Harvest Estimates for Selected Marine Sport Fisheries in Southeast Alaska During 1994

by

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October 1995

Alaska Department of Fish and Game
## Symbols and Abbreviations

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### Weights and measures (metric)
- centimeter cm
- deciliter dl
- gram g
- hectare ha
- kilogram kg
- kilometer km
- liter L
- meter m
- metric ton mt
- milliliter ml
- millimeter mm

### Weights and measures (English)
- cubic feet per second ft³/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.
- e.g., Dr., Ph.D., R.N., etc.
- @

### Compass directions:
- east E
- north N
- south S
- west W

### Copyright
- Corporate suffixes:
  - Company Co.
  - Corp.
  - Incorporated Inc.
  - Limited Ltd.
- et al (and other people)
- et al
- et cetera (and so forth)
- exempli gratia (for example)
- e.g.,

### Latitude or longitude
- i.e., lat. or long.
- S, E

### Monetary symbols (U.S.)
- months (tables and figures): Jan., Feb.,..., Dec.

### Number (before a number)
- # (e.g., #10)

### Pounds (after a number)
- ① (e.g., ①0)

### Registered trademark
- trademark ™

### United States
- (adjective) U.S.
- (noun) United States of America

### U.S. state and District of Columbia abbreviations
- use two-letter abbreviations (e.g., AK, DC)

### Mathematics, statistics, fisheries
- alternate hypothesis Hₐ
- base of natural logarithm e
- catch per unit effort CPUE
- coefficient of variation CV
- common test statistics F, t, X², 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) log₂, etc.
- minute (angular) ′
- multiplied by x
- not significant NS
- null hypothesis H₀
- 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, Sitka, Petersburg, and Wrangell marine sport fisheries for chinook salmon *Oncorhynchus tshawytscha* were conducted during 1994. 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 crab and shrimp were estimated in Ketchikan, Petersburg, and Wrangell; while harvest of crab was 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. A coded wire tag sampling program conducted at Craig on Prince of Wales Island 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 except Sitka. 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 24,167 (SE = 939), and the estimated catch was 76,897 (SE = 3,981) in the boat sport fisheries monitored. Harvests of chinook salmon were lower than the long-term average in both the Juneau and Ketchikan fisheries. The largest percentage of Alaska hatchery chinook salmon was harvested in Ketchikan, where an estimated 41% of the harvest was of Alaska hatchery origin and 71% was of hatchery origin. Hatcheries produced about 37% of the chinook salmon harvest in Juneau, with Southeast Alaska hatcheries contributing 33% of the total harvest. The estimated Alaska hatchery contribution of chinook salmon was 12% in Sitka, 30% in Petersburg, and 16% in Wrangell. Hatcheries in Alaska, British Columbia, Washington, and Oregon produced about 46% of the monitored chinook salmon harvest and 22% of the total harvest was of Alaska hatchery origin.

An estimated 129,994 (SE = 9,379) coho salmon, 44,765 (SE = 4,286) pink salmon *Oncorhynchus gorbuscha*, 35,105 (SE = 1,756) Pacific halibut, and 12,105 (SE = 902) rockfish were also harvested in the sampled marine boat fisheries. The total harvest of coho salmon was the highest recorded in both Juneau and Ketchikan. Hatcheries produced 13% and 32% of the coho harvest, respectively. The Pacific halibut harvest of 8,843 (SE = 877) in Juneau was below the long-term average, and the Ketchikan harvest of 10,960 (SE = 982) was above average. The total rockfish harvest of 5,603 (SE = 564) in Ketchikan was less than half of the long term average. Shellfish effort was above average in the Juneau and Ketchikan fisheries, but Dungeness crab harvest was below average in Juneau and above average in Ketchikan.

INTRODUCTION

The waters of Southeast Alaska support important 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, Prince of Wales Island, and Haines (Figure 1).

Data on sport harvests of important fish species in Southeast Alaska have been collected both by postal survey and by onsite creel survey at various locations. The Statewide Harvest Survey (SWHS) is a postal survey which has provided annual estimates of sport effort and harvest by area since 1977 (Mills 1994). 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. SWHS estimates, however, cannot be used directly for inseason management because estimates for a given year are not available until the following summer.

Estimates from onsite creel surveys can be used for inseason management and also can 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 marine boat sport fishery in the Southeast Alaska/Yakutat area which required inseason monitoring of the sport fishery to ensure the allocation (41,310 chinook salmon in 1992, 39,610 in 1993, and 39,600 in 1994) 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 were needed in the Ketchikan, Petersburg, Wrangell, Sitka, and Juneau boat fisheries during the major portion of the fishery for chinook salmon. In 1993, 79% of the total sport harvest of chinook salmon of Southeast Alaska occurred in the SWHS areas represented by these fisheries (Mills 1994). Sport harvests in other SWHS areas (Haines/Skagway, Glacier Bay, Yakutat, and Craig/Klawock) were determined to be too small or too dispersed to be effectively monitored with onsite creel surveys.

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. Lodges and charter boat operations were also contacted to try to obtain additional samples of coded wire tagged chinook salmon in voluntary sampling programs. Several terminal sport fisheries in fresh water for Alaska hatchery fish in the Petersburg and Juneau areas were not monitored with creel surveys, because 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 the entire Southeast/Yakutat area were
Figure 1.—Location of Juneau, Sitka, Petersburg, Wrangell, Ketchikan, and Craig in Southeast Alaska.
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 1994 as the current estimates of total harvests will be revised when final SWHS estimates are completed. A report detailing final estimates of quota harvests and Alaska hatchery contributions of chinook salmon will be finalized after SWHS estimates for the 1994 fishery are obtained.

Creel survey information from the marine boat sport fisheries is used for a variety of other management and reporting purposes. Coho salmon *Oncorhynchus kisutch* harvests by the boat sport fisheries are also of special interest as coho salmon management has become another high priority within the region. Harvest per unit effort (HPUE) data for coho salmon in marine boat recreational fisheries, along with HPUE data from commercial troll and net fisheries, are used to monitor the relative abundance and migratory patterns of coho salmon into inside waters. Hatchery contributions for 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 Alaska Board of Fisheries and the International Pacific Halibut Commission (IPHC) 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 from onsite creel surveys have been gathered on the harvest of shellfish in Southeast Alaska since 1988.

This report presents the findings of creel surveys of marine boat sport fisheries conducted in 1994 by the Division of Sport Fish of the Alaska Department of Fish and Game (ADF&G) in the Ketchikan, Juneau, Sitka, Petersburg, and Wrangell areas. Results from creel surveys associated with a variety of roadside sport fisheries in Southeast Alaska are presented in other ADF&G Fishery Data Series reports.

**REGULATIONS**

Sport fishing regulations during 1994 were identical to those described in Suchanek and Bingham (1992), with the following exceptions:

- An emergency order (#1-2-94) reduced the chinook salmon bag limit for the Southeast Alaska (including Yakutat) marine sport fishery from two to one fish, and prohibited charter boat operators and crew from retaining chinook salmon while clients were on board. This emergency order was in effect from 15 April through 30 June 1994.
- An emergency order (#1-16-94) returned the bag and possession limit to two chinook salmon and rescinded the restriction on charter boat operators and crew. This emergency order was in effect from 1 July through 29 July 1994.
- An emergency order (#1-21-94) increased the bag and possession limit to three chinook salmon from 30 July through 31 December 1994. Throughout the season, the minimum size limit for chinook salmon was 28 inches.
- An emergency order (#1-6-94) closed Blind Slough and the Wrangell Narrows Terminal Harvest Area in Petersburg to sport fishing from 1 June through 31 July 1994.
- An emergency order (#1-13-94) changed the bag and possession limit to two chinook salmon 28 inches or more in length and two chinook salmon less than 28 inches in length in terminal fisheries for hatchery chinook in Neets Bay, Carroll Inlet, Earl West Cove, Auke Bay, and Gastineau Channel. This emergency order was in effect from 24 June through 31 August 1994.
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) or more in length. 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. 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).

**OBJECTIVES**

Primary goals of the 1994 Southeast Alaska marine boat sport fishery surveys were to obtain: (1) inseason estimates of regionwide harvest of chinook salmon; (2) estimates of regionwide harvest of chinook salmon of Alaskan hatchery origin and; (3) estimates of harvest of coho salmon of Alaska hatchery origin in Ketchikan, Sitka, and Juneau fisheries. To help measure program performance and achieve project goals, the following objectives were identified:

1. to estimate total sport harvest of chinook salmon landed in the following marine boat sport fisheries during the noted time periods in 1994:
   - Ketchikan from 25 April to 25 September;
   - Petersburg from 9 May to 17 July;
   - Wrangell from 9 May to 17 July;
   - Sitka from 25 April to 25 September;
   - Juneau from 25 April to 25 September;

2. to estimate the contribution of Alaska hatchery chinook salmon by coded wire tag lot to each of the fisheries noted above; such that the contribution estimate in relative terms\(^1\) for each individual fishery was within ±25 percentage points of the true value 90% of the time;

3. to estimate the relative contribution of Alaska hatchery chinook salmon by coded wire tag lot to the Craig marine boat sport fishery from 9 May to 28 August; such that the total relative contribution estimate was within ±25 percentage points of the true value 90% of the time; and

4. to 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.

**TASKS**

In addition to meeting the primary objectives for monitoring the chinook salmon fishery (discussed above), there were also a number of additional tasks which addressed secondary data needs. To fulfill these data needs, additional tasks in 1994 included:

1. estimating the biweekly harvest per unit effort (HPUE) for coho salmon in the Juneau and Ketchikan marine boat sport fisheries during 25 April to 25 September;
2. estimating total sport angler effort, harvest and catch of coho salmon, pink

\(^1\) Contribution in relative terms equals the contribution estimate divided by the total harvest.
salmon *O. gorbuscha*, chum salmon *O. keta*, sockeye salmon *O. nerka*, Pacific halibut, lingcod, rockfish, and Dolly Varden *Salvelinus malma* by the Juneau and Ketchikan marine boat sport fisheries during 25 April to 25 September;

(3) estimating the shellfish effort and harvest of Dungeness crab *Cancer magister*, Tanner crab *Chionoecetes spp.*, and king crab *Paralithodes spp.* in the Juneau, Ketchikan, Petersburg, and Wrangell marine boat sport fisheries during 25 April to 25 September; and shrimp landed by the Ketchikan, Petersburg, and Wrangell marine boat fisheries;

(4) estimating the age composition and mean length-at-age of chinook salmon harvested in the Juneau and Ketchikan marine boat sport fisheries during 25 April to 25 September;

(5) estimating the maturity composition of chinook salmon harvested in the Juneau marine boat sport fishery from 25 April to 3 July; and

(6) estimating the average weights of Pacific halibut harvested in the Juneau, Sitka, and Ketchikan marine boat sport fisheries from 25 April to 25 September.

**METHODS**

Procedures for obtaining estimates associated with each of the study objectives were similar for each of the surveyed locations. The following sections detail the procedures that were common to multiple surveys.

**STUDY DESIGN**

**Onsite Creel Survey Angler Effort, Catch, and Harvest Estimates**

Direct expansion creel surveys were conducted of the Ketchikan, Petersburg, Wrangell, 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).

Three 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 2 harbors were selected at random WOR for surveying. During each sampled day, a creel technician attempted to interview all exiting boat-parties 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.

Four-stage sample surveys were conducted at Wrangell, and Sitka. For these surveys, 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 these surveys.

---

2 A boat-party is defined as all sport anglers in one boat exiting a fishery at an access location.
A three-stage sample survey was conducted at Petersburg. Each of three access locations were treated as a level of stratification. The days to sample within each stratum represented the first stage sampling units. Periods within the sampling day represented the second stage units, and boat-parties to interview represented the third stage unit in this survey.

The sampling designs for the surveys conducted in Juneau and Ketchikan were essentially equivalent to the surveys conducted in previous years at these locations (see Hubartt et al. 1993). The design for the Wrangell survey was also similar to the survey conducted in 1993. The surveys at Sitka and Petersburg represented a slight restructuring compared to the surveys conducted at each of these locations in 1993. The reasons for restructuring these surveys were primarily directed at obtaining unbiased estimates of angler effort, catch, and harvest in the most efficient manner possible.

Estimates of harvested chinook salmon at each of the five surveyed Southeast Alaskan 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 summation across strata. Estimates were obtained similarly for the three-stage designs, with the appropriate reordering of calculations.

Estimates of harvest of other species by the 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 estimated in a similar manner.

The procedures outlined in Bernard et al. (In prep) were used to estimate the optimal sampling fractions for allocation of resources among the strata for the surveys. Data from the most recent creel surveys (1992 and 1993) at each of these sites were used in estimating the sampling fractions. The actual allocation of sampling resources was also dependent upon logistical and fiscal constraints in addition to the optimal fractions desired.

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). 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 Management and Development (CFMD) Division coded wire tag laboratory for eventual dissection, tag removal, and decoding.

Information from the sampling program as well as the coastwide coded wire tag database was used to estimate contributions of both Alaskan and non-Alaskan hatchery chinook salmon according to procedures described by Clark and Bernard (1987) as adapted by Conrad and Larson (1987). 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.

Additional Coded Wire Tag Sampling

A technician sampled catches of chinook and coho salmon for the presence of a clipped adipose fin from boat parties returning to Craig harbors from 9 May through 18 September. Some
additional sampling for adipose clipped fish was also conducted in Ketchikan from 18 July to 25 September and in Juneau from 4 July through 16 October. Sampling was conducted Thursdays through Sundays from 1100 h to 2000 h in Craig.

**Biweekly Estimates of Coho Salmon Harvest Per Unit Effort**

Information collected during creel surveys of the Ketchikan and Juneau marine boat sport fisheries was 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, ADF&G, Douglas, personal communication). Mean HPUE from these fisheries was considered to be an index of abundance under the traditional linear model:

\[
\text{hpue}_k = qN + \varepsilon_k
\]

where \(\text{hpue}_k\) is the harvest per unit of effort during the \(k\)th angler-trip, \(N\) is abundance of the fish, \(q\) is the catchability coefficient, and \(\varepsilon\) is a random error with mean equal to zero and variance equal to \(\sigma^2\). In this case, each angler-trip was considered a separate, replicated sample in a test fishery. All boat-parties interviewed within each week surveyed at each location were treated as equally weighted test samples (i.e., ignoring strata and sampling stages).

**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 (with the exception of the Sitka fishery) were sampled for scales for age determination. 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). Estimates of age composition and mean length-at-age were obtained using standard procedures.

**Pacific Halibut Harvest by Weight.** As time permitted, Pacific halibut landed by boat anglers interviewed in the sampled fisheries were sampled for length. 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.

**DATA COLLECTION**

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, Petersburg, and Wrangell, numbers of shrimp harvested were also recorded in multiples of 10. All onsite interview data were recorded on ADF&G Marine Interview mark-sense forms (version 1.0).

In addition to interviewing boat-parties, creel technicians also sampled harvested fish as time allowed. 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." Heads from adipose finclipped fish were collected and identified with a uniquely numbered cinch strap.

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, ADF&G, Douglas, personal communication).
Douglas, Alaska, personal communication). Lengths in millimeters (tip of snout to fork of tail) of these chinook salmon were also recorded.

Total lengths in millimeters from Pacific halibut sampled were also recorded. All data recording procedures were outlined in detail in site-specific Creel Technician Manuals; computer data files and analysis programs are listed in Appendix C1.

**DATA ANALYSIS**

**Effort, Catch, and Harvest Estimates**

Estimates of angler effort, catch, and harvest by species for the surveys at Petersburg, Wrangell, and Sitka were calculated according to standard direct expansion equations for stratified four-stage sampling designs (with locations, days, periods, and boat-parties as sampling units). Although the survey conducted of the Petersburg fishery was a three-stage design (with days, periods, and boat-parties as sampling units), the four-stage equations were used with the appropriate collapsing of the first sampling stage. Specific calculating procedures for the point estimates and their variances are described in Appendix A1.

