

Fishery Data Series No. 98-20

Harvest Estimates for Selected Marine Sport Fisheries in Southeast Alaska During 1997

by

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Alaska Department of Fish and Game

Division of Sport Fish



Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
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 ₀
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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IN SOUTHEAST ALASKA DURING 1997**

by
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ABSTRACT

Creel surveys of the Juneau, Ketchikan, and Sitka marine sport fisheries for chinook salmon *Oncorhynchus tshawytscha* were conducted during 1997. Estimates from these surveys were necessary to provide data for inseason management of the chinook salmon sport fishery in Southeast Alaska to meet an allocation determined by the Alaska Board of Fisheries. Dockside interviews of boat-parties completing trips were used to estimate angler effort for and total catch and harvest of chinook salmon. Harvest and total catches of other Pacific salmon and trout *Oncorhynchus* species, Pacific halibut *Hippoglossus stenolepis*, lingcod *Ophiodon elongatus*, rockfish *Sebastes* species, and Dolly Varden *Salvelinus malma* were also estimated. In addition, harvests of Dungeness crab *Cancer magister* and shrimp *Pandalus* species were estimated in Ketchikan; while harvest of king, Dungeness, and Tanner crab (*Paralithodes* species, *Cancer magister*, and *Chionoecetes* species, respectively) were estimated in Juneau. The contributions of hatchery and wild tagged stocks of chinook salmon and coho salmon *Oncorhynchus kisutch* to these sport fisheries were estimated from coded wire tag recovery information. Coded wire tag sampling programs conducted at Petersburg, Wrangell, and Craig also provided hatchery and wild tagged stock contribution estimates.

The estimated harvest of chinook salmon was 37,047 (SE = 1,767) in the combined Ketchikan, Sitka, and Juneau boat sport fisheries. Harvests of chinook salmon were slightly more than half of the long-term average in the Ketchikan fishery, above average in the Juneau fishery, and 265% of the long-term average in the Sitka fishery. Hatcheries in British Columbia, Washington, and Oregon produced about 32% of the monitored chinook salmon harvest, with an additional 15% of the total harvest of Alaska hatchery origin. Alaska hatcheries produced 34% of the chinook salmon harvest in Ketchikan, 22% in Juneau, and 11% in Sitka. Non-Alaskan hatcheries accounted for 44% of the chinook salmon harvest in Sitka but produced only an additional 2% of the harvest in Ketchikan, and 4% in Juneau. Coded wire tag sampling in Petersburg, Wrangell, and Craig revealed that chinook salmon from Alaska hatcheries contributed about 17% , 6% and 4% of the harvest, respectively.

An estimated 57,470 (SE = 4,423) coho salmon, 22,271 (SE = 2,099) pink salmon *Oncorhynchus gorbuscha*, 42,382 (SE = 2,502) Pacific halibut, and 18,097 (SE = 1,298) rockfish were also harvested in the combined Ketchikan, Juneau, and Sitka marine boat fisheries. Hatcheries produced 42%, 17% and 16% of the coho salmon harvest in Ketchikan, Juneau, and Sitka, respectively. The Pacific halibut harvest of 12,547 (SE = 1,327) in Juneau was slightly above the long-term average, the Ketchikan harvest of 7,983 (SE = 806) was well below average, and the Sitka harvest of 21,852 (SE = 1,962) was the highest recorded and nearly twice the long-term average. Shellfish effort was above average in the Juneau and Ketchikan fisheries. Dungeness crab harvest was above average in Juneau but below average in Ketchikan.

Key words: Creel survey, angler effort and harvest, harvest per unit effort, age composition, length-at-age estimation, round weight, boat sport fishery, hatchery, enhancement, coded wire tag, chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, salmon, *Oncorhynchus*, Pacific halibut, *Hippoglossus stenolepis*, Dolly Varden, *Salvelinus malma*, lingcod, *Ophiodon elongatus*, rockfish, *Sebastes*, Dungeness crab, *Cancer magister*, Tanner crab, *Chionoecetes* species, king crab, *Paralithodes* species, shrimp, *Pandalus* species, Juneau, Ketchikan, Sitka, Petersburg, Wrangell, Craig, Southeast Alaska.

INTRODUCTION

The waters of Southeast Alaska support commercial, sport, personal use, and subsistence fisheries for a variety of salmonid, bottomfish, and shellfish species. In terms of effort, the largest sport fishery in Southeast Alaska is the Juneau marine boat fishery, but other important marine boat sport fisheries occur around Ketchikan, Sitka, Petersburg, Wrangell, Craig, and Haines (Figure 1).

Data on sport harvests of fish species in Southeast Alaska have been collected both by postal surveys and by various onsite creel surveys. The Statewide Harvest Survey (SWHS) is a postal survey which has provided annual estimates of sport effort and harvest by area since 1977 (Howe et al. 1997). This statewide survey has been an economical means of comprehensively monitoring often remote sport fisheries, and SWHS estimates are used for official regional and statewide sport harvests. The SWHS estimates, however, cannot be used directly for inseason management because estimates for a given year are not available until the following summer.

Estimates from onsite creel surveys, however, can be used for inseason management and can also be used to gather a variety of other biological and fishery performance data. Creel surveys, however, are relatively expensive and usually less comprehensive than the SWHS. For instance, it is virtually impossible to survey all access points into the sport fishery for chinook salmon *Oncorhynchus tshawytscha* in Southeast Alaska, which remains open year-round in nearly all marine waters. In fisheries where comparisons of harvest estimates from the SWHS and onsite creel surveys are possible, the two surveys have shown very similar results (Mills and Howe 1992).

Expansion of the onsite creel survey program in Southeast Alaska was necessary beginning in 1992 to monitor sport harvests of chinook salmon on an inseason basis. The Alaska Board of Fisheries allocated the Pacific Salmon Treaty catch quota for chinook salmon in Southeast Alaska between the sport and commercial fisheries in March of 1992. They also passed a chinook salmon management plan for the sport fishery in

Southeast Alaska which required inseason monitoring of the sport fishery to ensure the allocation was not exceeded.

In order to monitor the entire Southeast Alaska chinook salmon fishery with adequate precision to ensure compliance with the sport fishery allocation, it was determined that creel surveys or catch sample programs were needed in the Ketchikan, Craig, Petersburg, Wrangell, Sitka, and Juneau boat fisheries during the major portion of the fishery for chinook salmon. In 1996, 86% of the total sport harvest of chinook salmon of Southeast Alaska occurred in the SWHS areas represented by these fisheries (Howe et al. 1997). Sport harvests in other SWHS areas (Haines/Skagway, Glacier Bay, and Yakutat) were determined to be too small or too dispersed to be effectively monitored with onsite programs.

In addition to total harvest estimates for the sport fishery, estimates of the number of Alaska hatchery chinook salmon taken were also necessary since most of this harvest does not count toward the sport fishery allocation. Sampling of sport-harvested chinook salmon for coded wire tags by creel samplers was necessary to provide this information, as a portion of all hatchery releases of chinook salmon in Southeast Alaska are coded wire tagged. Several terminal sport fisheries for Alaska hatchery fish in the Petersburg and Juneau areas were not monitored with creel surveys, as these harvests do not count toward the sport allocation, and post-season estimates from the SWHS will be adequate to document harvests within these fisheries.

Inseason estimates of the harvest of chinook salmon for all of Southeast Alaska were obtained by combining information from past SWHS and onsite creel surveys. This report, however, will only present information from the onsite creel surveys conducted in 1997, because current estimates of total harvests will be revised when final SWHS estimates are completed.

Creel survey information from the marine boat sport fisheries is used for a variety of other management and reporting purposes. Coho salmon *Oncorhynchus kisutch* harvests by the boat sport fisheries are also of special interest, as

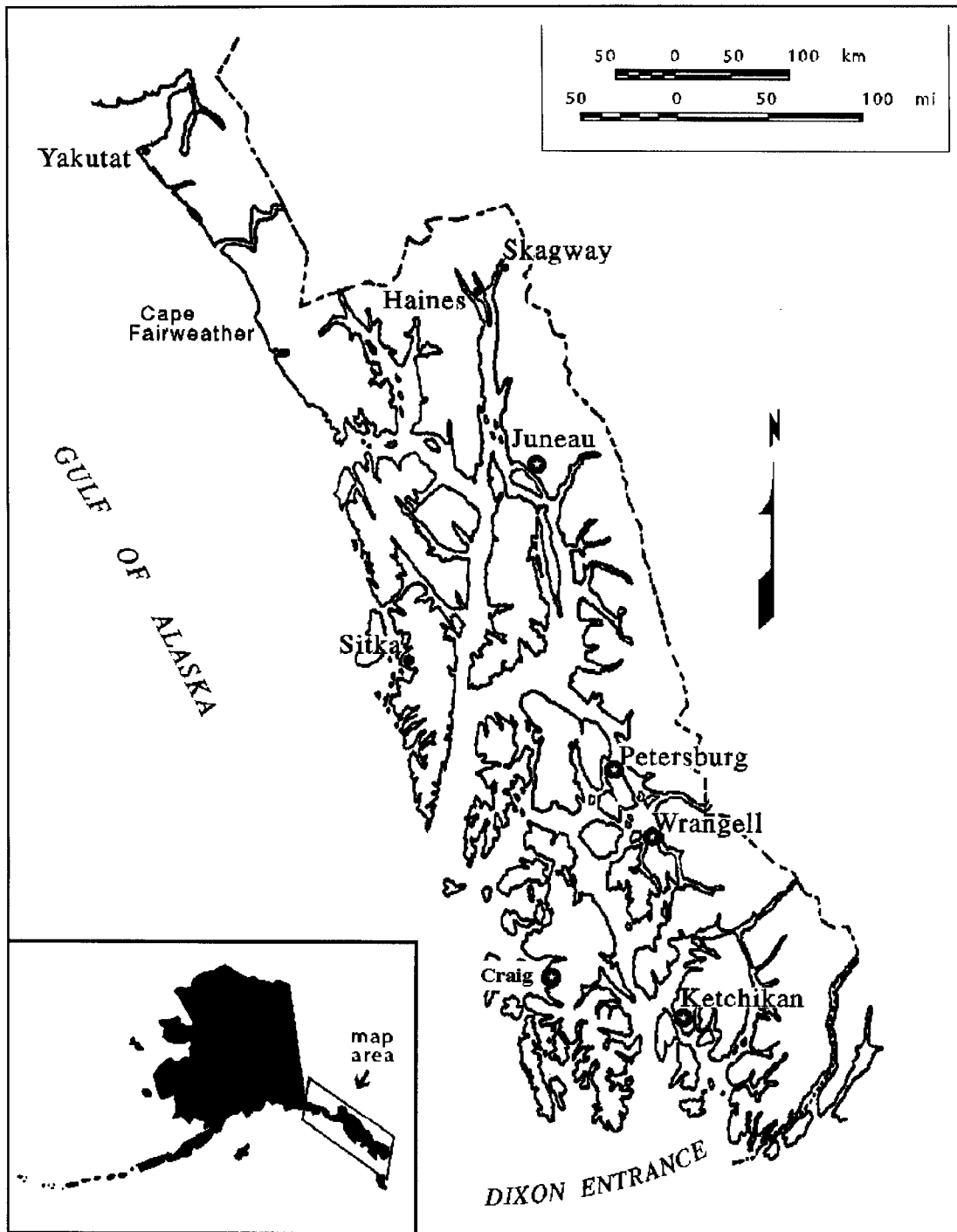


Figure 1.—Location of Juneau, Sitka, Petersburg, Wrangell, Ketchikan, and Craig in Southeast Alaska.

coho salmon management has become another high priority within the region. Harvest per unit effort (HPUE) data for coho salmon in marine boat recreational fisheries, along with HPUE data

from commercial troll and net fisheries, are used to monitor the relative abundance and migratory patterns of coho salmon. Analyses of coded wire tag data from coho salmon harvested in these

sport fisheries are used for determinations of stock composition.

Creel survey effort and harvest information on the Pacific halibut *Hippoglossus stenolepis* fishery is provided to the North Pacific Fisheries Management Council during their consideration of proposed changes to sport fishing regulations and in resolving allocation issues. Estimated weight of the sport catch of Pacific halibut in Alaska is reported to the International Pacific Halibut Commission (IPHC) on an annual basis.

The personal use or sport harvest of shellfish is a very important activity, both for residents of Southeast Alaska and for visitors to the region. Shellfish harvest information is needed so that the Department, in conjunction with the Board of Fisheries, will have the necessary tools to take a more active role in managing these fisheries. Data on the harvest of shellfish in Southeast Alaska have been gathered from onsite creel surveys since 1988.

This report presents the findings of creel surveys of marine boat sport fisheries conducted in 1997 by the Division of Sport Fish of the Alaska Department of Fish and Game (ADF&G) in the Ketchikan, Juneau, and Sitka areas. Also covered are the results from coded wire tag sampling programs conducted at Petersburg, Wrangell, and Craig. Results from creel surveys in the Haines area and other sport fisheries in Southeast Alaska are presented in other ADF&G Fishery Data Series reports (e.g., Beers 1997, Ericksen 1997).

REGULATIONS

The daily bag and possession limit in marine waters of two chinook salmon $\geq 28"$ was reduced by emergency order (E.O. #1-13-97) to one chinook salmon $\geq 28"$ from 7 July through 31 December 1997. This regulation was enacted to limit sport harvests to a management target of 53,800 treaty chinook salmon. There was an annual limit of four chinook salmon for non-residents only, and charter vessel operators and crew members were prohibited from retaining king salmon while clients were on board.

The following marine terminal areas (i.e., areas near hatcheries or hatchery release sites) were regulated by emergency orders to harvest surplus hatchery-produced chinook salmon:

- Emergency order (E.O.#1-3-97) increased the chinook salmon bag and possession limit to three $\geq 28"$ and six $< 28"$ in Wrangell Narrows terminal area near Petersburg from 1 June through 1 August 1997.
- Emergency order (E.O.#1-7-97) increased the chinook salmon bag and possession limit to two $\geq 28"$ and two $< 28"$ in Eastern Passage near Wrangell from 14 June through 1 September 1997.
- Emergency order (E.O.#1-8-97) increased chinook salmon bag and possession limits to two $\geq 28"$ and two $< 28"$ for parts of Auke Bay, Fritz Cove, and Gastineau Channel near Juneau from 14 June through 31 August 1997.
- Emergency order (E.O.#1-10-97) increased chinook salmon bag and possession limits to two $\geq 28"$ and two $< 28"$ in Silver Bay terminal area near Sitka from 15 June through 1 August 1997.

General bag limits for salmon species other than chinook salmon were six fish per day, 12 in possession for fish 16" or more in length, except that conservation concerns for coho salmon resulted in the following regulations:

- Emergency order (E.O.#1-23-97) reduced the coho salmon bag limit to three fish and the possession limit to six fish in Cross Sound, Icy Strait, lower Lynn Canal, Stephens Passage, and Gastineau Channel near Juneau from 1 September through 31 December 1997. Taku Inlet was also closed to the harvest of coho salmon. E.O.#1-24-97 increased the coho bag limit to six fish in part of the Gastineau Channel from 5 September through 31 December 1997 to provide for increased harvests of returning hatchery coho salmon.
- On 13 September 97, emergency order (E.O.#1-25-97) increased the area of the

three coho salmon bag limit restriction surrounding Juneau to include additional areas of Lynn Canal and Stephens Passage. This emergency order also increased the area of the coho salmon closure near Taku Inlet and closed Berners Bay to coho salmon fishing

- Emergency order (E.O.#1-26-97) reduced the coho salmon bag limit to three fish and the possession limit to six fish in Sitka Sound and Salisbury Sound, and closed Silver Bay to retention of coho salmon from 14 September through 31 December 1997.

The Pacific halibut bag limit remained at two fish per day, four in possession. The bag and possession limit for lingcod *Ophiodon elongatus* was two per day, four in possession during the open season from 1 May through 30 November 97. The lingcod bag limit for nonresidents in Sitka Sound was 1 per day, 2 in possession. Emergency order (E.O.#1-6-97) also closed "the Pinnacles" off Mount Edgecumbe near Sitka to the taking of lingcod from 10 June through 30 November 1997. Anglers were limited to five pelagic rockfish *Sebastes* per day, 10 in possession, and five non-pelagic rockfish, 10 in possession. Only two of the nonpelagic rockfish per day (four in possession) could be yelloweye rockfish *Sebastes ruberrimus*. Areas adjacent to Ketchikan and Sitka were further restricted to a nonpelagic rockfish bag and possession limit of three fish per day, only one of which could be a yelloweye rockfish.

Sport, personal use, and subsistence regulations for the harvest of crab in Southeast Alaska have been summarized by Suchanek and Bingham (1989, 1990). A daily bag and possession limit of two king crab *Paralithodes* was in effect for much of the Juneau area in 1997 (E.O.#1-C-9-97). The summer king crab fishery in the Juneau area in Section 11A was closed (E.O.#1-C-18-97) from 17 August through 30 September 97.

OBJECTIVES

The primary goals of the 1997 Southeast Alaska marine boat sport fishery surveys were to obtain: (1) inseason estimates of the regionwide

harvest of chinook salmon; (2) estimates of the regionwide harvest of chinook salmon of Alaska hatchery origin; and (3) estimates of the harvest of coho salmon of Alaska hatchery origin in the Ketchikan, Sitka, and Juneau fisheries. To help measure program performance and achieve project goals, the following objectives were identified:

1. Estimate total sport harvest of chinook salmon landed in the Ketchikan, Sitka, and Juneau marine boat sport fisheries from 28 April to 28 September 1997, such that each individual estimate for the surveyed period was within $\pm 20\%$ of the true value 90% of the time;
2. estimate the contribution of Alaska hatchery chinook salmon by coded wire tag lot to each fishery noted above, such that the estimated contribution in relative terms for each individual fishery¹ was within ± 25 percentage points of the true value 90% of the time;
3. estimate the relative contribution of Alaska hatchery chinook salmon by coded wire tag lot to the following marine boat sport fisheries during the noted time periods:
 - Wrangell from 28 April to 6 July
 - Petersburg from 5 May to 13 July
 - Craig from 28 April to 14 Septembersuch that the total relative contribution estimate was within ± 25 percentage points of the true value 90% of the time;
4. estimate the contribution of Alaska hatchery coho salmon by coded wire tag lot to the Ketchikan, Sitka, and Juneau fisheries, such that the contribution estimate in relative terms for each individual fishery was within ± 25 percentage points of the true value 90% of the time; and
5. estimate the relative contribution of Alaska hatchery coho salmon by coded wire tag lot to the Craig fishery, such that the total relative contribution estimate was within ± 25 percentage points of the true value 90% of the time.

¹ Contribution in relative terms equals the contribution estimate divided by total harvest.

TASKS

In addition to meeting the primary objectives for monitoring the chinook and coho salmon fisheries (discussed above), there were a number of tasks that addressed secondary data needs. To fulfill these data needs, the additional tasks in 1997 included:

1. estimating biweekly harvest per unit effort (HPUE) for coho salmon in the Juneau, Sitka, and Ketchikan marine boat sport fisheries during the periods surveyed;
2. estimating total sport angler effort, harvest and catch of coho salmon, pink salmon *O. gorbuscha*, chum salmon *O. keta*, sockeye salmon *O. nerka*, Pacific halibut, lingcod, rockfish, and Dolly Varden *Salvelinus malma* by the Juneau, Ketchikan, and Sitka marine boat sport fisheries during the periods surveyed;
3. estimating personal use effort and harvest of Dungeness crab *Cancer magister*, Tanner crab *Chionoecetes* spp., and king crab in the Juneau and Ketchikan marine boat sport fisheries during the periods surveyed, and of shrimp landed by the Ketchikan marine boat fishery;
4. estimating the age composition and mean length-at-age of chinook salmon harvested in the Juneau and Ketchikan marine boat sport fisheries during the periods surveyed;
5. estimating average weights of Pacific halibut harvested in the Juneau, Sitka, and Ketchikan marine boat sport fisheries during the periods surveyed.

METHODS

Procedures for obtaining estimates associated with each of the study objectives were similar for each of the surveyed locations. The following sections detail procedures that were common to multiple surveys. Site-specific differences in procedures are outlined in later sections of this report.

ONSITE CREEL SURVEY ANGLER EFFORT, CATCH, AND HARVEST ESTIMATES

Direct expansion creel surveys were conducted of the Ketchikan, Sitka, and Juneau marine boat sport fisheries. The harvest of chinook salmon landed by sport anglers was estimated from information collected via stratified random multistage sample surveys. Strata were defined according to unique combinations of biweekly periods, type of day (e.g., weekday vs. weekend-holiday), time of day (early vs. late) and, in some instances, type of access location (e.g., heavy-use vs. low-use harbors).

Two general sampling designs were used within each stratum. For the Ketchikan and Juneau surveys, a three-stage sample survey was conducted. Within any stratum for these two surveys, days to sample represented the first sampling stage, and were selected at random without replacement (WOR). The various access locations at which marine boat sport anglers land their harvested fish represented the second sampling stage. As such, within any selected day within each stratum, at least two harbors were selected at random WOR for surveying. During each sampled day, a creel technician attempted to interview all exiting boat-parties² at each of the selected access locations during the sampled days within each stratum. If all boat-parties could not be interviewed, any missed boat-parties were counted. Boat-parties represented the third sampling stage in these three-stage surveys.

A four-stage sample survey was conducted at Sitka. For this survey, access locations to sample represented the first sampling stage, with days within each stratum at each sampled location representing the second stage sampling units. Periods within the sampling day represented the third sampling stage. At some sites and for some strata, only one sampling period existed; for these strata at any sampled day-location combination, the entire period was sampled. Minimally, two periods were sampled for each day-location

² A boat-party is defined as all sport anglers from one boat exiting a fishery at an access location.

combination for strata with more than one period per sampling day. Finally, boat-parties to interview represented the fourth sampling stage units in this survey.

The sampling designs for the surveys conducted in Juneau and Ketchikan were essentially equivalent to the surveys conducted in previous years at these locations (see Hubartt et al. 1994, 1995, 1996, 1997). One important access location, Clover Pass Resort near Ketchikan, could not be sampled because of access problems. The survey at Sitka represented a slight restructuring compared to the survey conducted at this location in 1994 but was the same as surveys in 1995, 1996 and 1997. In Sitka, access locations were not used as a level of stratification, and the “type of day” stratum and the definition of sampling day were modified. The reasons for continuing to use the restructured survey in Sitka were primarily directed at obtaining unbiased estimates of angler effort, catch, and harvest in the most efficient manner possible.

Data collected from each interviewed boat-party included number of rods fished, hours fished, trip type (guided or unguided), number of days fished in trip, location fished, target (e.g., salmon, bottomfish, crab or shrimp), and number of fish kept and/or released by species. Crab effort (boat-days fished and number of pots or rings fished) and harvest was recorded in all areas sampled except Sitka. In Ketchikan, numbers of shrimp harvested were also recorded in multiples of 10. All data-recording procedures were outlined in detail in site-specific Creel Technician Manuals, and computer data files and analysis programs are listed in Appendix C1.

Estimates of harvested chinook salmon at each of the three surveyed marine boat sport fisheries were calculated according to standard direct expansion equations for stratified multistage sampling designs. Mean harvest of boat-parties interviewed during a sample were expanded by the number of boat-parties counted exiting the fishery during each sample to obtain the estimates for each sample. Means across sample periods were similarly expanded by the number of periods within a sampling day to obtain the estimates at a sampled access location for the four-stage

surveys. Means across days within a sampled location were then expanded by the number of possible days, to obtain the location estimate of catch, effort, or harvest for the four-stage surveys. Finally, across-location means were expanded by the number of access locations in a stratum to obtain the stratum estimates. Across-stratum estimates of harvest were obtained by summation across strata. Estimates were obtained similarly for the three-stage designs, with the appropriate reordering of calculations. Specific calculation procedures for the point estimates and their variances are described in detail in Appendices A1 and A2.

Estimates of harvest of other species by surveyed boat anglers were estimated similarly. Additionally, estimates of the total catch (caught and released as well as caught and kept) of all species of interest were calculated in a similar manner.

BIWEEKLY ESTIMATES OF COHO SALMON HARVEST PER UNIT EFFORT

Data collected during creel surveys of the Ketchikan, Juneau and Sitka marine boat sport fisheries were used to calculate mean biweekly coho salmon harvest per unit effort (HPUE) of boat anglers in harvest per angler-hour. Harvest instead of total catch was used, because relatively few coho salmon were released, and those salmon released may not have been correctly identified to species. Estimates obtained by these procedures were indicative of the abundance of coho salmon (L. D. Shaul, Alaska Department of Fish and Game, Douglas, personal communication). Mean HPUE from these fisheries was considered to be an index of abundance under the traditional linear model:

$$hpue_k = qN + \varepsilon_k \quad (1)$$

where $hpue_k$ is the harvest per unit of effort during the k^{th} angler-trip, N is the abundance of fish, q is the catchability coefficient, and ε is a random error with mean equal to zero and variance equal to σ^2 . In this case, each angler-trip was considered a separate, replicated sample in a test fishery.

