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Harvest Estimates for Selected Marine Sport Fisheries in Southeast Alaska During 1996

by

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August 1997

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Spell out acre and ton.

Time and temperature

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

Spell out year, month, and week.

Physics and chemistry

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

General

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

Mathematics, statistics, fisheries

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

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ABSTRACT

Creel surveys of the Juneau, Ketchikan, and Sitka marine sport fisheries for chinook salmon *Oncorhynchus tshawytscha* were conducted during 1996. Estimates from these surveys were necessary to provide data for inseason management of the chinook salmon sport fishery in Southeast Alaska to meet an allocation determined by the Alaska Board of Fisheries. Dockside interviews of boat-parties completing trips were used to estimate angler effort for and total catch and harvest of chinook salmon. Harvest and total catches of other Pacific salmon and trout *Oncorhynchus* species, Pacific halibut *Hippoglossus stenolepis*, lingcod *Ophiodon elongatus,* rockfish *Sebastes* species, and Dolly Varden *Salvelinus malma* were also estimated. In addition, harvests of Dungeness crab *Cancer magister* and shrimp *Pandalus* species were estimated in Ketchikan; while harvest of king, Dungeness, and Tanner crab (*Paralithodes* species, *Cancer magister,* and *Chionoecetes* species, respectively) were estimated in Juneau. The contributions of hatchery chinook salmon and coho salmon *Oncorhynchus kisutch* to these sport fisheries were estimated from coded wire tag recovery information. Coded wire tag sampling programs conducted at Petersburg, Wrangell, and Craig also provided hatchery contribution estimates. Scale samples and lengths were taken from chinook salmon for age composition and length-at-age estimates in all fisheries. Lengths of Pacific halibut were taken to estimate total round weight of the harvest from existing length-weight relationships.

The estimated harvest of chinook salmon was 21,473 (SE = 955) in the three boat sport fisheries monitored. Harvests of chinook salmon were about half of the long-term average in the Ketchikan fishery, but about average in the Juneau and Sitka fisheries. Hatcheries in Alaska, British Columbia, Washington, and Oregon produced about 32% of the monitored chinook salmon harvest with 24% of the total harvest of Alaska hatchery origin. In the Juneau fishery hatcheries produced about 29% of the chinook salmon harvest with Southeast Alaska hatcheries contributing 28% of the total harvest. In the Ketchikan fishery 54% of the harvest was of hatchery origin, and the percentage of Alaska hatchery chinook salmon harvested was 39%. The estimated Alaska hatchery contribution of chinook salmon was 17% in Sitka and coded wire tag sampling in Petersburg, Wrangell, and Craig revealed that chinook salmon from Alaska hatcheries contributed about 28% , 38% and 7% of the harvest, respectively.

An estimated 90,017 (SE = 5,289) coho salmon, 54,146 (SE = 5,719) pink salmon *Oncorhynchus gorbuscha*, 34,350 (SE = 1,772) Pacific halibut, and 13,020 (SE = 836) rockfish were also harvested in the three marine boat fisheries surveyed. Hatcheries produced 40%, 17% and 18% of the coho harvest in Ketchikan, Juneau, and Sitka, respectively. The Pacific halibut harvest of 11,158 (SE = 1,053) in Juneau was slightly below the long-term average, but the Ketchikan harvest of 11,177 (SE = 1,069) and the Sitka harvest of 12,015 (SE = 943) were above average. Shellfish effort was above average in the Juneau fishery, but below average in the Ketchikan fishery. Dungeness crab harvest was the highest recorded in Juneau but below average in Ketchikan.

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

INTRODUCTION

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

Data on sport harvests of fish species in Southeast Alaska have been collected by both postal surveys and 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. 1996). This statewide survey has been an economical means of comprehensively monitoring often remote sport fisheries, and SWHS estimates are used for official regional and statewide sport harvests. The SWHS estimates, however, cannot be used directly for inseason management because estimates for a given year are not available until the following summer.

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

Expansion of the onsite creel survey program in Southeast Alaska was necessary beginning in 1992 to monitor sport harvests of chinook salmon on an inseason basis. The Alaska Board of Fisheries allocated the Pacific Salmon Treaty catch quota for chinook salmon in Southeast Alaska between the sport and commercial fisheries in March of 1992. They also passed a chinook salmon management plan for the sport fishery in Southeast Alaska which required inseason monitoring of the sport fishery to ensure the quota 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 1994, 95% of the total sport harvest of chinook salmon of Southeast Alaska occurred in the SWHS areas represented by these fisheries (Howe et al. 1995). 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 1996, because current estimates of total harvests will be revised when final SWHS estimates are completed.

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

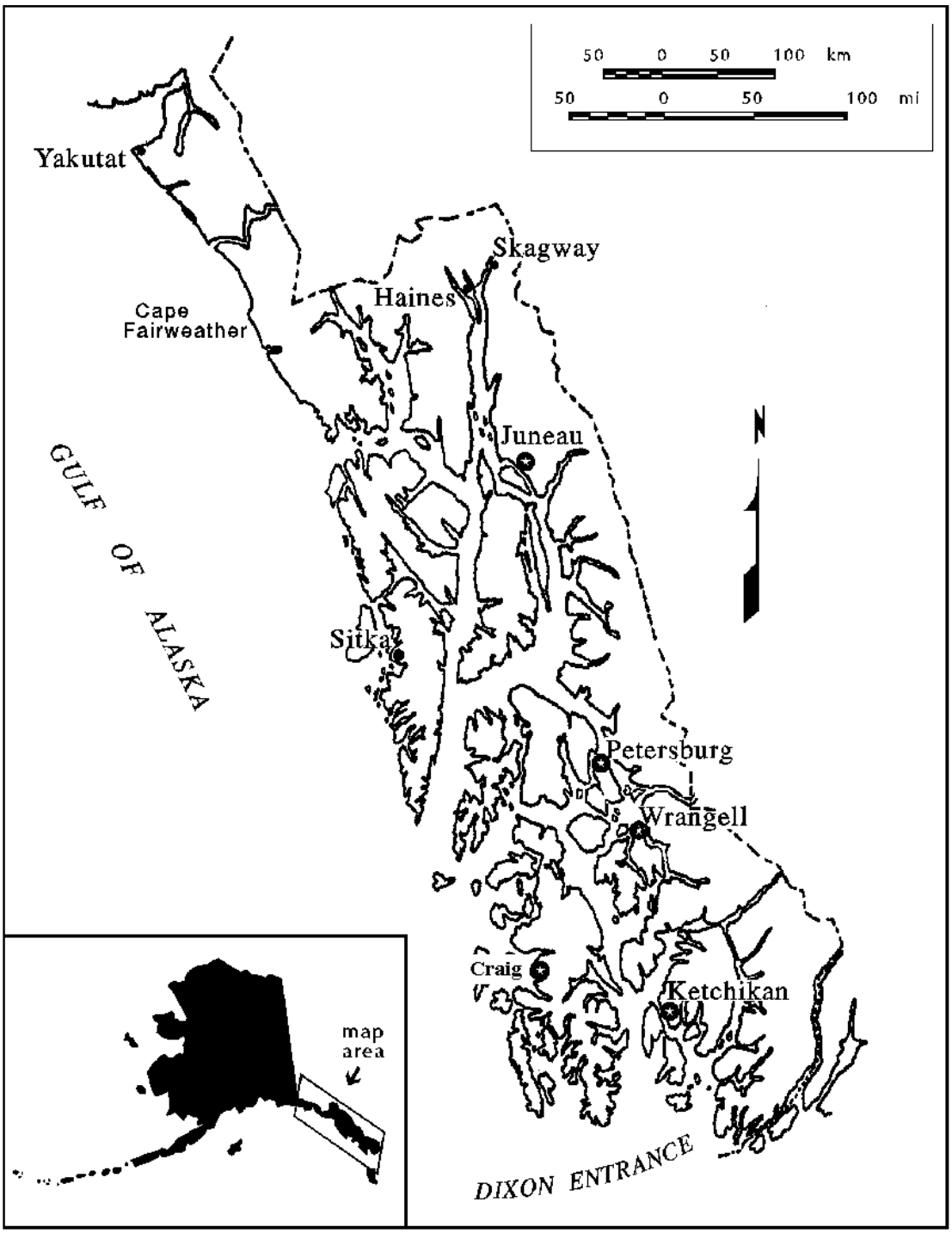


Figure 1.–Location of Juneau, Sitka, Petersburg, Wrangell, Ketchikan, and Craig in Southeast Alaska.

coho salmon management has become another high priority within the region. Harvest per unit effort (HPUE) data for coho salmon in marine boat recreational fisheries, along with HPUE data from commercial troll and net fisheries, are used to monitor the relative abundance and migratory patterns of coho salmon. Analyses of coded wire tag data from coho salmon harvested in these

sport fisheries are used for determinations of stock composition.

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

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

This report presents the findings of creel surveys of marine boat sport fisheries conducted in 1996 by the Division of Sport Fish of the Alaska Department of Fish and Game (ADF&G) in the Ketchikan, Juneau, and Sitka areas. Results from creel surveys in the Haines area and other sport fisheries in Southeast Alaska are presented in other ADF&G Fishery Data Series reports (e.g., Beers 1996, Ericksen 1996).

REGULATIONS

Sport fishing regulations for chinook salmon in marine waters during 1996 were identical to those described in Suchanek and Bingham (1992) until 15 June when an emergency order (E.O. #1-16-96) reduced the Southeast Alaska bag and possession limit for chinook salmon in all marine waters to one chinook salmon >28" and prohibited vessel operators and crew members from retaining king salmon while clients were on board. This E.O. was in effect from 15 June through 31 December 1996.

The following terminal areas (i.e., areas near hatcheries or hatchery release sites) where two chinook salmon >28" and two chinook salmon ≤28" could be taken were also opened by emergency order as follows:

- Emergency order (E.O.#1-14-96) increased the king salmon bag and possession limits in a terminal fishery area adjacent to Ketchikan to harvest surplus hatchery-produced king salmon. This emergency order was in effect from 15 June through 31 July 1996.
- Emergency order (E.O. #1-6-96) to harvest surplus hatchery-produced king salmon increased the bag and possession limits in Wrangell Narrows near Petersburg from 1 June through 31 July.
- Emergency order (E.O. #1-10-96) to harvest surplus hatchery-produced king salmon increased the bag an possession limits in Eastern Passage and selected fresh water drainages on Wrangell Island from 15 June through 31 August.
- Emergency order (E.O. #1-12-96) to harvest surplus hatchery-produced king salmon increased the bag and possession limits in a terminal area around Juneau from 15 June through 31 August.

Also an emergency order (E.O. #1-23-96) to harvest stray surplus hatchery-produced king salmon provided for a daily bag and possession limit of ten king salmon 16 inches in length and five king salmon 16 inches in length in specific areas of Sawmill Creek and Salmon Lake Creek near Sitka from 20 July through 31 December.

General bag limits for salmon species other than chinook salmon remained at six fish per day, 12 in possession for fish 16 inches (41 cm) in length, and the Herring Bay Special Harvest Area near Ketchikan was opened by emergency order (E. O. #1-26-96) from 29 October through 31 December to allow for harvest of hatchery coho salmon.

The Pacific halibut bag limit also remained at two fish per day, four in possession. The bag and possession limit for lingcod *Ophiodon elongatus* was two per day, four in possession during the open season from 1 May through 30 November. Anglers were limited to five pelagic rockfish (*Sebastes* spp.) per day, 10 in possession, and five

non-pelagic rockfish, 10 in possession; only two fish per day (four in possession) of which could be yelloweye rockfish *Sebastes ruberrimus*. Areas adjacent to Ketchikan and Sitka were further restricted to a non-pelagic rockfish bag and possession limit of three fish per day, only one of which could be a yelloweye rockfish.

The sport, personal use, and subsistence regulations for the harvest of crab in Southeast Alaska have been summarized by Suchanek and Bingham (1989 and 1990). A daily bag and possession limit of 3 king crab *Paralithodes* species was in effect for the Juneau area in 1996 until 30 August when the personal use red king crab fishery was closed in Section 11-A through 30 September (E.O. #1-C-26-96).

OBJECTIVES

The primary goals of the 1996 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 Alaskan 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 the total sport harvest of chinook salmon landed in the following marine boat sport fisheries during the noted time periods in 1996:
   - Ketchikan from 6 May to 6 October
   - Sitka from 22 April to 22 September
   - Juneau from 22 April to 22 September

   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 of the fisheries noted above, such that the estimated contribution in relative terms for each individual fishery[1] was within ±25 percentage points of the true value 90% of the time;
3. estimate the relative contribution of Alaska hatchery chinook salmon by coded wire tag lot to the following marine boat sport fisheries during the noted time periods:
   - Wrangell from 1 May to 14 July
   - Petersburg from 1 May to 14 July
   - Craig from 1 May to 8 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 fisheries in Ketchikan, Sitka, and Juneau, such that the contribution estimate in relative terms for each individual fishery was within ±25 percentage points of the true value 90% of the time; and
5. estimate the relative contribution of Alaska hatchery coho salmon by coded wire tag lot to the fishery in Craig, 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 also a number of additional tasks which addressed secondary data needs. To fulfill these data needs, additional tasks in 1996 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,

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

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 shrimp landed by the Ketchikan marine boat fishery.
4. estimating age composition and mean length-at-age of chinook salmon harvested in the Juneau and Ketchikan marine boat sport fisheries during the periods surveyed.
5. estimating average weights of Pacific halibut harvested in the Juneau, Sitka, and Ketchikan marine boat sport fisheries during the periods surveyed.

METHODS

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

ONSITE CREEL SURVEY ANGLER EFFORT, CATCH, AND HARVEST ESTIMATES

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

Two general sampling designs were used within each stratum. For the Ketchikan and Juneau surveys a three-stage sample survey was conducted. Within any stratum for these two surveys, days to sample represented the first sampling stage, and were selected at random without replacement (WOR). The various access locations at which marine boat sport anglers land their harvested fish represented the second sampling stage. As such within any selected day within each stratum at least two harbors were selected at random WOR for surveying. During each sampled day, a creel technician attempted to interview all exiting boat-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. 1994, 1995, and 1996). The survey at Sitka represented a slight restructuring compared to the survey conducted at this location in 1994, but was the same as the survey in 1995 and 1996. In Sitka access locations were not used as a level of stratification and the "type of day" stratum and the definition of sampling day were modified. The reasons for continuing to use the restructured survey in Sitka were primarily directed at obtaining unbiased estimates of angler effort,

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

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, Pacific halibut, or rockfish), and number of fish kept and/or released by species. Crab effort (boat-days fished and number of pots or rings fished) and harvest was recorded in all areas sampled except Sitka. In Ketchikan numbers of shrimp harvested were also recorded in multiples of 10. All data recording procedures were outlined in detail in site-specific Creel Technician Manuals, and computer data files and analysis programs are listed in Appendix C1.

Estimates of harvested chinook salmon at each of the three surveyed marine boat sport fisheries were calculated according to standard direct expansion equations for stratified multistage sampling designs. Mean harvest of boat-parties interviewed during a sample were expanded by the number of boat-parties counted exiting the fishery during each sample to obtain the estimates for each sample. Means across sample periods were similarly expanded by the number of periods within a sampling day to obtain the estimates at a sampled access location for the four-stage surveys. Means across days within a sampled location were then expanded by the number of possible days to obtain the location estimate of catch, effort, or harvest for the four-stage surveys. Finally, across location means were expanded by the number of access locations in a stratum to obtain the stratum estimates. Across stratum estimates of harvest were obtained by summation across strata. Estimates were obtained similarly for the three-stage designs, with the appropriate reordering of calculations. Specific calculation procedures for the point estimates and their variances are described in detail in Appendices A1 and A2.

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

BIWEEKLY ESTIMATES OF COHO SALMON HARVEST PER UNIT EFFORT

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

$$\text{hpue}_k = qN + \varepsilon_k \qquad (1)$$

where hpue_k is the harvest per unit of effort during the kth angler-trip, N is abundance of the 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). Harvest per unit effort (HPUE) in terms of coho salmon harvested per angler-hour of effort was estimated for each biweek using the procedures outlined in Appendix A3.

HATCHERY CONTRIBUTION ESTIMATES

Creel technicians attempted to inspect each harvested chinook and coho salmon for a missing adipose fin indicating the probable presence of an internal coded wire tag (CWT). Catches of chinook salmon and coho salmon checked for clipped adipose fins were recorded as "sampled," while catches not checked were recorded as "not sampled." The number of chinook and coho salmon inspected for a clipped adipose fin was 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 Commercial Fisheries Manage-ment and Development (CFMDD) Division coded wire tag laboratory for eventual dissection, tag removal, and decoding.

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

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

ADDITIONAL CODED WIRE TAG SAMPLING

Technicians sampled catches of chinook and coho salmon for the presence of a clipped adipose fin from boat parties returning to Wrangell and Petersburg harbors from 1 May through 14 July, and to Craig harbors from 1 May through 8 September. Some additional sampling for adipose clipped fish was also conducted in Ketchikan from 15 July to 6 October and in Juneau from 22 August through 22 September. The specific equations for estimating the relative contributions of hatchery stocks are detailed in Appendix A4.

AGE, LENGTH, AND WEIGHT ESTIMATES

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

As time permitted, chinook salmon harvested by anglers surveyed in the sampled marine boat sport fisheries were sampled for scales for age determination. Three scales were taken from the preferred area (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 designed by Van Allen and McPherson (ADF&G Commercial Fisheries, Douglas, Alaska, personal communi-cation). Lengths in millimeters (tip of snout to fork of tail) of these chinook salmon were also recorded.

For the estimation of age composition of the harvest and for the estimation of mean length-at-age, all data collected from harvested chinook salmon within each of these fisheries were treated as one sample (i.e., ignoring internal stratification and sampling stages). Age composition estimates were calculated from the sample data using procedures outlined in Cochran (1977). Estimates of mean length by age group of chinook salmon sampled from the harvest were calculated following the 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 in the sampled fisheries were sampled for length. Total lengths in millimeters from Pacific halibut sampled were also recorded. Procedures as outlined by Quinn, et al. (1983), were used to convert the harvest and the mean length estimates to an estimate of the round weight of Pacific halibut harvested.