The procedures used to calculate estimates for the surveys at Juneau and Ketchikan were appropriate for stratified three-stage sampling designs with days, locations, and boat-parties as sampling stages. The specific calculating procedures for the point estimates and their variances for the Juneau and Ketchikan surveys are described in Appendix A2.

**Coho Salmon Harvest Per Unit Effort Estimates**

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. Harvest instead of total catch was used, because relatively few coho salmon were released and those salmon released may not have been correctly identified to species.

**Estimates of Contributions of Coded Wire Tagged Stocks**

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 Clark and Bernard (1987).

**Age, Length, and Weight Estimates**

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.

**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.
2. No significant number of boat-parties returned between evening civil twilight 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:
Table 1.—Summary of estimated total and derby angler effort by target for the Southeast Alaska marine boat sport fisheries during 1994.

<table>
<thead>
<tr>
<th>Time period</th>
<th>Ketchikan</th>
<th>Juneau</th>
<th>Sitka</th>
<th>Petersburg</th>
<th>Wrangell</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat-hours</td>
<td>105,845</td>
<td>148,160</td>
<td>64,673</td>
<td>8,071</td>
<td>18,071</td>
<td>344,820</td>
</tr>
<tr>
<td>SE</td>
<td>8,254</td>
<td>10,819</td>
<td>2,719</td>
<td>546</td>
<td>1,416</td>
<td>13,960</td>
</tr>
<tr>
<td>Salmon-hours</td>
<td>230,372</td>
<td>320,385</td>
<td>123,971</td>
<td>12,853</td>
<td>38,537</td>
<td>726,118</td>
</tr>
<tr>
<td>SE</td>
<td>17,494</td>
<td>25,095</td>
<td>5,375</td>
<td>879</td>
<td>3,388</td>
<td>31,256</td>
</tr>
<tr>
<td>Bottomfish-hours</td>
<td>56,092</td>
<td>63,398</td>
<td>43,363</td>
<td>6,552</td>
<td>9,196</td>
<td>178,601</td>
</tr>
<tr>
<td>SE</td>
<td>4,807</td>
<td>6,628</td>
<td>2,775</td>
<td>1,090</td>
<td>1,527</td>
<td>8,846</td>
</tr>
<tr>
<td>Angler-hours</td>
<td>286,464</td>
<td>384,528</td>
<td>168,146</td>
<td>19,406</td>
<td>47,734</td>
<td>906,278</td>
</tr>
<tr>
<td>SE</td>
<td>19,920</td>
<td>30,522</td>
<td>7,414</td>
<td>1,539</td>
<td>4,055</td>
<td>37,445</td>
</tr>
<tr>
<td>% Salmon-hours</td>
<td>80%</td>
<td>83%</td>
<td>74%</td>
<td>66%</td>
<td>81%</td>
<td>80%</td>
</tr>
</tbody>
</table>

**DERBY EFFORT BY TARGET**

<table>
<thead>
<tr>
<th>Time period</th>
<th>Ketchikan</th>
<th>Juneau</th>
<th>Sitka</th>
<th>Petersburg</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat-hours</td>
<td>14,267</td>
<td>9,763</td>
<td>8,624</td>
<td>1,445</td>
<td>34,099</td>
</tr>
<tr>
<td>SE</td>
<td>2,544</td>
<td>1,361</td>
<td>448</td>
<td>82</td>
<td>2,924</td>
</tr>
<tr>
<td>Salmon-hours</td>
<td>30,344</td>
<td>26,044</td>
<td>19,258</td>
<td>3,402</td>
<td>79,048</td>
</tr>
<tr>
<td>SE</td>
<td>4,873</td>
<td>4,433</td>
<td>1,051</td>
<td>182</td>
<td>6,673</td>
</tr>
<tr>
<td>Bottomfish-hours</td>
<td>4,939</td>
<td>611</td>
<td>1,226</td>
<td>88</td>
<td>6,864</td>
</tr>
<tr>
<td>SE</td>
<td>747</td>
<td>158</td>
<td>237</td>
<td>30</td>
<td>801</td>
</tr>
<tr>
<td>Angler-hours</td>
<td>35,283</td>
<td>26,655</td>
<td>20,484</td>
<td>3,490</td>
<td>85,912</td>
</tr>
<tr>
<td>SE</td>
<td>5,457</td>
<td>4,400</td>
<td>1,101</td>
<td>220</td>
<td>7,156</td>
</tr>
<tr>
<td>% Salmon-hours</td>
<td>13%</td>
<td>8%</td>
<td>16%</td>
<td>26%</td>
<td>11%</td>
</tr>
</tbody>
</table>

\[a\] 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.

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

**RESULTS**

Detailed finfish effort and chinook salmon harvest results are presented here primarily for the Juneau and Ketchikan areas, while other fisheries are presented in less detail. Detailed tables presenting total estimates of finfish effort, harvest, and catch for all species monitored at each area surveyed; as well as shellfish effort and harvest, are found in Appendices B1 through B5. Appendices B6 through B10 present biweekly and total estimates and variances for effort, harvest, and catch for all species monitored for each boat fishery surveyed.

**ANGLER EFFORT**

An estimated 906,278 (SE = 37,445) angler-hours of effort were expended in the five marine boat sport fisheries during the time periods sampled (Table 1). Eighty percent of the total effort in angler-hours was targeted on salmon in Ketchikan, 83% in Juneau, 74% in Sitka, 66% in Petersburg, and 81% in Wrangell. Pacific halibut was the other major target species. Major salmon
Table 2.—Summary of estimated catches and harvests of chinook salmon in Southeast Alaska marine boat sport fisheries surveyed during 1994.

<table>
<thead>
<tr>
<th>Sport fishery</th>
<th>Time period</th>
<th>Chinook ≥ 28&quot;</th>
<th></th>
<th></th>
<th>Chinook &lt; 28&quot;</th>
<th></th>
<th></th>
<th>Total harvested</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Catch</td>
<td>Harvest</td>
<td></td>
<td>Catch</td>
<td>Harvest</td>
<td></td>
<td>Number</td>
<td>SE</td>
<td></td>
</tr>
<tr>
<td>Sitka</td>
<td>4/25-9/25</td>
<td>16,107</td>
<td>13,135</td>
<td>2,513</td>
<td>4</td>
<td>13,139</td>
<td>762</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petersburg</td>
<td>5/09-7/17</td>
<td>709</td>
<td>698</td>
<td>367</td>
<td>0</td>
<td>699</td>
<td>67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrangell</td>
<td>5/09-7/17</td>
<td>1,218</td>
<td>1,137</td>
<td>151</td>
<td>0</td>
<td>1,137</td>
<td>93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>27,477</td>
<td>23,993</td>
<td>49,420</td>
<td>174</td>
<td>24,167</td>
<td>939</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Major salmon derbies</th>
<th>Time period</th>
<th>Chinook ≥ 28&quot;</th>
<th></th>
<th></th>
<th>Chinook &lt; 28&quot;</th>
<th></th>
<th></th>
<th>Total harvested</th>
<th></th>
<th></th>
<th>%b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ketchikan King Salmon Derby</td>
<td>5/28-5/30, 6/4-6/5, 6/11-6/12</td>
<td>378c</td>
<td>612</td>
<td>0</td>
<td>0</td>
<td>612</td>
<td>85</td>
<td>18%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juneau Golden North Salmon Derby</td>
<td>8/19-8/21</td>
<td>551</td>
<td>672</td>
<td>2</td>
<td>6</td>
<td>678</td>
<td>3</td>
<td>12%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitka Salmon Derby</td>
<td>5/28-5/30, 6/4-6/5</td>
<td>909</td>
<td>1,820</td>
<td>0</td>
<td>0</td>
<td>1,820</td>
<td>101</td>
<td>14%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petersburg Salmon Derby</td>
<td>5/27-5/30</td>
<td>211</td>
<td>0</td>
<td>0</td>
<td>211</td>
<td>0</td>
<td>30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Includes entered and take-home harvests.
b (total derby harvest/total area harvest) * 100.
c Most of these fish were not sold.

derbies in Ketchikan, Juneau, and Sitka increased the amount of effort targeted on salmon, as 13%, 8%, and 16% of the total salmon fishing effort, respectively, occurred during these short time periods.

**CHINOOK SALMON FISHERIES**

An estimated 24,167 chinook salmon (SE = 939) were harvested in all the sampled marine boat sport fisheries (Table 2). Most of the chinook salmon harvested were at least 28 inches in length, but an estimated 174 small (< 28 inches) chinook salmon were also harvested. The total catch of 49,420 small chinook salmon was nearly twice as large as the total catch of 27,477 large chinook salmon.

Harvest of chinook salmon in the Ketchikan King Salmon Derby composed 18% of the total chinook salmon harvested in the Ketchikan marine fishery. Twelve percent of the harvest of chinook salmon in the Juneau marine boat sport fishery was taken during the Juneau Golden North Salmon Derby, while 8% of the total salmon fishing effort was expended during this event (Table 1). A total of 929 chinook salmon was entered in the Ketchikan and Juneau derbies from a harvest of 1,290 fish during the derby time periods; 909 chinook salmon were entered in the Sitka Salmon Derby from a total harvest of 1,820 chinook salmon during the derby time period, making it the largest derby in Southeast Alaska in terms of fish entered; and 211 chinook salmon were entered in the Petersburg Salmon Derby, about 30% of the harvest in the surveyed fishery.

About 23% of the estimated harvest of chinook salmon in the Ketchikan boat fishery were sampled for coded wire tags (Appendix B11). In the Juneau boat fishery, 23% of the estimated harvest of chinook salmon were sampled, 19% in Sitka, 44% in Petersburg, and 24% in Wrangell.

An estimated 22% of the chinook salmon harvested in the marine boat fisheries were of Alaska hatchery origin (Table 3). Additional
Table 3. Contributions of hatchery chinook salmon to sampled marine boat sport fisheries of Southeast Alaska, 1994.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon</td>
<td></td>
<td>0</td>
<td>57</td>
<td>12</td>
<td>39</td>
<td>0</td>
<td>108</td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td>19</td>
<td>19</td>
<td>0</td>
<td>212</td>
<td>0</td>
<td>250</td>
</tr>
<tr>
<td>British Columbia</td>
<td></td>
<td>213</td>
<td>939</td>
<td>4</td>
<td>4317</td>
<td>9</td>
<td>5482</td>
</tr>
<tr>
<td>Columbia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Alaskan total</td>
<td></td>
<td>232</td>
<td>1,015</td>
<td>16</td>
<td>4,568</td>
<td>9</td>
<td>5,840</td>
</tr>
<tr>
<td>ALASKA</td>
<td></td>
<td>164</td>
<td>572</td>
<td>15</td>
<td>980</td>
<td>8</td>
<td>1,146</td>
</tr>
<tr>
<td>Burnett Inlet</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Carroll Inlet</td>
<td></td>
<td>19</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>41</td>
<td>546</td>
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<tr>
<td>Crystal Lake</td>
<td></td>
<td>35</td>
<td>86</td>
<td>158</td>
<td>0</td>
<td>129</td>
<td>408</td>
</tr>
<tr>
<td>Deer Mt.</td>
<td></td>
<td>0</td>
<td>99</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>103</td>
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<td>Gastineau</td>
<td></td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>199</td>
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<tr>
<td>Hidden Falls</td>
<td></td>
<td>536</td>
<td>0</td>
<td>42</td>
<td>0</td>
<td>0</td>
<td>578</td>
</tr>
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<td>Little Port Walter</td>
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<td>22</td>
<td>155</td>
</tr>
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</tr>
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<td>Neets Bay</td>
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<td>23</td>
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<td>482</td>
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<tr>
<td>Pt Armstrong</td>
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<td>4</td>
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<tr>
<td>Sheldon Jackson</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>180</td>
<td>0</td>
<td>180</td>
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<tr>
<td>Snettisham</td>
<td></td>
<td>805</td>
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<td>0</td>
<td>0</td>
<td>805</td>
<td></td>
</tr>
<tr>
<td>Tongus Crk.</td>
<td></td>
<td>43</td>
<td>156</td>
<td>0</td>
<td>0</td>
<td>199</td>
<td></td>
</tr>
<tr>
<td>Whitman L.</td>
<td></td>
<td>0</td>
<td>68</td>
<td>0</td>
<td>0</td>
<td>68</td>
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</tr>
<tr>
<td>Alaskan total</td>
<td></td>
<td>1,895</td>
<td>1,378</td>
<td>210</td>
<td>1,642</td>
<td>179</td>
<td>5,304</td>
</tr>
<tr>
<td>SE</td>
<td></td>
<td>301</td>
<td>391</td>
<td>74</td>
<td>385</td>
<td>79</td>
<td>636</td>
</tr>
<tr>
<td>Absolute precision</td>
<td></td>
<td>495</td>
<td>643</td>
<td>122</td>
<td>633</td>
<td>130</td>
<td>1,046</td>
</tr>
<tr>
<td>(α = 0.10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Absolute precision</td>
<td></td>
<td>8</td>
<td>19</td>
<td>17</td>
<td>11</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>All areas total</td>
<td></td>
<td>2,127</td>
<td>2,393</td>
<td>226</td>
<td>6,210</td>
<td>188</td>
<td>11,144</td>
</tr>
<tr>
<td>SE</td>
<td></td>
<td>343</td>
<td>693</td>
<td>76</td>
<td>1,053</td>
<td>80</td>
<td>1,311</td>
</tr>
<tr>
<td>Absolute precision</td>
<td></td>
<td>564</td>
<td>1,140</td>
<td>125</td>
<td>1,732</td>
<td>132</td>
<td>2,157</td>
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<tr>
<td>(α = 0.10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Absolute precision</td>
<td></td>
<td>10</td>
<td>34</td>
<td>18</td>
<td>13</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Chinook salmon harvest</td>
<td></td>
<td>5,819</td>
<td>3,374</td>
<td>698</td>
<td>13,139</td>
<td>1,137</td>
<td>24,167</td>
</tr>
<tr>
<td>SE</td>
<td></td>
<td>403</td>
<td>354</td>
<td>67</td>
<td>762</td>
<td>93</td>
<td>939</td>
</tr>
<tr>
<td>% Alaska hatchery</td>
<td></td>
<td>33</td>
<td>41</td>
<td>30</td>
<td>12</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>% Total hatchery</td>
<td></td>
<td>37</td>
<td>71</td>
<td>32</td>
<td>47</td>
<td>17</td>
<td>46</td>
</tr>
</tbody>
</table>

a SE * 1.645.

b (Absolute precision / total harvest) * 100.

Hatchery fish originated in Oregon, Washington, and British Columbia, and, in aggregate, 46% of the chinook salmon harvested in boat fisheries originated in hatcheries. The Ketchikan fishery had the highest percentage of Alaska hatchery fish (41%), and the overall hatchery contribution to the Ketchikan fishery totaled 71%. Most of the Alaskan hatchery chinook salmon taken in Ketchikan originated in Neets Bay, Whitman Lake, and Carroll Inlet (release site only) hatcheries operated by the Southern Southeast Regional Aquaculture Association. About 33% of the chinook salmon harvest in the Juneau boat fishery was of Alaska hatchery origin. Alaska hatchery fish taken in Juneau came primarily from the Snettisham hatchery operated by ADF&G and the Hidden Falls hatchery operated by the Northern Southeast Regional Aquaculture Association. Twenty-three percent of the chinook salmon harvest in Petersburg came from the Crystal Lake hatchery operated by ADF&G.

Detailed contribution estimates by tag code are presented in appendices for the Ketchikan fishery (Appendix B12), Juneau fishery (Appendix B13), Sitka fishery (Appendix B14), Petersburg fishery (Appendix B15), and the Wrangell fishery (Appendix B16). In addition to the recoveries of hatchery origin fish, wild coded wire tagged chinook salmon were recovered from the Juneau fishery (Appendix B18). Total contributions of these tagged wild stocks could not be estimated as tagging fractions are unknown.

