
A Survey of Participants in the Lower and Central Cook Inlet Halibut and Salmon Sport Fisheries

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ABSTRACT: Results of a postal survey of participants in the 1997 central and lower Cook Inlet saltwater halibut and salmon sport fisheries are reported and compared with the results of the 1997 Alaska Department of Fish and Game (ADF&G) statewide sportfishing harvest survey and the 1998 ADF&G saltwater charter vessel logbook census. Despite the use of different survey methods and instruments, responses to related questions correspond closely across all 3 surveys. Nonresident sportfishing accounted for 44% of the 197,556 angler-days of effort in the lower and central Cook Inlet halibut and salmon saltwater sport fisheries during 1997. Effort levels by Kenai Peninsula Borough residents and other Alaskans were 25% and 31% of the total, respectively. Local residents, other Alaskans, and nonresidents exhibited differing demographic and economic characteristics and different catch rates, selected different fishing modes, and incurred different trip expenditures. Alaskan respondents were younger, lived with larger families, and had a lower average income than the average nonresident angler. Women comprised over a third of the Alaskan anglers, but scarcely more than a fifth of the nonresidents. Nonresidents, local residents, and other Alaskans accounted for 65%, 10%, and 25% of the charter client-days, respectively. Nonresidents incurred higher average fishing trip-specific costs than residents for similar trips. Likewise, fishing trip-specific expenditures were higher for charter clients than for private-vessel or shorebased fishers. Although 88% of the Alaskan respondents identified saltwater fishing as the primary purpose of their trip to the Kenai Peninsula, 57% of the nonresident respondents indicated their participation was incidental to their primary trip purpose. After adjusting for spending that would have occurred in the absence of sportfishing, we estimate that \$34.1 million in expenditures can be uniquely attributed to the 1997 central and lower Cook Inlet halibut and salmon sport fisheries. These expenditures include \$24.9 million in “new” money, money released into the Kenai Peninsula economy by individuals who reside outside the borough. These same fisheries contributed \$22.3 million and \$23.5 million in new money in 1998 and 1999, respectively.

INTRODUCTION

This report summarizes results derived from responses to a postal survey funded by University of Alaska Sea Grant and conducted in summer 1998 (the UAF survey). We gathered information on the demographic and

economic characteristics, catches, and trip expenditures from participants in the central and lower Cook Inlet (Figure 1) marine sport fisheries for Pacific halibut *Hippoglossus stenolepis* and chinook *Oncorhynchus tshawytscha*, coho *O. kisutch*, and other salmon. In addition, we compared our survey results to

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the annual Alaska Department of Fish and Game (ADF&G) statewide harvest survey (Howe et al. 1998) and to the recently implemented ADF&G saltwater charter vessel logbook census (Dean and Howe 1999). ADF&G recently revised the 1996 and 1997 estimates of catch and effort to correct a programming error and to better address nonresponse bias (ADF&G, unpublished data). Our analysis is based on the revised estimates. These will be referred to as the "ADF&G" and the "logbook" surveys, respectively. Although both halibut and salmon are important sport fisheries in Cook Inlet, this report focuses primarily on Pacific halibut because of its importance as the preeminent marine sport fishery in southcentral Alaska.

The importance of accurate sportfishing survey data continues to increase as the demand for sportfishing opportunities grows. Although Alaskan resident sportfishing license sales increased steadily from 1961 to 1986 and then leveled off, total license sales continued to increase, fueled by increased sales to non-

residents. Between 1961 and 1997, license sales to nonresidents grew from 26% to 58% of total sportfishing license sales (Howe et al. 1998). Overall sportfishing license sales increased from 90,565 to 431,894 over the same time period (Figure 2).

Sportfishing survey data is an important source of information used to support management decisions such as fishery allocations between sport and commercial sectors and for environmental impact statements, regulatory changes for conservation purposes, regulatory impact reviews, and damage assessment (such as for the 1989 *Exxon Valdez* oil spill). Concerns about the accuracy and extent of sportfishing data figure prominently in allocation debates and regulatory and judicial actions associated with damage assessments. A recent example of the need for accurate sportfishing data arose in the debate over the North Pacific Fishery Management Council's adoption of a guideline harvest level for the halibut charter sector. Halibut allocation issues have become further complicated by a rural-

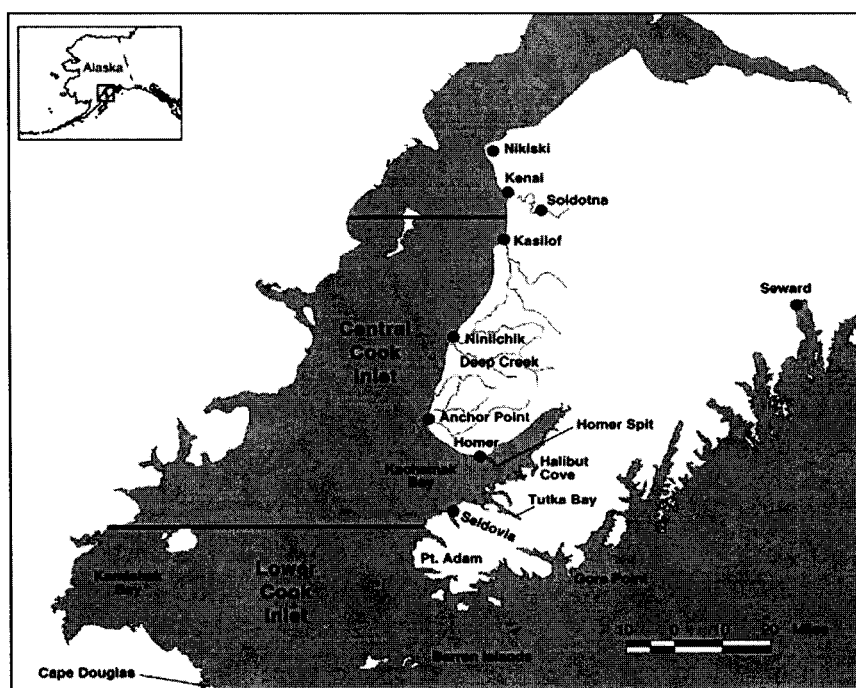


Figure 1. Location of the study area.

