

Fishery Data Series No. 94-30

**Effort, Catch, and Harvest of Chinook Salmon in the
Spring Marine Boat Sport Fishery Near Haines,
Alaska, 1993**

by

Randolph P. Ericksen

September 1994

Alaska Department of Fish and Game

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ABSTRACT

The Haines marine boat sport fishery targets wild mature chinook salmon *Oncorhynchus tshawytscha* returning to the Chilkat River. This fishery was closed during the spring of 1991 and 1992 because of conservation concerns for this stock. A limited fishery was allowed in 1993 with a maximum allowable harvest of 500 wild mature chinook salmon. Stratified two-stage direct expansion surveys were used to estimate angler effort for, and harvest of, wild mature chinook salmon in the Haines marine boat fishery during 1993. Harvest of large (>28 inches total length) chinook salmon and chartered angler effort and harvest were also estimated. Contributions of hatchery chinook salmon to the fishery were estimated from coded wire tag recovery information. Age and size compositions were estimated by using scale samples and lengths collected from chinook salmon in the angler harvest.

An estimated 11,919 angler-hours (SE = 1,559) of effort (9,069 targeted salmon hours, SE = 1,479) were expended for a harvest of 314 (SE = 55) large chinook salmon, of which 252 (SE = 46) were wild mature fish. Chartered anglers accounted for 18% and 30% of the estimated targeted salmon effort and harvest of large chinook salmon, respectively. Hatcheries produced about 12% of the estimated chinook salmon harvest. Most of the hatchery fish harvested in this fishery were produced at the Hidden Falls hatchery and were released in 1990 at Lutak Inlet, north of Haines.

KEY WORDS: Creel survey, angler effort and harvest, boat sport fishery, hatchery, enhancement, coded wire tag, fishery performance curve, age composition, length-at-age estimation, chinook salmon, *Oncorhynchus tshawytscha*, Chilkat River, Haines, Southeast Alaska.

INTRODUCTION

The spring marine boat sport fishery near Haines occurs in Chilkat Inlet and targets mature chinook salmon *Oncorhynchus tshawytscha* returning to the Chilkat River (Figure 1). A creel survey has been used to monitor the harvest in this fishery since 1984. The harvest in the Haines marine sport fishery peaked at over 1,600 chinook salmon in 1985 and 1986 (Neimark 1985; Mecum and Suchanek 1986, 1987; Bingham et al. 1988; Suchanek and Bingham 1989, 1990, 1991). This fishery has been popular with both local and non-local anglers; in 1985, an estimated 61% of anglers who fished in this fishery were not from Haines (Bethers 1986). This fishery has been important to the local economy of Haines; in 1988, an estimated \$1.1 million was spent by anglers fishing in Haines and Skagway for chinook salmon (Jones and Stokes 1991). The annual Haines King Salmon Derby, begun in the mid 1950's, was directed primarily at returning Chilkat River chinook salmon.

Concern for this stock of chinook salmon developed when indices of spawner abundance in the Chilkat River declined in 1985 and 1986. This decline coincided with high harvests of chinook in the commercial troll, commercial drift gill net, and marine sport fisheries in the area. On the basis of these concerns, and after discussion with interested anglers in Haines, the department gradually restricted fisheries in upper Lynn Canal beginning in 1987; recreational fisheries were closed entirely in 1991 and 1992. The Haines King Salmon Derby was closed beginning in 1988.

In 1993, management of Chilkat chinook salmon consisted of:

- 1) Chilkat Inlet, north of a line extending from the mouth of Ludaseska Creek to the northern tip of Kochu Island and continuing to a department marker immediately north of Paradise Cove, would be closed to fishing for king salmon from April 15 through July 15 (Figure 2);
- 2) A seasonal limit of two king salmon 28 inches or more in length per person would be in effect from April 15 through July 15 in salt waters of Chilkat Inlet and in Lynn Canal north of the latitude of the northern tip of Sullivan Island and south of the latitude of the red navigational can (59° 11' 45" north) off the mouth of the Katzehin Flats; and
- 3) The fishery would be managed for a maximum harvest of 500 mature chinook salmon. Once an estimated 500 wild mature fish had been harvested, the fishery would be closed by emergency order.

To comply with (3) above, a creel survey was used to obtain weekly estimates of harvest of wild mature chinook salmon in the Haines marine spring sport fishery.

