

Fishery Data Series No. 01-2

**Assessment of the Recreational Marine Fisheries in
Eastern Prince William Sound, 1999**

by

Matt G. Miller

February 2001

Alaska Department of Fish and Game

Division of Sport Fish



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Weights and measures (metric)		General		Mathematics, statistics, fisheries	
centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	H_A
deciliter	dL	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
gram	g	and	&	catch per unit effort	CPUE
hectare	ha	at	@	coefficient of variation	CV
kilogram	kg	Compass directions:		common test statistics	F, t, χ^2 , etc.
kilometer	km	east	E	confidence interval	C.I.
liter	L	north	N	correlation coefficient	R (multiple)
meter	m	south	S	correlation coefficient	r (simple)
metric ton	mt	west	W	covariance	cov
milliliter	ml	Copyright	©	degree (angular or temperature)	°
millimeter	mm	Corporate suffixes:		degrees of freedom	df
Weights and measures (English)		Company	Co.	divided by	÷ or / (in equations)
cubic feet per second	ft ³ /s	Corporation	Corp.	equals	=
foot	ft	Incorporated	Inc.	expected value	E
gallon	gal	Limited	Ltd.	fork length	FL
inch	in	et alii (and other people)	et al.	greater than	>
mile	mi	et cetera (and so forth)	etc.	greater than or equal to	≥
ounce	oz	exempli gratia (for example)	e.g.,	harvest per unit effort	HPUE
pound	lb	id est (that is)	i.e.,	less than	<
quart	qt	latitude or longitude	lat. or long.	less than or equal to	≤
yard	yd	monetary symbols (U.S.)	\$, ¢	logarithm (natural)	ln
Spell out acre and ton.		months (tables and figures): first three letters	Jan,...,Dec	logarithm (base 10)	log
Time and temperature		number (before a number)	# (e.g., #10)	logarithm (specify base)	log ₂ , etc.
day	d	pounds (after a number)	# (e.g., 10#)	mideye-to-fork	MEF
degrees Celsius	°C	registered trademark	®	minute (angular)	'
degrees Fahrenheit	°F	trademark	™	multiplied by	x
hour (spell out for 24-hour clock)	h	United States (adjective)	U.S.	not significant	NS
minute	min	United States of America (noun)	USA	null hypothesis	H_0
second	s	U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	percent	%
Spell out year, month, and week.				probability	P
Physics and chemistry				probability of a type I error (rejection of the null hypothesis when true)	α
all atomic symbols				probability of a type II error (acceptance of the null hypothesis when false)	β
alternating current	AC			second (angular)	"
ampere	A			standard deviation	SD
calorie	cal			standard error	SE
direct current	DC			standard length	SL
hertz	Hz			total length	TL
horsepower	hp			variance	Var
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY DATA SERIES NO. 01-2

**ASSESSMENT OF THE RECREATIONAL MARINE FISHERIES IN
EASTERN PRINCE WILLIAM SOUND, 1999**

by

Matt G. Miller
Division of Sport Fish, Cordova

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599

February 2001

This investigation was partially financed by the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K) under Project F-10-15, Job No. B-2-3.

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Matt G. Miller

*Alaska Department of Fish and Game, Division of Sport Fish
P.O. Box 669, Cordova, AK 99574-0669, USA*

This document should be cited as:

Miller, M. 2001. Assessment of the recreational marine fisheries in eastern Prince William Sound, 1999. Alaska Department of Fish and Game, Fishery Data Series No. 01-2, Anchorage.

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ABSTRACT

A creel survey was conducted in 1999 to estimate harvest and effort in the Simpson Bay and Sheep Bay fisheries of eastern Prince William Sound. A pilot study was also conducted to determine the need to expand current groundfish catch sampling to the port of Cordova. Unguided clients in floating lodges and tent camps were thought to account for a significant percent of the angler effort in the marine waters of eastern Prince William Sound. Since these anglers do not return to port after each trip, a port-based survey would not encounter them. A dual survey design, with marine interviews and survey cards, was used to collect harvest and effort data from these anglers.

Of the 843 anglers that were interviewed, 63% were lodge anglers, 22% were unguided anglers, and 16% were guided anglers. Lodge anglers fished an estimated 1,419 (SE = 81) angler-days from 27 June through 31 August 1999 and harvested an estimated 320 (SE = 63) rockfish *Sebastes*, of which 152 (SE = 35) were non-pelagic. Their estimated coho salmon *Oncorhynchus kisutch* harvest was 502 (SE = 92) fish.

Key words: eastern Prince William Sound, rockfish, *Sebastes*, Pacific halibut, *Hippoglossus stenolepis*, coho salmon, *Oncorhynchus kisutch*, chinook salmon, *Oncorhynchus tshawytscha*, lingcod, *Ophiodon elongatus*, salmon shark, *Lamna ditropis*, pink salmon, *Oncorhynchus gorbuscha*, marine creel survey, guided, unguided, lodge angler, port sampling, catch, harvest, effort, angler success.

INTRODUCTION

Eastern Prince William Sound (PWS) consists of marine waters near Cordova, such as Orca Inlet, Orca Bay, Port Gravina, Sheep Bay and Simpson Bay; these are Alaska Department of Fish and Game (ADF&G) groundfish statistical areas 466031, 456031, and 456032 (Figures 1 and 2). Recreational fisheries in this area have grown significantly since the late 1980s (Table 1, Figure 3). Sport fishing effort, harvest and catch in eastern PWS are estimated through the annual Statewide Harvest Survey (SWHS; Mills 1987-1994; Howe et al. 1995 and 1996, *In prep* a, b, c, and d). However, these are minimums for eastern PWS because estimates are published for Orca Inlet only. Response rates for other marine sites in eastern PWS, such as Sheep and Simpson bays, are too low to generate reliable estimates and are lumped into an “other” category for all of Prince William Sound.

Following the 1989 *Exxon Valdez* oil spill cleanup, effort expended by sport anglers in marine waters of eastern PWS increased because of awareness of angling opportunities in the area (Table 1 and Figure 3). Angler effort has fluctuated between 7,000 and 10,500 angler-days since then. The primary species harvested in eastern PWS are halibut *Hippoglossus stenolepis*, rockfish *Sebastes*, and salmon, particularly coho salmon *Oncorhynchus kisutch*. Halibut harvests have averaged about 3,000 fish for 1995–1999; rockfish harvests (all species combined) have fluctuated widely, from 644 fish in 1995 to 1,713 fish in 1996; and marine harvests of coho salmon averaged about 1,600 fish, ranging from 1,072 fish in 1998 to 1,973 fish in 1999 (Howe et al. 1996, *In prep* a, b, c, and d [Sport Fish intranet site final estimates as of 11/16/00]). Total harvests of these species in eastern PWS is greater because estimates are available for Orca Inlet only and do not include such sites as Sheep and Simpson bays. Other species harvested include flounder, pollock, cod, and sharks.

Although effort and harvest of most species as reported in the SWHS have remained relatively stable over the last few years, fishery managers anticipate increases in sport fishing in eastern PWS. Examination of responses from sites such as Port Gravina, Sheep Bay and Simpson Bay, sites with response rates that are too low to generate published estimates for the SWHS, indicates that effort, catch and harvest are increasing, probably due to the rise in promotion of recreational fishing opportunities around the port of Cordova in recent years.