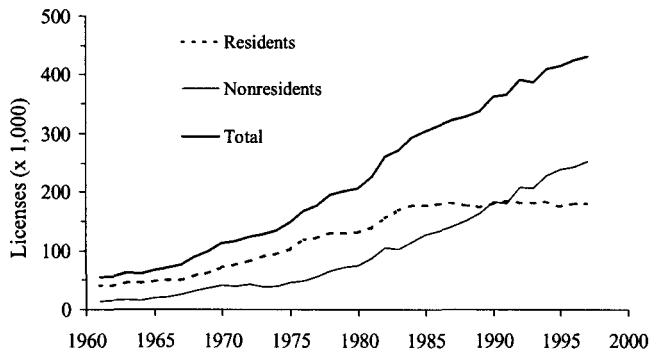


Figure 2. Number of Alaska sportfishing licenses sold, by residency (Mills 1994; Howe et al. 1998).

preference ruling that places a greater importance on Kenai Peninsula-area subsistence fisheries (Manning and Little 2000). Because subsistence receives the highest priority in allocation decisions, the court ruling recognizing the Kenai Peninsula as a rural-preference area for subsistence can be expected to lead to a reduction in the amount of halibut available to the commercial and sport fisheries.

Historically, the commercial total allowable catch for Pacific halibut was determined by subtracting anticipated noncommercial (sport and subsistence) harvests and waste and bycatch mortality from the region-specific constant-exploitation yield (30% of the region-specific exploitable biomass) estimated by the International Pacific Halibut Commission. When the proportion of halibut catch taken in the International Pacific Halibut Commission management area 3A sport fishery grew rapidly from less than 2% in 1977 to over 18% in 1998 (Figure 3), commercial fishers became concerned that unchecked expansion of sportfishing catches would reduce commercial fishing opportunities, particularly in periods of declining halibut biomass. The proposal to cap charter-based halibut sportfishing harvests arose in response to the reported rapid increase in charter client-days and the implementation of individual fishing quotas (IFQs) in the commercial halibut fishery. Under IFQs, individual commercial fishers are entitled to catch limits based on the number of quota shares they control as adjusted by the annual apportionment of the total allowable catch between commercial and noncommercial uses. Consequently, increased sportfishing catches reduce the quantity of fish available to individual commercial fishers in any given year and thus annual net revenue. Because the asset value of the IFQ is a function of the discounted stream of future profits, expansion of sportfishing also reduces the wealth of IFQ holders.

In February 2000 the North Pacific Fishery Management Council recommended a management structure that sets a guideline harvest level for sportfishing catches of halibut from charter boats equal to the 1995–1999 average with provisions for changes in the guideline harvest level if halibut biomass declines (NPFMC 2000). Under the proposed regulations, subsistence catches and catches by self-guided sport fishers are accommodated through reductions of the commercial total allowable catch. Subject to approval by the U.S. Secretary of Commerce, the new management scheme will be implemented in 2001.

The primary sources for halibut sportfishing data are the ADF&G postal survey, logbook census, and port-sampling programs. The ADF&G postal survey has been conducted annually since 1977. Surveys are mailed to a stratified random sample of about 10% of the households with at least one individual who purchased a sportfishing license during the preceding year. Respondents are asked to report the number of sportfishing trips taken by location, as well as their success in terms of the number of fish retained. Based on comparisons with on-site creel survey results, Mills and Howe (1992) conclude the ADF&G survey provides accurate and precise estimates of sportfishing catches. However, these estimates cannot be accurately separated by target species or fine geographic scale (Meyer 1994).

Whereas the ADF&G postal survey is distributed to a sample of the general population of sport fishers, the logbook census is only distributed to businesses that register with ADF&G to provide saltwater charter ser-

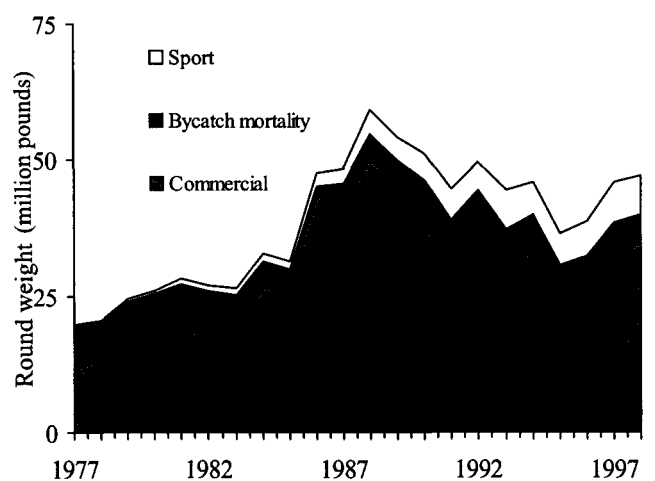


Figure 3. Commercial catch and bycatch mortality and sport catches of Pacific halibut from IPHC management area 3A (Vincent-Lang 1998; IPHC 1999).