All boat-parties interviewed within each biweek surveyed at each location were treated as equally weighted test samples (i.e., ignoring strata and sampling stages). HPUE in terms of coho salmon harvested per angler-hour of effort was estimated for each biweek using the procedures outlined in Appendix A3.

HATCHERY CONTRIBUTION ESTIMATES

Creel technicians attempted to inspect each harvested chinook and coho salmon for a missing adipose fin indicating the probable presence of an internal coded wire tag (CWT). Catches of chinook salmon and coho salmon checked for clipped adipose fins were recorded as “sampled,” while catches not checked were recorded as “not sampled.” Numbers of chinook and coho salmon inspected for a clipped adipose fin were recorded, and heads from salmon with clipped adipose fins were collected and identified with a uniquely numbered cinch strap. These heads were forwarded to the ADF&G Commercial Fisheries Management and Development (CFMDD) Division coded wire tag laboratory for eventual dissection, tag removal, and decoding.

Information from the sampling programs as well as the coastwide coded wire tag database was used to estimate the contributions of both Alaskan and non-Alaskan hatchery chinook salmon according to procedures described by Bernard and Clark (1996). Since not all hatchery releases from Oregon, Washington, and Idaho are coded wire tagged, the estimates of non-Alaskan contributions should be considered as minimal estimates.

The contribution of chinook and coho salmon with a particular tag code to the marine fisheries surveyed was estimated using procedures outlined in Appendix A4, which essentially followed the approach proposed by Bernard and Clark (1996).

ADDITIONAL CODED WIRE TAG SAMPLING

Technicians sampled catches of chinook and coho salmon for the presence of a clipped adipose fin from boat parties returning to Wrangell harbors 28 April through 6 July, to Petersburg harbors

5 May through 13 July, and to Craig harbors from 28 April through 14 September. Some additional sampling for adipose finclipped fish was also conducted in Ketchikan from 21 July to 28 September, and in Juneau from 20 May through 27 June and again from 31 July through 14 September. Specific equations for estimating the relative contributions of hatchery stocks are detailed in Appendix A4.

AGE, LENGTH, AND WEIGHT ESTIMATES

Estimates of Chinook Salmon Age Composition and Mean Length-at-age

As time permitted, chinook salmon harvested by anglers surveyed in the sampled marine boat sport fisheries were sampled for scales for age determination. Three scales were taken from the preferred area (Welanders 1940 and INPFC 1958) of each chinook salmon sampled. Scales were then mounted on gum cards, and impressions were made in cellulose acetate (Clutter and Whitesel 1956). The ages were determined by reading the scales using procedures designed by Van Alen and McPherson (Olsen 1995). Lengths in millimeters (tip of snout to fork of tail) of these chinook salmon were also recorded.

For the estimation of age composition of the harvest and for the estimation of mean length-at-age, all data collected from harvested chinook salmon within each of these fisheries were treated as one sample (i.e., ignoring internal stratification and sampling stages). Age composition estimates were calculated from the sample data using the procedures outlined in Cochran (1977). Estimates of mean length by age group of chinook salmon sampled from the harvest were calculated following procedures outlined by Sokal and Rohlf (1981). Each survey's entire sample was used in an unweighted fashion to obtain the length-at-age statistics.

Pacific Halibut Harvest by Weight

As time permitted, Pacific halibut landed by boat anglers interviewed were sampled by recording total lengths in millimeters. To obtain representative samples, creel survey personnel were instructed to measure all halibut in the creel and

not to record data from any parties who had already cleaned part of their harvest. Procedures as outlined by Quinn et al. (1983) were used to convert length of each Pacific halibut sampled to round weight in pounds. The mean round weight of the sampled halibut was then multiplied by harvest to estimate total weight by fishery.

ASSUMPTIONS

The assumptions necessary for estimates of angler effort, catch, harvest, and HPUE from these surveys to be unbiased were:

1. Anglers accurately reported their hours of fishing effort and the number by species of fish harvested and released.
2. No significant number of boat-parties returned between evening civil twilight (i.e., one-half hour after sunset) and the beginning of early-day surveys, or at access locations other than those surveyed.

In addition to the above assumptions, the following conditions must be met for unbiased estimates of contributions of CWT stocks to the harvest:

3. Relative contributions of different stocks of salmon associated with a CWT release lot to the harvest did not vary appreciably within a biweekly period, or that fish were sampled proportionally throughout the biweekly period.

Similarly, the following assumptions must be true for unbiased length-at-age and age composition estimates:

4. Length-at-age and age composition did not vary substantially within the sampling season.
5. Measured fish were representative of the entire harvest.

RESULTS

Detailed tables presenting total estimates of finfish effort, harvest, and catch for all species monitored in the Juneau, Sitka, and Ketchikan areas, as well as shellfish effort and harvest, can be found in Appendices B1 through B3.

Appendices B4 through B6 present biweekly and total estimates and variances for effort, harvest, and catch for all species monitored for each boat fishery surveyed. Summary data from catch sampling programs are presented in Appendices B7 (Petersburg), B8 (Wrangell), and B9 (Craig).

ANGLER EFFORT

An estimated 712,362 (SE = 21,309) angler-hours of effort were expended in the Ketchikan, Sitka, and Juneau marine boat sport fisheries during the time periods sampled (Table 1). Seventy-two percent of the total effort in angler-hours was targeted on salmon in Ketchikan, 74% in Juneau, and 70% in Sitka. Bottomfish (primarily Pacific halibut) were the other major target of anglers. Major salmon derbies in Ketchikan, Juneau, and Sitka increased the amount of effort targeted on salmon, as 13%, 7%, and 12% of the total salmon fishing effort, respectively, occurred during these short time periods.

CHINOOK SALMON FISHERIES

An estimated 37,047 chinook salmon (SE = 1,767) were harvested in the Ketchikan, Sitka, and Juneau marine boat sport fisheries (Table 2). Relative precisions of the estimated chinook salmon harvests were within our goal of $\pm 20\%$ of the true value 90% of the time at all locations. About 70% (25,850) of the monitored harvest of chinook salmon was taken in the Sitka fishery, the Juneau fishery accounted for an additional 21% of the harvest, and 9% was taken in the Ketchikan fishery. Most of the chinook salmon harvested were at least 28" in length, but an estimated 130 small (<28") chinook salmon were also harvested.

Harvest of chinook salmon in the Ketchikan King Salmon Derby constituted 15% of the total chinook salmon harvest in the Ketchikan marine fishery, whereas only 6% of the chinook salmon harvest in the Juneau marine boat sport fishery was taken during the Juneau Golden North Salmon Derby (Table 2). Anglers entered a total of 716 chinook salmon in the Ketchikan and Juneau derbies from a harvest of 947 fish during the derby time periods.

Table 1.—Summary of estimated total and derby angler effort by target for the Ketchikan, Sitka, and Juneau marine boat sport fisheries during 1997.

TOTAL EFFORT BY TARGET AND TIME PERIOD					
		Ketchikan 4/28–9/28	Juneau 4/28–9/28	Sitka 4/28–9/28	Total
Boat-hours		76,599	120,283	71,494	268,376
	SE	4,388	5,032	3,465	6,681
Salmon-hours		144,735	226,291	145,114	516,140
	SE	9,805	10,411	7,506	16,151
Bottomfish-hours ^a		55,242	78,435	61,711	195,388
	SE	4,147	6,416	4,573	8,903
Angler-hours ^b		199,977	305,097	207,288	712,362
	SE	11,631	14,316	10,670	21,309
% salmon-hours ^c		72%	74%	70%	72%

DERBY EFFORT BY TARGET AND TIME PERIOD					
		Ketchikan 5/24–26, 5/31, 6/01, 6/07–08	Juneau 8/22–24	Sitka 5/24–26, 5/31,6/01	Total
Boat-hours		11,051	7,837	9,834	28,722
	SE	1,351	992	1,280	2,109
Salmon-hours		23,475	20,267	22,201	65,943
	SE	1,692	2,705	2,554	4,552
Bottomfish-hours		1,811	620	2,674	5,105
	SE	185	135	471	523
Angler-hours		25,286	20,887	24,875	71,048
	SE	2,706	2,751	2,765	4,747
% of total salmon fishery ^d		13%	7%	12%	10%

^a Includes hours fished for Pacific halibut, rockfish, and other bottomfish.

^b Includes all targeted and non-targeted effort.

^c (salmon-hours/total angler-hours) * 100.

^d (derby salmon-hours/total salmon-hours) * 100.

Anglers entered 1,826 chinook salmon in the Sitka Salmon Derby from a total harvest of 4,138 chinook salmon during the derby time period. In the Petersburg Salmon Derby, 264 chinook salmon were entered.

About 22% of the estimated harvest of chinook salmon in the Ketchikan boat fishery was sampled for coded wire tags (Appendix B10); 22% of the estimated harvest of chinook salmon was sampled in the Juneau boat fishery, and 16% in Sitka.

An estimated 15% of chinook salmon harvested in the Ketchikan, Sitka, and Juneau marine boat fisheries were of Alaska hatchery origin (Table 3). Contribution estimates of Alaska hatchery

chinook salmon were within ± 25 percentage points of the true value 90% of the time at all locations (Table 3). Relative precision of Alaska hatchery contribution estimates at all sites ranged from 4% to 14%. Large numbers of hatchery fish also originated in British Columbia, Washington, and Oregon, and, in aggregate, 47% of the chinook salmon harvested in these three fisheries originated in hatcheries.

Eleven percent of the harvest of chinook salmon in Sitka came from Alaska hatcheries, and the overall hatchery contribution was 55% of the harvest. Most Alaska hatchery chinook salmon harvested in Sitka were produced at the Medvejie

Table 2.—Summary of estimated harvests of chinook salmon in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed during 1997.

CHINOOK SALMON HARVESTS						
Sport fishery	Time period	Harvest of chinook $\geq 28''$	Harvest of chinook $< 28''$	Combined	SE	Relative precision ($\alpha = 0.10$)
Ketchikan	4/28–9/28	3,179	66	3,245	301	15%
Juneau	4/28–9/28	7,900	52	7,952	609	13%
Sitka	4/28–9/28	25,838	12	25,850	1,631	10%
Total		36,917	130	37,047	1,767	8%

DERBY CHINOOK SALMON HARVESTS								
Major salmon derbies	Time period	Chinook $\geq 28''$		Chinook $< 28''$		Total harvested		
		Entered	Total ^a	Entered	Total ^a	Number	SE	% ^b
Ketchikan King Salmon Derby	5/24–26, 5/31, 6/01, 6/07–08	316	475	0	0	475	26	15
Juneau Golden North Salmon Derby	8/22–8/24	398	467	2	5	472	26	6
Sitka Salmon Derby	5/24–26, 5/31, 6/01	1,826	4,138	0	0	4,138	202	8
Petersburg Salmon Derby ^c	5/23–5/26	371		0				

^a Includes entered and take-home harvests.

^b (total derby harvest/total area harvest) * 100.

^c Number taken home was not estimated.

hatchery. In Ketchikan, 34% of the harvest of chinook salmon was from Alaska hatcheries, and the overall hatchery contribution to the Ketchikan fishery totaled 35%. Most of the Alaska hatchery chinook salmon taken in Ketchikan originated from Whitman Lake and Carroll Inlet (release site only) hatcheries operated by the Southern Southeast Regional Aquaculture Association. About 22% of the chinook salmon harvest in the Juneau boat fishery was of Alaska hatchery origin. Most of the Alaska hatchery fish taken in Juneau came from the Gastineau, Snettisham, Crystal Lake, Little Port Walter, and Hidden Falls hatcheries. Detailed hatchery contribution estimates by tag code appear in appendices for the Ketchikan fishery (Appendix B11), Juneau fishery (Appendix B12), and Sitka fishery (Appendix B13).

In the Petersburg marine boat sport fishery, 438 chinook salmon were examined for clipped adipose fins, and about 21% of the sampled fish came from hatcheries (Appendix B14). The largest contributor to the Petersburg harvest was the Crystal Lake hatchery. About 6% of the 393 chinook salmon sampled from the Wrangell marine boat sport fishery came from the Crystal Lake/Earl West Cove and Carroll Inlet release sites (Appendix B15). Overall, 49% of the 375 chinook salmon sampled in Craig came from hatcheries, but the only Alaska hatchery contributor was the Medvejie hatchery near Sitka (Appendix B16).

In total, 1,525 chinook salmon were successfully aged from the six fisheries sampled (Table 4; Appendix B17). About 23% of chinook salmon

Table 3.—Contributions of hatchery chinook salmon to the Ketchikan, Sitka, and Juneau marine boat sport fisheries of Southeast Alaska, 1997.

Region or hatchery	Marine boat sport fishery			Total
	Juneau (4/28–9/28)	Ketchikan (4/28–9/28)	Sitka (4/28–9/28)	
Oregon	0	0	984	984
Washington	0	20	1,640	1,660
British Columbia	325	24	8,752	9,101
Non-Alaskan total	325	44	11,376	11,745
SE	305	21	2,375	2,395
Alaska				
Bell Island	0	7	0	7
Carroll Inlet	35	622	24	681
Crystal Lake	68	0	11	79
Crystal Lake/Earl West Cove	53	0	80	133
Deer Mountain	0	34	0	34
Elmendorf	0	0	3	3
Gastineau	753	0	0	753
Hidden Falls	166	0	21	187
Jerry Myers	7	0	0	7
Little Port Walter	97	0	121	218
Medvejie	0	0	2,419	2,419
Neets Bay	0	73	22	95
Sheldon Jackson	0	0	10	10
Snettisham	549	0	16	565
Tamgas Creek	0	58	0	58
Whitman Lake	2	265	28	295
Alaskan total	1,730	1,059	2,755	5,544
SE	285	260	647	753
Relative precision ^a	6	13	4	3
Total all areas	2,430	1,576	2,966	6,972
SE	358	512	675	920
Relative precision ^a	9	13	16	11
Chinook salmon harvest	7,952	3,245	25,850	37,047
SE	609	301	1,631	1,767
% Alaska hatchery	22	34	11	15
% total hatchery	26	35	55	47

^a $((SE * 1.645) / \text{total harvest}) * 100, \alpha = 0.10$.

salmon sampled lacked a freshwater annulus (age-0.), which usually indicates non-Alaskan origin (Van Alen 1988). Saltwater ages varied considerably; an estimated 99% of the chinook salmon harvested during the Juneau Golden North Salmon Derby were age-.3 or less, whereas only 17% of chinook salmon sampled in the Petersburg fishery were age-.3 or less. The sampled harvest across all surveyed fisheries consisted of 43% males and 57% females. Mean length-at-age of sampled chinook salmon varied only slightly among the fisheries surveyed (Appendix B18). In

general, fish of a given age were smaller in Juneau than in the other fisheries.

COHO SALMON FISHERIES

Harvests of coho salmon in the Ketchikan, Sitka, and Juneau fisheries totaled an estimated 57,470 fish (SE = 4,423) (Table 5). The only monitored derby in which coho salmon were heavily targeted was the Juneau Golden North Salmon Derby, and an estimated 1,919 coho salmon (SE = 62) were taken during this event (Appendix B2).

Table 4.—Summary of the age composition of chinook salmon sampled in selected marine sport fisheries in Southeast Alaska during 1997.

FRESHWATER AGE COMPOSITION					
Sport fishery	-----Age 0.-----		-----Age 1. or more-----		Total sampled
	Sample size	Percent	Sample size	Percent	
Ketchikan	35	24	109	76	144
Juneau non-derby	0	0	374	100	374
Juneau Derby ^a	8	10	72	90	80
Sitka	259	40	393	60	652
Petersburg	8	8	91	92	99
Wrangell	5	4	116	96	121
Craig	33	60	22	40	55
Total	348	23	1,177	77	1,525

SALTWATER AGE COMPOSITION					
Sport fishery	-----Age .3 or less-----		-----Age .4 or more-----		Total sampled
	Sample size	Percent	Sample size	Percent	
Ketchikan	99	69	45	31	144
Juneau non-derby	123	33	251	67	374
Juneau Derby ^a	77	96	3	4	80
Sitka	431	66	221	34	652
Petersburg	17	17	82	83	99
Wrangell	39	32	82	68	121
Craig	46	84	9	16	55
Total	832	55	693	45	1,525

^a Juneau Golden North Salmon Derby.

Table 5.—Summary of estimated catch and harvest of coho salmon in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed 28 April–28 September 1997.

Sport fishery	TOTAL HARVEST		TOTAL CATCH		% retained
	Estimate	SE	Estimate	SE	
Ketchikan	25,379	3,483	16,841	2,900	82
Juneau	15,540	1,354	3,276	941	98
Sitka	23,757	1,428	5,224	1,637	95
TOTAL	69,734	4,000	25,341	3,461	92

Harvests of hatchery coho salmon were estimated from an overall sample of 15% of the coho salmon harvest (Appendix B19). Estimates of coho salmon hatchery contributions by tag code and time period are presented in Appendix B20 for the Ketchikan fishery, Appendix B21 for the Juneau fishery, and Appendix B22 for the Sitka

fishery. An estimated 12,782 (SE = 2,392) hatchery coho salmon were taken in the combined Ketchikan, Sitka, and Juneau fisheries (Table 6). Wild stocks of coho salmon dominated the harvest in all areas, but hatchery contributions ranged from 16% in Sitka to 17% in Juneau and 42% in Ketchikan. A few hatchery coho salmon taken in Sitka and Ketchikan originated in British Columbia hatcheries. The Neets Bay hatchery contributed the most coho salmon to the Ketchikan fishery, while Gastineau hatchery owned by Douglas Island Pink and Chum, Inc. contributed the most coho salmon to the Juneau fishery, and Hidden Falls hatchery was the major contributor in Sitka. About 3% of the 1,189 coho salmon examined for clipped adipose fins from the Craig marine boat sport fishery were from the Klawock River, Whitman Lake, and Crystal Lake hatcheries (Appendix B23). No coho salmon were sampled in Petersburg or Wrangell this year. Additionally, some recoveries of coho salmon from wild stocks were obtained in the Ketchikan,

Table 6.—Contributions of hatchery coho salmon to the Ketchikan, Sitka, and Juneau marine boat sport fisheries of Southeast Alaska, 1997.

Region or hatchery	Marine boat sport fishery			Total
	Juneau (4/28–9/28)	Ketchikan (4/28–9/28)	Sitka (4/28–9/28)	
British Columbia	0	13	25	38
Non-Alaskan total	0	13	25	38
SE	0	13	24	28
Alaska				
Burro Creek	9	0	0	9
Crystal Lake	0	0	106	106
Deer Mountain	0	870	41	911
Gastineau	2,113	0	0	2,113
Hidden Falls	35	0	2,099	2,134
Klawock River	0	0	538	538
Medvejie	0	0	322	322
Nakat Inlet	0	20	0	20
Neets Bay	0	3,812	990	4,802
Sheep Creek	5	0	0	5
Tamgas Creek	0	675	263	938
Whitman Lake	0	432	414	846
Alaskan total	2,162	5,809	4,773	12,744
SE	406	1,232	1,992	2,377
Relative precision ^a	5	14	11	7
Total all areas	2,162	5,822	4,798	12,782
SE	406	1,256	1,995	2,392
Relative precision	5	15	11	7
Coho salmon harvest	12,477	14,204	30,789	57,470
SE	1,066	1,901	3,849	4,423
% Alaska hatchery	17	41	16	22
% total hatchery	17	41	16	22

^a $((SE * 1.645) / \text{total harvest}) * 100, \alpha = 0.10$.

Juneau, and Sitka, and Craig fisheries (Appendices B20, B21, B22, B23). Contributions of these wild-tagged stocks were estimated only when an estimate of the tagging fraction, θ_c , was available (Appendix A4).

The biweekly harvest per unit of effort (HPUE) for coho salmon in the Ketchikan, Juneau, and Sitka fisheries reached highs of 0.361 (SE = 0.036), 0.138 (SE = 0.012), and 0.421 (SE = 0.044) coho salmon, respectively, per angler-hour of effort (Table 7). The peak in HPUE for coho salmon occurred in late September in Ketchikan and in late August for Juneau and Sitka, although Juneau's peak was more like a hill. Sitka and Ketchikan anglers experienced

higher HPUEs for coho salmon than did Juneau anglers for the peak of the season.

BOTTOMFISH FISHERIES

Most bottomfish effort in Southeast Alaska targets on Pacific halibut, and an estimated 42,382 (SE = 2,502) were harvested in Ketchikan, Sitka, and Juneau (Table 8). Estimated average round weight of Pacific halibut ranged from 19.6 pounds in Craig to 43.7 pounds in the Petersburg and Wrangell areas (Table 9). About 1,182,500 pounds of Pacific halibut were taken in Ketchikan, Sitka, and Juneau, with about 52% of this harvest landed in Sitka.

Table 7.—Harvest per unit effort (HPUE) for coho salmon (harvest per angler-hour of effort) by biweekly period in the Ketchikan, Juneau, and Sitka marine boat sport fisheries during 1997.

HARVEST OF COHO SALMON PER ANGLER-HOUR OF EFFORT ^a						
Seasonal period	Ketchikan		Juneau		Sitka	
	HPUE	SE	HPUE	SE	HPUE	SE
5/26–6/08	0.000	0.000	0.000	0.000	0.001	0.000
6/09–6/22	0.001	0.001	0.002	0.001	0.019	0.008
6/23–7/06	0.006	0.001	0.004	0.001	0.038	0.006
7/07–7/20	0.040	0.006	0.017	0.002	0.054	0.011
7/21–8/03	0.076	0.012	0.038	0.004	0.238	0.024
8/04–8/17	0.079	0.013	0.094	0.009	0.364	0.031
8/18–8/31	0.113	0.018	0.138	0.012	0.421	0.044
9/01–9/14	0.228	0.022	0.135	0.069	0.316	0.041
9/15–9/28	0.361	0.036	0.137	0.021	0.170	0.077
All periods	0.079	0.005	0.047	0.002	0.137	0.007

^a Does not include derby effort or harvest.

Table 8.—Summary of estimated catch and harvest of Pacific halibut, rockfish, and lingcod in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed 28 April–28 September 1997.

	Sport fishery	Total catch	SE	Harvest	SE	% retained
Pacific halibut	Ketchikan	11,549	1,351	7,983	806	69
	Juneau	18,248	1,954	12,547	1,327	69
	Sitka	35,370	3,435	21,852	1,962	62
	Total	65,167	4,176	42,382	2,502	65
Rockfish	Ketchikan	16,320	1,642	6,514	716	40
	Juneau	1,663	412	1,295	345	78
	Sitka	26,745	2,001	10,288	1,014	38
	Total	44,728	2,621	18,097	1,288	40
Lingcod	Ketchikan	568	117	445	92	78
	Juneau	6	5	6	5	100
	Sitka	7,854	979	6,929	866	88
	Total	8,428	986	7,380	871	88

Table 9.—Average length, round weight, and total round weight of Pacific halibut harvested in sampled Southeast Alaska marine boat sport fisheries during 1997.

Sport fishery	Survey period	Sample size	Total length		Average round weight (lb)	Estimated number harvested	Estimated total round weight (thousand lb.)
			Mean (cm)	SE (cm)			
Ketchikan	4/28–9/28	264	95.0	1.4	29.4	7,983	234.7
Juneau	4/28–9/28	221	93.1	1.5	27.3	12,547	342.5
Sitka	4/28–9/28	153	93.5	1.8	27.7	21,852	605.3
Petersburg/ Wrangell	5/01–7/14/ 4/28–7/06	113	108.4	2.4	43.7		
Craig	5/01–9/08	158	85.1	1.5	19.6		
All areas combined		909	94.2	0.8	28.7	42,382	1,182.5

Although rockfish are not a primary target of most Southeast Alaska marine boat sport anglers, an estimated 44,728 (SE = 2,621) rockfish were caught in the combined Ketchikan, Sitka, and Juneau fisheries (Table 8). Only 40% (18,097, SE = 1,288) of the rockfish caught were retained. Retention in Juneau, where few rockfish were caught, was much higher, at 78%.

Major species composition of the rockfish harvest was estimated for the Ketchikan and Sitka fisheries (Table 10). Quillback rockfish *S. maliger* (42%) and yelloweye rockfish (31%) were most frequently taken in Ketchikan. Yelloweye rockfish (57%) and black rockfish *S. melanops* (27%) composed most of the Sitka rockfish harvest. Other species in the sport harvest included copper *S. caurinus*, dusky *S. ciliatus*, and silvergrey *S. brevispinis* rockfish, along with a variety of other unidentified species. An estimated 6,929 (SE = 866) lingcod were harvested in Sitka, and 445 (SE = 92) in Ketchikan (Table 8). This species appears to be harvested in proportion to local abundance and accessibility.