ASSUMPTIONS

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

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

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

3. the relative contribution of different stocks of salmon associated with a CWT release lot to the harvest did not vary appreciably within a biweekly period.

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

4. length-at-age and age composition did not vary substantially within the sampling season.

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 791,871 (SE = 26,440) angler-hours of effort were expended in the three marine boat sport fisheries during the time periods sampled (Table 1). Seventy-four percent of the total effort in angler-hours was targeted on salmon in Ketchikan, 81% in Juneau, and 75% in Sitka. Bottomfish (primarily Pacific halibut) were the other major target of anglers. Major salmon derbies in Ketchikan, Juneau, and Sitka increased the amount of effort targeted on salmon, as 5%, 18%, and 16% of the total salmon fishing effort, respectively, occurred during these short time periods.

CHINOOK SALMON FISHERIES

An estimated 21,473 chinook salmon (SE = 955) were harvested in the three surveyed marine boat sport fisheries (Table 2). Relative precision of the estimated chinook harvests were within our goal of ± 20% of the true value 90% of the time at all locations. About 47% (10,078) of the monitored harvest of chinook salmon were taken in the Sitka fishery, the Juneau fishery accounted for an additional 39% of the harvest, and 14% were taken in the Ketchikan fishery. Most of the chinook salmon harvested were at least 28 inches in length, but an estimated 412 small (<28 inches) chinook salmon were also harvested.

Harvest of chinook salmon in the Ketchikan King Salmon Derby comprised 21% of the total chinook salmon harvested in the Ketchikan marine fishery. Nine percent of the harvest of chinook salmon in the Juneau marine boat sport fishery was taken during the Juneau Golden North Salmon Derby, while 18% of the total salmon fishing effort was expended during this event (Table 1). A total of 932 chinook salmon were entered in the Ketchikan and Juneau derbies from a harvest of 1,406 fish during the derby time periods (Table 2). A total of 465 chinook salmon were entered in the Sitka Salmon Derby from a total harvest of 1,246 chinook salmon during the derby time period. A total of 264 chinook salmon were entered in the Petersburg Salmon Derby.

About 20% of the estimated harvest of chinook salmon in the Ketchikan boat fishery were sampled for coded wire tags (Appendix B10). In the Juneau boat fishery, 19% of the estimated harvest of chinook salmon were sampled, and 17% in Sitka.

An estimated 24% of the chinook salmon harvested in the marine boat fisheries were of Alaska hatchery origin (Table 3). Contribution estimates of Alaska hatchery chinook salmon were within ±25 percentage points of the true value 90% of the time at all locations (Table 3). Absolute precision of the Alaska hatchery contribution estimates at all sites ranged from 7% to 19%. Additional hatchery fish originated in Oregon, Washington, and British Columbia, and, in aggregate, 32% of chinook salmon harvested in boat fisheries originated in hatcheries.

Seventeen percent of the harvest of chinook salmon in Sitka came from Alaska hatcheries, and the overall hatchery contribution was 29% of the harvest. Most Alaska hatchery chinook salmon harvested in Sitka were produced at the Medvejie hatchery. This year in Ketchikan 39% of the

Table 1.–Summary of estimated total and derby angler effort by target for the Ketchikan, Sitka, and Juneau marine boat sport fisheries during 1996.

	TOTAL EFFORT BY TARGET AND TIME PERIOD			
	Ketchikan 5/06-10/06	Juneau 4/22-9/22	Sitka 4/22-9/22	Total
Boat-hours	96,189	138,856	62,320	297,365
SE	5,483	7,411	2,718	9,611
Salmon-hours	188,947	287,481	136,585	613,013
SE	12,080	17,486	6,854	22,331
Bottomfish-hours[a]	62,673	67,555	45,075	175,303
SE	4,548	5,328	2,989	7,616
Angler-hours[b]	253,977	355,381	182,513	791,871
SE	14,400	20,480	8,502	26,440
% salmon-hours[c]	74%	81%	75%	77%

	DERBY EFFORT BY TARGET AND TIME PERIOD			
	Ketchikan 5/25-26,6/01, 6/08,6/15,6/22-23	Juneau 8/16-18	Sitka 5/25-27, 6/01-02	Total
Boat-hours	12,626	18,845	9,047	40,518
SE	2,080	3,829	977	4,131
Salmon-hours	9,005	51,785	22,071	82,861
SE	3,874	11,628	2,356	12,074
Bottomfish-hours	5,640	1,612	1,375	8,627
SE	1,133	374	303	840
Angler-hours	29,352	53,397	23,429	106,178
SE	4,293	11,859	2,348	12,344
% of total salmon fishery[d]	5%	18%	16%	14%

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

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

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

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

harvest of chinook salmon were from Alaska hatcheries, and the overall hatchery contribution to the Ketchikan fishery totaled 54%. Most Alaska hatchery chinook salmon taken in Ketchikan originated from Whitman Lake and Carroll Inlet (release site only) hatcheries operated by the Southern Southeast Regional Aquaculture Association. About 28% of the chinook salmon harvest in the Juneau boat fishery was of Alaska hatchery origin. Most Alaska hatchery fish taken in Juneau came from the Gastineau, Snettisham, Crystal Lake, Little Port Walter, and Hidden Falls hatcheries. Detailed hatchery contribution estimates by tag code appear in appendices for the Ketchikan fishery (Appendix B11), Juneau fishery (Appendix B12), and Sitka fishery (Appendix B13).

A total of 354 chinook salmon (Appendix B10) was examined for clipped adipose fins at the Petersburg marine boat sport fishery, and about 28% of the sampled fish came from hatcheries (Appendix B14). In addition to the recoveries of hatchery origin fish, one wild coded wire tagged chinook salmon was recovered from the Petersburg fishery (Appendix B14). Relative contribution of this wild stock could not be estimated as the tagging fraction was unknown. The largest contributor to the Petersburg harvest was the Crystal Lake hatchery. A total of 213 chinook salmon were examined for clipped adipose fins at the Wrangell marine boat sport fishery, and about 38% of the sampled fish came from hatcheries (Appendix B15). The largest

Table 2.–Summary of estimated harvests of chinook salmon in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed during 1996.

CHINOOK SALMON HARVESTS						
Sport fishery	Time period	Harvest of chinook ≥ 28"	Harvest of chinook < 28"	Combined	SE	Relative precision
Ketchikan	5/06–10/06	2,575	356	2,931	274	15%
Juneau	4/22–9/22	8,417	47	8,464	517	10%
Sitka	4/22–9/22	10,069	9	10,078	755	12%
Total		21,061	412	21,473	955	7%

DERBY CHINOOK SALMON HARVESTS								
		Chinook ≥ 28"		**Chinook < 28"**		**Total harvested**		
Major salmon derbies	Time period	Entered	Total[a]	Entered	Total[a]	Number	SE	%[b]
Ketchikan King Salmon Derby	5/25–26, 6/01, 6/08, 6/15, 6/22–23	268	590	0	32	622	39	21
Juneau Golden North Salmon Derby	8/16–8/18	653	769	11	15	784	42	9
Sitka Salmon Derby	5/25–5/27 6/01–6/02	465	1,246	0	0	1,246	120	12
Petersburg Salmon Derby[c]	5/24–5/27	264		0				

[a] Includes entered and take-home harvests.

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

[c] Number taken home was not estimated.

contributors to the Wrangell harvest included the Crystal Lake/Earl West Cove and Neets Bay hatcheries. A total of 509 chinook salmon (Appendix B10) was examined for clipped adipose fins at the Craig marine boat sport fishery. Overall, 44% of the sample came from hatcheries, and while only 7% were from Alaska hatcheries, the Medvejie hatchery was the largest Alaskan contributor (Appendix B16).

A total of 1,282 chinook salmon was successfully aged from the sampled fisheries (Table 4 and Appendix B17). About 14% of the chinook salmon sampled lacked a freshwater annulus (age-0.), which usually indicates non-Alaskan origin (Van Alen 1988). Saltwater ages varied considerably; an estimated 99% of the chinook salmon harvested during the Juneau Golden North Salmon Derby were age-.3 or less, whereas only 5% of chinook salmon sampled in the Wrangell 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 among the fisheries surveyed (Appendix B18).

COHO SALMON FISHERIES

Harvests of coho salmon in the surveyed fisheries totaled an estimated 90,017 fish (SE = 5,289) (Table 5). The only monitored derby in which coho salmon were heavily targeted was the Juneau Golden North Salmon Derby, and an estimated 4,505 coho salmon (SE = 327) were taken during this event (Appendix B2).

Harvests of hatchery coho salmon were estimated from an overall sample of 17% of the coho salmon harvest (Appendix B19). Estimates of coho salmon hatchery contributions by tag code

Table 3.–Contributions of hatchery chinook salmon to the Ketchikan, Sitka, and Juneau marine boat sport fisheries of Southeast Alaska, 1996.

Region or hatchery	Marine boat sport fishery: Juneau (4/22–9/22)	Ketchikan (5/06–10/06)	Sitka (4/22-9/22)	Total
Oregon	17	0	88	105
Washington	0	0	302	302
British Columbia	53	445	846	1,344
Non-Alaskan total	70	445	1,236	1,751
SE	56	382	445	589
Alaska				
Burro Creek	4	0	0	4
Carroll Inlet	11	813	0	824
Crystal Lake	278	0	0	278
Crystal Lake/Earl West Cove	9	0	0	9
Deer Mountain	0	86	0	86
Gastineau	976	0	0	976
Hidden Falls	151	0	0	151
Jerry Myers	1	0	0	1
Little Port Walter	169	0	17	186
Medvejie	0	0	1,574	1,574
Neets Bay	4	0	0	4
Port Armstrong	47	0	0	47
Sheldon Jackson	0	0	108	108
Snettisham	703	0	0	703
Whitman Lake	7	232	31	270
Alaskan total	2,360	1,131	1,730	5,221
SE	351	337	488	689
Absolute precision[a] ($\alpha = 0.10$)	577	554	803	1,133
% absolute precision[b]	7	19	8	5
Total all areas	2,430	1,576	2,966	6,972
SE	358	512	675	920
Absolute precision ($\alpha = 0.10$)	589	842	1,110	1,513
% absolute precision	7	29	11	7
Chinook salmon harvest	8,464	2,931	10,078	21,473
SE	517	274	755	955
% Alaska hatchery	28	39	17	24
% total hatchery	29	54	29	32

[a] SE * 1.645.
[b] (Absolute precision / total harvest) * 100.

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 25,341 (SE = 3,461) hatchery coho salmon were taken in all sampled fisheries combined (Table 6). Wild stocks of coho salmon dominated the harvest in all areas, but hatchery contributions ranged from 17% in Juneau to 18% in Sitka and 40% in Ketchikan. A few hatchery coho salmon taken in Sitka and Ketchikan originated in British Columbia hatcheries. The Neets Bay hatchery contributed the most coho salmon to the Ketchikan fishery, while Gastineau hatchery owned by Douglas Island Pink and Chum, Inc. contributed the most coho salmon to the Juneau fishery, and Hidden Falls hatchery was the major contributor in Sitka. Additionally, some recoveries of coho salmon from wild stocks were obtained in the Ketchikan, Juneau, and Sitka fisheries (Appendix B23). Tagging fractions are currently unknown, so total contributions of these wild-tagged stocks were not estimated.

Table 4.–Summary of the age composition of chinook salmon sampled in selected marine sport fisheries in Southeast Alaska during 1996.

	FRESHWATER AGE COMPOSITION				
	----------Age 0.----------		**--------Age 1. or more--------**		
Sport fishery	Sample size	Percent	Sample size	Percent	Total sampled
Ketchikan	27	28	68	72	95
Juneau non-derby	2	1	338	99	340
Juneau Derby[a]	7	4	174	96	181
Sitka	95	23	321	77	416
Petersburg	1	1	78	99	79
Wrangell	4	5	75	95	79
Craig	47	51	45	49	92
Total	183	14	1,099	86	1,282

	SALTWATER AGE COMPOSITION				
	---------Age .3 or less---------		**--------Age .4 or more--------**		
Sport fishery	Sample size	Percent	Sample size	Percent	Total sampled
Ketchikan	65	68	30	32	95
Juneau non-derby	275	81	65	19	340
Juneau Derby[a]	179	99	2	1	181
Sitka	255	61	161	39	416
Petersburg	37	47	42	53	79
Wrangell	4	5	75	95	79
Craig	55	60	37	40	92
Total	870	68	412	32	1,282

[a] Juneau Golden North Salmon Derby.

Table 5.–Summary of estimated catch and harvest of coho salmon in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed during 1996.

		HARVEST							
		Wild		Hatchery		Total		Total catch	
Sport fishery	Time period	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Ketchikan	5/06–10/6	25,379	3,483	16,841	2,900	42,220	4,532	44,263	4,657
Juneau	4/22–9/22	15,540	1,354	3,276	941	18,816	1,649	19,362	1,648
Sitka	4/22–9/22	23,757	1,428	5,224	1,637	28,981	2,172	31,450	2,460
TOTAL		69,734	4,000	25,341	3,461	90,017	5,289	95,075	5,518

Table 6.–Contributions of hatchery coho salmon to the Ketchikan, Sitka, and Juneau marine boat sport fisheries of Southeast Alaska, 1996.

Region or hatchery	Marine boat sport fishery: Juneau (4/22–9/22)	Ketchikan (5/06–10/06)	Sitka (4/22–9/22)	Total
British Columbia	0	18	39	57
Non-Alaskan total	0	18	39	57
SE	0	13	28	30
Alaska				
Crystal Lake	0	0	12	12
Deer Mountain	0	2,641	26	2,667
Gastineau	2,141	0	0	2,141
Hidden Falls	314	0	2,483	2,797
Medvejie	0	0	897	897
Medvejie CIF	816	0	0	816
Nakat Inlet	0	208	0	208
Neets Bay	0	10,441	587	11,028
Port Armstrong	0	0	235	235
Sheep Creek	5	0	0	5
Sheldon Jackson	0	0	76	76
Tamgas Creek	0	2,362	869	3,231
Whitman Lake	0	1,171	0	1,171
Alaskan total	3,276	16,823	5,185	25,284
SE	941	2,899	1,636	3,460
Absolute precision[a] ($\alpha = 0.10$)	1,548	4,769	2,691	5,692
% absolute precision[b]	8	11	9	7
Total all areas	3,276	16,841	5,224	25,341
SE	941	2,900	1,637	3,461
Absolute precision ($\alpha = 0.10$)	1,548	4,771	2,693	5,693
% absolute precision	8	11	9	6
Coho salmon harvest	18,816	42,220	28,981	90,017
SE	1,649	4,532	2,172	5,289
% Alaska hatchery	17	40	18	28
% total hatchery	17	40	18	28

[a] SE * 1.645.
[b] (Absolute precision / total harvest) * 100.

From the Craig marine boat sport fishery, 4,541 coho salmon were examined for clipped adipose fins, and tag codes recovered, and the relative contributions to the fishery are presented in Appendix B24. About 14% of the coho salmon harvested in Craig were from hatcheries, with Klawock River, Neets Bay, and Tamgas Creek hatcheries contributing the largest numbers of coho salmon. No coho salmon were sampled in Petersburg or Wrangell this year.

The HPUEs for coho salmon in the Ketchikan, Juneau, and Sitka fisheries reached highs of 0.532 (SE = 0.023), 0.138 (SE = 0.012), and 0.421 (SE = 0.044) coho salmon, respectively, per angler-hour of effort (Table 7). The peak in HPUE for coho salmon occurred in late August for Juneau and Sitka, and inearly September for Ketchikan. Ketchikan anglers experienced higher HPUEs for coho salmon than did Juneau and Sitka anglers for the peak of the season.

BOTTOMFISH FISHERIES

Most bottomfish effort in Southeast Alaska targets on Pacific halibut, and an estimated 34,350 (SE = 1,772) were harvested in Ketchikan, Sitka, and Juneau (Table 8). Estimated average round

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 1996.

HARVEST OF COHO SALMON PER ANGLER-HOUR OF EFFORT[a]						
	Ketchikan		Juneau		Sitka	
Seasonal period	HPUE	SE	HPUE	SE	HPUE	SE
5/20–6/02	0.001	0.001	0.000	0.000	0.001	0.000
6/03–6/16	0.005	0.002	0.002	0.001	0.019	0.008
6/17–6/30	0.027	0.005	0.004	0.001	0.038	0.006
7/01–7/14	0.163	0.015	0.017	0.002	0.054	0.011
7/15–7/28	0.225	0.043	0.038	0.004	0.238	0.024
7/29–8/11	0.133	0.022	0.094	0.009	0.364	0.031
8/12–8/25	0.238	0.029	0.138	0.012	0.421	0.044
8/26–9/08	0.532	0.023	0.135	0.069	0.316	0.041
9/09–9/22	0.308	0.026	0.137	0.021	0.170	0.077
9/23–10/6	0.040	0.013				
All periods	0.217	0.008	0.047	0.002	0.137	0.007

[a] Does not include derby effort or harvest.

weight of Pacific halibut ranged from 22.7 pounds in Craig to 39.4 pounds in the Petersburg and Wrangell areas (Table 9). About 992,700 pounds of Pacific halibut were taken in Ketchikan, Sitka, and Juneau, with about 46% of this harvest landed in Sitka.

Although rockfish are not a primary target of most Southeast Alaska marine boat sport anglers, an estimated 36,069 (SE = 1,879) rockfish were caught in the marine boat sport fisheries surveyed (Table 8). Only 13,020 (SE = 836) of the rockfish caught were retained (36%). Ketchikan anglers

Table 8.–Summary of estimated catch and harvest of Pacific halibut, rockfish, and lingcod in the Ketchikan, Sitka, and Juneau marine boat sport fisheries during 1996.