The research objective for 1993 was to estimate the harvest of wild mature chinook salmon in the Haines spring marine boat sport fishery from April 26 to July 18, 1993. In addition, tasks were performed to address secondary objectives. Because immature and hatchery chinook salmon were also harvested, total effort for, and harvests of, all chinook salmon were estimated. Effort and harvest of chinook salmon by charter operators has become increasingly important, and the Alaska Board of Fisheries has given the department the ability to regulate them as a distinct group. Information on other species of interest to management was collected (the harvest estimates for Pacific halibut *Hippoglossus*



Figure 1. Location of sampling (access) sites and release sites of coded wire tagged chinook salmon in the Haines/Skagway area, Southeast Alaska.

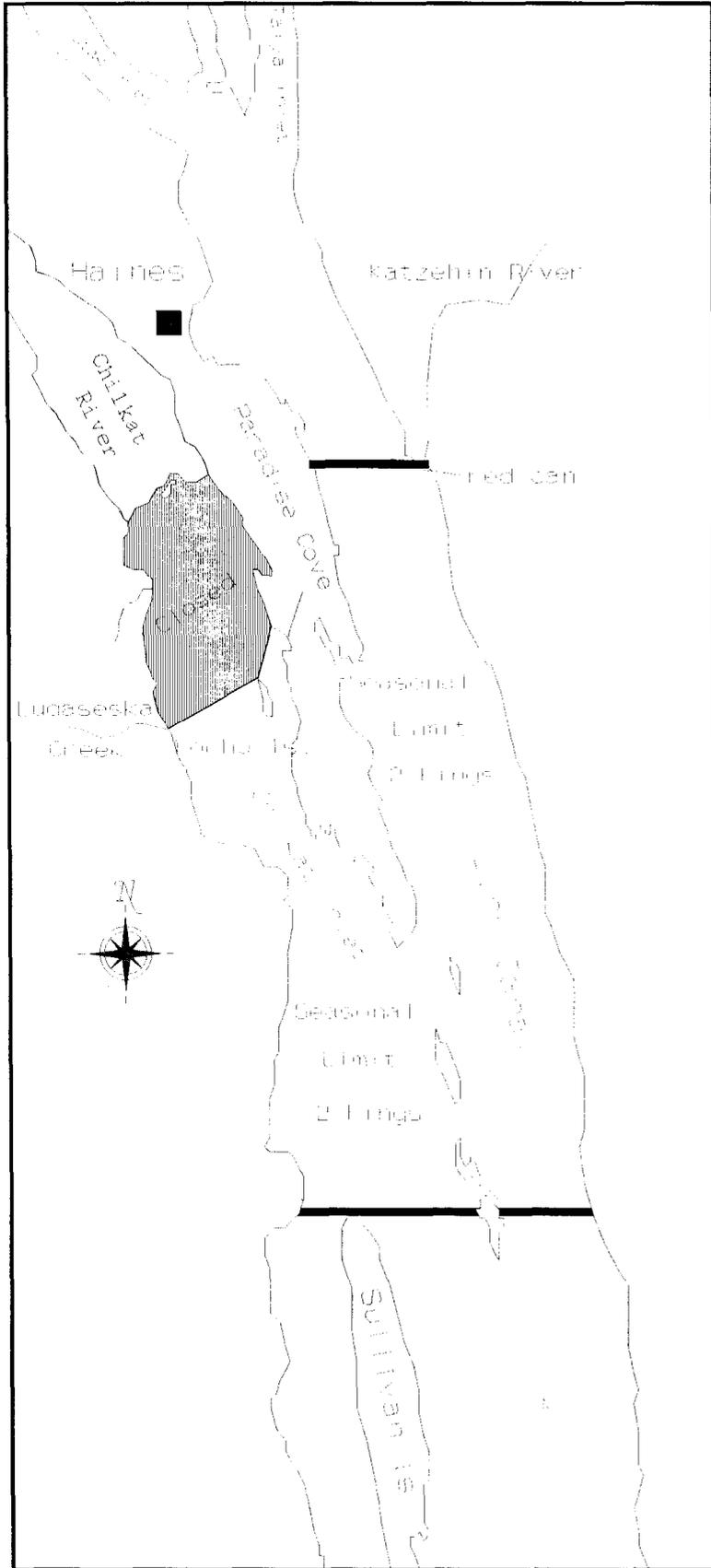


Figure 2. Location of the 1993 Haines marine chinook salmon sport fishing regulatory area.