OTHER SALMONID FISHERIES

Although not usually primary targets, other salmonids such as pink, chum, and sockeye salmon, and Dolly Varden were harvested in Ketchikan, Sitka and Juneau (Table 11). Pink salmon were taken in large numbers in Ketchikan, and the estimated harvest totaled 13,557 (SE = 1,938). Only 4,174 (SE = 473) pink salmon were harvested in Juneau, and the retention rate was 61% in Juneau and 46% in Sitka, in comparison to the 81% observed in Ketchikan. Harvests of both chum and sockeye salmon were much less, totaling 6,772 chum salmon and 675 sockeye salmon for the three fisheries combined. About 98% of the 357 Dolly Varden harvested were taken by Juneau anglers.

SHELLFISH FISHERIES

Shellfish effort and harvests of Dungeness, Tanner, and king crab were estimated for Ketchikan and Juneau (Table 12). Shellfish effort in boat-days for the Juneau fishery was 5,382 boat-

Table 10.—Rockfish composition in the Ketchikan and Sitka marine boat sport fisheries during 1997. (An estimated 1,295 rockfish harvested in the Juneau marine boat sport fishery were not identified by individual species.)

Rockfish species	Ketchikan		Sitka	
	Harvest ^a	%	Harvest ^a	%
Quillback	2,765	42.4	472	4.6
Dusky	149	2.3	223	2.2
Copper	401	6.2	31	0.3
Black	252	3.9	2,776	27.0
Yelloweye	1,991	30.5	5,849	56.8
Silvergrey	646	9.9	245	2.4
Other nonpelagic	241	3.7	96	0.9
Other pelagic	69	1.1	596	5.8
Total	6,514		10,288	

^a The unidentified rockfish harvest was allocated to species by expanding the appropriate percentage of harvest in the identified harvest to the total harvest.

days—more than three times that estimated for the Ketchikan fishery (1,566 boat-days). Since some effort was expended by divers, effort in boat-days is more comparable from fishery to fishery than effort in number of pots or rings fished.

Substantial numbers of Dungeness, Tanner and king crabs were harvested in the Juneau fishery, but no king crab or Tanner crab were taken in the Ketchikan area. Shrimp harvest was recorded only in Ketchikan (51,150 shrimp, SE = 3,507).

DISCUSSION

Onsite creel surveys provide data necessary for inseason management, and they also can provide detailed fishery performance and biological information difficult to obtain with postal surveys. For inseason management, the usefulness of onsite surveys lies in their consistency of method and coverage, so that inseason estimates can be compared with the Statewide Harvest Survey (SWHS) and onsite creel estimates from previous years. Because the Clover Pass access location was not sampled in the Ketchikan fishery during 1997, it is known that estimates were biased low in comparison to

Table 11.—Summary of estimated total catch and harvest of pink salmon, chum salmon, sockeye salmon, and Dolly Varden in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed 28 April–28 September 1997.

	Sport fishery	Total catch	SE	Harvest	SE	% retained
Pink salmon	Ketchikan	16,840	2,397	13,557	1,938	81
	Juneau	6,822	767	4,174	473	61
	Sitka	9,900	1,315	4,540	645	46
	Total	33,562	2,840	22,271	2,096	66
Chum salmon	Ketchikan	2,881	520	2,686	489	93
	Juneau	1,236	198	1,055	187	85
	Sitka	4,410	908	3,031	758	69
	Total	8,527	1,065	6,772	921	79
Sockeye salmon	Ketchikan	21	15	21	15	100
	Juneau	20	17	20	17	100
	Sitka	655	171	634	171	97
	Total	696	173	675	172	97
Dolly Varden	Ketchikan	0	0	0	0	0
	Juneau	745	174	351	96	47
	Sitka	49	29	6	5	12
	Total	794	177	357	96	45

previous surveys. The probable bias could have ranged up to 40%, but was more likely in the range of 20%. Therefore, in comparisons with past Ketchikan creel surveys, estimates are going to be highly affected by the bias in the 1997 estimates.

Effort, harvest and total catch estimates from the three creel surveys reported here should not be considered to encompass all of the total Southeast

Alaska marine boat sport fisheries. Overall statistics are best estimated by the SWHS (Howe et al. 1997).

The estimates for chinook salmon in the Juneau and Ketchikan fisheries are incomplete because there were no surveys of: (1) harvests occurring outside of the survey periods; (2) private moorages on the road system or remote moorages, docks, or lodges inaccessible from the road

Table 12.—Estimated effort for, and harvest of Dungeness crab, king crab, Tanner crab and shrimp in the Ketchikan and Juneau marine boat sport fisheries during 1997.

Sport fishery	Time period	Effort		Harvest			
		Boat-days	SE	Dungeness crab	Tanner crab	King crab	Shrimp
Ketchikan	4/28–9/28	1,566	267	6,224	0	0	51,150
Juneau	4/28–9/28	5,382	378	12,440	1,348	4,839	— ^a
Total		6,948	463	18,664	1,348	4,839	51,150

^a Shrimp harvest not estimated in Juneau.

system; (3) the night period from the end of civil twilight to the beginning of surveys at about 0800; and (4) boat parties which are not counted or interviewed due to being missed by creel samplers. Omission of the Clover Pass access location in Ketchikan during 1997 also had a major impact. Mills and Howe (1992) reported that SWHS estimates were generally about 10% higher than creel survey estimates for comparable surveys from the same geographic areas in Southeast Alaska.

Onsite creel surveys of the Juneau and other selected Southeast Alaska marine boat sport fisheries have been conducted every year since 1960 (Schmidt et al. 1973; Schmidt and Robards 1974, 1975; Mattson 1975; Robards 1976, 1977, 1978; Marriott et al. 1979; Schwan 1980, 1981, 1982; Neimark and Schwan 1983; Neimark 1984, 1985; Mecum and Suchanek 1986, 1987; Bingham et al. 1988; Suchanek and Bingham 1989, 1990, 1991, 1992; and Hubartt et al. 1993, 1994, 1995, 1996, 1997). These reports also present some sporadic surveys of the Ketchikan fishery, although it has been monitored for the entire spring and summer season since 1984, except for a one-year hiatus in 1985. The Sitka fishery was not surveyed in 1990, 1991, or prior to 1986, but was surveyed in the spring in 1986 and 1989, and for most of the season (April or May through August or September) in 1987, 1988, 1992, 1993, 1994, 1995, and 1996. The Petersburg and Wrangell fisheries were not surveyed in 1990 or 1991, but were consistently surveyed in the spring from 1983–1989 and during 1992, 1993, and 1994; and in Petersburg in 1995.

Juneau and Ketchikan marine boat fisheries have been consistently surveyed from approximately mid-April or early May through late September or, occasionally, early October. Among-year comparisons of angler effort and harvest for a given fishery are confounded by some variation in the time periods surveyed from year to year. Effort and harvest at either the beginning or the end of the survey season is small, however, in comparison to effort during the middle of the season. Among-year comparisons are generally valid, but the variations in survey periods should

be noted. Variances for the harvest estimates have only been generated since 1987, so it is not possible to do statistical comparisons with prior years. In the following discussion, it should be noted that in some instances it might not be possible to show a statistically significant difference between years.

ANGLER EFFORT

Angler-hours of fishing effort in the Juneau and Ketchikan marine fisheries have been relatively stable or declining for the past few years while effort in the Sitka fishery has been generally increasing (Table 13; Figure 2). Total effort in the Juneau fishery during 1997 was 14% lower than in 1996, and 15% lower than the 1983–1996 average of 357,785 angler-hours. In Ketchikan, total 1997 effort was down 21% from estimated effort in 1996, and 23% below the 1984–1996 average of 258,461 angler-hours. This apparent decline may have been due entirely to the failure to sample Clover Pass. Growth in the Sitka fishery resumed, as total effort during 1997 was 14% higher than in 1996 and was 58% higher than the 1987–1996 average. In 1997, total effort in Ketchikan and Sitka was 66% and 68%, respectively, of that expended in Juneau.

In both the Juneau and Ketchikan fisheries, estimated salmon fishing effort was below average in 1997 (Table 13; Figure 2). Bottom-fish effort was average or below in both fisheries during 1997. In Juneau, 74% of the 1997 effort targeted salmon, while 70% of Ketchikan effort targeted salmon, both slightly below average. This season, the growth noted in the Sitka fishery has been due to increased salmon effort and bottomfishing effort, above average by 57% and 61%, respectively.

CHINOOK SALMON FISHERIES

Total harvest of chinook salmon in the Juneau marine boat fishery has shown little trend over the past 14 years, whereas the Ketchikan harvest increased to a peak in 1991 and has since steadily declined to less than 25% of the 1991 peak (Table 14; Figure 3). The Juneau harvest of 7,952 chinook salmon was above average,

Table 13.—Estimated angler effort in the Juneau, Ketchikan and Sitka marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

Sport fishery	Year	Survey dates	Salmon-hours		Bottomfish-hours		Total angler-hours
			Estimate	Percent	Estimate	Percent	
Juneau	1983	4/17-10/01	236,344	74	84,259	26	320,603
	1984	4/29-9/29	246,732	77	72,090	23	318,822
	1985	4/15-9/29	269,077	79	72,381	21	341,458
	1986	4/14-10/05	240,921	76	77,165	24	318,086
	1987	3/16-9/27	307,124	76	94,658	24	401,840
	1988	4/11-9/25	254,196	72	96,188	27	351,247
	1989	4/24-9/24	287,676	77	85,354	23	373,504
	1990	4/23-9/23	300,167	78	83,106	22	383,976
	1991	4/15-9/29	324,788	82	69,475	18	394,275
	1992	4/27-9/27	301,588	78	84,718	22	388,498
	1993	4/26-9/26	270,838	77	78,820	23	349,965
	1994	4/25-9/25	320,385	83	63,398	16	384,528
	1995	4/24-9/24	265,923	81	60,158	18	326,807
	1996	4/22-9/22	287,481	81	67,555	19	355,381
	Average		279,517	78	77,809	22	357,785
	1997	4/28-9/28	226,921	74	78,435	26	305,097
	% of average		81		101		85
Ketchikan	1984	4/29-9/29	161,100	72	62,625	28	223,725
	1985	-----no comparable survey-----					
	1986	4/28-9/28	133,518	72	51,208	28	184,726
	1987	4/20-9/27	157,306	65	84,954	35	242,274
	1988	4/11-9/25	153,086	68	71,611	32	225,779
	1989	4/24-9/24	195,974	71	79,958	29	276,516
	1990	5/07-9/23	199,063	80	49,347	20	248,618
	1991	4/29-9/29	275,856	80	67,842	20	343,698
	1992	4/27-9/27	192,269	73	69,366	27	261,635
	1993	4/26-9/26	198,960	72	78,002	28	276,969
	1994	4/25-9/25	230,372	80	56,092	20	286,464
	1995	4/24-9/24	175,765	63	101,381	37	277,146
	1996	5/6-10/6	188,947	74	62,673	25	253,977
	Average		188,518	73	69,588	27	258,461
	1997	4/28-9/28	144,735	72	55,242	28	199,977
	% of average		77		79		77
Sitka	1987	4/20-9/13	33,130	56	24,266	41	58,814
	1988	4/11-9/25	35,763	65	18,493	34	54,766
	1989	4/24-7/02 ^a	34,946	84	6,177	15	41,362
	1990	no survey					
	1991	no survey					
	1992	5/11-8/30	74,183	64	40,756	35	115,031
	1993	4/26-9/26	107,184	71	44,480	29	151,829
	1994	4/25-9/25	123,971	74	43,363	26	168,146
	1995	4/24-9/24	135,866	72	51,710	28	188,000
	1996	4/22-9/22	136,585	75	45,075	25	182,513
	Average		92,383	71	38,306	29	131,300
	1997	4/28-9/28	145,114	70	61,711	30	207,288
	% of average		157		161		158

^a Not used to calculate average.

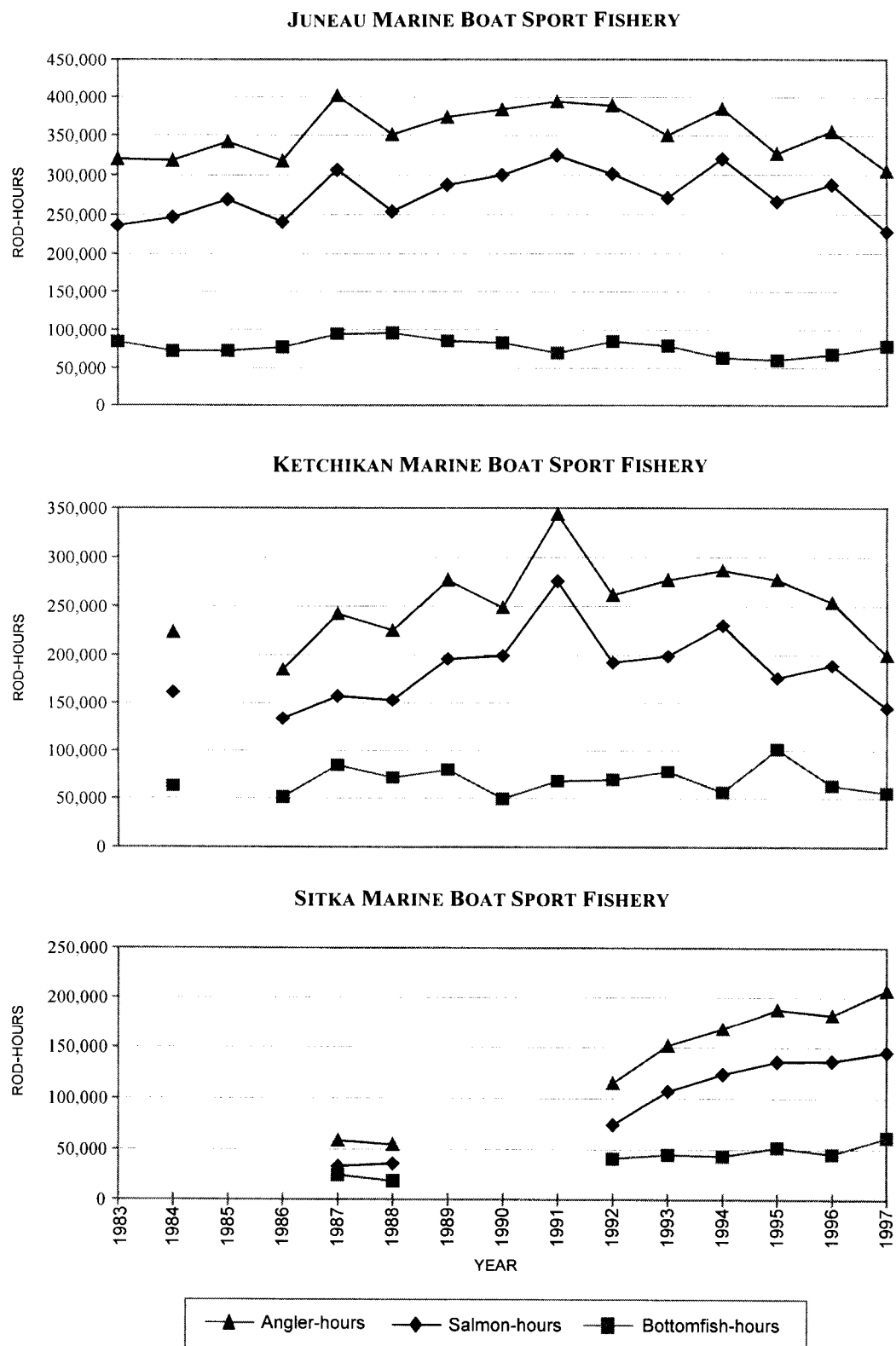


Figure 2.—Estimated angler effort in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

Table 14.—Estimated harvest of chinook salmon in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

Year	Juneau marine ^a	Juneau Golden North Derby	Ketchikan marine	Sitka marine
1983	4,316	872		
1984	6,474	855	1,820	
1985	8,133	1,222		
1986	5,050	1,073	5,006	
1987	8,893	1,005	4,723	2,466
1988	5,683	677	5,245	3,177
1989	7,074	609	5,752	
1990	7,335	493	9,869	
1991	12,234	522	12,730	
1992	7,114	603	5,670	9,588
1993	8,337	243	5,277	13,779
1994	5,819	678	3,374	13,139
1995	6,371	334	3,499	16,048
1996	8,464	784	2,931	10,078
Average	7,236	712	5,724	9,754
1997	7,952	472	3,245	25,850
% of average	110	66	57	265

^a Includes Juneau Golden North Salmon Derby harvest.

but the Ketchikan harvest was 43% below the 1984–1996 average, and the third lowest harvest recorded. Chinook harvests in the Sitka fishery had been steadily increasing through 1995, then declined 37% from the 1995 peak in 1996; they more than doubled in 1997. The 1997 Sitka harvest of 25,850 is by far the highest recorded sport harvest of chinook salmon in Southeast Alaska, a fact which emphasizes the growing importance of the Sitka fishery.

Hatchery contributions of chinook salmon to the Juneau and Ketchikan fisheries increased steadily during the late 1980s but have remained fairly consistent since about 1990 (Figure 4; Table 15). An estimated 26% of the 1997 chinook salmon harvest in Juneau originated in hatcheries, compared to the 1983–1996 average of 25%. In Ketchikan, an estimated 35% of the 1997 harvest originated in hatcheries, in comparison to the average of 47%. Harvests of Alaska hatchery chinook salmon are of higher value, because these fish do not count toward U.S./Canada Pacific Salmon Treaty catch totals.

An estimated 34% of the 1997 chinook salmon harvest in Ketchikan originated in Alaskan hatcheries, a percentage substantially higher than in Juneau or Sitka. In Juneau, an estimated 22% of the 1997 harvest originated in Alaskan hatcheries, compared to the average of 21%.

In Sitka, a higher proportion of chinook salmon originate in non-Alaska hatcheries than in Ketchikan or Juneau (Table 15; Figure 4). In 1997, the overall percentage of hatchery chinook increased in Sitka, due primarily to a large increase in the percentage of non-Alaskan hatchery chinook taken. In 1997, 55% of the Sitka harvest originated in hatcheries, 11% coming from Alaska hatcheries.

COHO SALMON FISHERIES

The 1997 harvest of 14,204 coho salmon in the Ketchikan area was 41% below the 1984–1996 average of 23,893 (Table 16), and the Juneau area harvest of coho salmon (12,477 fish) was 38% below the 1983–1996 average of 20,174. The Juneau Golden North Salmon derby harvest of

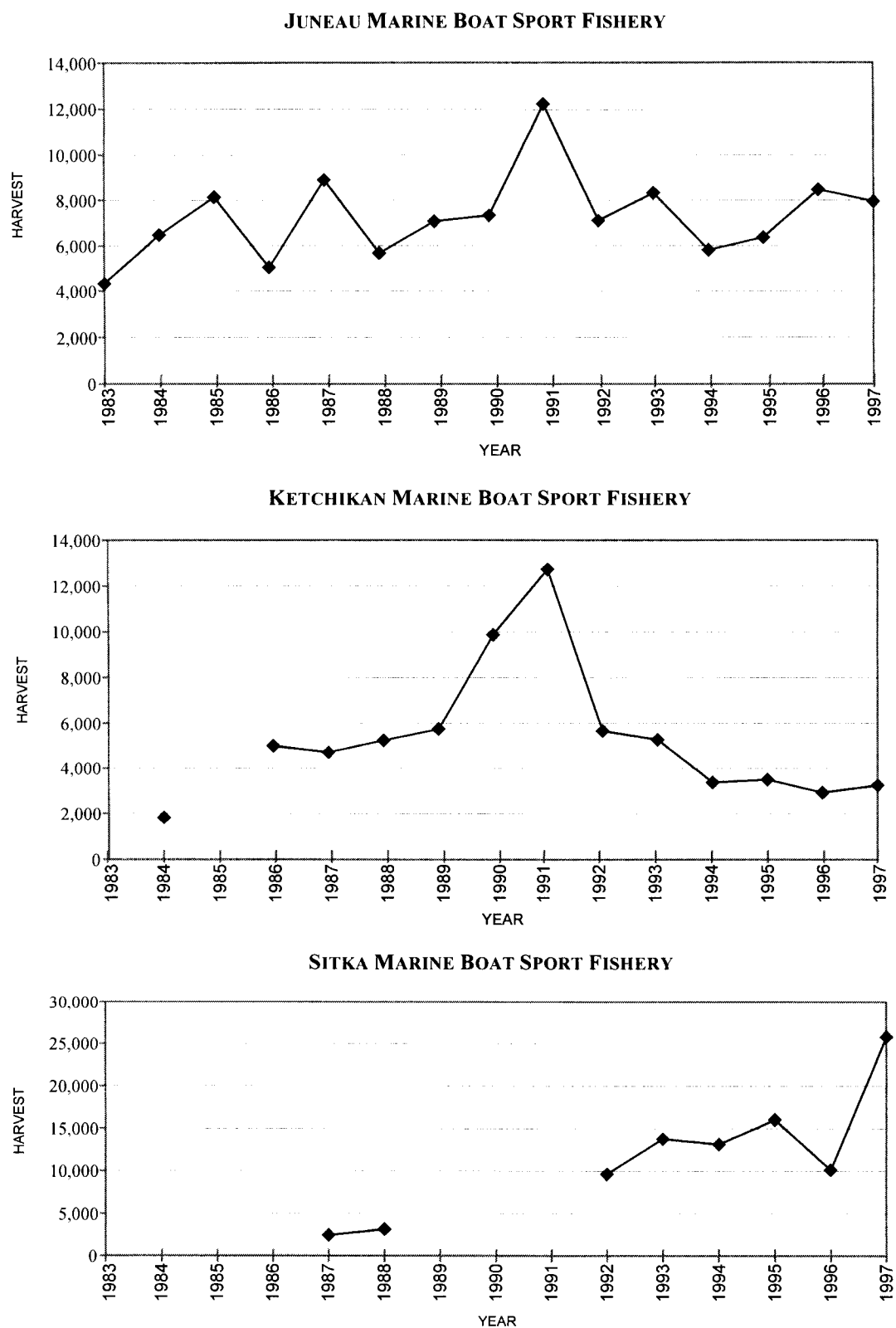


Figure 3.—Estimated harvest of chinook salmon in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys.

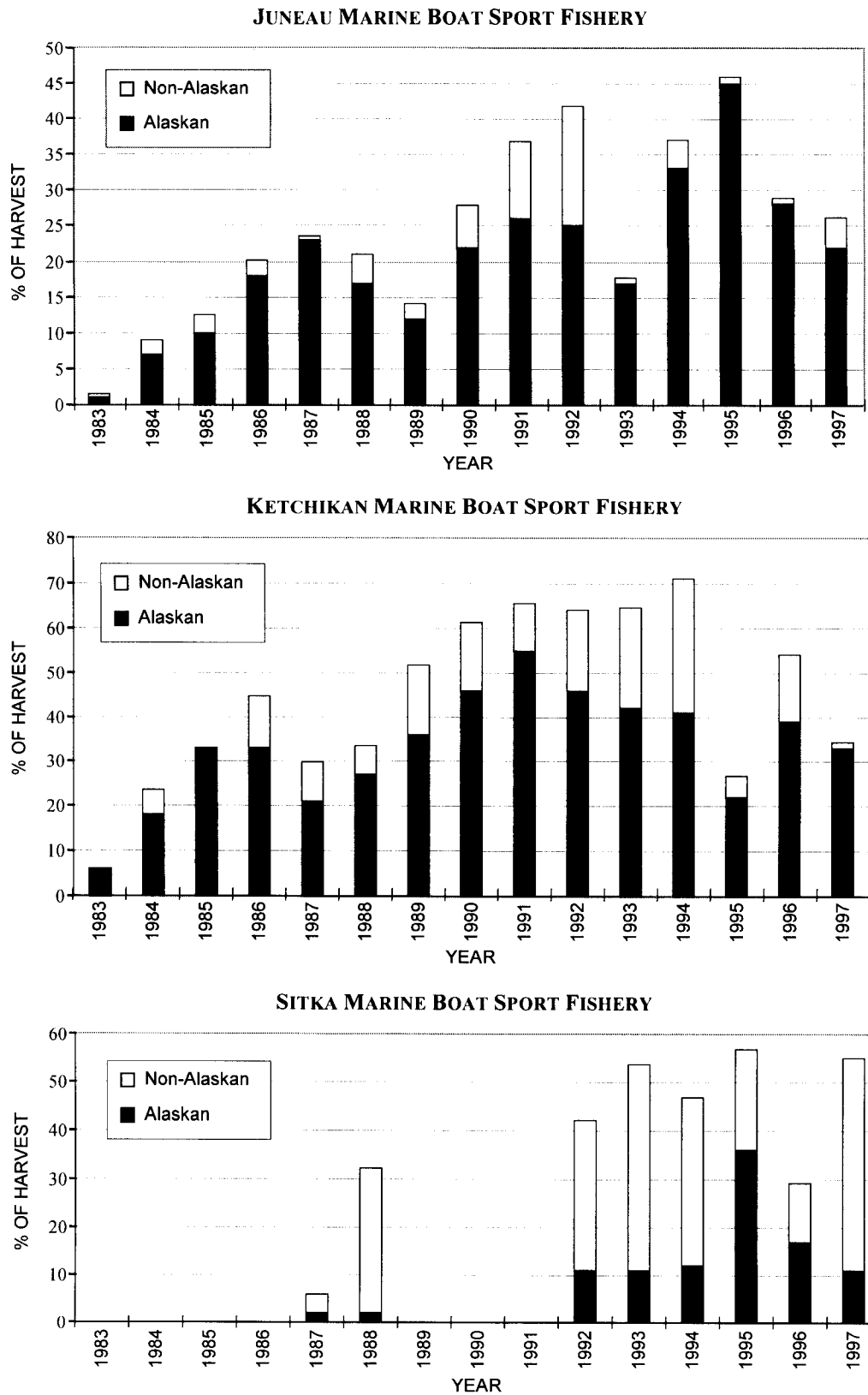


Figure 4.—Estimated contributions of hatchery-produced chinook salmon to Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys.