vices. First implemented in 1998, the logbook census is intended to provide an annual account of daily harvest and effort information by species for each active charter vessel. Dean and Howe (1999) reported about 460 logbooks were issued to charter vessels intending to operate in Cook Inlet in 1998. Based on returned logbooks, Dean and Howe (1999) estimated that Cook Inlet-based charter vessels targeting halibut and other bottomfish serviced 61,494 client-days, 64% of the southcentral total for bottomfish client-days. Some of this effort was directed at rockfish, lingcod, and other species, but halibut comprised 99% of the reported Cook Inlet total catch of these species in numbers of fish.

Port sampling is used to gather information on the species, size, age, and gender composition of groundfish catches. Port sampling and creel surveys have been used to validate effort and harvest estimates derived from the ADF&G postal survey.

Although the ADF&G postal survey and logbook census can be used to estimate effort and catches, they do not provide the detailed demographic or economic data required for economic valuation and damage assessments, regulatory impact reviews, or allocation decisions. The UAF survey was designed to gather these data from participants in the marine sport fisheries for halibut and salmon off the Kenai Peninsula. We compare some of the results with corresponding values obtained in the ADF&G postal survey and logbook census to assess the consistency of these 3 independent survey instruments. Although consistency does not validate results, it lends confidence to them.

METHODS

The UAF survey was based on a random sample of 4,000 anglers drawn from the set of U.S. residents who purchased Alaska state sportfishing licenses in 1997. Respondents were asked to rank (or rate) a set of hypothetical fishing trips and to tell whether or not they would take them. Respondents who participated in saltwater sport fisheries off the Kenai Peninsula at least once during the previous 5 years were asked to provide information regarding the number of trips taken and total catch during their most recent trip.

Our survey was developed and carried out following Dillman (1978). Respondents received up to 3 survey mailings plus a thank-you or reminder after the first mailing. All sampled license holders received a survey during the first mailing, followed by a reminder card. Nonrespondents were sent a second survey 14 days after the initial survey was mailed. The first 2

survey mailings and the reminder card were distributed by first class mail. The third survey was sent by certified mail to those who did not respond within 14 days after the second survey was mailed. All survey mailings contained a cover letter, a prize entry card (to increase the response rate), a business reply envelope, and one of 18 versions of the survey instrument.

The ADF&G postal survey and logbook census focused on catch and effort. The UAF survey also included questions about the respondents' demographic and socioeconomic attributes, their trip expenses, their most recent saltwater fishing trip (if taken in the last 5 years) to the Kenai Peninsula, and questions about hypothetical trips.

The UAF survey was administered in June and July 1998. The results reported below were based on responses to a question that asked respondents about their most recent trip and is solely based on information provided by respondents who took at least one trip in 1997 or 1998. The most recent trip for 73% of the respondents was taken in 1997 (27% of the most recent trips were taken in 1998). While the 1997 trips could have been taken at any time during the year, the fact that some individuals took multiple trips concentrates the reported observations into the second half of the year. The reported 1998 trips are all from the first half of the year. Combining data from trips taken in 1997 and 1998 ensures that our analysis is reflective of trips taken throughout the season (see Figure 4).

RESULTS

The sample was composed of a 49.3% to 50.7% mix of Alaskans and nonresidents, mirroring the actual 1997

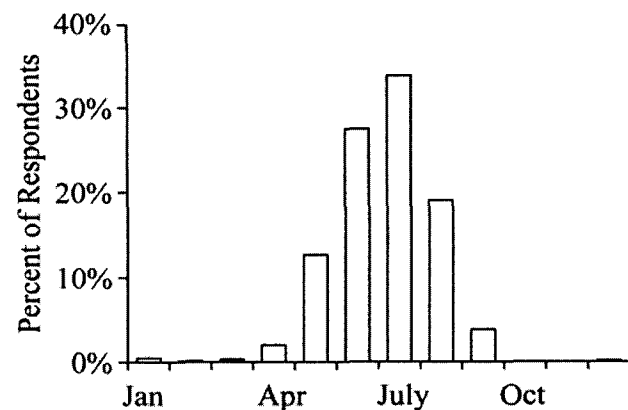


Figure 4. Month in which UAF survey respondents started their most recent trip.

license sales proportions (49.7% to 50.3%). The difference between the proportions was not statistically significant ($P = 0.62$). The overall response rate based on delivered surveys was 70.1% (3,767 of the 4,000 surveys mailed were delivered). Because the response rate for Alaskans was 63.4% and that for nonresidents was 76.4%, nonresponse bias may be present in estimates of the differences between residents and nonresidents. While this may affect effort estimates based solely on the UAF survey, it does not affect our estimates of catches and expenditures because those estimates are based on unbiased estimates of mean catches and expenditures by residency and fishing mode multiplied by the corresponding and unbiased ADF&G estimates of effort.