A total of 1,354 chinook salmon (Appendix B11) was examined for clipped adipose fins at the Craig marine boat sport fishery. Overall, 35% of the sample came from hatcheries. The tag codes recovered and the relative contribution to the fishery are presented in Appendix B17.

A total of 1,501 chinook salmon was successfully aged from the surveyed fisheries (Table 4 and Appendix B19). About 34% of the chinook salmon sampled lacked a freshwater annulus (age-0.), which usually indicates non-Alaskan origin (Van Alen 1988).

<table>
<thead>
<tr>
<th>Freshwater age composition</th>
<th>Age 0</th>
<th>Age 1 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample size</td>
<td>Sample size</td>
</tr>
<tr>
<td>Sport fishery</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Ketchikan</td>
<td>59</td>
<td>40</td>
</tr>
<tr>
<td>Juneau non-derby</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Juneau derby a</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Petersburg</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Wrangell</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Craig</td>
<td>411</td>
<td>76</td>
</tr>
<tr>
<td>Total</td>
<td>521</td>
<td>35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Saltwater age composition</th>
<th>Age .3 or less</th>
<th>Age .4 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample size</td>
<td>Sample size</td>
</tr>
<tr>
<td>Sport fishery</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Ketchikan</td>
<td>58</td>
<td>39</td>
</tr>
<tr>
<td>Juneau non-derby</td>
<td>144</td>
<td>41</td>
</tr>
<tr>
<td>Juneau derby a</td>
<td>64</td>
<td>90</td>
</tr>
<tr>
<td>Petersburg</td>
<td>48</td>
<td>26</td>
</tr>
<tr>
<td>Wrangell</td>
<td>51</td>
<td>29</td>
</tr>
<tr>
<td>Craig</td>
<td>294</td>
<td>52</td>
</tr>
<tr>
<td>Total</td>
<td>659</td>
<td>44</td>
</tr>
</tbody>
</table>

a Juneau Golden North Salmon Derby

Saltwater ages varied considerably; an estimated 90% of the chinook salmon harvested during the Juneau Golden North Salmon Derby were age-.3 or less while only 39% of the chinook salmon sampled in the Ketchikan fishery were age-.3 or less. The sampled harvest across all surveyed fisheries consisted of 45% males and 55% females. Mean length-at-age of sampled chinook salmon varied among fisheries surveyed (Appendix B20).

Coho Salmon Fisheries

Harvests of coho salmon in the sampled fisheries totaled an estimated 129,994 fish (SE = 9,379) (Table 5). Only small percentages of the coho salmon fisheries in Petersburg and Wrangell were monitored as surveys were discontinued by July 18. The only monitored derby in which coho salmon were heavily targeted was the Juneau Golden North Salmon Derby, and an estimated 8,358 coho salmon (SE = 491) were taken during this event (Appendix B2).

Harvests of hatchery coho salmon were estimated from a sample of 16% of the coho salmon harvest (Appendix B21). Estimates of coho salmon hatchery contributions by tag code and time period are presented in Appendix B22 for the Ketchikan fishery, Appendix B23 for the Juneau fishery, and Appendix B24 for the Sitka fishery. An estimated 27,524 (SE = 4,722) hatchery coho salmon were taken in all the sampled fisheries combined (Table 6). Wild stocks of coho salmon dominated the harvest in all areas, but hatchery contributions ranged from 13% in Juneau to 21% in Sitka and 32% in Ketchikan. Some 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 the Gastineau hatchery owned by Douglas Island Pink and Chum, Inc. contributed the most coho salmon to the Juneau fishery.

Table 5.—Summary of estimated catch and harvest of coho salmon in Southeast Alaska marine boat sport fisheries surveyed during 1994.

<table>
<thead>
<tr>
<th>Sport fishery</th>
<th>Time period</th>
<th>Wild Estimate</th>
<th>SE</th>
<th>Hatchery Estimate</th>
<th>SE</th>
<th>Total Estimate</th>
<th>SE</th>
<th>Catch Estimate</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petersburg</td>
<td>5/09-7/17</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wrangell</td>
<td>5/09-7/17</td>
<td>23</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>18</td>
<td>37</td>
<td>12</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>102,470</td>
<td>8,103</td>
<td>27,524</td>
<td>4,722</td>
<td>129,994</td>
<td>9,379</td>
<td>138,470</td>
<td>9,968</td>
</tr>
</tbody>
</table>

13
Table 6.—Contributions of hatchery coho salmon to sampled marine boat sport fisheries of Southeast Alaska, 1994.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>0</td>
<td>98</td>
<td>28</td>
<td>126</td>
</tr>
<tr>
<td>Non-Alaskan total</td>
<td>0</td>
<td>98</td>
<td>28</td>
<td>126</td>
</tr>
<tr>
<td>SE</td>
<td>0</td>
<td>40</td>
<td>31</td>
<td>51</td>
</tr>
</tbody>
</table>

Table 7.—Harvest per unit effort (HPUE) for coho salmon (harvest per angler-hours of effort) by biweekly period in the Ketchikan, Juneau, and Sitka marine boat sport fisheries during 1994.

<table>
<thead>
<tr>
<th>Dates</th>
<th>Ketchikan HPUE</th>
<th>Juneau HPUE</th>
<th>Sitka HPUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/06-6/19</td>
<td>0.018</td>
<td>0.004</td>
<td>0.008</td>
</tr>
<tr>
<td>6/20-7/03</td>
<td>0.024</td>
<td>0.004</td>
<td>0.034</td>
</tr>
<tr>
<td>7/04-7/17</td>
<td>0.090</td>
<td>0.011</td>
<td>0.125</td>
</tr>
<tr>
<td>7/18-7/31</td>
<td>0.139</td>
<td>0.025</td>
<td>0.211</td>
</tr>
<tr>
<td>8/01-8/14</td>
<td>0.181</td>
<td>0.019</td>
<td>0.290</td>
</tr>
<tr>
<td>8/15-8/28</td>
<td>0.316</td>
<td>0.022</td>
<td>0.339</td>
</tr>
<tr>
<td>8/29-9/11</td>
<td>0.203</td>
<td>0.016</td>
<td>0.279</td>
</tr>
<tr>
<td>9/12-9/25</td>
<td>0.352</td>
<td>0.032</td>
<td>0.403</td>
</tr>
</tbody>
</table>

| All periods  | 0.154          | 0.006       | 0.142      |

a Does not include derby effort or harvest.

The HPUE for coho salmon for the Ketchikan, Juneau, and Sitka fisheries reached highs of 0.352 (SE = 0.032), 0.403 (SE = 0.124), and 0.458 (SE = 0.039) coho salmon per angler-hour of effort, respectively (Table 7). The peak in HPUE for coho salmon occurred in late August in Sitka, and late September in Juneau and Ketchikan. Sitka anglers experienced higher HPUE's for coho salmon than did Juneau and Ketchikan anglers for the peak of the season.

**BOTTOMFISH FISHERIES**

Most of the bottomfish effort in Southeast Alaska is targeted on Pacific halibut, and an estimated 35,105 (SE = 1,756) were harvested in the sampled marine boat sport fisheries (Table 8). Substantial portions of the bottomfish fisheries were monitored only in Juneau, Ketchikan, and Sitka. Estimated average round weight of the Pacific halibut in the sampled fisheries ranged from 20.4 pounds in Juneau to 45.8 pounds in Sitka (Table 9). About 1,098,300 pounds of Pacific halibut were taken in the sampled fisheries, with about 55% of this harvest taken in Sitka.

Although rockfish are not a primary target of most Southeast Alaska marine boat sport anglers, an estimated 36,911 (SE = 2,071) rockfish were caught in the marine boat sport fisheries surveyed (Table 8). Only 12,105 (SE = 902) of the rockfish...
Table 8.—Summary of estimated catch and harvest of Pacific halibut, rockfish, and lingcod in the Southeast Alaska marine boat sport fisheries sampled during 1994.

<table>
<thead>
<tr>
<th>Sport fishery</th>
<th>Dates</th>
<th>Total catch</th>
<th>SE</th>
<th>Harvest</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PACIFIC HALIBUT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ketchikan</td>
<td>4/25-9/25</td>
<td>13,809</td>
<td>1,247</td>
<td>10,960</td>
<td>982</td>
</tr>
<tr>
<td>Juneau</td>
<td>4/25-9/25</td>
<td>12,890</td>
<td>1,335</td>
<td>8,843</td>
<td>877</td>
</tr>
<tr>
<td>Sitka</td>
<td>4/25-9/25</td>
<td>18,418</td>
<td>1,744</td>
<td>13,185</td>
<td>1,133</td>
</tr>
<tr>
<td>Petersburg</td>
<td>5/09-7/17</td>
<td>1,407</td>
<td>265</td>
<td>1,121</td>
<td>201</td>
</tr>
<tr>
<td>Wrangell</td>
<td>5/09-7/17</td>
<td>1,037</td>
<td>173</td>
<td>996</td>
<td>166</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>47,561</td>
<td>2,545</td>
<td>35,105</td>
<td>1,756</td>
</tr>
<tr>
<td><strong>ROCKFISH</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ketchikan</td>
<td>4/25-9/25</td>
<td>13,887</td>
<td>1,147</td>
<td>5,603</td>
<td>564</td>
</tr>
<tr>
<td>Juneau</td>
<td>4/25-9/25</td>
<td>919</td>
<td>205</td>
<td>702</td>
<td>136</td>
</tr>
<tr>
<td>Sitka</td>
<td>4/25-9/25</td>
<td>21,847</td>
<td>1,710</td>
<td>5,576</td>
<td>685</td>
</tr>
<tr>
<td>Petersburg</td>
<td>5/09-7/17</td>
<td>154</td>
<td>49</td>
<td>139</td>
<td>47</td>
</tr>
<tr>
<td>Wrangell</td>
<td>5/09-7/17</td>
<td>104</td>
<td>67</td>
<td>85</td>
<td>67</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>36,911</td>
<td>2,071</td>
<td>12,105</td>
<td>902</td>
</tr>
<tr>
<td><strong>LINGCOD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ketchikan</td>
<td>4/25-9/25</td>
<td>892</td>
<td>143</td>
<td>819</td>
<td>131</td>
</tr>
<tr>
<td>Juneau</td>
<td>4/25-9/25</td>
<td>19</td>
<td>17</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>Sitka</td>
<td>4/75-7/07</td>
<td>4,776</td>
<td>361</td>
<td>3,564</td>
<td>337</td>
</tr>
<tr>
<td>Petersburg</td>
<td>5/09-7/17</td>
<td>17</td>
<td>15</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>Wrangell</td>
<td>5/09-7/17</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Total</td>
<td></td>
<td>5,158</td>
<td>389</td>
<td>4,423</td>
<td>357</td>
</tr>
</tbody>
</table>

Major species composition of the rockfish harvest was determined for the Ketchikan, Sitka, Petersburg, and Wrangell fisheries (Table 10). Quillback rockfish S. maliger were most frequently taken in Ketchikan (36.9%), while yelloweye rockfish composed 33.8% of the Ketchikan rockfish harvest. Yelloweye rockfish S. ruberrimus were most often taken in Sitka (38.3%), and black rockfish S. melanops composed 36.8% 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 Ophiodon elongatus was another bottomfish species frequently harvested in the Sitka and Ketchikan 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 the sampled fisheries (Table 11). Pink salmon were taken in large numbers in Ketchikan and the estimated harvest totaled 33,366 (SE = 4,196). Only 8,456 (SE = 787) pink salmon were harvested in Juneau as the retention rate was only 41% in comparison to the 79% observed in Ketchikan. Harvests of both chum and sockeye salmon were much less, totaling 10,902 chum salmon and 467 sockeye salmon for the sampled fisheries.

Table 9.—Average length, round weight, and total round weight of Pacific halibut harvested in sampled Southeast Alaska marine boat sport fisheries during 1994.

<table>
<thead>
<tr>
<th>Sport fishery</th>
<th>Survey period</th>
<th>Sample size</th>
<th>Total length Mean (cm)</th>
<th>Total length SE (cm)</th>
<th>Average round wt (lbs)</th>
<th>Estimated number harvested</th>
<th>Estimated total round wt (thousand lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ketchikan</td>
<td>4/25-9/25</td>
<td>375</td>
<td>86.9</td>
<td>1.5</td>
<td>21.7</td>
<td>10,960</td>
<td>237.8</td>
</tr>
<tr>
<td>Juneau</td>
<td>4/25-9/25</td>
<td>138</td>
<td>81.7</td>
<td>2.1</td>
<td>20.4</td>
<td>8,843</td>
<td>180.4</td>
</tr>
<tr>
<td>Sitka</td>
<td>4/25-9/25</td>
<td>253</td>
<td>107.7</td>
<td>1.8</td>
<td>45.8</td>
<td>13,185</td>
<td>603.9</td>
</tr>
<tr>
<td>Petersburg/</td>
<td>5/09-7/17</td>
<td>196</td>
<td>100.4</td>
<td>1.9</td>
<td>36.0</td>
<td>2,117</td>
<td>76.2</td>
</tr>
<tr>
<td>Wrangell</td>
<td></td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>23.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Craig</td>
<td>5/09-9/04</td>
<td>1,570</td>
<td>89.5</td>
<td>0.5</td>
<td>26.1</td>
<td>35,105</td>
<td>1,098.3</td>
</tr>
<tr>
<td>All areas combined</td>
<td>2,532</td>
<td>91.4</td>
<td>0.5</td>
<td>26.1</td>
<td>35,105</td>
<td>1,098.3</td>
<td></td>
</tr>
</tbody>
</table>
Table 10.—Rockfish composition in sampled marine boat sport fisheries during 1994. An estimated 702 rockfish were harvested in the Juneau marine boat sport fishery, and individual species were not identified.

<table>
<thead>
<tr>
<th>Rockfish species</th>
<th>Ketchikan</th>
<th>Sitka</th>
<th>Petersburg</th>
<th>Wrangell</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Harvesta</td>
<td>%</td>
<td>Harvestb</td>
<td>%</td>
</tr>
<tr>
<td>Quillback</td>
<td>2,067</td>
<td>36.9</td>
<td>706</td>
<td>12.7</td>
</tr>
<tr>
<td>Dusky</td>
<td>68</td>
<td>1.2</td>
<td>116</td>
<td>2.1</td>
</tr>
<tr>
<td>Copper</td>
<td>334</td>
<td>6.0</td>
<td>112</td>
<td>2.0</td>
</tr>
<tr>
<td>Black</td>
<td>316</td>
<td>5.7</td>
<td>2,053</td>
<td>36.8</td>
</tr>
<tr>
<td>Yelloweye</td>
<td>1,892</td>
<td>33.8</td>
<td>2,135</td>
<td>38.3</td>
</tr>
<tr>
<td>Silvergrey</td>
<td>315</td>
<td>5.6</td>
<td>159</td>
<td>2.9</td>
</tr>
<tr>
<td>Other non-pelagic</td>
<td>611</td>
<td>10.9</td>
<td>110</td>
<td>2.0</td>
</tr>
<tr>
<td>Other pelagic</td>
<td>0</td>
<td>0.0</td>
<td>186</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>5,604</td>
<td>5.60</td>
<td>5,577</td>
<td>5.57</td>
</tr>
</tbody>
</table>

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

Shellfish effort and harvests of Dungeness, Tanner, and king crab were estimated for all of the marine boat sport fisheries except Sitka (Table 12). Shellfish effort in boat-days for the Juneau fishery (5,486 boat-days) was nearly four times that estimated for the Ketchikan fishery (1,439 boat-days). Since some effort was expended by divers, effort in boat-days is more comparable from fishery to fishery than effort in number of pots or rings fished. Substantial numbers of Dungeness, Tanner and king crab were harvested in the Juneau fishery, but no king crab or Tanner crab were taken in the Ketchikan area. The majority of the shrimp harvest (34,580 shrimp, SE = 3,241) occurred in Ketchikan, but shrimp harvests were also estimated in Petersburg and Wrangell.

