	0.020	0.013	0.009	0.009	0.008	0.005	0.003
	466100	44	4	0	8	6	0.043	0.005	0.000	0.010	0.004	0.006	0.002		0.004	0.002
	475932	12	9	50	49	57	0.012	0.010	0.043	0.064	0.033	0.003	0.003	0.006	0.009	0.004
	475933	0	0	0	9	0	0.000	0.000	0.000	0.012	0.000				0.004	
	476001	0	6	6	4	0	0.000	0.007	0.005	0.005	0.000		0.003	0.002	0.003	
	476002	18	61	63	62	46	0.018	0.071	0.054	0.081	0.027	0.004	0.009	0.007	0.010	0.004
	476003	30	22	42	6	169	0.029	0.025	0.036	0.008	0.099	0.005	0.005	0.005	0.003	0.007
	476004	0	6	0	0	0	0.000	0.007	0.000	0.000	0.000		0.003			
	476005	0	15	10	0	0	0.000	0.017	0.009	0.000	0.000		0.004	0.003		
	476007	87	0	77	61	96	0.085	0.000	0.066	0.079	0.056	0.009		0.007	0.010	0.006
	476008	4	33	51	8	161	0.004	0.038	0.044	0.010	0.094	0.002	0.007	0.006	0.004	0.007
	476009	45	0	0	44	149	0.044	0.000	0.000	0.057	0.087	0.006			0.008	0.007
	476031	4	31	9	16	15	0.004	0.036	0.008	0.021	0.009	0.002	0.006	0.003	0.005	0.002
	476032	75	31	13	25	23	0.073	0.036	0.011	0.033	0.013	0.008	0.006	0.003	0.006	0.003
	476033	10	14	6	0	0	0.010	0.016	0.005	0.000	0.000	0.003	0.004	0.002		
	476034	51	39	11	43	0	0.050	0.045	0.009	0.056	0.000	0.007	0.007	0.003	0.008	
	476035	7	29	6	44	80	0.007	0.034	0.005	0.057	0.047	0.003	0.006	0.002	0.008	0.005
	476036	5	0	0	18	0	0.005	0.000	0.000	0.023	0.000	0.002			0.005	
		1,021	863	1,165	769	1,707										
Private	465932	0	0	0	0	10	0.000	0.000	0.000	0.000	0.018					0.006
	466001	0	0	10	0	0	0.000	0.000	0.015	0.000	0.000			0.005		
	466002	13	2	0	9	16	0.027	0.006	0.000	0.030	0.029	0.007	0.004		0.010	0.007
	466003	53	41	39	32	109	0.110	0.113	0.058	0.108	0.195	0.014	0.017	0.009	0.018	0.017
	466004	32	10	14	4	8	0.066	0.028	0.021	0.014	0.014	0.011	0.009	0.006	0.007	0.005
	466005	0	0	8	4	12	0.000	0.000	0.012	0.014	0.021			0.004	0.007	0.006
	466031	30	9	8	16	47	0.062	0.025	0.012	0.054	0.084	0.011	0.008	0.004	0.013	0.012
	466032	67	33	83	37	101	0.138	0.091	0.124	0.125	0.180	0.016	0.015	0.013	0.019	0.016
	466033	163	132	244	31	26	0.337	0.365	0.365	0.105	0.046	0.022	0.025	0.019	0.018	0.009
	466100	65	78	176	94	114	0.134	0.215	0.263	0.318	0.204	0.016	0.022	0.017	0.027	0.017
	475932	0	2	0	0	0	0.000	0.006	0.000	0.000	0.000		0.004			
	476001	0	0	6	0	0	0.000	0.000	0.009	0.000	0.000			0.004		
	476002	5	0	6	5	0	0.010	0.000	0.009	0.017	0.000	0.005		0.004	0.008	
	476003	8	0	0	12	0	0.017	0.000	0.000	0.041	0.000	0.006			0.012	
	476007	0	6	4	0	0	0.000	0.017	0.006	0.000	0.000		0.007	0.003		
	476008	4	0	0	10	0	0.008	0.000	0.000	0.034	0.000	0.004			0.011	
	476009	0	0	7	0	12	0.000	0.000	0.010	0.000	0.021			0.004		0.006
	476031	4	3	5	14	0	0.008	0.008	0.007	0.047	0.000	0.004	0.005	0.003	0.012	
	476032	0	2	22	9	31	0.000	0.006	0.033	0.030	0.055		0.004	0.007	0.010	0.010
	476033	3	13	2	2	0	0.006	0.036	0.003	0.007	0.000	0.004	0.010	0.002	0.005	
	476034	13	25	20	6	6	0.027	0.069	0.030	0.020	0.011	0.007	0.013	0.007	0.008	0.004
	476035	21	6	15	11	68	0.043	0.017	0.022	0.037	0.121	0.009	0.007	0.006	0.011	0.014
	476036	3	0	0	0	0	0.006	0.000	0.000	0.000	0.000	0.004				
		484	362	669	296	560										

