Fishery Data Series No. 99-15

Harvest Estimates for Selected Marine Sport Fisheries in Southeast Alaska During 1998

by

Dennis J. Hubartt,

Allen E. Bingham,

and

Paul M. Suchanek

August 1999

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Spell out acre and ton.

Time and temperature

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

Spell out year, month, and week.

Physics and chemistry

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

General

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

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	Var

FISHERY DATA SERIES NO. 99-15

HARVEST ESTIMATES FOR SELECTED MARINE SPORT FISHERIES IN SOUTHEAST ALASKA DURING 1998

by
Dennis J. Hubartt
Division of Sport Fish, Ketchikan
Allen E. Bingham
Division of Sport Fish, Anchorage
and
Paul M. Suchanek
Division of Sport Fish, Douglas

Alaska Department of Fish and Game
Division of Sport Fish
Anchorage, Alaska

August 1999

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Dennis J. Hubartt
Alaska Department of Fish and Game, Division of Sport Fish, Region I
2030 Sea Level Drive, Suite 205, Ketchikan, AK 99901, USA

Allen E. Bingham
Alaska Department of Fish and Game, Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, AK 99518-1599, USA

Paul M. Suchanek
Alaska Department of Fish and Game, Division of Sport Fish, Region I
Douglas Island Center Building, Douglas, AK 99824-0020, USA

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ABSTRACT

Creel surveys of the Juneau, Ketchikan, and Sitka marine sport fisheries for chinook salmon *Oncorhynchus tshawytscha* were conducted during 1998. 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. The estimated harvest of chinook salmon was 27,114 in the combined Ketchikan, Sitka, and Juneau boat sport fisheries. Harvests of chinook salmon were less than half of the long-term average in the Ketchikan fishery, well below average in the Juneau fishery, and 178% of the long-term average in the Sitka fishery. Hatcheries in British Columbia, Washington, and Oregon produced about 37% of the monitored chinook salmon harvest, with an additional 13% of the total harvest of Alaska hatchery origin. Alaska hatcheries produced 49% of the chinook salmon harvest in Ketchikan, 37% in Juneau, and 4% in Sitka. Non-Alaskan hatcheries accounted for 45% of the chinook salmon harvest in Sitka and 31% of the harvest in Ketchikan, but produced only 2% in Juneau. Coded wire tag sampling in Petersburg, Wrangell, and Craig revealed that chinook salmon from Alaska hatcheries contributed about 8%, 14% and 1% of the harvest, respectively.

An estimated 82,313 coho salmon *Oncorhynchus kisutch*, 41,261 pink salmon *Oncorhynchus gorbuscha*, 34,618 Pacific halibut *Hippoglossus stenolepis*, and 15,674 rockfish *Sebastes* species, were also harvested in the combined Ketchikan, Juneau, and Sitka marine boat fisheries. Hatcheries produced 52%, 23% and 21% of the coho salmon harvest in Ketchikan, Juneau, and Sitka, respectively. The Pacific halibut harvest of 8,200 in Juneau was 71% of the long-term average, the Ketchikan harvest of 6,778 was 65% of average, and the Sitka harvest of 19,640 was the second highest recorded and 156% of the long-term average. Shellfish effort was above average in the Juneau fishery, but below average in the Ketchikan fishery. Dungeness crab *Cancer magister* harvest was below average in both Juneau and 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, Peters-burg, 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. 1998). 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 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 1997, 90% of the total sport harvest of chinook salmon of Southeast Alaska occurred in the SWHS areas represented by these fisheries (Howe et al. 1998). 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 1998, 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 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 (see Shaul 1998). Analyses of coded wire tag data from coho salmon harvested in these sport fisheries are used for determinations of stock composition (e.g., McPherson et al. 1998).

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 average weight of sport-caught Pacific halibut in Southeast Alaska is reported to the International Pacific Halibut Commission (IPHC) on an annual basis as in Frenette and Suchanek (*Unpublished*).

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 gathered so that the Alaska Department of Fish and Game (ADF&G), in conjunction with the Alaska Board of Fisheries, will have the information necessary

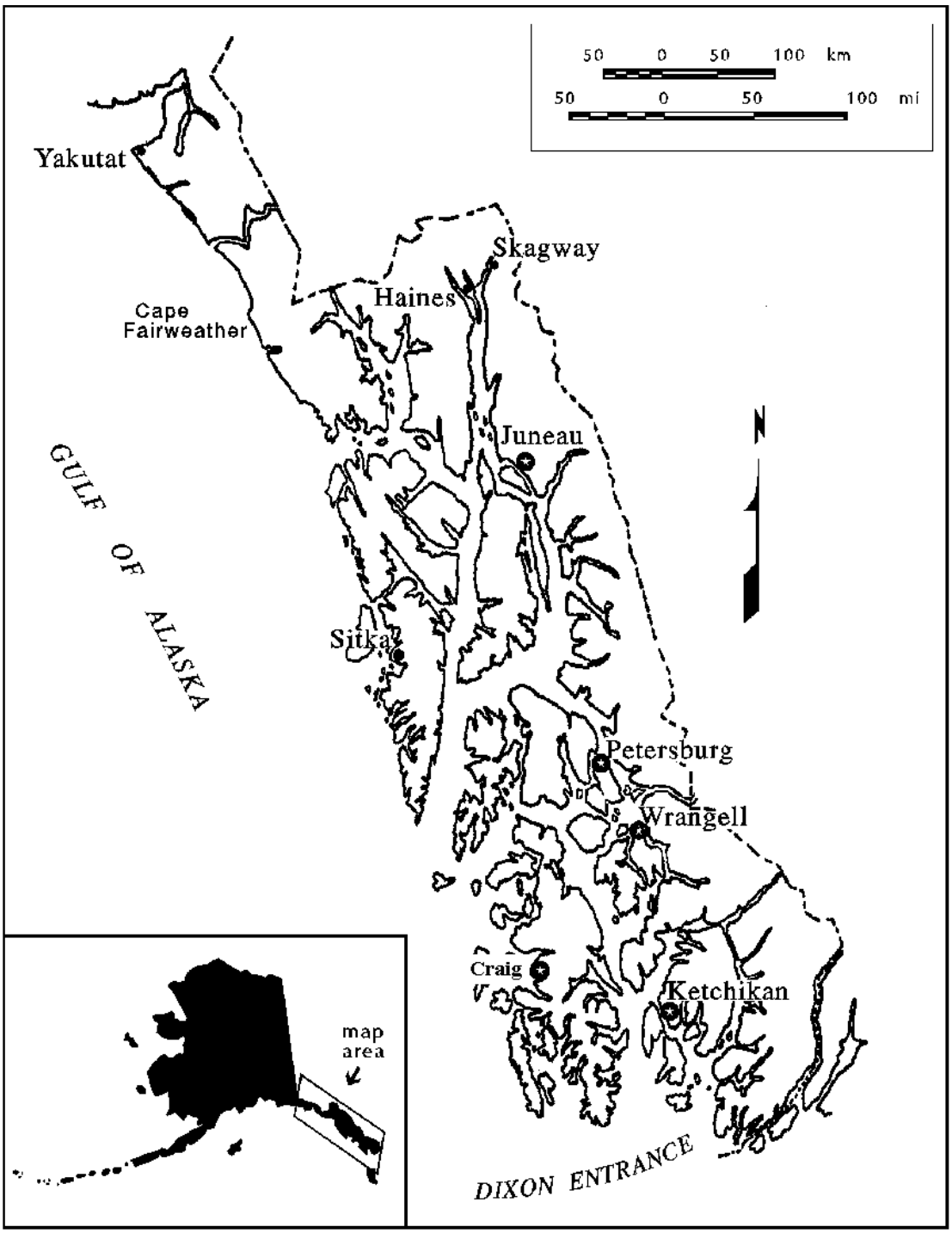

Figure 1.–Location of Juneau, Sitka, Petersburg, Wrangell, Ketchikan, and Craig in Southeast Alaska.

to effectively manage these fisheries. Data on the personal use and sport 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 1998 by the Division of Sport Fish of 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., Frenette 1998, Ericksen 1998).

REGULATIONS

The daily bag and possession limit in marine waters of two chinook salmon ≥28″ was increased by emergency order (E.O. #1-15-98) to three chinook salmon ≥28″ on 3 July 1998. This regulation was enacted to increase sport harvests to a management target of 41,700 treaty chinook salmon. When harvests were greater than expected, the bag limit was reduced to one chinook salmon ≥28″ (E.O. #1-24-98) from 9 September through 31 December 1998. There was an annual limit of four chinook salmon for nonresidents only, and charter vessel operators and crew members were prohibited from retaining king salmon while clients were on board. Filleting, mutilating, or heading sport caught chinook or coho salmon was prohibited at ports sampled by the creel program (E.O. #1-3-98) until marine sport boats reached the dock.

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.#1-6-98) increased the chinook salmon bag and possession limit to two ≥28″ and two <28″ in Wrangell Narrows terminal area near Petersburg from 1 June through 31 July 1998.
- Emergency order (E.O.#1-8-98) increased the chinook salmon bag and possession limit to two ≥28″ and two <28″ in terminal areas near Juneau from 6 June to 31 August 1998.
- Emergency order (E.O.#1-13-98) increased chinook salmon bag and possession limits to two ≥28″ and two <28″ for the Medvijie and Hidden Falls terminal areas near Sitka from 21 June through 31 July 1998.

Bag limits for salmon species other than chinook salmon were six fish per day, 12 in possession for fish 16″ or more in length .

The Pacific halibut bag limit was 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. The lingcod bag limit for nonresidents in Sitka Sound was 1 per day, 2 in possession. New regulations also closed "the Pinnacles" off Mount Edgecumbe near Sitka to the taking of rockfish *Sebastes* and lingcod. Anglers were limited to five pelagic rockfish per day, 10 in possession, and five nonpelagic 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 six male king crab *Paralithodes* was in effect with local exceptions of 2 males in the Yakutat area and in subdistrict 11-A near Juneau and 3 males in subdistricts 12-B and 15-C near Juneau. Also a harvest permit was required for subdistrict 11-A near Juneau which included an annual limit of 10 per individual and 20 per household. E.O.#1-C-22-98 closed several bays south of Juneau to the taking of king crab.

OBJECTIVES

The primary goals of the 1998 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 27 April to 27 September 1998, such that each individual estimate for the surveyed period was within ±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[1] for each indi-vidual fishery was within ±25 percentage points of the true value 90% of the time;
3. estimate the percentages of Alaska hatchery chinook salmon by coded wire tag lot to the following marine boat sport fisheries during the noted time periods:
   - Wrangell from 27 April to 5 July
   - Petersburg from 4 May to 12 July
   - Craig from 27 April to 13 September

   such 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 percentages 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.

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, additional tasks in 1998 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; and
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 by sport anglers was estimated from information collected via stratified random multistage sample

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

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, derby versus non-derby periods.

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-parties[2] 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 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. 1993, 1994, 1995, 1996, 1997, 1998). 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 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 Juneau and Ketchikan. 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 (Appendices A1 and A2). Mean harvest of boat-parties interviewed during a sample was 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

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

summation across strata. Estimates were obtained similarly for the three-stage designs, with appropriate reordering of calculations.

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:

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

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 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 (CF) 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 for clipped adipose fins on chinook and coho salmon taken by boat parties returning to Wrangell harbors from 27 April through 15 June, Petersburg harbors from 4 May through 12 July, and Craig harbors from 27 April through 13 September. Some additional sampling for adipose-clipped fish was also conducted in Ketchikan from 23 May to 27 September, and in Juneau from 30 April through 13 September. Specific equations for estimating the relative contributions of hatchery stocks in Wrangell, Petersburg, and Craig are detailed in Appendix A4.

AGE, LENGTH, AND WEIGHT ESTIMATES

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

As time permitted, harvested chinook salmon were sampled for scales for age determination. Four scales were taken from the preferred area (Welander 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 from 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 and 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 repre-sentative 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 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., ½ hour after sunset) and the beginning of early-day surveys, or at access locations other than those surveyed (this assumption was violated in Ketchikan in 1997 and 1998 because a major access location, Clover Pass, refused access to staff).

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 are necessary for unbiased estimates of length-at-age and age composition:

4. Length-at-age and age composition did not vary substantially within the sampling season, or sampling was proportional to harvest throughout the 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 705,110 (SE = 23,786) angler-hours of effort were expended in the Ketchikan, Sitka, and Juneau marine boat sport fisheries during the time periods sampled (Table 1). Eighty percent of the total effort in angler-hours was targeted on salmon in Ketchikan, 75% in Juneau, and 71% in Sitka. In 1998, total effort in Ketchikan and Sitka was 69% and 68%, respectively, of that expended in Juneau.

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%, 19%, and 12% of the total salmon fishing effort, respectively, occurred during these short time periods.

CHINOOK SALMON FISHERIES

An estimated 27,114 chinook salmon (SE = 1,451) 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 ± 20% of

Table 1.–Summary of estimated total and derby angler effort by target for the Ketchikan, Sitka, and Juneau marine boat sport fisheries during 1998.

	TOTAL EFFORT BY TARGET AND TIME PERIOD			
	Ketchikan[a] 4/27–9/27	Juneau 4/27–9/27	Sitka 4/27–9/27	Total
Boat-hours	77,022	116,200	68,316	261,538
SE	4,404	6,336	2,980	8,272
Salmon-hours	163,855	221,598	144,850	530,303
SE	11,459	14,565	6,895	19,774
Bottomfish-hours[b]	41,194	75,288	57,378	173,860
SE	3,456	5,552	4,077	7,706
Angler-hours[c]	205,063	297,229	202,818	705,110
SE	12,871	17,461	9,760	23,786
% salmon-hours[d]	80%	75%	71%	75%

	DERBY EFFORT BY TARGET AND TIME PERIOD			
	Ketchikan[a] 5/23–25, 5/30, 5/31, 6/06–07	Juneau 8/21–23	Sitka 5/23–25, 5/30-31	Total
Boat-hours	10,091	15,005	7,963	33,059
SE	1,305	3,239	861	3,596
Salmon-hours	21,211	41,036	17,962	80,209
SE	2,565	9,847	1,842	10,341
Bottomfish-hours	2,668	1,324	1,712	5,704
SE	343	230	319	522
Angler-hours	23,880	42,385	19,673	85,938
SE	2,833	10,023	1,752	10,562
% of total salmon fishery[e]	13%	19%	12%	15%

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Includes hours fished for Pacific halibut, rockfish, and other bottomfish.

[c] Includes all targeted and non-targeted effort.

[d] (salmon-hours/total angler-hours) * 100.

[e] (derby salmon-hours/total salmon-hours) * 100.

Table 2.–Summary of estimated harvests of chinook salmon in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed during 1998.

CHINOOK SALMON HARVESTS

Sport fishery	Time period	Harvest of chinook ≥28″	Harvest of chinook <28″	Combined	SE	Relative precision ($\alpha = 0.10$)
Ketchikan[a]	4/27–9/27	2,052	20	2,072	182	14%
Juneau	4/27–9/27	3,847	281	4,128	299	12%
Sitka	4/27–9/27	20,848	66	20,914	1,408	11%
Total		26,747	367	27,114	1,451	9%

DERBY CHINOOK SALMON HARVESTS

		Chinook ≥28″		Chinook <28″		Total harvested		
Major salmon derbies	Time period	Entered	Total[b]	Entered	Total[b]	Number	SE	%[c]
Ketchikan King Salmon Derby	5/23–25, 5/30, 5/31, 6/06–07	269	294	0	0	294	10	14
Juneau Golden North Salmon Derby	8/21–8/23	327	406	0	3	409	29	10
Sitka Salmon Derby	5/23–25, 5/30-31	1,037	2,359	0	0	2,359	191	11
Petersburg Salmon Derby[d]	5/22–5/25	222		0				

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Includes entered and take-home harvests.

[c] (total derby harvest/total area harvest) * 100.

[d] Number taken home was not estimated.

the true value 90% of the time at all locations. About 77% (20,914) of the monitored harvest of chinook salmon was taken in the Sitka fishery, the Juneau fishery accounted for an additional 15% of the harvest, and 8% was taken in the Ketchikan fishery. Most chinook salmon harvested were at least 28″ in length, but an estimated 367 small (<28″) chinook salmon were also harvested.

Harvest of chinook salmon during the Ketchikan King Salmon Derby constituted 14% of the total chinook salmon harvest in the Ketchikan marine fishery, and 10% of the chinook salmon harvest in the Juneau marine boat sport fishery was taken during the Juneau Golden North Salmon Derby (Table 2). In Sitka, 11% of the total chinook salmon harvest was taken during the Sitka Salmon Derby and 1,037 chinook were entered in the derby. Anglers entered a total of 1,633 chinook salmon in the Ketchikan, Juneau and Sitka derbies from a harvest of 3,073 fish during the derby time periods. In the Petersburg Salmon Derby, 222 chinook salmon were entered.

About 28% of the estimated harvest of chinook salmon in the Ketchikan boat fishery was sampled for coded wire tags (Appendix B10); 33% of the estimated harvest of chinook salmon was sampled in the Juneau boat fishery, and 29% in Sitka.

An estimated 13% of chinook salmon harvested in the Ketchikan, Sitka, and Juneau marine boat fisheries were of Alaska hatchery origin (Table 3). The contribution estimates for Alaska hatchery chinook salmon were within ±25 percentage points

Table 3.–Contributions of hatchery chinook salmon to the Ketchikan, Sitka, and Juneau marine boat sport fisheries of Southeast Alaska, 1998.

	Marine boat sport fishery			
Region or hatchery	Juneau (4/27–9/27)	Ketchikan[a] (4/27–9/27)	Sitka (4/27–9/27)	**Total**
Oregon	49	0	226	275
Washington	0	5	720	725
British Columbia	49	628	8,481	9,158
Non-Alaskan total	98	633	9,427	10,158
SE	55	376	1,232	1,289
Alaska				
Big Boulder instream	2	0	0	2
Carroll Inlet	0	612	38	650
Crystal Lake	83	0	50	133
Crystal Lake/Earl West Cove	44	70	0	114
Deer Mountain	0	77	0	77
Gastineau	1,050	0	0	1,050
Hidden Falls	105	0	83	188
Jerry Myers	3	0	0	3
Little Port Walter	64	0	4	68
Medvejie	0	0	638	638
Neets Bay	9	0	43	52
Snettisham	147	0	0	147
Tamgas Creek	0	11	19	30
Whitman Lake	2	244	0	246
Alaskan total	1,509	1,014	875	3,398
SE	207	234	220	382
Relative precision (%)[b]	8	19	2	2
Total all areas	1,607	1,647	10,302	13,556
SE	216	443	1,279	1,371
Relative precision (%)[b]	9	35	10	8
Chinook salmon harvest	4,128	2,072	20,914	27,114
SE	299	182	1,408	1,451
% Alaska hatchery	37	49	4	13
% total hatchery	39	79	49	50

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] ((SE * 1.645) / total harvest) * 100, $\alpha = 0.10$.