Table 15.—Estimated contributions of hatchery-produced chinook salmon to Juneau, Ketchikan and Sitka marine boat sport fisheries as determined by onsite creel surveys, 1983–1997.

Year	Juneau marine				Ketchikan marine				Sitka marine			
	Total	% of harvest	Alaska	% of harvest	Total	% of harvest	Alaska	% of harvest	Total	% of harvest	Alaska	% of harvest
1983	46	1	25	1	350	10	233	6				
1984	577	9	444	7	432	24	333	18				
1985	1,037	13	831	10	862	34	838	33				
1986	1,032	20	918	18	2,226	44	1,638	33				
1987	2,060	23	2,015	23	1,409	30	999	21	150	6	53	2
1988	1,210	21	979	17	1,747	33	1,405	27	1,026	32	66	2
1989	1,018	14	865	12	2,992	52	2,082	36				
1990	2,011	27	1,584	22	6,023	61	4,511	46				
1991 ^a	4,279	37	2,957	26	8,373	66	7,035	55				
1992	2,958	42	1,762	25	3,628	64	2,604	46	4,074	42	1,092	11
1993	1,511	18	1,446	17	3,425	65	2,234	42	7,351	53	1,468	11
1994	2,127	37	1,895	33	2,393	71	1,378	41	6,210	47	1,642	12
1995	2,933	46	2,873	45	888	25	723	22	9,052	56	5,702	36
1996	2,430	29	2,360	28	1,576	54	1,131	39	2,966	29	1,730	17
Average	1,802	25	1,497	21	2,595	47	1,939	35	4,404	45	1,679	17
1997	2,055	26	1,730	22	1,098	35	1,059	34	14,131	55	2,755	11

^a Juneau percentages for 1991 were calculated without including 803 chinook salmon taken in strata which were not sampled for coded wire tags.

Table 16.—Estimated harvest of coho salmon, 1983–1997, in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

Year	Juneau marine ^a	Juneau Golden North Derby	Ketchikan marine	Sitka marine
1983	12,662	2,964	---	
1984	10,100	1,594	14,231	
1985	17,138	2,919	---	
1986	9,763	367	20,814	
1987	17,610	3,056	10,464	1,185
1988	12,017	1,453	5,525	616
1989	23,819	3,173	10,781	
1990	26,343	1,914	33,661	
1991	22,379	2,567	43,789	
1992	18,482	2,166	22,688	4,336
1993	15,921	2,031	18,703	14,166
1994	62,218	8,358	44,673	23,080
1995	15,172	2,914	19,165	12,015
1996	18,816	4,505	42,220	28,981
Average	20,174	2,856	23,893	12,054
1997	12,477	1,919	14,204	30,789
% of average	62	67	59	255

^a Includes Juneau Golden North Salmon Derby harvest.

Table 17.—Estimated contributions of hatchery-produced coho salmon to Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys, 1983–1997.

Year	Juneau marine		Ketchikan marine		Sitka marine	
	Total	% of harvest	Total	% of harvest	Total	% of harvest
1983	227	2				
1984	52	1	5,181	36		
1985	1,353	8				
1986	37	< 1	3,200	15		
1987	94	1	4,663	45	57	5
1988	262	2	292	5	218	35
1989	930	4	1,147	11		
1990	482	2	9,515	28		
1991 ^a	2,526	12	18,627	43		
1992	905	5	9,588	42	1,264	29
1993	1,577	10	4,325	23	1,650	12
1994	8,260	13	14,491	32	4,773	21
1995	1,010	7	7,327	38	2,270	19
1996	3,276	17	16,841	40	5,224	18
Average	1,499	7	7,933	33	2,208	18
1997	2,162	17	5,822	41	4,798	16

^a Juneau percentages for 1991 were calculated without including 1,111 coho salmon taken in strata which were not sampled for coded wire tags.

1,919 coho salmon was 33% below the 1983–1996 average of 2,856. Fishery restrictions in bag limits and closed areas reduced the harvest slightly in the Juneau area, but closures of the commercial troll fishery in northern Southeast Alaska waters allowed more fish to move to inside waters and the Juneau fishery probably improved because of this. The Sitka area harvest of 30,789 coho salmon was more than double the 7-year average (1987, 1988, 1992, 1993, 1994, 1995, and 1996), and was Sitka's highest recorded harvest.

Harvest of coho salmon in the Juneau, Ketchikan and Sitka areas continues to be supplemented by hatchery contributions (Table 17). The relative contribution (17% of total harvest) of hatchery coho salmon in Juneau matched the 1996 record. The Ketchikan fishery has been much more dependent upon hatchery coho salmon than has the Juneau fishery. About 33% of the 1984–1996 Ketchikan harvest originated in hatcheries (Table 17). In 1997, the estimated harvest of 5,969

hatchery coho salmon was below average, but the hatchery contribution in terms of the percent of harvest (42%) was above average in Ketchikan. The contribution of hatchery-produced coho salmon to the Sitka fishery (4,798) was the highest recorded, but below average in terms of percent of harvest (16%).

BOTTOMFISH FISHERIES

The 1997 harvest of Pacific halibut in the Juneau fishery (12,547) was similar to the 1983–1996 average of 11,470 (Table 18). The Ketchikan harvest (7,983) was 25% below the 1984–1996 average of 10,637. As with angler effort, this low estimate may have been entirely due to the failure to sample Clover Pass. Total estimated catch of Pacific halibut in the Juneau fishery (18,248) was 9% above the 1983–1996 average (16,073). The 1997 catch of Pacific halibut in Ketchikan (11,549) was 13% below the 1984–1996 average (13,282). The retention rate for Pacific halibut was slightly below the average of 71% in Juneau

at 69%, and the retention rate in Ketchikan (69%) was below the 1984–96 average of 80%. The Sitka harvest of halibut in 1997 (21,852) was 94% above the average harvest of 11,265 and the highest sport harvest of halibut ever recorded in Southeast Alaska. The retention rate of 62% in 1997 was below average.

Rockfish harvest in the 1997 Ketchikan fishery (6,514) was 37% below the 1984–96 average of 10,422 (Table 19). Retention of rockfish at 40% was below the 1986–1996 average of 46%. Targeted and non-targeted HPUE and CPUE for rockfish were both below average, continuing a trend of declining rockfish catch rates.

SHELLFISH FISHERIES

Shellfish harvests in the Juneau and Ketchikan areas have been consistently estimated with creel surveys since 1988 (Table 20). In 1997, the estimated shellfish effort of 5,382 boat-days in the Juneau area was above average, as were the harvests of 4,839 king crab and 12,440 Dungeness crab. The Tanner crab harvest for Juneau was below average. In Ketchikan, shellfish effort of 1,566 boat-days was above the 1988–1996 average of 1,395 boat-days. Dungeness crab harvest in Ketchikan of 6,224 was below the 1988–1996 average of 7,630. Shrimp harvest in the Ketchikan area during 1997 (51,150) was below average.

CONCLUSIONS AND RECOMMENDATIONS

The primary goals of this project to estimate the harvest and the Alaska hatchery contributions of chinook salmon in selected sport fisheries of Southeast Alaska, with specified levels of precision, were obtained.

Many changes have occurred in Southeast Alaska marine boat sport fisheries over the past decade. While the monitored Juneau and Ketchikan sport fisheries have declined a bit in the last few years, the Sitka fishery has grown greatly. Due in part to its location near fish

migration corridors for abundant stocks, sport harvests of chinook salmon, coho salmon, and Pacific halibut in the Sitka fishery were the largest in the region during 1997. It is expected that this growth in the Sitka fishery will continue as tourism increases in Southeast Alaska.

Wild stocks of fish have historically supported most of the sport fisheries, but increasing enhancement efforts have led to increased harvests of hatchery chinook and coho salmon. During 1997, about 15% of the chinook salmon and 22% of the coho salmon taken in the combined Ketchikan, Sitka, and Juneau marine fisheries originated in Alaska hatcheries. An additional 32% of the chinook harvest originated in non-Alaskan hatcheries. These enhancement efforts are costly, and catch monitoring through the use of onsite survey programs is one of the few means to evaluate and document the success of hatchery programs in producing fish for sport anglers.

Wild stock evaluation programs which include coded wire tagging of both chinook and coho salmon have been implemented in Southeast Alaska, and others are being planned. Tag recoveries from the sport fisheries are necessary to improve knowledge of wild stock contributions to the fisheries. It is recommended that onsite creel surveys and catch sampling programs of marine sport boat fisheries be continued, in order to evaluate the effectiveness of stocking programs and to provide information about wild stock composition.

In March of 1992, the Alaska Board of Fisheries allocated the Southeast Alaska chinook salmon quota, established under the U.S./Canada Pacific Salmon Treaty, between commercial and sport fisheries. The board also adopted a management plan for the chinook salmon sport fishery which requires inseason management by the Department of Fish and Game to ensure the sport fishery does not exceed its allocation. In 1997, sampling of all major boat sport fisheries, including those in Ketchikan, Juneau, and Sitka, was necessary in order to estimate the total Southeast Alaska sport harvest of chinook salmon so the sport fishery could be effectively managed. These sampling efforts, along with

Table 18.—Estimated harvest and catch of Pacific halibut in the Juneau, Ketchikan, and Sitka marine boat sport fisheries, 1983–1997.

Year	Juneau marine				Ketchikan marine				Sitka marine			
	Kept	Released	Total catch	Percent retained	Kept	Released	Total catch	Percent retained	Kept	Released	Total catch	Percent retained
1983	16,414	4,674	21,088	78								
1984	14,609	9,100	23,709	62	8,913	748	9,661	92				
1985	11,931	3,955	15,886	75								
1986	13,132	6,868	20,000	66	8,208	1,577	9,785	84				
1987	13,513	10,357	23,870	57	10,493	3,390	13,883	76	8,314	7,214	15,528	54
1988	12,672	5,027	17,699	72	7,317	1,338	8,655	85	6,923	5,962	12,885	54
1989	12,484	2,406	14,890	84	10,797	1,256	12,053	90				
1990	11,774	4,018	15,792	75	7,419	1,281	8,700	85				
1991	8,611	2,363	10,974	78	9,650	1,125	10,775	90				
1992	9,265	2,554	11,819	78	10,257	2,582	12,839	80	12,549	3,927	16,476	76
1993	6,928	2,652	9,580	72	12,783	4,443	17,226	74	12,720	4,289	17,009	75
1994	8,843	4,047	12,890	69	10,960	2,849	13,809	79	13,185	5,233	18,418	72
1995	9,252	3,234	12,486	74	19,675	7,089	26,764	74	13,151	5,963	19,114	69
1996	11,158	3,183	14,341	78	11,177	4,052	15,229	73	12,015	5,859	17,874	67
Average	11,470	4,603	16,073	71	10,637	2,644	13,282	80	11,265	5,492	16,758	67
1997	12,547	5,701	18,248	69	7,983	3,566	11,549	69	21,852	13,518	35,370	62
% of average	109	124	114		75	135	87		194	246	211	

Table 19.—Comparative effort and catch statistics for the Ketchikan rockfish sport fishery, 1984–1997.

Year	Survey dates	Angler effort		Total rockfish harvest and catch				Harvest per unit effort		Catch per unit effort	
		Total angler-hours	Bottomfish-hours	Harvest	Released	Total catch	% harvest	Targeted ^a	Non-targeted ^b	Targeted ^c	Non-targeted ^d
1984	4/29–9/29	223,725	62,625	9,805	---	---	---	0.16	0.04	---	---
1985 ^e	4/15–6/30	---	---	---	---	---	---	---	---	---	---
1986	4/28–9/28	184,726	51,208	6,017	7,527	13,544	44	0.12	0.03	0.54	0.19
1987	4/20–9/27	242,274	84,954	18,591	27,539	46,130	40	0.22	0.08	0.26	0.07
1988	4/11–9/25	225,779	71,611	17,477	15,516	32,993	53	0.24	0.08	0.46	0.15
1989	4/24–9/24	276,516	79,958	11,224	6,742	17,966	62	0.14	0.04	0.22	0.06
1990	5/07–9/23	248,618	49,347	9,561	9,132	18,693	51	0.19	0.04	0.38	0.08
1991	4/29–9/29	343,698	67,842	12,442	10,714	23,156	54	0.18	0.04	0.34	0.07
1992	4/27–9/27	261,635	69,366	8,149	15,272	23,424	35	0.12	0.03	0.34	0.09
1993	4/26–9/26	276,969	78,002	10,573	15,192	25,765	41	0.14	0.04	0.33	0.09
1994	4/25–9/25	286,464	56,092	5,604	8,283	13,887	40	0.10	0.02	0.25	0.05
1995	4/24–9/24	277,146	101,381	10,132	13,015	23,147	44	0.10	0.04	0.23	0.08
1996	5/06–10/06	253,977	62,673	5,492	7,401	12,893	43	0.09	0.02	0.21	0.05
Average		258,461	69,588	10,422	12,394	22,873	46	0.15	0.04	0.33	0.09
1997	4/28–9/28	199,977	55,242	6,514	9,806	16,320	40	0.12	0.03	0.30	0.08
% of average		77	79	63	79	71		79	81	90	92

^a Rockfish harvest per bottomfish-hour of effort.^b Rockfish harvest per angler-hour of effort.^c Rockfish total catch per bottomfish-hour of effort.^d Rockfish total catch per angler-hour of effort.^e Data in 1985 are not comparable because the creel survey lasted only through 30 June, instead of late September.

Table 20.—Comparison of estimated shellfish effort and harvest for the Juneau and Ketchikan marine boat fisheries, 1988–1997.

JUNEAU FISHERY					
Year	Effort (boat-days)	Dungeness crab harvest	Tanner crab harvest	King crab harvest	Shrimp harvest
1988	2,287	6,459	3,042	552	—
1989	2,652	8,356	3,369	1,849	—
1990	2,622	6,289	1,883	1,960	—
1991	3,812	13,433	1,294	2,467	—
1992	5,411	12,675	1,034	5,673	—
1993	6,013	11,980	1,557	8,963	—
1994	5,486	6,786	2,328	5,925	—
1995	5,161	10,460	2,161	4,598	—
1996	5,036	15,605	2,134	4,826	—
Average	4,276	10,227	2,089	4,090	—
1997	5,382	12,440	1,348	4,839	—

KETCHIKAN FISHERY					
Year	Effort (boat-days)	Dungeness crab harvest	Tanner crab harvest	King crab harvest	Shrimp harvest
1988	1,398	9,043	0	0	27,643
1989	508	2,688	100	0	12,730
1990	614	3,367	0	0	17,130
1991	1,394	7,631	0	0	69,450
1992	1,387	10,227	0	0	130,720
1993	1,973	8,897	0	0	37,060
1994	1,439	7,032	0	0	34,580
1995	2,590	14,258	0	0	164,390
1996	1,255	5,528	0	0	76,840
Average	1,395	7,630	11	0	63,394
1997	1,566	6,224	0	0	51,150

coded wire tag sampling programs in Craig, Petersburg, and Wrangell, were also necessary to better document harvests of Alaska hatchery fish for catch reporting required by the Pacific Salmon Treaty. We recommend continuation of this expanded program.

Data from marine boat surveys are also used for a variety of other purposes, including preparation of position statements on proposed regulation changes and public information documents. It is recommended that collection of current data on sport fisheries for coho salmon and Pacific halibut be continued, in order to improve management planning for these species.

It is also recommended that estimation of the shellfish harvest as a component of the marine harvest studies be continued, to provide informa-

tion for evaluating the performance of this fishery and for addressing potential regulation changes during Alaska Board of Fisheries meetings.

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APPENDIX A: DATA ANALYSIS PROCEDURES

Appendix A1.—Data analysis procedures for angler effort, catch, and harvest estimates for the Sitka marine boat sport fishery during 1997.

Standard procedures were used to calculate estimates of angler effort, and catch and harvest by species for the survey at Sitka. The standard equations for a stratified four-stage random sample survey with locations, days, periods, and boat-parties were used for the Sitka survey to obtain point estimates as well as variance estimates.

First, the mean harvest of each species was obtained over all boat-parties interviewed during each sampled period for a sampled day at an access location:

$$\bar{n}_{hjo} = \frac{\sum_{k=1}^{m_{hjo}} n_{hjo k}}{m_{hjo}} \quad (\text{A1.1})$$

where $n_{hjo k}$ is the number of fish harvested by interviewed boat-party k during period o during sampled day i at access location j within stratum h ; and m_{hjo} equals the number of interviewed boat-parties during each sample.

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

$$\hat{N}_{hjo} = M_{hjo} \bar{n}_{hjo} \quad (\text{A1.2})$$

where M_{hjo} equals the number of boat-parties counted within each sample.

Then, the mean harvest by species was obtained over all periods sampled for the sampled day at each access location:

$$\bar{\hat{N}}_{hji} = \frac{\sum_{o=1}^{p_{hji}} \hat{N}_{hjo}}{p_{hji}} \quad (\text{A1.3})$$

where p_{hji} is the number of periods sampled within each sampled day.

Then this mean was expanded over all periods at each location to obtain the harvest estimate for the day at each access location:

$$\hat{N}_{hji} = p_{hji} \bar{\hat{N}}_{hji} \quad (\text{A1.4})$$

where p_{hji} equals the number of periods within the sampling day.

Next the mean harvest over all days sampled at each access location was obtained:

$$\bar{\hat{N}}_{hj} = \frac{\sum_{i=1}^{d_{hj}} \hat{N}_{hji}}{d_{hj}} \quad (\text{A1.5})$$

where d_{hj} equals the days sampled for access location j .

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The estimated harvest for the sampled access location within each stratum was obtained by expanding by the number of days:

$$\hat{N}_{hj} = D_{hj} \bar{\hat{N}}_{hj} \quad (\text{A1.6})$$

where D_{hj} equals the total number of possible days available for sampling.

Then the stratum mean harvest over all sampled access locations was obtained:

$$\bar{\hat{N}}_h = \frac{\sum_{j=1}^{q_h} \hat{N}_{hj}}{q_h} \quad (\text{A1.7})$$

where q_h equals the number of access locations sampled within each stratum.

Finally, the estimated harvest for each stratum was obtained by expanding for access locations:

$$\hat{N}_h = Q_h \bar{\hat{N}}_h \quad (\text{A1.8})$$

where Q_h equaled the total number of access locations in each stratum.

Estimates of catch of each species were calculated similarly by substituting the appropriate catch statistics for each species into equations (A1.1) through (A1.8), above. Similarly, the angler effort estimate was calculated by substitution.

The variance of the stratum estimates of harvest was obtained using the standard four-stage equation (adapted from Cochran 1977):

$$\begin{aligned} \hat{V}[\hat{N}_h] = & \left\{ (1 - f_{1h}) Q_h^2 \frac{S_{1h}^2}{q_h} \right\} + \left\{ f_{1h} \frac{Q_h^2}{q_h q_h} \sum_{j=1}^{q_h} (1 - f_{2hj}) D_{hj}^2 \frac{S_{2hj}^2}{d_{hj}} \right\} \\ & + \left\{ f_{1h} \frac{Q_h^2}{q_h^2} \sum_{j=1}^{q_h} f_{2hj} \frac{D_{hj}^2}{d_{hj} d_{hj}} \sum_{i=1}^{d_{hj}} (1 - f_{3hji}) P_{hji}^2 \frac{S_{3hji}^2}{p_{hji}} \right\} \\ & + \left\{ f_{1h} \frac{Q_h^2}{q_h^2} \sum_{j=1}^{q_h} f_{2hj} \frac{D_{hj}^2}{d_{hj}^2} \sum_{i=1}^{d_{hj}} f_{3hji} \frac{P_{hji}^2}{p_{hji} p_{hji}} \sum_{o=1}^{p_{hji}} (1 - f_{4hjio}) M_{hjio}^2 \frac{S_{4hjio}^2}{m_{hjio}} \right\} \end{aligned} \quad (\text{A1.9})$$

where f_{1h} , f_{2hj} , f_{3hji} , and f_{4hjio} are the sampling fractions for access locations, days, sampling periods, and boat-parties respectively (i.e., $f_{1h} = q_h / Q_h$; $f_{2hj} = d_{hj} / D_{hj}$; $f_{3hji} = p_{hji} / P_{hji}$; $f_{4hjio} = m_{hjio} / M_{hjio}$); S_{1h}^2 equals the among access location variance component for the angler harvest estimate, which was calculated as

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$$S_{1h}^2 = \frac{\sum_{j=1}^{q_h} (\hat{N}_{hj} - \bar{N}_h)^2}{q_h - 1} \quad (\text{A1.10})$$

S_{2hj}^2 equals the among day (within access location) variance component for the harvest estimate, obtained as

$$S_{2hj}^2 = \frac{\sum_{i=1}^{d_{hj}} (\hat{N}_{hji} - \bar{N}_{hj})^2}{d_{hj} - 1} \quad (\text{A1.11})$$

q_h is the number of access locations sampled in which S_{2hj}^2 can be estimated (i.e., in which at least two days sampled); S_{3hji}^2 equals the among sampling period variance component for the harvest estimate, obtained as

$$S_{3hji}^2 = \frac{\sum_{o=1}^{p_{hji}} (\hat{N}_{hji o} - \bar{N}_{hji})^2}{p_{hji} - 1} \quad (\text{A1.12})$$

d_{hj} is the number of days sampled in which S_{3hji}^2 can be estimated (i.e., in which at least two periods are sampled or fewer than two periods are available for sampling by definition); $s_{4hji o}^2$ equals the among boat-party variance component for the harvest estimate, obtained as

$$s_{4hji o}^2 = \frac{\sum_{k=1}^{m_{hji o}} (n_{hji o k} - \bar{n}_{hji o})^2}{m_{hji o} - 1} \quad (\text{A1.13})$$

p_{hji} is the number of periods in which $s_{4hji o}^2$ can be estimated [i.e., either (1) at least two boat-parties interviewed or (2) the number of boat-parties interviewed equals the number of exiting boat-parties: $m_{hji o} = M_{hji o}$].

Variances of the stratum estimates of catch by species and angler effort were obtained similarly, by substituting the appropriate catch and effort statistics into equations (A1.9) to (A1.13), above.

In applying these procedures for some of the strata (for example during the derby at Sitka), only one period is defined within a sampling day. The sampling day in these surveys is completely covered during any sample. Accordingly, $p_{hji} = P_{hji} = 1$, and $f_{3hji} = 1$, and as such, the third-stage variance term in equation (A1.9) equals zero.

Similarly, in applying these procedures to some strata, only one location is defined. Accordingly, $q_h = Q_h = 1$, and $f_{1h} = 1$, and as such, the first-stage variance term equals zero. Also note that during

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many of the derby strata, each derby day is defined as a separate stratum, so that $d_{hj} = D_{hj} = 1$, and $f_{2hj} = 1$, and as such the second-stage variance term equals zero. Finally, during many samples, all exiting boat-parties were interviewed, so that $m_{hjio} = M_{hjio}$ and $f_{4hjio} = 1$, and as such, the fourth-stage variance term equals zero.

Estimates of angler effort, catch and harvest by species and their variances across all strata, or select combinations of strata, were obtained by summing individual stratum estimates (assuming independence). Standard errors of the strata and total estimates were obtained simply by taking the square root of the appropriate variance estimate.