Chilkat Inlet north of a line extending from the mouth of Ludaseska Creek to the northern tip of Kochu Island and continuing to a department marker immediately north of Paradise Cove, was closed to fishing for chinook salmon April 15 through July 15.

A seasonal limit of two king salmon 28 inches or more in length per person was in effect from April 15 through July 15, in salt waters of Chilkat Inlet and in Lynn Canal north of the latitude of the northern tip of Sullivan Island and south of the latitude of the red navigational can off the mouth of the Katzehin Flats.

stenolepsis and Dolly Varden *Salvelinus malma* are not reported here but are available on request). Harvest information on hatchery (adipose finclipped) fish was collected to estimate Alaska hatchery contributions to the fishery, to provide information on recent enhancement efforts near Haines (Figure 3), and to provide harvest estimates for wild fish tagged in the Chilkat River drainage. Scales from harvested chinook salmon were collected to age wild mature chinook salmon (assumed) bound for the Chilkat River (all hatchery releases in the area have been coded wire tagged).

The secondary objectives were:

- 1) Estimate total sport effort for and harvest of all chinook salmon in the Haines marine boat sport fishery from April 26 to July 18, 1993;
- 2) Estimate total charter effort for and harvest of all chinook salmon in the Haines marine boat sport fishery from April 26 to July 18, 1993;
- 3) Estimate the contribution of hatchery chinook salmon by coded wire tag lot to the Haines marine boat sport fishery from April 26 to July 18, 1993; and
- 4) Estimate age composition of chinook salmon sampled in the Haines marine boat sport fishery from April 26 to July 18, 1993.

METHODS

Study Design

Stratified multi-stage direct expansion creel surveys were used to estimate the harvest of chinook salmon in the Haines marine boat sport fishery. Strata were always defined by combinations of 7-day (weekly) periods and access location (one high-use and two low-use sites). Weekly stratification was made to facilitate harvest estimates for inseason management.

The three access locations sampled were Letnikof Dock, Chilkat State Park boat launch, and the Small Boat Harbor (see Figure 1). Creel surveys in 1988 and 1989 indicated that 82-93% of the effort and harvest originated from Letnikof Dock. Thus, this was considered the high-use site. The two low-use sites (Chilkat State Park and the Small Boat Harbor) were sampled at relatively low rates.

Each fishing day was defined as starting at 0800 and ending at civil twilight. Analysis of data from a survey in 1990 indicated that precision would benefit from (a) morning/evening stratification with relatively longer evening strata and (b) weekend/weekday stratification during the peak of the season. However, because most mature king salmon were expected to be landed at Letnikof Dock, stratification at low-use harbors was not useful. Sampling densities with two technicians were expected to yield an overall relative precision (95% confidence intervals) of about $\pm 35\%$ for the survey. The following sampling scheme was utilized during 1993:

Letnikof Dock: Sampling at the Letnikof Dock occurred from April 26 to July 18, 1993. Primary sampling units were days, and secondary sampling units were boat-parties. Within each week there were two sampling strata, morning and evening.