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 2% to 19%. Large numbers of hatchery fish also originated in British Columbia, Washington, and Oregon, and, in aggregate, 50% of the chinook salmon harvested in these three fisheries originated in hatcheries.

Four percent of the harvest of chinook salmon in Sitka came from Alaska hatcheries, and the overall hatchery contribution was 49% of the harvest. Most Alaska hatchery chinook salmon harvested in Sitka were produced at the Medvejie hatchery. In Ketchikan, 49% of the harvest of chinook salmon was from Alaska hatcheries, and the overall hatchery contribution to the Ketchikan fishery totaled 79%. Most of the Alaska hatchery chinook salmon taken in Ketchikan originated from Whitman Lake and Carroll Inlet (release site only) hatcheries. About 37% 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 the Sitka fishery (Appendix B13).

In the Petersburg marine boat sport fishery, 389 chinook salmon were examined for clipped adipose fins, and about 14% of the sampled fish came from hatcheries with about 8% from Alaska hatcheries (Appendix B14). The Crystal Lake hatchery was the largest contributor to the Petersburg harvest. About 14% of the 140 chinook salmon sampled from the Wrangell marine boat sport fishery came from Alaska hatcheries and 21% were from all hatcheries combined (Appendix B15). Overall, 50% of the 1,310 chinook salmon sampled in Craig came from hatcheries, but the only Alaska hatchery contributors were Little Port Walter and Neets Bay (Appendix B16).

In total, 1,734 chinook salmon were successfully aged from the six fisheries sampled (Table 4; Appendix B17). About 48% of chinook salmon sampled lacked a freshwater annulus (age-0.), which usually indicates non-Alaskan origin (Van Alen 1988). Saltwater ages varied considerably; an estimated 100% 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 44% males and 56% 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.

Table 4.–Summary of the age composition of chinook salmon sampled in selected marine sport fisheries in Southeast Alaska during 1998.

	FRESHWATER AGE COMPOSITION				
	----------Age 0.----------		**--------Age 1. or more--------**		
Sport fishery	Sample size	Percent	Sample size	Percent	Total sampled
Ketchikan	67	27	178	73	245
Juneau non-derby	15	4	336	96	351
Juneau Derby[a]	2	5	41	95	43
Sitka	693	80	176	20	869
Petersburg	13	12	100	88	113
Wrangell	0	0	56	100	56
Craig	36	63	21	37	57
Total	826	48	908	52	1,734

	SALTWATER AGE COMPOSITION				
	---------Age .3 or less---------		**--------Age .4 or more--------**		
Sport fishery	Sample size	Percent	Sample size	Percent	Total sampled
Ketchikan	187	76	58	24	245
Juneau non-derby	192	55	159	45	351
Juneau Derby[a]	43	100	0	0	43
Sitka	528	61	341	39	869
Petersburg	19	17	94	83	113
Wrangell	25	45	31	55	56
Craig	33	58	24	42	57
Total	1,027	59	707	41	1,734

[a] Juneau Golden North Salmon Derby.

COHO SALMON FISHERIES

Harvests of coho salmon in the Ketchikan, Sitka, and Juneau fisheries totaled an estimated 82,313 fish (SE = 5,209) (Table 5). The only monitored derby in which coho salmon were heavily targeted was the Juneau Golden North Salmon Derby, and an estimated 4,419 coho salmon (SE = 409) were taken during this event (Appendix B2).

Harvests of hatchery coho salmon were estimated from an overall sample of 33% 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 24,958 (SE = 2,332) hatchery coho salmon were taken in the combined Ketchikan, Sitka, and Juneau fisheries (Table 6).

Hatchery contributions ranged from 21% in Sitka to 23% in Juneau and 52% 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 contributed the most coho salmon to the Juneau fishery, and Medvejie, Neets Bay, and Tamgas Creek hatcheries were the major contributors in Sitka. About 6% of the 2,630 coho salmon examined for clipped adipose fins from the Craig marine boat sport fishery were from Alaska hatcheries (Appendix B23). Sixteen coho salmon were sampled in Petersburg, but none were sampled in Wrangell. Additionally, some recoveries of coho salmon from wild stocks were obtained in the Ketchikan, Juneau, 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 0.406 (SE = 0.024), 0.204 (SE = 0.020), and 0.463 (SE = 0.027) coho salmon, respectively, per angler-hour of effort (Table 7). The peak in HPUE for coho salmon occurred in early September in Ketchikan and Juneau and in August in Sitka.

Table 5.–Summary of estimated catch and harvest of coho salmon in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed 27 April–27 September 1998.

Sport fishery	TOTAL CATCH		TOTAL HARVEST		
	Estimate	SE	Estimate	SE	% retained
Ketchikan[a]	26,300	3,022	24,059	2,778	91
Juneau	16,139	1,968	15,730	1,905	97
Sitka	44,973	4,059	42,524	3,972	95
TOTAL	87,412	5,429	82,313	5,209	94

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Sitka and Ketchikan anglers experienced higher HPUEs for coho salmon than did Juneau anglers for much of the season.

BOTTOMFISH FISHERIES

Most bottomfish effort in Southeast Alaska targets on Pacific halibut, and an estimated 34,618 (SE = 2,046) halibut were harvested in Ketchikan, Sitka, and Juneau (Table 8). Estimated average round weight of harvested Pacific halibut ranged from 21.8 pounds in Ketchikan to 53.4 pounds in the Petersburg and Wrangell areas (Table 9). About 1,087,000 pounds of Pacific halibut were taken in Ketchikan, Sitka, and Juneau, and about 71% of this poundage was landed in Sitka. Although rockfish are not a primary target of most Southeast Alaska sport anglers, an estimated 41,030 (SE = 2,285) rockfish were caught in the combined Ketchikan, Sitka, and Juneau fisheries (Table 8). Only 38% (15,674, SE = 1,014) of the rockfish caught were retained. Retention in Juneau, where few rockfish were caught, was higher, at 57%.

Major species composition of the rockfish harvest was estimated for the Ketchikan and Sitka fisheries (Table 10). Yelloweye rockfish composed 46% of the harvest in both Ketchikan and Sitka. Quillback rockfish *S. maliger* (28%) were the next most frequently taken species in

Table 6.–Contributions of hatchery coho salmon to the Ketchikan, Sitka, and Juneau marine boat sport fisheries of Southeast Alaska, 1998.

Region or hatchery		Marine boat sport fishery: Juneau (4/27–9/27)	Ketchikan[a] (4/27–9/27)	Sitka (4/27–9/27)	Total
British Columbia		0	25	92	117
Non-Alaskan total		0	25	92	117
	SE	0	12	29	32
Alaska					
Crystal Lake/Earl West Cove		0	0	210	210
Deer Mountain		0	542	4	546
Fort Richardson		0	0	17	17
Gastineau		3,267	0	105	3,372
Gunnuk Creek		0	0	14	14
Hidden Falls		329	0	630	959
Jerry Myers		1	0	0	1
Medvejie		0	0	3,083	3,083
Medvejie CIF		0	0	51	51
Nakat Inlet		0	151	158	309
Neets Bay		0	10,086	2,998	13,084
Port Armstrong		0	224	260	484
Sheldon Chinson		0	0	26	26
Tamgas Creek		0	752	1,050	1,802
Whitman Lake		0	675	208	883
Alaskan total		3,597	12,430	8,814	24,841
	SE	583	1,920	1,183	2,329
Relative precision[b]		6	13	5	5
Total all areas		3,597	12,455	8,906	24,958
	SE	583	1,920	1,188	2,332
Relative precision[b]		6	13	5	5
Coho salmon harvest		15,730	24,059	42,524	82,313
	SE	1,905	2,778	3,972	5,209
% Alaska hatchery		23	52	21	30
% total hatchery		23	52	21	30

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] ((SE ∗ 1.645) / total harvest) ∗ 100, $\alpha = 0.10$.

Ketchikan, whereas black rockfish *S. melanops* (24%) were second in harvest frequency in Sitka. 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 3,777 (SE = 395) lingcod were harvested in Sitka, and 452 (SE = 91) in Ketchikan (Table 8).

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 abundant in Ketchikan, as the estimated harvest totaled 32,740 (SE = 8,198). Only 3,114 (SE = 464) pink salmon were harvested in Juneau. Retention rates for pink salmon were 58% in Juneau, 44% in Sitka, and 70% in Ketchikan. Harvests of both chum and sockeye salmon were much less, totaling 8,697 chum salmon and 603 sockeye salmon for the three fisheries combined. About 90% of the 345 Dolly Varden harvested were taken by Juneau anglers.

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 1998.

Seasonal period	HARVEST OF COHO SALMON PER ANGLER-HOUR OF EFFORT [a]					
	Ketchikan[b]		Juneau		Sitka	
	HPUE	SE	HPUE	SE	HPUE	SE
5/25–6/07	0.000	0.000	0.000	0.000	0.000	0.000
6/08–6/21	0.002	0.001	0.000	0.000	0.002	0.001
6/22–7/05	0.022	0.004	0.002	0.001	0.021	0.005
7/06–7/19	0.052	0.009	0.015	0.003	0.255	0.027
7/20–8/02	0.078	0.014	0.039	0.009	0.404	0.047
8/03–8/16	0.102	0.014	0.126	0.013	0.463	0.027
8/17–8/30	0.163	0.021	0.189	0.023	0.459	0.044
8/31–9/13	0.406	0.024	0.204	0.020	0.388	0.080
9/14–9/27	0.355	0.024	0.135	0.026	0.137	0.042
All periods	0.164	0.007	0.047	0.003	0.217	0.011

[a] Does not include derby effort or harvest.

[b] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

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 27 April–27 September 1998.

	Sport fishery	Total catch	SE	Harvest	SE	% retained
Pacific halibut	Ketchikan[a]	9,113	1,219	6,778	780	74
	Juneau	10,398	1,061	8,200	802	79
	Sitka	29,344	2,635	19,640	1,713	67
	Total	48,855	3,091	34,618	2,046	71
Rockfish	Ketchikan[a]	10,828	856	3,864	352	36
	Juneau	1,163	296	659	106	57
	Sitka	29,039	2,098	11,151	945	38
	Total	41,030	2,285	15,674	1,014	38
Lingcod	Ketchikan[a]	907	193	452	91	50
	Juneau	69	45	45	27	65
	Sitka	4,567	425	3,777	395	83
	Total	5,543	469	4,274	406	77

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 9.–Average length, round weight, and total round weight of Pacific halibut harvested in sampled Southeast Alaska marine boat sport fisheries during 1998.

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[a]	4/27-9/27	302	88.0	1.0	21.8	6,778	147.8
Juneau	4/27–9/27	767	95.3	0.7	28.1	8,200	230.4
Sitka	4/27–9/27	407	101.8	1.4	39.2	19,640	770.0
Petersburg/ Wrangell	5/04–7/19/ 4/27–6/15	114	114.4	2.7	53.4		
Craig	4/27–9/13	97	93.3	2.6	29.0		
All areas combined		1,687	96.8	0.6	31.4	34,618	1,087.0

[a] Ketchikan harvest estimate is biased low because a major access site (Clover Pass) was not sampled.

Table 10.–Rockfish species composition in the Ketchikan and Sitka marine boat sport fisheries during 1998. (An estimated 659 rockfish harvested in the Juneau marine boat sport fishery were not identified by individual species .)

	Ketchikan[a]		Sitka	
Rockfish species	Harvest[b]	%	Harvest[b]	%
Quillback	1,068	27.6	628	5.6
Dusky	281	7.3	111	1.0
Copper	239	6.2	219	2.0
Black	63	1.6	2,662	23.8
Yelloweye	1,770	45.8	5,190	46.4
Silvergrey	55	1.4	301	2.7
Other nonpelagic	216	5.6	171	1.5
Other pelagic	174	4.5	1,902	17.0

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] The unidentified rockfish harvest was allocated to species by expanding the appropriate percentage of harvest in the identified harvest to the total harvest.

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 5,551 boat-days—more than seven times that estimated for the Ketchikan fishery (743 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 and only a few Tanner crab were taken in the Ketchikan area. Shrimp harvest was recorded only in Ketchikan (99,680 shrimp, SE = 10,266).

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 27 April–27 September 1998.

	Sport fishery	Total catch	SE	Harvest	SE	% retained
Pink salmon	Ketchikan[a]	46,873	10,618	32,740	8,198	70
	Juneau	5,397	901	3,114	464	58
	Sitka	12,411	1,631	5,407	816	44
	Total	64,681	10,780	41,261	8,251	64
Chum salmon	Ketchikan[a]	8,440	1,684	7,130	1,419	84
	Juneau	576	68	480	60	83
	Sitka	1,351	181	1,087	147	80
	Total	10,367	1,695	8,697	1,428	84
Sockeye salmon	Ketchikan[a]	20	11	20	11	100
	Juneau	42	20	42	20	100
	Sitka	562	183	541	175	96
	Total	624	184	603	177	97
Dolly Varden	Ketchikan[a]	35	24	17	15	49
	Juneau	532	95	309	70	58
	Sitka	477	307	19	15	4
	Total	1,044	322	345	73	33

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 12.–Estimated shellfish effort in boat-days, and harvest of Dungeness crab, king crab, Tanner crab and shrimp in the Ketchikan and Juneau marine boat fisheries, 27 April – 27 September 1998.

Sport fishery	Effort		Harvest			
	Boat-days	SE	Dungeness crab	Tanner crab	King crab	Shrimp
Ketchikan[a]	743	99	4,190	210	0	99,680
Juneau[b]	5,551	370	8,112	768	5,310	
Total	6,294	382	12,302	978	5,310	99,680

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Shrimp harvest not estimated in Juneau.

DISCUSSION

Onsite creel surveys provide data necessary for inseason management, and they also can provide detailed fishery performance and biological information which is 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 1998 (as in 1997), it is known that estimates were biased low in comparison to 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 and 1998 estimates.

Effort, harvest and total catch estimates from the three creel surveys reported here should not be considered to encompass all these three fisheries. Overall statistics are best estimated by the SWHS (Howe et al. 1998). 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 system; (3) the night period from the end of civil twilight to the beginning of surveys at about 0800 hr; and (4) boat parties which are not sampled due to being missed by creel samplers. As previously discussed, omission of the Clover Pass access location in Ketchikan during 1998 had the largest 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 marine boat sport fishery 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, 1998). These reports also present results from other surveys which have been done more sporadically. The Ketchikan fishery 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 and 1992-1998. The Petersburg and Wrangell fisheries were not surveyed in 1990 or 1991, but were consistently surveyed in the spring from 1983–1989 and during 1992-1994; and in Petersburg in 1995. Additional catch sampling results are presented in these reports for Wrangell from 1995-1997, Petersburg from 1996-1997, and Craig from 1993-1997.

The Juneau and Ketchikan marine boat fisheries have been consistently surveyed from about 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 1998 was 3% lower than in 1997, and 16% lower than the 1983–1997 average of 354,272 angler-hours. In Ketchikan, total 1998 effort was up 3% from 1997, but 19% below the 1984–1997 average of 253,962 angler-hours. This apparent decline may have been due entirely to the failure to sample Clover Pass. Effort in the Sitka fishery dropped slightly, as total effort during 1998 was 2% lower than in 1997 but 44% higher than the 1987–1997 average.

Estimated effort for both salmon and bottomfish was below average in Juneau and Ketchikan in 1998 (Table 13; Figure 2). In Juneau, 75% of the 1998 effort targeted salmon, while 80% of Ketchikan effort targeted salmon, both slightly below average. In the Sitka fishery, salmon effort and bottomfishing effort were above average by 46% and 39%, respectively.

CHINOOK SALMON FISHERIES

Total harvest of chinook salmon in the Juneau marine boat fishery has shown little trend since 1983, whereas the Ketchikan harvest increased to a peak in 1991 and has since steadily declined to l6% of the 1991 peak with the 1998 harvest as the lowest since 1984 (Table 14, Figure 3).

The Juneau harvest of 4,128 chinook salmon was the lowest harvest recorded since 1978 (Marriott et al. 1979).

Chinook harvests in the Sitka fishery have been generally increasing. The 1998 Sitka harvest of 20,914 was 19% lower than the record sport harvest of 1997, but 78% above average.

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 39% of the 1998 chinook salmon harvest in Juneau originated in hatcheries, compared to the 1983–1997 average of 25%. 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 49% of the 1998 chinook salmon harvest in Ketchikan originated in Alaskan hatcheries, a percentage substantially higher than the average of 35%. In Ketchikan, an estimated 79% of the 1998 harvest originated in hatcheries, in comparison to the average of 47%. The 1998 estimated hatchery percentage of 79% is the highest ever measured during Southeast Alaska creel surveys.