Appendix A2.—Data analysis procedures for angler effort, catch, and harvest estimates for the Ketchikan and Juneau marine boat sport fisheries during 1997.

Estimates of angler effort, and catch and harvest by species for the surveys conducted at Juneau and Ketchikan were obtained by the procedures appropriate to a stratified three-stage random sample survey with days, locations, and boat-parties as sampling units. First, the mean harvest of each species was calculated over all boat-parties interviewed at each sampled access location within each sampled day:

$$\bar{n}_{hij} = \frac{\sum_{k=1}^{m_{hij}} n_{hijk}}{m_{hij}} \quad (\text{A2.1})$$

where n_{hijk} is the number of fish harvested by interviewed boat-party k at access location j during sampled day i within stratum h ; and m_{hij} equals the number of interviewed boat-parties during each sample. Then the mean estimate was expanded over all counted boat-parties to obtain the harvest estimate for each sampled location within a day:

$$\hat{N}_{hij} = M_{hij} \bar{n}_{hij} \quad (\text{A2.2})$$

where M_{hij} equals the number of boat-parties counted within each sample.

Then, the mean harvest by species was obtained over all periods sampled at each access location within each sampled day:

$$\bar{\hat{N}}_{hi} = \frac{\sum_{j=1}^{q_{hi}} \hat{N}_{hij}}{q_{hi}} \quad (\text{A2.3})$$

where q_{hi} equals the number of access locations sampled during sampled day i .

The estimated harvest for the sampled day within each stratum was then obtained by expanding by the number of access locations:

$$\hat{N}_{hi} = Q_{hi} \bar{\hat{N}}_{hi} \quad (\text{A2.4})$$

where Q_{hi} equals the total number of possible access locations available for sampling.

Then the stratum mean daily harvest was calculated :

$$\bar{\hat{N}}_h = \frac{\sum_{i=1}^{d_h} \hat{N}_{hi}}{d_h} \quad (\text{A2.5})$$

where d_h equals the number of days sampled within each stratum.

Finally, the estimated harvest for each stratum was obtained by expanding for days:

$$\hat{N}_h = D_h \bar{\hat{N}}_h \quad (\text{A2.6})$$

where D_h equals the total number of days in each stratum.

Estimates of catch of each species were obtained similarly by substituting the appropriate catch statistics for each species into equations (A2.1) through (A2.6), above. Similarly, the angler effort estimate was calculated by substitution.

-continued-

The variance of the stratum estimates of harvest were obtained using the three-stage equation (adapted from Cochran 1977):

$$\begin{aligned} \hat{V}[\hat{N}_h] = & \left\{ (1 - f_{1h}) D_h^2 \frac{S_{1h}^2}{d_h} \right\} + \left\{ f_{1h} \frac{D_h^2}{d_h d_h'} \sum_{i=1}^{d_h'} (1 - f_{2hi}) Q_{hi}^2 \frac{S_{2hi}^2}{q_{hi}} \right\} \\ & + \left\{ f_{1h} \frac{D_h^2}{d_h^2} \sum_{i=1}^{d_h} f_{2hi} \frac{Q_{hi}^2}{q_{hi} q_{hi}'} \sum_{j=1}^{q_{hi}'} (1 - f_{3hij}) M_{hij}^2 \frac{s_{3hij}^2}{m_{hij}} \right\} \end{aligned} \quad (A2.7)$$

where f_{1h} , f_{2hi} , and f_{3hij} are the sampling fractions for days, access locations, and boat-parties, respectively (i.e., $f_{1h} = d_h/D_h$; $f_{2hi} = q_{hi}/Q_{hi}$; $f_{3hij} = m_{hij}/M_{hij}$),

S_{1h}^2 equals the among day variance component for the angler harvest estimate, obtained as

$$S_{1h}^2 = \frac{\sum_{i=1}^{d_h} (\hat{N}_{hi} - \bar{\hat{N}}_h)^2}{d_h - 1} \quad (A2.8)$$

S_{2hi}^2 equals the among access location (within day) variance component for the harvest estimate, obtained as

$$S_{2hi}^2 = \frac{\sum_{j=1}^{q_{hi}} (\hat{N}_{hij} - \bar{\hat{N}}_{hi})^2}{q_{hi} - 1} \quad (A2.9)$$

d_h' is the number of days in which S_{2hi}^2 can be estimated (i.e., days with at least two locations sampled); s_{3hij}^2 equalled the among boat-party variance component for the harvest estimate, obtained as

$$s_{3hij}^2 = \frac{\sum_{k=1}^{m_{hij}} (n_{hijk} - \bar{n}_{hij})^2}{m_{hij} - 1} \quad (A2.10)$$

and q_{hi}' is the number of locations in which s_{3hij}^2 can be estimated (i.e., locations with either (1) at least two boat-parties interviewed, or (2) the number of boat-parties interviewed equals the number of exiting boat-parties: $m_{hij} = M_{hij}$).

Variances of the stratum estimates of catch by species and angler effort were obtained similarly, by substituting the appropriate catch and effort statistics into equations (A2.1) through (A2.10), above.

Estimates of angler effort, catch and harvest by species and their variances across all strata, or select combinations of strata were calculated by summing the individual stratum estimates (assuming independence). Standard errors of the strata and total estimates were obtained simply by taking the square root of the appropriate variance estimate.

Appendix A3.—Data analysis procedures for coho salmon harvest per unit effort estimates for the Ketchikan, Juneau, and Sitka marine boat sport fishery surveys during 1997.

Harvest per unit effort (HPUE) in terms of coho salmon harvested per angler-hour of effort was estimated for the Juneau, Ketchikan, and Sitka surveys by the following procedures for each biweek. The estimates of HPUE were obtained from unweighted means as follows, by first obtaining the mean HPUE for all anglers in each interviewed boat-party:

$$\overline{HPUE}_{hijk} = \frac{n_{hijk}}{e_{hijk} v_{hijk}} \quad (\text{A3.1})$$

where n_{hijk} equaled the entire harvest of the interviewed boat-party k , from the sample at access location j , during day i within stratum h ; e_{hijk} was the effort (in boat-hours) of each interviewed boat-party; and v_{hijk} was the number of anglers in the interviewed boat-party.

The mean HPUE for the biweek was obtained over all boat-parties interviewed within each biweek:

$$\hat{HPUE} = \frac{\sum_{h=1}^s \sum_{i=1}^{d_h} \sum_{j=1}^{q_{hi}} \sum_{k=1}^{m_{hij}} \overline{HPUE}_{hijk}}{m} \quad (\text{A3.2})$$

where m_{hij} equaled the number of boat-parties interviewed; q_{hi} equaled the number of access locations sampled during each day; d_h equaled the number of days sampled within each stratum; s equaled the number of strata within each biweekly period; and m equaled all boat-parties interviewed within a biweekly period, obtained as

$$m = \sum_{h=1}^s \sum_{i=1}^{d_h} \sum_{j=1}^{q_{hi}} m_{hij} \quad (\text{A3.3})$$

The variances of the biweekly estimates of HPUE were obtained by the following equation:

$$\hat{V}[\hat{HPUE}] = \frac{\sum_{h=1}^s \sum_{i=1}^{d_h} \sum_{j=1}^{q_{hi}} \sum_{k=1}^{m_{hij}} (\overline{HPUE}_{hijk} - \hat{HPUE})^2}{m(m-1)} \quad (\text{A3.4})$$

Standard errors were obtained by taking the square root of the variance estimates.

Appendix A4.—Data analysis procedures for hatchery contributions for the surveys of the marine boat sport fishery during 1997.

Hatchery contributions were estimated for the surveys using procedures outlined by Bernard and Clark (1996). Estimates were obtained on a biweekly basis, treating all strata within each biweek equally. As such, the relative contributions of the Alaskan hatchery releases of interest were assumed to be consistent from one sampling stratum (except for derby strata) to the next within any biweekly period. Considering that anglers in general fished the same stocks of fish, regardless of access location used within each survey, then this assumption should be valid. Estimating procedures used (Bernard and Clark 1996) are those appropriate for estimating contributions and variances when total harvest is estimated.

The notation used in the following equations essentially follows that used by Bernard and Clark (1996), with subscripts adapted to avoid confusion with other subscripts used in this report. The first step involved estimating the contribution to each biweekly period in the fishery of each particular tag code:

$$\hat{r}_{tc} = \hat{N}_t \hat{p}_{tc} \theta_c^{-1} \quad (\text{A4.1})$$

where \hat{r}_{tc} equals the estimated number of salmon from a hatchery release identified by the unique tag code c , harvested in biweek t ; \hat{N}_t is the estimated total harvest of salmon (one particular species only) for biweek t ; θ_c is the proportion of a particular hatchery release which contained a coded wire tag of the unique tag code c ; \hat{p}_{tc} which was calculated as

$$\hat{p}_{tc} = \frac{m_{tc}}{\lambda_t n_t} \quad (\text{A4.2})$$

n_t is number of salmon (one particular species only) inspected for missing adipose fins from the sampled harvest in biweek t ; m_{tc} equals the number of coded wire tags dissected out of the salmon heads and decoded as the unique tag code c , originally sampled from biweek t ; λ_t is defined as

$$\lambda_t = \frac{a'_t t'_t}{a_t t_t} \quad (\text{A4.3})$$

a_t is the number of salmon with a missing adipose fin from the n_t sampled harvest in biweek t ; a'_t equals the number of salmon heads previously marked with a head strap which arrived at the tag lab, from fish originally sampled from biweek t ; t_t is the number of coded wire tags which were detected in the salmon heads at the tag lab, from those salmon sampled in biweek t ; t'_t equals the number of coded wire tags which were removed from the salmon heads and decoded, from those salmon sampled in biweek t .

Estimates of across biweek contributions by tag code, as well as by combined tag codes (e.g., all Alaskan hatchery tag codes), were obtained by summing the estimates across biweeks and tag codes, as appropriate:

$$\hat{R} = \sum_t \sum_c \hat{r}_{tc} \quad (\text{A4.4})$$

-continued-

Estimates of the variance for contributions in a biweekly period were estimated following the approach outlined by Bernard and Clark (1996):

$$\hat{V}[\hat{r}_{tc}] = \hat{r}_{tc}^2 \left\{ \frac{\hat{V}[\hat{p}_{tc}]}{\hat{p}_{tc}^2} + \frac{\hat{V}[\hat{N}_t]}{\hat{N}_t^2} - \frac{\hat{V}[\hat{p}_{tc}]\hat{V}[\hat{N}_t]}{\hat{p}_{tc}^2\hat{N}_t^2} \right\} \quad (\text{A4.5})$$

where $\hat{V}[\hat{N}_t]$ equals the estimated variance of overall harvest estimate for biweek t , obtained from the harvest sampling program; and $\hat{V}[\hat{p}_{tc}]$ is the variance of \hat{p}_{tc} which was estimated following the large-scale approximation approach proposed by Bernard and Clark (1996; their equation 12):

$$\hat{V}[\hat{p}_{tc}] \approx \left(\frac{\hat{p}_{tc}}{\lambda_t n_t} \right) (1 - \lambda_t \hat{\phi}_t \theta_c) \quad (\text{A4.6})$$

where $\hat{\phi}_t = n_t / \hat{N}_t$.

Estimates of the variance of across biweek contributions by tag code, as well as by combined tag codes, were obtained by the following equation (adapted from equation 3 in Bernard and Clark, 1996):

$$\hat{V}[\hat{R}] = \sum_t \sum_c \hat{V}[\hat{r}_{tc}] + 2 \sum_t \sum_c \sum_{u>c} \hat{Cov}[\hat{r}_{tc}, \hat{r}_{tu}] \quad (\text{A4.7})$$

where $\hat{Cov}[\hat{r}_{tc}, \hat{r}_{tu}]$ is the covariance between the estimated contribution of two different tag codes within one biweekly period, which is calculated using the large-sample approximation of Bernard and Clark (1996); their equation (14):

$$\hat{Cov}[\hat{r}_{tc}, \hat{r}_{tu}] \approx \hat{r}_{tc} \hat{r}_{tu} \left(\frac{\hat{V}[\hat{N}_t]}{\hat{N}_t^2} \right) \quad (\text{A4.8})$$

Standard errors (SEs) were obtained as the square root of the appropriate variance.

Estimates of relative contribution by coded wire tag code for Alaskan hatchery fish (denoted below by the term \hat{u}_c) for the Craig, Petersburg, and Wrangell surveys were estimated by the approach outlined in Bernard and Clark (1996). Specifically, equation (A4.1) was adapted by dividing through by the unknown total harvest estimate (N):

$$\hat{u}_c = \left(\frac{m_c}{\lambda n} \right) \theta_c^{-1} = \hat{p}_c \theta_c^{-1} \quad (\text{A4.9})$$

where all terms are as defined above, without the biweek subscript, since estimates are calculated for the season as a whole.

The variance of \hat{u}_c was calculated by

$$\hat{V}[\hat{u}_c] = V[\hat{p}_c] \theta_c^{-2} \quad (\text{A4.10})$$

-continued-

The variance of \hat{p}_c was calculated approximately (adapting equation [A4.6], above) as

$$\hat{V}[\hat{p}_c] \approx \frac{\hat{p}_c}{\lambda n} \quad (\text{A4.11})$$

where all terms are as defined above without the biweek subscript. Note that $\hat{V}[\hat{u}_c] > V[\hat{u}_c]$ by a factor of $(1 - \lambda\phi\theta_c)$ where $\phi = n/N$. If the product $\lambda\phi\theta_c$ is negligible, $\hat{V}[\hat{u}_c] = V[\hat{u}_c]$. If the product $\lambda\phi\theta_c$ is not negligible, $\hat{V}[\hat{u}_c](1 - \lambda\phi\theta_c) = V[\hat{u}_c]$. Substitution of $\hat{\phi}$ for ϕ would produce $\hat{V}[\hat{u}_c](1 - \lambda\hat{\phi}\theta_c) = V[\hat{u}_c]$.

Unbiased estimates of \hat{u}_c were obtained only if the total harvest of chinook salmon is sampled proportionally throughout each of the harvest sampling surveys *or* the contributions do not vary within the season at each survey location.

Estimates of the contributions of tagged wild stocks of chinook and coho salmon were generated similarly when the tagging fraction, θ_c , was estimated by sampling returning adults on the spawning grounds to obtain the ratio of tagged adults to total adults sampled (McPherson and Bernard 1995).

APPENDIX B: CREEL SURVEY STATISTICS

Appendix B1.—Estimated effort, harvest, and total catches for the Ketchikan marine boat sport fishery, 28 April–28 September 1997.

	Estimate	Standard error	Relative precision ^a
Finfish effort			
Boat-hours	76,599	4,388	9%
Salmon-hours	144,735	9,805	11%
Bottomfish-hours	55,242	4,147	12%
Angler-hours	199,977	11,631	10%
Boat-days	20,540	1,135	9%
Finfish harvests^b			
Total chinook salmon ≥ 28"	3,179	298	15%
Derby take-home	159	26	27%
Derby entered	316	0	0%
Derby take-home & entered	475	26	9%
Total chinook salmon < 28"	66	36	90%
Coho salmon	14,204	1,901	22%
Chum salmon	2,686	489	30%
Sockeye salmon	21	15	118%
Pink salmon	13,557	1,938	24%
Pacific halibut	7,983	806	17%
Lingcod	445	92	34%
Total rockfish	6,517	716	18%
Quillback rockfish	1,891	272	24%
Dusky rockfish	102	31	50%
Copper rockfish	274	67	40%
Black rockfish	172	92	88%
Yelloweye rockfish	1,362	191	23%
Silvergrey rockfish	442	261	97%
Other pelagic rockfish	47	21	74%
Other non-pelagic rockfish	165	45	45%
Unidentified rockfish	2,062	376	30%
Steelhead	8	7	143%
Finfish total catch^b			
Chinook salmon ≥ 28"	3,374	332	16%
Chinook salmon < 28"	6,946	1,120	27%
Coho salmon	17,406	2,691	25%
Chum salmon	2,881	520	30%
Sockeye salmon	21	15	118%
Pink salmon	16,840	2,397	23%
Pacific halibut	11,549	1,351	19%
Lingcod	568	117	34%
Total rockfish	16,320	1,642	17%
Steelhead	8	7	143%
Shellfish effort and harvest^c			
Boat-days fished	1,566	267	28%
Pots or rings	3,886	513	22%
Crab boat-days fished	1,091	182	27%
Crab pots or rings	1,854	260	23%
Dungeness crab kept	6,224	831	22%
Shrimp kept	51,150	3,507	11%

^a Relative precision ($\alpha = 0.10$) = (SE * 1.645 / estimate) * 100.

^b No cutthroat trout, Dolly Varden, Tanner crab, or king crab were caught or harvested.

Appendix B2.—Estimated effort, harvest, and total catches for the Juneau marine boat sport fishery, 28 April–28 September 1997.

	Estimate	Standard error	Relative precision ^a
Finfish effort			
Boat-hours	120,283	5,032	7%
Salmon-hours	226,291	10,411	8%
Bottomfish-hours	78,435	6,416	13%
Angler-hours	305,097	14,316	8%
Boat-days	30,344	1,219	7%
Finfish harvests ^b			
Total chinook salmon ≥ 28"	7,900	609	13%
Derby take-home	69	26	62%
Derby entered	398	0	0%
Derby take-home & entered	467	26	9%
Total chinook salmon < 28"	52	16	51%
Derby take-home	3	2	110%
Derby entered	2	0	0%
Derby take-home & entered	5	2	66%
Coho salmon	12,477	1,066	14%
Derby take-home	322	62	32%
Derby entered	1,597	0	0%
Derby take-home & entered	1,919	62	5%
Chum salmon	1,055	187	29%
Derby take-home	11	4	60%
Derby entered	8	0	0%
Derby take-home & entered	19	4	35%
Sockeye salmon	20	17	140%
Derby take-home	0	0	0%
Derby entered	1	0	0%
Derby take-home & entered	1	0	0%
Pink salmon	4,174	473	19%
Derby take-home	80	22	45%
Derby entered	2	0	0%
Derby take-home & entered	82	22	44%
Pacific halibut	12,547	1,327	17%
Total rockfish	1,295	345	44%
Lingcod	6	5	137%
Dolly Varden	351	96	45%
Cutthroat trout	31	24	127%
Finfish total catch ^b			
Chinook salmon ≥ 28"	8,195	660	13%
Chinook salmon < 28"	6,168	722	19%
Coho salmon	12,782	1,074	14%
Chum salmon	1,236	198	26%
Sockeye salmon	20	17	140%
Pink salmon	6,822	767	18%
Pacific halibut	18,248	1,954	18%
Total rockfish	1,663	412	41%
Lingcod	6	5	137%
Dolly Varden	745	174	38%
Cutthroat trout	63	52	136%
Shellfish effort and harvest			
Boat-days fished	5,382	378	12%
Pots or rings	10,317	670	11%
King crab boat-days fished	2,143	222	17%
King crab pots or rings	4,088	427	17%
King crab kept	4,839	540	18%
Dungeness crab kept	12,440	1,200	16%
Tanner crab kept	1,348	221	27%

^a Relative precision ($\alpha = 0.10$) = (SE * 1.645 / estimate) * 100.

^b No steelhead trout were caught or harvested.

Appendix B3.—Estimated effort, harvest, and total catches for the Sitka marine boat sport fishery, 28 April–28 September 1997.

	Estimate	Standard error	Relative precision ^a
Finfish effort			
Boat-hours	71,494	3,465	8%
Salmon-hours	145,114	7,506	9%
Bottomfish-hours	61,711	4,573	12%
Angler-hours	207,288	10,670	8%
Boat-days	20,251	977	8%
Finfish harvests^b			
Total chinook salmon ≥ 28"	25,838	1,631	10%
Derby take-home	2,312	202	14%
Derby entered	1,826	0	0%
Derby take-home & entered	4,138	202	8%
Total chinook salmon < 28"	12	11	151%
Coho salmon	30,789	3,849	21%
Chum salmon	3,031	758	41%
Sockeye salmon	634	171	44%
Pink salmon	4,540	645	23%
Pacific halibut	21,852	1,962	15%
Lingcod	6,929	866	21%
Total rockfish	10,288	1,014	16%
Quillback rockfish	468	89	31%
Dusky rockfish	221	61	45%
Copper rockfish	31	13	69%
Black rockfish	2,750	376	22%
Yelloweye rockfish	5,794	739	21%
Silvergrey rockfish	243	124	84%
Other non-pelagic rockfish	96	49	84%
Other pelagic rockfish	591	151	42%
Unidentified rockfish	94	34	60%
Dolly Varden	6	5	137%
Steelhead trout	5	4	132%
Finfish total catch^b			
Chinook salmon ≥ 28"	36,776	2,289	10%
Chinook salmon < 28"	1,944	314	27%
Coho salmon	32,370	3,970	20%
Sockeye salmon	655	171	43%
Chum salmon	4,410	908	34%
Pink salmon	9,900	1,315	22%
Pacific halibut	35,370	3,435	16%
Lingcod	7,854	979	21%
Total rockfish	26,745	2,001	12%
Dolly Varden	49	29	97%
Steelhead trout	5	4	132%

^a Relative precision ($\alpha = 0.10$) = (SE * 1.645 / estimate) * 100.

^b No cutthroat trout were caught or harvested; shellfish effort, catch and harvest were not recorded.

Appendix B4.—Estimated effort, harvest and catch for the Ketchikan marine boat sport fishery by seasonal period, 28 April–28 September 1997.

Seasonal period	Boat-hours		Salmon-hours		Bottomfish-hours		Angler-hours	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	1,942	461,127	2,662	1,749,493	1,589	396,128	4,251	2,690,529
12May-25May	4,973	1,669,598	7,276	5,982,743	3,340	679,452	10,616	9,597,882
Derby ^a	11,051	1,826,463	23,475	6,881,009	1,811	34,051	25,286	7,323,565
26May-08Jun	2,503	212,600	5,012	1,226,780	1,102	74,856	6,114	1,733,694
09Jun-22Jun	6,256	1,799,795	9,012	3,501,150	4,860	805,794	13,872	6,233,314
23Jun-06Jul	10,124	1,428,623	17,809	4,964,584	9,943	2,047,483	27,752	8,843,736
07Jul-20Jul	5,461	1,475,350	13,697	17,253,308	3,498	605,623	17,195	19,712,623
21Jul-03Aug	8,264	1,600,955	15,620	13,538,926	7,222	2,755,964	22,842	19,333,822
04Aug-17Aug	9,137	1,857,908	18,292	8,418,290	10,354	4,074,458	28,646	19,918,102
18Aug-31Aug	7,739	3,905,977	13,000	18,228,630	8,387	5,263,995	21,387	24,070,858
01Sep-14Sep	5,055	1,851,422	9,741	7,405,314	2,219	318,156	11,960	8,090,585
15Sep-28Sep	4,094	1,164,170	9,139	6,981,602	917	138,201	10,056	7,722,598
Total	76,599	19,253,988	144,735	96,131,829	55,242	17,144,161	199,977	135,271,308

Seasonal period	Boat-days		Chinook salmon ≥ 28" total catch		Chinook salmon ≥ 28" harvested		Chinook salmon < 28" total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	773	124,249	82	1,853	82	1,853	32	619
12May-25May	1,400	63,685	140	1,285	140	1,285	216	12,164
Derby ^a	2,224	60,636	475	671	475	671	460	1,483
26May-08Jun	704	17,470	123	1,715	123	1,715	161	2,291
09Jun-22Jun	1,660	169,795	666	29,222	666	29,222	251	4,271
23Jun-06Jul	2,970	110,214	876	32,306	802	26,405	695	32,361
07Jul-20Jul	1,653	105,536	521	33,883	437	20,349	570	62,940
21Jul-03Aug	2,511	136,776	216	3,135	179	1,545	339	23,499
04Aug-17Aug	2,369	89,683	143	4,519	143	4,519	1,288	294,950
18Aug-31Aug	1,988	230,379	45	1,005	45	1,005	363	30,771
01Sep-14Sep	1,246	112,372	87	494	87	494	1,468	560,108
15Sep-28Sep	1,042	66,660	0	0	0	0	1,103	228,400
Total	20,540	1,287,455	3,374	110,088	3,179	89,063	6,946	1,253,857

Seasonal period	Chinook salmon < 28" harvested		Coho salmon total catch		Coho salmon harvested		Pink salmon total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	0	0	0	0	0	0
12May-25May	0	0	0	0	0	0	0	0
Derby ^a	0	0	10	23	3	8	12	53
26May-08Jun	0	0	0	0	0	0	0	0
09Jun-22Jun	0	0	27	586	27	586	53	1,221
23Jun-06Jul	4	12	197	1,897	168	1,376	644	26,418
07Jul-20Jul	10	86	981	121,919	733	49,498	2,080	295,752
21Jul-03Aug	13	164	2,038	162,939	1,897	145,586	5,508	1,342,469
04Aug-17Aug	32	961	3,023	597,963	2,789	567,802	4,653	1,528,579
18Aug-31Aug	0	0	3,754	2,818,094	2,507	962,317	3,133	2,530,508
01Sep-14Sep	7	42	2,989	727,867	2,567	544,730	694	20,981
15Sep-28Sep	0	0	4,387	2,809,274	3,513	1,340,913	63	405
Total	66	1,265	17,406	7,240,562	14,204	3,612,816	16,840	5,746,386

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Appendix B4.—Page 2 of 4.