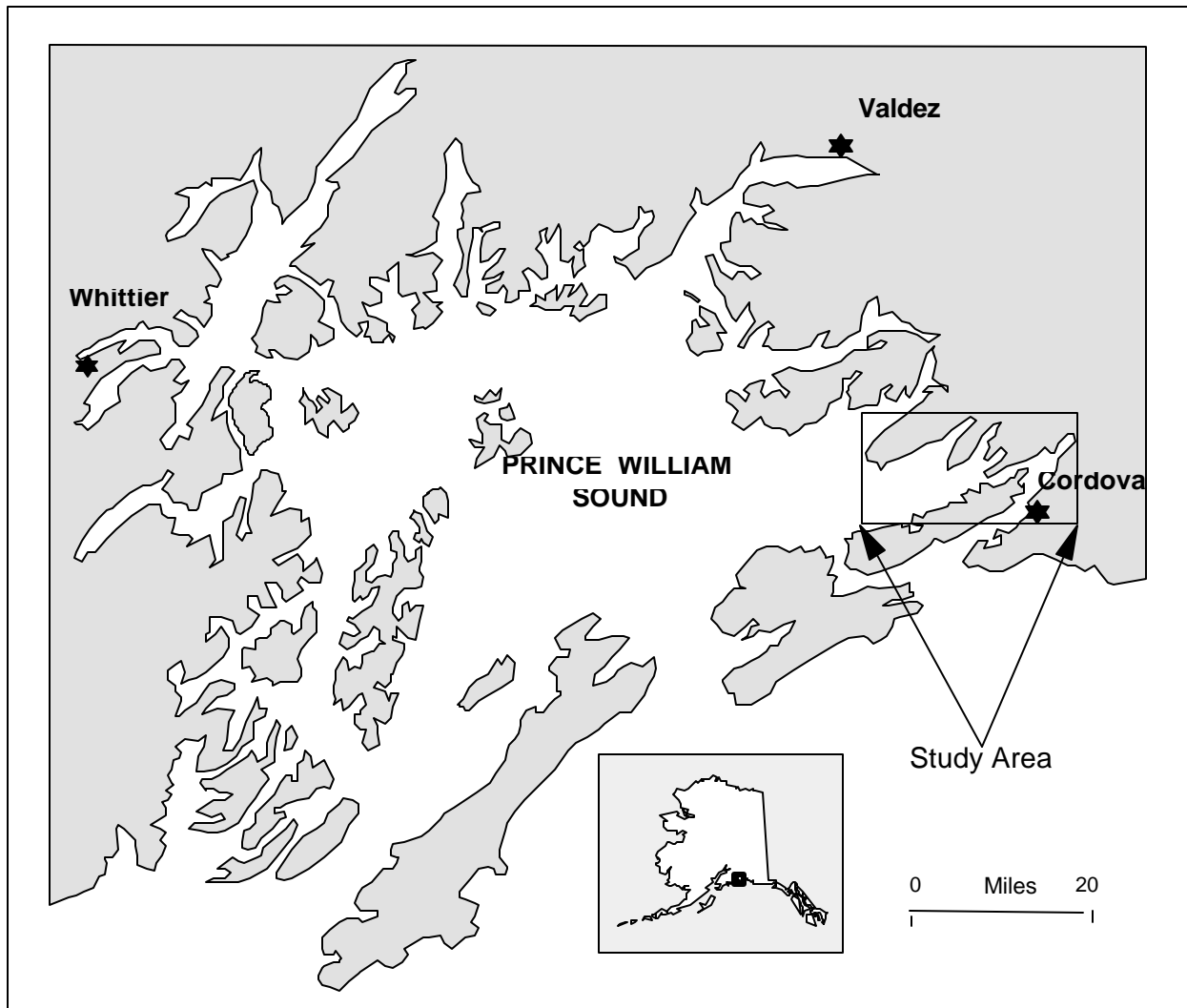


Figure 1.-Map of Prince William Sound and location of the study area, 1999.

The Cordova-area Advisory Committee has recently expressed concern about the expansion of “floating lodges” in eastern PWS. Outfitters have established these floating lodges based out of houseboats anchored in the bays near Cordova. These houseboats, along with leased cabins and Weatherport camps, were operating on 14 sites in Sheep and Simpson bays (Figure 2) during 1999. Each camp can accommodate up to six guests who generally stay for 3 days or a week.

Of increasing concern are possible effects of concentrated angling effort from lodges on resident demersal rockfish species. Although rockfish are seldom targeted, non-pelagic rockfish populations can be vulnerable to mortality due to incidental bycatch from anglers targeting Pacific halibut. Another concern is that the floating lodges can move closer to various salmon spawning streams during the season. Throughout PWS, runs of wild coho salmon are generally small and widespread. Concentrated angling effort and harvest on any one stream, such as

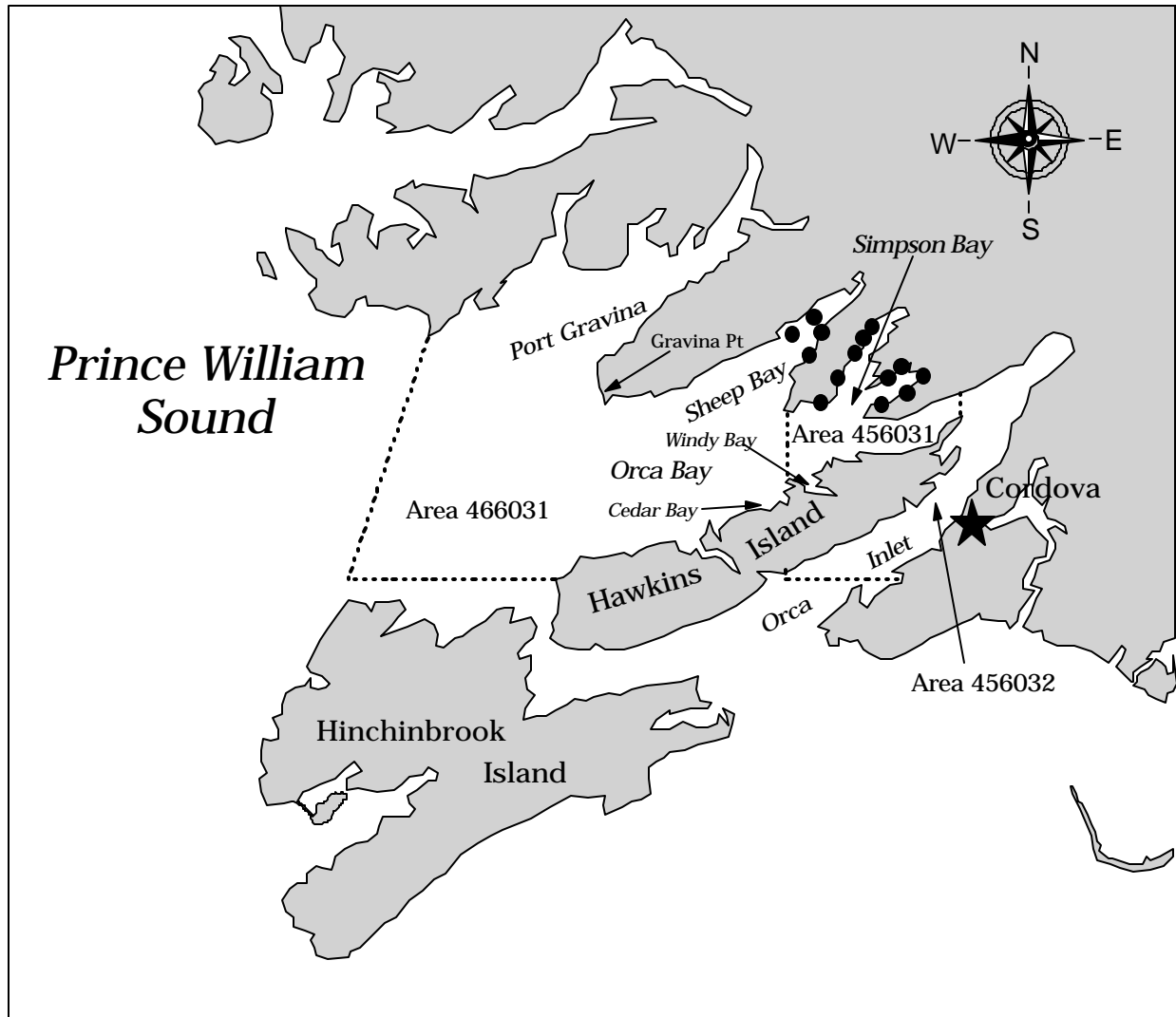


Figure 2.-Schematic map of the eastern Prince William Sound study area, ADF&G groundfish statistical areas, and lodge sites (dark circles), 1999.

Milton Creek at the head of Simpson Bay, could result in weak escapement and poor future returns.

The number of operators offering sport fishing charters out of Cordova is also increasing. Besides catering to visitors who come to Cordova by plane or on the Marine Highway System, charter operators have also targeted cruise ship passengers. In 1998, two different cruise lines added Cordova as a port-of-call and charter operators have taken advantage of this opportunity to coordinate with cruise schedules to offer half-day fishing trips.