Sport fishery	Time period	Total catch	SE	Harvest	SE
Pacific halibut					
Ketchikan	5/06-10/06	15,229	1,619	11,177	1,069
Juneau	4/22-9/22	14,341	1,486	11,158	1,053
Sitka	4/22-9/22	17,874	1,528	12,015	943
Total halibut		47,444	2,677	34,350	1,772
Rockfish					
Ketchikan	5/06-10/06	12,893	1,043	5,492	576
Juneau	4/22-9/22	805	141	774	140
Sitka	4/22-9/22	22,371	1,557	6,754	590
Total rockfish		36,069	1,879	13,020	836
Lingcod					
Ketchikan	5/06-10/06	965	157	783	149
Juneau	4/22-9/22	11	10	11	10
Sitka	4/22-9/22	5,320	499	4,377	419
Total lingcod		6,296	523	5,171	445

Table 9.–Average length, round weight, and total round weight of Pacific halibut harvested in sampled Southeast Alaska marine boat sport fisheries during 1996.

Sport fishery	Survey period	Sample size	Total length Mean (cm)	Total length SE (cm)	Average round weight (lb)	Estimated number harvested	Estimated total round weight (thousand lb.)
Ketchikan	5/06–10/06	188	93.0	1.6	27.2	11,177	304.0
Juneau	4/22–9/22	300	90.9	1.5	27.0	11,158	301.3
Sitka	4/22–9/22	118	101.7	2.6	38.4	12,015	461.4
Petersburg/ Wrangell	5/01–7/14	158	104.9	2.0	39.4		
Craig	5/01–9/08	312	88.3	2.3	22.7		
All areas combined		1,076	93.8	0.7	28.9	34,350	1,066.7

retained an estimated 43% (5,492) of the 12,893 rockfish caught. Sitka anglers retained an estimated 30% (6,754) of the 22,371 rockfish caught. Retention in Juneau, where few were caught, was 96%.

Major species composition of the rockfish harvest was estimated for the Ketchikan and Sitka fisheries (Table 10). Quillback rockfish *S. maliger* (36%) and yelloweye rockfish (34%) were most frequently taken in Ketchikan. Yelloweye rockfish were most frequently taken in Sitka, constituting 54%, and black rockfish *S. melanops* composed an additional 28% of the Sitka rockfish harvest. Other species in the sport harvest included copper *S. caurinus*, dusky *S. ciliatus*, and silvergrey *S. brevispinis* rockfish along with a variety of other unidentified species. Lingcod was another bottomfish species frequently harvested in the Sitka (4,377) and Ketchikan (783) fisheries (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 taken in large numbers in Ketchikan, and the estimated harvest totaled 43,156 (SE = 5,559). Only 3,029 (SE = 435) pink salmon were harvested in Juneau, and the retention rate was 55%, in comparison to the 57% observed in Ketchikan. Harvests of both chum and sockeye salmon were much less, totaling 11,686 chum salmon and 884 sockeye salmon for the three fisheries combined. About 92% of the 645 Dolly Varden harvested were taken by Juneau anglers.

Shellfish Fisheries

Shellfish effort and harvests of Dungeness, Tanner, and king crab were estimated for Ketchikan and Juneau (Table 12). Shellfish effort in boat-days for the Juneau fishery was 5,036 boat-days—four times that estimated for the Ketchikan fishery (1,255 boat-days). Since some

Table 10.–Rockfish composition in the Ketchikan and Sitka marine boat sport fisheries during 1996. An estimated 774 rockfish were harvested in the Juneau marine boat sport fishery, but individual species were not identified. The unidentified rockfish harvest was allocated to species by expanding the appropriate percentage of harvest in the identified harvest to the total harvest.

	Ketchikan		Sitka	
Rockfish species	Harvest	%	Harvest	%
Quillback	1,994	36.3	537	8.0
Dusky	335	6.1	118	1.7
Copper	197	3.6	22	0.3
Black	158	2.9	1,910	28.3
Yelloweye	1,839	33.5	3,623	53.6
Silvergrey	188	3.4	167	2.5
Other non-pelagic	350	6.4	92	1.4
Other pelagic	432	7.8	285	4.2
Total	5,492		6,754	

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 sampled during 1996.

Sport fishery	Time period	Pink salmon		Chum salmon		Sockeye salmon		Dolly Varden	
		Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
Ketchikan	5/06–10/06	75,811	43,156	3,214	2,624	252	252	0	0
Juneau	4/22–9/22	5,469	3,029	4,037	2,898	60	60	869	592
Sitka	4/22–9/22	18,576	7,961	8,666	6,164	638	572	88	53
Total		99,856	54,146	15,917	11,686	950	884	957	645

effort was expended by divers, effort in boat-days is more comparable from fishery to fishery than effort in number of pots or rings fished.

Substantial numbers of Dungeness, Tanner and king crabs were harvested in the Juneau fishery, but no king crab or Tanner crab were taken in the Ketchikan area. Shrimp harvest was recorded only in Ketchikan (76,840 shrimp, SE = 10,641).

DISCUSSION

Onsite creel surveys provide data necessary for inseason management, and they also can provide detailed fishery performance and biological information difficult to obtain with postal surveys. For inseason management, the usefulness of onsite surveys lies in their consistency of method and coverage, so that inseason estimates can be compared with Statewide Harvest Survey (SWHS) and onsite creel estimates from previous years.

Effort, harvest and total catch estimates from the three creel surveys reported here should not be considered to be representative of the total Southeast Alaska marine boat sport fisheries. This number is best estimated by the SWHS (Howe et al. 1996).

The estimates for chinook salmon in the Juneau and Ketchikan fisheries are incomplete because there were no surveys of: (1) harvests occurring outside of the survey periods; (2) private moorages on the road system or remote moorages, docks, or lodges inaccessible from the road system; (3) the night period from the end of civil twilight to the beginning of surveys at about 0800; and (4) boat parties which are not counted or interviewed due to being missed by creel samplers. 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.

Table 12.–Estimated effort for, and harvest of Dungeness crab, king crab, Tanner crab and shrimp in the Ketchikan and Juneau marine boat sport fisheries during 1996.

Sport fishery	Time period	Effort		Harvest			
		Boat-days	SE	Dungeness crab	Tanner crab	King crab	Shrimp
Ketchikan	5/06–10/06	1,255	145	5,528	0	0	76,840
Juneau	4/22–9/22	5,036	348	15,605	2,134	4,826	__ [a]
Total		6,291	377	21,133	2,134	4,826	76,840

[a] Shrimp harvest not estimated in Juneau.

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

Juneau and Ketchikan marine boat fisheries have been consistently surveyed from approximately mid-April or early May through late September or, occasionally, early October. Among-year comparisons of angler effort and harvest for a given fishery are confounded by some variation in the time periods surveyed from year to year. Effort and harvest at either the beginning or the end of the survey season is small, however, in comparison to effort during the middle of the season. Among-year comparisons are generally valid, but the variations in survey periods should be noted. Variances for the harvest estimates have only been generated since 1987, so it is not possible to do statistical comparisons with prior years. In the following discussion, it should be noted that in some instances, it might not be possible to show a statistically significant difference between years.

Angler Effort

Angler-hours of fishing effort in the Juneau and Ketchikan marine fisheries have been relatively stable or declining for the past few years while effort in the Sitka fishery has been generally increasing (Table 13; Figure 2). Total effort in the Juneau fishery during 1996 was 9% higher than in 1995, but 1% lower than the 1983–1995 average of 357,970 angler-hours. In Ketchikan, total 1996 effort was down 8% from estimated effort in 1995, and 2% below the 1984–1995 average of 258,868 angler-hours. Growth in the Sitka fishery has slowed; total effort during 1996 was 3% lower than in 1995, reversing a trend of at least three years of steady growth. In 1996, total effort in Ketchikan and Sitka was 71% and 51%, respectively, of that expended in Juneau.

In both the Juneau and Ketchikan fisheries, estimated salmon fishing effort was about average in 1996 (Table 13; Figure 2). Bottomfish effort was below average in both fisheries during 1996. In Juneau, 81% of the 1996 effort targeted salmon, while 74% of Ketchikan effort targeted salmon, both slightly above average. Most of the growth noted in the overall Sitka fishery has been due to growth in the salmon fishery, as bottomfishing effort has remained stable. Due to this growth, a record high (75%) of total effort in Sitka was directed toward salmon.

Chinook Salmon Fisheries

Total harvest of chinook salmon in the Juneau marine boat fishery has shown little trend over the past 10 years, while the Ketchikan harvest increased to a peak in 1991 and has since steadily declined to less than 25% of the 1991 peak (Table 14; Figure 3). The Juneau harvest of 8,464 chinook salmon was above average, but the Ketchikan harvest was 49% below the 1984–1995 average, and the second lowest harvest recorded. Chinook harvests in the Sitka fishery had been steadily increasing through 1995, but in 1996 they declined 37% from the 1995 peak The 1996 Sitka harvest of 10,078 was still more than triple that of the 1988 harvest of 3,177.

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 (Table 15; Figure 4).

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
	Average		278,905	78	78,598	22	357,970
	1996	4/22-9/22	287,481	81	67,555	19	355,381
	% of average		103		86		99
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
	Average		188,479	73	70,217	27	258,868
	1996	5/6-10/6	188,947	74	62,673	25	253,977
	% of average		100		89		98
Sitka	1987	4/20-9/13	33,130	56	24,266	41	58,814
	1988	4/11-9/25	35,763	65	18,493	34	54,766
	1989	4/24-7/02[a]	34,946	84	6,177	15	41,362
	1990	no survey					
	1991	no survey					
	1992	5/11-8/30	74,183	64	40,756	35	115,031
	1993	4/26-9/26	107,184	71	44,480	29	151,829
	1994	4/25-9/25	123,971	74	43,363	26	168,146
	1995	4/24-9/24	135,866	72	51,710	28	188,000
	Average		85,016	69	37,178	30	122,764
	1996	4/22-9/22	136,585	75	45,075	25	182,513
	% of average		161		121		149

[a] Not used to calculate average.

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

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

Year	Juneau marine[a]	Juneau Golden North Derby	Ketchikan marine	Sitka marine
1983	4,316	872		
1984	6,474	855	1,820	
1985	8,133	1,222		
1986	5,050	1,073	5,006	
1987	8,893	1,005	4,723	2,466
1988	5,683	677	5,245	3,177
1989[b]	7,074	609	5,752	3,501
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
Average	7,141	707	5,724	9,700
1996	8,464	784	2,931	10,078
% of average	119	111	51	104

[a] Includes Juneau Golden North Salmon Derby harvest.

[b] Not used to calculate Sitka average.

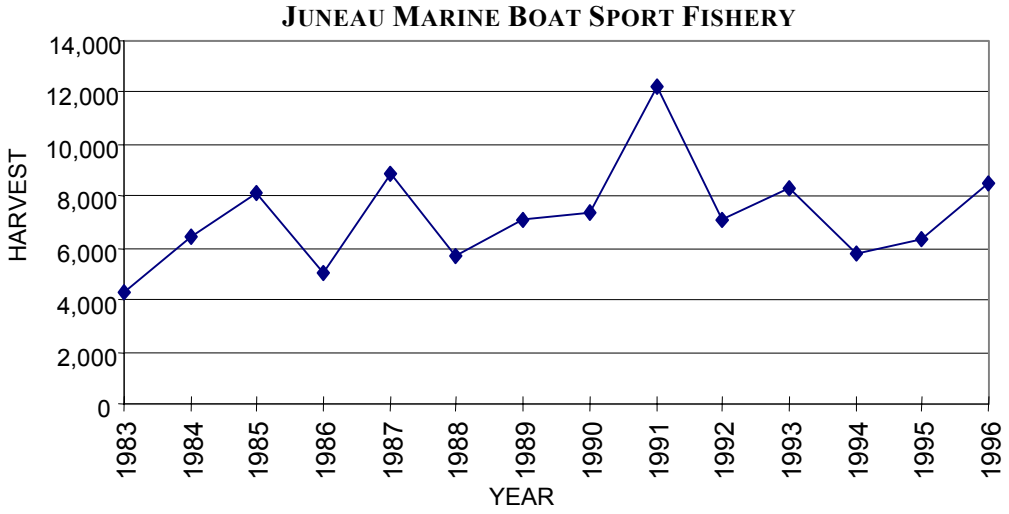
An estimated 29% of the 1996 chinook salmon harvest in Juneau originated in hatcheries, compared to the 1983–1995 average of 21%. In Ketchikan, an estimated 54% of the 1996 harvest originated in hatcheries, in comparison to the average of 47%. Harvests of Alaska hatchery chinook salmon are of higher value, because these fish do not count toward U.S./Canada Pacific Salmon Treaty catch totals. An estimated 39% of the 1996 chinook salmon harvest in Ketchikan originated in Alaskan hatcheries, a percentage substantially higher than in Juneau or Sitka. In Juneau, an estimated 28% of the 1996 harvest originated in Alaskan hatcheries, compared to the average of 17%.

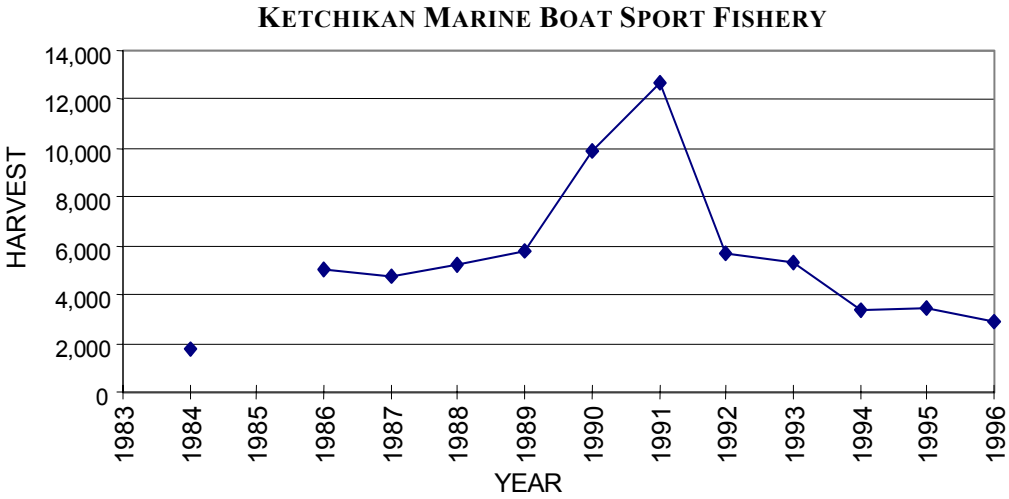
In Sitka, a higher proportion of chinook salmon originate in non-Alaska hatcheries than in Ketchikan or Juneau (Table 15 and Figure 4). The overall percentage of hatchery chinook declined in Sitka in 1996, due primarily to a large decline in the percentage of non-Alaskan hatchery chinook taken. In 1996, 29% of the Sitka harvest originated in hatcheries, with 17% coming from Alaska hatcheries. Both of these estimates represented large declines from the 1995 season.

COHO SALMON FISHERIES

The 1996 harvest of 42,220 coho salmon in the Ketchikan area was 90% above the 1984–1995 average of 22,227 (Table 16), and the Juneau area harvest of coho salmon (18,816 fish) was 7% below the 1983–1995 average of 20,279. The Juneau Golden North Salmon derby harvest of 4,505 coho salmon was 65% above the 1983–1995 average of 2,729. The Sitka area harvest of 28,981 coho salmon was more than triple the 6-year average (1987, 1988, 1992, 1993, 1994, and 1995), and was Sitka's highest recorded harvest.

Harvest of coho salmon in the Juneau, Ketchikan and Sitka areas continued to be supplemented by hatchery contributions (Table 17). The relative contribution (17% of total harvest) of hatchery coho salmon in Juneau was the highest ever recorded. The Ketchikan fishery has been much more dependent upon hatchery coho salmon than the Juneau fishery. About 32% of the 1984 to 1995 Ketchikan harvest originated in hatcheries (Table 17). In 1996, both the estimated harvest of 16,841 hatchery coho salmon and the hatchery contribution of 40% in Ketchikan were above





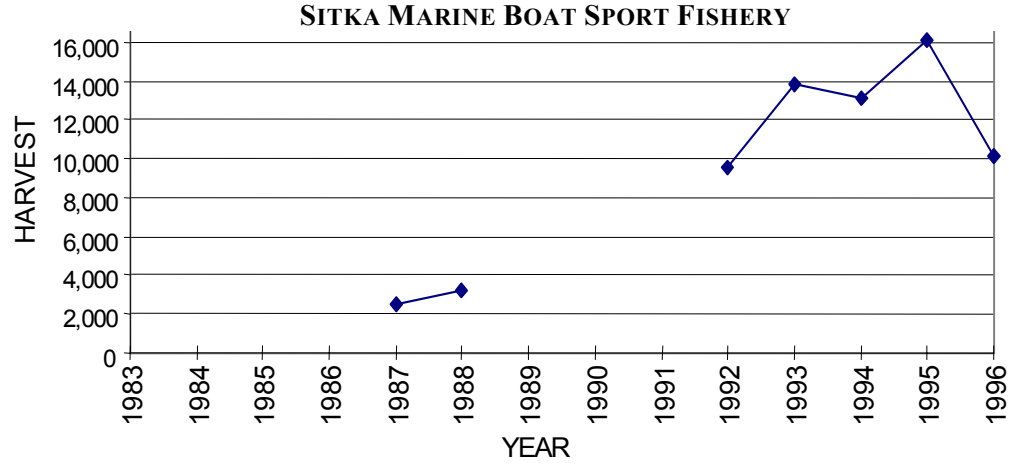


Figure 3.–Estimated harvest of chinook salmon in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys.