Seasonal period	Pink salmon harvested		Chum salmon total catch		Chum salmon harvested		Sockeye salmon catch and harvest	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	0	0	0	0	0	0
12May-25May	0	0	0	0	0	0	0	0
Derby ^a	0	0	16	51	16	51	0	0
26May-08Jun	0	0	16	121	16	121	0	0
09Jun-22Jun	0	0	29	386	18	121	0	0
23Jun-06Jul	355	3,716	321	12,693	266	9,465	0	0
07Jul-20Jul	1,887	271,123	715	57,728	654	41,862	0	0
21Jul-03Aug	4,685	1,422,192	951	157,877	930	154,748	13	164
04Aug-17Aug	4,357	1,507,969	393	13,915	385	14,080	8	49
18Aug-31Aug	2,000	546,738	329	25,938	297	17,292	0	0
01Sep-14Sep	250	4,280	82	1,079	75	1,088	0	0
15Sep-28Sep	23	177	29	384	29	384	0	0
Total	13,557	3,756,195	2,881	270,172	2,686	239,212	21	213

Seasonal period	Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch		Rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	139	7,278	114	3,974	267	8,833	114	3,116
12May-25May	259	14,944	196	9,812	814	46,942	281	11,503
Derby ^a	309	3,315	251	1,946	790	31,670	254	1,600
26May-08Jun	97	1,341	77	1,124	540	84,817	271	18,395
09Jun-22Jun	922	50,466	676	24,623	2,135	273,307	793	41,641
23Jun-06Jul	1,836	171,814	1,383	107,874	3,203	410,887	1,021	47,610
07Jul-20Jul	747	49,866	612	29,538	434	10,847	225	3,518
21Jul-03Aug	2,187	378,956	1,523	149,849	1,841	303,994	688	28,236
04Aug-17Aug	2,627	691,021	1,754	222,145	2,303	295,160	1,381	163,130
18Aug-31Aug	1,702	379,192	819	58,562	2,686	967,603	1,089	170,814
01Sep-14Sep	456	26,002	382	15,544	658	52,507	249	7,011
15Sep-28Sep	268	51,195	196	24,807	649	209,988	148	16,186
Total	11,549	1,825,390	7,983	649,798	16,320	2,696,555	6,514	512,760

Seasonal period	Lingcod total catch		Lingcod harvested		Quillback rockfish harvested		Dusky rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	13	146	0	0	13	146	0	0
12May-25May	17	96	8	56	84	3,037	0	0
Derby ^a	19	60	12	27	108	620	3	8
26May-08Jun	5	24	5	24	139	7,571	17	109
09Jun-22Jun	45	205	45	205	253	8,892	0	0
23Jun-06Jul	187	6,281	131	2,559	359	7,652	14	111
07Jul-20Jul	25	318	25	318	122	2,825	15	106
21Jul-03Aug	94	4,019	94	4,019	153	4,653	13	164
04Aug-17Aug	95	1,810	71	570	356	22,638	15	195
18Aug-31Aug	25	175	18	139	283	15,335	11	119
01Sep-14Sep	43	475	36	532	21	378	14	168
15Sep-28Sep	0	0	0	0	0	0	0	0
Total	568	13,609	445	8,449	1,891	73,747	102	980

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Seasonal period	Copper rockfish harvested		Black rockfish harvested		Other pelagic rockfish harvested		Yelloweye rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	0	0	0	0	32	619
12May-25May	0	0	0	0	0	0	68	816
Derby ^a	18	63	6	25	0	0	19	79
26May-08Jun	53	1,613	0	0	0	0	0	0
09Jun-22Jun	57	1,376	0	0	13	151	193	7,870
23Jun-06Jul	67	747	100	7,293	11	66	268	3,693
07Jul-20Jul	10	34	0	0	0	0	70	687
21Jul-03Aug	16	92	0	0	0	0	253	11,206
04Aug-17Aug	45	578	54	1,060	15	195	282	8,907
18Aug-31Aug	8	49	0	0	8	49	144	2,459
01Sep-14Sep	0	0	0	0	0	0	33	289
15Sep-28Sep	0	0	12	132	0	0	0	0
Total	274	4,552	172	8,510	47	461	1,362	36,625

Seasonal period	Silvergrey rockfish harvested		Other non-pelagic rockfish harvested		Unidentified rockfish total catch		Unidentified rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	13	146	210	7,792	57	1,141
12May-25May	0	0	0	0	662	41,569	129	2,976
Derby ^a	3	7	25	136	608	25,587	73	755
26May-08Jun	7	45	33	348	290	28,444	22	218
09Jun-22Jun	28	588	29	343	1,562	173,183	219	4,967
23Jun-06Jul	23	371	12	32	2,349	230,565	167	3,663
07Jul-20Jul	9	70	0	0	209	4,255	0	0
21Jul-03Aug	0	0	0	0	1,406	169,004	253	8,663
04Aug-17Aug	343	66,979	42	924	1,151	47,388	229	6,604
18Aug-31Aug	10	90	11	119	2,212	892,963	615	96,168
01Sep-14Sep	14	168	0	0	576	42,574	167	2,986
15Sep-28Sep	5	24	0	0	631	199,732	131	13,295
Total	442	68,342	165	2,048	11,866	1,863,056	2,062	141,436

Seasonal period	Shellfish boat-days		Shellfish pots or rings		Crab boat-days		Crab pots or rings	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	285	45,652	292	16,329	158	14,215	196	11,144
12May-25May	204	8,218	336	27,340	195	8,584	156	3,820
Derby ^a	72	331	195	3,202	58	290	114	1,297
26May-08Jun	5	24	54	2,376	0	0	0	0
09Jun-22Jun	74	619	213	5,169	61	554	134	2,818
23Jun-06Jul	313	5,718	578	22,095	264	5,034	392	11,852
07Jul-20Jul	148	1,801	358	12,488	79	912	116	1,980
21Jul-03Aug	96	833	265	6,285	96	833	265	6,285
04Aug-17Aug	88	1,125	543	63,585	33	199	125	6,195
18Aug-31Aug	85	2,128	255	17,858	68	1,602	218	16,932
01Sep-14Sep	110	2,693	182	7,196	68	831	133	5,264
15Sep-28Sep	86	1,915	615	79,455	11	95	5	24
Total	1,566	71,057	3,886	263,378	1,091	33,149	1,854	67,611

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Seasonal period	Dungeness crab total catch		Dungeness crab harvested		Shrimp harvested		Steelhead harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	3,847	5,902,591	454	105,527	3,910	657,910	0	0
12May-25May	1,057	240,520	512	44,236	3,600	1,152,000	0	0
Derby ^a	1,139	166,016	351	15,112	3,390	397,900	0	0
26May-08Jun	0	0	0	0	1,890	291,060	0	0
09Jun-22Jun	1,255	215,206	460	32,915	1,820	195,830	0	0
23Jun-06Jul	3,685	285,365	1,333	52,632	11,640	4,315,350	0	0
07Jul-20Jul	1,995	617,043	796	83,942	2,590	112,810	0	0
21Jul-03Aug	2,203	741,814	743	73,179	0	0	0	0
04Aug-17Aug	2,200	1,758,730	453	72,429	5,230	852,190	8	49
18Aug-31Aug	2,683	2,183,779	673	125,549	550	16,350	0	0
01Sep-14Sep	1,832	1,944,776	411	83,196	6,370	2,134,020	0	0
15Sep-28Sep	76	4,657	38	1,164	10,160	2,174,830	0	0
Total	21,972	14,060,497	6,224	689,881	51,150	12,300,250	8	49

^a Includes 316 chinook salmon entered in the Ketchikan derby.

Appendix B5.—Estimated effort, harvest and catch for the Juneau marine boat sport fishery by seasonal period, 28 April–28 September 1997.

Seasonal period	Boat-hours		Salmon-hours		Halibut-hours		Angler-hours	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	7,452	1,510,306	16,539	8,467,752	288	36,864	16,827	8,806,595
12May-25May	13,301	2,019,554	30,269	12,816,612	210	12,789	30,479	12,904,440
26May-08Jun	14,340	2,427,833	34,589	15,904,751	4,470	4,013,227	39,101	25,176,870
09Jun-22Jun	12,316	1,967,013	26,152	11,738,475	4,227	983,591	30,379	16,204,102
23Jun-06Jul	10,919	3,099,074	15,483	8,829,770	12,560	7,943,229	28,255	24,921,983
07Jul-20Jul	6,462	761,278	8,558	2,330,902	8,168	1,603,739	16,750	6,236,294
21Jul-03Aug	10,568	2,174,738	13,642	3,758,923	14,690	8,700,077	28,367	18,886,937
04Aug-17Aug	14,522	3,489,067	20,572	9,101,156	16,943	7,312,362	37,565	24,695,411
Derby ^a	7,837	983,548	20,267	7,315,084	620	18,153	20,887	7,566,827
18Aug-31Aug	9,379	5,204,761	16,481	20,149,033	8,518	8,964,324	25,000	49,338,384
01Sep-14Sep	10,672	1,272,745	18,539	6,241,022	7,155	1,521,504	25,701	7,913,560
15Sep-28Sep	2,515	406,095	5,200	1,738,486	586	51,130	5,786	2,283,863
Total	120,283	25,316,012	226,291	108,391,966	78,435	41,160,989	305,097	204,935,266

Seasonal period	Boat-days		Chinook salmon ≥ 28" total catch		Chinook salmon ≥ 28" harvested		Chinook salmon < 28" total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	1,868	75,106	615	25,764	615	25,764	41	504
12May-25May	3,218	135,573	1,558	45,311	1,550	44,706	114	1,606
26May-08Jun	3,574	161,320	2,433	216,398	2,265	156,129	358	13,316
09Jun-22Jun	3,130	91,735	1,562	93,975	1,556	95,369	484	15,150
23Jun-06Jul	2,966	176,343	622	36,408	616	35,674	368	9,755
07Jul-20Jul	1,831	53,103	283	7,697	225	4,442	881	144,545
21Jul-03Aug	2,906	176,677	262	4,160	251	3,691	1,104	76,775
04Aug-17Aug	3,845	245,022	220	3,227	209	2,435	917	125,993
Derby ^a	1,265	24,075	494	1,282	467	666	924	77,229
18Aug-31Aug	2,243	233,642	77	698	77	698	613	52,603
01Sep-14Sep	2,772	82,251	51	789	51	789	158	2,205
15Sep-28Sep	726	30,614	18	144	18	144	206	1,210
Total	30,344	1,485,461	8,195	435,853	7,900	370,507	6,168	520,891

Seasonal period	Chinook salmon < 28" harvested		Coho salmon total catch		Coho salmon harvested		Pink salmon total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	0	0	0	0	0	0
12May-25May	0	0	0	0	0	0	0	0
26May-08Jun	0	0	0	0	0	0	8	101
09Jun-22Jun	0	0	12	132	12	132	49	960
23Jun-06Jul	36	205	54	742	54	742	760	90,002
07Jul-20Jul	0	0	444	13,170	356	8,319	1,027	61,949
21Jul-03Aug	0	0	1,373	90,383	1,290	82,691	1,421	70,770
04Aug-17Aug	0	0	2,484	161,750	2,423	160,692	2,030	193,303
Derby ^a	5	5	1,941	4,808	1,919	3,887	178	981
18Aug-31Aug	0	0	1,825	367,787	1,825	367,787	1,119	160,251
01Sep-14Sep	0	0	3,670	398,694	3,624	396,104	136	2,179
15Sep-28Sep	11	50	979	115,325	974	115,400	94	7,417
Total	52	260	12,782	1,152,791	12,477	1,135,754	6,822	587,913

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Seasonal period	Pink salmon harvested		Chum salmon total catch		Chum salmon harvested		Sockeye salmon catch and harvest	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	0	0	0	0	0	0
12May-25May	0	0	9	72	9	72	0	0
26May-08Jun	0	0	14	133	14	133	0	0
09Jun-22Jun	24	194	19	288	19	288	19	288
23Jun-06Jul	486	32,480	170	1,908	134	1,400	0	0
07Jul-20Jul	709	25,886	377	26,113	336	23,370	0	0
21Jul-03Aug	922	40,649	358	6,551	295	5,819	0	0
04Aug-17Aug	1,526	102,072	153	2,828	145	2,808	0	0
Derby ^a	82	489	36	35	19	16	0	0
18Aug-31Aug	305	13,918	61	715	52	706	1	0
01Sep-14Sep	32	222	39	449	32	418	0	0
15Sep-28Sep	88	7,392	0	0	0	0	0	0
Total	4,174	223,302	1,236	39,092	1,055	35,030	20	288

Seasonal period	Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch		Rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	8	56	0	0	16	224	16	224
12May-25May	21	256	21	256	0	0	0	0
26May-08Jun	1,251	509,746	928	347,281	322	64,272	322	64,272
09Jun-22Jun	1,850	296,106	1,157	103,447	0	0	0	0
23Jun-06Jul	3,814	1,050,673	2,298	322,513	348	46,340	144	3,704
07Jul-20Jul	1,785	189,460	1,249	62,247	102	3,748	45	463
21Jul-03Aug	3,279	941,583	2,244	398,357	297	17,075	278	16,892
04Aug-17Aug	2,956	241,124	2,181	149,862	246	9,193	161	4,283
Derby ^a	286	4,953	162	1,673	39	507	36	499
18Aug-31Aug	2,077	531,289	1,763	359,067	242	27,588	242	27,588
01Sep-14Sep	844	51,086	494	16,680	51	1,146	51	1,146
15Sep-28Sep	77	1,832	50	866	0	0	0	0
Total	18,248	3,818,164	12,547	1,762,249	1,663	170,093	1,295	119,071

Seasonal period	Lingcod catch and harvest		Dolly Varden total catch		Dolly Varden harvested		Cutthroat trout total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	8	56	0	0	0	0
12May-25May	0	0	87	3,922	59	2,206	0	0
26May-08Jun	0	0	175	6,672	37	457	0	0
09Jun-22Jun	6	30	247	8,435	127	3,415	0	0
23Jun-06Jul	0	0	18	175	12	132	60	2,700
07Jul-20Jul	0	0	33	792	11	88	0	0
21Jul-03Aug	0	0	0	0	0	0	0	0
04Aug-17Aug	0	0	128	9,724	77	2,736	0	0
Derby ^a	0	0	30	235	28	246	3	5
18Aug-31Aug	0	0	0	0	0	0	0	0
01Sep-14Sep	0	0	19	313	0	0	0	0
15Sep-28Sep	0	0	0	0	0	0	0	0
Total	6	30	745	30,324	351	9,280	63	2,705

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Seasonal period	Cutthroat trout harvested		Shellfish boat-days		Shellfish pots or rings		King crab boat-days	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	153	2,464	351	20,342	0	0
12May-25May	0	0	185	1,439	331	6,213	0	0
26May-08Jun	0	0	461	11,386	822	27,283	0	0
09Jun-22Jun	0	0	282	4,410	474	11,346	0	0
23Jun-06Jul	28	588	754	25,291	1,469	79,394	306	7,902
07Jul-20Jul	0	0	788	15,211	1,619	60,340	609	12,074
21Jul-03Aug	0	0	683	27,120	1,126	46,049	382	6,112
04Aug-17Aug	0	0	1,292	37,089	2,458	117,060	815	22,887
Derby ^a	3	5	41	271	72	545	0	0
18Aug-31Aug	0	0	228	3,523	440	23,843	0	0
01Sep-14Sep	0	0	391	12,682	874	43,203	6	35
15Sep-28Sep	0	0	124	2,146	281	12,905	25	376
Total	31	593	5,382	143,032	10,317	448,523	2,143	49,386

Seasonal period	King crab pots or rings		King crab harvested		Tanner crab harvested		Dungeness crab harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	0	0	48	720	519	96,339
12May-25May	0	0	0	0	18	252	776	129,753
26May-08Jun	0	0	0	0	56	2,912	1,996	267,333
09Jun-22Jun	0	0	0	0	6	30	648	67,740
23Jun-06Jul	582	26,401	848	87,705	287	8,898	1,669	210,104
07Jul-20Jul	1,175	45,045	1,448	66,901	295	10,260	948	53,466
21Jul-03Aug	761	30,387	819	34,550	331	18,432	814	48,768
04Aug-17Aug	1,461	74,567	1,598	94,874	281	6,980	1,965	150,228
Derby ^a	0	0	0	0	0	0	171	9,092
18Aug-31Aug	0	0	0	0	0	0	938	182,428
01Sep-14Sep	26	556	90	6,812	26	556	1,476	161,763
15Sep-28Sep	83	5,646	36	574	0	0	520	62,191
Total	4,088	182,602	4,839	291,416	1,348	49,040	12,440	1,439,205

^a Includes 398 large chinook, 2 small chinook, 1,597 coho, 2 pink, 8 chum, and 1 sockeye salmon entered in the derby.

Appendix B6.—Estimated effort, harvest and catch for the Sitka marine boat sport fishery by seasonal period, 28 April–28 September 1997.

Seasonal period	Boat-hours		Salmon-hours		Bottomfish-hours		Angler-hours	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	1,658	219,829	3,321	816,316	234	22,104	3,555	1,008,340
12May-25May	4,536	524,813	9,802	2,058,522	937	84,482	10,738	2,458,838
Derby ^a	9,834	1,637,996	22,201	6,525,028	2,674	221,587	24,875	7,646,146
26May-08Jun	7,339	2,080,095	13,676	4,936,149	7,955	5,771,787	21,632	19,064,451
09Jun-22Jun	9,443	888,167	21,697	4,651,965	7,586	1,041,804	29,291	8,583,771
23Jun-06Jul	9,679	1,202,885	17,368	5,352,055	8,596	1,473,799	26,113	8,364,736
07Jul-20Jul	6,384	2,139,378	13,108	8,089,226	7,178	5,410,850	20,376	23,966,410
21Jul-03Aug	6,779	1,065,043	13,662	6,618,552	5,740	1,938,921	19,615	14,455,973
04Aug-17Aug	7,280	1,047,005	15,336	7,507,033	8,090	1,416,666	23,428	13,275,053
18Aug-31Aug	5,991	1,019,577	12,876	9,497,513	7,368	2,620,379	20,245	13,321,938
01Sep-14Sep	2,373	176,674	2,024	280,200	4,901	882,092	6,925	1,679,149
15Sep-28Sep	198	5,464	43	1,479	452	23,920	495	31,269
Total	71,494	12,006,926	145,114	56,334,038	61,711	20,908,391	207,288	113,856,074

Seasonal period	Boat-days		Chinook salmon ≥ 28" total catch		Chinook salmon ≥ 28" harvested		Chinook salmon < 28" total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	579	26,130	566	33,548	437	19,517	0	0
12May-25May	1,400	54,004	1,520	87,219	1,338	55,065	13	46
Derby ^a	1,910	43,034	5,424	63,231	4,138	40,802	82	548
26May-08Jun	2,202	190,873	6,581	2,113,340	4,911	1,094,710	254	11,822
09Jun-22Jun	2,721	77,680	10,362	882,807	5,670	477,986	341	8,763
23Jun-06Jul	2,731	102,623	6,963	1,546,395	4,690	572,134	345	7,383
07Jul-20Jul	1,857	163,222	1,614	175,841	1,358	126,793	89	1,492
21Jul-03Aug	2,120	105,153	1,719	212,045	1,466	168,295	104	1,052
04Aug-17Aug	2,166	78,872	1,507	106,376	1,338	87,945	109	1,168
18Aug-31Aug	1,671	89,817	424	16,478	396	14,116	455	54,699
01Sep-14Sep	807	22,763	96	3,065	96	3,065	152	11,562
15Sep-28Sep	87	701	0	0	0	0	0	0
Total	20,251	954,872	36,776	5,240,345	25,838	2,660,428	1,944	98,535

Seasonal period	Chinook salmon < 28" harvested		Coho salmon total catch		Coho salmon harvested		Pink salmon total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	0	0	0	0	0	0
12May-25May	0	0	15	117	15	117	21	412
Derby ^a	0	0	36	130	33	134	91	1,155
26May-08Jun	0	0	46	169	46	169	282	41,774
09Jun-22Jun	0	0	225	5,068	202	4,246	104	2,137
23Jun-06Jul	12	120	1,083	29,568	1,025	26,556	282	6,547
07Jul-20Jul	0	0	8,578	7,878,046	8,049	7,409,076	2,147	236,681
21Jul-03Aug	0	0	7,180	2,915,260	6,821	2,937,449	3,383	917,971
04Aug-17Aug	0	0	8,894	2,629,999	8,663	2,470,007	2,311	216,369
18Aug-31Aug	0	0	5,926	2,296,565	5,576	1,964,174	1,184	303,815
01Sep-14Sep	0	0	387	8,912	359	6,687	95	3,547
15Sep-28Sep	0	0	0	0	0	0	0	0
Total	12	120	32,370	15,763,834	30,789	14,818,615	9,900	1,730,408

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Seasonal period	Pink salmon harvested		Chum salmon total catch		Chum salmon harvested		Sockeye salmon total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	0	0	0	0	0	0
12May-25May	0	0	28	232	15	117	0	0
Derby ^a	22	103	257	1,352	192	1,054	17	75
26May-08Jun	121	7,086	444	63,281	295	23,774	17	160
09Jun-22Jun	51	1,284	102	1,580	96	1,614	0	0
23Jun-06Jul	140	2,263	122	1,411	88	814	337	17,316
07Jul-20Jul	1,038	82,469	923	255,517	645	162,350	72	865
21Jul-03Aug	1,510	112,144	892	58,727	368	6,040	116	9,955
04Aug-17Aug	1,140	83,382	963	186,819	711	127,587	34	274
18Aug-31Aug	488	126,649	670	255,394	612	250,406	56	708
01Sep-14Sep	30	272	9	78	9	78	6	32
15Sep-28Sep	0	0	0	0	0	0	0	0
Total	4,540	415,652	4,410	824,391	3,031	573,834	655	29,385

Seasonal period	Sockeye salmon harvested		Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	60	825	60	825	574	50,252
12May-25May	0	0	613	135,520	353	29,673	1,465	218,416
Derby ^a	14	58	1,804	161,266	1,048	32,028	1,978	136,278
26May-08Jun	17	160	5,073	3,600,042	2,962	748,607	1,653	426,829
09Jun-22Jun	0	0	4,089	340,390	2,641	170,345	2,697	163,034
23Jun-06Jul	337	17,316	4,576	578,193	2,839	178,363	4,477	506,669
07Jul-20Jul	72	865	4,054	2,551,830	2,794	1,202,360	2,576	807,592
21Jul-03Aug	116	9,955	3,721	1,495,088	2,338	632,354	3,263	423,023
04Aug-17Aug	25	204	3,765	789,051	2,656	369,117	3,060	299,297
18Aug-31Aug	47	663	4,583	1,379,137	2,699	329,114	2,437	366,422
01Sep-14Sep	6	32	2,995	764,560	1,433	155,209	2,512	604,114
15Sep-28Sep	0	0	37	161	29	198	53	2,311
Total	634	29,253	35,370	11,796,063	21,852	3,848,193	26,745	4,004,237

Seasonal period	Rockfish harvested		Lingcod total catch		Lingcod harvested		Quillback rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	36	564	34	567	23	242	0	0
12May-25May	401	8,425	318	7,291	233	6,654	21	139
Derby ^a	638	11,488	593	36,543	481	25,977	52	364
26May-08Jun	976	118,252	1,410	413,866	1,271	329,743	0	0
09Jun-22Jun	1,061	37,418	658	19,762	612	21,213	58	715
23Jun-06Jul	1,717	168,089	1,131	46,718	1,002	37,815	49	1,018
07Jul-20Jul	1,369	368,998	742	107,769	694	94,049	5	18
21Jul-03Aug	871	69,382	815	89,020	732	68,973	54	628
04Aug-17Aug	1,316	102,187	640	27,086	606	23,427	58	735
18Aug-31Aug	865	88,350	682	76,364	646	69,308	10	83
01Sep-14Sep	1,006	53,349	799	131,915	629	71,893	161	4,158
15Sep-28Sep	32	832	32	832	0	0	0	0
Total	10,288	1,027,334	7,854	957,733	6,929	749,294	468	7,858

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Seasonal period	Dusky rockfish harvested		Copper rockfish harvested		Black rockfish harvested		Other pelagic rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	24	528	0	0	0	0	0	0
12May-25May	30	224	0	0	188	5,298	66	800
Derby ^a	16	98	11	28	149	637	19	53
26May-08Jun	77	2,212	0	0	160	4,557	0	0
09Jun-22Jun	18	270	0	0	278	5,269	18	126
23Jun-06Jul	11	53	6	35	301	9,029	164	5,872
07Jul-20Jul	0	0	0	0	562	79,975	106	6,968
21Jul-03Aug	22	215	0	0	201	4,633	95	4,592
04Aug-17Aug	5	18	5	21	335	11,861	51	1,590
18Aug-31Aug	9	72	0	0	187	4,883	10	83
01Sep-14Sep	9	78	9	78	357	14,746	62	2,615
15Sep-28Sep	0	0	0	0	32	832	0	0
Total	221	3,768	31	162	2,750	141,720	591	22,699

Seasonal period	Yelloweye rockfish harvested		Silvergrey rockfish harvested		Other non-pelagic rockfish harvested		Unidentified rockfish total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	0	0	0	0	0	0	550	45,500
12May-25May	85	682	11	103	0	0	1,043	175,347
Derby ^a	376	7,133	0	0	6	9	1,344	83,251
26May-08Jun	698	94,481	4	18	25	570	677	106,727
09Jun-22Jun	684	20,706	5	23	0	0	1,636	72,371
23Jun-06Jul	1,163	161,808	22	238	0	0	2,701	322,094
07Jul-20Jul	680	114,222	0	0	0	0	1,169	101,078
21Jul-03Aug	442	36,932	26	539	0	0	2,423	335,299
04Aug-17Aug	651	32,519	142	13,911	56	1,778	1,758	113,559
18Aug-31Aug	621	67,202	19	330	9	72	1,573	145,985
01Sep-14Sep	394	10,515	14	100	0	0	1,486	360,479
15Sep-28Sep	0	0	0	0	0	0	21	370
Total	5,794	546,200	243	15,262	96	2,429	16,381	1,862,060

Seasonal period	Unidentified rockfish harvested		Dolly Varden total catch		Dolly Varden harvested		Steelhead Catch and harvest	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
28Apr-11May	12	132	0	0	0	0	0	0
12May-25May	0	0	0	0	0	0	0	0
Derby ^a	9	27	6	24	6	24	0	0
26May-08Jun	12	142	9	72	0	0	0	0
09Jun-22Jun	0	0	5	23	0	0	0	0
23Jun-06Jul	0	0	0	0	0	0	0	0
07Jul-20Jul	16	208	0	0	0	0	0	0
21Jul-03Aug	31	468	29	714	0	0	0	0
04Aug-17Aug	14	159	0	0	0	0	5	18
18Aug-31Aug	0	0	0	0	0	0	0	0
01Sep-14Sep	0	0	0	0	0	0	0	0
15Sep-28Sep	0	0	0	0	0	0	0	0
Total	94	1,136	49	833	6	24	5	18

^a Includes 1,826 large chinook salmon entered in the derby.