The ADF&G survey was mailed to 47,000 households containing at least one individual who purchased an Alaska sportfishing license in 1997. A total of 9,736 surveys were returned after 3 separate mailings. The compliance rate with the logbook census is uncertain. However, because charter operators are aware that the logbooks may be used as evidence of participation for future limited entry or IFQ programs, compliance is probably fairly high. One measure of consistency in the results of the UAF and ADF&G surveys is that similar participation rates were found for Kenai Peninsula-area saltwater sport fisheries. In the UAF survey, 34.5% of the Alaskan residents and 35.5% of the nonresidents who purchased sportfishing licenses fished in saltwater off the Kenai Peninsula in 1997 (average of 35.1% for all license holders). The ADF&G survey results suggest 32.6% of the 1997 license holders fished in marine waters off the Kenai Peninsula in 1997.

Based on data reported in Dean and Howe (1999), 26.9% of the 1998 total saltwater charter client-days were fished in saltwater off the Kenai Peninsula west of Gore Point, the area that we have attributed to saltwater sportfishing trips originating in Cook Inlet. The Kenai Peninsula-area charter fisheries are particularly important for residents (45.2% of all resident client-days) and somewhat less important for nonresidents (23.3% of all nonresident client-days).

Demographic Characteristics of Cook Inlet Sport Fishers

In the UAF survey, the average Alaskan who participated in the marine sport fisheries off the Kenai Peninsula was 42.6 years old, living in a 3.01-person household, and had an aftertax household income of \$57,453. In contrast, the average nonresident was older (49.3 years), lived in a smaller household (2.73 persons), and had a larger household income (\$73,268). A

larger proportion of the Alaskan respondents were female (34.4%) compared to nonresidents (21.4%). The majority (73%) of sport fishers had at least some college education. However, fewer Alaskans (35.7%) than nonresidents (50.6%) identified themselves as college graduates. Not only was the mean age of nonresidents greater than that of residents, but also the age-distribution of nonresident respondents was strongly right-skewed (Figure 5). The difference between resident and nonresident respondents was statistically significant at the 99% level for each of these demographic variables.

To understand the regional economic impact of sportfishing, it is important to know the extent to which saltwater sportfishing was primary or incidental to the purpose of the trip. The primary trip purposes for residents and nonresidents who took sportfishing trips in Cook Inlet during 1997 are summarized in Table 1. A majority of respondents identified fishing for halibut or salmon in Cook Inlet as the primary purpose of their most recent trip. This response was particularly pronounced for Alaskans who reside outside the Kenai Peninsula Borough. In contrast, less than half of the nonresidents identified fishing for halibut or salmon in Cook Inlet as the primary motive of their trip (although it was the single largest category). Visiting and vacationing in Alaska, freshwater fishing on the Kenai Peninsula, and visiting relatives were also important motives for nonresident trips. While these results are based on 2,641 completed surveys and may provide a reasonable characterization of the population of anglers who visited the Kenai Peninsula, these results should not be misconstrued to represent the trip purposes for the population of visitors to the Kenai Peninsula. In fact, fishing is a smaller primary motivation for overall visits

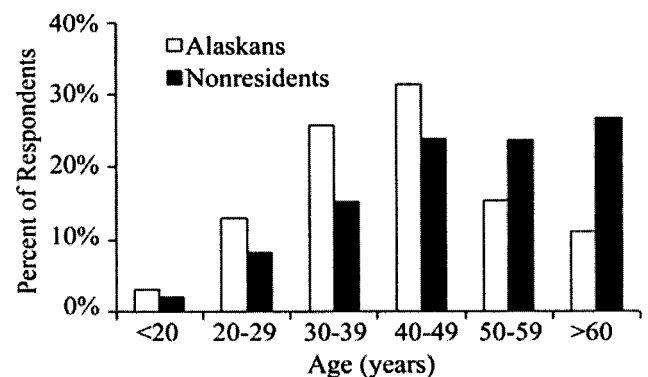


Figure 5. Age distribution of respondents in UAF survey.

Table 1. Primary purpose of trip to the Kenai Peninsula.

Purpose	Residency	
	Alaskans (nonlocal)	Nonresidents
Fishing for halibut or salmon in Cook Inlet	87.9%	43.0%
Visit/vacation Alaska	2.9%	24.4%
Freshwater fishing on the Kenai Peninsula	1.7%	12.0%
Visit relatives	5.2%	11.2%
Business	1.2%	3.7%
Saltwater/freshwater fishing	0.0%	2.5%
Visit friends	1.2%	0.4%
Cruise ship	0.0%	1.2%
Hunting	0.0%	1.7%

to the Kenai Peninsula than it is for visits by individuals who purchased sportfishing licenses.

Angler Effort

Based on responses to the postal survey ADF&G estimated 140,905 individuals participated in Kenai Peninsula-area marine sport fisheries in 1997. The UAF survey estimate (151,590) is somewhat higher, possibly because our survey emphasized the Kenai saltwater sports fishery and may have had a higher return from participants than from nonparticipants. Combining the ADF&G estimates of average days fished and numbers of participants provides an estimate of the total number of sportfishing angler days (286,521) fished off the Kenai in 1997. However, because the ADF&G survey incorporated data from all marine sport fisheries off the Kenai Peninsula, and the UAF survey focused on lower and central Cook Inlet sport fisheries, it was necessary to disaggregate the ADF&G data, exclude the Seward and "other Gulf Coast east of Gore Point" reporting areas, and aggregate the remaining areas. Based on these adjustments, we estimated a total of 197,556 angler-days were fished in lower and

central Cook Inlet in 1997. The total included 78,587 charter vessel client-days, 91,139 angler-days fished from private vessels, and 27,830 shorebased angler-days (see Table 2).