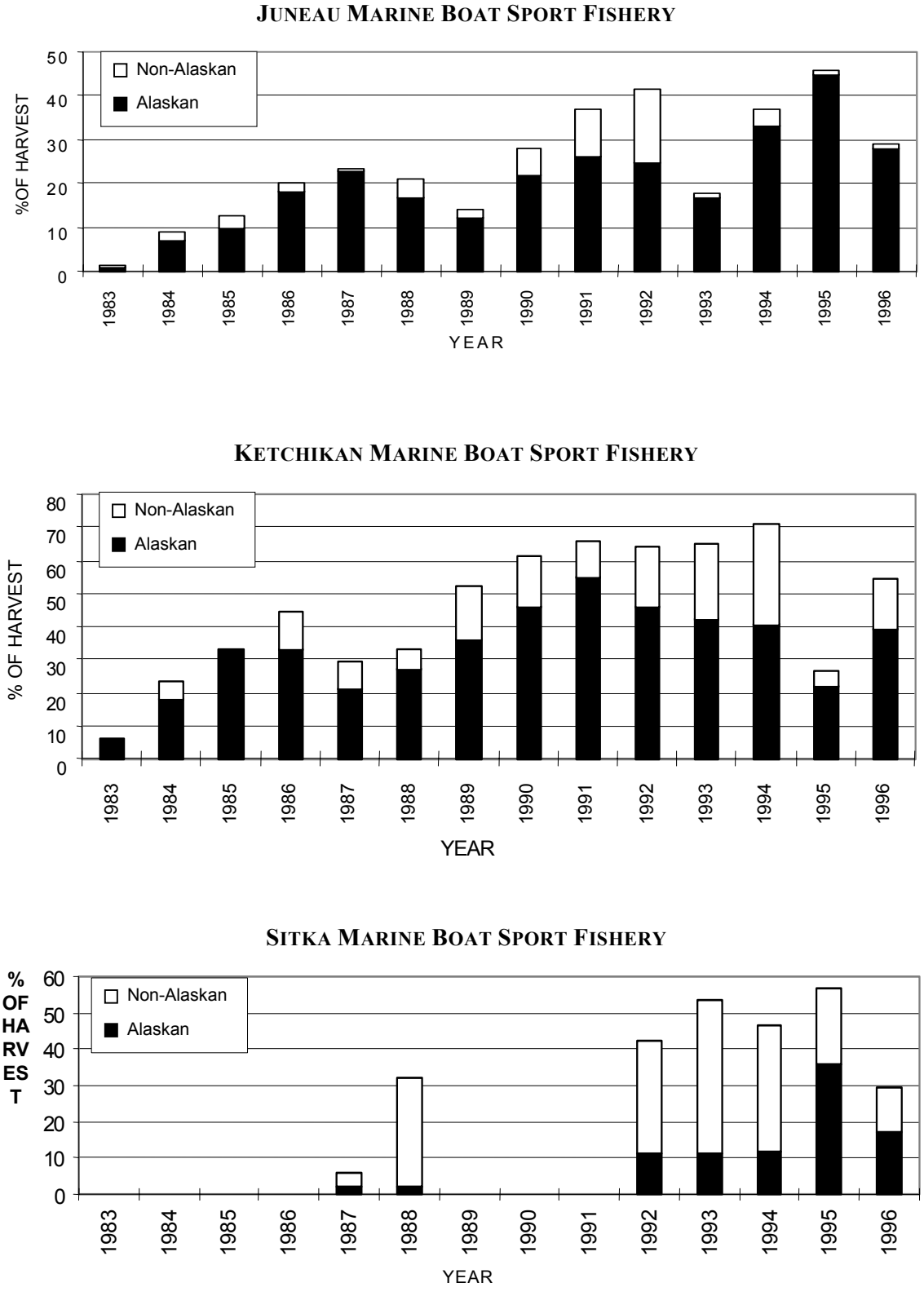


Figure 4.–Estimated contributions of hatchery-produced chinook salmon to Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys.

Table 15.–Estimated contributions of hatchery-produced chinook salmon to Juneau, Ketchikan and Sitka marine boat sport fisheries as determined by onsite creel surveys, 1983–1996.

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	1,186 [a]	34	215	6
1990	2,011	27	1,584	22	6,023	61	4,511	46	no survey			
1991[b]	4,279	37	2,957	26	8,373	66	7,035	55	no survey			
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
Average	1,754	21	1,430	17	2,673	47	2,001	35	4,644	46	1,671	17
1996	2,430	29	2,360	28	1,576	54	1,131	39	2,966	29	1,730	17

[a] Not used to calculate average.

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

Table 16.–Estimated harvest of coho salmon, 1983–1996, 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	104[b]
1990	26,343	1,914	33,661	no survey
1991	22,379	2,567	43,789	no survey
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
Average	20,279	2,729	22,227	9,233
1996	18,816	4,505	42,220	28,981
% of average	93	165	190	314

[a] Includes Juneau Golden North Salmon Derby harvest.

[b] Not used to calculate Sitka average.

Table 17.–Estimated contributions of hatchery-produced coho salmon to Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys, 1983–1996.

	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	no survey	
1990	482	2	9,515	28	no survey	
1991[a]	2,526	12	18,627	43	no survey	
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
Average	1,363	7	7,123	32	1,705	18
1996	3,276	17	16,841	40	5,224	18

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

average. The contribution of hatchery-produced coho salmon to the Sitka fishery was about average at 18% of the total harvest.

BOTTOMFISH FISHERIES

The 1996 harvest of Pacific halibut in the Juneau fishery (11,158) was similar to the 1983–1995 average of 11,494 (Table 18). The Ketchikan harvest (11,177) was 6% above the 1984–1995 average of 10,588. Total estimated catch of Pacific halibut in the Juneau fishery (14,341) was 12% below the 1983–1995 average (16,206). The 1996 catch of Pacific halibut in Ketchikan (15,229) was 16% above the 1984–1995 average (13,105). The retention rate for Pacific halibut was slightly above the average of 71% in Juneau at 78%, and the retention rate in Ketchikan (73%) was below the 1984–95 average of 81%. The Sitka harvest of halibut in 1996 (12,015) was 8% above the average harvest of 11,140, and retention rate of 67% in 1996 was average.

Rockfish harvest in the 1996 Ketchikan fishery (5,492) was 49% below the 1984–95 average of 10,870 (Table 19). Retention of rockfish at 43% was below the 1986-1995 average of 46%. Targeted and non-targeted HPUE and CPUE for rockfish were both well below average, continuing a trend of declining rockfish catches.

SHELLFISH FISHERIES

Harvests of shellfish in the Juneau and Ketchikan areas have been consistently estimated with creel surveys since 1988 (Table 20). In 1996, the estimated shellfish effort of 5,036 boat-days in the Juneau area was above average, as were the harvests of 4,826 king crab, 2,134 Tanner crab, and 15,605 Dungeness crab. The Dungeness crab harvest for Juneau was the highest on record. In Ketchikan, shellfish effort of 1,255 boat-days was below the 1988–1995 average of 1,413 boat-days. Dungeness crab harvest in Ketchikan of 5,528 was 30% below the 1988–1995 average of 7,893. Shrimp harvest in the Ketchikan area during 1996 (76,840) was above average.

Table 18.–Estimated harvest and catch of Pacific halibut in the Juneau, Ketchikan, and Sitka marine boat sport fisheries, 1983–1996.

	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	2,694[a]	1,411[a]	4,105[a]	66
1990	11,774	4,018	15,792	75	7,419	1,281	8,700	85		no survey		
1991	8,611	2,363	10,974	78	9,650	1,125	10,775	90		no survey		
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
Average	11,494	4,712	16,206	71	10,588	2,516	13,105	81	11,140	5,431	16,572	67
1996	11,158	3,183	14,341	78	11,177	4,052	15,229	73	12,015	5,859	17,874	67
% of average	97	68	88		106	161	116		108	108	108	

[a] Not used to calculate average.

Table 19.–Comparative effort and catch statistics for the Ketchikan rockfish sport fishery, 1984–1996.

		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
Average		258,868	70,217	10,870	12,893	23,871	46	0.15	0.04	0.34	0.09
1996	5/06–10/06	253,977	62,673	5,492	7,401	12,893	43	0.09	0.02	0.21	0.05
% of average		98	89	51	57	54		60	50	62	56

[a] Rockfish harvest per bottomfish-hour of effort.

[b] Rockfish harvest per angler-hour of effort.

[c] Rockfish total catch per bottomfish-hour of effort.

[d] Rockfish total catch per angler-hour of effort.

[e] Data in 1985 are not comparable because the creel survey lasted only through 30 June, instead of late September.

Table 20.–Comparison of estimated shellfish effort and harvest for the Juneau and Ketchikan marine boat fisheries, 1988–1996.

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	
Average	4,181	9,555	2,084	3,998	
1996	5,036	15,605	2,134	4,826	

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
Average	1,413	7,893	13	0	61,713
1996	1,255	5,528	0	0	76,840

CONCLUSIONS AND RECOMMENDATIONS

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

Several changes have occurred in Southeast Alaska marine boat sport fisheries over the past decade. 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. For example, from 1990 through 1994, over 60% of the chinook salmon taken in the Ketchikan area originated in hatcheries. These enhancement efforts are costly, and catch monitoring through the use of onsite creel survey programs is one of the few means to evaluate the success of hatchery programs in producing fish for sport anglers. During 1996, the percent contribution of Alaskan hatchery chinook salmon to Ketchikan, Sitka, and Juneau marine boat sport fisheries averaged 24%, and the total hatchery contribution averaged 32%. The percentages of hatchery coho salmon contributed to the Ketchikan, Juneau, and Sitka sport fisheries were 40%, 17%, and 18%, respectively, of the harvest. It is recommended that onsite creel surveys and catch sampling programs of marine sport boat fisheries be continued, in order to evaluate the effectiveness of stocking programs.

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 the 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 1996, 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 that 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. It is recommended that this expanded program be continued.

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

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

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APPENDIX A: DATA ANALYSIS PROCEDURES

Appendix A1.–Data analysis procedures for angler effort, catch, and harvest estimates for the Sitka marine boat sport fisheries during 1996.

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

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

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

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:

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

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:

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

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:

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

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:

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

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

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

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

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

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 less 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 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 1996.

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

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

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:

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

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:

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

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:

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

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

Then the stratum mean daily harvest was calculated :

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

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:

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

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):

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

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

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

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

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

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

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

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 and Juneau marine boat sport fishery surveys during 1996.

Harvest per unit effort (HPUE) in terms of coho salmon harvested per angler-hour of effort was estimated for the Juneau and Ketchikan 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:

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

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:

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

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 the 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:

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

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 1996.

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:

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

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

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harvest sampling program; and $V[\hat{p}_{tc}]$ is the variance of $\hat{p}_{tc}$ which was estimated following the large-scale approximation approach proposed by Bernard and Clark (1996; their equation [12]);

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

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 approximate equation (adapted from equation [3] in Bernard and Clark 1996):

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

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

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

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 Craig and Wrangell surveys were estimated by the approach outlined in Bernard and Clark (1996). Specifically, equation (A4.1) was adapted by dividing through by the unknown total harvest estimate (N):

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

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

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

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

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.

APPENDIX B: CREEL SURVEY STATISTICS

Appendix B1.–Estimated effort, harvest, and total catches for the Ketchikan marine boat sport fishery, 6 May–6 October 1996.

	Estimate	Standard error	Relative precision[a]
Finfish effort			
Boat-hours	96,189	5,483	6%
Salmon-hours	188,947	12,080	11%
Bottomfish-hours	62,673	4,548	12%
Angler-hours	253,977	14,400	9%
Boat-days	24,958	1,365	9%
Finfish harvests[b]			
Total chinook salmon ≥ 28"	2,575	252	16%
Derby take-home	322	37	19%
Derby entered	268	0	0%
Derby take-home & entered	590	37	10%
Total chinook salmon < 28"	356	106	49%
Coho salmon	42,220	4,532	18%
Chum salmon	2,624	414	26%
Sockeye salmon	252	92	60%
Pink salmon	43,156	5,559	21%
Pacific halibut	11,177	1,069	16%
Lingcod	783	149	31%
Total rockfish	5,492	576	17%
Quillback rockfish	1,339	238	29%
Dusky rockfish	225	125	91%
Copper rockfish	133	39	48%
Black rockfish	106	49	76%
Yelloweye rockfish	1,235	165	22%
Silvergrey rockfish	127	36	47%
Other pelagic rockfish	235	94	66%
Other non-pelagic rockfish	290	110	62%
Unidentified rockfish	1,804	241	22%
Finfish total catch[b]			
Chinook salmon ≥ 28"	2,706	260	16%
Chinook salmon < 28"	11,459	1,153	17%
Coho salmon	44,263	4,657	17%
Chum salmon	3,214	488	25%
Sockeye salmon	252	92	60%
Pink salmon	75,811	9,000	20%
Pacific halibut	15,229	1,619	17%
Lingcod	965	157	27%
Total rockfish	12,893	1,043	13%
Shellfish effort and harvest[c]			
Boat-days fished	1,255	145	19%
Pots or rings	2,842	306	18%
Dungeness crab kept	5,528	905	27%
Shrimp kept	76,840	10,641	2%

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

[b] No steelhead trout, cutthroat trout, Dolly Varden, Tanner crab, or king crab were caught or harvested.

Appendix B2.–Estimated effort, harvest, and total catches for the Juneau marine boat sport fishery, 22 April–22 September 1996.

	Estimate	Standard error	Relative precision[a]
Finfish effort			
Boat-hours	138,856	7,411	9%
Salmon-hours	287,481	17,486	10%
Bottomfish-hours	67,555	5,328	13%
Angler-hours	355,381	20,480	9%
Boat-days	32,773	1,589	8%
Finfish harvests[b]			
Total chinook salmon ≥ 28"	8,417	517	10%
Derby take-home	116	42	38%
Derby entered	653	0	0%
Derby take-home & entered	769	42	9%
Total chinook salmon < 28"	47	13	46%
Derby take-home	4	3	123%
Derby entered	11	0	0%
Derby take-home & entered	15	3	33%
Coho salmon	18,816	1,649	14%
Derby take-home	1,060	327	51%
Derby entered	3,445	0	0%
Derby take-home & entered	4,505	327	12%
Chum salmon	3,059	435	23%
Derby take-home	67	16	39%
Derby entered	161	0	0%
Derby take-home & entered	228	16	12%
Sockeye salmon	64	16	41%
Derby take-home	9	4	73%
Derby entered	4	0	0%
Derby take-home & entered	13	4	51%
Pink salmon	3,029	437	24%
Derby take-home	205	41	33%
Pacific halibut	11,158	1,053	16%
Dolly Varden	592	131	36%
Lingcod	11	10	150%
Total rockfish	774	140	30%
Finfish total catch[b]			
Chinook salmon ≥ 28"	8,940	550	10%
Chinook salmon < 28"	5,717	576	17%
Coho salmon	19,362	1,648	14%
Chum salmon	4,198	563	22%
Sockeye salmon	64	16	41%
Pink salmon	5,469	921	28%
Pacific halibut	14,341	1,486	17%
Dolly Varden	869	170	32%
Lingcod	11	10	150%
Total rockfish	805	141	29%
Shellfish effort and harvest			
Boat-days fished	5,036	348	11%
Pots or rings	10,194	782	13%
King crab kept	4,826	619	21%
Dungeness crab kept	15,605	1,485	16%
Tanner crab kept	2,134	546	42%

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

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

Appendix B3.–Estimated effort, harvest, and total catches for the Sitka marine boat sport fishery, 22 April–22 September 1996.

	Estimate	Standard Error	Relative Precision[a]
Finfish effort			
Boat-hours	62,320	2,718	7%
Salmon-hours	136,585	6,854	8%
Bottomfish-hours	45,075	2,989	11%
Angler-hours	182,513	8,502	8%
Boat-days	16,649	711	7%
Finfish harvests[b]			
Total chinook salmon ≥ 28"	10,069	755	12%
Derby take-home	781	120	25%
Derby entered	465	0	0%
Derby take-home & entered	1,246	120	16%
Total chinook salmon < 28"	9	6	110%
Coho salmon	28,981	2,172	12%
Chum salmon	6,164	1,550	41%
Sockeye salmon	572	161	46%
Pink salmon	7,961	1,267	26%
Pacific halibut	12,015	943	13%
Dolly Varden	53	50	155%
Lingcod	4,377	419	16%
Total rockfish	6,754	590	14%
Quillback rockfish	515	96	31%
Dusky rockfish	113	56	82%
Copper rockfish	22	12	90%
Black rockfish	1,830	237	21%
Yelloweye rockfish	3,472	378	18%
Silvergrey rockfish	160	56	58%
Other non-pelagic rockfish	88	35	65%
Other pelagic rockfish	273	79	48%
Unidentified rockfish	281	114	67%
Finfish total catch[b]			
Chinook salmon ≥ 28"	11,254	886	13%
Chinook salmon < 28"	1,390	239	28%
Coho salmon	31,450	2,460	13%
Sockeye salmon	638	175	45%
Chum salmon	8,666	2,199	42%
Pink salmon	18,576	2,007	18%
Pacific halibut	17,874	1,528	14%
Dolly Varden	88	52	97%
Lingcod	5,322	499	15%
Total rockfish	22,371	1,557	11%

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

[b] No steelhead trout 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, 6 May–6 October 1996.