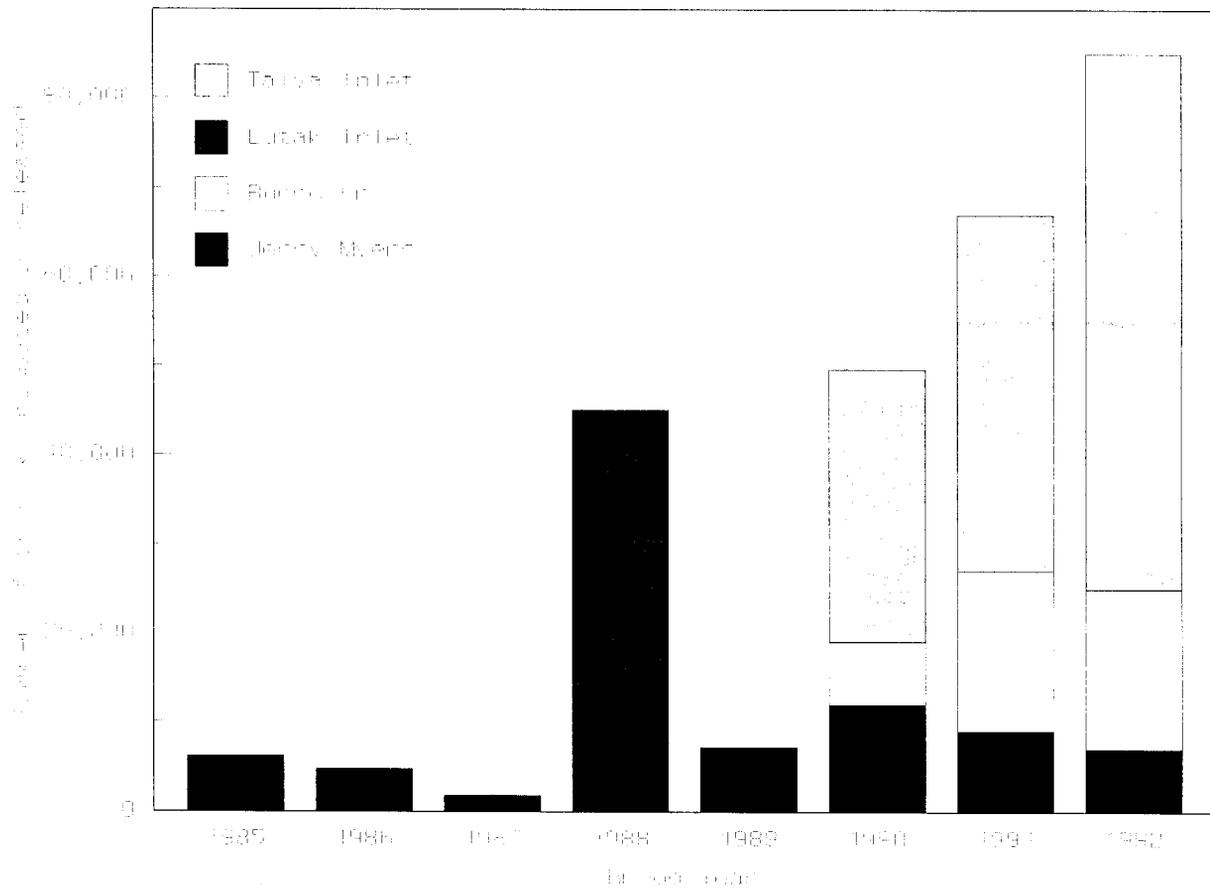


Figure 3. Hatchery chinook salmon production and releases in Lynn Canal north of Haines by brood year and site, 1985-1992. Adults are expected to return as 1.3 and 1.4 adults (e.g., 1988 brood year releases are expected to return as adults in 1993 and 1994).

Between April 26 and May 16, the day was divided equally, starting at 0800 hours and ending at civil twilight. After May 16, mornings lasted from 0800 hours to two hours before midday, and evenings lasted from two hours before midday to civil twilight. Thus, evening strata were four hours longer in duration than morning strata. This stratification scheme was designed to maximize sampling during hours when most anglers exited the fishery, thus increasing the precision of estimates. Random selections determined primary units to sample in each strata. Two morning and three evening strata were sampled each week, except as noted below.

During the peak of the fishery (May 17 through June 13) the evening period was further divided into weekday and weekend/holiday strata. Weekend/holiday strata at Letnikof Dock were defined as Saturdays, Sundays, May 24 (Victoria Day), and May 31 (Memorial Day). During this peak season, two morning, two weekday evening, and two weekend/holiday evening periods were sampled each week. A total of 28 unique strata was sampled at Letnikof Dock in 1993.

Low-use sites: Sampling occurred at the low-use sites (Small Boat Harbor and Chilkat State Park boat launch) during seven weekly time periods, from May 17 through July 4. In addition, the Small Boat Harbor was sampled from July 5 through July 18 to document harvests of hatchery chinook salmon in this fishery. Primary sampling units were harbors, and secondary sampling units were boat-parties.

There was no time or type of day stratification at the low-use sites. Each sampling week at each site was divided into 14 periods (half-days) of equal length.