Economic impact analysis requires information on the origin of sportfishing effort: local (residents of the Kenai Peninsula), nonlocal Alaskans, and nonresidents. Although most nonresident sportfishing effort is charter-based, many Alaskans use private vessels and bare-boat charters (Table 3). In total, 46% of the lower and central Cook Inlet saltwater sportfishing effort in 1997 was conducted from private boats or bare-boat charters, and 40% occurred on charter boats. Most (83%) respondents who engaged in saltwater sportfishing from shore did so on Homer Spit, the locus of a tidal terminal fishery for hatchery-reared salmon.

Responses to the UAF survey were used to determine the distributions of locations where respondents launched their boats or fished. Homer was the most frequent location (35%), followed by Seward (24%), Deep Creek/Ninilchik (23%), the city of Kenai (10%), and Anchor Point (6%). When Seward-based trips are disregarded, Homer and Deep Creek are responsible for 46% and 30% of charter client-days, respectively.

Table 2. Angler-days fished from Cook Inlet ports during 1997 (ADF&G, unpublished data).

Fishing Area	Charter	Private	Shore	Total
Anchor River, Whiskey Gulch, Deep Creek, and Ninilchik River	30,693	48,841	1,132	80,666
Other Cook Inlet/gulf coast west of Gore Point	37,401	40,489		77,890
Other Cook Inlet north of Ninilchik River	769	339		1,108
Barren Islands	9,724	1,470		11,194
Seldovia Bay			1,642	1,642
Homer Spit (Kachemak Bay)			23,218	23,218
Shoreline-other			1,838	1,838
Total	78,587	91,139	27,830	197,556

Table 3. Angler-days fished and effort distribution (%) in lower and central Cook Inlet during 1997 by residency category and sportfishing mode (ADF&G, unpublished data).

Residency	Charter		Private		Shore		Total	
	Angler-days	Effort	Angler-days	Effort	Angler-days	Effort	Angler-days	Effort
Local	7,518	3.81%	28,498	14.43%	12,861	6.51%	48,877	24.74%
Alaskan (nonlocal)	19,898	10.07%	37,044	18.75%	4,767	2.41%	61,709	31.24%
Nonresident	51,171	25.90%	25,597	12.96%	10,202	5.16%	86,970	44.02%
Total	78,587	39.78%	91,139	46.13%	27,830	14.09%	197,556	100.00%

Angler Success

All 3 surveys contain information on angler success in Cook Inlet marine saltwater fisheries. The average total, retained, and released catches determined from responses to the UAF survey for Cook Inlet are listed in Table 4. For example, the mean (across fishing modes and target species) nonresident fishing trip for halibut in Cook Inlet resulted in a daily catch of 2.43 halibut, of which 1.04 were retained and 1.40 were released. Overall Kenai Peninsula charter-client catch estimates from the UAF and ADF&G surveys are compared in Table 5. The estimates of retained catch agree closely. In the UAF survey, a daily average of 1.20 halibut were retained and 1.71 were released for a total catch of 2.91. In the ADF&G survey, 1.24 halibut were retained and 1.35 were released for a total daily catch of 2.59. The ADF&G estimates of retained, released, and total catch lie within the 95% confidence intervals of the corresponding UAF estimates. The ADF&G data included trips that were for species other than salmon and halibut.

In 1997 this catch comprised of 6.6% of the total catch of all species. Because the ADF&G survey does not differentiate between charter trips for halibut and charter trips for other species, the resulting catch rate

Table 4. Mean attributes of all 1997–1998 Cook Inlet sportfishing trips (daily averages).

Species	Disposition	Number of Fish by Angler Residency	
		Alaskan	Nonresident
Halibut	Retained	0.72	1.04
	Released	0.98	1.40
	Total caught	1.71	2.43
Chinook salmon	Retained	0.08	0.11
	Released	0.11	0.04
	Total caught	0.19	0.14
Coho salmon	Retained	0.05	0.13
	Released	0.01	0.18
	Total caught	0.06	0.31

estimates do not provide an accurate picture of angler success on halibut charters and are not directly comparable with the logbook census results. However, a comparison for halibut-only charters (charters where halibut was the main species targeted during the trip) can be made between the UAF survey and the logbook census for the area west of Gore Point (Table 6). The logbook survey reports effort for bottomfish. However, the total halibut catch in the logbook survey makes up 99% of the total bottomfish catch in Cook Inlet and therefore mostly reflects harvest effort. For halibut-only charter trips, we found a daily average of 1.43 halibut were retained and 2.08 were released for a total catch of 3.51. The logbook census results lead to estimates of 1.85 halibut retained, 1.96 released, and a total daily catch of 3.81. These estimates lie within the 95% confidence intervals of the corresponding UAF estimates.

Angler Expenditures

In the UAF survey respondents were asked to provide detailed information regarding expenses incurred on their most recent salmon and halibut fishing trips. The average expenses incurred by respondents who sportfished in Cook Inlet during 1997 or 1998 are reported in Table 7. For local residents, the mean transportation and living expenditures totaled \$30.41 per day. Transportation and living expenses for other Alaskans

Table 5. Average daily charter-based sportfishing catches^a of halibut for the entire Kenai Peninsula area.

Survey	Disposition	Charter	95% Confidence
			Interval
UAF survey	Retained	1.20	1.12 to 1.28
	Released	1.71	1.32 to 2.10
	Total Catch	2.91	2.49 to 3.33
ADF&G survey	Retained	1.24	
	Released	1.35	
	Total Catch	2.59	

^aFor trips where a variety of species are targeted.