Seasonal	----------Boat-hours----------		--------Salmon-hours-------		-------Bottomfish-hours-------		----------Angler-hours---------	
period	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
06May-19May	3,927	513,670	5,224	2,079,415	3,653	662,719	8,877	2,485,399
20May-02Jun	5,393	807,656	7,669	1,286,643	5,181	1,343,186	12,850	3,610,373
Derby[a]--------	12,626	1,444,072	9,005	5,015,924	5,640	474,573	29,352	6,176,549
17Jun-30Jun	8,513	1,121,073	16,177	3,831,802	6,711	2,105,338	22,888	7,618,286
01Jul-14Jul	13,025	4,997,778	25,060	23,732,337	9,533	3,552,255	34,593	42,545,652
15Jul-28Jul	10,142	3,302,878	21,109	29,189,965	9,335	4,410,190	30,445	33,134,213
29Jul-11Aug	5,879	1,823,392	14,651	21,925,260	4,461	1,675,789	19,112	24,443,715
12Aug-25Aug	7,486	4,029,214	17,139	16,753,855	4,495	2,997,508	21,634	30,352,330
26Aug-08Sep	15,294	10,096,640	31,430	33,630,066	6,210	2,291,687	37,640	43,906,373
09Sep-22Sep	7,607	1,286,032	16,213	6,903,017	2,627	150,463	20,269	8,651,545
23Sep-06Oct	1,846	411,421	1,557	571,250	2,143	700,890	4,629	2,740,643
Total	96,189	30,061,308	188,947	145,927,625	62,673	20,680,679	253,977	207,373,571

Seasonal	----------Boat-days----------		Chinook salmon ≥ 28" total catch		Chinook salmon ≥ 28" harvested		Chinook salmon < 28" total catch	
period	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
06May-19May	1,151	41,993	38	193	38	193	466	26,203
20May-02Jun	1,770	76,363	174	4,594	174	4,594	687	50,110
Derby[a]--------	2,621	59,700	662	3,734	590	1,370	1652	103,361
03Jun-16Jun	1,271	19,567	369	5,484	360	5,672	752	12,953
17Jun-30Jun	2,258	83,317	605	7,929	605	7,929	1159	188,563
01Jul-14Jul	3,465	337,038	496	36,705	487	36,792	1,039	100,162
15Jul-28Jul	2,664	200,234	140	4,596	140	4,596	1440	201,911
29Jul-11Aug	1,562	129,573	137	3,682	96	1,858	1217	418,224
12Aug-25Aug	2,039	235,589	58	554	58	554	705	49,452
26Aug-08Sep	3,667	573,899	13	71	13	71	878	49,891
09Sep-22Sep	1,967	64,205	10	80	10	80	1,387	126,617
23Sep-06Oct	523	42,726	4	12	4	12	77	1,734
Total	24,958	1,864,204	2,706	67,634	2,575	63,721	11,459	1,329,181

Seasonal	Chinook salmon < 28" harvested		Coho salmon total catch		Coho salmon harvested		Pink salmon total catch	
period	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
06May-19May	0	0	104	4,459	38	650	0	0
20May-02Jun	0	0	25	324	11	55	0	0
Derby[a]--------	32	183	255	4,557	132	259	46	306
03Jun-16Jun	0	0	98	1,395	76	1,179	0	0
17Jun-30Jun	17	136	699	51,632	639	49,477	919	253,128
01Jul-14Jul	108	4,630	6,141	1,637,994	5,414	1,100,182	18,133	13,670,916
15Jul-28Jul	100	2,891	5,218	2,617,913	5,171	2,621,863	18,371	34,308,249
29Jul-11Aug	5	0	2,469	421,314	2,387	348,611	10,966	13,970,730
12Aug-25Aug	8	60	5,248	1,622,691	5,141	1,682,296	13,552	11,476,869
26Aug-08Sep	84	3,362	17,262	13,536,197	16,857	12,904,971	13,071	7,232,322
09Sep-22Sep	2	0	6,476	1,763,553	6,154	1,812,157	749	88,530
23Sep-06Oct	0	0	268	25,964	200	15,896	4	12
Total	356	11,262	44,263	21,687,993	42,220	20,537,596	75,811	81,001,062

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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
06May-19May	0	0	0	0	0	0	0	0
20May-02Jun	0	0	0	0	0	0	0	0
Derby[a]--------	14	39	32	65	29	66	0	0
03Jun-16Jun	0	0	6	25	6	25	0	0
17Jun-30Jun	799	198,963	157	6,332	150	5,511	0	0
01Jul-14Jul	10,412	6,814,070	665	50,301	658	50,270	35	381
15Jul-28Jul	11,371	14,208,656	588	76,305	507	70,796	33	666
29Jul-11Aug	7,828	5,339,043	309	16,339	293	14,761	85	2,759
12Aug-25Aug	8,480	3,700,938	314	11,754	263	10,368	99	4,574
26Aug-08Sep	4,080	642,897	738	33,765	589	17,256	0	0
09Sep-22Sep	172	3,206	381	42,840	105	1,997	0	0
23Sep-06Oct	0	0	24	216	24	216	0	0
Total	43,156	30,907,812	3,214	237,942	2,624	171,266	252	8,380

Seasonal period	Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch		Rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
06May-19May	375	15,121	279	3,966	885	17,473	195	1,251
20May-02Jun	916	125,151	682	39,179	852	37,124	274	6,534
Derby[a]--------	1,160	15,316	887	6,377	2,056	84,897	694	17,415
03Jun-16Jun	437	23,464	360	12,223	684	33,708	261	4,680
17Jun-30Jun	1,558	203,889	979	45,499	1,417	184,829	593	55,870
01Jul-14Jul	2,664	527,669	2,297	506,211	1,233	81,916	573	24,476
15Jul-28Jul	2,807	307,642	2,307	243,534	1,576	186,836	805	85,048
29Jul-11Aug	1,739	956,843	785	47,195	897	157,456	439	24,139
12Aug-25Aug	1,369	209,672	1,078	124,859	1,082	88,536	472	32,058
26Aug-08Sep	1,067	84,493	1,015	91,346	989	38,198	636	12,529
09Sep-22Sep	930	142,935	333	13,641	509	15,717	191	2,586
23Sep-06Oct	207	8,056	175	8,511	713	161,345	359	64,856
Total	15,229	2,620,251	11,177	1,142,541	12,893	1,088,035	5,492	331,442

Seasonal period	Lingcod total catch		Lingcod harvested		Quillback rockfish total catch		Quillback rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
06May-19May	12	42	6	30	82	384	82	384
20May-02Jun	58	453	32	324	55	606	55	606
Derby[a]--------	145	2,037	110	1,423	131	1,552	128	1,600
03Jun-16Jun	56	733	30	452	88	2,284	88	2,284
17Jun-30Jun	189	4,146	137	3,859	89	2,245	89	2,245
01Jul-14Jul	214	10,627	206	10,258	114	2,557	114	2,557
15Jul-28Jul	134	3,768	134	3,768	236	18,047	236	18,047
29Jul-11Aug	0	0	0	0	105	2,829	105	2,829
12Aug-25Aug	83	1,547	61	1,034	146	8,448	146	8,448
26Aug-08Sep	27	373	20	184	129	3,588	129	3,588
09Sep-22Sep	47	983	47	983	31	311	31	311
23Sep-06Oct	0	0	0	0	136	13,724	136	13,724
Total	965	24,709	783	22,315	1,342	56,575	1,339	56,623

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Seasonal period	Dusky rockfish catch and harvest		Copper rockfish catch and harvest		Black rockfish catch and harvest		Other pelagic rockfish catch and harvest	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
06May-19May	0	0	24	480	0	0	6	30
20May-02Jun	0	0	5	19	0	0	0	0
Derby[a]--------	25	330	58	675	13	61	56	434
03Jun-16Jun	14	81	0	0	0	0	8	56
17Jun-30Jun	88	6,864	15	186	30	472	111	6,389
01Jul-14Jul	0	0	6	35	0	0	0	0
15Jul-28Jul	93	8,338	16	95	63	1,825	8	60
29Jul-11Aug	0	0	0	0	0	0	0	0
12Aug-25Aug	0	0	9	66	0	0	46	1,872
26Aug-08Sep	0	0	0	0	0	0	0	0
09Sep-22Sep	5	22	0	0	0	0	0	0
23Sep-06Oct	0	0	0	0	0	0	0	0
Total	225	15,635	133	1,556	106	2,358	235	8,841

Seasonal period	Yelloweye rockfish catch and harvest		Silvergrey rockfish catch and harvest		Other non-pelagic rockfish catch and harvest		Unidentified rockfish total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
06May-19May	69	374	0	0	0	0	704	14,274
20May-02Jun	95	1,430	11	110	0	0	686	26,741
Derby[a]--------	50	289	6	13	18	126	1,699	81,341
03Jun-16Jun	85	1,077	6	25	0	0	483	23,459
17Jun-30Jun	73	2,282	0	0	20	360	991	97,150
01Jul-14Jul	168	2,427	0	0	88	6,231	857	56,704
15Jul-28Jul	190	8,202	25	538	15	200	931	54,241
29Jul-11Aug	129	3,145	25	269	27	666	611	114,031
12Aug-25Aug	81	1,149	9	66	26	590	766	54,263
26Aug-08Sep	156	2,719	20	177	0	0	684	39,441
09Sep-22Sep	57	577	21	87	36	489	359	15,163
23Sep-06Oct	82	3,561	4	15	60	3,420	431	41,019
Total	1,235	27,232	127	1,300	290	12,082	9,202	617,827

Seasonal period	Unidentified rockfish harvested		Shellfish boat-days		Shellfish pots or rings		Crab boat-days	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
06May-19May	14	179	71	666	170	4,071	59	330
20May-02Jun	108	1,799	168	5,543	322	11,950	113	1,699
Derby[a]--------	340	8,866	62	75	184	936	49	54
03Jun-16Jun	61	923	47	378	90	1,397	47	378
17Jun-30Jun	168	11,695	77	1,668	116	3,006	69	1,561
01Jul-14Jul	197	5,709	129	1,663	364	14,380	100	1,304
15Jul-28Jul	160	4,439	110	1,735	421	21,789	54	535
29Jul-11Aug	153	5,987	91	2,393	125	3,542	91	2,393
12Aug-25Aug	156	3,272	265	4,676	322	9,491	221	3,110
26Aug-08Sep	330	12,782	141	1,479	436	9,215	77	808
09Sep-22Sep	41	166	33	50	77	347	11	99
23Sep-06Oct	76	2,303	61	635	215	13,406	44	561
Total	1,804	58,120	1,255	20,961	2,842	93,530	935	12,832

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Seasonal period	Crab pots or rings		Dungeness crab total catch		Dungeness crab harvested		Shrimp catch and harvest	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
06May-19May	128	1,509	996	149,748	408	32,472	1,200	120,000
20May-02Jun	173	3,155	2,461	1,061,345	602	47,295	7,380	2,375,190
Derby[a]--------	117	607	1,060	119,588	343	8,184	6,910	1,520,820
03Jun-16Jun	90	1,397	921	181,697	333	22,090	0	0
17Jun-30Jun	101	2,764	292	31,351	114	5,149	0	0
01Jul-14Jul	292	11,924	2,970	1,662,316	736	131,028	9,800	6,697,330
15Jul-28Jul	200	10,230	1,463	973,503	506	105,119	6,780	2,625,970
29Jul-11Aug	125	3,542	922	265,017	256	16,500	0	0
12Aug-25Aug	256	4,678	2,509	855,354	805	85,614	3,490	965,790
26Aug-08Sep	225	11,136	2,361	890,391	732	94,509	34,780	97,532,670
09Sep-22Sep	22	396	72	4,183	33	891	5,010	1,312,000
23Sep-06Oct	171	12,763	1,265	298,650	660	270,963	1,490	77,960
Total	1,900	64,101	17,292	6,493,143	5,528	819,814	76,840	113,227,730

[a] Includes 268 chinook salmon entered in the Ketchikan derby.

Appendix B5.–Estimated effort, harvest and catch for the Juneau marine boat sport fishery by seasonal period, 22 April–22 September 1996.

Seasonal period	Boat-hours		Salmon-hours		Bottomfish-hours		Angler-hours	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
21Apr-05May	4,906	629,811	9,606	2,228,225	188	11,980	9,794	2,340,186
06May-19May	13,865	7,808,387	30,677	40,833,118	531	25,272	31,307	41,475,164
20May-02Jun	18,551	3,685,883	43,874	27,572,527	2,750	1,238,905	46,638	37,605,397
03Jun-16Jun	11,282	2,471,768	27,554	14,167,214	2,769	629,627	30,344	18,362,149
17Jun-30Jun	7,601	1,564,162	17,154	9,906,607	2,231	256,018	19,493	12,137,742
01Jul-14Jul	11,976	2,754,390	18,160	8,427,582	12,448	4,189,070	30,685	22,102,685
15Jul-28Jul	14,649	2,565,199	19,584	4,356,873	17,626	5,949,267	37,236	17,569,350
29Jul-11Aug	13,029	3,093,417	25,984	20,293,647	12,212	4,284,859	38,196	37,240,381
Derby[a]	18,845	14,663,868	51,785	135,216,015	1,612	139,847	53,397	140,645,673
12Aug-25Aug	10,285	9,837,884	19,454	28,959,191	6,583	5,755,128	26,037	58,196,152
26Aug-08Sep	10,534	4,802,842	17,628	9,755,192	7,048	5,736,984	24,676	26,679,789
09Sep-22Sep	3,333	1,043,690	6,021	4,056,323	1,557	173,135	7,578	5,086,848
Total	138,856	54,921,301	287,481	305,772,514	67,555	28,390,092	355,381	419,441,516

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
21Apr-05May	1,293	40,450	111	2,382	111	2,382	12	132
06May-19May	3,194	322,464	1,597	93,335	1,597	93,335	105	720
20May-02Jun	3,925	165,482	1,719	46,381	1,685	44,604	331	3,963
03Jun-16Jun	2,626	128,110	1,558	54,681	1,542	54,545	379	8,938
17Jun-30Jun	2,105	101,079	871	19,636	837	18,406	317	3,598
01Jul-14Jul	3,311	183,678	460	15,449	415	11,607	631	27,259
15Jul-28Jul	3,883	166,612	623	16,959	604	16,107	720	40,172
29Jul-11Aug	3,613	226,934	671	31,994	604	21,080	874	52,865
Derby[a]	2,571	281,277	1,070	18,574	769	1,738	1,853	177,474
12Aug-25Aug	2,467	519,570	134	1,921	134	1,921	387	14,033
26Aug-08Sep	2,888	314,281	98	984	91	954	97	2,249
09Sep-22Sep	897	74,986	28	421	28	421	11	99
Total	32,773	2,524,923	8,940	302,717	8,417	267,100	5,717	331,502

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
21Apr-05May	0	0	0	0	0	0	0	0
06May-19May	0	0	0	0	0	0	0	0
20May-02Jun	0	0	0	0	0	0	0	0
03Jun-16Jun	0	0	49	306	49	306	12	132
17Jun-30Jun	26	146	135	3,449	131	3,461	36	564
01Jul-14Jul	0	0	702	29,879	676	28,973	1,190	69,973
15Jul-28Jul	0	0	1,795	81,521	1,701	66,327	1,400	97,560
29Jul-11Aug	6	25	3,621	560,627	3,546	564,446	1,981	658,305
Derby[a]	15	10	4,538	101,670	4,505	106,920	295	3,309
12Aug-25Aug	0	0	4,013	1,087,294	3,912	1,080,247	303	12,605
26Aug-08Sep	0	0	3,453	677,344	3,344	727,095	164	3,285
09Sep-22Sep	0	0	1,056	172,387	952	143,010	88	2,129
Total	47	181	19,362	2,714,477	18,816	2,720,785	5,469	847,862

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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
21Apr-05May	0	0	0	0	0	0	0	0
06May-19May	0	0	0	0	0	0	0	0
20May-02Jun	0	0	0	0	0	0	0	0
03Jun-16Jun	12	132	53	464	53	464	18	98
17Jun-30Jun	8	12	500	65,553	494	65,523	8	56
01Jul-14Jul	699	36,417	2,036	200,362	1,341	95,643	18	77
15Jul-28Jul	666	15,791	842	31,639	506	9,922	7	14
29Jul-11Aug	1,113	129,041	367	15,621	309	15,117	0	0
Derby[a]	205	1,696	248	332	228	261	13	20
12Aug-25Aug	202	6,095	94	2,399	77	1,509	0	0
26Aug-08Sep	80	1,270	58	932	51	768	0	0
09Sep-22Sep	44	842	0	0	0	0	0	0
Total	3,029	191,296	4,198	317,302	3,059	189,207	64	265

Seasonal period	Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch		Rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
21Apr-05May	12	132	12	132	0	0	0	0
06May-19May	27	96	27	96	0	0	0	0
20May-02Jun	338	17,330	303	13,888	19	274	0	0
03Jun-16Jun	700	67,092	564	36,709	62	2,478	62	2,478
17Jun-30Jun	408	13,732	377	11,601	26	318	26	318
01Jul-14Jul	2,635	265,330	1,963	110,349	111	1,305	99	1,175
15Jul-28Jul	3,135	274,672	2,339	135,833	191	4,082	191	4,082
29Jul-11Aug	3,494	904,960	2,588	348,605	171	6,471	171	6,471
Derby[a]	871	108,086	579	34,998	17	45	17	45
12Aug-25Aug	1,492	314,490	1,331	232,607	97	3,329	97	3,329
26Aug-08Sep	1,141	242,898	1,003	183,944	78	813	78	813
09Sep-22Sep	88	644	72	272	33	891	33	891
Total	14,341	2,209,462	11,158	1,109,034	805	20,006	774	19,602

Seasonal period	Lingcod catch and harvest		Dolly Varden total catch		Dolly Varden harvested		Shellfish boat-days	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
21Apr-05May	0	0	11	114	11	114	185	1,738
06May-19May	0	0	137	10,060	24	216	123	1,125
20May-02Jun	0	0	125	1,564	70	870	235	2,808
03Jun-16Jun	0	0	225	12,189	209	12,177	162	2,102
17Jun-30Jun	0	0	171	2,467	164	2,429	324	4,209
01Jul-14Jul	0	0	123	1,773	65	913	1,204	38,304
15Jul-28Jul	11	110	62	722	34	314	1,026	15,769
29Jul-11Aug	0	0	6	19	6	19	872	29,836
Derby[a]	0	0	7	10	4	10	0	0
12Aug-25Aug	0	0	0	0	0	0	376	19,379
26Aug-08Sep	0	0	0	0	0	0	295	3,169
09Sep-22Sep	0	0	0	0	0	0	113	1,521
Total	11	110	869	28,928	592	17,072	5,036	120,889

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Seasonal period	Shellfish pots or rings		King crab boat-days		King crab pots or rings		Dungeness crab catch and harvest	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
21Apr-05May	416	7,846	0	0	0	0	703	98,552
06May-19May	331	12,661	0	0	0	0	225	7,413
20May-02Jun	526	15,703	0	0	0	0	964	233,701
03Jun-16Jun	358	21,142	0	0	0	0	944	121,008
17Jun-30Jun	542	13,558	0	0	0	0	1,072	86,800
01Jul-14Jul	2,362	156,058	578	15,630	1,241	76,248	3,314	459,500
15Jul-28Jul	2,116	95,056	546	6,899	1,176	30,670	2,009	175,727
29Jul-11Aug	1,680	153,653	560	24,185	1,110	126,452	2,437	437,551
Derby[a]	213	4,038	84	616	139	1,887	205	9,641
12Aug-25Aug	766	91,796	212	5,684	397	18,364	1,566	374,374
26Aug-08Sep	507	11,164	71	612	109	1,516	1,412	116,421
09Sep-22Sep	377	29,560	6	25	6	25	754	84,917
Total	10,194	612,235	2,057	53,651	4,178	255,162	15,605	2,205,605

Seasonal period	King crab catch and harvest		Tanner crab catch and harvest	
	Estimate	Variance	Estimate	Variance
21Apr-05May	0	0	607	183,246
06May-19May	0	0	79	2,711
20May-02Jun	0	0	70	4,550
03Jun-16Jun	0	0	180	29,700
17Jun-30Jun	0	0	96	7,680
01Jul-14Jul	1,418	95,335	343	10,988
15Jul-28Jul	1,207	74,494	215	5,579
29Jul-11Aug	1,387	176,685	425	51,118
Derby[a]	268	13,699	40	362
12Aug-25Aug	437	20,868	40	976
26Aug-08Sep	109	2,074	39	1,222
09Sep-22Sep	0	0	0	0
Total	4,826	383,154	2,134	298,132

[a] Includes 653 large chinook, 11 small chinook, 3,445 coho, 161 chum, and 4 sockeye salmon entered in the derby.