Appendix B7.—Recorded effort and harvest from the Petersburg marine boat catch sampling program by biweekly period, 1 May–14 July 1997.

Biweekly period ^a	Salmon-hours	Bottomfish-hours	Chinook salmon harvested	Chinook salmon sampled ^b	Pacific Halibut harvested	Rockfish harvested
28 Apr–11 May ^c	83	11	4	1	1	0
12 May–25 May	119	3	6	4	1	0
26 May–08 Jun	581	208	36	33	31	2
Derby entered ^d			371	371		
Derby other			1	1		
09 Jun–22 Jun	465	419	30	28	85	4
23 Jun–06 Jul	187	520	3	2	123	8
07 Jul–20 Jul	14	143	0	0	40	3
Total	1,447	1,302	451	438	281	17

^a Sampling was conducted 5 days per week by one sampler working 7-hr shifts.

^b Fish were sampled for presence or absence of adipose fin, and heads were collected from fish with missing adipose fins.

^c Sampling was only conducted during the second week of this biweekly period.

^d Petersburg derby held 23–26 May; effort and harvest not recorded for species other than chinook salmon.

Appendix B8.—Recorded effort and harvest from the Wrangell marine boat catch sampling program by biweekly period, 28 April–6 July 1997.

Biweekly period ^a	Salmon-hours	Bottomfish-hours	Chinook salmon harvested	Chinook salmon sampled ^b	Pacific Halibut harvested	Crab boat-days	Crab pots or rings	Dungeness crab harvested
28 Apr–11 May	571	166	32	31	8	56	29	148
21 May–25 May	2,934	83	114	110	15	34	45	241
26 May–08 Jun	3,998	190	182	169	21	48	47	211
09 Jun–22 Jun	1,606	299	76	70	31	18	42	137
23 Jun–06 Jul	304	734	17	13	100	35	14	39
Total	9,413	1,472	421	393	175	191	177	776

Biweekly period ^a	Tanner crab harvested	Shrimp boat-days	Shrimp pots or rings	Shrimp harvested
28 Apr–11 May	33	2	3	200
21 May–25 May	0	1	2	200
26 May–08 Jun	6	4	20	300
09 Jun–22 Jun	0	7	5	810
23 Jun–06 Jul	0	24	15	310
Total	39	38	45	1,820

^a Sampling was conducted 5 days per week by one sampler working 7-hour shifts.

^b Fish were examined for presence or absence of adipose fin, and heads were collected from fish with missing adipose fins.

Appendix B9.—Recorded effort and harvest from the Craig marine boat catch sampling program by biweekly period, 28 April–14 September 1997.

Biweekly period ^a	Salmon-hours	Bottomfish-hours	Chinook salmon harvested	Chinook salmon sampled ^b	Coho salmon harvested	Coho salmon sampled ^b	Chum salmon harvested
28Apr-11May	387	340	10	5	0	0	0
12May-25May	520	335	24	20	0	0	0
26May-08Jun	847	359	112	85	2	2	0
09Jun-22Jun	1,142	441	201	113	18	12	0
23Jun-06Jul	1,265	799	152	110	111	77	1
07Jul-20Jul	681	168	29	20	139	79	2
21Jul-03Aug	985	655	45	14	467	191	1
04Aug-17Aug	1,588	675	14	8	858	460	2
18Aug-31Aug	1,006	356	0	0	507	277	0
01Sep-14Sep	346	524	0	0	119	91	0
Total	8,767	4,652	587	375	2,223	1,189	6

Biweekly Period ^a	Pink salmon harvested	Halibut harvested	Lingcod harvested	Rockfish harvested	Crab boat-days	Crab pots or rings	Dungeness crab harvested
28Apr-11May	0	48	11	69	8	11	18
12May-25May	0	49	29	92	5	14	23
26May-08Jun	0	95	5	103	7	25	79
09Jun-22Jun	4	191	18	105	12	25	72
23Jun-06Jul	6	306	53	147	14	27	42
07Jul-20Jul	19	48	4	51	6	9	25
21Jul-03Aug	135	200	23	107	14	40	52
04Aug-17Aug	92	183	40	130	12	29	70
18Aug-31Aug	21	62	15	118	6	11	16
01Sep-14Sep	5	75	23	133	7	7	17
Total	282	1,257	221	1,055	91	198	414

Biweekly Period ^a	Shrimp boat-days	Shrimp pots or rings	Shrimp harvested
28Apr-11May	4	29	750
12May-25May	10	35	1,030
26May-08Jun	4	12	650
09Jun-22Jun	5	19	3,130
23Jun-06Jul	4	9	200
07Jul-20Jul	6	13	440
21Jul-03Aug	6	25	420
04Aug-17Aug	2	3	20
18Aug-31Aug	3	13	220
01Sep-14Sep	5	21	740
Total	49	179	7,600

^a Sampling was conducted from 11 a.m. through 8 p.m. each Thursday through Sunday.

^b Fish were sampled for presence or absence of adipose fin, and heads were collected from fish with missing adipose fins.

Appendix B10.—Numbers of chinook salmon examined for coded wire tags in Southeast Alaska marine boat sport fisheries in 1997.

Sport fishery	Seasonal period	Chinook salmon ≥ 28"			Chinook salmon < 28"		
		Estimated harvest	Number sampled	Percent	Estimated harvest	Number sampled	Percent
Creel surveys							
Ketchikan	4/28–6/22	1,011	154	15	0	0	0
	Derby entered ^a	316	305	97	0	0	0
	Derby take-home ^a	159	41	26	0	0	0
	6/23–8/03	1,418	158	11	27	4	15
	8/04–9/28	275	32	12	39	7	18
	Total	3,179	690	22	66	11	17
Juneau	4/28–6/22	5,986	1,063	18	0	0	0
	6/23–8/03	1,092	167	15	36	8	22
	8/04–9/28	355	117	33	11	2	18
	Derby entered ^b	398	398	100	2	2	100
	Derby take-home ^b	69	29	42	3	0	0
	Total	7,900	1,774	22	52	12	23
Sitka	4/28–6/22	12,356	1,150	9	0	0	0
	Derby entered ^c	1,826	1,684	92	0	0	0
	Derby take-home ^c	2,312	510	22	0	0	0
	6/23–8/03	7,514	602	8	12	2	17
	8/04–9/28	1,830	139	8	0	0	0
	Total	25,838	4,085	16	12	2	17
Creel survey totals		36,917	6,562	18	130	25	19
Catch sample programs							
Petersburg	5/01–7/14		66				
	Derby entered ^d	371	371	100			
	Derby take-home ^d		1				
	Total		438				
Wrangell	4/28–7/06		392			1	
Craig	4/28–9/14		375			0	
Total sampled			1,205			1	

^a Derby held 24–26 May, 31 May, June, 1 June, and 6–8 June.

^b Derby held 22–24 August.

^c Derby held 24–26 May, 31 May, and 1 June.

^d Derby held 23–26 May.

Appendix B11.—Estimates of hatchery-produced chinook salmon contributed to the Ketchikan marine boat sport fishery, 28 April–28 September 1997.

Region	Agency ^b	Hatchery/ release site	Tag code	Non-derby 4/28-6/22			Derby ^a			Non-derby 6/23-8/03			Non-derby 8/04-9/28			Total				
				Rec ^c	Con ^d	Variance ^e	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance		
British Columbia	CDFO	Kincolith	18-10-45				2	20	256							2	20	256		
		Quinsam River	18-13-56				1	4	10							1	4	10		
		B.C. total					3	24	265							3	24	265		
Washington	WDFW	Turtle Rock	63-57-05							1	11	119				1	11	119		
		Wells Hatchery	63-46-10										1	8	57	1	8	57		
			63-57-02				1	1	0							1	1	0		
		Washington Total					1	1	0	1	11	119	1	8	57	3	20	176		
Alaska	AAC	Bell Island	04-42-60	1	6	36	1	1	0							2	7	36		
	ADFG	Deer Mountain	04-38-57				1	1	0							1	1	0		
			04-42-23							1	33	1,039				1	33	1,039		
	MIC	Tamgas Creek	12-01-01-0103				1	52	2,669							1	52	2,669		
			47-17-05				2	6	14							2	6	14		
	SSRA	Carroll Inlet	04-40-49	2	139	10,189	3	36	393							5	175	10,581		
			04-41-04				1	11	103	1	75	5,503				2	86	5,606		
			04-41-48				1	12	128	1	84	7,002				2	96	7,130		
			04-41-49				1	45	1,943							1	45	1,943		
			04-44-17	1	47	2,149										1	47	2,149		
		Neets Bay	04-44-20	1	62	3,824							1	111	12,338	2	173	16,162		
			04-39-34	1	63	3,876										1	63	3,876		
			04-41-42				2	10	33							2	10	33		
		Whitman Lake	04-41-01	3	62	1,233	2	4	5	1	15	223				6	81	1,460		
			04-41-43	1	15	204	4	10	16	4	127	6,271				9	152	6,491		
			04-44-07							2	32	501				2	32	501		
	Alaska total					10	394	26,821	19	188	5,486	10	366	23,006	1	111	12,338	40	1,059	67,651
	All regions					10	394	26,821	23	213	5,873	11	377	23,376	2	119	12,395	46	1,103	68,465

^a Derby held on 24-26 May, 31 May, 1 June, and 6-8 June 1997.

^b CDFO = Canada Department of Fisheries and Oceans, WDFW = Washington Department of Fisheries and Wildlife, AAC = American Aquaculture Corporation, ADFG = Alaska Department of Fish and Game, MIC = Metlakatla Indian Community, SSRA = Southern Southeast Regional Aquaculture Association.

^c Rec = Number of fish recovered of noted tag code.

^d Con = Estimated harvest (contribution) of the release of the noted tag code.

^e Variance = Variance of the estimated harvest of the release of the noted tag code.

Appendix B12.—Estimates of hatchery-produced and wild tagged chinook salmon contributed to the Juneau marine boat sport fishery, 28 April–28 September 1997.

Region	Agency ^b	Hatchery/ release site	Tag code	Non-derby 4/28-6/22			Non-derby 6/23-8/03			Non-derby 8/03-9/28			Derby ^a			Total			
				Rec ^c	Con ^d	Variance ^e	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	
HATCHERY STOCKS																			
British Columbia	CDFO	Kitimat River	18-14-33										1	10	86	1	10	86	
		Nitinat River	18-14-26	1	306	93,048							1	306	93,048				
		Oweekeno	18-10-31										1	2	3	1	2	3	
		Snootli Creek	18-12-38										1	7	38	1	7	38	
		B.C. total		1	306	93,048							3	19	126	4	325	93,174	
Alaska	ADFG	Crystal Lake	04-01-01-1510	1	8	51										1	8	51	
			04-01-02-0913										2	4	5	2	4	5	
			04-42-38									3	30	263	3	30	263		
			04-42-39						1	17	263	1	9	68	2	26	331		
		Crystal Lake/ Earl West Cove	04-42-40									1	7	38	1	7	38		
			04-42-41	1	39	1,522						1	7	44	2	46	1,566		
		Jerry Meyers Snettisham	04-37-36	1	7	39									1	7	39		
			04-34-11									1	4	9	1	4	9		
		04-38-11										1	4	10	1	4	10		
		04-40-30	1	12	142	1	13	157							2	25	299		
		04-40-31	6	125	2,995	5	116	3,602							11	241	6,597		
		04-40-32				2	45	982							2	45	982		
		04-40-33	2	41	821										2	41	821		
		04-40-34	1	58	3,258										1	58	3,258		
		04-40-51	2	43	866	2	46	1,118				1	4	10	5	93	1,994		
		04-42-04				1	38	1,392							1	38	1,392		
		DIPC	Gastineau	04-37-37					1	17	262						1	17	262
				04-40-44	9	373	17,081	1	45	1,983						10	418	19,063	
				04-42-51	2	77	2,982	2	122	7,428	1	13	146	3	20	110	8	232	10,666
				04-44-39				1	33	1,064						1	33	1,064	
				04-44-40									2	15	97	2	15	97	
				04-44-42							1	4	16				1	4	16
				50-04-01				2	34	629							2	34	629
	NMFS	Little Port Walter	03-01-31										1	1	0	1	1	0	
			03-01-32							1	4	14	1	1	0	2	5	14	
			03-01-34				1	9	71							1	9	71	
			03-02-34	1	6	32							1	1	0	2	7	32	

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Region	Agency ^b	Hatchery/ release site	Tag code	Non-derby 4/28-6/22			Non-derby 6/23-8/03			Non-derby 8/03-9/28			Derby ^a			Total		
				Rec ^c	Con ^d	Variance ^e	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
	NMFS	Little Port Walter (cont'd)	03-02-36							1	3	6				1	3	6
			03-02-37										1	1	0	1	1	0
			03-02-38	1	6	29	1	7	37				1	1	0	3	14	65
			03-21-37										1	4	13	1	4	13
			03-22-36										1	1	0	1	1	0
			03-22-37										1	1	0	1	1	0
			03-22-38										1	1	0	1	1	0
			03-22-42										1	1	0	1	1	0
			03-22-44										1	1	0	1	1	0
			03-63-01	1	6	33				1	2	2				2	8	35
			03-63-39				1	6	36							1	6	36
			03-63-50	1	7	43										1	7	43
			03-63-51							1	2	3				1	2	3
			03-63-52										1	1	0	1	1	0
			03-63-53							1	2	3				1	2	3
			03-63-55	1	6	29										1	6	29
			03-63-56	2	13	69										2	13	69
			03-63-60										2	2	0	2	2	0
			03-63-62										1	1	0	1	1	0
	NSRA	Hidden Falls	04-40-56	1	6	34										1	6	34
			04-41-07	1	121	14,424										1	121	14,424
			04-41-26										1	1	0	1	1	0
			04-41-28	1	6	30							1	1	0	2	7	30
			04-41-33	4	31	240										4	31	240
	SSRA	Carroll Inlet	04-44-20										1	35	1,217	1	35	1,217
		Whitman Lake	04-41-43										1	2	4	1	2	4
		Alaska total		40	991	54,365	21	531	24,287	8	47	552	35	161	1,929	104	1,730	81,133
		All regions		41	1,297	148,790	21	531	24,287	8	47	552	38	180	2,056	108	2,055	175,685
WILD STOCKS^f																		
Alaska	ADFG	Taku River	04-28-53	1	1,355	1,834,560										1	1,355	1,834,560
			04-42-27	3	5,001	8,461,261										3	5,001	8,461,261
		Wild stocks total		4	6,356	10,295,821										4	6,356	10,295,821

^a Derby held on 22-24 August 1997.

^b CDFO = Canada Department of Fisheries and Oceans, ADFG = Alaska Department of Fish and Game, DIPC = Douglas Island Pink and Chum, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association, SSRA = Southern Southeast Regional Aquaculture Association.

^c Rec = Number of fish recovered of noted tag code.

^d Con = Estimated harvest (contribution) of the release of the noted tag code.

^e Variance = Variance of the estimated harvest of the release of the noted tag code.

^f Wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds.

Appendix B13.—Estimates of hatchery-produced chinook and wild tagged salmon contributed to the Sitka marine boat sport fishery, 28 April–28 September 1997.

Region	Agency ^b	Hatchery/ release site	Tag code	Non-derby 4/28-6/22			Derby ^a			Non-derby 6/23-8/03			Non-derby 8/04-9/28			Total		
				Rec ^c	Con ^d	Variance ^e	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS																		
British Columbia	CDFO	Conuma River	18-06-32				2	29	372							2	29	372
			18-06-33	2	205	20,735	1	10	85							3	215	20,820
			18-13-63							1	386	148,950				1	386	148,950
		Kitimat River	18-09-02	1	56	3,080										1	56	3,080
			18-14-33							1	164	26,634				1	164	26,634
			18-18-11	1	52	2,647										1	52	2,647
		Nitinat River	18-06-35	1	373	139,128	2	69	2,310	1	403	162,135				4	845	303,573
			18-14-26	1	616	378,849	1	239	56,701	2	1,576	1,274,725				4	2,431	1,710,275
			18-15-24							2	1,401	1,006,529				2	1,401	1,006,529
		18-15-57				3	313	53,321							3	313	53,321	
		18-18-61										2	115	6,769	2	115	6,769	
		Oweekeno Puntledge River	18-10-31				1	2	3	1	39	1,482				2	41	1,485
			18-14-05				1	3	8							1	3	8
			18-13-56				1	18	315							1	18	315
		Quinsam River	18-13-57	1	48	2,246										1	48	2,246
			18-13-58				1	4	14							1	4	14
			18-14-59										1	621	385,237	1	621	385,237
		18-15-41	1	451	203,148										1	451	203,148	
		18-15-42							1	501	250,328				1	501	250,328	
		18-15-43				1	25	613							1	25	613	
		18-15-45	1	264	69,234											1	264	69,234
		18-15-46	1	219	47,800	2	40	758								3	259	48,558
		18-15-47	1	59	3,469	1	6	26								2	65	3,494
		Snootli Creek	18-07-54	1	9	75										1	9	75
			18-12-37	2	345	62,055										2	345	62,055
			18-14-22							1	38	1,416				1	38	1,416
		Tahsis Terrace	18-10-46							1	13	161				1	13	161
			181-0-52							1	13	158				1	13	158
			02-31-16	2	26	302	1	1	0							3	27	303
		B.C. total				16	2,723	1,047,969	18	759	114,647	12	4,534	3,083,749	3	736	399,023	49
Oregon	ODFW	Bonneville Hatchery	07-49-54				1	181	32,477							1	181	32,477
			07-58-14	1	194	37,465									1	194	37,465	
			07-58-16	1	481	230,705									1	481	230,705	

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Region	Agency ^b	Hatchery/ release site	Tag code	Non-derby 4/28-6/22			Derby ^a			Non-derby 6/23-8/03			Non-derby 8/04-9/28			Total		
				Rec ^c	Con ^d	Variance ^e	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Oregon	ODFW	Coos River,	07-59-43				1	5	17							1	5	17
		Noble Creek	07-04-21				1	6	26							1	6	26
		Salmon River	07-04-59	1	15	214							1	16	243	2	31	457
			07-04-61										1	14	182	1	14	182
			07-04-62				3	12	49							3	12	49
			07-04-63				1	1	0							1	1	0
		Trask River																
		Ponds	07-03-36	1	59	3,415										1	59	3,415
		Oregon total		4	749	281,189	7	205	32,621				2	30	447	13	984	314,257
Washington	FWS	Makah on																
		Sooes	05-35-20							1	332	109,930				1	332	109,930
		Quinault -																
		Cook Creek	05-31-27				1	9	77							1	9	77
	NBS ODFW WDFW	Willard	05-01-01-0911	1	101	10,193										1	101	10,193
		Columbia R.	05-35-55	1	12	132										1	12	132
		Bonneville	07-08-17				1	74	5,407							1	74	5,407
		Cowlitz	63-55-39							1	283	79,796				1	283	79,796
		Kalama Falls	63-50-54				2	72	2,529							2	72	2,529
		Kendall Creek	63-58-34										1	9	72	1	9	72
		Priest Rapids	05-01-01-0808				1	1	0							1	1	0
			63-55-40				2	205	29,299				1	460	211,342	3	665	240,642
		Similkameen	63-51-54	1	9	71	1	1	0							2	10	71
			63-51-55				2	6	18	1	13	155				3	19	172
		Turtle Rock	63-50-45				1	3	4							1	3	4
			63-53-17				1	23	493							1	23	493
		Wells Dam	63-50-05	1	12	141	2	2	0							3	14	141
		Wells Hatchery	63-57-02	1	13	151										1	13	151
		Washington total		5	147	10,737	14	396	38,257	3	628	195,185	2	469	211,414	24	1,640	455,593

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Region	Agency ^b	Hatchery/ release site	Tag code	Non-derby 4/28-6/22			Derby ^a			Non-derby 6/23-8/03			Non-derby 8/04-9/28			Total		
				Rec ^c	Con ^d	Variance ^c	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
89	ADFG	Crystal Lake/ Earl West Cove	04-40-28				1	11	101							1	11	101
			04-42-41	1	80	6,365										1	80	6,365
			31-23-13				1	3	5							1	3	5
			04-40-33				2	7	20							2	7	20
		NMFS	04-40-36				1	9	78							1	9	78
			03-02-38				1	1	0							1	1	0
			03-22-34				1	1	0							1	1	0
			03-22-36	1	12	130										1	12	130
			03-22-37	1	12	135	5	12	37							6	24	171
			03-22-40				1	6	26							1	6	26
			03-63-32	1	13	145										1	13	145
			03-63-41				2	2	1							2	2	1
			03-63-42	1	12	143										1	12	143
			03-63-44				1	6	27							1	6	27
			03-63-46	1	9	73										1	9	73
			03-63-52	1	12	134										1	12	134
			03-63-53							1	13	163				1	13	163
			03-63-55				1	1	0							1	1	0
			03-63-56										1	9	73	1	9	73
	NSRA	Hidden Falls Medvejie	04-41-08				1	21	436							1	21	436
			04-01-01-0303	1	169	28,476										1	169	28,476
			04-36-51				1	15	208							1	15	208
			04-39-19				3	20	107							3	20	107
			04-40-62	2	380	71,608	3	53	877							5	433	72,485
			04-41-03				1	87	7,483							1	87	7,483
			04-41-05	2	385	73,667	2	34	546							4	419	74,213
			04-41-09	2	339	58,470	1	18	322							3	357	58,792
			04-41-10							1	204	41,362				1	204	41,362
			04-41-11				1	13	147							1	13	147
			04-41-12	2	265	35,311										2	265	35,311
			04-41-13	1	132	17,394										1	132	17,394
			04-41-21							1	144	20,634				1	144	20,634
			04-41-27	1	136	18,267	2	25	289							3	161	18,555

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Region	Agency ^b	Hatchery/ release site	Tag code	Non-derby 4/28-6/22			Derby ^a			Non-derby 6/23-8/03			Non-derby 8/04-9/28			Total		
				Rec ^c	Con ^d	Variance ^e	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Alaska	SJ	Sheldon																
		Jackson	04-40-52				1	10	93							1	10	93
	SSRA	Carroll Inlet	04-40-50				1	12	124							1	12	124
			04-41-48				1	12	143							1	12	143
		Neets Bay	04-41-42				1	22	483							1	22	483
		Whitman Lake	04-41-01	1	24	549	1	2	3							2	26	552
			04-41-43				1	2	4							1	2	4
	Alaska total			19	1,980	344,489	38	405	11,657	3	361	62,256	1	9	73	61	2,755	418,475
	All regions			44	5,599	2,001,025	77	1,765	202,846	18	5,523	3,481,622	8	1,244	647,800	147	14,131	6,333,293
	WILD STOCKS ^f																	
Washington	COOP	Hanford Reach	63-57-04				1	1	0							1	1	0
		Wild stocks total					1	1	0							1	1	0

^a Derby held on 24-26 May, 31 May, and 1 June 1997.