Random selections determined primary units to sample in each strata. Two periods were sampled at each low-use harbor each week (except during the week of June 28 to July 4, when a typographical error on the sampling schedule resulted in the Small Boat Harbor being sampled once, and the Chilkat State Park boat launch three times). One change was made to the randomized sampling schedule at a low-use site during the first week of the survey to accommodate a union rule. To accommodate the impossibility of sampling three sites simultaneously, three changes (period moves) were made to the randomized sampling schedule at a low-use site. Sixteen unique strata were sampled at the low-use harbors during 1993.

Data Collection

During each sample period, all sport fishing boats returning to the harbor were counted. Boat-parties returning to the dock were interviewed to determine number of rods fished, hours fished, type of trip (charter or noncharter), target species (chinook salmon, Pacific halibut), and number of fish kept and/or released by species. Interviews of boat-parties also included sampling all harvests of chinook salmon for maturity and missing adipose fins. Maturity was determined from criteria found in Appendix A. In rare cases, some parties were not interviewed, or maturity status could not be determined. When a boat-party could not be interviewed, the effort and catch of the interviewed boat-parties were expanded by total number of parties returning to the dock during that period. Similarly, when a boat-party had fish with indeterminate maturity status, interview information for that boat-party was ignored, and expansions (by sample period) were made from harvests by remaining boat-parties and the total number of boat-parties counted.

Chinook salmon sampled in the angler harvest were measured to the nearest 5 mm FL (fork length). Four scales were removed from the left side of each sampled fish (right side if left side scales were regenerated), along a line two scale rows above the lateral line between the posterior insertion of the dorsal fin and anterior insertion of the anal fin. A triacetate impression of the scales (30 seconds at 7,000 kg/sq², at a temperature of 97°C) was used for age determination. Scales were aged using procedures in Olsen (1992).

Information recorded for each chinook salmon sampled included sex, length, maturity, and the presence or absence of adipose fins.

Heads from chinook salmon missing adipose fins were retained by technicians. A locking plastic strap with a unique number was inserted through the jaw of the head. Heads and coded wire tag (CWT) recovery data were sent to the ADF&G CWT Processing Laboratory in Juneau, where any tags present were removed and decoded, and corresponding information entered into the tag lab data base.

Data Analysis

The harvest in each stratum was estimated (Cochran 1977)

$$\hat{H}_h = D_h \bar{H}_h \quad (1)$$

$$\bar{H}_h = \frac{\sum_{i=1}^{d_h} \hat{H}_{hi}}{d_h} \quad (2)$$

$$\hat{H}_{hi} = M_{hi} \cdot \frac{\sum_{j=1}^{m_{hi}} h_{nij}}{m_{hi}} \quad (3)$$

where h_{nij} = harvest on boat j in sampling day (or period) i stratum h ,

m_{hi} = number of boat-parties interviewed in day i ,

M_{hi} = number of boat-parties completing trips in day i ,

d_h = number of days sampled in stratum h , and

D_h = number of days in stratum h .

The variance of the harvest by stratum is estimated

$$V[\hat{H}_h] = (1-f_{1h}) D_h^2 \frac{\sum_{i=1}^{d_h} (\hat{H}_{hi} - \bar{H}_h)^2}{d_h (d_h - 1)} + D_h \sum_{i=1}^{d_h} M_{hi}^2 (1-f_{2hi}) \frac{\sum_{j=1}^{m_{hi}} (h_{nij} - \bar{h}_{hi})^2}{d_h m_{hi} (m_{hi} - 1)} \quad (4)$$

where f_{ih} = sampling fraction for days and f_{2h} = sampling fraction for boat-parties. Catch and effort are estimated similarly, substituting C and E for H in Eq. (1) through Eq. (4). Total harvests for the season are the sums across strata $\sum H_n$ and $\sum V[H_n]$.

Application of estimators to harvests of mature wild chinook salmon assumes that maturity status is accurately obtained for all wild fish (i.e., fish with adipose fins) sampled during interviews, that all wild fish have adipose fins, and that all hatchery fish do not have adipose fins; these assumptions were largely met (see Discussion section for further details).

Harvests of wild mature chinook salmon in each strata sampled were totaled daily and expanded for boat-parties not sampled (including any boat-parties with fish of unknown maturity status). At the end of each week, the calculated daily total harvests in a strata were totaled and expanded by the total number of days in the strata. These estimates would have been used to close the fishery if the total estimated harvest of wild mature chinook salmon totaled, or was expected to total, 500 fish.

Age composition, mean length-at-age, and variances were estimated using standard normal statistics.