Presently the only data available for managing recreational fisheries in eastern PWS come from the SWHS and a port sampling program in Valdez. Although the SWHS has proven to be a useful tool in describing large fisheries or areas, it is not particularly effective for specific sites.

Likewise, the port sampling program in Valdez gives managers valuable information regarding groundfish harvests in PWS, but these data are not necessarily representative of marine fisheries in all PWS waters. Moreover, a comparison of SWHS data and port sampling data collected in Valdez indicates that there is a significant harvest of non-pelagic rockfish in PWS not accounted for by the charter operations out of Valdez. One potential source of this non-pelagic harvest is from the floating lodge operations and other fisheries in eastern PWS.

To ensure that recent sport fishery developments in the Cordova and eastern PWS area are compatible with management objectives for the area, a marine creel survey of the eastern PWS fisheries was initiated, along with a pilot study to determine if the current Sport Fish Division catch sampling program for groundfish should be expanded to include Cordova.

Table 1.-Angler-days of effort in marine waters of Orca Inlet, eastern Prince William Sound, 1986–1999.

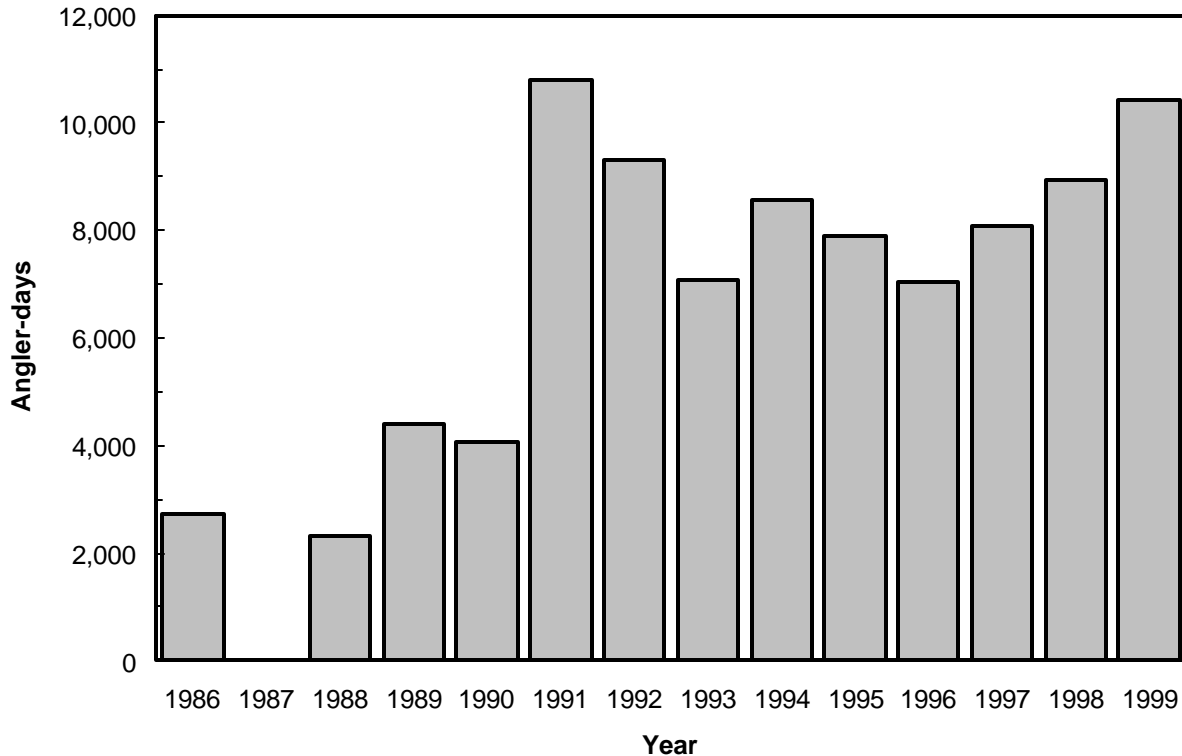
Year	Effort (Angler-days) ^a
1986	2,721
1987	
1988	2,310
1989	4,397
1990	4,071
1991	10,799
1992	9,314
1993	7,079
1994	8,559
1995	7,906
1996 ^b	7,038
1997 ^b	8,086
1998 ^b	8,958
1999 ^c	10,433

Source: Statewide Harvest Survey; Mills 1987-1994; Howe et al. 1995 and 1996, *In prep* a, b, c, and d.

^a Boat and shoreline, salt water only. Absence of an estimate does not mean there was no sport fishing, but that response rate for the location was too low in that year to generate a reliable estimate. Total effort for the Cordova area and eastern PWS is greater because sites with less effort, such as Sheep and Simpson bays, are lumped in an "other" category not included here.

^b Estimates presented here are revised estimates.

^c Final estimates obtained from Sport Fish Intranet site as of 11/16/00.



Notes: Statewide Harvest Survey; Mills 1987-1994; Howe et al. 1995 and 1996, *In prep a, b, c and d*. Boat and shoreline, salt water only. Absence of an estimate does not mean there was no sport fishing, but that response rate for the location was too low in that year to generate a reliable estimate. Total effort for the Cordova area and eastern PWS is greater because sites with less effort, such as Sheep and Simpson bays, are lumped in an "other" category not included here. Estimates presented for 1996-1998 are revised estimates. Final estimates for 1999 obtained from Sport Fish Intranet site as of 11/16/00.

Figure 3.-Angler-days of effort in marine waters of Orca Inlet, eastern Prince William Sound, 1986–1999.

STUDY OBJECTIVES

Objectives for the 1999 study were to:

1. Estimate harvest and effort by angler type in the Sheep Bay, Simpson Bay, and Orca Inlet areas of eastern Prince William Sound using a marine creel survey; and
2. Estimate groundfish harvest and effort in eastern Prince William Sound using a port sampling survey in Cordova.

METHODS

MARINE CREEL SURVEY

A marine creel survey was designed to sample all user groups in eastern PWS, including recreational anglers from the floating lodges (lodge anglers) that would not be included in a port-based creel survey. The study area consisted of the marine waters of groundfish statistical areas

456032 (Orca Inlet), 456031 (Simpson Bay area), and area 466031 east of Gravina Point and Cedar Bay (Sheep Bay area) (Figure 2). Interviews were conducted every 3 days from 16 June through 31 August 1999 (Appendix A1). Working from a 22 ft boat, technicians interviewed as many anglers as possible within the survey area. All anglers, whether they were actively fishing or not, were sampled. Effort, catch, and harvest by species were recorded for each angler (Appendix B1).

Most anglers (> 97%) were still fishing at the time of interview. In order to collect completed interview data, anglers were given a survey card (Appendix C1). Each self-addressed, stamped card was dated and labeled to correspond to a specific angler interview. Anglers were asked to take time at the end of the day to record on the card their catch and harvest for that day, the date, and their name and address which provided information about whether they were Alaskan residents or out-of-state residents. Since a high return rate for cards was needed to ensure an adequate number of completed-trip interviews, an incentive of a specially-designed baseball-style hat was offered to anglers who returned their cards.

Marine interviews were from three types of anglers: guided, unguided, and lodge anglers. Because of the nature of the fishery, nearly all lodge anglers could be sampled on any given day (Figure 2). Therefore data from the lodge anglers were analyzed as an access-point survey and estimates of total catch and harvest obtained (Bernard et al. 1998: equations 2.1 and 2.5). Dates of inference for the survey estimates are from 27 June through 31 August 1999, because cards were not consistently issued until 28 June. An unknown fraction of guided and unguided anglers were interviewed on any given day of the survey; therefore, estimates for total catch and harvest were not calculated for these components of the fishery.

Data collected from the marine interviews allowed angler success (mean catch per day, mean harvest per day) to be estimated for lodge anglers only. Estimates of angler success for guided and unguided anglers were subject to bias because the probability of being interviewed depended on trip length, and generally angler success is related to trip length. Therefore angler success estimates for guided and unguided anglers from the marine interviews were not reported.