Appendix B6.–Estimated effort, harvest and catch for the Sitka marine boat sport fishery by seasonal period, 22 April–22 September 1996.

Seasonal period	Boat-hours Estimate	Boat-hours Variance	Salmon-hours Estimate	Salmon-hours Variance	Bottomfish-hours Estimate	Bottomfish-hours Variance	Angler-hours Estimate	Angler-hours Variance
21Apr-05May	1,422	193,880	2,801	1,317,311	304	21,559	3,265	1,592,406
06May-19May	2,750	235,836	4,254	660,498	1,835	184,660	6,097	1,260,161
Derby[a]	9,047	954,844	22,071	5,550,758	1,375	92,012	23,429	5,558,016
20May-02Jun	3,661	340,354	6,822	2,019,551	2,226	336,874	9,091	2,748,390
03Jun-16Jun	8,061	979,538	19,858	6,591,201	5,851	2,192,750	25,709	11,775,649
17Jun-30Jun	8,467	1,925,215	18,686	11,395,310	6,041	1,015,771	24,815	16,872,330
01Jul-14Jul	7,457	763,005	12,953	2,491,902	7,578	2,049,371	20,748	6,550,194
15Jul-28Jul	6,639	898,046	16,532	9,282,294	5,418	1,074,068	22,017	13,038,856
29Jul-11Aug	6,493	466,607	13,889	2,777,045	6,645	1,138,828	20,703	4,517,129
12Aug-25Aug	4,499	437,196	11,558	3,434,766	3,760	612,157	15,330	6,243,151
26Aug-08Sep	3,206	180,372	6,421	1,376,091	3,385	198,248	9,910	1,993,903
09Sep-22Sep	618	13722	740	83869	657	15316	1399	128617
Total	62,320	7,388,615	136,585	46,980,596	45,075	8,931,614	182,513	72,278,802

Seasonal period	Boat-days Estimate	Boat-days Variance	Chinook salmon ≥ 28" total catch Estimate	Chinook salmon ≥ 28" total catch Variance	Chinook salmon ≥ 28" harvested Estimate	Chinook salmon ≥ 28" harvested Variance	Chinook salmon < 28" total catch Estimate	Chinook salmon < 28" total catch Variance
21Apr-05May	491	13,643	33	499	25	248	0	0
06May-19May	985	23,647	177	3,331	168	3,196	23	142
Derby[a]	1,610	35,670	1,320	15,833	1,246	14,361	97	331
20May-02Jun	899	18,485	865	62,887	823	56,277	67	1,727
03Jun-16Jun	2,032	59,830	3,878	318,764	3,644	294,435	240	2,676
17Jun-30Jun	2,396	131,277	2,915	310,221	2,253	144,181	194	3,033
01Jul-14Jul	2,226	71,213	724	34,553	669	26,885	370	40,605
15Jul-28Jul	1,819	77,275	526	20,201	488	16,214	112	1,522
29Jul-11Aug	1,865	33,759	447	8,578	421	7,247	73	1,335
12Aug-25Aug	1,232	26,393	242	6,557	205	4,079	90	1,495
26Aug-08Sep	900	13,302	120	2945	120	2945	12	116
09Sep-22Sep	194	1,196	7	42	7	42	112	4,296
Total	16,649	505,690	11,254	784,411	10,069	570,110	1,390	57,278

Seasonal period	Chinook salmon < 28" harvested Estimate	Chinook salmon < 28" harvested Variance	Coho salmon total catch Estimate	Coho salmon total catch Variance	Coho salmon harvested Estimate	Coho salmon harvested Variance	Pink salmon total catch Estimate	Pink salmon total catch Variance
21Apr-05May	0	0	0	0	0	0	0	0
06May-19May	0	0	0	0	0	0	0	0
Derby[a]	0	0	20	9	17	16	0	0
20May-02Jun	0	0	34	524	34	524	0	0
03Jun-16Jun	0	0	373	7,761	355	7,402	5	22
17Jun-30Jun	0	0	1,499	148,761	1,436	145,947	522	25,708
01Jul-14Jul	5	24	1,189	122,921	1,177	123,716	1,352	146,257
15Jul-28Jul	4	13	7,558	2,629,099	6,659	1,850,601	5,541	1,972,388
29Jul-11Aug	0	0	9,533	1,000,248	8,863	930,274	5,953	1,076,558
12Aug-25Aug	0	0	7,203	1,590,648	6,668	1,256,231	4,417	710,963
26Aug-08Sep	0	0	3,801	543,221	3,581	397,802	786	97,469
09Sep-22Sep	0	0	240	7,117	191	6,436	0	0
Total	9	37	31,450	6,050,309	28,981	4,718,949	18,576	4,029,365

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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
21Apr-05May	0	0	0	0	0	0	0	0
06May-19May	0	0	14	83	14	83	0	0
Derby[a]	0	0	115	352	81	52	3	4
20May-02Jun	0	0	17	114	8	62	0	0
03Jun-16Jun	5	22	195	1,382	186	1,352	11	37
17Jun-30Jun	366	13,046	335	12,860	221	2,359	10	39
01Jul-14Jul	851	40,589	1,448	174,293	1,082	124,523	395	21,110
15Jul-28Jul	2,601	838,087	3,195	4,018,526	2,305	1,946,262	96	3,304
29Jul-11Aug	2,512	454,097	2,410	519,282	1,533	249,312	123	6,298
12Aug-25Aug	1,395	244,817	807	107,374	633	76,095	0	0
26Aug-08Sep	231	13,497	130	2,349	101	1,112	0	0
09Sep-22Sep	0	0	0	0	0	0	0	0
Total	7,961	1,604,155	8,666	4,836,615	6,164	2,401,212	638	30,792

Seasonal period	Sockeye salmon harvested		Pacific halibut total catch		Pacific halibut harvested		Lingcod total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
21Apr-05May	0	0	29	385	20	172	182	16,101
06May-19May	0	0	123	4,500	95	2,577	235	3,848
Derby[a]	3	4	417	10,074	312	5,072	508	3,925
20May-02Jun	0	0	764	100,778	504	38,405	143	2,139
03Jun-16Jun	11	37	2,194	217,776	1,471	117,474	308	3,375
17Jun-30Jun	10	39	2,639	638,677	1,782	145,307	953	78,790
01Jul-14Jul	382	19,422	2,535	393,669	1,638	152,345	662	38,782
15Jul-28Jul	83	3,307	2,431	256,145	1,687	125,925	713	30,656
29Jul-11Aug	83	3,025	2,703	243,737	1,957	123,798	746	36,319
12Aug-25Aug	0	0	1,975	264,095	1,193	94,080	466	21,018
26Aug-08Sep	0	0	1,884	197,820	1,232	80,068	324	13,507
09Sep-22Sep	0	0	180	7,836	124	3,769	82	737
Total	572	25,834	17,874	2,335,492	12,015	888,992	5,322	249,197

Seasonal period	Lingcod harvested		Dolly Varden total catch		Dolly Varden harvested		Rockfish total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
21Apr-05May	98	7,004	60	2,548	53	2,494	887	287,989
06May-19May	173	3,093	0	0	0	0	1,118	41,049
Derby[a]	258	1,240	0	0	0	0	1,834	101,099
20May-02Jun	118	1,263	0	0	0	0	1,739	303,195
03Jun-16Jun	277	3,258	0	0	0	0	2,257	366,617
17Jun-30Jun	795	52,685	5	22	0	0	3,087	416,828
01Jul-14Jul	581	31,356	6	31	0	0	3,189	385,714
15Jul-28Jul	616	13,520	13	62	0	0	1,715	124,380
29Jul-11Aug	676	29,467	4	15	0	0	2,579	139,162
12Aug-25Aug	447	20,389	0	0	0	0	2,217	158,443
26Aug-08Sep	289	11,715	0	0	0	0	1,492	93,655
09Sep-22Sep	49	355	0	0	0	0	257	5,191
Total	4,377	175,345	88	2,678	53	2,494	22,371	2,423,322

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Seasonal period	Rockfish harvested		Black rockfish harvested		Copper rockfish harvested		Dusky rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
21Apr-05May	212	27,547	107	8,543	0	0	0	0
06May-19May	229	4,040	75	1,197	0	0	14	95
Derby[a]	314	4,381	38	259	0	0	12	35
20May-02Jun	328	20,441	50	642	0	0	0	0
03Jun-16Jun	674	32,737	170	4,357	6	30	0	0
17Jun-30Jun	1,252	75,842	357	12,793	5	17	76	2,898
01Jul-14Jul	916	48,597	236	6,831	0	0	7	47
15Jul-28Jul	796	44,296	247	6,821	11	100	4	13
29Jul-11Aug	955	48,186	182	2,976	0	0	0	0
12Aug-25Aug	519	30,456	239	9,299	0	0	0	0
26Aug-08Sep	475	10,043	106	2,066	0	0	0	0
09Sep-22Sep	84	1,021	23	261	0	0	0	0
Total	6,754	347,587	1,830	56,045	22	147	113	3,088

Seasonal period	Quillback rockfish harvested		Silvergrey rockfish harvested		Yelloweye rockfish harvested		Other non-pelagic rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
21Apr-05May	0	0	8	54	97	5,624	0	0
06May-19May	37	529	19	146	51	321	0	0
Derby[a]	79	473	17	93	112	519	17	99
20May-02Jun	50	2,238	50	1,566	126	5,267	0	0
03Jun-16Jun	52	743	0	0	384	29,469	0	0
17Jun-30Jun	63	856	37	1,093	581	20,274	20	167
01Jul-14Jul	91	2,074	0	0	514	28,348	11	51
15Jul-28Jul	7	42	11	100	406	11,879	6	33
29Jul-11Aug	61	1,553	12	76	660	26,033	0	0
12Aug-25Aug	8	24	6	26	224	6,503	34	860
26Aug-08Sep	67	739	0	0	275	8,105	0	0
09Sep-22Sep	0	0	0	0	42	432	0	0
Total	515	9,271	160	3,154	3,472	142,774	88	1,210

Seasonal period	Other pelagic rockfish harvested		Unidentified rockfish total catch		Unidentified rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance
21Apr-05May	0	0	675	148,286	0	0
06May-19May	33	626	890	32,275	0	0
Derby[a]	12	29	1,544	82,664	28	230
20May-02Jun	0	0	1,462	239,269	50	2,238
03Jun-16Jun	57	2,093	1,588	197,444	5	17
17Jun-30Jun	44	269	1,905	173,325	69	1,918
01Jul-14Jul	56	2,056	2,200	220,931	0	0
15Jul-28Jul	0	0	1,023	68,305	105	8,400
29Jul-11Aug	41	672	1,624	66,972	0	0
12Aug-25Aug	8	54	1,698	78,982	0	0
26Aug-08Sep	22	387	1,022	82,109	5	24
09Sep-22Sep	0	0	191	4,488	19	274
Total	273	6,186	15,822	1,395,050	281	13,101

[a] Includes 465 large chinook salmon entered in the derby.

Appendix B7.–Recorded effort and harvest from the Petersburg marine boat catch sampling program by biweekly period, 1 May–14 July 1996.

Biweekly period[a]	Salmon-hours	Bottomfish-hours	Chinook salmon harvested	Chinook salmon sampled[b]	Halibut harvested	Rockfish harvested
22Apr–05May[c]	19	27	1	1	0	0
06May–19May	133	11	4	2	0	2
20May–02Jun	168	107	9	9	16	0
Derby[d]			265	261		
03Jun–16Jun	645	91	68	53	18	4
17Jun–30Jun	179	261	22	21	51	9
01Jul–14Jul	166	428	10	6	96	11
Total	1,310	925	379	353	181	26

[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 collected from fish with missing adipose fins.

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

[d] Petersburg derby held 24–27 May; effort and harvest of species other than chinook salmon not recorded.

Appendix B8.–Recorded effort and harvest from the Wrangell marine boat catch sampling program by biweekly period, 1 May–14 July 1996.

Biweekly period[a]	Salmon-hours	Bottomfish-hours	Chinook salmon harvested	Chinook salmon sampled[b]	Halibut harvested	Crab boat-days	Crab pots or rings	Dungeness crab harvested
06May–19May	1,637	327	39	36	26	21	34	94
20May–02Jun	2,284	358	105	90	54	13	12	42
03Jun–16Jun	1,090	337	87	77	56	13	7	47
17Jun–30Jun	370	633	22	9	95	1	4	25
01Jul–14Jul	53	581	1	1	60	0	0	0
Total	5,434	2,236	254	213	291	48	57	208

Biweekly period[a]	Tanner crab harvested	Shrimp boat-days	Shrimp pots or rings	Shrimp harvested
06May–19May	4	6	18	70
20May–02Jun	0	0	0	0
03Jun–16Jun	0	0	0	0
17Jun–30Jun	0	1	9	110
01Jul–14Jul	0	0	0	0
Total	4	7	27	180

[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 collected from fish with missing adipose fins.

Appendix B9.–Recorded effort and harvest from the Craig marine boat catch sampling program by biweekly period, 1 May–8 September 1996.

Biweekly period[a]	Salmon-hours	Bottomfish-hours	Chinook salmon harvested	Chinook salmon sampled[b]	Coho salmon harvested	Coho salmon sampled[b]	Chum salmon harvested
22Apr-05May[c]	196	67	7	6	0	0	0
06May-19May	660	400	17	17	0	0	0
20May-02Jun	2,223	682	80	72	0	0	0
03Jun-16Jun	2,402	500	75	68	5	1	0
17Jun-30Jun	1,869	865	150	118	57	51	1
01Jul-14Jul	2,817	919	78	63	1,275	984	3
15Jul-28Jul	2,091	957	107	99	1,414	1,078	6
29Jul-11Aug	2,312	827	59	53	1,729	1,207	17
12Aug-25Aug	1,998	731	12	9	1,383	956	3
26Aug-08Sep	746	377	4	4	376	264	0
Total	17,314	6,325	589	509	6,239	4,541	30

Biweekly Period[a]	Pink salmon harvested	Halibut harvested	Lingcod harvested	Rockfish harvested	Crab boat-days	Crab pots or rings	Dungeness crab harvested
22Apr-05May[c]	0	11	1	32	5	15	45
06May-19May	0	116	44	112	13	32	28
20May-02Jun	0	397	80	174	6	18	70
03Jun-16Jun	1	427	97	203	9	14	25
17Jun-30Jun	24	374	137	197	11	24	29
01Jul-14Jul	77	456	54	166	9	21	38
15Jul-28Jul	109	450	78	140	8	17	32
29Jul-11Aug	216	362	61	146	7	23	15
12Aug-25Aug	146	364	62	77	3	6	7
26Aug-08Sep	16	114	44	64	5	15	30
Total	589	3,071	658	1,311	76	185	319

Biweekly Period[a]	Tanner crab harvested	Shrimp boat-days	Shrimp pots or rings	Shrimp harvested
22Apr-05May[c]	0	5	38	200
06May-19May	0	3	23	840
20May-02Jun	0	6	31	560
03Jun-16Jun	0	5	11	620
17Jun-30Jun	1	6	20	700
01Jul-14Jul	10	5	9	780
15Jul-28Jul	0	7	17	1,450
29Jul-11Aug	0	5	33	800
12Aug-25Aug	0	3	5	160
26Aug-08Sep	0	1	1	120
Total	11	46	188	6,230

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

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

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

Appendix B10.–Numbers of chinook salmon examined for coded wire tags in Southeast Alaska marine boat sport fisheries in 1996.

Sport fishery	Seasonal period	Chinook salmon ≥ 28" Estimated harvest	Number sampled	Percent	Chinook salmon < 28" Estimated harvest	Number sampled	Percent
Creel surveys							
Ketchikan	5/06-6/16	572	74	13	0	0	
	Derby entered[a]	268	262	98	0	0	
	Derby take-home[a]	322	68	21	32	8	25
	6/17-7/28	1,232	107	9	225	15	6
	7/29-10/06	181	15	8	99	18	20
	Total	2,575	526	20	356	41	12
Juneau	4/22-6/16	4,935	544	11	0	0	
	6/17-7/28	1,856	229	12	26	3	12
	7/29-9/22	857	140	16	6	1	17
	Derby entered[b]	653	653	100	11	11	100
	Derby take-home[b]	116	14	12	4	1	25
	Total	8,417	1,580	19	47	16	34
Sitka	4/22-6/16	4,660	574	12	0	0	
	Derby entered[c]	465	425	91	0	0	
	Derby take-home[c]	781	238	30	0	0	
	6/17-7/28	3,410	365	11	9	1	11
	7/29-9/22	753	74	10	0	0	
	Total	10,069	1,676	17	9	1	11
Creel survey totals		21,061	3,782	18	412	58	14
Catch sample programs							
Petersburg	5/01-7/14		92			0	
	Derby entered[d]	264	261	99	0	0	
	Derby take-home[d]		1			0	
	Total		354			0	
Wrangell	5/01-7/14		213			0	
Craig	5/01-9/08		509			0	
Total sampled			4,858			58	

[a] Derby held 25–26 May, 1 June, 8 June, 15 June, and 22–23 June.