DISCUSSION

As noted previously, onsite creel surveys provide data necessary for inseason management and they also can provide very 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 methods and coverage so that inseason estimates can be compared with Statewide Harvest Survey (SWHS) and onsite creel estimates from previous years.

Table 11. Summary of estimated total catch and harvest of pink salmon, chum salmon, sockeye salmon, and Dolly Varden in the Southeast Alaska marine boat sport fisheries sampled during 1994.

<table>
<thead>
<tr>
<th>Sport fishery</th>
<th>Time period</th>
<th>Pink salmon</th>
<th>Chum salmon</th>
<th>Sockeye salmon</th>
<th>Dolly Varden</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Catch</td>
<td>Harvest</td>
<td>Catch</td>
<td>Harvest</td>
</tr>
<tr>
<td>Ketchikan</td>
<td>4/25-9/25</td>
<td>42,057</td>
<td>33,366</td>
<td>6,125</td>
<td>5,818</td>
</tr>
<tr>
<td>Petersburg</td>
<td>5/09-7/17</td>
<td>53</td>
<td>53</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Wrangell</td>
<td>5/09-7/17</td>
<td>62</td>
<td>62</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>69,923</td>
<td>44,765</td>
<td>12,956</td>
<td>10,902</td>
</tr>
</tbody>
</table>
Table 12.—Estimated effort for, and harvest of Dungeness crab, king crab, Tanner crab and shrimp in sampled Southeast Alaska marine boat sport fisheries during 1994.

<table>
<thead>
<tr>
<th>Sport fishery</th>
<th>Time period</th>
<th>Effort</th>
<th>Dungeness crab harvest</th>
<th>Tanner crab harvest</th>
<th>King crab harvest</th>
<th>Shrimp harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Boat-days</td>
<td>SE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ketchikan</td>
<td>4/25-9/25</td>
<td>1,439</td>
<td>203</td>
<td>7,032</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Juneau</td>
<td>4/25-9/25</td>
<td>5,486</td>
<td>447</td>
<td>6,786</td>
<td>2,328</td>
<td>5,925</td>
</tr>
<tr>
<td>Petersburg</td>
<td>5/09-7/19</td>
<td>87</td>
<td>21</td>
<td>324</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>Wrangell</td>
<td>5/09-7/19</td>
<td>201</td>
<td>38</td>
<td>867</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>7,213</td>
<td>493</td>
<td>15,009</td>
<td>2,383</td>
<td>5,925</td>
</tr>
</tbody>
</table>

* Shrimp harvest not estimated in Juneau.

Effort, harvest and total catch estimates from the five 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. This is especially true for species other than chinook salmon in fisheries near Petersburg and Wrangell where surveys occurred from 9 May through 17 July. Pacific halibut, coho salmon, and pink salmon are harvested in substantially larger numbers during 18 July through the end of September than during the period from 9 May through 17 July.

The estimates for chinook salmon in the Juneau and Ketchikan fisheries are incomplete because there were no surveys of: (1) all harvests occurring during 1 January–24 April and 26 September–31 December; (2) private moorages on the road system or remote moorages or docks inaccessible from the road system; (3) the night period from the end of civil twilight to the beginning of surveys at about 0800 h; 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.


The Juneau and Ketchikan marine boat fisheries have been consistently surveyed from approximately mid-April or early May through late September. 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**

Total effort in the Juneau fishery during 1994 (384,528 angler-hours) was 10% higher than in
Table 13.—Estimated angler effort in the Juneau and Ketchikan marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

<table>
<thead>
<tr>
<th>Sport fishery</th>
<th>Year</th>
<th>Survey dates</th>
<th>Salmon-hours</th>
<th>Bottomfish-hours</th>
<th>Total angler-hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juneau</td>
<td>1983</td>
<td>4/17-10/1</td>
<td>236,344</td>
<td>48,299</td>
<td>320,603</td>
</tr>
<tr>
<td></td>
<td>1984</td>
<td>4/29-9/29</td>
<td>246,732</td>
<td>72,090</td>
<td>318,822</td>
</tr>
<tr>
<td></td>
<td>1985</td>
<td>4/15-9/29</td>
<td>269,077</td>
<td>72,381</td>
<td>341,458</td>
</tr>
<tr>
<td></td>
<td>1986</td>
<td>4/14-10/5</td>
<td>240,921</td>
<td>77,165</td>
<td>318,086</td>
</tr>
<tr>
<td></td>
<td>1989</td>
<td>4/24-9/4</td>
<td>287,676</td>
<td>85,354</td>
<td>373,504</td>
</tr>
<tr>
<td></td>
<td>1990</td>
<td>4/23-9/23</td>
<td>300,167</td>
<td>83,106</td>
<td>383,376</td>
</tr>
<tr>
<td></td>
<td>1993</td>
<td>4/26-9/26</td>
<td>270,838</td>
<td>78,820</td>
<td>349,655</td>
</tr>
<tr>
<td></td>
<td>% of average</td>
<td>116%</td>
<td>78%</td>
<td>107%</td>
<td></td>
</tr>
</tbody>
</table>

| Ketchikan     | 1984 | 4/29-9/29    | 161,100      | 62,625           | 223,725           |
|               | 1985 | 4/20-9/28    | 133,518      | 51,208           | 184,726           |
|               | 1987 | 4/11-9/25    | 153,086      | 71,611           | 225,777           |
|               | 1988 | 4/24-9/4     | 195,974      | 79,958           | 276,516           |
|               | 1989 | 5/07-9/23    | 199,063      | 49,347           | 248,410           |
|               | 1990 | 4/29-9/29    | 275,856      | 67,842           | 343,698           |
|               | 1992 | 4/26-9/26    | 198,960      | 78,002           | 277,962           |
|               | Average | 185,237     | 68,324        | 253,771           |
|               | % of average | 124%           | 82%             | 113%             |                   |

1993 (349,965 angler-hours) and 7% higher than the 1983-1993 average of 358,389 angler-hours. In Ketchikan, total 1994 effort (286,464 angler-hours) was up 3% from the estimated effort in 1993 (276,969 angler-hours), and 13% above the 1984-1993 average of 253,771 angler-hours (Table 13). Average effort through 1993 (as determined from available data) for the Ketchikan fishery was about 71% of the Juneau average. In 1994 total effort in Ketchikan was 74% of that seen in Juneau.

In Juneau the estimated amount of salmon effort was 16% above average, while salmon effort in Ketchikan was 24% above average. Bottomfish effort in Juneau was 22% below average, while bottomfish effort in Ketchikan was 18% below the 1984-93 average. In Juneau and Ketchikan, 83% and 80%, respectively, of 1994 effort targeted on salmon, which was above long-term averages.

**Chinook Salmon Fisheries**

Total harvests of chinook salmon for both the Juneau and Ketchikan marine boat fisheries were down from 1993 (Table 14). The Juneau harvest of 5,819 chinook salmon was 8% below the 1977-1993 average, but the Ketchikan harvest was 46% below the 1984-1993 average, and the lowest since 1984. Harvest of chinook salmon in the Juneau Golden North Salmon Derby was 93% of average.

Relative hatchery contributions to the Juneau and Ketchikan fisheries were higher than in 1993 (Table 15). An estimated 37% of the 1994 chinook salmon harvest in Juneau originated in hatcheries compared to the 1983-1993 average of 25%. In Ketchikan, an estimated 71% of the 1994 harvest originated in hatcheries in comparison to the average of 46%. Harvests of
Table 14.—Estimated harvest of chinook salmon in the Juneau and Ketchikan marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

<table>
<thead>
<tr>
<th>Year</th>
<th>Juneau marine</th>
<th>Juneau Golden North Derby</th>
<th>Ketchikan marine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>4,845</td>
<td>516</td>
<td>---</td>
</tr>
<tr>
<td>1978</td>
<td>3,020</td>
<td>250</td>
<td>---</td>
</tr>
<tr>
<td>1979</td>
<td>4,644</td>
<td>1,077</td>
<td>---</td>
</tr>
<tr>
<td>1980</td>
<td>5,552</td>
<td>477</td>
<td>---</td>
</tr>
<tr>
<td>1981</td>
<td>4,185</td>
<td>873</td>
<td>---</td>
</tr>
<tr>
<td>1982</td>
<td>4,670</td>
<td>1,016</td>
<td>---</td>
</tr>
<tr>
<td>1983</td>
<td>4,316</td>
<td>872</td>
<td>---</td>
</tr>
<tr>
<td>1984</td>
<td>6,474</td>
<td>855</td>
<td>1,820</td>
</tr>
<tr>
<td>1985</td>
<td>8,133</td>
<td>1,222</td>
<td>---</td>
</tr>
<tr>
<td>1986</td>
<td>5,050</td>
<td>1,073</td>
<td>5,006</td>
</tr>
<tr>
<td>1987</td>
<td>8,893</td>
<td>1,065</td>
<td>4,723</td>
</tr>
<tr>
<td>1988</td>
<td>5,083</td>
<td>617</td>
<td>2,493</td>
</tr>
<tr>
<td>1989</td>
<td>7,074</td>
<td>609</td>
<td>5,752</td>
</tr>
<tr>
<td>1990</td>
<td>7,335</td>
<td>493</td>
<td>9,860</td>
</tr>
<tr>
<td>1991</td>
<td>12,234</td>
<td>522</td>
<td>12,730</td>
</tr>
<tr>
<td>1992</td>
<td>7,114</td>
<td>603</td>
<td>5,670</td>
</tr>
<tr>
<td>1993</td>
<td>8,337</td>
<td>243</td>
<td>5,277</td>
</tr>
<tr>
<td>Average</td>
<td>6,326</td>
<td>728</td>
<td>6,232</td>
</tr>
</tbody>
</table>

1994 | 5,819 | 678 | 3,374

% of average 92% 93% 54%
aIncludes Juneau Golden North Salmon Derby harvest.

Alaska hatchery chinook salmon are of most value, as most of these fish do not count toward U.S./Canada Pacific Salmon Treaty catch totals. An estimated 33% of the 1994 chinook salmon harvest in Juneau originated in Alaskan hatcheries, which was the highest percentage recorded. In Ketchikan, an estimated 41% of the 1994 harvest originated in Alaskan hatcheries in comparison to the average of 35%. This year was the third season that total harvest of wild and non-Alaskan hatchery fish taken by the sport fishery in Southeast Alaska was limited to a quota.

COHO SALMON FISHERIES

The 1994 harvest of 44,673 coho salmon in the Ketchikan area was the highest recorded and was 123% above the 1984-1993 average of 20,073 (Table 16). The Juneau area harvest of coho salmon (62,218 fish) was also the highest recorded and was nearly four times the 1977-1993 average of 15,722. The Juneau Golden North Salmon derby harvest of 8,358 coho salmon was also a record and was 233% above the 1977-1993 average of 2,511.

Harvest of coho salmon in both the Juneau and Ketchikan areas continues to be supplemented by

Table 15.—Estimated contributions of hatchery-produced chinook salmon to Juneau and Ketchikan marine boat sport fisheries as determined by onsite creel surveys, 1983-1994.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>% Alaska</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>46</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>1984</td>
<td>577</td>
<td>9</td>
<td>444</td>
</tr>
<tr>
<td>1985</td>
<td>1,037</td>
<td>13</td>
<td>831</td>
</tr>
<tr>
<td>1986</td>
<td>1,032</td>
<td>20</td>
<td>918</td>
</tr>
<tr>
<td>1987</td>
<td>2,060</td>
<td>23</td>
<td>2,015</td>
</tr>
<tr>
<td>1988</td>
<td>1,210</td>
<td>21</td>
<td>979</td>
</tr>
<tr>
<td>1989</td>
<td>1,018</td>
<td>14</td>
<td>865</td>
</tr>
<tr>
<td>1990</td>
<td>2,011</td>
<td>27</td>
<td>1,584</td>
</tr>
<tr>
<td>1991</td>
<td>4,279</td>
<td>37</td>
<td>2,957</td>
</tr>
<tr>
<td>1992</td>
<td>2,958</td>
<td>42</td>
<td>1,762</td>
</tr>
<tr>
<td>1993</td>
<td>1,511</td>
<td>18</td>
<td>1,446</td>
</tr>
<tr>
<td>Average</td>
<td>1,613</td>
<td>25</td>
<td>1,257</td>
</tr>
<tr>
<td>1994</td>
<td>2,127</td>
<td>37</td>
<td>1,895</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>% Alaska</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>350</td>
<td>10</td>
<td>233</td>
</tr>
<tr>
<td>1984</td>
<td>432</td>
<td>24</td>
<td>333</td>
</tr>
<tr>
<td>1985</td>
<td>862</td>
<td>34</td>
<td>838</td>
</tr>
<tr>
<td>1986</td>
<td>2,226</td>
<td>44</td>
<td>1,638</td>
</tr>
<tr>
<td>1987</td>
<td>1,409</td>
<td>30</td>
<td>999</td>
</tr>
<tr>
<td>1988</td>
<td>1,747</td>
<td>33</td>
<td>1,405</td>
</tr>
<tr>
<td>1989</td>
<td>2,992</td>
<td>52</td>
<td>2,082</td>
</tr>
<tr>
<td>1990</td>
<td>6,023</td>
<td>61</td>
<td>4,511</td>
</tr>
<tr>
<td>1991</td>
<td>8,373</td>
<td>66</td>
<td>7,035</td>
</tr>
<tr>
<td>1992</td>
<td>3,628</td>
<td>64</td>
<td>2,604</td>
</tr>
<tr>
<td>1993</td>
<td>3,425</td>
<td>65</td>
<td>2,234</td>
</tr>
<tr>
<td>Average</td>
<td>2,861</td>
<td>46</td>
<td>2,174</td>
</tr>
</tbody>
</table>

a 1991 Juneau percentages were calculated without including 803 chinook salmon taken in strata not sampled for coded wire tags.
Table 16.—Estimated harvest of coho salmon in the Juneau and Ketchikan marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

<table>
<thead>
<tr>
<th>Year</th>
<th>Juneau marine</th>
<th>Juneau Golden North Derby</th>
<th>Ketchikan marine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>13,084</td>
<td>3,625</td>
<td>---</td>
</tr>
<tr>
<td>1978</td>
<td>16,697</td>
<td>2,855</td>
<td>---</td>
</tr>
<tr>
<td>1979</td>
<td>10,150</td>
<td>3,224</td>
<td>---</td>
</tr>
<tr>
<td>1980</td>
<td>11,694</td>
<td>2,277</td>
<td>---</td>
</tr>
<tr>
<td>1981</td>
<td>8,661</td>
<td>1,174</td>
<td>---</td>
</tr>
<tr>
<td>1982</td>
<td>20,747</td>
<td>5,320</td>
<td>---</td>
</tr>
<tr>
<td>1983</td>
<td>12,662</td>
<td>2,964</td>
<td>---</td>
</tr>
<tr>
<td>1984</td>
<td>10,100</td>
<td>1,594</td>
<td>14,231</td>
</tr>
<tr>
<td>1985</td>
<td>17,138</td>
<td>2,919</td>
<td>---</td>
</tr>
<tr>
<td>1986</td>
<td>9,763</td>
<td>367</td>
<td>20,814</td>
</tr>
<tr>
<td>1987</td>
<td>17,610</td>
<td>3,056</td>
<td>10,464</td>
</tr>
<tr>
<td>1988</td>
<td>12,017</td>
<td>1,435</td>
<td>5,525</td>
</tr>
<tr>
<td>1989</td>
<td>23,819</td>
<td>3,173</td>
<td>10,781</td>
</tr>
<tr>
<td>1990</td>
<td>76,143</td>
<td>1,914</td>
<td>11,661</td>
</tr>
<tr>
<td>1991</td>
<td>22,379</td>
<td>2,567</td>
<td>43,789</td>
</tr>
<tr>
<td>1992</td>
<td>18,482</td>
<td>2,166</td>
<td>22,688</td>
</tr>
<tr>
<td>1993</td>
<td>15,921</td>
<td>2,031</td>
<td>18,703</td>
</tr>
<tr>
<td>Average</td>
<td>15,722</td>
<td>2,511</td>
<td>20,073</td>
</tr>
<tr>
<td>1994</td>
<td>62,218</td>
<td>8,358</td>
<td>44,673</td>
</tr>
</tbody>
</table>

% of average

<table>
<thead>
<tr>
<th></th>
<th>Juneau marine</th>
<th>Juneau Golden North Derby</th>
<th>Ketchikan marine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>396%</td>
<td>333%</td>
<td>223%</td>
</tr>
</tbody>
</table>

a Includes Juneau Golden North Salmon Derby harvest.