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 Estimate	Salmon-hours Percent	Bottomfish-hours Estimate	Bottomfish-hours Percent	Total angler-hours
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
	1997	4/28-9/28	226,921	74	78,435	26	305,097
	Average		276,011	78	77,851	22	354,272
	1998	4/27-9/27	221,598	75	75,288	25	297,229
	% of average		80		97		84
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
	1997[a]	4/28-9/28	144,735	72	55,242	28	199,977
	Average		185,150	73	68,485	27	253,962
	1998[a]	4/27-9/27	163,855	80	41,194	20	205,063
	% of average		88		60		81
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	----------no comparable survey----------					
	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
	1997	4/28-9/28	145,114	70	61,711	30	207,288
	Average		98,975	70	41,232	29	140,798
	1998	4/27-9/27	144,850	71	57,378	28	202,818
	% of average		146		139		144

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

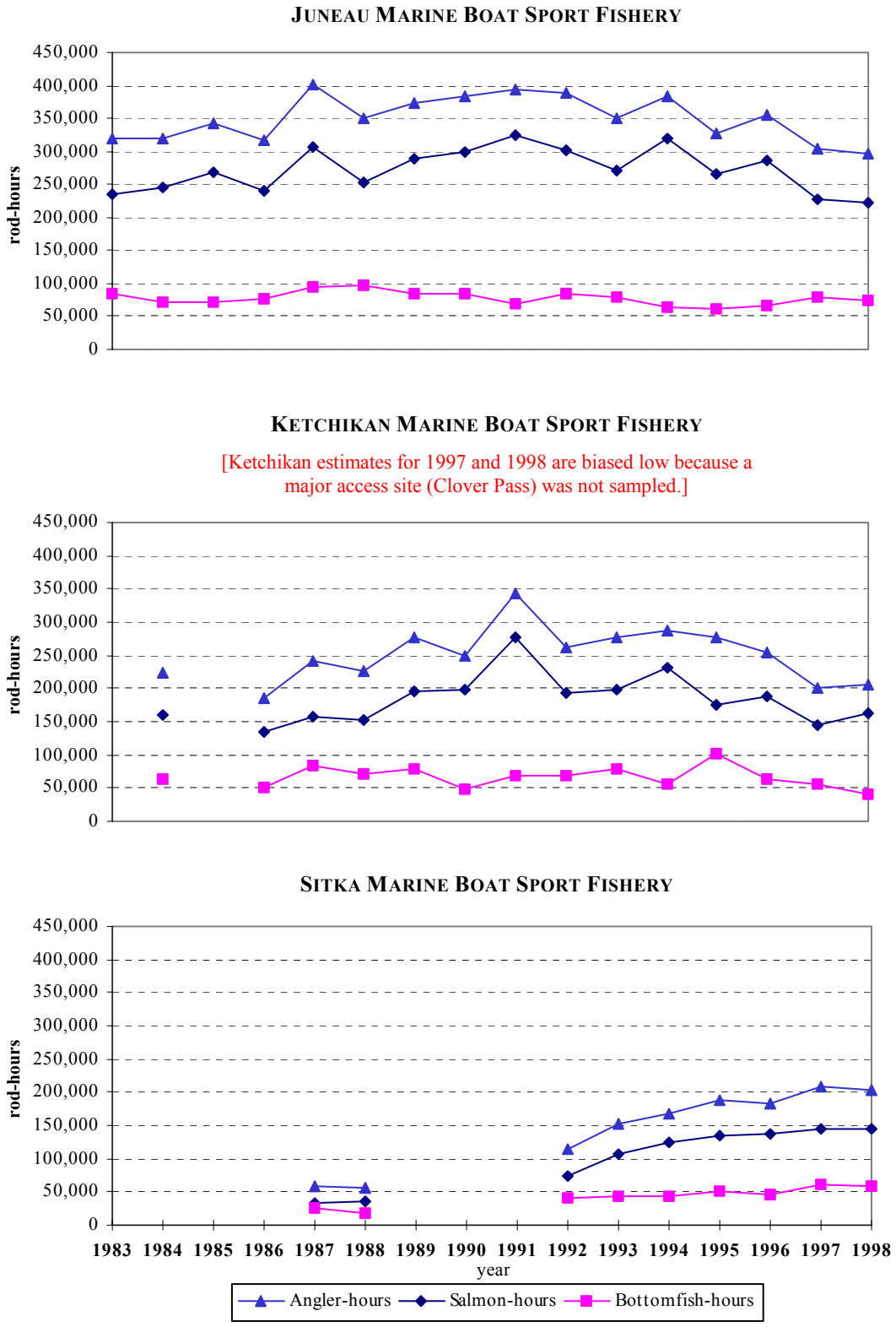

Figure 2.–Estimated effort in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys.

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
1997[b]	7,952	472	3,245	25,850
Average	7,283	696	5,319	11,766
1998[b]	4,128	409	2,072	20,914
% of average	57	59	39	178

[a] Includes Juneau Golden North Salmon Derby harvest.

[b] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

In Sitka, a higher proportion of chinook salmon originate in non-Alaska hatcheries than in Ketchikan or Juneau (Table 15; Figure 4). In 1998, the total hatchery percentage of 49% in Sitka was about average, but the Alaska hatchery percentage of 4% was well below average.

COHO SALMON FISHERIES

The 1998 harvest of 24,059 coho salmon in the Ketchikan area was 4% above the average of 23,148 (Table 16), and the Juneau area harvest of coho salmon (15,730) was 20% below the average of 19,661. The Juneau Golden North Salmon derby harvest of 4,419 coho salmon was 58% above the average of 2,793. The Sitka area harvest of 42,524 coho salmon was nearly triple the average, and was the highest recorded harvest for this fishery.

Harvests of coho salmon are being increasingly supplemented in the Juneau, Ketchikan and Sitka areas by hatchery contributions (Table 17). The relative contribution (23% of total harvest) of hatchery coho salmon in Juneau was the highest recorded. The Ketchikan fishery has been much more dependent upon hatchery coho salmon than has the Juneau fishery. About 34% of the 1984–1997 Ketchikan harvest originated in hatcheries (Table 17). The estimated harvest of 12,455 hatchery coho salmon in 1998 was above average, but in terms of the percent of harvest (52%), this hatchery contribution was the highest ever recorded. The contribution of hatchery-produced coho salmon to the Sitka fishery (8,906) was also the highest recorded, and above average as well in terms of percent of harvest (21%).

BOTTOMFISH FISHERIES

The 1998 harvest of Pacific halibut in the Juneau fishery (8,200) was 29% below the 1983–1997 average of 11,542 (Table 18). The record low

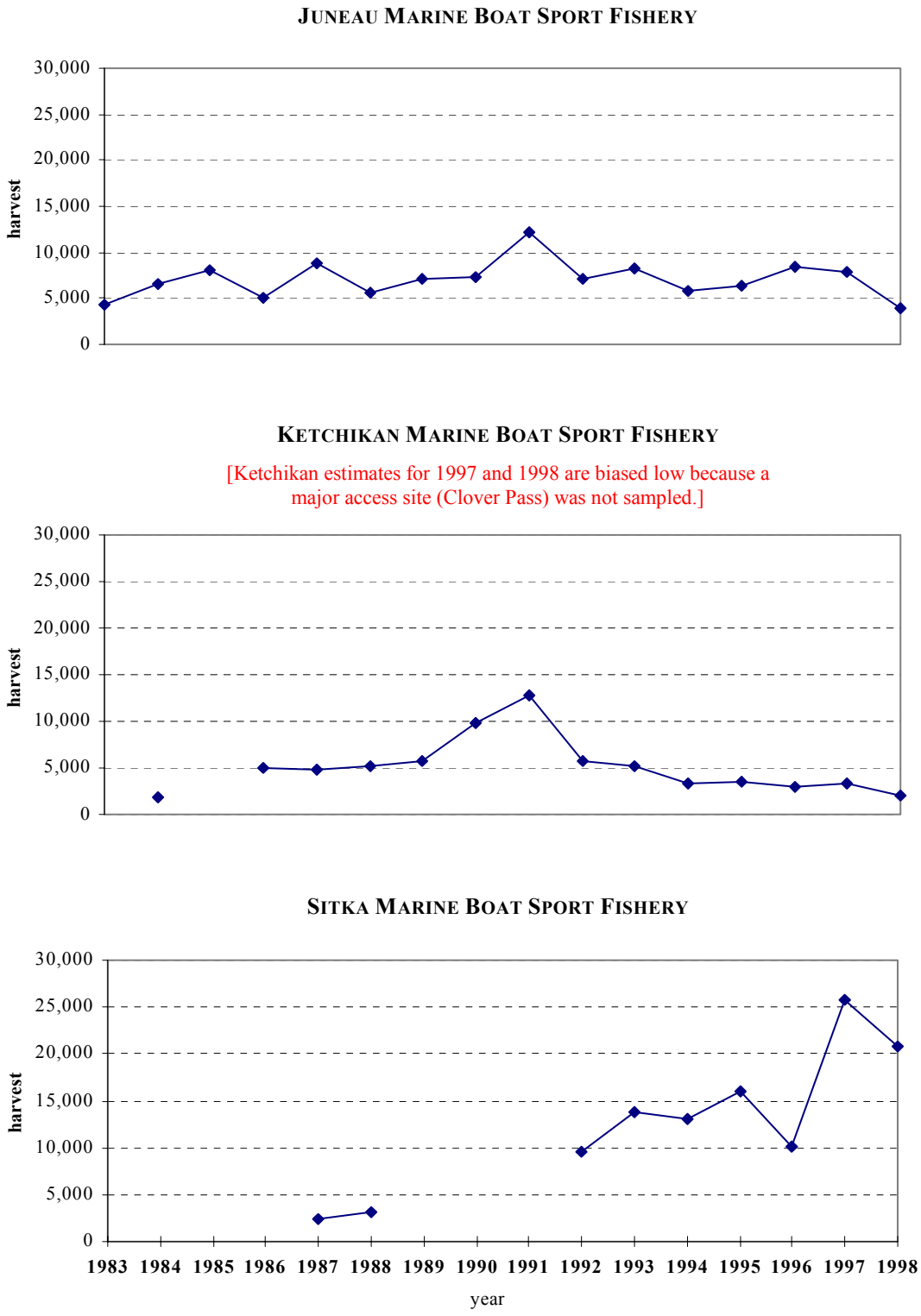

Figure 3.–Estimated harvest of chinook salmon in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys.

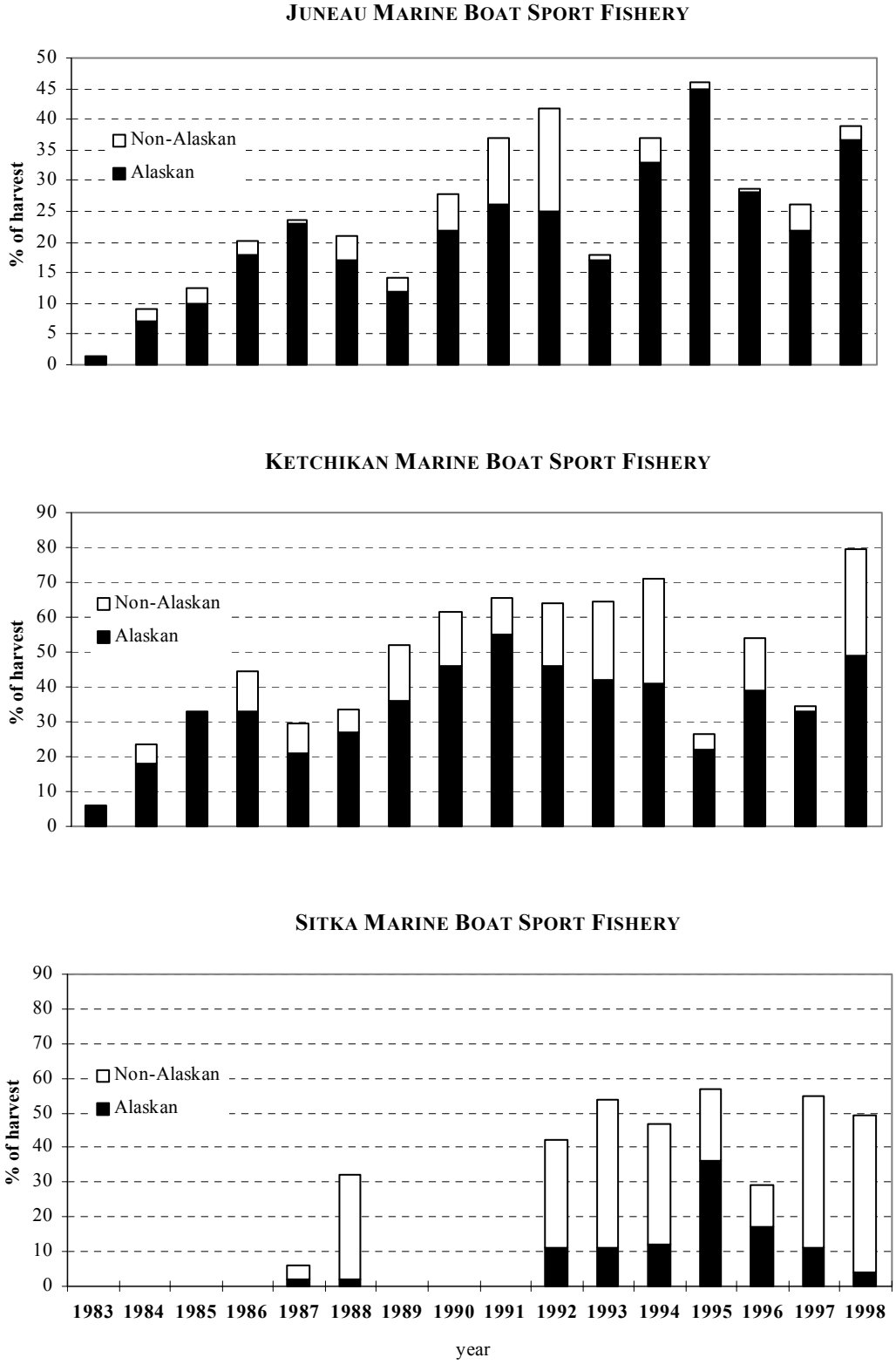

Figure 4.–Estimated percentages of hatchery-produced chinook salmon contributing to Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys.

Table 15.–Estimated contributions of hatchery-produced chinook salmon to Juneau, Ketchikan and Sitka marine boat sport fisheries as determined by onsite creel surveys, 1983–1998.

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
1997[b]	2,055	26	1,730	22	1,098	35	1,059	34	14,131	55	2,755	11
Average	1,819	25	1,512	21	2,495	47	1,880	35	5,620	48	1,814	15
1998[b]	1,607	39	1,509	37	1,647	79	1,014	49	10,302	49	875	4

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

[b] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 16.–Estimated harvest of coho salmon, 1983–1998, 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
1997[b]	12,477	1,919	14,204	30,789
Average	19,661	2,793	23,148	14,396
1998[b]	15,730	4,419	24,059	42,524
% of average	80	158	104	295

[a] Includes Juneau Golden North Salmon Derby harvest.

[b] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 17.–Estimated contributions of hatchery-produced coho salmon to Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys, 1983–1998.

	Juneau marine		Ketchikan marine		Sitka marine	
Year	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
1997[b]	2,162	17	5,822	41	4,798	16
Average	1,544	8	7,771	34	2,532	18
1998[b]	3,597	23	12,455	52	8,906	21

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

[b] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

harvest in Ketchikan (6,778) was 35% below the 1984–1997 average of 10,433. As with angler effort, this low estimate may have been entirely due to the failure to sample Clover Pass. Total estimated catches of Pacific halibut in the Juneau and Ketchikan fisheries were also well below average. The retention rate of 79% for Pacific halibut in Juneau was above the average of 71%, and the retention rate in Ketchikan (74%) was below the 1984–97 average of 79%. The Sitka harvest of halibut in 1998 (19,640) was 56% above the average harvest of 12,589 but 10% lower than the 1997 record. The retention rate of 67% in 1997 was about average.

Rockfish harvest in the 1998 Ketchikan fishery (3,864) was 62% below the 1984–97 average of 10,122 (Table 19). Retention of rockfish at 36% was below the 1986–1997 average of 45%. 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 estimated with creel surveys since 1988 (Table 20). In 1998, the estimated shellfish effort of 5,551 boat-days in the Juneau area was above average, as was the harvest of 5,310 king crab. Dungeness and Tanner crab harvests for Juneau were below average. In Ketchikan, shellfish effort of 743 boat-days was below the average of 1,412 boat-days. Dungeness crab harvest in Ketchikan of 4,190 was below the average of 7,490. Shrimp harvest in the Ketchikan area during 1998 (99,680) was above average.

CONCLUSIONS AND RECOMMENDATIONS

The primary goals of this project to estimate harvest and 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 again the largest in the region during 1998. 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. In 1998, the contributions of hatchery chinook and coho salmon to the Ketchikan fishery were 79% and 52%, respectively, both record highs. During 1998, about 13% of the chinook salmon and 30% of the coho salmon taken in the combined Ketchikan, Sitka, and Juneau marine fisheries originated in Alaska hatcheries. An additional 37% 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 boat sport fisheries be continued in order to both 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 1998, 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 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, Pacific halibut, rockfish, and lingcod be continued, in order to improve management of these species.

It is also recommended that estimation of the shellfish harvest as a component of the marine harvest studies be continued, to provide information for evaluating the performance of this fishery and for addressing potential regulation changes during Alaska Board of Fisheries meetings.

Table 18.–Estimated harvest and catch of Pacific halibut in the Juneau, Ketchikan, and Sitka marine boat sport fisheries, 1983–1998.

	Juneau marine				Ketchikan marine				Sitka marine			
Year	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
1997[a]	12,547	5,701	18,248	69	7,983	3,566	11,549	69	21,852	13,518	35,370	62
Average	11,542	4,676	16,218	71	10,433	2,715	13,148	79	12,589	6,496	19,084	66
1998[a]	8,200	2,198	10,398	79	6,778	2,335	9,113	74	19,640	9,704	29,344	67
% of average	71	47	64		65	86	69		156	149	154	

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 19.–Comparative effort and catch statistics for the Ketchikan rockfish sport fishery, 1984–1998.

		Angler effort		Total rockfish harvest and catch				Harvest per unit effort		Catch per unit effort	
Year	Survey dates	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
1997[f]	4/28–9/28	199,977	55,242	6,514	9,806	16,320	40	0.12	0.03	0.30	0.08
Average		253,962	68,485	10,122	12,178	22,327	45	0.15	0.04	0.32	0.09
1998[f]	4/27-9/27	205,063	41,194	3,864	6,964	10,828	36	0.09	0.02	0.26	0.05
% of average		81	60	38	57	48		64	46	82	60

[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.

[f] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 20.–Comparison of estimated shellfish effort and harvest for the Juneau and Ketchikan marine boat fisheries, 1988–1998.

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	
1997	5,382	12,440	1,348	4,839	
Average	4,386	10,448	2,015	4,165	
1998	5,551	8,112	768	5,310	

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
1997[a]	1,566	6,224	0	0	51,150
Average	1,412	7,490	10	0	62,169
1998[a]	743	4,190	210	0	99,680

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

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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 1998.