[b] Derby held 16–18 August.

[c] Derby held 25–27 May and 1–2 June.

[d] Derby held 24–27 May.

Appendix B11.–Estimates of hatchery-produced chinook salmon contributed to the Ketchikan marine boat sport fishery, 6 May–6 October 1996.

Region	Agency[b]	Hatchery/ Release site	Tag code	Non-derby 5/06-6/16			Derby[a]			Non-derby 6/17-7/28			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
British Columbia	CDFO	Conuma River	18-04-44				1	9	80				1	9	80
		Gillard Pass	18-14-44				1	3	9				1	3	9
		Kitimat River	18-09-01	1	37	1,339							1	37	1,339
		Tenderfoot Creek	18-19-49							1	381	144,150	1	381	144,150
		Terrace	02-31-16							1	15	226	1	15	226
		B.C. Total		1	37	1,339	2	12	89	2	396	144,736	5	445	146,164
Alaska	ADFG	Deer Mountain	04-37-45	1	10	88							1	10	88
			04-37-48				1	7	43				1	7	43
			04-37-50	1	10	82							1	10	82
			04-38-57				1	5	20				1	5	20
			04-38-59				2	7	35				2	7	35
			04-39-05				1	2	2				1	2	2
			04-39-06				2	2	0				2	2	0
			04-42-24							1	43	1,785	1	43	1,785
	SSRA	Carroll Inlet	04-40-49				2	22	228				2	22	228
			04-40-50				1	11	117	3	329	37,272	4	340	37,389
			04-41-02	1	75	5,520	2	20	189	1	143	20,273	4	238	25,981
			04-41-04				2	20	184	1	140	19,585	3	160	19,770
			04-41-57				1	53	2,732				1	53	2.732
		Whitman Lake	04-37-04				1	2	2				1	2	2
			04-41-01				4	16	90	5	127	3,998	9	143	4,089
			04-41-43				2	22	233	2	57	1,611	4	79	1,844
			04-44-07				1	8	68				1	8	68
		Alaska total		3	95	5,755	23	197	3,997	13	839	103,947	39	1,131	113,699
		All regions		4	132	7,206	25	209	4,086	15	1,235	250,563	44	1,576	261,855

[a] Derby held on 25-26 May, 1 June, 8 June, 15 June, and 22-23 June 1996.

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

[c] Rec = Number of fish recovered of noted tag code.

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

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

Appendix B12.–Estimates of hatchery produced chinook salmon contributed to the Juneau marine boat sport fishery, 22 April–22 September 1996.

Region	Agency[b]	Hatchery/ Release site	Tag code	Non-derby 4/22-6/16			Non-derby 6/17-7/28			Non-derby 7/29-9/22			Derby[a]			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
British Columbia	CDFO	Kitimat River	18-09-02							1	53	2,784				1	53	2,784
		B.C. Total								1	53	2,784				1	53	2,784
Oregon	ODF	Trask River Hatchery	07-03-50							1	17	268				1	17	268
		Oregon Total								1	17	268				1	17	268
Alaska	ADFG	Crystal Lake	04-01-02-0515										4	6	3	4	6	3
			04-01-02-0913										1	17	290	1	17	290
			04-40-28							1	15	202	3	29	253	4	44	454
			04-40-29				1	85	7,071	1	107	11,259	1	19	170	4	211	18,500
		Crystal Lake/ Earl West Cove	04-40-27										1	9	76	1	9	76
		Jerry Myers	04-37-36										1	1	0	1	1	0
		Snettisham	04-31-63	3	147	7,165	2	104	5,447							5	251	12,613
			04-34-01	1	13	159										1	13	159
			04-40-30	1	17	259				2	16	176	2	4	5	5	37	440
			04-40-31	1	30	843	1	32	1,013	1	41	1,620	6	22	6-	9	125	3,536
			04-40-32	2	49	1,171	1	26	659				1	3	6	4	78	1,836
			04-40-33				3	103	3,520	2	45	1,573	6	22	57	11	170	5,150
			04-40-34										2	19	168	2	19	168
			04-40-35										1	10	82	1	10	82
	AKI	Port Armstrong	04-36-20	1	47	2,166										1	47	2,166
	BCFI	Burro Creek	04-40-47										4	4	0	4	4	0
	DIPC	Gastineau	04-01-02-0602										1	1	0	1	1	0
			04-38-30	1	53	2,751										1	53	2,751
			04-40-44	6	354	21,598	7	435	29,302				11	79	491	24	868	51,392
			04-42-51				1	54	2,882							1	54	2,882
	NMFS	Little Port Walter	03-02-35				1	11	117							1	11	117
			03-02-37				1	11	117							1	11	117
			03-02-38							1	2	1	1	1	0	2	3	1
			03-22-21	1	9	65										1	9	65
			03-22-32							1	15	205				1	15	205
			03-22-33	1	8	63										1	8	63
			03-22-34										1	1	0	1	1	0
			03-22-36				1	9	71	1	11	121	2	2	0	4	22	192
			03-22-27										1	1	0	1	1	0
			03-22-40										1	1	0	1	1	0
			03-63-32										1	1	0	1	1	0
			03-63-41										1	1	0	1	1	0
			03-63-47	1	8	60							1	1	0	2	9	60

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Region	Agency[b]	Hatchery/ Release site	Tag code	Non-derby 4/22-6/16			Non-derby 6/17-7/28			Non-derby 7/29-9/22			Derby[a]			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
	NMFS	Little Port Walter	03-63-48				1	9	77							1	9	77
		(cont'd)	03-63-51				1	9	79				2	2	0	3	11	79
			03-63-52										2	2	0	2	2	0
			03-63-53							2	14	130				2	14	130
			03-63-54							1	13	153	1	1	0	2	14	153
			03-63-55							2	3	3	2	2	0	4	5	3
			03-63-56				2	18	156				3	3	0	5	21	157
	NSRA	Hidden Falls	04-39-14										1	36	1,259	1	36	1,259
			04-39-28										1	36	1,259	1	36	1,259
			04-40-57				1	12	125							1	12	125
			04-40-59				1	9	74				1	1	0	2	10	74
			04-40-60	2	19	157							1	1	0	3	20	157
			04-41-08										1	20	392	1	20	392
			04-41-26							1	7	41				1	7	41
			04-41-28										1	1	0	1	1	0
			04-41-29	1	8	64										1	8	64
			04-41-33										1	1	0	1	1	0
	SSRA	Carroll Inlet	04-40-50										1	11	120	1	11	120
		Neets Bay	04-41-42										1	4	15	1	4	15
		Whitman Lake	04-41-01										1	2	2	1	2	2
			04-41-43										2	5	7	2	5	7
		Alaska Total		22	762	41,732	25	927	58,452	16	289	17,987	77	382	4,717	140	2,360	122,888
		All Regions		22	762	41,732	25	927	58,452	18	359	23,075	77	382	4,717	142	2,430	127,976

[a] Derby held 16-18 August 1996.

[b] CDFO = Canada Department of Fisheries and Oceans, ODF = Oregon Department of Fisheries, ADFG = Alaska Department of Fish and Game, AKI = Armstrong-Keta Inc., BCFI = Burro Creek Farms Inc., 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.

Appendix B13.–Estimates of hatchery-produced chinook salmon contributed to the Sitka marine boat sport fishery, 22 April–22 September 1996.

Region	Agency[b]	Hatchery/ Release site	Tag code	Non-derby 4/22-6/16			Derby[a]			Non-derby 6/17-7/28			Non-derby 7/29-9/22			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
British Columbia	CDFO	Kitimat River	02-03-10	1	128	16,156	2	53	1,697							3	181	17,853
			18-09-02				1	15	221							1	15	221
		Marble River	02-10-50	1	39	1,448										1	39	1,448
		Nitinat River	18-04-62							1	169	28,511				1	169	28,511
			18-11-61	1	296	87,388										1	296	87,388
		Quinsam River	18-11-47							1	88	7,604				1	88	7,604
		Snootli Creek	18-08-26	1	38	1,436										1	38	1,436
		Sooke River	18-05-30				1	2	3							1	2	3
		Terrace	02-31-16	1	9	79										1	9	79
			18-10-49	1	9	70										1	9	70
		B.C. Total		6	519	108,175	4	70	1,948	2	257	38,140				12	846	148,263
Oregon	ODFW	Umatilla	07-63-30	1	88	7,657										1	88	7,657
		Oregon Total		1	88	7,657										1	88	7,657
Washington	FWS	Quinault	05-31-24				1	2	3							1	2	3
	MAKA	Hoko	21-23-27										1	21	407	1	21	407
	QDNR	Quinault Lake	21-22-36							1	55	2,963				1	55	2,963
		Quinault	21-22-60				1	7	38							1	7	38
	WDF	Dryden Dam	63-46-13	1	9	67										1	9	67
		Klickitat	63-47-36	1	180	32,285										1	180	32,285
		Priest Rapids	05-01-01-0808							1	12	142				1	12	142
		Similkameen	63-46-04	1	16	249										1	16	249
		Washington Total		3	205	32,807	2	9	41	2	67	3,143	1	21	407	8	302	36,398
Alaska	NMFS	Little Port Walter	03-22-35							1	13	151				1	13	151
			03-63-37				1	4	9							1	4	9
	NSRA	Medvejie	04-01-010303				1	16	229							1	16	229
			04-36-45	1	121	14,477	1	15	215				1	266	70,295	3	402	84,988
			04-36-47				1	16	229							1	16	229
			04-36-48				1	13	158							1	13	158
			04-36-51	1	123	15,090	2	31	450	1	190	35,768				4	344	51,308
			04-36-53				1	94	8,735							1	94	8,735
			04-39-12	1	52	2,694	1	7	37							2	59	2,731
			04-39-18				1	7	37							1	7	37
			04-39-19	2	105	5,510	2	40	760							4	145	6,270
			04-39-25				2	30	434							2	30	434
			04-39-26	2	243	29,858				1	187	34,613				3	430	64,471
			04-41-03				1	18	303							1	18	303
	SJ	Sheldon Jackson	04-37-20							1	68	4,552				1	68	4,552
			04-40-52				2	40	928							2	40	928

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Region	Agency[b]	Hatchery/ Release site	Tag code	Non-derby 4/22-6/16			Derby[a]			Non-derby 6/17-7/28			Non-derby 7/29-9/22			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
	SSRA	Whitman Lake	04-37-04				1	6	36							1	6	36
			04-41-43	1	25	587										1	25	587
		Alaska Total		8	669	75,139	18	337	13,005	4	458	79,403	1	266	70,295	31	1,730	237,842
		All Regions		18	1,481	248,267	24	416	15,522	8	782	120,995	2	287	71,159	52	2,966	455,943

[a] Derby held on 25–27 May and 1–2 June 1996.

[b] CDFO = Canada Department of Fisheries and Oceans, ODFW = Oregon Department of Fish and Wildlife, FWS = U.S. Fish and Wildlife Service, MAKA = Makah Indian Tribe, QDNR = Quinault Department of Natural Resources, WDF = Washington Department of Fisheries, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association, SJ = Sheldon Jackson College, SSRA = Southern Southeast Regional Aquaculture Association.

[c] Rec = Number of fish recovered of noted tag code.

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

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

Appendix B14.–Estimates (from sampled fish only) of hatchery-produced and wild tagged chinook salmon contributed to 354 chinook salmon examined during the Petersburg marine boat sport fishery from 1 May to 14 July 1996.

Region	Agency[a]	Hatchery/ Release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
			HATCHERY STOCKS				
Alaska	ADFG	Crystal Lake	04-38-21	3	5	3	1.4%
			04-38-22	4	20	82	5.7%
			04-38-23	1	13	158	3.7%
			04-40-28	2	21	202	5.9%
			04-40-29	1	11	102	3.1%
		Crystal Lake/ Earl West Cove	04-40-27	1	10	91	2.8%
		Snettisham	04-40-35	1	10	98	2.8%
	NMFS	Little Port Walter	03-22-19	2	2	0	0.6%
			03-22-20	2	1	0	0.3%
			03-22-24	1	1	0	0.3%
			03-22-28	1	2	1	0.6%
			03-22-34	1	1	0	0.3%
			03-22-35	1	1	0	0.3%
			03-63-45	1	1	0	0.3%
		Hatchery stocks total		22	99	737	28.0%
			WILD STOCKS				
Alaska	ADFG	Taku River (wild)	04-28-53	1	1	0	
		TOTAL ALL STOCKS		23	100	737	28.2%

Appendix B15.-Estimates (from sampled fish only) of hatchery-produced chinook salmon contributed to 213 chinook salmon examined during the Wrangell marine boat sport fishery from 1 May to 14 July 1996.

Region	Agency[a]	Hatchery/ Release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
Alaska	ADFG	Crystal Lake/ Earl West Cove	04-38-20	1	7	42	3.3%
			04-40-26	1	9	70	4.2%
			04-40-27	2	18	140	8.5%
	MIC	Tamgas Creek	47-16-51	1	5	20	2.3%
	SSRA	Carroll Inlet	04-41-02	1	10	89	4.7%
		Neets Bay	04-37-05	1	25	616	11.7%
			04-39-37	1	7	47	3.3%
		Alaska total		8	81	1,024	38.0%
		TOTAL ALL REGIONS		8	81	1,024	38.0%

[a] ADFG = Alaska Department of Fish and Game; NMFS = National Marine Fisheries Service; MIC = Metlakatla Indian Community; 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 509 chinook salmon examined during the Craig marine boat sport fishery from 1 May to 8 September 1996.

Region	Agency[a]	Hatchery/ Release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
British Columbia	CDFO	Clearwater River	18-07-26	1	1	0	0.2%
		Conuma River	18-04-41	1	16	255	3.1%
			18-04-42	2	33	510	6.5%
			18-04-44	1	11	102	2.2%
		Nitinat River	18-15-24	1	53	2,792	10.4%
		Oweekeno	18-04-39	1	6	30	1.2%
		Robertson Creek	18-15-43	1	16	656	3.1%
		Sooke River	18-05-27	1	2	3	0.4%
		Toboggan Creek	18-05-31	1	1	0	0.2%
			B.C. total	10	139	4,348	2.0%
Oregon	ODFW	Bonneville	07-04-33	1	48	2,297	9.4%
		Oregon Total		1	48	2,297	9.4%
Washington	WDF	Quinault	05-31-24	1	3	4	0.6%
			Washington total	1	3	4	0.6%
			Non-Alaska total	12	190	6,649	37.3%
Alaska	NMFS	Little Port Walter	03-22-28	1	2	2	0.4%
	NSRA	Medvejie	04-36-51	1	17	257	3.3%
			04-39-18	1	7	42	1.4%
			04-39-19	1	7	42	1.4%
			Alaska total	4	33	343	6.5%
			All regions	16	223	6,992	43.8%

[a] CDFO = Canada Department of Fisheries and Oceans, ODFW = Oregon Department of Fish and Wildlife, WDF = Washington Department of Fisheries, WDFW = Washington Department of Fish and Wildlife, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association.

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

[c] Con = Contribution to Estimated harvest (from the sampled harvest only) of the release of the noted tag code.

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

Appendix B17.–Age composition of chinook salmon from selected Southeast Alaska sport fisheries, 1996.

SPORT FISHERY			BROOD YEAR												SAMPLE SIZE
			1993	1992		1991			1990			1989		1988	
			0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	2.4	2.5	
Ketchikan	Males	n	1	2	4	2	10			5	1				25
		Percent	4.0	8.0	16.0	8.0	40.0			20.0	4.0				
		SE[a]	4.0	5.5	7.5	5.5	10.0			8.2	4.0				
	Females	n		5	1	5	7			3					21
		Percent		23.8	4.8	23.8	33.3			14.3					
		SE[a]		9.5	4.8	9.5	10.5			7.8					
	Total[b]	n	3	15	9	9	37			20	1	1			95
		Percent	3.2	15.8	9.5	9.5	38.9			21.1	1.1	1.1			
		SE[a]	1.8	3.8	3.0	3.0	5.0			4.2	1.1	1.1			
Juneau	Males	n			4		60			7	1	1			73
		Percent			5.5		82.2			9.6	1.4	1.4			
		SE[a]			2.7		4.5			3.5	1.4	1.4			
	Females	n		1			63			29	6	1	1		101
		Percent		1.0			62.4			28.7	5.9	1.0	1.0		
		SE[a]		1.0			4.8			4.5	2.4	1.0	1.0		
	Total[b]	n	1	1	11		250			59	12	4	2		340
		Percent	0.3	0.3	3.2		73.5			17.4	3.5	1.2	0.6		
		SE[a]	0.3	0.3	1.0		2.4			2.1	1.0	0.6	0.4		
Juneau Derby	Males	n		1	5		11			2					19
		Percent		5.3	26.3		57.9			10.5					
		SE[a]		5.3	10.4		11.6			7.2					
	Females	n		2	12		39								53
		Percent		3.8	22.6		73.6								
		SE[a]		2.6	5.8		6.1								
	Total[b]	n	1	6	39		133			2					181
		Percent	0.6	3.3	21.5		73.5			1.1					
		SE[a]	0.6	1.3	3.1		3.3			0.8					
Petersburg	Total[b]	n				1	37			39	1	1			79
		Percent				1.3	46.8			49.4	1.3	1.3			
		SE[a]				1.3	5.7			5.7	1.3	1.3			
Wrangell	Total[b]	n	1	2	1	1	49			23		2			79
		Percent	1.3	2.5	1.3	1.3	62.0			29.1		2.5			
		SE													

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SPORT FISHERY			BROOD YEAR 1993	1992		1991			1990			1989		1988	SAMPLE SIZE
			0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	2.4	2.5	
Craig	Males	n		5	1	14	12		1	12		2			47
		Percent		10.6	2.1	29.8	25.5		2.1	25.5		4.3			
		SE[a]		4.5	2.1	6.7	6.4		2.1	6.4		3.0			
	Females	n	6	15	1	5	15		1	2					45
		Percent	13.3	33.3	2.2	11.1	33.3		2.2	4.4					
		SE[a]	5.1	7.1	2.2	4.7	7.1		2.2	3.1					
	Total[b]	n	6	20	2	19	27		2	14		2			92
		Percent	6.5	21.7	2.2	20.7	29.3		2.2	15.2		2.2			
		SE[a]	2.6	4.3	1.5	4.2	4.8		1.5	3.8		1.5			
Sitka	Males	n	1	1		1	3			6		1			13
		Percent	7.7	7.7		7.7	23.1			46.2		7.7			
		SE[a]	7.7	7.7		7.7	12.2			14.4		7.7			
	Females	n				1	2			6					9
		Percent				11.1	22.2			66.7					
		SE[a]				11.1	14.7			16.7					
	Total[b]	n	14	43	22	35	176		3	114		7	1	1	416
		Percent	3.4	10.3	5.3	8.4	42.3		0.7	27.4		1.7	0.2	0.2	
		SE[a]	0.9	1.5	1.1	1.4	2.4		0.4	2.2		0.6	0.2	0.2	

[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, 1996.