CORDOVA PORT SAMPLING

A pilot study of port sampling was conducted in the Cordova small boat harbor. Port sampling was scheduled on days when marine interviews were not conducted, and followed the procedures described by Meyer (1992). Anglers returning to port from 1500-2100 hours were interviewed regardless of fishing success. The following data were recorded for each angler: time of interview, hours fished, angler class (guided or unguided), groundfish statistical area(s) fished, target species, and the number and species of fish caught and released. Age, weight, and length data were collected from harvested halibut, lingcod *Ophiodon elongatus* and rockfish.

Since anglers interviewed during port sampling had finished fishing for the day, angler success could be estimated for guided and unguided anglers. Success rates for guided and unguided anglers obtained from port sampling were then compared to lodge angler success obtained from marine interviews. Total effort, catch and harvest could not be estimated from port sampling interviews because an unknown fraction of anglers was not interviewed during the survey. Species composition and biological data from the Cordova port sampling will be published in a separate report with data from other port sampling studies.

DATA ANALYSIS

Angler effort and harvest by fish species was estimated using marine interview data according to Bernard et al. (1998; section 2.1 and equations 2.1 and 2.5). The total number of personal onsite interviews (along with refusals to be interviewed) during each day of the fishery represents the "count" of anglers (M_{hi} in Bernard et al. 1998). The total number of angler survey cards returned for each sampled day represents the number of anglers interviewed (m_{hi}). The systematic form of the between-day variance equation was used to apply the procedures outlined in equation 2.5 of Bernard et al. (1998). Computer files and software used to produce this report can be found in Appendix D1.

RESULTS

MARINE CREEL SURVEY

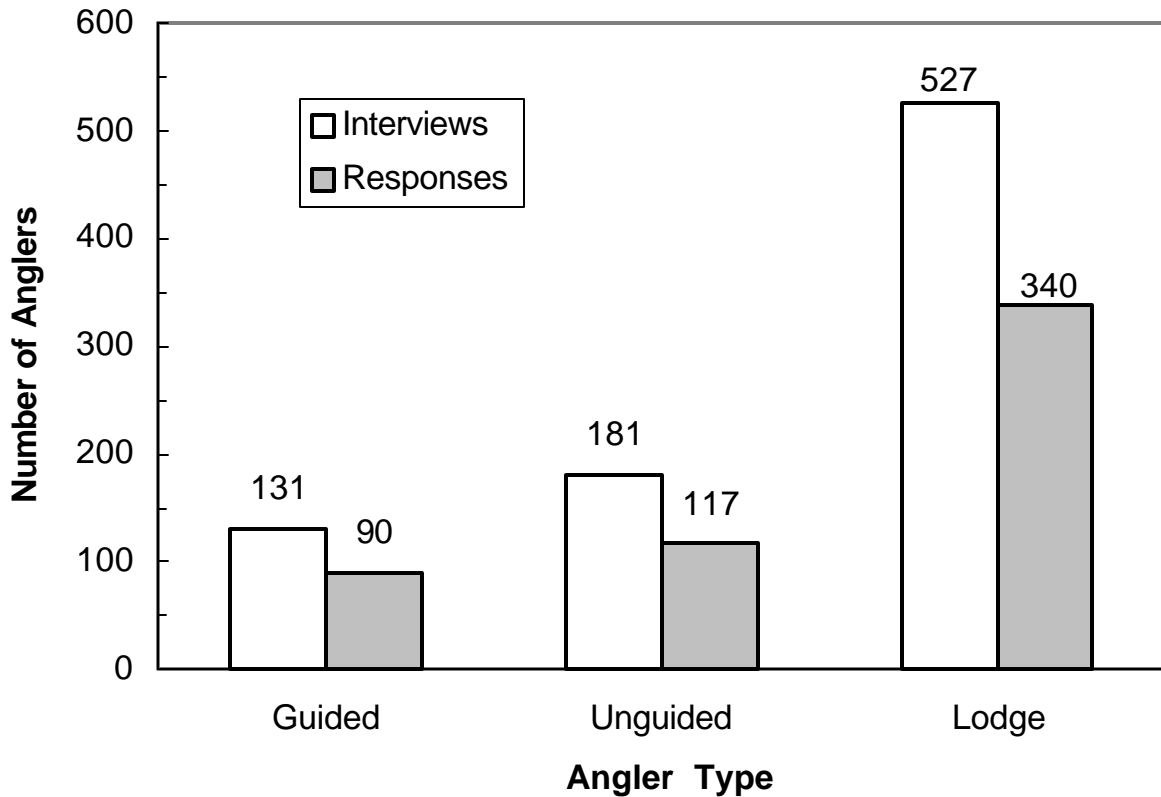
From 16 June through 31 August 1999, twenty-six days of sampling were conducted in eastern PWS. In that period 843 anglers were contacted and interviewed, of which 18 had completed fishing at the time of interview. Complete information could not be obtained from four anglers out of all those contacted. The number of interviews conducted per day ranged from 16 to 62. A total of 776 mail-in survey cards were given to anglers between 25 June and 31 August, of which 570 (73%) were returned. Response rate was similar ($\chi^2 = 0.645$, $df = 2$, $P = 0.72$) among angler types, with 65% for lodge anglers, 69% for guided anglers, and 65% for unguided anglers (Figure 4). Twenty-three of the returned cards could not be used in the analysis because they were filled out incorrectly or incompletely.

Over 47% of the interviews consisted of anglers that had fished in the Simpson Bay area (Figure 5). The rest of the interviews were distributed between the Sheep Bay (31%) and Orca Inlet (22%) areas. The high percentage of interviews from the Simpson Bay area can largely be attributed to the presence of 10 lodge sites in that area (Figure 2). This distribution of interviews by area is also reflected in the distribution of angler interviews by user group. Of the anglers that were interviewed, 527 (63%) were lodge anglers (Figure 4). Unguided anglers made up 21% of the interviews; the remainder (16%) were guided anglers.

Since a high percentage of lodge anglers were interviewed on a given day, the number of lodge-angler interviews was equivalent to the number of lodge angler-days fished. Lodge anglers fished for an estimated 1,419 angler-days ($SE = 81$) from 27 June through 31 August. Angler effort increased over the summer (Figure 6). The total number of days fished by guided and unguided anglers could not be estimated from the marine creel survey because the fraction of anglers interviewed versus not interviewed was unknown.

Unguided, guided, and lodge anglers targeted different fish species ($\chi^2 = 138$, $df = 8$, $P < 0.001$; Table 2; Figure 7). About half of lodge anglers targeted salmon only or salmon and groundfish, compared to only 10%-12% of guided and unguided anglers (Figure 7).

Lodge anglers caught an estimated 902 halibut ($SE = 114$); 487 rockfish ($SE = 78$); 6,351 pink salmon *O. gorbuscha* ($SE = 828$); and 618 coho salmon ($SE = 117$) from 27 June through 31 August (Table 3, Figure 8). They kept an estimated 461 halibut ($SE = 55$); 320 rockfish ($SE = 63$); 1,727 pink salmon ($SE = 254$); and 502 coho salmon ($SE = 92$).



Note: Angler type was not recorded for four interviewed anglers.

Figure 4.-Number of marine interviews and responses by user group, eastern Prince William Sound, 1999.

PORT SAMPLING

A total of 464 completed interviews were conducted in the Cordova boat harbor as part of the groundfish sampling project. These interviews comprised guided (33%) and unguided (67%) anglers. Lodge anglers were not represented in the port sampling interviews.

Of the anglers interviewed in port, about 58% (88) of guided anglers were targeting halibut only, and 24% (37) were targeting any kind of groundfish (i.e. halibut, rockfish, flounder; Figure 9). About 85% (263) of unguided anglers were targeting halibut only and 5% (14) were targeting any kind of groundfish (Figure 9). For both guided and unguided anglers, the remainder reported they were targeting some other species or combination of species.

The majority of the catch (68%) reported in the port sampling interviews was halibut (Figure 10). A significant percent consisted of salmon, with coho accounting for 10% of the total catch and pink salmon 9%. Pelagic and non-pelagic rockfish accounted for 8% of the fish caught by anglers interviewed in the port.