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:

$$\overline{n}_{hjio} = \frac{\sum_{k=1}^{m_{hjio}} n_{hjiok}}{m_{hjio}} \tag{A1.1}$$

where n_{hjiok} 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_{hjio} 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:

$$\hat{N}_{hjio} = M_{hjio}\,\overline{n}_{hjio} \tag{A1.2}$$

where M_{hjio} 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:

$$\overline{\hat{N}}_{hji} = \frac{\sum_{o=1}^{p_{hji}} \hat{N}_{hjio}}{p_{hji}} \tag{A1.3}$$

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:

$$\hat{N}_{hji} = P_{hji}\,\overline{\hat{N}}_{hji} \tag{A1.4}$$

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:

$$\overline{\hat{N}}_{hj} = \frac{\sum_{i=1}^{d_{hj}} \hat{N}_{hji}}{d_{hj}} \tag{A1.5}$$

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:

$$\hat{N}_{hj} = D_{hj}\bar{\hat{N}}_{hj} \tag{A1.6}$$

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:

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

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:

$$\hat{N}_h = Q_h\bar{\hat{N}}_h \tag{A1.8}$$

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):

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

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

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

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

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

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

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_{4hjio}^2 equals the among boat-party variance component for the harvest estimate, obtained as

$$s_{4hjio}^2 = \frac{\sum_{k=1}^{m_{hjio}}\left(n_{hjiok} - \bar{n}_{hjio}\right)^2}{m_{hjio} - 1} \tag{A1.13}$$

p_{hji}' is the number of periods in which s_{4hjio}^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: $m_{hjio} = M_{hjio}$].

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 1998.

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:

$$\overline{n}_{hij} = \frac{\sum_{k=1}^{m_{hij}} n_{hijk}}{m_{hij}} \tag{A2.1}$$

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:

$$\hat{N}_{hij} = M_{hij}\overline{n}_{hij} \tag{A2.2}$$

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:

$$\overline{\hat{N}}_{hi} = \frac{\sum_{j=1}^{q_{hi}} \hat{N}_{hij}}{q_{hi}} \tag{A2.3}$$

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:

$$\hat{N}_{hi} = Q_{hi}\overline{\hat{N}}_{hi} \tag{A2.4}$$

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

Then the stratum mean daily harvest was calculated :

$$\overline{\hat{N}}_{h} = \frac{\sum_{i=1}^{d_h} \hat{N}_{hi}}{d_h} \tag{A2.5}$$

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:

$$\hat{N}_{h} = D_h\overline{\hat{N}}_{h} \tag{A2.6}$$

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.

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

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

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

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

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

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

$d_h^{'}$ 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 equaled the among boat-party variance component for the harvest estimate, obtained as

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

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 1998.

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:

$$\overline{HPUE}_{hijk} = \frac{n_{hijk}}{e_{hijk} v_{hijk}} \tag{A3.1}$$

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:

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

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

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

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

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

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 1998.

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:

$$\hat{r}_{tc} = \hat{N}_t \hat{p}_{tc} \theta_c^{-1} \tag{A4.1}$$

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

$$\hat{p}_{tc} = \frac{m_{tc}}{\lambda_t n_t} \tag{A4.2}$$

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

$$\lambda_t = \frac{a_t' t_t'}{a_t t_t} \tag{A4.3}$$

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:

$$\hat{R} = \sum_t \sum_c \hat{r}_{tc} \tag{A4.4}$$

-continued-

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

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

where $\hat{V}\left[\hat{N}_t\right]$ equals the estimated variance of overall harvest estimate for biweek t, obtained from the harvest sampling program; and $\hat{V}\left[\hat{p}_{tc}\right]$ 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):

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

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):

$$\hat{V}\left[\hat{R}\right] = \sum_t\sum_c \hat{V}\left[\hat{r}_{tc}\right] + 2\sum_t\sum_c\sum_{u>c} \hat{Cov}\left[\hat{r}_{tc}, \hat{r}_{tu}\right] \tag{A4.7}$$

where $\hat{Cov}\left[\hat{r}_{tc}, \hat{r}_{tu}\right]$ 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):

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

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 ($\hat{N}$):

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

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

$$\hat{V}\left[\hat{u}_c\right] = V\left[\hat{p}_c\right]\theta_c^{-2} \tag{A4.10}$$

-continued-

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

$$\hat{V}[\hat{p}_c] \approx \frac{\hat{p}_c}{\lambda n} \tag{A4.11}$$

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, 27 April–27 September 1998.

	Estimate[a]	Standard Error	Relative Precision[b]
Finfish effort			
Boat-hours	77,022	4,404	9%
Salmon-hours	163,855	11,459	12%
Bottomfish-hours	41,194	3,456	14%
Angler-hours	205,063	12,871	10%
Boat-days	18,966	1,196	10%
Finfish harvests[b]			
Total chinook salmon ≥ 28"	2,052	182	15%
Derby take-home & entered	269	0	0%
Total chinook salmon < 28"	20	10	82%
Coho salmon	24,059	2,778	19%
Pink salmon	32,740	8,198	41%
Chum salmon	7,130	1,419	33%
Sockeye salmon	20	11	90%
Pacific halibut	6,778	780	19%
Lingcod	452	91	33%
Total rockfish	3,864	352	15%
Quillback rockfish	643	125	32%
Dusky rockfish	169	56	55%
Copper rockfish	144	50	57%
Black rockfish	38	19	82%
Yelloweye rockfish	1,066	129	20%
Silvergrey rockfish	33	14	70%
Other pelagic rockfish	105	42	66%
Other non-pelagic rockfish	130	54	68%
Unidentified rockfish	1,537	206	22%
Dolly Varden	17	15	145%
Finfish total catch[c]			
Chinook salmon ≥ 28"	2,286	221	16%
Chinook salmon < 28"	15,762	1,658	17%
Coho salmon	26,300	3,022	19%
Pink salmon	46,873	10,618	37%
Chum salmon	8,440	1,684	33%
Sockeye salmon	20	11	90%
Pacific halibut	9,113	1,219	22%
Lingcod	907	193	35%
Total rockfish	10,828	856	13%
Dolly Varden	35	24	113%
Shellfish effort and harvest[c]			
Boat-days fished	743	99	22%
Pots or rings	2,132	305	24%
Crab boat-days fished	502	72	24%
Crab pots or rings	1,338	179	22%
Dungeness crab kept	4,190	702	28%
Tanner crab kept	210	189	148%
Shrimp kept	99,680	10,266	17%

a Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

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

c No cutthroat trout, steelhead trout, or king crab were caught or harvested.

Appendix B2.–Estimated effort, harvest, and total catches for the Juneau marine boat sport fishery, 27 April–27 September 1998.

	Estimate	Standard error	Relative precision[a]
Finfish effort			
Boat-hours	116,200	6,336	9%
Salmon-hours	221,598	14,565	11%
Bottomfish-hours	75,288	5,552	12%
Angler-hours	297,229	17,461	10%
Boat-days	28,970	1,473	8%
Finfish harvests[b]			
Total chinook salmon ≥ 28"	3,847	291	12%
Derby take-home	79	23	48%
Derby entered	327	0	0%
Derby take-home & entered	406	23	9%
Total chinook salmon < 28"	281	70	41%
Derby take-home	3	2	110%
Derby entered	0	0	0%
Derby take-home & entered	3	2	110%
Coho salmon	15,730	1,905	20%
Derby take-home	1,519	409	44%
Derby entered	2,808	0	0%
Derby take-home & entered	4,419	409	15%
Chum salmon	480	60	21%
Derby take-home	37	11	49%
Derby entered	6	0	0%
Derby take-home & entered	43	11	42%
Sockeye salmon	42	20	78%
Derby take-home	3	2	110%
Derby entered	4	0	0%
Derby take-home & entered	7	2	94%
Pink salmon	3,114	464	25%
Derby take-home	123	31	41%
Derby entered	1	0	0%
Derby take-home & entered	124	31	41%
Pacific halibut	8,200	802	16%
Total rockfish	659	106	26%
Lingcod	45	27	99%
Dolly Varden	309	70	37%
Finfish total catch[b]			
Chinook salmon ≥ 28"	3,896	293	12%
Chinook salmon < 28"	4,810	508	17%
Coho salmon	16,139	1,968	20%
Chum salmon	576	68	19%
Sockeye salmon	42	20	78%
Pink salmon	5,397	901	27%
Pacific halibut	10,398	1,061	17%
Total rockfish	1,163	296	42%
Lingcod	69	45	107%
Dolly Varden	532	95	29%
Shellfish effort and harvest			
Boat-days fished	5,551	370	11%
Pots or rings	9,512	652	11%
King crab boat-days fished	2,700	266	16%
King crab pots or rings	4,679	471	17%
King crab kept	5,310	611	19%
Dungeness crab kept	8,112	1,140	23%
Tanner crab kept	768	129	28%

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

[b] No cutthroat or steelhead trout were caught or harvested.

Appendix B3.–Estimated effort, harvest, and total catches for the Sitka marine boat sport fishery, 27 April–27 September 1998.

	Estimate	Standard error	Relative precision[a]
Finfish effort			
Boat-hours	68,316	2,980	7%
Salmon-hours	144,850	6,895	8%
Bottomfish-hours	57,378	4,077	12%
Angler-hours	202,818	9,760	8%
Boat-days	18,671	840	7%
Finfish harvests[b]			
Total chinook salmon ≥ 28"	20,848	1,407	11%
Derby take-home	1,322	191	24%
Derby entered	1,037	0	0%
Derby take-home & entered	2,359	191	13%
Total chinook salmon < 28"	66	41	102%
Coho salmon	42,524	3,972	15%
Chum salmon	1,087	147	22%
Sockeye salmon	541	175	53%
Pink salmon	5,407	816	25%
Pacific halibut	19,640	1,713	14%
Lingcod	3,777	395	17%
Total rockfish	11,151	945	14%
Quillback rockfish	618	112	30%
Dusky rockfish	109	33	50%
Copper rockfish	215	108	83%
Black rockfish	2,619	335	21%
Yelloweye rockfish	5,106	584	19%
Silvergrey rockfish	296	121	67%
Other non-pelagic rockfish	168	98	96%
Other pelagic rockfish	1,871	471	41%
Unidentified rockfish	181	68	62%
Dolly Varden	19	15	130%
Finfish total catch[b]			
Chinook salmon ≥ 28"	25,836	1,694	11%
Chinook salmon < 28"	1,825	246	22%
Coho salmon	44,973	4,059	15%
Sockeye salmon	562	183	54%
Chum salmon	1,351	181	22%
Pink salmon	12,411	1,631	22%
Pacific halibut	29,344	2,635	15%
Lingcod	4,567	425	15%
Total rockfish	29,039	2,098	12%
Dolly Varden	477	307	106%

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

[b] No steelhead or 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, 27 April–27 September 1998[a].

Seasonal period	Boat-hours		Salmon-hours		Bottomfish-hours		Angler-hours	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	1,026	62,802	871	55,103	1,283	224,420	2,154	322,856
11May-24May	2,735	701,938	4,790	2,544,622	2,434	969,012	7,225	4,570,646
Derby[b]	10,091	1,703,120	21,211	6,581,539	2,668	117,576	23,880	8,027,135
25May-07Jun	2,916	437,303	6,460	4,539,042	1,300	400,696	7,760	4,075,257
08Jun-21Jun	7,434	957,183	15,135	3,325,956	4,154	781,333	19,299	5,218,840
22Jun-05Jul	7,711	1,317,716	15,419	9,082,149	6,052	1,231,152	21,471	12,938,431
06Jul-19Jul	8,805	3,700,999	20,496	24,810,183	5,392	4,898,179	25,889	34,253,664
20Jul-02Aug	6,679	1,399,298	13,529	15,627,728	4,400	567,678	17,929	17,589,008
03Aug-16Aug	6,637	2,530,851	12,955	26,046,648	5,324	1,423,051	18,279	29,446,891
17Aug-30Aug	7,411	1,958,369	17,121	10,039,753	4,274	668,003	21,395	15,013,707
31Aug-13Sep	9,556	3,347,466	22,280	19,897,042	1,946	547,173	24,227	24,739,808
14Sep-27Sep	6,021	1,280,187	13,588	8,761,251	1,967	112,215	15,555	9,457,614
Total	77,022	19,397,232	163,855	131,311,016	41,194	11,940,488	205,063	165,653,857

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
27Apr-10May	246	3,042	15	112	15	112	6	26
11May-24May	714	61,418	67	798	67	798	26	346
Derby[b]	1,970	60,972	298	134	294	107	329	4,947
25May-07Jun	693	31,018	35	889	35	889	85	1,287
08Jun-21Jun	1,886	63,978	840	10,934	796	10,660	805	42,288
22Jun-05Jul[b]	1,974	75,309	357	5,729	343	5,594	918	74,424
06Jul-19Jul	2,540	465,786	385	21,845	322	11,545	948	73,706
20Jul-02Aug[b]	1,966	132,443	79	2,236	79	2,236	717	65,819
03Aug-16Aug	1,885	228,573	153	5,660	60	754	914	34,686
17Aug-30Aug	1,779	94,821	35	283	23	155	4,198	1,076,723
31Aug-13Sep	1,782	136,359	5	19	5	19	3,628	614,726
14Sep-27Sep	1,531	76,613	17	90	13	79	3,188	761,235
Total	18,966	1,430,332	2,286	48,729	2,052	32,948	15,762	2,750,213

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
27Apr-10May	0	0	0	0	0	0	0	0
11May-24May	0	0	0	0	0	0	0	0
Derby[b]	0	0	22	92	11	24	7	31
25May-07Jun	0	0	0	0	0	0	0	0
08Jun-21Jun	0	0	86	703	67	804	66	537
22Jun-05Jul[b]	1	0	739	24,952	661	24,460	897	253,605
06Jul-19Jul	0	0	1,684	302,297	1,332	98,394	8,245	7,624,903
20Jul-02Aug[b]	1	0	1,473	91,021	1,348	80,733	12,503	35,263,986
03Aug-16Aug	0	0	2,723	1,736,560	2,401	1,340,873	15,254	65,297,830
17Aug-30Aug	0	0	4,244	1,068,608	4,007	945,056	7,593	3,928,246
31Aug-13Sep	10	36	9,842	4,379,105	9,152	3,829,509	2,264	375,461
14Sep-27Sep	8	56	5,487	1,526,717	5,080	1,399,801	44	657
Total	20	92	26,300	9,130,055	24,059	7,719,654	46,873	112,745,256

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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
27Apr-10May	0	0	0	0	0	0	0	0
11May-24May	0	0	0	0	0	0	0	0
Derby[b]	0	0	69	1,021	62	742	0	0
25May-07Jun	0	0	24	219	24	219	0	0
08Jun-21Jun	54	401	524	21,904	506	21,628	0	0
22Jun-05Jul	674	190,203	2,139	465,526	1,937	369,241	11	49
06Jul-19Jul	6,403	5,208,927	3,656	2,213,326	3,022	1,443,858	0	0
20Jul-02Aug	8,982	19,293,790	1,151	112,798	933	162,384	9	78
03Aug-16Aug	10,484	39,859,542	106	2,372	95	2,348	0	0
17Aug-30Aug	5,500	2,620,672	378	10,259	365	9,515	0	0
31Aug-13Sep	639	30,005	276	7,901	134	2,712	0	0
14Sep-27Sep	4	10	117	1,294	52	305	0	0
Total	32,740	67,203,550	8,440	2,836,620	7,130	2,012,952	20	127

Seasonal period	Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch		Rockfish Harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	99	1,471	94	1,301	487	37,273	130	6,578
11May-24May	310	6,631	242	2,780	454	38,445	94	1,528
Derby[b]	436	10,617	307	5,480	1,462	40,588	320	6,154
25May-07Jun	161	16,087	156	16,293	554	33,825	103	3,446
08Jun-21Jun	940	72,786	730	38,753	799	50,923	273	4,716
22Jun-05Jul	1,180	130,802	1,008	85,147	1,681	116,058	543	19,900
06Jul-19Jul	1,257	349,687	1,013	197,266	991	82,253	314	10,411
20Jul-02Aug	579	25,935	495	16,759	780	33,372	392	9,786
03Aug-16Aug	1,426	435,726	812	69,697	1,466	182,811	474	18,956
17Aug-30Aug	1,644	222,468	1,344	143,774	961	58,927	541	15,394
31Aug-13Sep	743	202,457	376	28,290	654	38,000	410	16,415
14Sep-27Sep	338	12,347	201	2,996	539	20,942	270	10,514
Total	9,113	1,487,014	6,778	608,536	10,828	733,417	3,864	123,798

Seasonal period	Lingcod total catch		Lingcod harvested		Quillback rockfish harvested		Dusky rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	17	232	6	26	31	448	0	0
11May-24May	0	0	0	0	8	56	0	0
Derby[b]	144	1,085	38	304	48	1,582	7	32
25May-07Jun	25	164	13	78	20	444	18	288
08Jun-21Jun	56	428	56	428	54	528	0	0
22Jun-05Jul	231	23,208	67	1,988	210	7,204	0	0
06Jul-19Jul	138	4,278	71	1,696	46	619	22	264
20Jul-02Aug	17	115	17	115	50	1,563	56	1,008
03Aug-16Aug	125	5,932	79	2,711	43	611	0	0
17Aug-30Aug	105	786	88	905	18	172	0	0
31Aug-13Sep	10	37	10	37	75	1,456	66	1,597
14Sep-27Sep	39	914	7	18	40	939	0	0
Total	907	37,179	452	8,306	643	15,622	169	3,189

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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
27Apr-10May	0	0	0	0	0	0	20	179
11May-24May	0	0	0	0	0	0	8	62
Derby[b]	17	135	0	0	3	6	45	190
25May-07Jun	0	0	0	0	31	1,062	7	49
08Jun-21Jun	0	0	0	0	0	0	90	982
22Jun-05Jul	0	0	0	0	0	0	57	490
06Jul-19Jul	0	0	0	0	8	61	105	1,610
20Jul-02Aug	29	475	0	0	6	25	81	2,372
03Aug-16Aug	23	416	0	0	0	0	213	4,868
17Aug-30Aug	35	1,050	28	271	57	603	171	1,790
31Aug-13Sep	25	245	10	82	0	0	165	2,351
14Sep-27Sep	15	164	0	0	0	0	104	1,818
Total	144	2,485	38	353	105	1,757	1,066	16,761