The estimated harvest of 8,260 (13% of total) hatchery coho salmon in Juneau was much greater than the 1993 contribution and more than ten times as much as the 1983-1993 average of 768. The increase in hatchery coho salmon harvests in the Juneau area was mostly due to returns to the Gastineau Hatchery owned by Douglas Island Pink and Chum, Inc. These returns also generated a substantial shoreline fishery in Gastineau Channel for coho salmon returning during late August through early October (Beers, In press).

The Ketchikan fishery has been much more dependent upon hatchery coho salmon than the Juneau fishery. About 14% of the 1984 to 1993 Ketchikan harvest originated in hatcheries (Table 17). In 1994, both the estimated harvest of 14,491 hatchery coho salmon and the 1994 hatchery contribution of 32% in Ketchikan were well above average.

Table 17.—Estimated contributions of hatchery-produced coho salmon to Juneau and Ketchikan marine boat sport fisheries as determined by onsite creel surveys, 1983-1994.

<table>
<thead>
<tr>
<th>Year</th>
<th>Juneau marine</th>
<th>Juneau Golden North Derby</th>
<th>Ketchikan marine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>227</td>
<td>2</td>
<td>---</td>
</tr>
<tr>
<td>1984</td>
<td>52</td>
<td>1</td>
<td>5,181</td>
</tr>
<tr>
<td>1985</td>
<td>1,353</td>
<td>8</td>
<td>---</td>
</tr>
<tr>
<td>1986</td>
<td>37</td>
<td>&lt;1</td>
<td>3,200</td>
</tr>
<tr>
<td>1987</td>
<td>94</td>
<td>1</td>
<td>4,663</td>
</tr>
<tr>
<td>1988</td>
<td>262</td>
<td>2</td>
<td>292</td>
</tr>
<tr>
<td>1989</td>
<td>930</td>
<td>4</td>
<td>1,147</td>
</tr>
<tr>
<td>1990</td>
<td>482</td>
<td>2</td>
<td>9,515</td>
</tr>
<tr>
<td>1991</td>
<td>2,526</td>
<td>12</td>
<td>18,627</td>
</tr>
<tr>
<td>1992</td>
<td>905</td>
<td>5</td>
<td>9,588</td>
</tr>
<tr>
<td>1993</td>
<td>1,577</td>
<td>10</td>
<td>4,325</td>
</tr>
<tr>
<td>Average</td>
<td>768</td>
<td>5</td>
<td>6,282</td>
</tr>
<tr>
<td>1994</td>
<td>8,260</td>
<td>13</td>
<td>14,491</td>
</tr>
</tbody>
</table>

% of average

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

**BOTTOMFISH FISHERIES**

The 1994 harvest of Pacific halibut in the Juneau fishery (8,843) was 74% of the 1983-1993 average of 11,939 (Table 18). The Ketchikan harvest (10,960) was 15% above the 1984-1993 average of 9,537. Total estimated catch of Pacific halibut in the Juneau fishery (12,890) was 77% of the 1983-1993 average (16,846). The 1994 catch of Pacific halibut in Ketchikan (13,809) was 20% above the 1984-1993 average (11,509). Retention rates for Pacific halibut were slightly below average in Juneau and Ketchikan at 69% and 79%, respectively.

Rockfish harvests in the 1994 Ketchikan fishery (5,604) were 51% below the 1984-93 average of 11,538 (Table 19). Retention of rockfish at 40% was below the 1986-1993 average of 46%. Targeted and non-targeted HPUE and CPUE for rockfish were all below average.

<table>
<thead>
<tr>
<th>Year</th>
<th>Juneau marine</th>
<th></th>
<th>Ketchikan marine</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kept</td>
<td>Released</td>
<td>Total catch</td>
<td>Percent retained</td>
</tr>
<tr>
<td>1983</td>
<td>16,414</td>
<td>4,674</td>
<td>21,088</td>
<td>78</td>
</tr>
<tr>
<td>1984</td>
<td>14,609</td>
<td>9,100</td>
<td>23,709</td>
<td>62</td>
</tr>
<tr>
<td>1985</td>
<td>11,931</td>
<td>3,955</td>
<td>15,886</td>
<td>75</td>
</tr>
<tr>
<td>1986</td>
<td>13,132</td>
<td>6,868</td>
<td>20,000</td>
<td>66</td>
</tr>
<tr>
<td>1987</td>
<td>13,513</td>
<td>10,357</td>
<td>23,870</td>
<td>57</td>
</tr>
<tr>
<td>1988</td>
<td>12,672</td>
<td>5,027</td>
<td>17,699</td>
<td>72</td>
</tr>
<tr>
<td>1989</td>
<td>12,484</td>
<td>2,406</td>
<td>14,890</td>
<td>84</td>
</tr>
<tr>
<td>1990</td>
<td>11,774</td>
<td>4,018</td>
<td>15,792</td>
<td>75</td>
</tr>
<tr>
<td>1991</td>
<td>8,611</td>
<td>2,363</td>
<td>10,974</td>
<td>78</td>
</tr>
<tr>
<td>1992</td>
<td>9,265</td>
<td>2,554</td>
<td>11,819</td>
<td>78</td>
</tr>
<tr>
<td>1993</td>
<td>6,928</td>
<td>2,652</td>
<td>9,580</td>
<td>72</td>
</tr>
</tbody>
</table>

Average 11,939 4,907 16,846 71

1994 8,843 4,047 12,890 69

% of Average 74 82 77

SHELLFISH FISHERIES

Harvests of shellfish in the Juneau and Ketchikan areas have been consistently estimated with creel surveys since 1988 (Table 20). Estimated shellfish effort of 5,456 boat-days in the Juneau area was well above average, as was the harvest of 5,925 king crab. Harvest of 2,328 Tanner crab in the Juneau area was above average; while the harvest of 6,786 Dungeness crab was below average. In Ketchikan, shellfish effort of 1,439 boat-days was the second highest recorded, and 19% above the 1988-1993 average of 1,212 boat-days. Dungeness crab harvest in Ketchikan of 7,032 was above the 1988-1993 average of 6,976. Shrimp harvest in the Ketchikan area during 1994 (34,580) was below average.

CONCLUSIONS AND RECOMMENDATIONS

The primary goals of this project were to obtain estimates of the harvest and Alaska hatchery contributions of chinook salmon in selected sport fisheries of Southeast Alaska with specified levels of precision for management of the fisheries. Individual estimates of chinook harvest were within our relative precision goal of ±20% of the true value 90% of the time at all locations (see Appendices B1 through B5). Similarly, contribution estimates of Alaska hatchery chinook salmon were within ±20 percentage points of absolute precision 90% of the time at all locations (Table 3). Absolute precision of the Alaska hatchery contribution estimates at all sites ranged from 5% to 19%.

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 increases in harvests of hatchery chinook and coho salmon. For example, since 1990 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 1994, the percent contribution of Alaskan hatchery chinook salmon to monitored marine boat sport fisheries averaged 22% and the total hatchery contribution averaged 46%. The number of hatchery coho salmon contributed to
Table 19.—Comparative effort and catch statistics for the Ketchikan rockfish sport fishery.

| 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          |            |
| Average |            | 253,771           | 68,324           | 11,538  | 13,454   | 25,209     | 46        | 0.17    | 0.05           | 0.37     | 0.10          |            |
| 1994  | 4/25–9/25    | 286,464           | 56,092           | 5,604   | 8,283    | 13,887     | 40        | 0.10    | 0.02           | 0.25     | 0.05          |            |
| % of average | 113         | 82                | 49               | 62      | 55       | 59         | 40        | 68      | 50            |          |               |            |

\(^a\) 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.
\(^e\) 1985 data not comparable because creel survey only lasted through 30 June instead of late September.

### JUNEAU FISHERY

<table>
<thead>
<tr>
<th>Year</th>
<th>Effort (boat-days)</th>
<th>Dungeness crab harvest</th>
<th>Tanner crab harvest</th>
<th>King crab harvest</th>
<th>Shrimp harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>2,287</td>
<td>6,459</td>
<td>3,042</td>
<td>552</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>2,652</td>
<td>8,356</td>
<td>3,369</td>
<td>1,849</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>2,622</td>
<td>6,289</td>
<td>1,883</td>
<td>1,960</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>3,812</td>
<td>13,433</td>
<td>1,294</td>
<td>2,467</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>5,411</td>
<td>12,675</td>
<td>1,034</td>
<td>5,673</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>6,013</td>
<td>11,980</td>
<td>1,557</td>
<td>8,963</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>5,486</td>
<td>6,786</td>
<td>2,328</td>
<td>5,925</td>
<td></td>
</tr>
</tbody>
</table>

### KETCHIKAN FISHERY

<table>
<thead>
<tr>
<th>Year</th>
<th>Effort (boat-days)</th>
<th>Dungeness crab harvest</th>
<th>Tanner crab harvest</th>
<th>King crab harvest</th>
<th>Shrimp harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>1,398</td>
<td>9,043</td>
<td></td>
<td></td>
<td>27,643</td>
</tr>
<tr>
<td>1989</td>
<td>508</td>
<td>2,688</td>
<td></td>
<td></td>
<td>12,730</td>
</tr>
<tr>
<td>1990</td>
<td>614</td>
<td>3,367</td>
<td></td>
<td></td>
<td>17,130</td>
</tr>
<tr>
<td>1991</td>
<td>1,394</td>
<td>7,631</td>
<td></td>
<td></td>
<td>69,450</td>
</tr>
<tr>
<td>1992</td>
<td>1,387</td>
<td>10,227</td>
<td></td>
<td></td>
<td>130,720</td>
</tr>
<tr>
<td>1993</td>
<td>1,973</td>
<td>8,897</td>
<td></td>
<td></td>
<td>37,000</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>49,122</td>
</tr>
<tr>
<td>1994</td>
<td>1,439</td>
<td>7,032</td>
<td></td>
<td></td>
<td>34,580</td>
</tr>
</tbody>
</table>

the Ketchikan, Juneau, Sitka, and Craig sport fisheries was greater than 10% of the harvest. It is recommended that onsite creel surveys of marine boat fisheries be continued 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 1994, sampling of all major boat sport fisheries including those in Ketchikan, Juneau, Sitka, Petersburg, and Wrangell was necessary to estimate the total Southeast Alaska sport harvest of chinook salmon so that the sport fishery could be effectively managed. These sampling efforts 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 preparation of position statements on proposed regulation changes and public information documents. It is recommended that the collection of current data on sport fisheries for coho salmon and Pacific halibut be continued to improve management planning for these species. It is also recommended that the 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.

### ACKNOWLEDGMENTS

We wish to thank the creel survey staff of Sue Millard, Linda Wendeborn, Rebecca Wilson, Sue
Cheeley, Dale Brandenburger, Mike Wood, Forest Parsley, Ronald Parsley, Teresa Wills, LoAnn Swanson, Catherine Hanson, Kerry Maeder, Margaret Byford, Judith Nutter, Bruce Engdahl, James Lecrone, and Bill Arnold for their invaluable data collection efforts and many suggestions to improve survey techniques. Mike Wood was especially helpful in coordinating the efforts of staff in Ketchikan, Petersburg, and Wrangell. Dean Beers supervised the creel survey staff in Sitka and Juneau and edited and analyzed data, and his efforts are appreciated. Sue Millard also aged all chinook salmon scales with assistance from Region I Commercial Fisheries staff. Staff of the ADF&G Commercial Fisheries Management and Development (CFMD) Division CWT lab are gratefully acknowledged for their work on dissecting salmon heads, coded wire tag decoding, and their data reduction efforts. We thank Donna Buchholz of the Research and Technical Services Unit (RTS) of the Division of Sport Fish for her diligence in mark sense form processing and data control.

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Schmidt, A. E., and F. S. Robards. 1975. Inventory and cataloging of the sport fish and sport fish waters in southeast Alaska. Alaska Department of Fish and Game, Federal Aid


APPENDIX A - DATA ANALYSIS PROCEDURES

Harvest as well as catch by species along with angler effort was estimated by the following procedures for each stratum with locations, days, periods, and boat-parties as sampling units for the surveys conducted at Petersburg, Wrangell, and Sitka.

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:

\[ \bar{N}_{\text{hjio}} = \frac{\sum_{k=1}^{m_{\text{hjio}}} n_{\text{hjiok}}}{m_{\text{hjio}}} \]  

where: \( n_{\text{hjiok}} \) was 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 \( m_{\text{hjio}} \) equaled 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:

\[ \hat{N}_{\text{hjio}} = M_{\text{hjio}} \bar{N}_{\text{hjio}} \]

where: \( M_{\text{hjio}} \) equaled the number of boat-parties counted within each sample.

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

\[ \bar{N}_{\text{hji}} = \frac{\sum_{o=1}^{p_{\text{hji}}} \hat{N}_{\text{hjio}}}{p_{\text{hji}}} \]

where: \( p_{\text{hji}} \) was 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:

\[ \hat{N}_{\text{hji}} = P_{\text{hji}} \bar{N}_{\text{hji}} \]

where: \( P_{\text{hji}} \) equaled the number of periods within the sampling day.

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

\[ \bar{N}_{\text{hj}} = \frac{\sum_{i=1}^{d_{\text{hj}}} \hat{N}_{\text{hji}}}{d_{\text{hj}}} \]  

-continued-

where: \( d_{nj} \) equaled the days sampled for access location \( j \).

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

\[
\hat{N}_{hj} = D_{hj} \bar{N}_{hj}
\]  
(A1.6)

where: \( D_{hj} \) equaled the total number of possible days available for sampling.

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

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

where: \( q_h \) equaled the number of access locations sampled within each stratum.

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

\[
\hat{N}_h = Q_h \bar{N}_h
\]  
(A1.8)

where: \( Q_h \) equaled the total number of access locations in each stratum.

Estimates of catch of each species was obtained 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):

\[
\hat{V}[\hat{N}_h] = \left\{ (1 - f_{1h})Q_h^2 \frac{S_{1h}^2}{q_h} \right\} + \left\{ f_{1h} \frac{Q_h^2}{q_h} \sum_{j=1}^{q_h} \left( 1 - f_{2hj} \right) D_{hj}^2 \frac{S_{2hj}^2}{d_{hj}} \right\} + \\
\left\{ f_{1h} \frac{Q_h^2}{q_h} \sum_{j=1}^{q_h} f_{2hj} \frac{D_{hj}^2}{d_{hj}} \frac{d_{hj}}{q_h} \sum_{i=1}^{d_{hj}} \left( 1 - f_{3hij} \right) p_{hij}^2 \frac{S_{3hij}^2}{p_{hij}} \right\} + \\
\left\{ f_{1h} \frac{Q_h^2}{q_h} \sum_{j=1}^{q_h} f_{2hj} \frac{D_{hj}^2}{d_{hj}} \frac{d_{hj}}{q_h} \sum_{i=1}^{d_{hj}} f_{3hii} \frac{p_{hij}^2}{p_{hij}} \sum_{o=1}^{p_{hij}} \left( 1 - f_{4hijo} \right) M_{hijo}^2 \frac{S_{4hijo}^2}{m_{hijo}} \right\} \right.
\]  
(A1.9)

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

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

$S^2_{2hj}$ equaled the among day (within access location) variance component for the harvest estimate, obtained as:

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

$S^2_{3hji}$ equaled the among sampling period variance component for the harvest estimate, obtained as:

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

and, $S^2_{4hjio}$ equaled the among boat-party variance component for the harvest estimate, obtained as:

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

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 Petersburg) only one period was defined within a sampling day. The sampling day in these surveys was 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 equaled zero.