SPORT FISHERY			BROOD YEAR 1993	1992		1991			1990			1989		1988	SAMPLE SIZE
			0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	2.4	2.5	
Ketchikan	Males	Mean	753	805	767	897	894			1054	872				
		SE		45	9	176	20			28					
		n	1	2	4	2	10			5	1				25
	Females	Mean		906	798	974	840			897					
		SE		28		26	12			9					
		n		5	1	5	7			3					21
	Total[a]	Mean	716	847	748	950	884			966	872	930			
		SE	20	22	14	37	11			18					
		n	3	15	9	9	37			20	1	1			95
Juneau	Males	Mean			723		824			979	910	865			
		SE			18		8			21					
		n			4		60			7	1	1			73
	Females	Mean		875			824			900	842	1000	1000		
		SE					7			0	22				
		n		1			63			29	6	1	1		101
	Total[a]	Mean	730	875	708		816			915	869	1021	985		
		SE			8		4			8	14	59	15		
		n	1	1	11		250			59	12	4	2		340
Juneau Derby	Males	Mean		700	710		751			863					
		SE			19		16			73					
		n		1	5		11			2					19
	Females	Mean		765	716		741								
		SE		65	12		8								
		n		2	12		39								53
	Total[a]	Mean	735	759	711		753			863					
		SE		37	6		5			73					
		n	1	6	39		133			2					181
Petersburg	Total[a]	Mean				1112	852			921	790	1105			
		SE					12			11					
		n				1	37			39	1	1			79
Wrangell	Total[a]	Mean	730	805	740	890	863			960		970			
		SE		55			8			14		30			
		n	1	2	1	1	49			23		2			79

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SPORT FISHERY			BROOD YEAR 1993	1992		1991			1990			1989		1988	SAMPLE SIZE
			0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	2.4	2.5	
Craig	Males	Mean		917	996	1020	909		1018	995		975			
		SE		29		15	13			21		28			
		n		5	1	14	12		1	12		2			47
	Females	Mean	763	863	773	954	883		972	941					
		SE	16	11		34	12			91					
		n	6	15	1	5	15		1	2					45
	Total[a]	Mean	763	876	885	1003	895		995	988		975			
		SE	16	12	111	15	9		23	21		28			
		n	6	20	2	19	27		2	14		2			92
Sitka	Males	Mean	745	910		1030	890			1038		1170			
		SE					40			24					
		n	1	1		1	3			6		1			13
	Females	Mean				930	880			953					
		SE					10			25					
		n				1	2			6					9
	Total[a]	Mean	738	855	755	961	875		1045	979		1036	990	820	
		SE	9	9	11	12	5		60	8		33			
		n	14	43	22	35	176		3	114		7	1	1	416

[a] Includes sexed and unsexed chinook salmon.

Appendix B19.–Numbers of coho salmon examined for coded wire tags in Southeast Alaska marine boat sport fisheries in 1996.

Sport fishery	Seasonal period	Estimated harvest	Number sampled	Percent
	Creel surveys			
Ketchikan	5/06-7/28 non-derby	11,349	1,019	9
	Derby entered[a]	0	0	
	Derby take-home[a]	132	26	20
	7/29-10/06	30,739	5,756	19
	Total	42,220	6,801	19
Juneau	4/22-7/28	2,557	331	13
	7/29-9/22 non-derby	11,754	1,948	17
	Derby entered[b]	3,445	3,445	100
	Derby take-home[b]	1,060	149	14
	Total	18,816	5,873	31
Sitka	4/22-7/28 non-derby	9,661	790	8
	Derby entered[c]	0	0	
	Derby take-home[c]	17	0	0
	7/29-9/22	19,303	1,569	8
	Total	28,981	2,359	8
	Creel survey totals	90,017	15,033	17
	Catch sampling programs			
Craig	5/01-9/08		4,541	
	Total sampled		19,574	

[a] Derby held 25–26 May, 1 June, 8 June, 15 June, and 22–23 June.

[b] Derby held 16–18 August.

[c] Derby held 25–27 May and 1–2 June.

Appendix B20.–Estimates of hatchery-produced coho salmon contributed to the Ketchikan marine boat sport fishery, 6 May–6 October 1996.

Region	Agency[b]	Hatchery/ Release site	Tag code	Derby[a]			Non-derby 6/17-7/28			Non-derby 7/29-10/06			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
British Columbia	CDFO	Kispiox River	18-12-50							1	6	29	1	6	29
			18-18-56							1	12	126	1	12	126
		B.C. Total								2	18	164	2	18	164
Alaska	KTHC	Deer Mountain	04-43-07				12	170	2,792				12	170	2,792
			04-43-08	2	10	43	14	202	3,497				16	212	3,540
			04-43-09				24	354	7,416				24	354	7,416
			04-43-10				14	204	3,584	1	11	103	15	215	3,687
			04-43-11				13	181	3,139	1	11	103	14	192	3,241
			04-43-12				7	355	19,945	2	71	2,625	9	426	22,569
			04-43-13	1	15	225	8	358	18,866				9	373	19,091
			04-44-44				29	410	8,971				29	410	8,971
			04-44-45				21	289	5,643				21	289	5,643
	MIC	Tamgas Creek	47-17-02							2	282	39,332	2	282	39,332
			47-17-03				1	322	103,613	3	376	48,080	4	698	151,693
			47-17-04							2	67	2,281	2	67	2,281
			47-17-06							4	1,111	350,049	4	1,111	350,049
			47-17-07							4	204	10,959	4	204	10,959
	SSRA	Nakat Inlet	04-44-12							3	154	8,015	3	154	8,015
			04-44-13							1	54	2,826	1	54	2,826
		Neets Bay	04-41-56							5	1,603	569,324	5	1,603	569,324
			04-44-05							7	1,955	623,310	7	1,955	623,310
			04-44-06							5	1,758	685,061	5	1,758	685,061
			04-44-08							6	1,817	673,606	6	1,817	673,606
			04-44-14							7	1,664	471,270	7	1,664	471,270
			04-44-15							7	1,644	412,502	7	1,644	412,502
		Whitman Lake	04-44-09							8	511	35,484	8	511	35,484
			04-44-10							7	660	69,445	7	660	69,445
		Alaska total		3	25	276	143	2,845	340,335	75	13,953	8,065,569	221	16,823	8,406,180
		Total all regions		3	25	276	143	2,845	340,335	77	13,971	8,068,187	223	16,841	8,408,798

[a] Derby held 25–26 May, 1 June, 8 June, 15 June, and 22–23 June 1996.

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

[c] Rec = Number of fish recovered of noted tag code.

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

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

Appendix B21.–Estimates of hatchery-produced coho salmon contributed to the Juneau marine boat sport fishery, 22 April–22 September 1996.

				Non-derby 6/17–7/28			Non-derby 7/29–9/22			Derby[a]			Total		
Region	Agency[b]	Release site	Tag code	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Alaska	DIPC	Gastineau	04-44-33				6	447	37,612	19	201	1,919	25	648	39,532
			04-44-34				6	400	30,249	16	156	1,358	22	556	31,606
			04-44-35				4	282	21,608	15	152	1,393	19	434	23,001
			04-44-36	1	61	3,714	1	50	2,407	12	119	1,068	14	230	7,189
			04-44-43				1	50	2,497	16	223	6,424	17	273	8,921
		Sheep Creek	04-01-02-1305							1	5	19	1	5	19
	NSRA	Hidden Falls	04-43-61				1	189	35,743				1	189	35,743
			04-43-62							1	42	1,729	1	42	1,729
			04-43-63							2	83	3,341	2	83	3,341
		Medvejie	04-43-30				1	816	664,722				1	816	664,722
		Total		1	61	3,714	20	2,234	865,287	82	981	17,250	103	3,276	886,251

[a] Derby held on 16-18 August 1996. [b] DIPC = Douglas Island Pink and Chum, NSRA = Northern Southeast Regional Aquaculture Assoc.

Appendix B22.–Estimates of hatchery-produced coho salmon contributed to the Sitka marine boat sport fishery, 22 April–22 September 1996.

				Non-derby 4/22-6/16			Non-derby 6/17–7/28			Non-derby 7/29-9/22			Total		
Region	Agency[a]	Release site	Tag code	Rec[b]	Con[c]	Variance[d]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
British Columbia	CDFO	Hartley Bay	18-15-50							1	24	537	1	24	537
		Kincolith	18-07-15							1	15	222	1	15	222
		B.C. Total								2	39	759	2	39	759
Alaska	ADFG	Crystal Lake	04-01-02-0512				1	12	133				1	12	133
	AKI	Port Armstrong	04-38-42							1	235	54,782	1	235	54,782
	KTHC	Deer Mountain	04-43-07	1	11	105							1	11	105
			04-43-11				1	15	200				1	15	200
	MIC	Tamgas Creek	47-17-03				1	589	346,111				1	589	346,111
			47-17-07							2	280	40,876	2	280	40,876
	NSRA	Hidden Falls	04-43-62				2	1,003	522,970	2	1,480	1,206,991	4	2,483	1,729,961
		Medvejie	04-43-28				2	95	4,582	6	394	28,598	8	489	33,180
			04-43-32							1	13	159	1	13	159
			04-43-56							4	395	41,137	4	395	41,137
	SJ	Sheldon Jackson	04-45-10							1	76	5,753	1	76	5,73
	SSRA	Neets Bay	04-44-05							1	587	343,454	1	587	343,454
		Alaska Total		1	11	105	7	1,714	883,049	18	3,460	1,794,430	26	5,185	2,677,584
		Total all regions		1	11	105	7	1,714	883,049	20	3,499	1,797,243	28	5,224	2,680,397

[a] 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; NSRA = Northern Southeast Regional Aquaculture Association; SJ = Sheldon Jackson College; SSRA = Southern Southeast Regional Aquaculture Association. [b] Rec = Number of fish recovered of noted tag code.

[c] Con = Estimated harvest (contribution) of the release of the noted tag code. [d] Variance = Variance of estimated harvest of the release of the noted tag code.

Appendix B23.–Estimates of the number of wild coded wire tagged coho salmon contributed to sampled marine boat sport fisheries of Southeast Alaska in 1996.

KETCHIKAN FISHERY

Region	Agency[a]	Release site	Tag code	Non-derby 7/29-10/06			Total		
				Rec[b]	Con[c]	Variance[d]	Rec	Con	Variance
Alaska	ADFG	Hugh Smith Lake	04-37-24	1	6	28	1	6	28
			04-37-28	3	18	85	3	18	85
		Total		4	24	119	4	24	119

JUNEAU FISHERY

Region	Agency	Release site	Tag code	Non-derby 7/29-9/22			Derby[e]			Total		
				Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Alaska	ADFG	Auke Creek	04-07-15	4	27	186	8	14	45	12	41	231
		Berners River	04-35-55	5	33	206	2	2	0	7	35	208
			04-39-54				1	1	0	1	1	0
			04-39-60	3	18	108	1	1	0	4	19	108
		Dredge Lake	04-45-14	2	17	137	2	2	0	4	19	137
		Taku River	04-42-29	1	10	82	1	1	0	2	11	82
			04-42-32	1	5	21	7	7	0	8	12	21
		Total		16	110	901	22	28	45	38	138	946

SITKA FISHERY

Region	Agency	Release site	Tag code	Non-derby 7/29-9/22			Total		
				Rec	Con	Variance	Rec	Con	Variance
Alaska	ADFG	Ford Arm Lake	04-40-18	1	23	527	1	23	527
		Hugh Smith Lake	04-37-38	2	35	659	2	35	659
		Total		3	58	1,199	3	58	1,199

[a] ADFG = Alaska Department of Fish and Game.

[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 the estimated harvest of the release of the noted tag code.

[e] Juneau derby held on 16-18 August.

Appendix B24.–Estimates (from sampled fish only) of hatchery-produced coho salmon contributed to 4,541 coho salmon examined during the Craig marine boat sport fishery from 1 May to 8 September 1996.

Region	Agency[a]	Hatchery/Release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
British Columbia	CDFO	Hartley Bay	18-10-24	1	3	5	0.1%
			18-13-15	2	4	4	0.1%
			18-13-26	1	3	7	0.1%
		Kispiox River	18-12-50	1	1	0	0.0%
		B.C. Total		5	11	16	0.2%
Alaska	ADFG	Crystal Lake	04-44-29	1	9	70	0.2%
	KRHI	Klawock River	04-43-41	7	81	855	1.8%
			04-43-42	9	228	5,556	5.0%
	KTHC	Deer Mountain	04-43-11	1	1	0	0.0%
			04-44-45	1	1	0	0.0%
	MIC	Tamgas Creek	47-17-02	1	26	657	0.6%
			47-17-06	1	58	3,286	1.3%
			47-17-10	1	61	3,664	1.3%
	SSRA	Nakat Inlet	04-44-12	2	19	155	0.4%
		Neets Bay	04-41-56	1	59	3,474	1.3%
			04-44-14	1	44	1,890	1.0%
			04-44-15	1	44	1,864	1.0%
		Whitman Lake	04-44-09	1	12	129	0.3%
		Alaska total		28	643	21,600	14.2%
		Total all regions		33	654	21,616	14.4%

[a] CDFO = Canada Department of Fisheries and Oceans; ADFG = Alaska Department of Fish and Game; KRHI = Klawock River Hatchery, Inc.; KTHC = Ketchikan Tribal Hatchery Corporation; MIC = Metlakatla Indian Community; SSRA = Southern Southeast Regional Aquaculture Association.

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

[c] Con = Contribution to Estimated harvest (from the sampled harvest only) of the release of the noted tag code.

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

APPENDIX C: DATA FILES

Appendix C1.–Computer data files and analysis programs developed for the 1996 Southeast Alaska marine boat sport fishery survey. Data files (*.DTA and *.DAT) archived at the Alaska Department of Fish & Game, Division of Sport Fish, Research and Technical Services Unit, 333 Raspberry Rd., Anchorage, AK 99518-1599.

Effort, Catch, and Harvest Estimation Files (in KMC96EST.ZIP, JMC96EST.ZIP, PMC96SAM.ZIP, SMC96EST.ZIP, WMC96SAM.ZIP, and CMC96SAM.ZIP)	
A0810M_6.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Ketchikan, 1996
B7600M_6.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Craig, 1996
C0820M_6.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Petersburg, 1996
C0810M_6.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Wrangell, 1996
D0810M_6.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Sitka, 1996
E0810M_6.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Juneau, 1996
??S96.SAS	SAS programs to create basic interview SAS save files from mark-sense data files. '???' stands for each site respectively: KMC for Ketchikan, PMC for Petersburg, WMC for Wrangell, SMC for Sitka, JMC for Juneau
???96ESS.SAS	SAS programs to create revised interview SAS save files from files created by ?MS96.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 '?'.
???96MSM.SAS	SAS programs to create SAS save files with only the sampling information associated with each sample for each survey from files created by ?MC96ESS.SAS. See above for explanation of '?'
???96EST.SAS	SAS programs to estimate effort, catch, and harvest with associated variances using SAS save files created by ?MC96ESS.SAS and ?MC96MSM.SAS. Program operates on one species at a time as determined by inputs in temporary input data files 'SPECLIST.DAT'. See above for explanation of '?'
Coded Wire Tag Contribution Estimation Files (in SEW96CWT.ZIP)	
SFBAS96.XLS	Data file from tag lab with sampling information for each biweekly period at each fishery.
SFCON96.XLS	Data file from tag lab with recovery information for each adipose fin clipped coho and chinook salmon sampled.
SEW96VBN.SAS	SAS program to create creel estimate file for combining with tag data.
SEN96CWT.SAS	SAS program to do basic estimates.
SEN96CO1.SAS	SAS program to summarize contributions across tag codes for main tables.
SEN96CWP.SAS	SAS program to list tags, contributions, and variances for Appendices.
Age-weight-length (AWL) Files (in CHI96AWL.ZIP and HAL96AWL.ZIP)	
A0810AA6.DTA	Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Ketchikan, 1996
B7600AC6.DTA	Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Craig, 1996

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C0810AB6.DTA	Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Wrangell, 1996
C0820AB6.DTA	Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Petersburg, 1996
D0810AA6.DTA	Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Sitka, 1996
E0810AA6.DTA	Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Juneau, 1996
A0810AB6.DTA	Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Ketchikan, 1996
B7600AA6.DTA	Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Craig, 1996
C0810AA6.DTA	Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Wrangell, 1996
C0820AA6.DTA	Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Petersburg, 1996
D0810AB6.DTA	Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Sitka, 1996
E0810AC6.DTA	Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Juneau, 1996
REF96CHI.SAS	SAS program to reformat chinook salmon AWL data
LF96CHI.SAS	SAS program to summarize chinook salmon AWL data
REF96HAL.SAS	SAS program to reformat halibut AWL data
LF96HAL.SAS	SAS program to summarize halibut AWL data