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
27Apr-10May	10	86	0	0	427	33,691	70	4,164
11May-24May	0	0	0	0	438	35,933	77	1,020
Derby[b]	12	68	0	0	1,330	39,168	188	1,820
25May-07Jun	0	0	0	0	478	25,588	27	300
08Jun-21Jun	11	45	0	0	645	45,715	118	3,381
22Jun-05Jul	0	0	0	0	1,414	103,052	276	11,792
06Jul-19Jul	0	0	18	94	793	71,249	115	4,346
20Jul-02Aug	0	0	12	122	546	19,364	158	3,376
03Aug-16Aug	0	0	49	2,058	1,139	117,815	147	3,131
17Aug-30Aug	0	0	14	102	638	37,767	218	5,057
31Aug-13Sep	0	0	5	19	308	12,031	64	2,638
14Sep-27Sep	0	0	32	547	349	12,811	79	1,315
Total	33	199	130	2,942	8,505	554,184	1,537	42,340

Seasonal period	Shellfish boat-days		Shellfish pots or rings		Crab boat-days		Crab pots or rings	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	45	334	140	2,909	28	130	84	1,453
11May-24May	72	1,267	200	3,663	72	1,267	200	3,663
Derby[b]	69	575	214	5,894	53	300	142	2,174
25May-07Jun	19	192	134	9,406	19	192	134	9,406
08Jun-21Jun	68	579	219	8,647	58	394	168	4,012
22Jun-05Jul	100	1,663	118	1,843	71	1,405	97	1,817
06Jul-19Jul	62	718	129	3,300	29	191	62	814
20Jul-02Aug	5	22	37	1,093	5	22	37	1,093
03Aug-16Aug	61	656	305	35,775	26	253	53	1,013
17Aug-30Aug	27	199	89	1,999	27	199	89	1,999
31Aug-13Sep	87	918	317	10,371	44	178	142	1,487
14Sep-27Sep	128	2,595	230	8,319	70	630	130	3,204
Total	743	9,718	2,132	93,219	502	5,161	1,338	32,135

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Seasonal period	Dungeness crab total catch		Dungeness crab harvested		Tanner Crab harvested		Shrimp Harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	818	245,442	375	74,230	0	0	3,360	410,760
11May-24May	2,040	558,972	560	36,250	0	0	0	0
Derby[b]	772	99,479	226	3,980	0	0	31,570	60,848,710
25May-07Jun	2,194	2,488,233	381	79,314	0	0	0	0
08Jun-21Jun	2,114	1,466,948	587	97,675	0	0	11,520	5,135,040
22Jun-05Jul	525	52,004	300	18,171	0	0	12,500	12,622,790
06Jul-19Jul	635	87,934	214	9,774	0	0	15,100	14,272,280
20Jul-02Aug	1,223	1,211,323	173	24,298	0	0	0	0
03Aug-16Aug	457	100,878	137	10,617	210	35,700	6,760	1,907,690
17Aug-30Aug	550	77,345	272	25,171	0	0	0	0
31Aug-13Sep	1,926	630,412	348	14,388	0	0	16,430	9,974,510
14Sep-27Sep	2,822	3,002,750	617	99,609	0	0	2,440	209,250
Total	16,076	10,021,720	4,190	493,477	210	35,700	99,680	105,381,030

Seasonal period	Dolly Varden total catch		Dolly Varden harvested	
	Estimate	Variance	Estimate	Variance
27Apr-10May	0	0	0	0
11May-24May	0	0	0	0
Derby[b]	0	0	0	0
25May-07Jun	0	0	0	0
08Jun-21Jun	0	0	0	0
22Jun-05Jul	12	142	0	0
06Jul-19Jul	0	0	0	0
20Jul-02Aug	0	0	0	0
03Aug-16Aug	23	414	17	234
17Aug-30Aug	0	0	0	0
31Aug-13Sep	0	0	0	0
14Sep-27Sep	0	0	0	0
Total	35	556	17	234

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Includes 269 large chinook salmon entered in the Ketchikan derby, 1 small chinook sampled during biweek 13, and 1 small chinook sampled during biweek 15.

Appendix B5.–Estimated effort, harvest and catch for the Juneau marine boat sport fishery by seasonal period, 27 April–27 September 1998.

Seasonal period	Boat-hours		Salmon-hours		Bottomfish-hours		Angler-hours	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	7,847	1,743,709	16,971	8,969,384	504	58,310	17,475	9,412,445
11May-24May	13,276	2,881,229	28,747	13,580,636	1,366	222,751	30,251	15,197,625
25May-07Jun	13,582	1,852,166	28,223	9,159,409	5,518	1,819,235	33,803	15,373,830
08Jun-21Jun	10,489	1,802,805	21,027	8,839,780	8,649	3,587,392	29,753	18,834,504
22Jun-05Jul	12,340	2,751,071	15,636	7,180,497	15,876	8,734,616	31,512	22,790,217
06Jul-19Jul	8,677	1,305,681	9,612	1,808,444	12,348	5,109,643	21,975	10,550,815
20Jul-02Aug	12,671	3,380,758	16,044	8,285,202	17,282	7,776,105	33,330	28,830,706
03Aug-16Aug	8,086	1,347,570	16,441	9,847,009	6,486	1,072,616	22,907	16,033,621
Derby[a]	15,005	10,488,874	41,036	96,966,395	1,324	52,939	42,385	100,465,065
17Aug-30Aug	7,229	10,830,887	15,042	40,583,139	2,926	1,837,029	18,010	57,582,035
31Aug-13Sep	4,927	1,503,607	9,541	6,189,239	1,725	274,709	11,266	8,056,213
14Sep-27Sep	2,071	258,421	3,278	735,500	1,284	276,983	4,562	1,753,907
Total	116,200	40,146,778	221,598	212,144,634	75,288	30,822,328	297,229	304,880,983

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
27Apr-10May	1,915	84,654	517	8,055	517	8,055	48	147
11May-24May	3,312	211,314	506	8,974	506	8,974	122	1,478
25May-07Jun	3,484	105,927	590	10,928	590	10,928	199	1,745
08Jun-21Jun	2,877	133,260	734	34,462	726	34,414	693	42,017
22Jun-05Jul	3,328	195,195	326	10,793	326	10,793	330	12,111
06Jul-19Jul	2,337	59,348	166	2,657	136	1,988	240	4,791
20Jul-02Aug	3,558	231,698	212	2,823	212	2,823	713	27,787
03Aug-16Aug	2,287	114,486	268	5,320	268	5,320	635	21,214
Derby[a]	2,101	184,090	417	823	406	521	1,367	134,855
17Aug-30Aug	1,942	743,390	111	667	111	667	349	11,061
31Aug-13Sep[a]	1,265	94,713	27	0	27	0	68	611
14Sep-27Sep	564	13,048	22	198	22	198	44	545
Total	28,970	2,171,123	3,896	85,700	3,847	84,681	4,808	258,362

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
27Apr-10May	0	0	0	0	0	0	0	0
11May-24May	0	0	0	0	0	0	0	0
25May-07Jun	0	0	0	0	0	0	0	0
08Jun-21Jun	208	4,493	30	750	30	750	16	144
22Jun-05Jul	62	380	68	468	50	462	317	25,339
06Jul-19Jul	4	10	314	5,748	314	5,748	1,378	339,708
20Jul-02Aug	0	0	1,302	97,307	1,245	95,289	1,703	230,050
03Aug-16Aug	0	0	2,980	700,608	2,839	579,924	1,341	154,050
Derby[a]	3	5	4,419	178,268	4,327	166,945	259	3,785
17Aug-30Aug	0	0	3,938	2,439,395	3,867	2,337,820	338	56,743
31Aug-13Sep[a]	4	0	2,554	392,973	2,535	387,705	45	1,703
14Sep-27Sep	0	0	534	57,511	523	55,630	0	0
Total	281	4,888	16,139	3,873,028	15,730	3,630,273	5,397	811,522

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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
27Apr-10May	0	0	11	103	11	103	0	0
11May-24May	0	0	11	47	11	47	0	0
25May-07Jun	0	0	20	111	20	111	0	0
08Jun-21Jun	0	0	30	145	22	110	0	0
22Jun-05Jul	236	18,447	68	513	54	559	0	0
06Jul-19Jul	861	54,017	226	1,943	193	1,387	4	10
20Jul-02Aug	777	34,547	86	1,098	64	677	8	21
03Aug-16Aug	934	93,968	57	409	46	380	3	5
Derby[a]	124	969	51	155	43	129	7	5
17Aug-30Aug	176	13,627	10	92	10	92	20	366
31Aug-13Sep	6	35	0	0	0	0	0	0
14Sep-27Sep	0	0	6	25	6	25	0	0
Total	3,114	215,610	576	4,641	480	3,620	42	407

Seasonal Period	Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch		Rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	72	4,752	72	4,752	0	0	0	0
11May-24May	150	4,668	150	4,668	0	0	0	0
25May-07Jun	470	25,385	312	10,751	40	553	28	193
08Jun-21Jun	1,419	149,390	1,221	92,494	100	1,740	38	366
22Jun-05Jul	1,753	202,413	1,428	146,317	39	371	10	42
06Jul-19Jul	1,625	162,183	1,152	63,884	175	4,046	115	1,176
20Jul-02Aug	2,857	473,492	2,001	226,992	535	74,138	200	3,096
03Aug-16Aug	1,179	43,865	1,020	35,364	102	1,150	102	1,150
Derby[a]	236	2,740	228	2,728	31	106	25	87
17Aug-30Aug	474	55,337	464	53,851	20	140	20	140
31Aug-13Sep	130	1,689	130	1,689	77	3,498	77	3,498
14Sep-27Sep	33	561	22	462	44	1,584	44	1,584
Total	10,398	1,126,475	8,200	643,952	1,163	87,326	659	11,332

Seasonal Period	Lingcod total catch		Lingcod harvested		Dolly Varden total catch		Dolly Varden harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	0	0	0	0	47	784	15	200
11May-24May	0	0	0	0	62	2,246	54	2,190
25May-07Jun	48	1,728	24	432	164	1,593	142	1,541
08Jun-21Jun	18	270	18	270	123	2,589	46	471
22Jun-05Jul	0	0	0	0	70	792	36	336
06Jul-19Jul	0	0	0	0	4	10	0	0
20Jul-02Aug	0	0	0	0	13	38	3	5
03Aug-16Aug	3	5	3	5	13	148	13	148
Derby[a]	0	0	0	0	0	0	0	0
17Aug-30Aug	0	0	0	0	30	824	0	0
31Aug-13Sep	0	0	0	0	0	0	0	0
14Sep-27Sep	0	0	0	0	6	25	0	0
Total	69	2,003	45	707	532	9,049	309	4,891

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Seasonal Period	Shellfish boat-days		Shellfish pots or rings		King crab boat-days		King crab pots or rings	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	63	339	147	2,391	0	0	0	0
11May-24May	177	2,802	343	9,146	0	0	0	0
25May-07Jun	356	3,701	507	7,192	0	0	0	0
08Jun-21Jun	362	5,959	616	27,748	0	0	0	0
22Jun-05Jul	650	21,749	1,138	59,299	272	7,368	476	24,792
06Jul-19Jul	1,250	36,282	2,086	120,401	809	25,869	1,395	75,956
20Jul-02Aug	1,247	21,266	2,266	73,873	718	11,485	1,398	51,005
03Aug-16Aug	490	10,914	748	28,327	348	10,030	563	25,998
Derby[a]	88	526	121	857	55	324	61	196
17Aug-30Aug	313	23,675	494	57,216	222	12,566	373	35,839
31Aug-13Sep	327	6,966	603	22,657	193	2,315	314	6,755
14Sep-27Sep	228	2,385	443	15,655	83	569	99	1,051
Total	5,551	136,564	9,512	424,762	2,700	70,526	4,679	221,592

Seasonal Period	King crab harvested		Tanner crab harvested		Dungeness crab harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	0	0	16	224	189	7,972
11May-24May	0	0	32	896	406	19,739
25May-07Jun	0	0	9	78	907	33,943
08Jun-21Jun	0	0	52	2,124	904	86,487
22Jun-05Jul	648	79,866	146	3,798	856	69,984
06Jul-19Jul	1,549	93,927	235	3,736	1,590	307,053
20Jul-02Aug	1,578	103,696	203	5,418	2,219	711,374
03Aug-16Aug	541	19,424	44	213	194	4,012
Derby[a]	94	635	14	120	72	1,800
17Aug-30Aug	454	56,398	0	0	151	12,460
31Aug-13Sep	308	14,428	6	35	225	19,497
14Sep-27Sep	138	5,242	11	99	399	24,433
Total	5,310	373,616	768	16,741	8,112	1,298,754

[a] Includes 327 large chinook, 2,808 coho, 1 pink, 6 chum, and 4 sockeye salmon entered in the derby, and 26 large chinook and 4 small chinook sampled during biweek 18. .

Appendix B6.–Estimated effort, harvest and catch for the Sitka marine boat sport fishery by seasonal period, 27 April–27 September 1998.

Seasonal period	Boat-hours		Salmon-hours		Bottomfish-hours		Angler-hours	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	1,611	104,559	3,284	558,247	180	6,606	3,464	524,169
11May-24May	3,025	257,372	5,620	884,773	993	59,464	6,737	1,140,626
Derby[a]	7,963	741,932	17,962	3,393,943	1,712	101,617	19,673	3,070,485
25May-07Jun	6,246	1,535,414	14,178	8,725,825	5,388	2,358,935	19,567	17,756,566
08Jun-21Jun	9,730	601,577	22,098	3,117,866	8,092	1,796,612	30,190	6,498,912
22Jun-05Jul	7,681	588,774	13,725	1,717,503	7,749	1,842,718	21,474	5,805,828
06Jul-19Jul	8,035	1,739,089	13,592	5,818,485	9,909	4,629,593	23,587	18,509,042
20Jul-02Aug	7,806	1,436,707	17,103	9,550,411	7,392	2,466,845	24,720	17,996,810
03Aug-16Aug	8,693	1,266,352	19,535	9,423,049	9,777	2,353,021	29,465	16,988,782
17Aug-30Aug	5,150	376,190	12,922	2,895,842	4,247	682,899	17,171	4,749,699
31Aug-13Sep	1,734	207,466	3,329	1,220,550	1,492	284,731	4,821	1,995,782
14Sep-27Sep	642	26,330	1,502	234,213	447	38,128	1,949	218,800
Total	68,316	8,881,762	144,850	47,540,707	57,378	16,621,169	202,818	95,255,501

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
27Apr-10May	532	9,677	563	81,900	506	47,789	28	709
11May-24May	956	28,990	1,239	71,153	1,110	56,122	32	928
Derby[a]	1,628	35,051	2,725	37,157	2,359	31,166	119	1,037
25May-07Jun	1,663	89,958	3,387	593,014	2,327	272,977	41	297
08Jun-21Jun	2,792	79,303	8,168	1043,907	5,870	670,402	127	813
22Jun-05Jul	2,258	89,164	4,322	431,060	3,462	319,377	299	6,880
06Jul-19Jul	2,394	137,817	1,783	387,828	1,768	385,420	255	9,934
20Jul-02Aug	1,997	83,921	1,332	88,531	1,245	75,568	233	3,714
03Aug-16Aug	2,401	108,068	1,624	115,860	1,563	103,527	88	609
17Aug-30Aug	1,338	28,884	572	17,094	551	15,960	227	5,847
31Aug-13Sep	457	11,854	68	1,260	62	1,300	264	19,206
14Sep-27Sep	255	2,512	53	399	25	147	112	10,334
Total	18,671	705,199	25,836	2,869,163	20,848	1,979,755	1,825	60,308

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
27Apr-10May	0	0	0	0	0	0	0	0
11May-24May	0	0	0	0	0	0	0	0
Derby[a]	0	0	5	4	5	4	3	5
25May-07Jun	0	0	0	0	0	0	0	0
08Jun-21Jun	6	30	59	739	59	739	32	232
22Jun-05Jul	0	0	523	13,237	507	13,040	240	2,317
06Jul-19Jul	50	1,593	6,279	3,081,536	6,238	3,087,493	2,127	282,851
20Jul-02Aug	5	18	10,884	3,911,054	10,640	3,769,918	1,635	96,129
03Aug-16Aug	5	18	15,756	6,732,368	14,903	6,385,157	5,918	2,113,496
17Aug-30Aug	0	0	9,122	2,448,863	8,088	2,305,807	2,292	156,008
31Aug-13Sep	0	0	1,895	271,957	1,730	202,663	143	9,459
14Sep-27Sep	0	0	450	14,301	354	14,840	21	370
Total	66	1,659	44,973	16,474,059	42,524	15,779,661	12,411	2,660,867

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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
27Apr-10May	0	0	0	0	0	0	0	0
11May-24May	0	0	0	0	0	0	0	0
Derby[a]	0	0	14	19	14	19	6	8
25May-07Jun	0	0	16	165	11	71	0	0
08Jun-21Jun	19	199	75	489	58	427	0	0
22Jun-05Jul	206	1,548	152	1,491	140	1,383	27	208
06Jul-19Jul	1,585	130,513	211	5,889	182	3,431	112	4,356
20Jul-02Aug	775	40,622	361	9,258	279	6,033	366	27,589
03Aug-16Aug	1,702	406,133	307	8,137	240	5,167	51	1,290
17Aug-30Aug	1,002	79,110	159	4,438	107	2,331	0	0
31Aug-13Sep	118	8,223	56	2,800	56	2,800	0	0
14Sep-27Sep	0	0	0	0	0	0	0	0
Total	5,407	666,348	1,351	32,686	1,087	21,662	562	33,451

Seasonal period	Sockeye salmon harvested		Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	0	0	0	0	0	0	201	6,054
11May-24May	0	0	420	29,078	331	21,558	499	15,531
Derby[a]	6	8	868	38,917	575	18,228	2,127	115,527
25May-07Jun	0	0	2,475	528,156	1,508	170,995	4,260	1,205,473
08Jun-21Jun	0	0	3,733	469,392	2,700	280,519	3,842	483,613
22Jun-05Jul	27	208	4,049	707,274	2,972	399,345	2,797	139,932
06Jul-19Jul	112	4,356	5,906	2323,214	3,810	918,854	4,133	790,878
20Jul-02Aug	345	24,800	4,249	1252,265	2,430	397,364	2,878	414,416
03Aug-16Aug	51	1,290	5,162	1255,614	3,644	607,455	4,531	806,510
17Aug-30Aug	0	0	1,702	197,806	1,148	78,597	2,508	186,201
31Aug-13Sep	0	0	544	122,991	348	31,509	936	220,886
14Sep-27Sep	0	0	236	17,484	174	9,781	327	16,704
Total	541	30,662	29,344	6,942,191	19,640	2,934,205	29,039	4,401,725