Contributions of hatchery and wild CWT chinook salmon to the Haines marine sport fishery were calculated from random recoveries of CWT fish by using procedures described in Bernard (1992) and Johnson et al. (1993).

RESULTS

Angler Effort and Harvest

Creel technicians interviewed 411 boat-parties who fished a total of 3,634 rod hours of effort (3,063 salmon-hours), who caught 126 and harvested 118 large (total length 28 inches or greater) chinook salmon (Appendix B1).

An estimated 11,919 (SE = 1,559) angler-hours of effort were expended in the Haines marine boat fishery between April 26 and July 18, 1993 to catch 349 (SE = 63) and harvest 314 (SE = 55) large chinook salmon (Table 1). An estimated 252 (SE = 46) of the chinook salmon harvested in this fishery were wild mature fish. Approximately 76% (9,069 salmon-hours, SE = 1,479) of the angler effort was targeted on chinook salmon. The remainder was directed toward other species, primarily Pacific halibut. An estimated 116 (SE = 23) small (sub-legal, <28 inches total length) chinook salmon were caught, and none were sampled (harvested). Ninety-three percent of the estimated salmon effort and all of the estimated harvest of chinook salmon occurred between May 17 and June 27 (Table 1). Angling pressure for chinook salmon was negligible during the first and last two weeks, so our coverage of the fishery was essentially complete. Estimates by site are shown in Appendix B1. Estimates of sample variances are provided in Appendices B2 and B3 for future planning purposes.

Charter boat anglers accounted for about 18% of the salmon effort (1,604 angler-hours, SE = 405) and 30% of the harvest (94, SE = 27) of chinook salmon in this fishery.

Table 1. Total estimated effort, catch and harvest of chinook salmon, with estimates of precision, in the Haines marine boat sport fishery, by week, April 26 through July 18, 1993.

	April 26 May 02	May 03 May 09	May 10 May 16	May 17 May 23	May 24 May 30	May 31 June 06	June 07 June 13	June 14 June 20	June 21 June 27	June 28 July 04	July 05 July 11	July 12 July 18	Total
Angler-hours													
Estimate	23	14	162	2,139	1,042	1,957	1,242	891	1,942	677	797	1,033	11,919
Variance	311	140	8,424	1,655,387	52,033	325,503	112,633	33,360	53,005	12,230	148,959	29,871	2,431,856
Precision ^a	1.50	1.66	1.11	1.18	0.43	0.57	0.53	0.40	0.23	0.32	0.95	0.33	0.26
Salmon-hours													
Estimate	23	14	152	2,113	984	1,814	1,066	786	1,631	206	126	154	9,069
Variance	311	140	8,206	1,655,387	53,875	326,270	84,700	17,610	24,480	1,255	1,512	12,453	2,186,199
Precision	1.50	1.66	1.17	1.19	0.46	0.62	0.54	0.33	0.19	0.34	0.60	1.42	0.32
Large chinook catch													
Estimate	0	0	0	27	35	42	76	65	104	0	0	0	349
Variance	0	0	0	378	195	87	786	655	1,865	0	0	0	3,966
Precision				1.41	0.78	0.44	0.72	0.77	0.81				0.35
Large chinook kept													
Estimate	0	0	0	27	35	42	76	46	88	0	0	0	314
Variance	0	0	0	378	195	87	786	363	1,222	0	0	0	3,031
Precision				1.41	0.78	0.44	0.72	0.81	0.78				0.34
Wild mature chinook kept													
Estimate	0	0	0	10	24	33	72	46	67	0	0	0	252
Variance	0	0	0	42	61	89	730	363	844	0	0	0	2,129
Precision				1.27	0.64	0.56	0.74	0.81	0.85				0.36
Small chinook catch													
Estimate	0	0	0	9	39	35	10	7	2	0	0	14	116
Variance	0	0	0	42	207	65	9	28	3	0	0	168	522
Precision				1.41	0.72	0.45	0.59	1.48	1.70			1.81	0.39

^a Relative Precision = 1.96 Standard Error/estimate.

Anglers returning to Letnikof Dock were responsible for 45% of the estimated salmon effort (4,078 angler-hours, SE = 212) and 66% of the estimated harvest (194, SE = 34) of large chinook salmon. Anglers returning to the Chilkat State Park boat launch and the Small Boat Harbor accounted for an estimated 1,766 (SE = 631) and 3,225 (SE = 1,320) salmon-hours of effort for a harvest of 50 (SE = 28) and 70 (SE = 33) large chinook salmon, respectively (Appendix B1). Since the projected harvest of wild mature chinook salmon never approached 500, the fishery remained open for the entire season.