Total effort, catch, and harvest could not be estimated from port sampling data. However, angler success as measured by mean catch or harvest per day divided by the number of anglers targeting that species was estimated and can be compared to lodge angler success obtained from marine

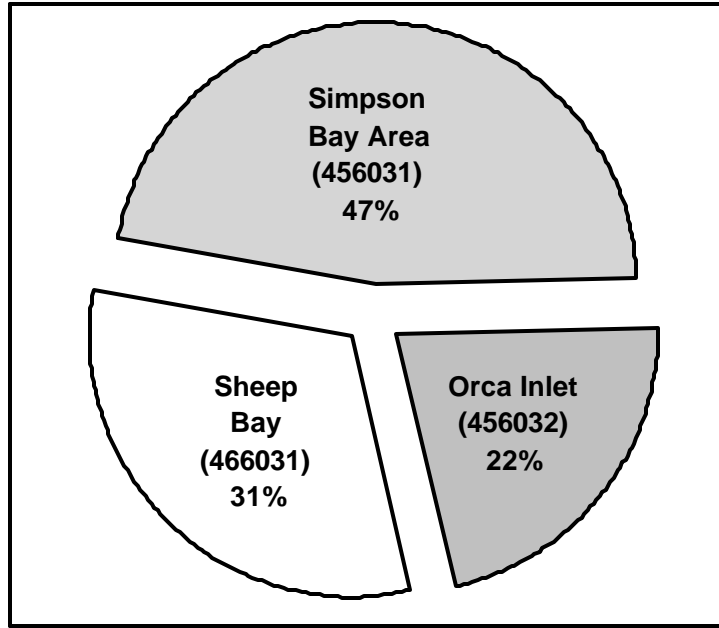


Figure 5.-Percent of marine interviews from each of three areas within the eastern Prince William Sound study area, 1999.

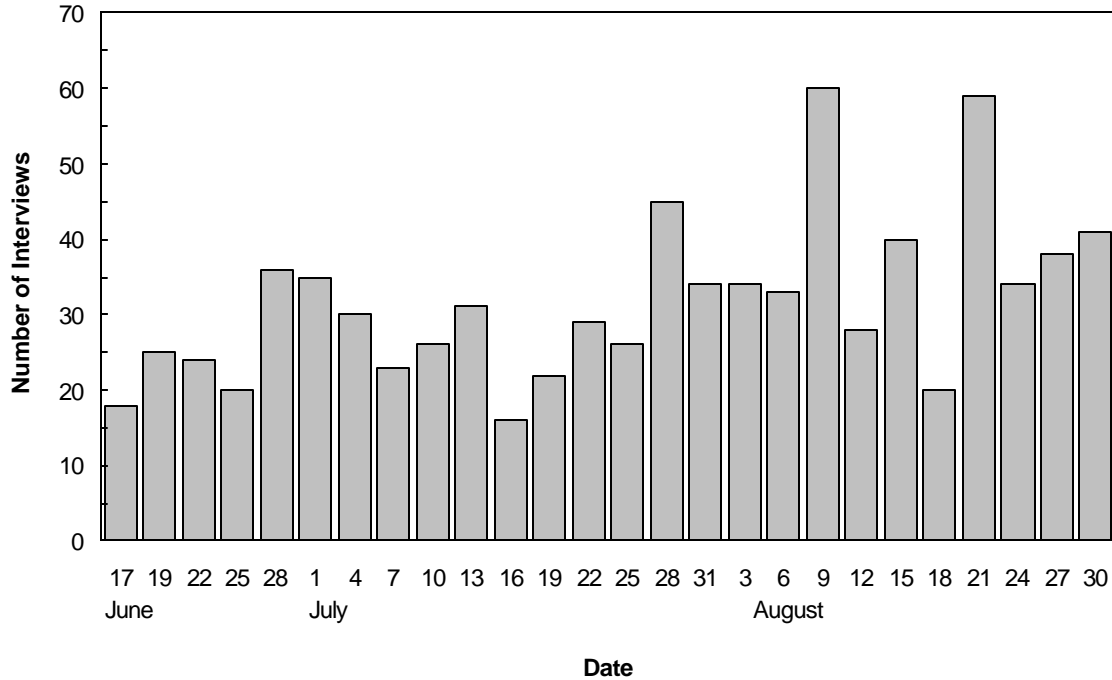


Figure 6.-Number of marine interviews (all angler types) by survey date, Prince William Sound, 1999.

Table 2.-Number of interviewed anglers by target species and user group as reported from marine interviews, 1999.

	Salmon Only	Groundfish Only	Halibut Only	Sharks Only	Salmon & Groundfish	Total
Guided	0	12	61	6	11	90
Unguided	6	16	76	0	4	102
Lodge	80	15	103	0	47	245
Totals	86	43	240	6	62	437

interviews. Based on this comparison, guided anglers were more successful at catching coho salmon, and guided and unguided anglers were generally more successful than lodge anglers at catching halibut (Table 4, Figure 11).

DISCUSSION

The dual interview study design of this project, which used marine interviews and follow-up survey cards, was the first of its kind in PWS. A harvest and effort study was conducted in ports and other key sites in PWS (Roth 1990), but this represents the first attempt to survey the marine fisheries of eastern PWS. The 843 interviews conducted over the study period were considerably higher (59%) than the anticipated 500 interviews. The return rate of the survey cards (73% returned) was also greater than anticipated.

The marine interviews provided data on geographic distribution of recreational fishing effort and user group composition in eastern PWS. Because of the high contact rate with lodge anglers and an excellent return rate of survey cards, it was also possible to estimate effort, catch, harvest, and species composition of the catch and harvest for lodge anglers.

There are probably several reasons for the wide variation in target species among users. First, pink salmon returns were very strong throughout PWS in 1999. Although anglers were not asked to specify which species of salmon they were targeting, the high catch of pink salmon by lodge anglers (Table 3) suggests a large proportion of angling effort was aimed at pink salmon. Strong pink salmon returns to Koppen and Sheep creeks at the head of Sheep Bay, and Milton Creek at the head of Simpson Bay, attracted lodge anglers from both areas. Another factor may have been differences in state of residency. Almost all lodge anglers (96%) were non-Alaska residents, compared to only 46% of boat anglers. Although unguided out-of-state anglers travel great distances for the opportunity to catch Alaska salmon in a wilderness setting, most Alaskans would probably not travel to Cordova to fish for pink salmon exclusively. Charter operators out of Cordova advertise halibut charters primarily, and those offering salmon trips in the marine waters of eastern PWS usually target coho and chinook salmon *O. tshawytscha*. In the port survey, salmon were only targeted by 5% of the anglers, and in the marine survey no guided anglers reported targeting salmon. Although the first coho salmon were caught in July, catches were low until mid-August and the survey ended 2 weeks later. A longer survey would likely have revealed greater numbers of coho salmon anglers.