Seasonal period	Rockfish harvested		Lingcod total catch		Lingcod harvested		Quillback rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	56	1,623	63	2,502	0	0	9	72
11May-24May	154	4,505	109	2,759	51	333	9	56
Derby[a]	479	7,259	335	2,279	163	1,463	16	65
25May-07Jun	1,633	199,265	748	58,000	552	44,226	99	2,027
08Jun-21Jun	1,022	37,181	483	19,117	459	18,767	32	233
22Jun-05Jul	1,458	119,045	556	12,038	484	13,132	53	505
06Jul-19Jul	2,328	279,784	479	33,336	455	32,934	89	1,984
20Jul-02Aug	1,227	59,023	558	27,977	519	27,755	80	2,648
03Aug-16Aug	1,608	135,699	717	13,065	671	11,192	71	1,292
17Aug-30Aug	1,013	43,907	436	8,587	378	5,970	92	1,110
31Aug-13Sep	152	4,841	72	938	34	349	62	2,447
14Sep-27Sep	21	391	11	103	11	103	7	43
Total	11,151	892,523	4,567	180,701	3,777	156,224	619	12,482

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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
27Apr-10May	0	0	0	0	9	72	0	0
11May-24May	0	0	4	14	79	2,718	13	63
Derby[a]	8	14	0	0	181	3,600	79	1,071
25May-07Jun	16	208	21	370	648	56,945	180	6,449
08Jun-21Jun	22	140	5	23	181	2,120	190	11,997
22Jun-05Jul	12	48	0	0	319	15,732	205	10,452
06Jul-19Jul	0	0	133	10,621	265	4,092	730	160,316
20Jul-02Aug	11	90	8	56	364	15,431	105	1,820
03Aug-16Aug	30	491	16	108	318	6,392	83	842
17Aug-30Aug	10	73	19	292	230	5,059	274	28,686
31Aug-13Sep	0	0	9	78	25	271	12	130
14Sep-27Sep	0	0	0	0	0	0	0	0
Total	109	1,064	215	11,562	2,619	112,432	1,871	221,826

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
27Apr-10May	0	0	9	72	29	1,434	82	1,366
11May-24May	30	285	19	159	0	0	345	10,300
Derby[a]	131	1,588	0	0	0	0	1,683	105,849
25May-07Jun	479	18,021	137	12,109	0	0	2,680	553,130
08Jun-21Jun	557	19,380	34	478	0	0	2,786	310,898
22Jun-05Jul	820	78,510	17	143	0	0	1,351	69,206
06Jul-19Jul	1,138	98,360	7	45	0	0	1,810	182,265
20Jul-02Aug	604	18,566	48	1,399	8	56	1,650	194,325
03Aug-16Aug	1,066	101,783	6	35	16	108	2,923	492,116
17Aug-30Aug	267	4,100	19	129	96	7,776	1,502	107,283
31Aug-13Sep	0	0	0	0	19	292	809	226,803
14Sep-27Sep	14	174	0	0	0	0	292	10,861
Total	5,106	340,767	296	14,569	168	9,666	17,913	2,264,402

Seasonal period	Unidentified rockfish harvested		Dolly Varden total catch		Dolly Varden harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance
27Apr-10May	0	0	0	0	0	0
11May-24May	0	0	448	93,995	0	0
Derby[a]	65	995	3	5	0	5
25May-07Jun	53	2,311	0	0	3	0
08Jun-21Jun	0	0	0	0	0	0
22Jun-05Jul	32	832	0	0	0	0
06Jul-19Jul	0	0	26	297	16	224
20Jul-02Aug	0	0	0	0	0	0
03Aug-16Aug	0	0	0	0	0	0
17Aug-30Aug	6	35	0	0	0	0
31Aug-13Sep	25	520	0	0	0	0
14Sep-27Sep	0	0	0	0	0	0
Total	181	4,693	477	94,297	19	229

[a] Includes 1,037 large chinook salmon entered in the derby.

Appendix B7.–Recorded effort and harvest from the Petersburg marine boat catch sampling program by biweekly period, 4 May–12 July 1998.

Biweekly Period[a]	Salmon-hours	Bottomfish-hours	Chinook salmon ≥ 28" harvested	Chinook salmon ≥ 28" Sampled[b]	Chinook salmon < 28" harvested	Chinook salmon < 28" Sampled[b]	Coho salmon Harvested & sampled	Pacific Halibut harvested	Rockfish harvested
27 Apr–10 May[c]	90	98	0	0	0	0	0	8	0
11 May–24 May	379	183	15	15	0	0	0	9	2
25 May–07 Jun	1,813	349	101	91	0	0	0	41	4
Derby entered[d]			222	215	0	0	0		
Derby other			3	3	0	0	0		
08 Jun–21 Jun	968	867	60	54	1	1	0	173	12
22 Jun–05 Jul	209	1,229	15	10	0	0	0	227	30
06 Jul–19 Jul[e]	57	437	0	0	0	0	16	99	7
Total	3,516	3,163	416	388	1	1	16	557	55

[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 22–25 May; effort and harvest of species other than chinook salmon were not recorded during this event.

[e] Sampling was only conducted during the first week of this biweekly period.

Appendix B8.–Recorded effort and harvest from the Wrangell marine boat catch sampling program by biweekly period, 27 April–21 June 1998.

Biweekly period[a]	Salmon-hours	Bottomfish-hours	Chinook salmon Harvested	Chinook salmon sampled[b]	Pacific Halibut harvested
27 Apr–10 May	638	120	16	16	9
11 May–24 May	3,012	65	66	65	7
25 May–07 Jun	3,069	387	49	43	26
08 Jun–21 Jun[c]	1,065	342	17	16	29
Total	7,784	914	148	140	71

[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.

[c] Sampling was only conducted during the first week of this biweekly period.

Appendix B9.–Recorded effort and harvest from the Craig marine boat catch sampling program by biweekly period, 27 April–13 September 1998.

Biweekly Period[a]	Salmon-hours	Bottomfish-hours	Chinook salmon harvested	Chinook salmon sampled[b]	Coho salmon harvested	Coho salmon sampled[b]	Chum salmon Harvested
27Apr-10May	326	273	27	21	0	0	0
11May-24May	558	152	47	41	0	0	0
25May-07Jun	1,466	466	140	90	1	0	2
08Jun-21Jun	1,435	448	105	86	4	3	0
22Jun-05Jul	1,852	778	170	122	39	28	3
06Jul-19Jul	738	396	42	35	109	64	2
20Jul-02Aug	929	513	43	30	319	228	0
03Aug-16Aug	705	339	17	12	265	207	0
17Aug-30Aug	806	492	2	1	301	198	2
31Aug-13Sep	95	217	0	0	17	17	0
Total	8,910	4,074	593	438	1,055	745	9

Biweekly Period[a]	Pink salmon harvested	Halibut harvested	Lingcod harvested	Rockfish harvested	Additional Sampling[c] Chinook sampled	Additional Sampling[c] Coho sampled
27Apr-10May	0	28	3	58	0	0
11May-24May	0	28	12	30	4	0
25May-07Jun	0	189	33	96	49	0
08Jun-21Jun	1	109	25	90	80	0
22Jun-05Jul	2	249	68	180	174	31
06Jul-19Jul	1	133	29	86	261	310
20Jul-02Aug	61	122	32	86	154	577
03Aug-16Aug	151	97	11	86	135	590
17Aug-30Aug	66	30	11	168	15	377
31Aug-13Sep	5	4	5	76	0	0
Total	287	989	229	956	872	1,885

[a] Sampling was conducted at the Craig harbors 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.

[c] Sampling of chinook and coho for presence or absence of adipose fin was conducted at additional charter sites as time permitted.

Appendix B10.–Numbers of chinook salmon examined for coded wire tags in Southeast Alaska marine boat sport fisheries in 1998.

Sport fishery	Seasonal period	Chinook salmon ≥ 28″ Estimated harvest	Number Sampled	Percent	Chinook salmon < 28″ Estimated harvest	Number Sampled	Percent
Creel surveys							
Ketchikan[a]	4/27–6/21	913	187	20	0	0	0
	Derby entered[b]	269	235	87	0	0	0
	Derby not entered[b]	25	5	20	0	0	0
	6/22–8/02	744	131	18	2	2	100
	8/03–9/27	101	19	19	18	2	11
	Total	2,052	577	28	20	4	20
Juneau	4/27–6/21	2,339	414	18	208	44	21
	6/22–8/02	674	278	41	66	32	48
	8/03–9/27	428	228	53	4	4	100
	Derby entered[c]	327	327	100	0	0	0
	Derby take-home[c]	79	23	29	3	1	33
	Total	3.847	1,270	33	281	81	29
Sitka	4/27–6/21	9,813	1,947	20	6	1	17
	Derby entered[d]	1,037	1,037	100	0	0	0
	Derby take-home[d]	1,322	352	27	0	0	0
	6/22–8/02	6,475	1,997	31	55	8	15
	8/03–9/27	2,201	629	29	5	1	20
	Total	20,848	5,962	29	66	10	15
Creel survey totals		26,747	7,809	29	367	95	26
Catch sample programs							
Petersburg	5/04–7/12		170			1	
	Derby entered[e]	222	215	97		0	
	Derby take-home[e]		3			0	
	Total		388			1	
Wrangell	4/27–6/21		140			0	
Craig	4/27–9/13		1,310			0	
	Catch sample total		1,838			1	
	Total sampled		9,647			96	

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Derby held 23-25 May, 30-31 May, and 6-7 June.

[c] Derby held 21-23 August.

[d] Derby held 23-25 May and 30-31 May.

[e] Derby held 22–25 May.

Appendix B11.–Estimates of hatchery-produced chinook salmon contributed to the Ketchikan marine boat sport fishery, 27 April–27 September 1998[a].

Region	Agency[c]	Hatchery/ release site	Tag code	Non-derby 4/27-6/21			Derby[b]			Non-derby 6/22-8/02			Non-derby 8/03-9/27			Total		
				Rec[d]	Con[e]	Variance[f]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
British Columbia	CDFO	Gillard Pass	18-14-44				1	2	1							1	2	1
		Kitimat River	18-14-35							1	29	833				1	29	833
		Nininat River	18-13-48										1	178	31,645	1	178	31,645
			18-18-59										1	265	69,980	1	265	69,980
		Quinsam River	18-16-48				1	10	81							1	10	81
		Robertson Creek	18-22-23				1	1	0							1	1	0
		San Juan River	18-13-34							1	137	18,714				1	137	18,714
		Snootli Creek	18-15-56				1	1	1							1	1	1
		Tofino PIP	18-22-51										1	5	18	1	5	18
		B.C. total					4	14	83	2	166	19,547	3	448	121,402	9	628	141,032
Washington	WDFW	Wells Hatchery	63-41-29										1	5	26	1	5	26
		Washington Total											1	5	26	1	5	26
Alaska	ADFG	Crystal Lake/ Earl West Cove	04-44-32	2	70	2,421										2	70	2,421
		Deer Mountain	04-43-15				2	59	2,847	1	18	318				3	77	3,165
	MIC	Tamgas Creek	47-17-05				3	11	29							3	11	29
	SSRA	Carroll Inlet	04-40-49	3	181	11,121										3	181	11,121
			04-40-50	1	60	3,584										1	60	3,584
			04-44-19	1	50	2,415										1	50	2,415
			04-44-20	2	108	5,837	1	12	137	1	37	1,356				4	157	7,330
			04-44-21	1	77	5,851	2	34	551	1	53	2,771				4	164	9,173
		Whitman Lake	04-41-43	2	26	308				2	18	147				4	44	455
			04-44-07	6	74	929	2	6	10	3	26	216				11	106	1,155
			04-45-62							1	17	266				1	17	266
			04-45-63	1	77	5,849										1	77	5,849
		Alaska total		19	723	45,193	10	122	3,573	9	169	6,157				38	1,014	54,923
		All regions		19	723	45,193	14	136	3,655	11	335	26,171	4	453	121,428	48	1,647	196,447

a Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

b Derby held on 23-25 May, 30-31 May, and 6-7 June 1998.

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

d Rec = Number of fish recovered of noted tag code.

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

f 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, 27 April–27 September 1998.

Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/27-6/21			Non-derby 6/22-8/02			Non-derby 8/03-9/27			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	20	397				1	20	397
			18-14-35										1	8	53	1	8	53
		Snootli Creek	18-15-56	1	6	30										1	6	30
		Tenderfoot Cr.	18-19-50										1	15	211	1	15	211
		B.C. total		1	6	30				1	20	397	2	23	263	4	49	690
Oregon	ODFW	Marion Forks	07-08-61							1	49	2,386				1	49	2,386
		Oregon total								1	49	2,386				1	49	2,386
Alaska	ADFG	Big Boulder	04-01-03-0214				1	2	1							1	2	1
		Crystal Lake	04-01-02-1404				1	4	12				1	2	3	2	6	15
			04-44-30				1	12	132				2	15	91	3	27	223
			04-44-31										1	12	134	1	12	134
			04-46-10							1	18	311	2	20	185	3	38	496
	Crystal Lake/Earl West Cove		04-42-44				1	15	209	1	16	247				2	31	455
			04-44-32							1	13	150				1	13	150
		Jerry Meyers	04-42-55				1	3	7							1	3	7
		Snettisham	04-38-10				2	28	399							2	28	399
			04-38-11				2	20	197							2	20	197
			04-40-31	1	22	481										1	22	481
			04-40-33				1	14	176							1	14	176
			04-40-51	1	22	473	1	14	182							2	36	655
			04-42-05	1	23	489							1	4	9	2	27	499
	DIPC	Gastineau	04-37-37				2	12	68				4	27	281	6	39	349
			04-37-38				2	21	256				2	8	23	4	29	279
			04-42-61	1	22	446	1	10	83	1	3	8	2	7	17	5	42	554
			04-44-37	1	31	904	4	77	1,848	2	14	87	2	27	464	9	149	3,303
			04-44-38	4	119	3,816	9	163	4,508	2	22	233	4	20	78	19	324	8,635
			04-44-39				1	5	20	2	13	83				3	18	103
			04-44-40	1	36	1,398	1	20	369				3	21	130	5	79	1,897
			04-44-41							1	3	6	1	1	0	2	4	7
			04-44-42							1	2	4	1	1	0	2	3	4
			50-04-01	2	35	660	2	21	236	4	29	222	11	92	1,383	19	177	2,501
			50-04-03	2	18	148				1	3	7				3	21	154
			50-04-04				1	4	9				2	12	86	3	16	95

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Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/27-6/21			Non-derby 6/22-8/02			Non-derby 8/03-9/27			Derby[a]			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Alaska	DIPC	Gastineau	50-04-05	1	17	280	2	16	147							3	33	427
			50-04-24	1	41	1,639										1	41	1,639
			50-04-25	1	40	1,592	1	35	1,213							2	75	2,805
		Little Port Walter	03-01-30							2	4	6				2	4	6
			03-01-31										1	1	0	1	1	0
			03-01-32							1	2	2	1	1	0	2	3	2
			03-01-38				1	2	1							1	2	1
			03-01-39							2	4	7				2	4	7
			03-02-37	1	5	22										1	5	22
			03-21-37	1	6	28	1	3	7							2	9	35
			03-22-38	1	6	25										1	6	25
			03-22-42				1	3	6							1	3	6
			03-22-50				1	2	1							1	2	1
			03-22-51										1	1	0	1	1	0
			03-22-54							1	2	2	2	2	0	3	4	2
			03-62-01				1	4	12							1	4	12
			03-62-09	1	6	34	1	2	1				1	1	0	3	9	35
			03-63-51	1	5	25										1	5	25
			03-63-59				1	2	1							1	2	1
	NSRA	Hidden Falls	04-41-29	1	5	23										1	5	23
			04-43-25				1	29	799							1	29	799
			04-43-26										2	30	431	2	30	431
			04-45-21										1	14	177	1	14	177
			04-45-22							1	27	682				1	27	682
	SSRA	Neets Bay	04-46-03										1	9	73	1	9	73
		Whitman Lake	04-44-07										1	2	3	1	2	3
		Alaska total		23	461	16,932	45	543	19,110	24	175	2,675	50	330	4,219	142	1,509	42,936
		All regions		24	467	16,969	45	543	19,10	26	244	6,140	52	353	4,482	147	1,607	46,701
				WILD STOCKS[f]														
Alaska	ADFG	Unuk River	04-35-56										1	11	119	1	11	119
			04-35-57				1	20	387							1	20	387
		Wild stocks total					1	20	387				1	11	119	2	31	506

[a] Derby held on 21-23 August 1998.

[b] CDFO = Canada Department of Fisheries and Oceans, ODFW=Oregon Department of Fish and Wildlife, 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, 27 April–27 September 1998.

Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/27-6/21			Derby[a]			Non-derby 6/22-8/02			Non-derby 8/03-9/27			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	1	53	2,765										1	53	2,765
			18-06-33	1	70	4,796	2	17	131	1	27	687				4	114	5,614
			18-13-63	1	246	60,042										1	246	60,042
			18-15-58							1	46	2,042	1	53	2,743	2	99	4,785
			18-18-14	1	255	64,658	2	170	20,081							3	425	84,739
			18-18-15	4	617	109,529	1	25	614	1	78	6,086				6	720	116,228
			18-18-16				1	23	501							1	23	501
			18-19-54	1	69	4,740	1	75	5,519	1	53	2,713				3	197	12,972
		Kincolith	18-10-45				1	18	292							1	18	292
		Kitimat River	18-14-34	1	34	1,120										1	34	1,120
			18-14-35	1	32	985				1	24	562				2	56	1,547
			18-22-53	1	35	1,209										1	35	1,209
		Little Qualicum River	18-18-13				1	46	2,083							1	46	2,083
		Nitinat River	18-06-35	1	129	16,614				2	188	17,616				3	317	34,231
			18-13-48							2	187	18,183				2	187	18,183
			18-14-26	1	211	44,196	1	51	2,596	2	307	46,915				4	569	93,707
			18-15-24	1	187	34,882										1	187	34,882
			18-15-57				2	84	3,419	2	240	29,864				4	324	33,283
			18-18-05	1	50	2,439				1	18	293				2	68	2,732
			18-18-32				1	50	2,424				1	179	31,770	2	229	34,194
			18-18-41							2	271	36,355	1	163	26,349	3	434	62,704
			18-18-58	2	83	3,408	1	10	92	1	44	1,859				4	137	5,359
			18-18-59				2	264	48,127							2	264	48,127
			18-18-60				1	58	3,320	1	180	32,399	1	176	30,794	3	414	66,513
			18-18-61	1	35	1,183	3	13	47	1	13	153	1	16	245	6	77	1,628
			18-18-62							1	101	10,111	2	155	11,961	3	256	22,072
		Puntledge River	18-21-41	1	54	2,813										1	54	2,813
		Quinsam River	18-13-61				1	8	53							1	8	53
		Robertson Creek	18-06-34	1	30	885	2	14	94				1	27	678	4	71	1,656
			18-14-55										1	149	22,071	1	149	22,071
			18-14-56				1	188	34,991							1	188	34,991
			18-14-57	1	183	33,371	1	45	1,955							2	228	35,326
			18-14-58				1	42	1,710	1	130	16,763				2	172	18,473
			18-14-60	2	280	39,663				4	449	52,613				6	729	92,276
			18-15-39	1	260	67,539										1	260	67,539
			18-15-40				1	39	1,492							1	39	1,492
			18-15-41	1	156	24,276										1	156	24,276
			18-15-44				1	22	477							1	22	477
			18-15-45				1	22	463							1	22	463

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Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/27-6/21			Derby[a]			Non-derby 6/22-8/02			Non-derby 8/03-9/27			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
British Columbia	CDFO	Robertson Creek	18-15-46	1	75	5,545										1	75	5,545
			18-15-47				1	5	20							1	5	20
			18-22-20				2	2	0							2	2	0
			18-22-21	2	8	27										2	8	27
			18-22-22	1	4	13	1	1	0							2	5	13
			18-22-23				1	4	16							1	4	16
			18-22-24							1	3	6	1	4	10	2	7	15
		San Juan River	18-13-33	1	54	2,874										1	54	2,874
			18-13-34	2	108	5,866				2	79	3,036	2	95	4,606	6	282	13,508
			18-14-25				1	5	204							1	15	204
		Shotbolt Bay	18-13-18				1	1	0							1	1	0
		Shuswap River	18-16-41	2	77	2,922	2	50	1,747	3	98	3,272				7	225	7,941
			18-24-62							1	39	1,456				1	39	1,456
		Snootli Creek	18-09-07				1	8	54							1	8	54
			18-12-29							1	48	2,226				1	48	2,226
			18-12-38	1	26	641	1	6	33							2	32	675
		Tahsis	18-14-22	1	24	565	2	16	167							3	40	732
		Terrace	18-10-50							1	3	7				1	3	7
		Toboggan Cr.	18-14-42				1	1	0							1	1	0
		B.C. total		37	3,445	681,671	43	1,393	141,625	34	2,626	378,194	12	1,017	153,398	126	8,481	1,354,888
Oregon	ODFW	Bonneville	07-08-18	1	4	14				1	3	7				2	7	21
			07-58-16	1	164	26,890										1	164	26,890
		Salmon River	07-04-61							1	3	8				1	3	8
			07-04-63	1	4	15										1	4	15
			07-09-62										1	4	14	1	4	14
		Umatilla	07-07-21	1	44	1,,896										1	44	1,896
		Oregon total		4	216	29,161				2	6	16	1	4	14	7	226	29,191
Washington	FWS	Makah on Sooes	05-35-20							1	81	6,450				1	81	6,450
	MAKA	Hoko	21-24-53										1	4	9	1	4	9
	MUCK	Keta Creek	05-01-01-1214	1	4	14										1	4	14
	NMFS	Columbia R.	23-29-13							1	3	7				1	3	7
	QDNR	Quinault Lake	21-24-28				1	4	14	1	12	142				2	16	157
			21-29-21	1	9	73				2	13	74				3	22	146
		Salmon River	21-24-52	2	14	98				3	12	43				5	26	141
		Carlton Rearing Pond	63-57-61							1	4	16				1	4	16
		Dryden Pond	63-58-39							1	5	17				1	5	17
		Elochoman	63-05-51							1	19	325				1	19	325

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Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/27-6/21			Derby[a]			Non-derby 6/22-8/02			Non-derby 8/03-9/27			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Washington	WDFW	Klickitat	63-55-17	1	91	8,227										1	91	8,227
		Lyons Ferry	63-58-44							1	3	5				1	3	5
			63-58-45							1	3	5				1	3	5
		Priest Rapids	63-55-40	1	148	21,735	1	36	1,268	1	112	12,468				3	296	35,471
			63-60-01							1	129	16,669				1	129	16,669
		Turtle Rock	63-57-05	1	6	32										1	6	32
		Wells Hatchery	63-57-02	1	8	61										1	8	61
		Washington total		8	260	31,001	2	40	1,282	15	396	37,132	1	4	9	26	720	69,424
Alaska	ADFG	Crystal Lake	04-44-31	1	50	2,408										1	50	2,408
	MIC	Tamgas Creek	47-16-61				1	19	337							1	19	337
	NMFS	Little Port Walter	03-62-01	1	4	13										1	4	13
	NSRA	Hidden Falls	04-39-20	1	83	6,811										1	83	6,811
			04-45-34-*2															
			04-41-03	1	67	4,430										1	67	4,430
			04-41-05				1	71	5,032							1	71	5,032
			04-41-09							1	47	2,145				1	47	2,145
			04-41-12				1	49	2,399							1	49	2,399
			04-41-18				1	15	222							1	15	222
			04-41-20	1	46	2,078										1	46	2,078
			04-41-21	1	46	2,093										1	46	2,093
			04-41-35	1	63	3,863				1	47	2,209				2	110	6,072
			04-43-29				2	31	447							2	31	447
			04-45-33							2	117	6,892				2	117	6,892
	SSRA	Carroll Inlet	04-44-18							1	28	764				1	28	764
			04-44-20				1	10	88							1	10	88
		Neets Bay	04-41-42				1	4	14							1	4	14
			04-46-04							1	39	1,495				1	39	1,495
		Alaska total		7	359	23,773	8	199	8,705	7	317	15,895				22	875	48,373
		All regions		56	4,300	849,594	53	1,632	155,599	58	3,345	476,278	14	1,025	153,786	181	10,302	1,635,257
							WILD STOCKS[f]											
Alaska	ADFG	Unuk River	04-38-03				1	23	508							1	23	508
		Wild stocks total					1	23	508							1	23	508

[a] Derby held on 23-25 May and 30-31 May 1998.

[b] CDFO = Canada Department of Fisheries and Oceans, ODFW = Oregon Department of Fish and Wildlife , FWS=U.S.Fish and Wildlife Service, MAKA=`Makah Tribe, MUCK=Muckleshoot Tribe, QDNR=Quinault Department of Natural Resources, WDFW = Washington Department of Fisheries and Wildlife, ADFG=Alaska Department of Fish and Game, MIC=Metlakatla Indian Community, 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 B14.–Estimates (from sampled fish only) of hatchery-produced chinook salmon contributed to 389 chinook salmon examined during the Petersburg marine boat sport fishery from 4 May to 12 July 1998.

Region	Agency[a]	Hatchery/ release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
British Columbia	CDFO	Tenderfoot Creek	18-15-28	1	21	436	5.4%
		Snootli Creek	02-33-05	1	1	0	0.3%
		B.C. total		2	22	436	5.7%
Washington	WDF	Stillaguamish	21-26-10	1	1	0	0.3%
		Washington total		1	1	0	0.3%
Alaska	ADFG	Crystal Lake	04-01-02-0913	1	2	2	0.5%
			04-42-39	2	17	121	4.4%
		Crystal Lake/Earl West Cove	04-42-41	1	7	39	1.8%
	NMFS	Little Port Walter	03-22-37	1	1	0	0.3%
			03-22-39	1	1	0	0.3%
			03-63-50	1	1	0	0.3%
			03-63-56	1	1	0	0.3%
		Alaska total		8	30	162	7.7%
		TOTAL ALL REGIONS		11	53	598	13.6%

Appendix B15.–Estimates (from sampled fish only) of hatchery-produced chinook salmon contributed to 140 chinook salmon examined during the Wrangell marine boat sport fishery from 27 April to 15 June 1998.

Region	Agency[a]	Hatchery/ release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
Washington	WDF	Hurd Creek	63-53-32	1	11	111	7.9%
		Washington total		1	11	111	7.9%
Alaska	ADFG	Crystal Lake	04-42-38	1	9	78	6.4%
	SSRA	Neets Bay	04-45-44	1	10	98	7.1%
		Alaska total		2	19	176	13.6%
		TOTAL ALL REGIONS		3	30	287	21.4%

[a] CDFO = Canada Department of Fisheries and Oceans; WDF=Washington Department of Fisheries, 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 1,310 chinook salmon examined during the Craig marine boat sport fishery from 27 April to 13 September 1998.

Region	Agency[a]	Hatchery/ release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
British Columbia	CDFO	Conuma River	18-06-32	2	27	346	2.1%
			18-18-15	1	27	683	2.1%
		Nitinat River	18-14-26	1	54	2,886	4.1%
			18-15-24	1	48	2,274	3.7%
			18-18-05	2	13	71	1.0%
			18-18-41	2	96	4,466	7.3%
			18-18-59	3	154	7,710	11.8%
			18-18-61	3	14	53	1.1%
			18-18-62	1	25	585	1.9%
		Quinsam River	18-13-56	1	4	9	0.3%
			02-09-63	1	10	92	0.8%
		Robertson Creek	18-06-34	1	8	53	0.6%
			18-14-57	1	47	2,175	3.6%
			18-14-58	1	44	1,902	3.4%
			18-22-21	1	1	0	0.1%
			18-22-22	1	1	0	0.1%
			18-22-23	1	1	0	0.1%
			18-22-24	1	1	0	0.1%
		Shuswap River	18-16-41	3	30	262	2.3%
		Terrace	02-11-04	1	1	0	0.1%
		Tofino	18-22-51	1	1	0	0.1%
		B.C. total		30	607	23,567	46.3%
Washington	WDFW	Klickitat	63-53-36	1	30	870	2.3%
		Quinault	05-19-56	1	1	0	0.1%
		Turtle Rock	63-53-17	1	5	16	0.4%
		Washington total		3	36	886	2.7%
		Non-Alaska total		33	643	24,453	49.1%
Alaska	NMFS	Little Port Walter	03-22-42	1	1	1	0.1%
	SSRA	Neets Bay	04-45-53	**1**	**10**	**91**	**0.8%**
		Alaska total		2	11	92	0.8%
		TOTAL ALL REGIONS		35	654	24,544	49.9%

[a] CDFO = Canada Department of Fisheries and Oceans; WDFW=Washington Department of Fisheries and Wildlife, 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 B17.–Age composition of chinook salmon from selected Southeast Alaska sport fisheries, 1998.

Sport Fishery			BROOD YEAR 1995 0.2	1995 1.1	1994 0.3	1994 1.2	1993 0.4	1993 1.3	1992 0.5	1992 1.4	1992 2.3	1991 1.5	1991 2.4	Sample Size
Ketchikan	Males	n			2	8	2	15		3				30
		Percent			6.7	26.7	6.7	50.0		10.0				
		SE[a]			4.6	8.2	4.6	9.3		5.6				
	Females	n	2		11	3	4	25		11				56
		Percent	3.6		19.6	5.4	7.1	44.6		19.6				
		SE[a]	2.5		5.4	3.0	3.5	6.7		5.4				
	Total[b]	n	9	1	41	26	17	110		40		1		245
		Percent	3.7	0.4	16.7	10.6	6.9	44.9		16.3		0.4		
		SE[a]	1.2	0.4	2.4	2.0	1.6	3.2		2.4		0.4		
Juneau	Males	n		3		12		38		33	1	3	1	91
		Percent		3.3		13.2		41.8		36.3	1.1	3.3	1.1	
		SE[a]		1.9		3.8		5.2		5.1	1.1	1.9	1.1	
	Females	n				3		20		62	1	1	5	92
		Percent				3.3		21.7		67.4	1.1	1.1	5.4	
		SE[a]				1.9		4.3		4.9	1.1	1.1	2.4	
	Total[b]	n	1	11	1	37		129		146	2	5	8	343
		Percent	0.3	3.2	0.3	10.8		37.6		41.6	0.6	1.5	2.3	
		SE[a]	0.3	1.0	0.3	1.7		2.6		2.6	0.4	0.6	0.8	
Juneau Derby	Total[b]	n			2	15		25			1			43
		Percent			0.6	4.3		7.1			0.3			
		SE[a]			0.4	1.1		1.4			0.3			
Petersburg	Males	n			1	2	1	6			19		2	31
		Percent			0.3	0.6	0.3	1.7			5.4		0.6	
		SE[a]			0.3	0.4	0.3	0.7			1.2		0.4	
	Females	n					4	5		2	42		4	55
		Percent					1.1	1.4		0.6	12.0		1.1	
		SE[a]					0.6	0.6		0.4	1.7		0.6	
	Total[b]	n			2	2	11	15		77		6		113
		Percent			1.8	1.8	9.7	13.3		68.1		5.3		
		SE[a]			1.2	1.2	2.8	3.2		4.4		2.1		
Wrangell	Males	n				1		8		13		1		23
		Percent				4.3		34.8		56.5		4.3		
		SE[a]				4.3		10.2		10.6		4.3		
	Females	n						16		16		1		33
		Percent						48.5		48.5		3.0		
		SE[a]						8.8		8.8		3.0		
	Total[b]	n				1		24		29		2		56
		Percent				1.8		42.9		51.8		3.6		
		SE[a]				1.8		6.7		6.7		2.5		

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Sport Fishery			BROOD YEAR 1995 0.2	1.1	1994 0.3	1.2	1993 0.4	1.3	1992 0.5	1.4	2.3	1991 1.5	2.4	Sample Size
Craig	Males	n	1		12	1	4	7		5				30
		Percent	3.3		40.0	3.3	13.3	23.3		16.7				
		SE[a]	3.3		9.1	3.3	6.3	7.9		6.9				
	Females	n			7		12	5		3				27
		Percent			25.9		44.4	18.5		11.1				
		SE[a]			8.6		9.7	7.6		6.2				
	Total[b]	n	1		19	1	16	12		8				57
		Percent	1.8		33.3	1.8	28.1	21.1		14.0				
		SE[a]	1.8		6.3	1.8	6.0	5.4		4.6				
Sitka	Males	n	1				2	3						6
		Percent	16.7				33.3	50.0						
		SE[a]	16.7				21.1	22.4						
	Females	n			3		1	2		2				8
		Percent			37.5		12.5	25.0		25.0				
		SE[a]			18.3		12.5	16.4		16.4				
	Total[b]	n	7		412	3	273	105	2	67	1	1		871
		Percent	0.8		47.3	0.3	31.3	12.1	0.2	7.7	0.1	0.1		
		SE[a]	0.3		1.7	0.2	1.6	1.1	0.2	0.9	0.1	0.1		

[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, 1998.

Sport Fishery			BROOD YEAR 1995 0.2	1995 1.1	1994 0.3	1994 1.2	1993 0.4	1993 1.3	1992 0.5	1992 1.4	1992 2.3	1991 1.5	1991 2.4	Sample Size
Ketchikan	Males	Mean			840	741	1,050	916		1,057				
		SE			25	20	15	17		73				
		n			2	8	2	15		3				30
	Females	Mean	710		874	833	973	895		990				
		SE	0		18	103	39	14		22				
		n	2		11	3	4	25		11				56
	Total[a]	Mean	722	680	867	746	1,013	885		1,015		940		
		SE	17	0	11	15	27	7		13		0		
		n	9	1	41	26	17	110		40		1		245
Juneau	Males	Mean		478		702		818		962	845	1,032	940	
		SE		43		9		13		17	0	60	0	
		n		3		12		38		33	1	3	1	91
	Females	Mean				702		820		917	870	1,015	965	
		SE				24		13		8	0	0	16	
		n				3		20		61	1	1	5	91
	Total[a]	Mean	660	450	775	686		810		925	858	1,008	948	
		SE	0	17	0	12		7		6	13	38	14	
		n	1	11	1	37		128		146	2	5	8	339
Juneau Derby	Total[a]	Mean			870	713		787			780			
		SE			10	9		10			0			
		n			2	15		25			1			43
Petersburg	Males	Mean			810	730	1,020	807		994		1,075		
		SE			0	10	0	30		18		15		
		n			1	2	1	6		19		2		31
	Females	Mean					1,005	889		923		953		
		SE					31	9		12		43		
		n					4	5		42		4		55
	Total[a]	Mean			760	730	1,014	848		945		993		
		SE			50	10	14	22		10		38		
		n			2	2	11	15		77		6		113

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Sport Fishery			BROOD YEAR 1995 0.2	1995 1.1	1994 0.3	1994 1.2	1993 0.4	1993 1.3	1992 0.5	1992 1.4	1992 2.3	1991 1.5	1991 2.4	Sample Size
Wrangell	Males	Mean				740		916		979		985		
		SE				0		18		28		0		
		n				1		8		13		1		23
	Females	Mean						864		940		970		
		SE						18		18		0		
		n						16		16		1		33
	Total[a]	Mean				740		881		957		978		
		SE				0		14		16		8		
		n				1		24		29		2		56
Craig	Males	Mean	790		855	720	958	916		974				
		SE	0		15	0	31	24		14				
		n	1		12	1	4	7		5				30
	Females	Mean			864		945	881		910				
		SE			24		15	21		18				
		n			7		12	5		3				27
	Total[a]	Mean	790		858	720	948	902		950				
		SE	0		13	0	13	17		15				
		n	1		19	1	16	12		8				57
Sitka	Males	Mean	720				885	923						
		SE	0				75	65						
		n	1				2	3						6
	Females	Mean			873		870	830		920				
		SE			24		0	40		80				
		n			3		1	2		2				8
	Total[a]	Mean	727		832	803	907	859	1,010	927	825	950		
		SE	12		3	39	4	6	10	11	0	0		
		n	7		410	3	272	105	2	66	1	1		867

[a] Includes sexed and unsexed chinook salmon.

Appendix B19.–Numbers and percent of coho salmon examined for coded wire tags in Southeast Alaska marine boat sport fisheries in 1998.