Age Composition and Mean Length-at-age

One hundred seventeen (117) chinook salmon were sampled for age and length during this study (one large chinook salmon was lost overboard after it was harvested and thus considered "harvested," but not sampled); 97 were assigned an age. Chinook sampled at the Small Boat Harbor were younger on average ($\chi^2 = 5.8$, 1 df, $p = .016$) than those sampled in the other harbors¹, thus samples from the Small Boat Harbor were analyzed separately from the other harbors.

One hundred seven (107) chinook salmon were sampled at Letnikof Dock and Chilkat State Park boat launch, and 55% (SE = 5%) were female; 89 were assigned an age, and most (62%) were age-1.4 (Table 2).

Ten (10) chinook salmon (six male and four female) were sampled at the Small Boat Harbor; eight were assigned an age, and 88% of these were age-1.3 (Table 3).

Contributions of Coded Wire Tagged Stocks

One hundred and seventeen (117) chinook salmon were examined for adipose finclips in the Haines marine fishery between April 26 and July 18. Fourteen were missing adipose fins. Coded wire tags from Chilkat River releases were not recovered in the Small Boat Harbor samples, and Lutak Inlet coded wire tags were relatively concentrated in the Small Boat Harbor samples, as expected. The proportion of adipose finclipped chinook salmon sampled at the Small Boat Harbor was significantly higher than the proportion of adipose finclipped fish sampled in the other harbors ($\chi^2 = 12.9$, 1 df, $p < .001$). Thus, contributions for the Small Boat Harbor were estimated separately from the two other harbors in Chilkat Inlet.

One hundred seven (107) chinook salmon were examined for adipose finclips (44% of the estimated harvest) at Letnikof Dock and Chilkat State Park boat launch (Table 2). Of nine fish which were missing adipose fins, seven had CWT's that were decoded. Both hatchery and wild coded wire tagged chinook salmon were recovered at these harbors. Contribution estimates by tag code and time period (for the five weeks that CWT fish were recovered) are presented in Table 4. Total contributions of wild tagged stocks could not be estimated, as tagging fractions have not yet been determined for the 1988 brood year.

Ten (10) chinook salmon (14% of the estimated harvest) were examined for adipose finclips at the Small Boat Harbor (Table 3). Five of these were missing adipose fins. All four of the successfully decoded recoveries at this harbor were from a 1990 Lutak Inlet release of smolt from the Hidden Falls hatchery. Contribution

¹ Fish aged 1.2 and 1.3 and fish aged 1.4 and 1.5 were pooled to increase sample sizes before calculating the chi-square statistic.

Table 2. Age composition and mean length-at-age (FL) for chinook salmon sampled at Letnikof Dock and Chilkat State Park boat launch near Haines, 1993.

		Brood year				Number aged	Number sampled ^a
		1989	1988	1987	1986		
		1.2	1.3	1.4	1.5		
Males	n	5	18	16	0	39	48
	Percent	13	46	41			45
	SE	5	8	8			5
	Mean length	719	811	1,003			
	SE	8	16	26			
Females	n	0	9	39	2	50	59
	Percent		18	78	4		55
	SE		6	6	3		5
	Mean length		849	972	995		
	SE		31	11	5		
Total	n	5	27	55	2	89	107
	Percent	6	30	62	2		
	SE	3	5	5	2		
	Mean length	719	824	981	995		
	SE	8	15	11	5		

^a Includes fish that were not assigned an age.

Table 3. Age composition and mean length-at-age (FL) for chinook salmon sampled at the Small Boat Harbor near Haines, 1993.

		Brood year				Number aged	Number sampled ^a
		1989	1988	1987	1986		
		1.2	1.3	1.4	1.5		
Males	n	0	3	1	0	4	6
	Percent		75	25			60
	SE		25	25			16
	Mean length		835	935			
	SE		33				
Females	n	0	4	0	0	4	4
	Percent		100				40
	SE						16
	Mean length		786				
	SE		48				
Total	n	0	7	1	0	8	10
	Percent		88	13			
	SE		13	13			
	Mean length		807	935			
	SE		30				

^a Includes fish that were not assigned an age.