Table 6. Average daily charter-based sportfishing catches^a of halibut for the Kenai Peninsula area to the west of Gore Point for halibut-only trips.

Survey	Disposition	Charter	95% Confidence
			Interval
UAF survey	Retained	1.43	1.23 to 1.63
	Released	2.08	1.48 to 2.68
	Total Catch	3.51	2.89 to 4.32
Logbook census	Retained	1.85	
	Released	1.96	
	Total Catch	3.81	

^aFor trips when only halibut was targeted.

ranged between \$34.29 and \$75.66 per day, and between \$62.99 and \$103.87 per day for nonresidents. Mean living expenditures were lower for nonresidents who fished from private vessels than for those who fished from shore or from charter boats, partly because the primary trip purpose for many such respondents was to visit friends and family. Private and charter expenditures for nonresidents were statistically different at the 95% confidence level. Differences between private or charter vessel and shorebased fishing expenditures were not statistically significant due to the high standard error associated with shoreline fishing expenditure estimates because there were very few obser-

ations. Mean local fishing expenditures ranged between \$2.14 and \$137.06 per day. Fishing expenditure means varied from \$4.50 to \$129.25 per day for Alaskans (nonlocal) and from \$30.57 to \$190.34 per day for nonresidents.

Expenditures varied greatly with the type of fishing mode (Table 8). The mean fishing expenditure for all residents was \$17.60 per day for shorebased fishing, \$47.29 per day for private boat, and \$161.19 per day for charter. Mean daily living expenditures were \$72.92, \$52.14, and \$86.70 for shorebased, private vessel-based, and charter-based recreators, respectively. Total living and fishing expenditures were \$90.52, \$99.43, and \$247.89 per day fished for shorebased, private vessel-based, and charter-based recreators, respectively. Again, the relatively low expenditure level for private vessel-based sport fishers is most likely due to the fact that many such individuals identified visiting Kenai Peninsula area friends or family as a primary trip purpose. The largest expenditures were associated with customers of the charter industry. The total daily expenditures (with 95% confidence limits) were \$167.47 ± \$51.42 for locals, \$204.91 ± \$35.63 for other Alaskans, and \$294.21 ± \$31.95 for nonresidents (Table 7). Fishing and living expense data by residency are summarized in Table 9.

Total expenditures on Cook Inlet saltwater trips totaled \$48.1 million in 1997. The 95% confidence level

Table 7. Average daily expenditures for Cook Inlet sportfishing trips, by residency and sportfishing mode (\$/day).

Expenditure Category	Local ^a			Alaskan (nonlocal)			Nonresident		
	Shore	Private	Charter	Shore	Private	Charter	Shore	Private	Charter
Auto or truck fuel	7.82	7.82	7.82	14.57	12.99	15.81	9.34	7.81	8.08
Auto or RV rental	0	0	0	0	0.39	3.97	28.91	2.92	18.92
Airfare	0	0	0	0	0.35	5.15	26.9	24.76	32.04
Other transportation	0.70	0.70	0.70	0	1.31	1.83	0.93	2.30	2.33
Lodging	3.15	3.15	3.15	3.86	6.20	21.19	14.83	7.83	22.94
Groceries	8.00	8.00	8.00	12.43	14.44	13.76	7.47	10.72	9.93
Restaurant and bar	10.74	10.74	10.74	3.43	9.58	13.95	10.2	6.65	9.63
Total transportation and lodging	30.41	30.41	30.41	34.29	45.26	75.66	98.58	62.99	103.87
Charter or guide	0	0	112.86	0	0	116.4	0	0	140.75
Fishing gear	2.14	7.12	2.00	4.50	5.53	3.58	20.00	17.12	15.5
Fish processing	0	0.92	10.5	0	2.33	7.14	9.62	7.87	32.72
Derby	0	0.36	11.7	0	0.18	2.13	0.95	1.65	1.37
Boat fuel and repairs	0	15.89	0	0	31.53	0	0	15.76	0
Moorage or haul out	0	8.36	0	0	5.48	0	0	9.00	0
Total fishing expenditures	2.14	32.65	137.06	4.50	45.05	129.25	30.57	51.40	190.34
Total fishing day expenditures ^b	32.55	63.06	167.47	38.79	90.31	204.91	129.15	114.39	294.21

^aFor "local" expenditures, the aggregate nonfishing expenditures for all types of fishing were used because of the low number of total observations. For instance, the survey only had 3 observations of local residents' expenditures for shorebased fishing.

^bTotal expenditures on days fished are the sum of the fishing expenditures and the living expenditures, which were averaged across the total days spent on a trip.

Table 8. Average (across residency categories) daily expenditures for Cook Inlet sportfishing trips by sportfishing mode (\$/day).

Expenditure Category	Daily Expenditures (\$) by Mode		
	Shore	Private	Charter
Auto or truck fuel	11.87	9.82	11.27
Auto or RV rental	14.74	1.65	11.26
Airfare	13.72	12.77	18.44
Other transportation	1.78	1.71	1.93
Lodging	9.32	6.59	20.79
Groceries	11.39	12.05	11.13
Restaurant and bar	10.10	7.56	11.88
Total nonfishing day expenditures ^a	72.92	52.14	86.70
Charter or guide	0	0	128.64
Fishing gear	12.21	11.58	9.53
Fish processing	4.91	5.04	20.48
Derby	0.48	0.95	2.55
Boat fuel and repairs	0	22.21	0
Moorage or haul out	0	7.52	0
Total fishing day expenditures	17.60	47.29	161.19
Total daily expenditures ^a	90.52	99.43	247.89
95% confidence interval on total expenses ^b	47.01–134.02	68.87–132.28	224.39–271.38

^aTotal expenditures on days fished are the sum of the fishing expenditures and the living expenditures which were averaged across the total days spent on a trip.