-continued-
Similarly, in applying these procedures to some strata only one location was defined. Accordingly, \( q_h = Q_h = 1 \), and \( f_{th} = 1 \), and as such the first-stage variance term equaled zero. Note, that only one access location was defined within all sampling strata for the Petersburg survey, and as such the first stage variance component reduces to zero for this survey.

Also note that during many of the derby strata each derby day was defined as a separate stratum, so that \( d_{hj} = D_{hj} = 1 \), and \( f_{2hj} = 1 \), and as such the second-stage variance term equaled 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 equaled 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 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 A2.-Data analysis procedures for angler effort, catch, and harvest estimates for the Ketchikan and Juneau marine boat sport fishery during 1994.

Estimates of angler effort, 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 obtained over all boat-parties interviewed at each sampled access location within each sampled day:

\[
\bar{n}_{hij} = \frac{\sum_{k=1}^{m_{hij}} n_{hijk}}{m_{hij}}
\]  

(A2.1)

where: \( n_{hijk} \) was the number of fish harvested by interviewed boat-party \( k \) at access location \( j \) during sampled day \( i \) within stratum \( h \); and \( m_{hij} \) equaled 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:

\[
\hat{N}_{hij} = M_{hij} \bar{n}_{hij} \]

(A2.2)

where: \( M_{hij} \) equaled 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:

\[
\bar{N}_{hi} = \frac{\sum_{j=1}^{q_{hi}} \hat{N}_{hij}}{q_{hi}}
\]  

(A2.3)

where: \( q_{hi} \) equaled 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:

\[
\hat{N}_{hi} = Q_{hi} \bar{N}_{hi}
\]  

(A2.4)

where: \( Q_{hi} \) equaled the total number of possible access locations available for sampling.

-continued-
Then the stratum mean daily harvest was obtained:

\[ \bar{N}_h = \frac{\sum_{i=1}^{d_h} \hat{N}_{hi}}{d_h} \]  

(A2.5)

where: \( d_h \) equaled the number of days sampled within each stratum.

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

\[ \hat{N}_h = D_h \bar{N}_h \]  

(A2.6)

where: \( D_h \) equaled the total number of days in each stratum.

Estimates of catch of each species was obtained similarly by substituting the appropriate catch statistics for each species into equations A2.1 through 2.6, above. Similarly, the angler effort estimate was calculated by substitution.

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

\[ \hat{\sigma}^2 \left[ \hat{N}_h \right] = \left\{ \left( 1 - f_{1h} \right) D_h^2 \frac{S_{1h}^2}{d_h} \right\} + \]

\[ \left\{ f_{1h} \frac{D_h^2}{d_h^2} \sum_{i=1}^{d_h} \left( 1 - f_{2hi} \right) Q_{hi}^2 \frac{S_{2hi}^2}{q_{hi}} \right\} + \]

\[ \left\{ f_{1h} \frac{D_h^2}{d_h^2} \sum_{i=1}^{d_h} f_{2hi} Q_{hi}^2 \frac{q_{hi}}{Q_{hi}} \sum_{j=1}^{q_{hi}} \left( 1 - f_{3hij} \right) M_{hij}^2 \frac{s_{3hij}^2}{m_{hij}} \right\} \]

(A2.7)

where: \( f_{1h}, f_{2hi}, \) and \( f_{3hij} \) were the sampling fractions for days, access locations, and boat-parties respectively (i.e., \( f_{1h} = d_h/D_h; f_{2hi} = q_{hi}/Q_{hi}; f_{3hij} = m_{hij}/M_{hij} \)); \( S_{1h}^2 \) equaled the among day variance component for the angler harvest estimate, which was obtained as:

\[ S_{1h}^2 = \frac{\sum_{i=1}^{d_h} \left( \hat{N}_{hi} - \bar{N}_h \right)^2}{d_h - 1} \]  

(A2.8)
Appendix A2.-Page 3 of 3.

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

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

and, $s_{3hij}^2$ equaled the among boat-party variance component for the harvest estimate, obtained as;

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

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 A2.7 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 obtained 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 1994.

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:

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

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:

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

Standard errors were obtained by taking the square root of the variance estimates.
Appendix A4.-Data analysis procedures for hatchery contributions for the Ketchikan, Petersburg, Wrangell, Sitka, Juneau, and Craig surveys of the marine boat sport fishery during 1994.

Hatchery contributions were estimated for the surveys using the procedures outlined by Clark and Bernard (1987). 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 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 the access location used within each survey, then this assumption should be valid.

Approximate procedures adapted from Clark and Bernard (1987) and proposed by Conrad and Larson (1987) were used for variance estimates for estimating variances and standard errors. The equations presented in Clark and Bernard (1987) could not be used directly to estimate variances due to the presence of sampling error in the estimates of total harvest.

\[ \hat{n}_{iA} = \left( \frac{N_t}{n_{2t}} \right) \left( \frac{a_{1t}}{a_{2t}} \right) \left( \frac{m_{1t}}{m_{2t}} \right) \left( \frac{m_{cA}t}{\theta_A} \right) \]  

(A4.1)

The notation used in the following equations essentially follows that used by Clark and Bernard (1987), with additional subscripts used to denote individual biweekly period values. The first step involved estimating the contribution to each biweekly period in the fishery of each particular tag code (using equation [10] from Clark and Bernard 1987):

where: \( \hat{n}_{iA} \) equaled the estimated number of salmon from a hatchery release identified by the unique tag code \( A \), harvested in biweek \( t \); \( N_t \) was the estimated total harvest of salmon (one particular species only) for biweek \( t \); \( n_{2t} \) is number of salmon (one particular species only) inspected for missing adipose fins from the sampled harvest in biweek \( t \); \( a_{1t} \) was the number of salmon with a missing adipose fin which were counted and marked with a head strap from biweek \( t \); \( a_{2t} \) equaled the number of salmon heads previously marked with a head strap which arrived at the tag lab, from fish originally sampled from biweek \( t \); \( m_{1t} \) was the number of coded wire tags which were detected in the salmon heads at the tag lab, from those salmon sampled in biweek \( t \); \( m_{2t} \) equaled the number of coded wire tags which were removed from the salmon heads and decoded, from those salmon sampled in biweek \( t \); \( m_{cA} \) equaled the number of coded wire tags dissected out of the salmon heads and decoded as the unique tag code \( A \), originally sampled from biweek \( t \); and \( \theta_A \) was the proportion of a particular hatchery release which contained a coded wire tag of the unique tag code \( A \).

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.

-continued-
Appendix A4.-Page 2 of 2.

Estimates of the variance for contributions calculated from tag code recoveries were estimated by following the approach proposed by Conrad and Larson (1987), in which the terms \( \hat{m}_{cAt} \) and \( m_{cAt} \) were treated as random variates, and all other terms in equation A4.1 were treated as constants (accordingly the procedures outlined by Goodman (1960) was used for the second major term of equation A4.2):

where: \( \hat{V}[\hat{m}_{cAt}] \) equaled the estimated variance of overall harvest estimate for biweek \( t \), obtained from the harvest sampling program; \( \hat{V}[m_{cAt}] \) was the variance of "random variate" \( m_{cAt} \), approximated by the approach used by Clark and Bernard (1987; equation [12]):

\[
\hat{V}[m_{cAt}] \approx \frac{n_{2t}(n_{2t}-1)a_{2t}(a_{2t}-1)m_{2t}(m_{2t}-1)\hat{n}_{1At}(\hat{n}_{1At}-1)\theta_A^2}{\hat{N}_t(\hat{N}_t-1)a_{1t}(a_{1t}-1)m_{1t}(m_{1t}-1)}
\]  

(A4.3)

The final step in calculating the variance of \( \hat{n}_{1At} \) was to perform the following bias correction (Clark and Bernard 1987; equation [15]):

\[
\hat{V}[\hat{n}_{1At}] = \left\{ \frac{(\hat{N}_t-1)n_{2t}(a_{1t}-1)a_{2t}(m_{1t}-1)m_{2t}}{\hat{N}_t(n_{2t}-1)a_{1t}(a_{2t}-1)m_{1t}(m_{2t}-1)} \right\}^2 \hat{V}^2[\hat{n}_{1At}].
\]  

(A4.4)

Estimates of the variance of across biweek contributions by tag code, as well as by combined tag codes were obtained by summing the variances across the biweeks and tag codes, as appropriate. The resulting estimates of variance were assumed to be conservative in that the covariances among contribution estimates by tag code within each sampling biweek were assumed to be negative (Clark and Bernard 1987).

Standard errors (SE's) were obtained as the square root of the appropriate variance.

In applying these procedures to the Craig sampling data the observed harvest (i.e., \( n_2 \)) was used in place of the unestimated total harvest. Accordingly, the reported estimates of hatchery contribution only apply to the sampled harvest. Also note that for the Craig survey the entire season’s data was used in total to calculate the contributions, instead of calculating in a biweekly manner.
APPENDIX B - CREEL SURVEY STATISTICS

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Relative Precision&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finfish Effort</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boat-hours</td>
<td>105,845</td>
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</tr>
<tr>
<td>Salmon-hours</td>
<td>230,372</td>
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<tr>
<td>Halibut-hours</td>
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</tr>
<tr>
<td>Angler-hours</td>
<td>286,464</td>
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</tr>
<tr>
<td>Boat-days</td>
<td>27,960</td>
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<td>13%</td>
</tr>
<tr>
<td><strong>Finfish Harvests</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total Chinook Salmon ≥ 28&quot;</td>
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</tr>
<tr>
<td>Derby Take-home</td>
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<td>85</td>
<td>60%</td>
</tr>
<tr>
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<td>0%</td>
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<tr>
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<td>23%</td>
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<tr>
<td>Total Chinook Salmon &lt; 28&quot;</td>
<td>62</td>
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<td>69%</td>
</tr>
<tr>
<td>Coho Salmon</td>
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</tr>
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<td>Dusky Rockfish</td>
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<tr>
<td>Other Non-pelagic Rockfish</td>
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<td>174</td>
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</tr>
<tr>
<td>Unidentified Rockfish</td>
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<td><strong>Finfish Total Catch</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Chinook Salmon ≥ 28&quot;</td>
<td>3,522</td>
<td>360</td>
<td>17%</td>
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<tr>
<td>Chinook Salmon &lt; 28&quot;</td>
<td>24,208</td>
<td>2,826</td>
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<tr>
<td>Coho Salmon</td>
<td>48,912</td>
<td>5,932</td>
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<td>Chum Salmon</td>
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<tr>
<td>Pink Salmon</td>
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<td>4,865</td>
<td>19%</td>
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<td>Pacific Halibut</td>
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<td>Lingcod</td>
<td>892</td>
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<tr>
<td>Total Rockfish</td>
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<tr>
<td><strong>Shellfish Effort and Harvest</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
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<td></td>
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<tr>
<td>Boat-days Fished</td>
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<td>23%</td>
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<tr>
<td>Dungeness Crab Kept</td>
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<tr>
<td>Shrimp Kept</td>
<td>34,580</td>
<td>3,241</td>
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<sup>a</sup> Relative precision (α=0.10) = (SE * 1.645 / Estimate) * 100.

<sup>b</sup> Lingcod-hours and rockfish-hours not recorded.

<sup>c</sup> No Dolly Varden, steelhead trout, cutthroat trout, Tanner crab, king crab, or other pelagic rockfish were caught or harvested.

<table>
<thead>
<tr>
<th>Effort/Species</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Relative Precision</th>
</tr>
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<tbody>
<tr>
<td><strong>Finfish Effort</strong></td>
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<tr>
<td>Boat-hours</td>
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<td>Angler-hours</td>
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<td>Boat-days</td>
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<tr>
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</tr>
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<td>0</td>
<td>0%</td>
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<tr>
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<td>0%</td>
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<td>Dolly Varden</td>
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</tr>
<tr>
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<td>17</td>
<td>147%</td>
</tr>
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<td>Total Rockfish</td>
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<td><strong>Shellfish Total Catch</strong></td>
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<tr>
<td>Chinook Salmon ≥ 28&quot;</td>
<td>5,921</td>
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<td>Chinook Salmon &lt; 28&quot;</td>
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<td>Coho Salmon</td>
<td>64,348</td>
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<tr>
<td>Sockeye Salmon</td>
<td>91</td>
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<td>51%</td>
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<tr>
<td>Pink Salmon</td>
<td>20,394</td>
<td>1,962</td>
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<td>Pacific Halibut</td>
<td>12,890</td>
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<tr>
<td>Dolly Varden</td>
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<tr>
<td>Steelhead Trout</td>
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<td>5</td>
<td>137%</td>
</tr>
<tr>
<td>Lingcod</td>
<td>19</td>
<td>17</td>
<td>147%</td>
</tr>
<tr>
<td>Total Rockfish</td>
<td>919</td>
<td>205</td>
<td>37%</td>
</tr>
</tbody>
</table>

Relative precision (α=0.10) = (SE * 1.645 / Estimate) * 100.

Lingcod-hours, rockfish-hours, and shrimp harvest not recorded.

No steelhead trout were harvested, and no cutthroat trout were caught or harvested.

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Relative Precisiona</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finfish Effort</strong>b</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Boat-hours</td>
<td>64,673</td>
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<tr>
<td>Salmon-hours</td>
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<td>Halibut-hours</td>
<td>43,363</td>
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<tr>
<td>Boat-days</td>
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<tr>
<td><strong>Finfish Harvests</strong>c</td>
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<td></td>
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<tr>
<td>Total Chinook Salmon ≥ 28”</td>
<td>13,135</td>
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<td>10%</td>
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<tr>
<td>Derby Take-home</td>
<td>911</td>
<td>101</td>
<td>18%</td>
</tr>
<tr>
<td>Derby Entered</td>
<td>909</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Derby Take-home &amp; Entered</td>
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<td>9%</td>
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<tr>
<td>Total Chinook Salmon &lt; 28”</td>
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<tr>
<td>Coho Salmon</td>
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<tr>
<td>Chum Salmon</td>
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<tr>
<td>Sockeye Salmon</td>
<td>211</td>
<td>81</td>
<td>63%</td>
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<tr>
<td>Pink Salmon</td>
<td>2,828</td>
<td>378</td>
<td>22%</td>
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<tr>
<td>Pacific Halibut</td>
<td>13,185</td>
<td>1,133</td>
<td>14%</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>33</td>
<td>21</td>
<td>105%</td>
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<tr>
<td>Lingcod</td>
<td>3,564</td>
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<td>5,577</td>
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<tr>
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<tr>
<td>Dusky Rockfish</td>
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<tr>
<td>Other Non-pelagic Rockfish</td>
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<tr>
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<tr>
<td>Coho Salmon</td>
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<tr>
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<td>3,380</td>
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<tr>
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<td>4,226</td>
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<tr>
<td>Total Rockfish</td>
<td>21,847</td>
<td>1,710</td>
<td>13%</td>
</tr>
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</table>

a Relative precision (α=0.10) = (SE * 1.645 / Estimate) * 100.

b Lingcod-hours and rockfish-hours were not recorded.