Sport fishery	Seasonal period	Estimated harvest	Number sampled	Percent
CREEL SURVEYS				
Ketchikan[a]	4/27–8/02 non-derby	3,408	577	17
	Derby entered[b]	0	0	0
	Derby not entered[b]	11	3	27
	8/03–9/27	20,640	6,624	32
	Total	24,059	7,204	30
Juneau	4/27–8/02	1,639	500	30
	8/03–9/27 non-derby	9,764	3,149	32
	Derby entered[c]	2,808	2,808	100
	Derby take-home[c]	1,519	366	24
	Total	15,730	6,823	43
Sitka	4/27–8/02 non-derby	17,444	5,720	33
	Derby entered[d]	0	0	0
	Derby take-home[d]	5	1	20
	8/03–9/27	25,075	7,182	29
	Total	42,524	12,903	30
Creel survey totals		82,313	26,930	33
Catch sampling programs				
Petersburg	5/4-7/12		16	
Craig	4/27–9/13		2,630	
Total sampled			29,576	

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Derby held 23–25 May, 30-31 May, and 6–7 June.

[c] Derby held 21–23 August.

[d] Derby held 23–25 May, 30-31 May.

Appendix B20.–Estimates of hatchery-produced and wild tagged coho salmon contributed to the Ketchikan marine boat sport fishery, 27 April–27 September 1998[a].

Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/27–6/21			Non-derby 6/22–8/02			Non-derby 8/03–9/27			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS															
British Columbia	CDFO	Kincolith	18-17-12							1	9	65	1	9	65
		Malaspina	18-17-14							2	10	37	2	10	37
		Toboggan Creek	18-11-42				1	6	31				1	6	31
		B.C. total					1	6	31	3	19	107	4	25	138
Alaska	ADFG	Whitman Lake	04-01-03-0804							1	11	109	1	11	109
	AKI	Port Armstrong	04-38-38				1	224	49,889				1	224	49,889
	KTHC	Deer Mountain	04-43-17				4	49	735				4	49	735
			04-45-03				4	61	1,067				4	61	1,067
			04-47-32	1	2	4							1	2	4
			04-47-33	2	5	11	3	30	363	2	10	40	7	45	414
			04-47-34	1	2	4	3	30	363	1	4	10	5	36	377
			04-47-35				5	67	1,117	1	4	10	6	71	1,127
			04-47-36				2	12	56				2	12	56
			04-47-39				4	110	3,862	3	30	300	7	140	4,162
			04-47-40				4	100	3,255	2	26	346	6	126	3,601
	MIC	Tamgas Creek	12-01-01-0110							1	249	61,791	1	24	61,791
			12-01-01-0111							1	170	28,679	1	170	28,679
			47-17-26							1	105	10,967	1	105	10,967
			47-17-29							1	125	15,396	1	125	15,396
			47-17-31							2	103	5,514	2	103	5,514
	SSRA	Nakat Inlet	04-48-06							4	122	3,752	4	122	3,752
			04-48-07							1	29	826	1	29	826
		Neets Bay	04-47-42							6	419	32,138	6	419	32,138
			04-47-43							3	213	15,509	3	213	15,509
			04-47-44							9	613	50,391	9	613	50,391
			04-47-48							9	613	47,729	9	613	47,729
			04-47-49							7	460	32,196	7	460	32,196
			04-47-50							10	650	50,010	10	650	50,010
			04-47-51							8	517	37,881	8	517	37,881
			04-47-52							6	385	26,754	6	385	26,754
			04-47-53							8	518	37,275	8	518	37,275
			04-48-01							14	1,590	225,897	14	1,590	225,897
			04-48-02							19	2,168	321,515	19	2,168	321,515
			04-48-03							13	1,869	329,024	13	1,869	329,024

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Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/27–6/21			Non-derby 6/22–8/02			Non-derby 8/03–9/27			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS															
Alaska	SSRA	Neets Bay	04-49-43							1	71	4,937	1	71	4,937
		Whitman Lake	04-47-61				1	65	4,135				1	65	4,135
			04-47-62	1	24	570							1	24	570
			04-48-04							5	219	10,206	5	219	10,206
			04-48-05							8	356	17,847	8	356	17,847
		Alaska total		5	33	675	31	748	74,437	147	11,649	3,609,794	183	12,430	3,684,906
		TOTAL ALL REGIONS		5	33	675	32	754	74,486	150	11,668	3,613,147	187	12,455	3,688,308
WILD STOCKS[f]															
Alaska	ADFG	Hugh Smith Lake	04-43-51							6	28	127	6	28	127
			04-43-55							5	23	106	5	23	106
		Unuk River	04-43-35							2	808	398,849	2	808	398,849
			04-43-36							4	1,615	797,698	4	1,615	797,698
		WILD STOCK TOTAL								17	2,474	1,196,780	17	2,474	1,196,780

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] CDFO = Canada Department of Fisheries and Oceans; ADFG=Alaska Department of Fish and Game, AKI=Armstrong-Keta, Inc., 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, 27 April–27 September 1998.

Region	Agency[b]	Release site	Tag code	Non-derby 6/22–8/02			Non-derby 8/03–9/27			Derby[a]			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS															
Alaska	ADFG	Jerry Myers	04-46-20							1	1	0	1	1	0
	DIPC	Gastineau	50-04-12				8	347	21,958	6	90	2,039	14	437	23,997
			50-04-13				5	212	11,184	13	127	1,105	18	339	12,289
			50-04-14				7	230	8,542	9	88	779	16	318	9,321
			50-04-15				11	363	15,814	17	194	2,870	28	557	18,684
			50-04-16				6	198	7,661	18	177	1,571	24	375	9,232
			50-04-17				4	144	6,554	16	210	4,280	20	354	10,834
			50-04-18				3	13	6,349	3	35	372	6	165	6,720
			50-04-19				2	98	5,419	3	73	2,617	5	171	8,036
			50-04-20				5	203	9,093	9	179	5,798	14	382	14,891
			50-04-21				4	135	5,220	3	34	349	7	169	5,569
	NSRA	Hidden Falls	04-47-04							1	12	141	1	12	141
			04-47-05							1	12	125	1	12	125
			04-47-06				1	76	5,663				1	76	5,663
			04-47-07	1	108	11,596	1	97	9,260	1	24	533	3	229	21,389
		Total		1	108	11,596	57	2,233	300,571	101	1,256	27,776	159	3,597	339,943
WILD STOCKS[f]															
Alaska	ADFG	Auke Creek	04-07-18				13	42	159	5	8	13	18	50	172
			04-46-47				6	227	13,630	5	42	317	11	269	13,949
		Berners River	04-46-48				2	76	4,543	1	8	63	3	84	4,606
		Duck Creek	04-49-37				5	17	53	4	7	13	9	24	66
		Taku River	04-42-16				3	681	234,582	1	69	6,767	4	750	241,349
			04-46-40	1	266	82,564	6	1,363	469,164	7	483	47,366	14	2,112	599,094
			04-46-41	2	531	165,128	2	454	156,388	2	138	13,533	6	1,123	335,049
		WILD STOCK TOTAL		3	797	247,692	37	2,860	878,519	25	755	68,072	65	4,412	1,194,285

[a] Derby held on 21–23 August 1998.

[b] 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 expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds.

Appendix B22.–Estimates of hatchery-produced and wild tagged coho salmon contributed to the Sitka marine boat sport fishery, 27 April–27 September 1998.

Region	Agency[a]	Release site	Tag code	Non-derby 4/27–6/21			Non-derby 6/22–8/02			Non-derby 8/03–9/27			Total		
				Rec[b]	Con[c]	Variance[d]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS															
British Columbia	AFSP	Orford River	28-16-02				1	3	7				1	3	7
	CDFO	Bella Bella	18-17-01				1	4	14				1	4	14
		Fort Babine	18-17-04				1	5	17				1	5	17
			18-17-05				1	4	13				1	4	13
			18-23-08	1	5	18							1	5	18
		Hartley Bay	18-21-48				1	3	6				1	3	6
		Kincolith	18-17-12							1	9	66	1	9	66
		Kitimat River	18-23-24				1	24	541				1	24	541
		Malaspina	18-17-14							1	4	9	1	4	9
		Sewell Inlet	18-11-17							1	4	14	1	4	14
			18-23-59				2	7	21				2	7	21
			18-23-60							2	8	26	2	8	26
		Snootli Creek	08-07-11				1	3	7				1	3	7
			18-11-41				1	5	19				1	5	19
		Toboggan Cr.	18-11-43				1	4	14				1	4	14
		B.C. Total		1	5	18	11	62	722	5	25	128	17	92	868
Alaska	ADFG	Fort Richardson	31-25-63							1	17	281	1	17	281
		Medvejie	04-01-03-0514				2	6	14	1	4	9	3	10	23
			04-01-03-0515				3	9	22	8	32	126	11	41	148
		Whitman Lake	04-01-03-0802				1	11	115				1	11	15
			04-01-03-0803							1	11	111	1	11	111
	AKI	Port Armstrong	04-44-51				1	123	15,015	1	137	18,528	2	260	33,543
	DIPC	Gastineau	50-04-13							1	33	1,046	1	33	1,046
			50-04-17							1	32	994	1	32	994
			50-04-20							1	40	1,530	1	40	1,530
	KAKE	Gunnuk Creek	04-01-01-0410							1	14	183	1	14	183
	KTHC	Deer Mountain	04-47-32				1	4	11				1	4	11
	MIC	Tamgas Creek	12-01-01-0111				1	176	30,783				1	176	30,783
			47-17-26				2	191	18,569	1	106	11,085	3	297	29,654
			47-27-29							2	469	126,071	2	469	126,071
			47-17-30				1	55	2,953	1	53	2,953	2	108	5,751
	NSRA	Hidden Falls	04-47-02							2	271	37,483	2	271	37,483
			04-47-04							1	42	1,721	1	42	1,721
			04-47-05				1	41	1,604	1	40	1,536	2	81	3,140
			04-47-06							2	164	13,720	2	164	13,720
			04-47-07				1	72	5,067				1	72	5,067

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Region	Agency[a]	Release site	Tag code	Non-derby 4/27–6/21 Rec[b]	Non-derby 4/27–6/21 Con[c]	Non-derby 4/27–6/21 Variance[d]	Non-derby 6/22–8/02 Rec	Non-derby 6/22–8/02 Con	Non-derby 6/22–8/02 Variance	Non-derby 8/03–9/27 Rec	Non-derby 8/03–9/27 Con	Non-derby 8/03–9/27 Variance	Total Rec	Total Con	Total Variance
HATCHERY STOCKS (cont.)															
Alaska	NSRA	Medvejie	04-47-10				11	45	189	12	65	395	23	110	584
			04-47-19				9	143	2,492	28	555	15,990	37	698	18,482
			04-47-20				11	175	3,219	32	601	16,129	43	776	19,348
			04-47-21				10	158	2,797	40	693	19,251	50	851	22,048
			04-47-22				5	77	1,226	34	571	14,011	39	648	15,237
	SJ	Sheldon Jackson	04-48-15							1	26	666	1	26	666
	SSRA	Earl West Cove	04-48-08				2	69	2,360	1	36	1,264	3	105	3,624
			04-48-09				1	33	1,031	2	72	2,564	3	105	3,595
		Nakat Inlet	04-48-06				2	59	1,720				2	59	1,720
			04-48-07							3	99	3,199	3	99	3,199
		Neets Bay	04-47-42				1	72	5,089	1	80	6,350	2	152	11,438
			04-47-43							1	77	5,817	1	77	5,817
			04-47-44				2	150	11,150	1	78	6,043	3	228	17,192
			04-47-48				1	66	4,236	3	218	16,606	4	284	20,842
			04-47-49							3	219	16,174	3	219	16,174
			04-47-50				1	66	4,300				1	66	4,300
			04-47-51				1	66	4,296				1	66	4,296
			04-47-53				2	131	8,742	2	146	10,930	4	277	19,672
			04-48-01				1	115	13,035	4	511	66,769	5	626	79,804
			04-48-02				1	114	12,958	2	255	32,151	3	369	45,109
			04-48-03				1	137	18,551	2	497	141,273	3	634	159,823
			04-01-03-0808				1	47	2,193				1	47	2,193
			04-48-05				2	89	4,027	1	50	2,432	3	139	6,458
		Alaska Total					79	2,500	322,859	199	6,314	1,075,636	278	8,814	1,398,495
		TOTAL ALL REGIONS		1	5	18	90	2,562	329,916	204	6,339	1,080,730	295	8,906	1,410,664
WILD STOCKS[e]															
Alaska	ADFG	Auke Creek	04-07-18				1	3	6				1	3	6
		Berners River	04-46-48							1	28	759	1	28	759
		Ford Arm Lake	04-40-19				12	364	13,341	11	388	13,291	23	752	26,632
			04-43-47							1	35	1,481	1	35	1,481
		Hugh Smith L.	04-43-51				1	5	17	1	5	20	2	10	37
			04-43-55				2	9	34	3	15	60	5	25	94
		Taku River	04-46-40				1	209	43,661	1	234	54,427	2	443	98,088

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Region	Agency[b]	Release site	Tag code	Non-derby 4/27–6/21 Rec[c]	Non-derby 4/27–6/21 Con[d]	Non-derby 4/27–6/21 Variance[e]	Non-derby 6/22–8/02 Rec	Non-derby 6/22–8/02 Con	Non-derby 6/22–8/02 Variance	Non-derby 8/03–9/27 Rec	Non-derby 8/03–9/27 Con	Non-derby 8/03–9/27 Variance	Total Rec	Total Con	Total Variance
WILD STOCKS (cont.)															
		Unuk River	04-43-35							3	1,169	748,337	3	1,169	748,337
	USFS	Eagle River	04-01-02-1314							2	25	288	2	25	288
			04-31-20				1	3	8				1	3	8
		Slippery Creek	04-43-34				1	4	15	2	9	35	3	13	50
			04-48-13				6	25	92	5	22	88	11	47	114
		TOTAL ALL REGIONS					25	622	57,174	30	1,930	818,786	55	2,552	875,960

[a] AFSP = Aboriginal Fishery Strategy Program; CDFO = Canada Department of Fisheries and Oceans; ADFG = Alaska Department of Fish and Game; AKI = Armstrong-Keta, Inc.; DIPC = Douglas Island Pink and Chum, Inc.; KAKE = Kake Non-profit Fisheries Corp.; KTHC = Ketchikan Tribal Hatchery Corporation; MIC = Metlakatla Indian Community; NSRA = Northern Southeast Regional Aquaculture Association; SJ = Sheldon Jackson College; SSRA = Southern Southeast Regional Aquaculture Association; USFS = U.S.Forest Service.

[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 2,630 coho salmon examined during the Craig marine boat sport fishery, 27 April–13 September 1998.

Region	Agency[a]	Hatchery/release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
			HATCHERY STOCKS				
British Columbia	CDFO	Fort Babine	18-23-08	1	1	0	0.0%
		Kitimat River	18-23-24	1	7	39	0.3%
		Coates Creek	18-24-59	1	1	0	0.0%
		Snootli Creek	18-33-59	1	1	0	0.0%
		B.C. total		4	10	39	0.4%
Alaska	NSRA	Hidden Falls	04-47-02	1	40	1,545	1.5%
	SSRA	Whitman Lake	04-01-03-0804	1	3	7	0.1%
		Medvejie	04-47-20	1	5	19	0.2%
		Neets Bay	04-47-44	1	23	500	0.9%
			04-47-53	1	21	436	0.8%
			04-48-02	1	37	1,355	1.4%
		Whitman Lake	04-48-04	1	15	198	0.6%
			04-48-05	1	15	197	0.6%
		Alaska total		8	159	4,257	6.0%
		TOTAL ALL REGIONS		12	169	4,296	6.4%
			WILD STOCKS[e]				
Alaska	ADFG	Hugh Smith Lake	04-43-51	1	1	0	
			04-43-55	1	1	0	
			WILD STOCK TOTAL	2	2	0	

[a] CDFO = Canada Department of Fisheries and Oceans; SSRA = Southern Southeast Regional Aquaculture Association, ADFG = Alaska Department of Fish and Game.

[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 1998 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 KMC98EST.ZIP, JMC98EST.ZIP, PMC98SAM.ZIP, SMC98EST.ZIP, WMC98SAM.ZIP, and CMC98SAM.ZIP)	
A0811998.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Ketchikan, 1998
B7601998.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Craig, 1998
C0821998.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Petersburg, 1998
C0811998.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Wrangell, 1998
C98SIM.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Sitka, 1998
C98JUM.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Juneau, 1998
aMS98.SAS	SAS programs to create basic interview SAS save files from mark-sense data files. 'a' stands for the letter of each site respectively: K for Ketchikan, P for Petersburg, W for Wrangell, S for Sitka, J for Juneau, C for Craig.
aMC98ESS.SAS	SAS programs to create revised interview SAS save files from files created by aMS98.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 'a'.
aMC98MSM.SAS	SAS programs to create SAS save files with only the sampling information associated with each sample for each survey from files created by aMC98ESS.SAS. See above for explanation of 'a'
aMC98EST.SAS	SAS programs to estimate effort, catch, and harvest with associated variances using SAS save files created by aMC98ESS.SAS and aMC98MSM.SAS. Program operates on one species at a time as determined by inputs in temporary input data file 'SPECLIST.DAT'. See above for explanation of 'a'
Coded Wire Tag Contribution Estimation Files (in CWT98.ZIP)	
SFBAS98.XLS	Data file from tag lab with sampling information for each biweekly period at each fishery.
SFCON98.XLS	Data file from tag lab with recovery information for each adipose finclipped coho and chinook salmon sampled.
SEN98CWT.SAS	SAS program to do basic estimates.
SEN98CO1.SAS	SAS program to summarize contributions across tag codes for main tables.
SEN98CWP.SAS	SAS program to list tags, contributions, and variances for appendices.
Age-weight-length (AWL) Files (in CHI98AWL.ZIP and HAL98AWL.ZIP)	
CHIN98ALL.DTA	Data file (ASCII) containing chinook salmon AWL data from all sample sites (this file was converted to CHIN98ALL.XLS for input to the SAS program).
REG_LF98CHI.SAS	SAS program to summarize chinook salmon AWL data
HAL98ALL.DTA	Data file (ASCII) containing halibut AWL data from all sample sites (this file was converted to HAL98ALL.XLS for input to the SAS program).
LF98HAL.SAS	SAS program to summarize halibut AWL data