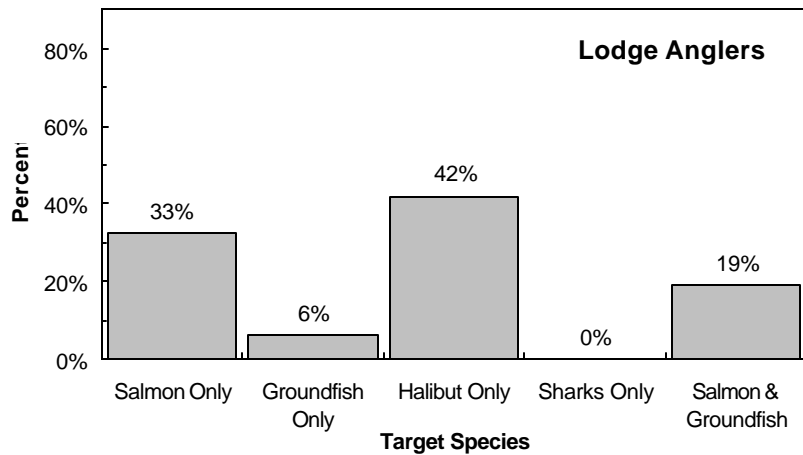
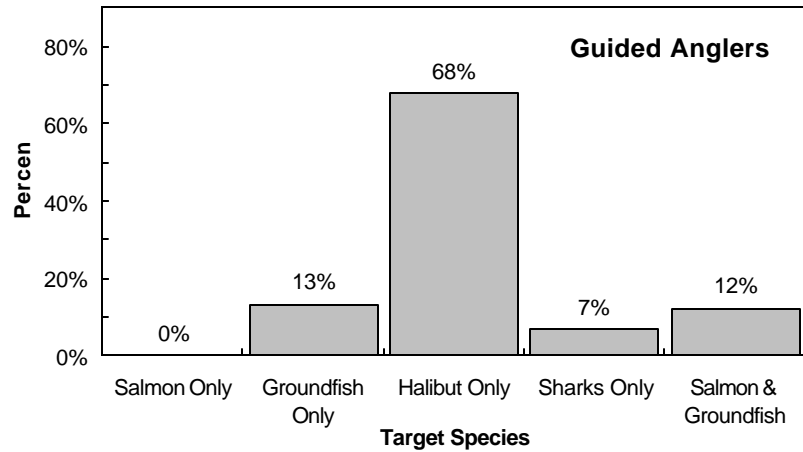
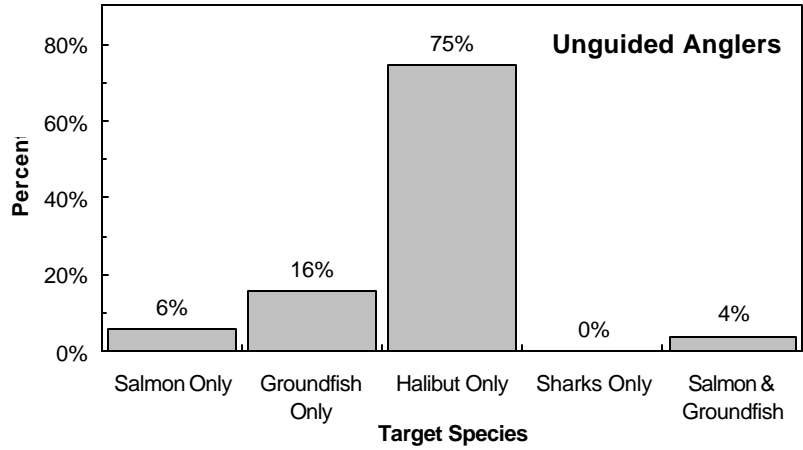


Figure 7.-Target species by user group reported from marine interviews, eastern Prince William Sound, 1999.

Table 3.-Total catch and harvest for lodge anglers as reported from marine interviews, 1999.

Species	Catch				Harvest			
	Estimate	SE	Upper 95% CI	Lower 95% CI	Estimate	SE	Upper 95% CI	Lower 95% CI
Halibut	902	114	678	1,126	461	55	354	569
Rockfish	487	78	334	640	320	63	197	443
Pelagic	294	57	183	405	168	46	78	258
Non-Pelagic	193	39	116	270	152	35	82	221
Pink Salmon	6,351	828	4,729	7,974	1,727	254	1,228	2,226
Coho Salmon	618	117	388	848	502	92	322	682
Chum Salmon	492	172	155	828	102	33	38	165
Sockeye Salmon	56	27	2	110	42	22	0	84
Chinook Salmon	65	42	0	148	13	12	0	36

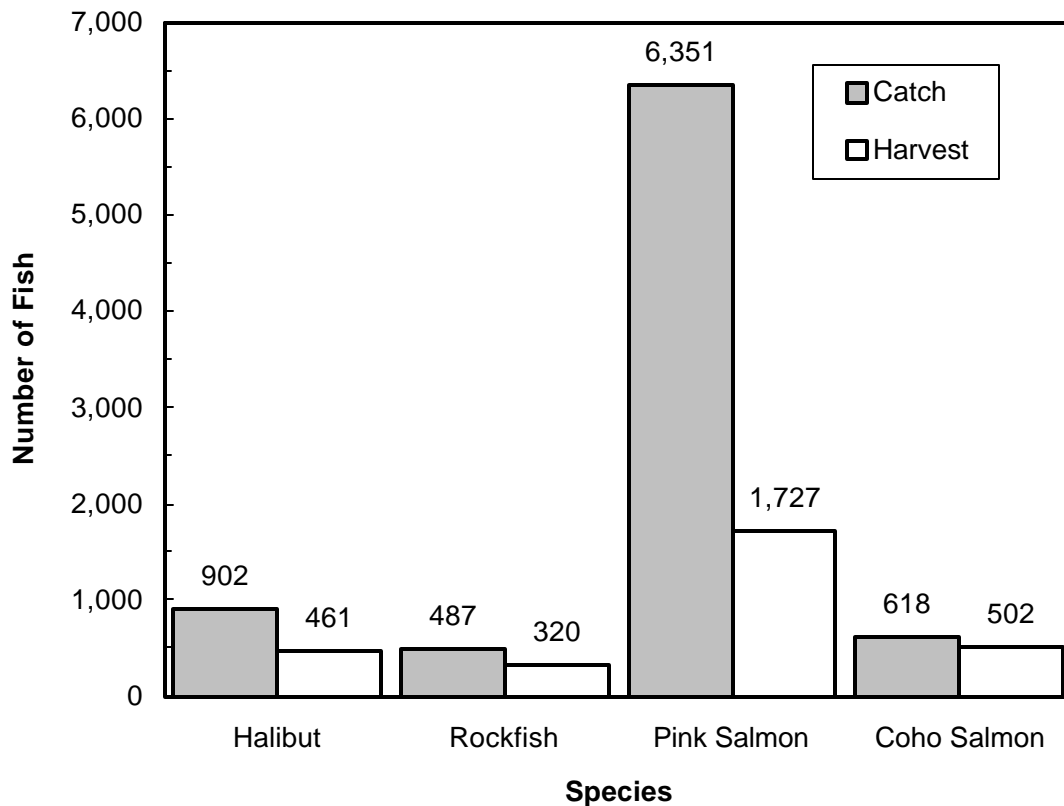


Figure 8.-Total catch and harvest for lodge anglers, eastern Prince William Sound, 1999.

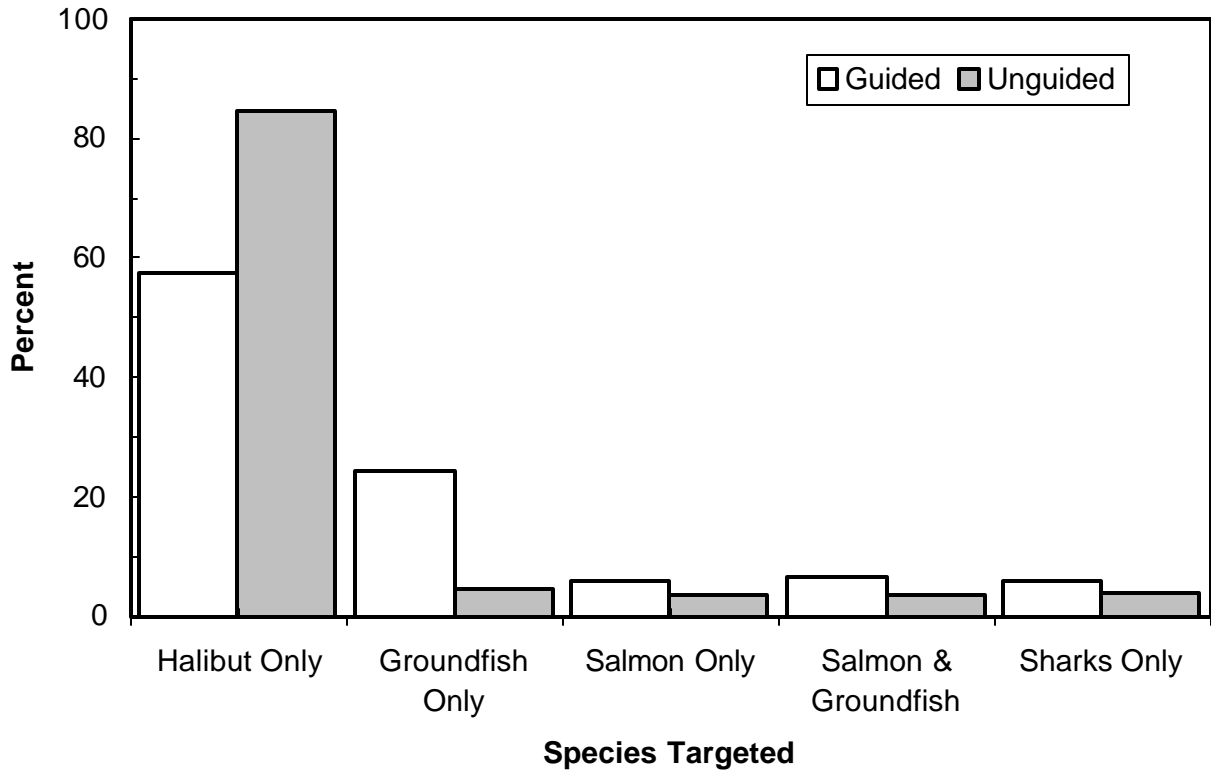


Figure 9.-Percent of guided and unguided anglers interviewed, by species targeted, from port sampling in eastern Prince William Sound, 1999.