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

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Relative Precision&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finfish Effort</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
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<td></td>
<td></td>
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<tr>
<td>Boat-hours</td>
<td>8,071</td>
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</tr>
<tr>
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<tr>
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<td>6,552</td>
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<tr>
<td>Angler-hours</td>
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<tr>
<td>Boat-days</td>
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<td>122</td>
<td>11%</td>
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<tr>
<td><strong>Finfish Harvest</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
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<tr>
<td>Total Chinook Salmon ≥ 28&quot;</td>
<td>698</td>
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<td>16%</td>
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<tr>
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<td>211</td>
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<td>0%</td>
</tr>
<tr>
<td>Pink Salmon</td>
<td>53</td>
<td>26</td>
<td>81%</td>
</tr>
<tr>
<td>Chum Salmon</td>
<td>8</td>
<td>5</td>
<td>103%</td>
</tr>
<tr>
<td>Sockeye Salmon</td>
<td>6</td>
<td>5</td>
<td>138%</td>
</tr>
<tr>
<td>Lingcod</td>
<td>17</td>
<td>15</td>
<td>146%</td>
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<tr>
<td>Pacific Halibut</td>
<td>1,121</td>
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<tr>
<td>Total Rockfish</td>
<td>138</td>
<td>47</td>
<td>56%</td>
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<tr>
<td>Quillback Rockfish</td>
<td>22</td>
<td>20</td>
<td>150%</td>
</tr>
<tr>
<td>Copper Rockfish</td>
<td>25</td>
<td>20</td>
<td>132%</td>
</tr>
<tr>
<td>Black Rockfish</td>
<td>8</td>
<td>7</td>
<td>144%</td>
</tr>
<tr>
<td>Yelloweye Rockfish</td>
<td>48</td>
<td>23</td>
<td>29%</td>
</tr>
<tr>
<td>Silvergrey Rockfish</td>
<td>14</td>
<td>10</td>
<td>118%</td>
</tr>
<tr>
<td>Unidentified Rockfish</td>
<td>21</td>
<td>11</td>
<td>86%</td>
</tr>
<tr>
<td><strong>Finfish Total Catch</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinook Salmon ≥ 28&quot;</td>
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<td>68</td>
<td>16%</td>
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<tr>
<td>Chinook Salmon &lt; 28&quot;</td>
<td>367</td>
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<td>26</td>
<td>81%</td>
</tr>
<tr>
<td>Chum Salmon</td>
<td>8</td>
<td>5</td>
<td>103%</td>
</tr>
<tr>
<td>Sockeye Salmon</td>
<td>6</td>
<td>5</td>
<td>138%</td>
</tr>
<tr>
<td>Lingcod</td>
<td>17</td>
<td>15</td>
<td>146%</td>
</tr>
<tr>
<td>Pacific Halibut</td>
<td>1,407</td>
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<td>31%</td>
</tr>
<tr>
<td>Total Rockfish</td>
<td>154</td>
<td>40</td>
<td>53%</td>
</tr>
<tr>
<td>Quillback Rockfish</td>
<td>22</td>
<td>20</td>
<td>150%</td>
</tr>
<tr>
<td>Copper Rockfish</td>
<td>25</td>
<td>20</td>
<td>132%</td>
</tr>
<tr>
<td>Black Rockfish</td>
<td>8</td>
<td>7</td>
<td>144%</td>
</tr>
<tr>
<td>Yelloweye Rockfish</td>
<td>49</td>
<td>23</td>
<td>29%</td>
</tr>
<tr>
<td>Silvergrey Rockfish</td>
<td>14</td>
<td>10</td>
<td>118%</td>
</tr>
<tr>
<td>Unidentified Rockfish</td>
<td>36</td>
<td>18</td>
<td>83%</td>
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<tr>
<td><strong>Shellfish Effort and Harvest</strong>&lt;sup&gt;d&lt;/sup&gt;</td>
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</tr>
<tr>
<td>Boat-days Fished</td>
<td>87</td>
<td>21</td>
<td>40%</td>
</tr>
<tr>
<td>Pots or Rings</td>
<td>202</td>
<td>54</td>
<td>44%</td>
</tr>
<tr>
<td>Dungeness Crab Kept</td>
<td>324</td>
<td>113</td>
<td>56%</td>
</tr>
<tr>
<td>Tanner Crab Kept</td>
<td>50</td>
<td>32</td>
<td>106%</td>
</tr>
<tr>
<td>Shrimp Kept</td>
<td>2,340</td>
<td>278</td>
<td>20%</td>
</tr>
</tbody>
</table>

<sup>a</sup> Relative precision (α=0.10) = (SE * 1.645 / Estimate) * 100.

<sup>b</sup> Lingcod-hours and rockfish-hours not recorded.

<sup>c</sup> No chinook salmon < 28" were harvested, and no coho salmon, Dolly Varden, steelhead trout, cutthroat trout, dusky rockfish, other pelagic rockfish, other non-pelagic rockfish, or king crab were caught or harvested.
Appendix B5.-Estimated effort, harvest, and total catches for the Wrangell marine boat sport fishery, 9 May-17 July 1994.

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Relative Precision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finfish Effort</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boat-hours</td>
<td>18,071</td>
<td>1,416</td>
<td>13%</td>
</tr>
<tr>
<td>Salmon-hours</td>
<td>38,537</td>
<td>3,388</td>
<td>15%</td>
</tr>
<tr>
<td>Halibut-hours</td>
<td>9,196</td>
<td>1,527</td>
<td>27%</td>
</tr>
<tr>
<td>Angler-hours</td>
<td>47,734</td>
<td>4,055</td>
<td>14%</td>
</tr>
<tr>
<td>Boat-days</td>
<td>3,712</td>
<td>257</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Finfish Harvests</strong></td>
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<tr>
<td>Total Chinook Salmon ≥ 28&quot;</td>
<td>1,137</td>
<td>93</td>
<td>13%</td>
</tr>
<tr>
<td>Coho Salmon</td>
<td>23</td>
<td>8</td>
<td>57%</td>
</tr>
<tr>
<td>Pink Salmon</td>
<td>62</td>
<td>40</td>
<td>106%</td>
</tr>
<tr>
<td>Pacific Halibut</td>
<td>996</td>
<td>166</td>
<td>28%</td>
</tr>
<tr>
<td>Lingcod</td>
<td>4</td>
<td>3</td>
<td>124%</td>
</tr>
<tr>
<td>Total Rockfish</td>
<td>85</td>
<td>67</td>
<td>133%</td>
</tr>
<tr>
<td>Silvergrey Rockfish</td>
<td>4</td>
<td>3</td>
<td>124%</td>
</tr>
<tr>
<td>Unidentified Rockfish</td>
<td>81</td>
<td>63</td>
<td>128%</td>
</tr>
<tr>
<td><strong>Finfish Total Catch</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Chinook Salmon ≥ 28&quot;</td>
<td>1,218</td>
<td>103</td>
<td>14%</td>
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<tr>
<td>Chinook Salmon &lt; 28&quot;</td>
<td>151</td>
<td>32</td>
<td>35%</td>
</tr>
<tr>
<td>Coho Salmon</td>
<td>37</td>
<td>12</td>
<td>54%</td>
</tr>
<tr>
<td>Pink Salmon</td>
<td>62</td>
<td>40</td>
<td>106%</td>
</tr>
<tr>
<td>Pacific Halibut</td>
<td>1,037</td>
<td>173</td>
<td>28%</td>
</tr>
<tr>
<td>Lingcod</td>
<td>4</td>
<td>3</td>
<td>124%</td>
</tr>
<tr>
<td>Dolly Varden</td>
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<td>4</td>
<td>132%</td>
</tr>
<tr>
<td>Total Rockfish</td>
<td>104</td>
<td>67</td>
<td>107%</td>
</tr>
<tr>
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<td>3</td>
<td>124%</td>
</tr>
<tr>
<td>Unidentified Rockfish</td>
<td>100</td>
<td>64</td>
<td>106%</td>
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<tr>
<td><strong>Shellfish Effort and Harvest</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Boat-days Fished</td>
<td>201</td>
<td>38</td>
<td>31%</td>
</tr>
<tr>
<td>Pots or Rings</td>
<td>291</td>
<td>56</td>
<td>32%</td>
</tr>
<tr>
<td>Tanner Crab Kept</td>
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<td>36%</td>
</tr>
<tr>
<td>Dungeness Crab Kept</td>
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</tr>
<tr>
<td>Shrimp Kept</td>
<td>2,880</td>
<td>533</td>
<td>31%</td>
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</tbody>
</table>

a Relative precision = (Standard error * 1.645 / Estimate) * 100.
b Lingcod-hours and rockfish-hours not recorded.
c No chinook salmon < 28" and no Dolly Varden harvested; and no chum salmon, sockeye salmon, steelhead trout, cutthroat trout, black rockfish, copper rockfish, dusky rockfish, quillback rockfish, yelloweye rockfish, other pelagic or non-pelagic rockfish, or king crab were caught or harvested.

### Estimated effort

<table>
<thead>
<tr>
<th>Seasonal period</th>
<th>Boat-hours</th>
<th>Salmon-hours</th>
<th>Halibut-hours</th>
<th>Angler-hours</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>Variance</td>
<td>Estimate</td>
<td>Variance</td>
</tr>
<tr>
<td>25 Apr - 08 May</td>
<td>471</td>
<td>29,474</td>
<td>709</td>
<td>152,512</td>
</tr>
<tr>
<td>09 May - 22 May</td>
<td>3,442</td>
<td>649,770</td>
<td>7,007</td>
<td>3,968,490</td>
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<tr>
<td>23 May - 03 Jun</td>
<td>2,996</td>
<td>214,121</td>
<td>6,282</td>
<td>2,101,207</td>
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<tr>
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<td>6,473,492</td>
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<td>16,531</td>
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<td>6,002,274</td>
<td>22,262</td>
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<td>4,971,742</td>
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<td>16,780,429</td>
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<td>9,093,042</td>
<td>32,844</td>
<td>59,959,235</td>
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<tr>
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<td>22,969,634</td>
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<td>11,784</td>
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</tr>
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</table>

### Seasonal weight

<table>
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<tr>
<th>Seasonal period</th>
<th>Chinook Salmon &lt; 28&quot;</th>
<th>Coho Salmon</th>
<th>Pink Salmon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>Variance</td>
<td>Estimate</td>
</tr>
<tr>
<td>25 Apr - 08 May</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>09 May - 22 May</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>23 May - 03 Jun</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Derby</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>06 Jun - 19 Jun</td>
<td>0</td>
<td>0</td>
<td>114</td>
</tr>
<tr>
<td>20 Jun - 03 Jul</td>
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<td>0</td>
<td>639</td>
</tr>
<tr>
<td>04 Jul - 17 Jul</td>
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<td>0</td>
<td>1,083</td>
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<tr>
<td>18 Jul - 31 Jul</td>
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<td>115</td>
<td>3,921</td>
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<td>01 Aug - 14 Aug</td>
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<tr>
<td>15 Aug - 28 Aug</td>
<td>23</td>
<td>244</td>
<td>16,166</td>
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<tr>
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| **Total**       | 62       | 691       | 48,912   | 35,187,375| 44,673   | 28,060,546| 42,057   | 23,668,059 |

-continued-
Appendix B6.-page 2 of 4.

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#### Copper Rockfish

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#### Shellfish

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<th>Harvested Catch Estimate</th>
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| Total                 | 108                                 | 1,231    | 64,348               | 57,473,704| 62,218              | 54,211,593|

## continued

50
### Appendix B7.-page 2 of 3.

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-continued-
Appendix B7.-Page 3 of 3.

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Total 5,486 199,414 10,973 914,975 7,647 40,650 5,467 183,348

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a Derby held on 19-21 August.

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### Appendix B8—page 2 of 3.

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Appendix B8.—Page 3 of 3.

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a Derby held on 28-30 May and 4-5 June.

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* Petersburg derby held on 27-30 May.

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<th>Halibut-hours Estimate</th>
<th>Variance</th>
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<th>Variance</th>
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continued
## Appendix B10. - Page 2 of 2.

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<th>Variance</th>
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- Derby held on 28-30 May, 4-5 June, and 11-12 June.
- Derby held on 19-21 August.
- Derby held on 28-30 May and 4-5 June.
- Derby held on 27-30 May.
Appendix B12.-Estimates of hatchery produced chinook salmon contributed to the Ketchikan marine boat sport fishery from 25 April to 25 September 1994.

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Table 1: Summary of Tag Recovery Data

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Notes:

- Derby held on 28-30 May, 4-5 June, and 11-12 June 1994.
- CDFO = Canada Department of Fisheries and Oceans, NIFC = Northwest Indian Fisheries Commission, ODFW = Oregon Department of Fish and Wildlife, ADFG = Alaska Department of Fish and Game, MIC = Metlakatla Indian Community, NMFS = National Marine Fisheries Service, SSRA = Southern Southeast Regional Aquaculture Association.

- Rec<sup>a</sup> = Number of fish recovered of noted tag code.
- Con<sup>b</sup> = Estimated harvest (contribution) of the release of the noted tag code.
- Variance<sup>c</sup> = Variance of the estimated harvest of the release of the noted tag code.
### Appendix B13.-Estimates of hatchery produced chinook salmon contributed to the Juneau marine boat sport fishery from 25 April to 25 September 1994.

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Derby held on 19-21 August 1994.

CDFO = Canada Department of Fisheries and Oceans, WDF = Washington Department of Fisheries, ADFG = Alaska Department of Fish and Game, DIPC = Douglas Island Pink and Chum, MIC = Metlakatla Indian Community, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association, SSRA = Southern Southeast Regional Aquaculture Association.

Rec = Number of fish recovered of noted tag code.

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

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

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## Appendix B14.-Page 2 of 3.

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| Washington | USFWS | Bonneville | 05-19-55 | 1 | 88 | 7,910 | 1 | 88 | 7,910 |
| Washington | USFWS | Yakima NFH | 05-01- | 010314 | 1 | 13 | 170 | 1 | 13 | 170 |
| Washington | WDF | Eastbank | 62-36-14 | 1 | 10 | 94 | 1 | 10 | 94 |
| Washington | WDF | Humptulips | 63-07-56 | 1 | 4 | 11 | 1 | 29 | 833 | 2 | 33 | 844 |
| Washington | WDF | Lyons Ferry | 63-41-43 | 1 | 13 | 161 | 1 | 13 | 161 |
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**Washington Total**

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| Alaska | NMFS Port Armstrong | 02-02-22 | 1 | 1 | 0 |
| Alaska | NMFS Medvejie | 02-22-01 | 1 | 9 | 82 |
| Alaska | NMFS Port Armstrong | 02-63-29 | 1 | 1 | 0 |
| Alaska | NMFS Medvejie | 03-63-33 | 1 | 10 | 98 |
| Alaska | NSRA 04-32-12 | 1 | 4 | 14 |
| Alaska | ODFW 04-01-0 | 010303 | 1 | 123 | 15,395 |
| Alaska | ODFW 04-07-03 | 2 | 28 | 355 | 4 | 505 | 70,069 | 6 | 533 | 70,424 |

- continued -
### Appendix B14.-Page 3 of 3.

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<sup>a</sup> Derby held on 28-30 May and 4-5 June 1994.

<sup>b</sup> CDFO = Canada Department of Fisheries and Oceans, NIFC = Northwest Indian Fisheries Commission, WDF = Washington Department of Fisheries, ODFW = Oregon Department of Fish and Wildlife, ADFG = Alaska Department of Fish and Game, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association, SJ = Sheldon Jackson College, USFWS = U.S. Fish and Wildlife Service.

<sup>c</sup> Rec = Number of fish recovered of noted tag code.

<sup>d</sup> Con = Estimated harvest (contribution) of the release of the noted tag code.

<sup>e</sup> Variance = Variance of the estimated harvest of the release of the noted tag code.