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User	Stat Area	Number of Halibut Kept					Proportion of Halibut Harvest (p)					SE(p)				
		1995	1996	1997	1998	1999	1995	1996	1997	1998	1999	1995	1996	1997	1998	1999
Distribution of Halibut Harvest:																
Charter	465932	0	0	0	39	60	0.000	0.000	0.000	0.038	0.026				0.006	0.003
	466001	0	17	49	45	15	0.000	0.016	0.029	0.044	0.006		0.004	0.004	0.006	0.002
	466002	96	177	271	92	221	0.089	0.161	0.158	0.091	0.095	0.009	0.011	0.009	0.009	0.006
	466003	115	239	119	62	240	0.107	0.218	0.070	0.061	0.103	0.009	0.012	0.006	0.008	0.006
	466004	244	142	445	170	455	0.227	0.130	0.260	0.168	0.196	0.013	0.010	0.011	0.012	0.008
	466005	105	62	96	78	86	0.098	0.057	0.056	0.077	0.037	0.009	0.007	0.006	0.008	0.004
	466031	16	27	22	2	53	0.015	0.025	0.013	0.002	0.023	0.004	0.005	0.003	0.001	0.003
	466032	103	37	41	5	62	0.096	0.034	0.024	0.005	0.027	0.009	0.005	0.004	0.002	0.003
	466033	73	57	128	9	18	0.068	0.052	0.075	0.009	0.008	0.008	0.007	0.006	0.003	0.002
	466100	4	0	0	0	2	0.004	0.000	0.000	0.000	0.001	0.002				0.001
	475932	11	17	91	94	92	0.010	0.016	0.053	0.093	0.040	0.003	0.004	0.005	0.009	0.004
	475933	0	0	0	9	0	0.000	0.000	0.000	0.009	0.000				0.003	
	476001	0	9	7	8	0	0.000	0.008	0.004	0.008	0.000		0.003	0.002	0.003	
	476002	32	118	117	102	89	0.030	0.108	0.068	0.101	0.038	0.005	0.009	0.006	0.009	0.004
	476003	29	14	73	11	160	0.027	0.013	0.043	0.011	0.069	0.005	0.003	0.005	0.003	0.005
	476004	0	12	0	0	0	0.000	0.011	0.000	0.000	0.000		0.003			
	476005	0	30	17	0	0	0.000	0.027	0.010	0.000	0.000		0.005	0.002		
	476007	72	0	134	61	124	0.067	0.000	0.078	0.060	0.053	0.008		0.006	0.007	0.005
	476008	8	50	61	3	264	0.007	0.046	0.036	0.003	0.114	0.003	0.006	0.005	0.002	0.007
	476009	49	0	0	51	267	0.046	0.000	0.000	0.050	0.115	0.006			0.007	0.007
	476031	3	20	16	21	28	0.003	0.018	0.009	0.021	0.012	0.002	0.004	0.002	0.005	0.002
	476032	41	22	12	43	17	0.038	0.020	0.007	0.042	0.007	0.006	0.004	0.002	0.006	0.002
	476033	5	15	0	0	0	0.005	0.014	0.000	0.000	0.000	0.002	0.004			
	476034	60	25	12	40	0	0.056	0.023	0.007	0.039	0.000	0.007	0.005	0.002	0.006	
	476035	8	6	1	52	69	0.007	0.005	0.001	0.051	0.030	0.003	0.002	0.001	0.007	0.004
	476036	1	0	0	17	0	0.001	0.000	0.000	0.017	0.000	0.001			0.004	
		1,075	1,096	1,712	1,014	2,322										
Private	465932	0	0	0	0	10	0.000	0.000	0.000	0.000	0.026					0.008
	466001	0	0	8	0	0	0.000	0.000	0.019	0.000	0.000			0.007		
	466002	19	1	0	14	7	0.049	0.006	0.000	0.072	0.018	0.011	0.006		0.019	0.007
	466003	54	23	46	31	70	0.139	0.131	0.111	0.160	0.183	0.018	0.026	0.015	0.026	0.020
	466004	51	18	23	5	15	0.131	0.102	0.055	0.026	0.039	0.017	0.023	0.011	0.011	0.010
	466005	0	0	9	0	9	0.000	0.000	0.022	0.000	0.023			0.007		0.008
	466031	19	6	5	6	30	0.049	0.034	0.012	0.031	0.078	0.011	0.014	0.005	0.012	0.014
	466032	83	26	62	32	116	0.213	0.148	0.149	0.165	0.303	0.021	0.027	0.018	0.027	0.024
	466033	97	58	138	8	14	0.249	0.330	0.333	0.041	0.037	0.022	0.036	0.023	0.014	0.010
	466100	14	9	29	38	38	0.036	0.051	0.070	0.196	0.099	0.009	0.017	0.013	0.029	0.015
	475932	0	0	0	0	0	0.000	0.000	0.000	0.000	0.000					
	476001	0	0	12	0	0	0.000	0.000	0.029	0.000	0.000			0.008		
	476002	3	0	9	10	0	0.008	0.000	0.022	0.052	0.000	0.005		0.007	0.016	
	476003	5	0	0	3	0	0.013	0.000	0.000	0.015	0.000	0.006			0.009	
	476007	0	3	5	0	0	0.000	0.017	0.012	0.000	0.000		0.010	0.005		
	476008	7	0	0	9	0	0.018	0.000	0.000	0.046	0.000	0.007			0.015	
	476009	0	0	14	0	13	0.000	0.000	0.034	0.000	0.034			0.009		0.009
	476031	8	5	8	9	0	0.021	0.028	0.019	0.046	0.000	0.007	0.012	0.007	0.015	
	476032	0	2	20	14	17	0.000	0.011	0.048	0.072	0.044		0.008	0.011	0.019	0.010
	476033	3	3	3	3	0	0.008	0.017	0.007	0.015	0.000	0.005	0.010	0.004	0.009	
	476034	7	15	17	2	10	0.018	0.085	0.041	0.010	0.026	0.007	0.021	0.010	0.007	0.008
	476035	18	7	7	10	34	0.046	0.040	0.017	0.052	0.089	0.011	0.015	0.006	0.016	0.015
	476036	1	0	0	0	0	0.003	0.000	0.000	0.000	0.000	0.003				
		389	176	415	194	383										