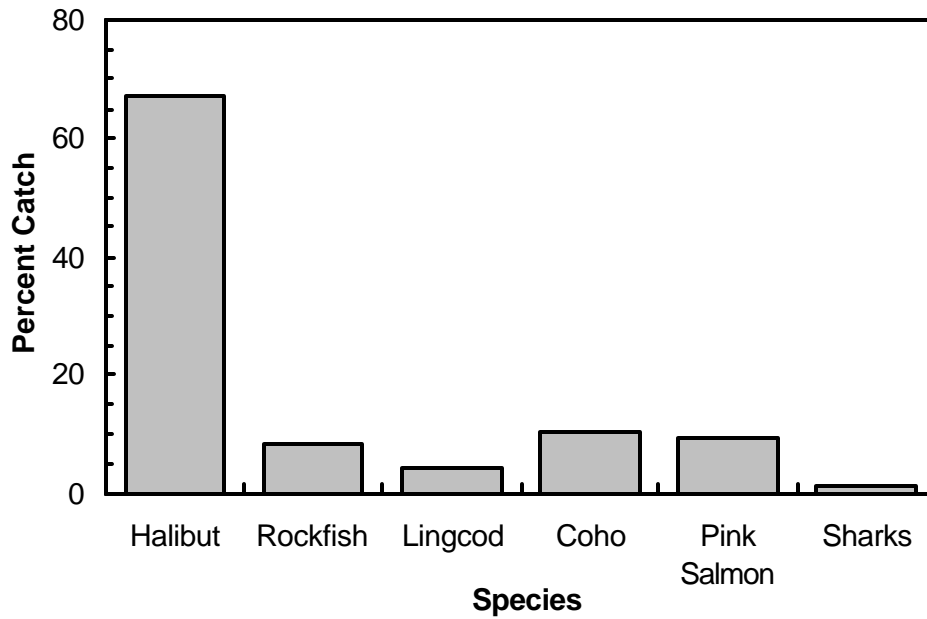


Figure 10.-Percent catch by species for anglers interviewed during port sampling, eastern Prince William Sound, 1999.

Table 4.-Angler success by species targeted.

	Catch per day						Harvest per day					
	Lodge ^a		Guided ^b		Unguided ^b		Lodge ^a		Guided ^b		Unguided ^b	
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Halibut	0.79	0.10	1.20	0.11	1.35	0.14	0.41	0.05	0.72	0.06	0.57	0.04
Rockfish	0.45	0.06	0.31	0.05	0.09	0.04	0.25	0.04	0.30	0.05	0.03	0.01
Pink Salmon	5.50	0.60	3.89	1.24	0.00	0.00	1.65	0.21	0.21	0.21	0.00	0.00
Coho Salmon	0.64	0.12	2.47	0.82	0.30	0.30	0.48	0.10	1.84	0.55	0.30	0.30

^a From marine interviews.

^b From port-sampling interviews.

The increase in angler effort over the summer was probably related to the timing of salmon returns in eastern PWS. In most cases the dramatic increase in effort for a given day coincided with the presence of cruise ships in port.

Lodge anglers were relatively ineffective at catching halibut. The total harvest estimated for this group was 461 (SE = 55) halibut, which is fairly insignificant compared to the estimated 1999 harvest for the Orca Inlet area of 3,441 halibut (Howe et al. *In prep* d, Sport Fish intranet site final estimate as of 11/16/00). Lodge anglers also had the lowest success rates for halibut and coho salmon, but the highest success rate for rockfish, a species caught incidentally while targeting halibut. They only harvested about half of the rockfish they caught, compared to guided anglers who reported harvesting nearly all their rockfish catch.

A source of potential bias in estimates of rockfish and halibut catch was species misidentification. Lodge anglers, mostly non-Alaska residents, often had difficulty identifying their catch. Sculpin or greenling were commonly mistaken for rockfish, and arrow-toothed flounder for halibut. Thus, rockfish and halibut harvests by lodge anglers may have been slightly inflated. Reporting accuracy by guided anglers was much higher, and unguided anglers were often local residents or in the company of a local.

A new and developing fishery in eastern PWS is the recreational shark fishery. Anglers are targeting salmon shark *Lamna ditropis* and a few charter operators market “shark charters.” Sharks were targeted by 5% of the anglers interviewed in port (as many as reported targeting salmon), and accounted for 1% of the catch. Shark fishing has caught the attention of recreational anglers, so ADF&G should closely monitor this fishery and continue existing tagging studies and cooperative efforts with other agencies.

The impact of lodge anglers on rockfish populations in eastern PWS is still a concern. The estimate of total rockfish harvest was 320 (SE = 63) in 1999 (Table 3). While this doesn’t account for all of the rockfish harvest discrepancy in the Statewide Harvest Survey and the port sampling, it is a relatively high rate of incidental catch. Rockfish mortality from lodge anglers is also likely to be high due to the release rate reported from that group. Lodge anglers released