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* Derby held on 27-30 May 1993.

b CDFO = Canada Department of Fisheries and Oceans, ODFW = Oregon Department of Fish and Wildlife, AAI = Alaska Aquaculture Incorporated, ADFG = Alaska Department of Fish and Game, NMFS = National Marine Fisheries Service, NSRA = Northern 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.

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a CDFO = Canada Department of Fisheries and Oceans, AAI = Alaska Aquaculture Incorporated, ADFG = Alaska Department of Fish and Game, 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 the estimated harvest of the release of the noted tag code.
Appendix B17.-Estimates (from sampled fish only) of hatchery produced chinook salmon contributed to 1,354 chinook salmon examined during the Craig marine boat sport fishery from 9 May to 18 September 1994.

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### Appendix B17.- Page 2 of 2.

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* a CDFO = Canada Department of Fisheries and Oceans, NIFC = Northwest Indian Fisheries Commission, WDFW = Washington Department of Fish and Wildlife, ODFW = Oregon Department of Fish and Wildlife, ADFG = Alaska Department of Fish and Game, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association, 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 B18.—Estimates of the number of wild coded wire tagged chinook salmon contributed to sampled marine boat sport fisheries of Southeast Alaska, 1994.

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<td>76</td>
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<td>4 20</td>
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a Juneau derby held on 19-21 August 1994.
b ADFG = Alaska Department of Fish and Game.
c Rec = Number of fish recovered of noted tag code.
d Con = Estimated harvest (contribution) of the release of the noted tag code.
e Variance = Variance of the estimated harvest of the release of the noted tag code.
Appendix B19.-Age composition of chinook salmon from selected Southeast Alaska sport fisheries, 1994.

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| Craig         |       |       |       |       |       |       |             |
| Males         |       |       |       |       |       |       |             |
| n             | 1     | 19    | 16    | 6     | 16    |       | 58          |
| Percent       | 1.7   | 32.8  | 27.6  | 10.3  | 27.6  |       |             |
| SE^a          | 1.7   | 6.2   | 5.9   | 4.0   | 5.9   |       |             |
| Females       |       |       |       |       |       |       |             |
| n             | 22    | 30    | 2     | 1     | 7     |       | 62          |
| Percent       | 35.5  | 48.4  | 3.2   | 1.6   | 11.3  |       |             |
| SE^a          | 6.1   | 6.4   | 2.3   | 1.6   | 4.1   |       |             |
| Total^b       |       |       |       |       |       |       |             |
| n             | 8     | 238   | 8     | 181   | 38    | 6     | 570         |
| Percent       | 1.4   | 41.6  | 1.4   | 31.8  | 6.7   | 1.1   |             |
| SE^a          | 0.5   | 2.1   | 0.5   | 2.0   | 1.0   | 0.4   | 0.2         |

^a SE in percent.

^b Includes sexed and unsexed chinook salmon.
Appendix B20.-Length-at-age in millimeters (from tip of snout to fork-of-tail) by sex for chinook salmon from selected Southeast Alaska sport fisheries, 1994.

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## Appendix B20.-Page 2 of 2.

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a Includes sexed and unsexed chinook salmon.
Appendix B21.-Numbers of coho salmon examined for coded wire tags in Southeast Alaska marine boat sport fisheries in 1994.

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<sup>a</sup> Derby held on 28-30 May, 4-5 June, and 11-12 June.

<sup>b</sup> Derby held on 19-21 August.

<sup>c</sup> Derby held on 28-30 May and 4-5 June.
Appendix B22.-Estimates of hatchery produced coho salmon contributed to the Ketchikan marine boat sport fishery from 25 April to 25 September 1994.

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|                 |        | 04-38-50 |                     | 1 14 223 |                     | 1 14 223 |                     |       |
|                 |        | 04-38-51 |                     | 2 38 825 |                     | 2 38 825 |                     |       |
|                 |        | 04-38-52 |                     | 1 23 655 |                     | 1 23 655 |                     |       |
|                 |        | 04-38-53 |                     | 5 50 628 | 2 36 947 | 7 86 1,375 |                     |       |
|                 |        | 04-38-54 |                     | 7 64 850 | 2 22 272 | 9 86 1,130 |                     |       |
|                 |        | 04-38-55 |                     | 4 133 6,293 |         | 4 133 6,293 |                     |       |
|                 |        | 04-38-66 |                     | 184 9,769 | 7 60 2,038 | 6 244 11,858 |                     |       |
|                 |        | 31-21-38 |                     | 1 21 555 |                     | 1 21 555 |                     |       |
|                 |        | 04-38-60 |                     | 1 110 15,473 |       | 1 110 15,473 |                     |       |
|                 | MIC    | Tngas Creek 47-16-55 | 04-38-55 | 1 159 28,219 | 1 159 28,219 |                     |                     |       |
|                 |        | 04-16-56 |                     | 2 126 9,467 | 2 126 9,467 |                     |                     |       |
|                 |        | 47-16-57 |                     | 3 244 25,126 | 3 244 25,126 |                     |                     |       |
|                 |        | 04-39-33 |                     | 4 6,776 14,486,288 | 4 6,776 14,486,288 |                     |                     |       |
|                 |        | 04-39-34 |                     | 3 2,809 3,412,858 | 3 2,809 3,412,858 |                     |                     |       |
|                 |        | 04-39-34 |                     | 4 770 3,412,858 | 4 770 3,412,858 |                     |                     |       |
|                 |        | 47-16-57 |                     | 8 1,026 171,859 | 8 1,026 171,859 |                     |                     |       |
|                 |        | Alaska Total | 2 118 354 | 57 713 56,703 | 57 713 56,703 |                     |                     |       |
|                 |        | All Regions | 1 118 354 | 57 713 56,703 | 57 713 56,703 |                     |                     |       |

- Derby held on 28-30 May, 4-5 June, and 11-12 June 1994.
- CDFO = Canada Department of Fisheries and Oceans, ADFG = Alaska Department of Fish and Game, MIC = Metlakatla Indian Community, SSRA = Southern Southeast Regional Aquaculture Association.
- Rec = Number of fish recovered of noted tag code.
- Con = Estimated harvest (contribution) of the release of the noted tag code.
- Variance = Variance of the estimated harvest of the release of the noted tag code.

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a Derby held on 19-21 August 1994.
b DIPC = Douglas Island Pink and Chum, NSRA = Northern 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.

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a CDFO = Canada Department of Fisheries and Oceans, 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 the estimated harvest of the release of the noted tag code.
Appendix B25.-Estimates of the number of wild coded wire tagged coho salmon contributed to sampled marine boat sport fisheries of Southeast Alaska, 1994.

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<td>188</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td></td>
<td>1</td>
<td>14</td>
<td>188</td>
<td>1</td>
<td>14</td>
<td>188</td>
</tr>
</tbody>
</table>

---

*a CDFO = Canada Department of Fisheries and Oceans, 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 19-21 August.
Appendix B26.-Estimates of wild and hatchery produced coho salmon contributed to 4,910 coho salmon sampled from the Craig marine boat sport fishery from 9 May to 18 September 1994.

<table>
<thead>
<tr>
<th>Region</th>
<th>Agency*</th>
<th>Hatchery/Release Site</th>
<th>Tag Code</th>
<th>Rec</th>
<th>Con</th>
<th>Variance</th>
<th>Relative Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>CDFO</td>
<td>Fort Babine</td>
<td>18-01-45</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hartley Bay</td>
<td>02-09-24</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>&lt;0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18-05-33</td>
<td>1</td>
<td>3</td>
<td>8</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kispiox River</td>
<td>02-12-29</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>&lt;0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kitimat River</td>
<td>18-10-05</td>
<td>1</td>
<td>9</td>
<td>76</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lachmach River (wild)</td>
<td>08-01-25</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>&lt;0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Masset</td>
<td>02-09-25</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>&lt;0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sewell Inlet</td>
<td>18-05-37</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>&lt;0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zolzap Creek (wild)</td>
<td>18-09-29</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.C. Total</td>
<td>9</td>
<td>25</td>
<td>25</td>
<td>96</td>
<td>0.5%</td>
</tr>
<tr>
<td>Alaska</td>
<td>ADFG</td>
<td>Crystal Lake</td>
<td>04-40-22</td>
<td>1</td>
<td>6</td>
<td>28</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Earl West Cove</td>
<td>04-39-42</td>
<td>3</td>
<td>65</td>
<td>1,327</td>
<td>1.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hugh Smith Lake (wild)</td>
<td>04-40-16</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>&lt;0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Klawock</td>
<td>04-37-55</td>
<td>3</td>
<td>12</td>
<td>34</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-38-06</td>
<td>1</td>
<td>4</td>
<td>10</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-38-60</td>
<td>7</td>
<td>127</td>
<td>2,174</td>
<td>2.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-38-61</td>
<td>9</td>
<td>286</td>
<td>8,733</td>
<td>5.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-38-62</td>
<td>5</td>
<td>45</td>
<td>351</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-39-01</td>
<td>2</td>
<td>24</td>
<td>261</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIC Tamgas Creek</td>
<td>47-16-56</td>
<td>2</td>
<td>16</td>
<td>110</td>
<td>0.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>47-16-57</td>
<td>1</td>
<td>10</td>
<td>85</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NSRA Hidden Falls</td>
<td>04-07-07</td>
<td>1</td>
<td>11</td>
<td>104</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medvejie</td>
<td>04-39-21</td>
<td>1</td>
<td>5</td>
<td>24</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SSRA Nakat Inlet</td>
<td>04-39-40</td>
<td>1</td>
<td>10</td>
<td>84</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neets Bay</td>
<td>04-39-31</td>
<td>1</td>
<td>105</td>
<td>10,870</td>
<td>2.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-39-35</td>
<td>2</td>
<td>170</td>
<td>14,273</td>
<td>3.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Whitman Lake</td>
<td>04-39-43</td>
<td>1</td>
<td>15</td>
<td>212</td>
<td>0.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04-39-44</td>
<td>1</td>
<td>15</td>
<td>208</td>
<td>0.3%</td>
</tr>
<tr>
<td>Alaska Total</td>
<td></td>
<td></td>
<td></td>
<td>44</td>
<td>928</td>
<td>38,888</td>
<td>18.9%</td>
</tr>
<tr>
<td>All Regions</td>
<td></td>
<td></td>
<td></td>
<td>53</td>
<td>953</td>
<td>38,984</td>
<td>19.4%</td>
</tr>
</tbody>
</table>

a CDFO = Canada Department of Fisheries and Oceans. ADFG = Alaska Department of Fish and Game, MIC = Metlakatla Indian Community, NSRA = Northern Southeast Regional Aquaculture Association, SSRA = Southern Southeast Regional Aquaculture Association.

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

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

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

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APPENDIX C - DATA FILES
Appendix C1. Computer data files and analysis programs developed for the 1994 Southeast Alaskan marine boat sport fishery survey. Data files (*.DTA and *.DAT) are archived with the Alaska Department of Fish and Game, Division of Sport Fish, Research and Technical Services Unit, 333 Raspberry Road, Anchorage, Alaska 99518-1599.

<table>
<thead>
<tr>
<th>Effort, Catch, and Harvest Estimation Files, etc.</th>
<th>(KMC94EST.ZIP, JMC94EST.ZIP, SMC94EST.ZIP, PMC94EST.ZIP, WMC94EST.ZIP).</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0810M_4.DTA</td>
<td>Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Ketchikan, 1994</td>
</tr>
<tr>
<td>B7600M_4.DTA</td>
<td>Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) at Craig, 1994</td>
</tr>
<tr>
<td>C0820M_4.DTA</td>
<td>Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Petersburg, 1994</td>
</tr>
<tr>
<td>C0810M_4.DTA</td>
<td>Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Wrangell, 1994</td>
</tr>
<tr>
<td>E0810M_4.DTA</td>
<td>Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Juneau, 1994</td>
</tr>
<tr>
<td>D0810M_4.DTA</td>
<td>Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Sitka, 1994</td>
</tr>
<tr>
<td>???94.SAS</td>
<td>SAS programs to create basic interview SAS save files from mark-sense data files. &quot;??&quot; stands for each site respectively: KMC for Ketchikan, PMC for Petersburg, WMC for Wrangell, SMC for Sitka, JMC for Juneau</td>
</tr>
<tr>
<td>???94ESS.SAS</td>
<td>SAS programs to create revised interview SAS save files from files created by ?MS93.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 '?'</td>
</tr>
<tr>
<td>???93MSM.SAS</td>
<td>SAS programs to create SAS save files with only the sampling information associated with each sample for each survey from files created by ?MC94ESS.SAS. See above for explanation of '?'</td>
</tr>
<tr>
<td>???94EST.SAS</td>
<td>SAS programs to estimate effort, catch, and harvest with associated variances using SAS save files created by ?MC94ESS.SAS and ?MC94MSM.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 '?'</td>
</tr>
</tbody>
</table>
### Appendix C1. (Page 2 of 3).

**Coded Wire Tag Contribution Estimation Files, etc. (CWT94.ZIP).**

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>94SPBAS.DTA</td>
<td>Data file from tag lab with sampling information for each biweekly period at each fishery.</td>
</tr>
<tr>
<td>94SPCON.DTA</td>
<td>Data file from tag lab with recovery information for each adipose fin clipped coho and chinook salmon sampled.</td>
</tr>
<tr>
<td>CWT94CHK.SAS</td>
<td>SAS program to compare 94SPCON.DTA &amp; 94SPBAS.DTA for consistency errors.</td>
</tr>
<tr>
<td>SEW94VBN.SAS</td>
<td>SAS program to create creel estimate file for combining with tag data.</td>
</tr>
<tr>
<td>SEN94CWT.SAS</td>
<td>SAS program to do basic estimates.</td>
</tr>
<tr>
<td>SEN94CO1.SAS</td>
<td>SAS program to summarize contributions across tag codes for main tables.</td>
</tr>
<tr>
<td>SEN94CWP.SAS</td>
<td>SAS program to list tags, contributions, and variances for Appendices.</td>
</tr>
</tbody>
</table>

**Age-weight-length (AWL) Files, etc. (AWL94.ZIP)**

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0810AC4.DTA</td>
<td>Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Ketchikan, 1994</td>
</tr>
<tr>
<td>C0810AB4.DTA</td>
<td>Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Wrangell, 1994</td>
</tr>
<tr>
<td>C0820AB4.DTA</td>
<td>Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Petersburg, 1994</td>
</tr>
<tr>
<td>E0810AB4.DTA</td>
<td>Data file (ASCII) containing chinook salmon AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Juneau, 1994</td>
</tr>
</tbody>
</table>

-continued-
Appendix C1. (Page 3 of 3).

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0810AA4.DTA</td>
<td>Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Ketchikan, 1994</td>
</tr>
<tr>
<td>B7600AB4.DTA</td>
<td>Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Craig, 1994</td>
</tr>
<tr>
<td>C0810AA4.DTA</td>
<td>Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Wrangell, 1994</td>
</tr>
<tr>
<td>C0820AA4.DTA</td>
<td>Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Petersburg, 1994</td>
</tr>
<tr>
<td>D0810AA4.DTA</td>
<td>Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Sitka, 1994</td>
</tr>
<tr>
<td>E0810AA4.DTA</td>
<td>Data file (ASCII) containing halibut AWL information recorded on mark-sense interview forms (ALTERNATE AGE WEIGHT LENGTH VERSION 1.0) recorded at Juneau, 1994</td>
</tr>
<tr>
<td>REF94CHI.SAS</td>
<td>SAS program to reformat chinook salmon AWL data</td>
</tr>
<tr>
<td>LF94CHI.SAS</td>
<td>SAS program to summarize chinook salmon AWL data</td>
</tr>
<tr>
<td>REF94HAL.SAS</td>
<td>SAS program to reformat halibut AWL data</td>
</tr>
<tr>
<td>LF94HAL.SAS</td>
<td>SAS program to summarize halibut AWL data</td>
</tr>
</tbody>
</table>