Appendix C14.-Distribution of halibut effort and harvest by user group and ADF&G statistical area for anglers interviewed at Cordova, 1999.

User	Stat Area	Number of Angler-Days 1999	Proportion of Angler-Days (p) 1999	SE(p) 1999
Distribution of Halibut Effort:				
Charter	456002	0	0.000	
	456003	6	0.044	0.018
	456031	29	0.215	0.035
	456032	22	0.163	0.032
	466003	4	0.030	0.015
	466031	70	0.519	0.043
	466033	4	0.030	0.015
		135		
Private	456002	3	0.010	0.006
	456003	2	0.007	0.005
	456031	37	0.128	0.020
	456032	203	0.705	0.027
	466003	0	0.000	
	466031	40	0.139	0.020
	466033	3	0.010	0.006
		288		

User	Stat Area	Number of Halibut Kept 1999	Proportion of Halibut Harvest (p) 1999	SE(p) 1999
Distribution of Halibut Harvest:				
Charter	456002	0	0.000	
	456003	4	0.041	0.020
	456031	21	0.216	0.042
	456032	8	0.082	0.028
	466003	3	0.031	0.018
	466031	61	0.629	0.049
	466033	0	0.000	
		97		
Private	456002	0	0.000	
	456003	0	0.000	
	456031	20	0.122	0.026
	456032	98	0.598	0.038
	466003	0	0.000	
	466031	42	0.256	0.034
	466033	4	0.024	0.012
		164		

Note: No interviews were conducted in Cordova in 1995-1998.