^bActual confidence intervals for daily averages cannot be calculated because there is no daily data on persons who took multiple day trips (just the average daily expenditures). The confidence intervals are calculated using the daily average expenditures per person. As there is likely to be less variation per day for individuals than between individuals, these confidence intervals may be too wide.

for total expenditures across all expenses and participants was $\pm 9.5\%$. This is less than for individual expenses because much of the individual variation was smoothed out when more participants were included; the increasing number of observations also lowers the uncertainty. Applying the 9.5% relative precision to the total expenditures leads to a CI of \$43.5 to \$52.6 million for total expenditures. Charter clients accounted for over 70% of the expenditures, private vessel fishing trips accounted for approximately 22%, and shorebased fishing trips generated about 7% of the to-

tal expenditures. Nonresidents accounted for 72% of expenditures and all Alaskans for 28%.

However, not all of these expenditures are directly attributable to the respondents' desire to fish for salmon and halibut in lower and central Cook Inlet. Some respondents would have traveled to Alaska and the Kenai, and incurred many of the same expenditures, even if the Cook Inlet saltwater sportfishing opportunities had been unavailable or less attractive. For example, visitors on business trips may well have visited Alaska whether or not they were planning to fish on the Kenai.

Table 9. Alaska expenditures by all individuals who sport fished for halibut and salmon in Cook Inlet during 1997, by residency and fishing mode (Herrmann et al. 2000).

Residency	Fishing Mode	Expenditures (\$)		
		Fishing	Nonfishing	Total
Local		1,988,399	1,562,945	3,551,344
Alaska		4,262,100	5,594,931	9,857,032
Nonresident		11,367,449	23,287,982	34,655,431
Total		17,617,949	30,445,859	48,063,807
	Shore	360,849	2,944,724	3,305,574
	Private	3,914,978	6,812,216	10,727,194
	Charter	13,342,122	20,688,918	34,031,040
	Total	17,617,949	30,445,859	48,063,807

Table 10. Alaska expenditures directly attributable to sportfishing for halibut and salmon in Cook Inlet during 1997, by residency and fishing mode (Herrmann et al. 2000).

Residency	Fishing Mode	Expenditures (\$)		
		Fishing	Nonfishing	Total
Local		1,988,399	1,562,945	3,551,344
Alaska		4,262,100	4,775,483	9,037,583
Nonresident		11,367,449	10,104,664	21,472,113
Total		17,617,949	16,443,092	34,061,041
	Shore	360,849	1,770,663	2,131,512
	Private	3,914,978	4,884,698	8,799,675
	Charter	13,342,122	9,787,732	23,129,853
	Total	17,617,949	16,443,092	34,061,041

Although fishing expenses would not have been incurred if the respondents had not fished, assumptions about whether the trip would have been taken, and whether the other living and traveling expenses would have been incurred, are less certain. Herrmann et al. (2000) estimate the expenditures directly attributable to the fishing component of the trip (see Table 10).

Using the estimate of living and transportation expenditures attributed directly to the Cook Inlet halibut and salmon sportfishing trip reduces the estimate of total expenditures to \$34.1 million. This \$14.1 million reduction comes from living and transportation expenditure reductions of \$3.6 million from the Kenai and \$10.4 million from elsewhere in Alaska. Nonresidents contributed 63.4% of sportfishing-related spending, and as a class, charter clients were responsible for 68.3% of the total spending. Herrmann et al. (2000) estimate that \$28.5 million of this is spent on the Kenai (the rest in other parts of Alaska), and subtracting the \$3.6 million expenditures by local Kenai residents leaves a \$24.9 million infusion of new money to the Kenai Peninsula Borough economy. These are expenditures on local goods and services that are directly attributable to the 1997 lower and central Cook Inlet saltwater sport fishery for halibut and salmon (Table 11). The 1997 average expenditures were multiplied by annual effort levels and adjusted to current prices to provide estimates for more recent years. The 1998 and 1999 infusions into the Kenai Peninsula were estimated to be \$22.3 and \$23.5 million, respectively.

DISCUSSION

Despite the use of different survey techniques and instruments, there is remarkable consistency in estimates of variables common to the 3 surveys. This bodes well for the accuracy of estimates of angler effort, angler success, and overall catch, and is particularly impor-

tant as conflicts between commercial, sport, and subsistence fishers inevitably increase with increasing demand. The allocation dispute between commercial fishers and commercial charter operators has led to an intense scrutiny of commercial and sport fishery statistics. The ADF&G postal survey, ADF&G logbook census, and UAF survey were the principal information sources for sportfishing data used in environmental assessment and regulatory impact review documents prepared in support of the North Pacific Fishery Management Council's guideline harvest level decision.

The UAF and ADF&G postal surveys provide similar estimates of participation in the saltwater sport fisheries off the Kenai Peninsula in terms of the proportion of total anglers who had purchased an Alaska license. The slightly higher estimate from the UAF survey is most likely due to an increased response from Kenai anglers given the focus of the UAF survey on Kenai saltwater fishing. In comparing fishing success for charter clients (across species), the UAF survey estimates a retained average of 1.20 halibut, whereas the ADF&G survey estimates 1.24. The logbook census allows a comparison of charter trips that target only halibut. For 1997 the UAF survey estimated an average total catch of 3.51 halibut (retained and released) for halibut-only charter trips, and the logbook census estimated 3.81 for 1998. Again, the differences are not statistically significant.