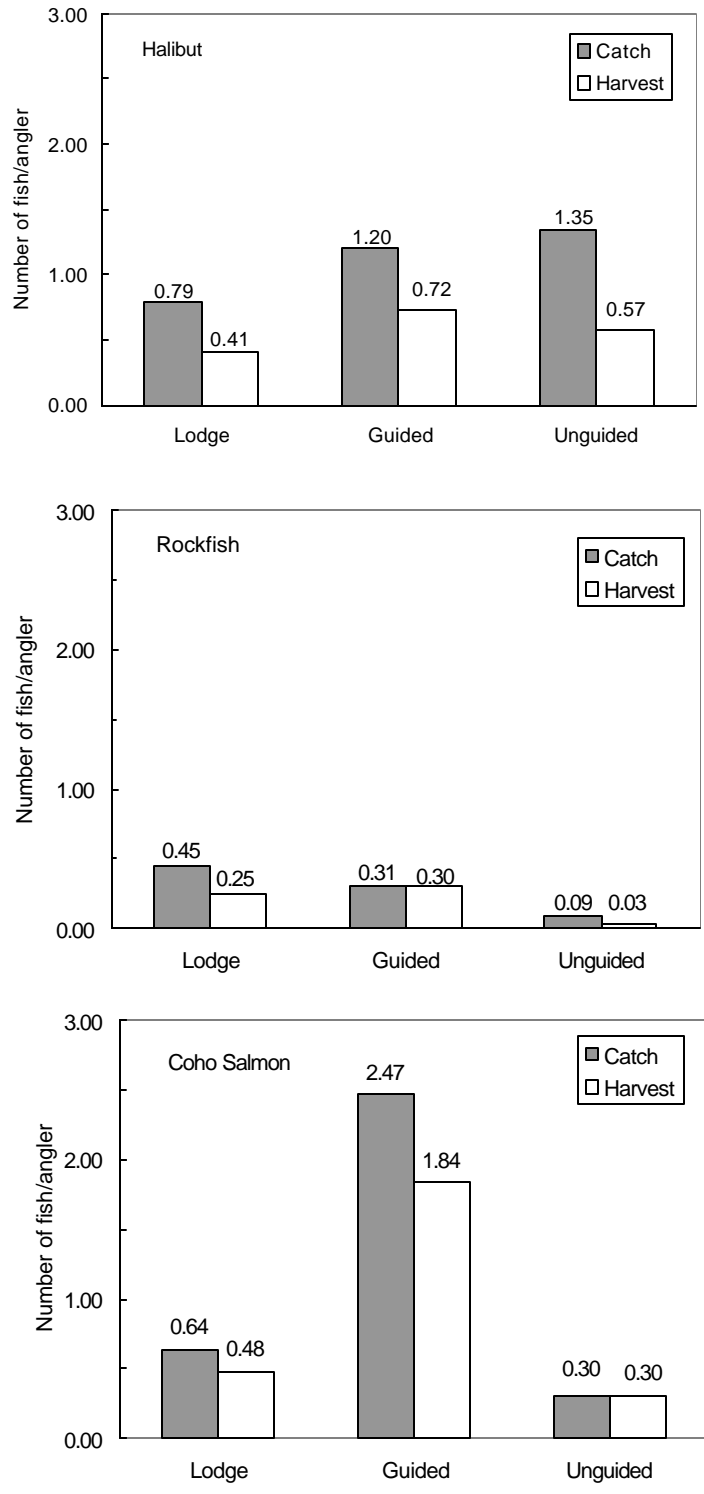


Figure 11.-Success of lodge anglers (from marine interviews) and guided and unguided anglers (from port sampling), by species targeted, eastern Prince William Sound, 1999.

nearly half of all rockfish caught compared to guided anglers who reported harvesting nearly every fish landed. Without the benefit of local knowledge, lodge anglers will continue to put pressure on local rockfish populations. Until data can be collected on rockfish abundance it is unknown if current harvest levels are sustainable. In addition to continued groundfish sampling, the department should continue efforts to educate anglers. An informational rockfish brochure was published in 1997 and was distributed to anglers along with the survey cards. A color guide to bottomfish identification would not only educate anglers, but also help insure more reliable data from returned survey cards and the SWHS.

Coho salmon harvest levels were another concern addressed by this study. The estimated total harvest by lodge anglers of 502 (SE = 92) coho salmon is potentially a significant portion of the harvest for eastern PWS. The 1999 marine harvest was 1,809 coho salmon for Orca Inlet (Howe et al. *In prep* d, Sport Fish intranet site final estimates as of 11/16/00). Although hatchery returns to Fleming Spit in Cordova seem healthy, wild stocks in the study area are of concern. If harvest levels grow, or if current harvest is concentrated on a few small runs, wild coho salmon stocks could be jeopardized. Regulatory measures adopted at the PWS Board of Fisheries meetings in December 1999 reduced the coho salmon bag limit from six to three fish a day. This conservative measure is certainly warranted given the data from this study. Because this study ended before the peak of the coho salmon returns in eastern Prince William Sound, estimates of total harvest from all user groups were probably underestimated. Continuing surveys and extending the study period into mid-September is recommended in order to collect more complete data on coho salmon.

The purpose of the Cordova port sampling survey was to determine if we should expand the current port sampling program to include Cordova. Although a full-time sampling program would provide managers with better data concerning the groundfish harvest in eastern PWS, the relatively low effort of anglers currently fishing out of Cordova does not justify expanding the program. If effort continues to grow and more anglers access the marine fisheries in eastern PWS through Cordova, the need for a dedicated port sampler in Cordova should be reexamined.

ACKNOWLEDGMENTS

This project was made possible by the guidance and support of Andy Hoffmann. A special thanks for the technical tutelage of Allen Bingham and Bob Clark, and to Steve Fleischman for putting it all together. My gratitude to Jeff Milton for all his work and dedication collecting data. Scott Meyer and Charlie Stock in Homer gave direction and helped make the port sampling happen. My sincere thanks to the ADF&G staff in Cordova and Anchorage for their support, especially Sandy Nehl and Becky DeArmoun for entering data and mailing out over 570 hats. Of course this project wouldn't be possible without the cooperation of the anglers in eastern PWS. My thanks to the lodges, charter operators, and anglers who participated in this study.

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APPENDIX A. SAMPLE OF THE SURVEY SCHEDULE

Appendix A1.-Sample of the survey schedule for the marine interviews and Cordova port sampling, 1999.

July 1999						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 INTERVIEW	2 PORT	3 PORT
4 INTERVIEW	5 PORT	6 PORT	7 INTERVIEW	8 OFF	9 OFF	10 INTERVIEW
11 PORT	12 PORT	13 INTERVIEW	14 OFF	15 OFF	16 INTERVIEW	17 PORT
18 PORT	19 INTERVIEW	20 PORT	21 PORT	22 INTERVIEW	23 OFF	24 OFF
25 INTERVIEW	26 PORT	27 PORT	28 INTERVIEW	29 OFF	30 OFF	31 INTERVIEW

**APPENDIX B. SAMPLE DATA FORM
FROM MARINE INTERVIEWS.**

Appendix B1.-Sample data form from marine interviews.

Cordova Area Marine Interviews

Date 8/6/99

Samplers A. Miller, J. Miller

Time	Int. #	Com/In	Class	N/Res	Lodge	Target	Stat Area	Hrs. Fished	Harvested	Released	Notes
1010	1,2	1	3	CO	AK(H)	0	456031	2.0	8 PS	6 PS	
1020	3,4	1	3	CO	AK(H)	0	456031	2.0	8 PS	2 PS	
1035	5	1	3	IL	AK(+2)	0	456031	2.5	2 PS	∅	5 KRAL
1040	6,7	1	3	MLL	AK(+2)	0	456031	2.5	3 PS	3 PS	
1055					OD						NOTHING HOME
1110	8,9,10,11	1	1	OK/CO		D	456031	.15	∅	∅	BIG SPLASH II - JUST STARTED
1120					AK(+2)						EMPTY - 1ST # 5,67
1135					AK(+5)						EMPTY.
1140	12-15	1		GA	AK(+1)			∅			JUST STARTING
1155	16,17	1	3	FL	AK(WP)			∅			WAIT FISHING YET
1200	18,19,20	1	3	DY	AK(AC)	A	466031	3.0	1R, 1HA	∅	
1205	21,22	1	3	TX	AKL	A	466031	4.5	2HA, 11MF	∅	
1225					Ketchikan						No Body Home
12:37	23,24	I	3	CAL	AWL-Ship	A		∅			Getting Ready to Fish
12:42	25,26	I	3	WA AK	AWL#3	0	466031	1.5		23-PS	
13:46	27-28	I	3	CA	AWL#3	A	466031	3	1-HA	-	
13:55	29,30	I	3	AK	AWL#3	A	466031	3	-	-	
15:45	31,32	C	2	WA		A	456032	.45	-	-	Ticketed for No Licenses
16:25	33,	I	2	AK		A	456032	2	1-HA	2-HA	

Class: 1-Charter, 2-Private, 3-Lodge

Target: 0-Salmon, 7-Bottomfish, A-Halibut, B-Rockfish, C-Lingcod, D-Salmon & Bottomfish

APPENDIX C. SURVEY CARD

Appendix C1.-Survey card given to anglers in the marine interview.



State of Alaska
Department of Fish & Game
Division of Sport Fish

1999
Cordova Area
Marine Harvest Survey

Int. # _____

Date _____

Last Name	First Name	Middle Initial
Address	City	State Zip

	Halibut	Pelagic Rockfish	Non-Pelagic Rockfish	SALMON				Other Fish
				Red	Silver	Pink	King	
Total # Caught Today								
Total # Kept Today								

Everyone who returns a completed survey will receive a special ADF&G hat.

**APPENDIX D. COMPUTER FILES AND SOFTWARE
USED TO PRODUCE THIS REPORT.**

Appendix D1.-Computer files and software used to produce this report.

CHcordova.sas:	Estimates catch and harvest for lodge anglers from the marine interview data
PortCordova.sas:	Estimates catch/day and harvest/day for guided and unguided boat anglers from the port-sampling interview data
SuccessCordova.sas:	Estimates catch/day and harvest/day for lodge anglers from the marine interview data
MarineInt99.xls:	Data entered from the marine interview form used in the field
PortSampling99.xls:	Data entered from the portsampling interviews
ReturnCards99.xls:	Data from returned survey cards merged with SAS-generated fields from the MarineInt99.xls spreadsheet
FDS99.doc:	Final report document