^b CDFO = Canada Department of Fisheries and Oceans, ODFW = Oregon Department of Fish and Wildlife, FWS=U.S.Fish and Wildlife Service, NBS = National Biological Survey, WDFW = Washington Department of Fisheries and Wildlife, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association, SJ = Sheldon Jackson College, SSRA = Southern Southeast Regional Aquaculture Association, COOP = Washington Department of Fish and Wildlife - Cooperative.

^c Rec = Number of fish recovered of noted tag code.

^d Con = Estimated harvest (contribution) of the release of the noted tag code.

^e Variance = Variance of the estimated harvest of the release of the noted tag code.

^f The wild stock contribution estimate was not expanded by the tagging fraction.

Appendix B14.—Estimates (from sampled fish only) of hatchery-produced chinook salmon contributed to 483 chinook salmon examined during the Petersburg marine boat sport fishery from 1 May to 14 July 1997.

Region	Agency ^a	Hatchery/ release site	Tag code	Rec ^b	Con ^c	Variance ^d	Relative contribution
British Columbia	CDFO	Kitimat River	18-08-06	1	2	2	0.5%
		Toboggan Creek	18-10-08	1	1	0	0.2%
		Snootli Creek	18-12-23	1	9	64	2.1%
		B.C. total		3	12	66	2.7%
Washington	WDF	Klickitat	63-47-39	1	5	18	1.1%
		Washington total		1	5	18	1.1%
Alaska	ADFG	Crystal Lake	04-38-23	2	23	245	5.3%
			04-40-28	2	19	156	4.3%
			04-40-29	2	19	157	4.3%
		Crystal Lake/Earl West Cove	04-42-40	1	6	34	1.4%
	NMFS	Little Port Walter	03-02-36	1	1	0	0.2%
			03-02-38	1	1	0	0.2%
			03-22-36	1	1	0	0.2%
			03-22-38	1	1	0	0.2%
			03-63-53	1	1	0	0.2%
			03-63-55	1	1	0	0.2%
		Alaska total			13	73	592
TOTAL ALL REGIONS				17	90	676	20.5%

Appendix B15.—Estimates (from sampled fish only) of hatchery-produced chinook salmon contributed to 393 chinook salmon examined during the Wrangell marine boat sport fishery from 28 April to 6 July 1997.

Region	Agency ^a	Hatchery/ release site	Tag code	Rec ^b	Con ^c	Variance ^d	Relative contribution
Alaska	ADFG	Crystal Lake/ Earl West Cove	04-40-27	1	9	70	2.3%
			04-42-40	1	6	34	1.5%
	SSRA	Carroll Inlet	04-44-16	1	7	45	1.8%
			Alaska total			3	22
TOTAL ALL REGIONS				3	22	149	5.6%

^a CDFO = Canada Department of Fisheries and Oceans; ADFG = Alaska Department of Fish and Game; NMFS = National Marine Fisheries Service; SSRA = Southern Southeast Regional Aquaculture Association.

^b Rec = Recovered number of fish of noted tag code from the sampled harvest.

^c Con = Contribution to sampled harvest of the release of the noted tag code.

^d Variance = Variance of the estimated contribution of the release of the noted tag code.

Appendix B16.—Estimates (from sampled fish only) of hatchery-produced chinook salmon contributed to 375 chinook salmon examined during the Craig marine boat sport fishery from 28 April to 14 September 1997.

Region	Agency ^a	Hatchery/ release site	Tag code	Rec ^b	Con ^c	Variance ^d	Relative contribution
British Columbia	CDFO	Conuma River	18-06-32	1	13	155	3.5%
		Nitinat River	18-06-35	2	63	1,932	16.8%
			18-18-32	1	50	2,424	13.3%
		Tahsis	18-14-22	1	3	6	0.8%
		Robertson Creek	18-15-40	1	39	1,492	10.4%
		Fort Babine	02-63-43	1	1	2	0.5%
			B.C. total	7	169	6,011	45.1%
Non-Alaska total				7	169	6,011	45.1%
Alaska	NSRA	Medvejie	04-41-05	1	16	245	4.3%
Alaska total				1	16	245	4.3%
TOTAL ALL REGIONS				8	185	6,256	49.3%

^a CDFO = Canada Department of Fisheries and Oceans; NSRA = Northern Southeast Regional Aquaculture Association.

^b Rec = Recovered number of fish of noted tag code from the sampled harvest.

^c Con = Contribution to sampled harvest of the release of the noted tag code.

^d Variance = Variance of the estimated contribution of the release of the noted tag code.

Appendix B17.—Age composition of chinook salmon from selected Southeast Alaska sport fisheries, 1997.

SPORT FISHERY			BROOD YEAR											SAMPLE SIZE	
			1993	1992		1991			1990			1989			1988
			0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	2.4		2.5
Ketchikan	Males	n		10	5	1	7		1	4					28
		Percent		35.7	17.9	3.6	25.0		3.6	14.3					
		SE ^a		9.2	7.4	3.6	8.3		3.6	6.7					
	Females	n		8	5	2	20			11	1	1			48
		Percent		16.7	10.4	4.2	41.7			22.9	2.1	2.1			
		SE ^a		5.4	4.5	2.9	7.2			6.1	2.1	2.1			
	Total ^b	n	1	23	15	10	58		1	31	2	1		2	144
		Percent	0.7	16.0	10.4	6.9	40.3		0.7	21.5	1.4	0.7		1.4	
		SE ^a	0.7	3.1	2.6	2.1	4.1		0.7	3.4	1.0	0.7		1.0	
Juneau (non-derby)	Males	n			1		35			63	1				100
		Percent			1.0		35.0			63.0	1.0				
		SE ^a			1.0		4.8			4.9	1.0				
	Females	n					29			94	2				125
		Percent					23.2			75.2	1.6				
		SE ^a					3.8			3.9	1.1				
	Total ^b	n			3		113			249	7		2		374
		Percent			0.8		30.2			66.6	1.9		0.5		
		SE ^a			0.5		2.4			2.4	0.7		0.4		
Juneau Derby	Total ^b	n	3	5	28		41		3					80	
		Percent	0.8	1.3	7.5		11.0		0.8						
		SE ^a	0.5	0.6	1.4		1.6		0.5						
Petersburg	Total ^b	n		4	1	4	12		72		6			99	
		Percent		4.0	1.0	4.0	12.1		72.7		6.1				
		SE ^a		2.0	1.0	2.0	3.3		4.5		2.4				
Wrangell	Total ^b	n		4	5	1	30		78		3			121	
		Percent		3.3	4.1	0.8	24.8		64.5		2.5				
		SE		1.6	1.8	0.8	3.9		4.4		1.4				

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SPORT FISHERY			BROOD YEAR											SAMPLE SIZE	
			1993	1992		1991			1990			1989			1988
			0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	2.4		2.5
Craig	Males	n	1	14			5			5					25
		Percent	4.0	56.0			20.0			20.0					
		SE ^a	4.0	10.1			8.2			8.2					
	Females	n	2	15			8			4					29
		Percent	6.9	51.7			27.6			13.8					
		SE ^a	4.8	9.4			8.4			6.5					
	Total ^b	n	3	30			13			9					55
		Percent	5.5	54.5			23.6			16.4					
		SE ^a	3.1	6.8			5.8			5.0					
Sitka	Males	n		1						1					2
		Percent		50.0						50.0					
		SE ^a		50.0						50.0					
	Females	n		1											1
		Percent		100.0											
		SE ^a		0.0											
	Total ^b	n	5	204	4	49	217		1	167	1	4			652
		Percent	0.8	31.3	0.6	7.5	33.3		0.2	25.6	0.2	0.6			
		SE ^a	0.3	1.8	0.3	1.0	1.8		0.2	1.7	0.2	0.3			

^a SE in percent.

^b Includes sexed and unsexed chinook salmon.

Appendix B18.—Length-at-age in millimeters (from tip of snout to fork of tail) by sex for chinook salmon from selected Southeast Alaska sport fisheries, 1997.

SPORT FISHERY			BROOD YEAR											SAMPLE SIZE	
			1994	1993		1992			1991			1990			1989
			0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	2.4		2.5
Ketchikan	Males	Mean		865	741	1,130	929		1,043						
		SE		16	17		21		13						
		n		10	5	1	7		4					27	
	Females	Mean		858	716	965	892		955	945	1,000				
		SE		28	24	20	17		17						
		n		8	5	2	20		11	1	1			48	
	Total ^a	Mean	725	858	732	964	884		1,225	971	948	1,000	910		
		SE		12	11	24	11		14	3			150		
		n	1	23	15	10	37		1	31	2	1	2	123	
	Juneau	Males	Mean			820		847		965	935				
			SE					13		10					
			n				1	34		63	1			99	
Females		Mean					833		907	865					
		SE					10		6	15					
		n					29		90	2			121		
Total ^a		Mean			727		838		931	872		983			
		SE			47		6		4	16		63			
		n			3		110		243	7		2	365		
Juneau Derby		Total ^a	Mean	725	845	729		772		833					
			SE	3	24	10		10		44					
			n	3	5	28		41		3				80	
Petersburg	Total ^a	Mean		855		937	894		941	915					
		SE		23		18	20		10	36					
		n		4		4	6		64	5			83		
Wrangell	Total ^a	Mean		863	774	950	865		965	1,047					
		SE		48	37		11		8	17					
		n		4	5	1	30		78	3			121		

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SPORT FISHERY			BROOD YEAR											SAMPLE SIZE	
			1994	1993		1992			1991			1990			1989
			0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	2.4		2.5
Craig	Males	Mean	745	840			922			987					25
		SE		11			47			45					
		n	1	14			5			5					
	Females	Mean	768	861			884			976					29
		SE	18	14			17			29					
		n	2	15			8			4					
	Total ^a	Mean	760	862			899			982					55
		SE	13	14			20			27					
		n	3	30			13			9					
	Sitka	Males	Mean		765						1,095				2
SE															
n				1						1					
Females		Mean		825										1	
		SE													
		n		1											
Total ^a		Mean	750	836	766	956	867		895	947	890	959		650	
		SE	17	3	26	12	4			7		8			
	n	5	203	4	50	216		1	166	1	4				

^a Includes sexed and unsexed chinook salmon.

Appendix B19.—Numbers of coho salmon examined for coded wire tags in Southeast Alaska marine boat sport fisheries in 1997.

Sport fishery	Seasonal period	Estimated harvest	Number sampled	Percent
Creel surveys				
Ketchikan	4/28–8/03 non-derby	2,825	273	10
	Derby entered ^a	0	0	0
	Derby take-home ^a	3	0	0
	8/04–9/28	11,376	3,155	28
	Total	14,204	3,428	24
Juneau	4/28–8/03	1,712	199	12
	8/04–9/28 non-derby	8,846	1,732	20
	Derby entered ^b	1,597	1,597	100
	Derby take-home ^b	322	91	28
	Total	12,477	3,619	29
Sitka	4/28–8/03 non-derby	16,158	898	6
	Derby entered ^c	0	0	0
	Derby take-home ^c	33	6	18
	8/04–9/28	14,598	891	6
	Total	30,789	1,795	6
Creel survey totals		57,470	8,842	15
Catch sampling programs				
Craig	4/28–9/14		1,189	
Total sampled			10,031	

^a Derby held 24–26 May, 31 May, 1 June, and 7–8 June.

^b Derby held 22–24 August.

^c Derby held 24–26 May, 31 May, and 1 June.

Appendix B20.—Estimates of hatchery-produced and wild tagged coho salmon contributed to the Ketchikan marine boat sport fishery, 28 April–28 September 1997.

Region	Agency ^b	Hatchery/ release site	Tag code	Derby ^a			Non-derby 6/23–8/03			Non-derby 8/04–9/28			Total					
				Rec	Con	Variance	Rec ^c	Con ^d	Variance ^e	Rec	Con	Variance	Rec	Con	Variance			
HATCHERY STOCKS																		
British Columbia	CDFO	Snootli Creek	18-22-49				1	13	167				1	13	167			
			B.C. total				1	13	167				1	13	167			
Alaska	KTHC	Deer Mountain	04-43-21				4	66	1,074				4	66	1,074			
			04-44-58				3	55	997				3	55	997			
			04-44-59				5	81	1,367	2	15	101	7	96	1,468			
			04-44-60				9	167	3,529	2	19	177	11	186	3,706			
			04-44-61				4	58	866	4	26	205	8	84	1,071			
			04-44-62				6	99	1,866	2	17	133	8	116	1,998			
			04-44-63				2	88	3,763	2	45	1,030	4	133	4,793			
			04-45-01				2	90	4,320	2	44	1,018	4	134	5,338			
			MIC	Tamgas Creek	47-17-21							1	112	12,336	1	112	12,336	
					47-17-22						1	563	316,606	1	563	316,606		
			SSRA	Nakat Inlet Neets Bay	04-45-51							1	20	370	1	20	370	
					04-45-40						1	44	1,876	1	44	1,876		
	04-45-41								2	88	4,077	2	88	4,077				
	04-45-42								2	148	12,569	2	148	12,569				
	04-45-45								6	219	11,351	6	219	11,351				
	04-45-46								6	184	7,079	6	184	7,079				
	04-45-47								4	337	33,428	4	337	33,428				
	04-45-48								6	431	42,976	6	431	42,976				
	04-45-49								1	120	14,231	1	120	14,231				
	04-45-50								6	356	28,954	6	356	28,954				
	04-45-55								3	246	25,053	6	356	28,954				
	04-45-56								6	575	78,847	6	575	78,847				
	04-45-57								3	246	25,120	3	246	25,120				
	04-45-58								9	818	118,084	9	818	118,084				
	Whitman Lake	04-45-59								4	152	7,368	4	152	7,368			
		04-45-60								6	280	16,741	6	280	16,741			
	Alaska total							35	704	31,377	82	5,105	1,485,733	117	5,809	1,517,110		
	TOTAL ALL REGIONS							36	717	31,571	82	5,105	1,485,733	118	5,822	1,517,304		
	WILD STOCKS ^f																	
	Alaska	ADFG	Hugh Smith Lake	04-38-09							1	7	42	1	7	42		
	WILD STOCK TOTAL										1	7	42	1	7	42		

^a Derby held 24–26 May, 31 May, 1 June, and 6–8 June 1997.

^b CDFO = Canada Department of Fisheries and Oceans; KTHC = Ketchikan Tribal Hatchery Corporation; MIC = Metlakatla Indian Community; SSRA = Southern Southeast Regional Aquaculture Association.

^c Rec = Number of fish recovered of noted tag code.

^d Con = Estimated harvest (contribution) of the release of the noted tag code.

^e Variance = Variance of estimated harvest of the release of the noted tag code.

^f Wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds.

Appendix B21.—Estimates of hatchery-produced and wild tagged coho salmon contributed to the Juneau marine boat sport fishery, 28 April–28 September 1997.

Region	Agency ^b	Release site	Tag code	Non-derby 6/23–8/03			Non-derby 8/04–9/28			Derby ^a			Total			
				Rec ^c	Con ^d	Variance ^e	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	
HATCHERY STOCKS																
Alaska	BURR	Burro Creek	04-40-15				1	9	72				1	9	72	
		DIPC	Gastineau	50-04-06	1	80	6,274	6	431	33,883	3	31	287	10	542	40,444
				50-04-07				3	196	13,679	7	70	634	10	266	14,313
				50-04-08				8	494	34,586	7	69	614	15	563	35,200
				50-04-09				5	357	25,961	9	116	1,923	14	473	27,884
				50-04-10				3	191	13,021	5	78	1,680	8	269	14,701
	NSRA	Sheep Creek	04-01-03-0211								1	5	21	1	5	21
		Hidden Falls	04-45-16								1	35	1,212	1	35	1,212
		Total			1	80	6,274	26	1,678	152,094	33	404	6,466	60	2,162	164,834
	WILD STOCKS ^f															
Alaska	ADFG	Auke Creek	04-07-17				7	46	311	3	3	0	10	49	311	
		Berners River	04-37-34				2	48	1,316	3	10	24	5	58	1,340	
			04-37-35				1	24	658				1	24	658	
				04-45-29				4	87	2,144	4	13	32	8	100	2,176
		Dredge Lake	04-46-61							1	1	0	1	1	0	
		Duck Creek	04-46-60				1	6	36	1	1	0	2	7	36	
		Taku River	04-42-33	1	613	375,202	9	4,118	2,407,829	3	232	19,978	13	4,963	2,803,009	
		WILD STOCK TOTAL			1	613	375,202	24	4,329	2,412,294	15	260	20,034	40	5,202	2,807,530

^a Derby held on 22–24 August 1997.

^b BURR = Burro Creek Farms, Inc.; DIPC = Douglas Island Pink and Chum; NSRA = Northern Southeast Regional Aquaculture Association; ADFG = Alaska Department of Fish and Game.

^c Rec = Number of fish recovered of noted tag code.

^d Con = Estimated harvest (contribution) of the release of the noted tag code.

^e Variance = Variance of estimated harvest of the release of the noted tag code.

^f Wild stock contribution estimates were not expanded by tagging fractions at Dredge Lake or Duck Creek.

Appendix B22.—Estimates of hatchery-produced and wild tagged coho salmon contributed to the Sitka marine boat sport fishery, 28 April–28 September 1997.

Region	Agency ^a	Release site	Tag code	Non-derby 6/23–8/03			Non-derby 8/04–9/28			Total		
				Rec ^b	Con ^c	Variance ^d	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS												
British Columbia	CDFO	Sewell Inlet	18-11-17	1	25	592				1	25	592
			B.C. total	1	25	592				1	25	592
Alaska	ADFG	Crystal Lake	04-46-09	1	106	11,053				1	106	11,053
	KTHC	Deer Mountain	04-44-62	2	41	918				2	41	918
	MIC	Tamgas Creek	47-17-09	1	263	69,164				1	263	69,164
	NSRA	Hidden Falls	04-45-17	1	1,229	1,509,962				1	1,229	1,509,962
			04-45-18	1	870	756,040				1	870	756,040
			04-44-02	1	161	25,813				1	161	25,813
			04-45-20	1	161	25,830				1	161	25,830
	PWHA	Klawock River	04-46-14				1	538	288,402	1	538	288,402
	SSRA	Neets Bay	04-45-45	1	278	76,897				1	278	76,897
			04-45-50				1	712	506,676	1	712	506,676
			04-45-59				1	414	170,936	1	414	170,936
			Whitman Lake									
				Alaska total	9	3,109	2,941,485	3	1,664	1,025,294	12	4,773
			TOTAL ALL REGIONS	10	3,134	2,956,424	3	1,664	1,025,294	13	4,798	3,981,718
WILD STOCKS ^e												
Alaska	ADFG	Ford Arm Lake	04-43-47	2	373	69,758				2	373	69,758
			WILD STOCK TOTAL	2	373	69,758				2	373	69,758

^a CDFO = Canada Department of Fisheries and Oceans; ADFG = Alaska Department of Fish and Game; KTHC = Ketchikan Tribal Hatchery Corporation; MIC = Metlakatla Indian Community; NSRA = Northern Southeast Regional Aquaculture Association; PWHA = Prince of Wales Hatchery Association; SSRA = Southern Southeast Regional Aquaculture Association.

^b Rec = Number of fish recovered of noted tag code.

^c Con = Estimated harvest (contribution) of the release of the noted tag code.

^d Variance = Variance of estimated harvest of the release of the noted tag code.

^e Wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds.

Appendix B23.—Estimates (from sampled fish only) of hatchery-produced and wild tagged coho salmon contributed to 1,189 coho salmon examined during the Craig marine boat sport fishery, 28 April–14 September 1997.

Region	Agency ^a	Hatchery/release site	Tag code	Rec ^b	Con ^c	Variance ^d	Relative contribution
HATCHERY STOCKS							
Alaska	ADFG	Crystal Lake/Earl West Cove	04-45-54	1	10	82	0.8%
	KRHI	Klawock River	04-46-14	1	17	284	1.4%
	SSRA	Whitman Lake	04-45-59	1	13	165	1.1%
Alaska total				3	40	531	3.4%
TOTAL ALL REGIONS				3	40	531	3.4%
WILD STOCKS^e							
Alaska	ADFG	Hugh Smith Lake	04-38-09	1	1	0	0.1%
WILD STOCK TOTAL				1	1	0	0.1%

^a ADFG = Alaska Department of Fish and Game; KRHI = Klawock River Hatchery, Inc.; SSRA = Southern Southeast Regional Aquaculture Association.

^b Rec = Recovered number of fish of noted tag code from the sampled harvest.

^c Con = Contribution to the sampled harvest of the release of the noted tag code.

^d Variance = Variance of the estimated contribution of the release of the noted tag code.

^e Wild stock tagging fraction at Hugh Smith Lake was 100%.

APPENDIX C: DATA FILES

Appendix C1.—Computer data files and analysis programs developed for the 1997 Southeast Alaska marine boat sport fishery survey. Data files (*.DTA) archived at Alaska Department of Fish and Game, Division of Sport Fish, Research and Technical Services Unit, 333 Raspberry Rd., Anchorage, AK 99518-1599.

Effort, Catch, and Harvest Estimation Files (in KMC97EST.ZIP, JMC97EST.ZIP, PMC97SAM.ZIP, SMC97EST.ZIP, WMC97SAM.ZIP, and CMC97SAM.ZIP)	
A0810M_A.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Ketchikan, 1997
B7600M_A.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Craig, 1997
C0820M_A.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Petersburg, 1997
C0810M_A.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Wrangell, 1997
D0810M_A.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Sitka, 1997
E0810M_A.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Juneau, 1997
abS97.SAS	SAS programs to create basic interview SAS save files from mark-sense data files. 'abc' stands for the letter of each site respectively: KMC for Ketchikan, PMC for Petersburg, WMC for Wrangell, SMC for Sitka, JMC for Juneau
abc97ESS.SAS	SAS programs to create revised interview SAS save files from files created by aMS97.SAS. Revised files have stratification information added to them, have non fin-fish (i.e., shellfish) data removed, and/or have multi-line interviews collapsed to one record per interview. See above for explanation of 'abc'.
abc97MSM.SAS	SAS programs to create SAS save files with only the sampling information associated with each sample for each survey from files created by aMC97ESS.SAS. See above for explanation of 'abc'
abc97EST.SAS	SAS programs to estimate effort, catch, and harvest with associated variances using SAS save files created by aMC97ESS.SAS and aMC97MSM.SAS. Program operates on one species at a time as determined by inputs in temporary input data files 'SPECLIST.DAT'. See above for explanation of 'abc'
Coded Wire Tag Contribution Estimation Files (in CWT97.ZIP)	
SFBAS97.XLS	Data file from tag lab with sampling information for each biweekly period at each fishery.
SFCON97.XLS	Data file from tag lab with recovery information for each adipose finclipped coho and chinook salmon sampled.
SEN97CWT.SAS	SAS program to do basic estimates.
SEN97CO1.SAS	SAS program to summarize contributions across tag codes for main tables.
SEN97CWP.SAS	SAS program to list tags, contributions, and variances for Appendices.
Age-weight-length (AWL) Files (in CHI97AWL.ZIP and HAL97AWL.ZIP)	
CHIN97ALL.DTA	Data file (ASCII) containing chinook salmon AWL data from all sample sites (this file was converted to CHIN97ALL.XLS for input to the SAS program).
REG_LF97CHI.SAS	SAS program to summarize chinook salmon AWL data
HAL97ALL.DTA	Data file (ASCII) containing halibut AWL data from all sample sites (this file was converted to HAL97ALL.CSV for input to the SAS program).
LF97HAL.SAS	SAS program to summarize halibut AWL data