From the UAF study the typical Alaskan fisher was younger, lived in a larger family, and had less money and education than the typical nonresident angler. Homer was the most common launch site. Alaskans showed a preference for fishing off a private vessel, but most nonresidents were charter clients. Across all fishing modes a saltwater fishing trip yielded an average of 1.71 halibut for Alaskans and 2.43 halibut for nonresidents. When only charter trips were examined, average halibut catch (across residency) increased to 2.91 halibut. Halibut-only charters averaged 3.51 fish.

Typical nonresident expenditures far outstrip resident expenditures for similar (charter, private boat, shorebased) fishing trips. Likewise, typical per-trip expenditures for charter clients exceeded those of private-vessel and shorebased anglers. For example,

Table 11. Total Kenai Peninsula area expenditures by Alaskans (nonlocal) and nonresidents during 1997 that can be attributed directly to Cook Inlet halibut or salmon sportfishing trips (Herrmann et al. 2000).

Expenditure Category	Expenditures (\$)	
	Fishing	Other
Auto fuel		2,208,331
Auto or RV rental		
Lodge		3,061,159
Groceries		2,443,248
Restaurant and bar		1,996,927
Charter	9,518,445	
Gear	1,658,566	
Fish processing	2,202,291	
Derby	171,082	
Boat fuel	1,279,407	
Moorage or haul out	433,374	
Total	15,263,165	9,709,665

Kenai-resident anglers spent an average of \$167.47 fishing and living expenses per day of charter fishing. Nonlocal Alaskans and nonresidents spent an average of \$204.91 and \$294.21 per charter fishing day, respectively. Anglers who fished from shore incurred average fishing and living expenses of \$90.52 per day. Private vessel trips cost an average of \$99.43 per angler-day, and charter trip costs averaged \$247.89 per day. Total fishing and living expenditures during trips involving saltwater fishing were estimated to be \$48.1 million. Charter clients incurred the largest share of these expenditures (\$34.0 million). Similarly, nonresidents were responsible for the bulk (\$34.7 million) of trip-related spending in 1997. When expenditures directly attributable to the saltwater fishing portion of the trip were isolated from expenses that would have been incurred irrespective of the availability of the sportfishing opportunity, we estimated \$34.1 million was spent on activities in Alaska directly related to the halibut and saltwater fisheries in Cook Inlet in 1997. An estimated \$28.5 million of the \$34.1 million was spent on the Kenai, and \$24.9 million of this was new money flowing into the region. Finally, the infusion into the Kenai Peninsula was estimated to be \$22.3 million in 1998 and \$23.5 million in 1999.

LITERATURE CITED

- Dean, M. R., and A. L. Howe. 1999. Alaska Department of Fish and Game sportfishing guide and business registration and saltwater sportfishing charter logbook program, 1998. Alaska Department of Fish and Game, Division of Sport Fish, Special Publication 99-1, Anchorage.
- Dillman, D. A. 1978. Mail and telephone surveys. John Wiley & Sons, New York.
- Herrmann, M., S. T. Lee, C. Hamel, and K. R. Criddle. 2000. An economic assessment of the sport fisheries for halibut, chinook and coho salmon in Lower Cook Inlet. Final Report prepared for the Minerals Management Service, Coastal Marine Institute, April 2000, University of Alaska Fairbanks.
- Howe, A. L., G. Fidler, C. Olnes, A. E. Bingham, and M. J. Mills. 1998. Harvest, catch, and participation in Alaska sport fisheries during 1997. Alaska Department of Fish and Game, Fishery Data Series No. 98-25, Anchorage.
- IPHC (International Pacific Halibut Commission). 1999. Pacific halibut stock assessment and fishery evaluation (SAFE). Appendix A in Stock assessment and fishery evaluation report for groundfish resources of the Gulf of Alaska. North Pacific Fishery Management Council, Anchorage.
- Manning, E., and J. Little. 2000. Entire peninsula declared rural. Anchorage Daily News, May 5.
- Meyer, S. C. 1994. The recreational halibut fishery in Southcentral Alaska (area 3A) with 1993 harvest composition: a report to the International Pacific Halibut Commission. Alaska Department of Fish and Game, Sport Fish Division, Special Publication No. 94-1, Anchorage, Alaska.
- Mills, M. J. 1994. Harvest, catch, and participation in Alaska sport fisheries during 1993. Alaska Department of Fish and Game, Sport Fish Division, Fishery Data Series No. 94-28, Anchorage.
- Mills, M. J., and A. L. Howe. 1992. An evaluation of estimates of sport fish harvest from the Alaska statewide mail survey. Alaska Department of Fish and Game, Division of Sport Fish, Special Publication No. 922, Anchorage.
- (NPFMC) North Pacific Fishery Management Council. 2000. Draft environmental assessment/regulatory impact review/initial regulatory flexibility analysis for a regulatory amendment to implement management measures under a guideline harvest level and/or moratorium for halibut in areas 2C and 3A. North Pacific Fishery Management Council, Anchorage.
- Vincent-Lang, D. 1998. Area management report for North Gulf of Alaska recreational groundfish fisheries, 1997. Alaska Department of Fish and Game, Sport Fish Division, Fishery Management Report No. 98-2, Anchorage.

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