Table 4. Contribution estimates of hatchery produced and wild stock tagged chinook salmon to the Haines marine sport fishery, showing statistics used for computing estimates, by week and area of recovery, May 17 to June 27, 1993.

Hatchery	Release site	Tag code	Brood year	Week	N ^a	Var[N]	n2	a1	a2	m1	m2	mc	Estimate	SE
<u>Recoveries from Chilkat Inlet Harbors</u>														
Hidden Falls	Lutak Inlet	04-32-38	88	6/07-6/13	62	618	32	4	4	3	3	1	2	2
		04-32-39	88	5/17-5/23	6	0	6	1	1	1	1	1	1	1
Release site contribution													3	2
Jerry Myers	hatchery site	04-34-47	89	5/31-6/06	42	87	19	2	2	1	1	1	2	2
		Release site contribution												
Jerry Myers	Tahini River	04-01-011008	89	6/21-6/27	83	1,159	21	1	1	1	1	1	4	4
		Release site contribution												
Wild Stock	Chilkat River	04-33-37	88	6/07-6/13	62	618	32	4	4	3	3	1	2	2
	Kelsall River	04-27-14	88	6/07-6/13	62	618	32	4	4	3	3	1	2	2
	Tahini River	04-28-37	88	6/14-6/20	65	655	16	1	1	1	1	1	4	4
Wild tag contribution ^b													8	5
<u>Recoveries from the Small Boat Harbor</u>														
Hidden Falls	Lutak Inlet	04-32-38	88	6/21-6/27	21	378	3	3	3	3	3	2	14	13
		04-32-39	88	5/17-5/23	21	378	3	2	2	1	1	1	7	7
		04-32-39	88	6/21-6/27	21	378	3	3	3	3	3	1	7	7
Release Site Contribution													28	16

- ^a N = estimated harvest of large chinook; Var[N] = variance of N.
n2 = number of chinook sampled.
a1 = number of adipose clipped in n2.
a2 = heads received at tag lab.
m1 = number of tags detected in a2.
m2 = tags decoded in m1.
mc = number of CWT's in m2 with given tag code.

- ^b Estimated number of recoveries of wild chinook of the noted tag code, not corrected for tagging fraction.

estimates by tag code and time period (for the two weeks that CWT fish were recovered) are presented in Table 4. Most (28, SE = 16) of the estimated contribution of hatchery fish (37, SE = 17) were landed at this harbor.

All of the randomly sampled hatchery fish were from Tahini River (Chilkat River drainage) stock, reared in Southeast Alaska hatcheries and released in either the Tahini River, or in northern Lynn Canal. Wild coded wire tagged stocks were all tagged in the Chilkat River drainage (Chilkat River, Kelsall River, Tahini River; see Figure 1).

DISCUSSION

The distribution of effort and harvest in the Haines Marine boat sport fishery was strikingly different from past years. Sampling at each site in 1988 and 1989 suggested that 82-92% of the effort and harvest would originate from the Letnikof Dock. In contrast, 45% of the estimated salmon effort and 62% of the estimated harvest of chinook salmon originated from the Letnikof Dock in 1993. Anglers returning to the Small Boat Harbor were responsible for 36% and 22% of the estimated effort and harvest of large chinook, respectively. On May 22, unusually high effort, catch, and harvest was observed at the Small Boat Harbor. Since the sample density was low and a peak period was "hit" when sampling, estimates for that week may be biased high. However, it did appear that effort at the Small Boat Harbor was high during the early part of the season. In contrast, we did not sample the Small Boat Harbor prior to May 17, so our estimates of total effort and harvest for this harbor are probably biased low.

The shift in effort away from Letnikof Dock may have been due, in part, to anglers targeting on returns of chinook salmon from hatchery releases at Lutak Inlet, Taiya Inlet, and the Burro Creek and Jerry Myers hatcheries. This would tend to direct angler effort north of Haines and away from wild Chilkat River stocks. In addition, anglers had to motor approximately 2 km from the Letnikof Dock to reach waters open to chinook salmon fishing in 1993. This may have discouraged anglers from using the Letnikof Dock in favor of the other harbors.

The assumptions necessary to apply the estimators for the harvest of wild mature chinook salmon (Data Analysis section) were largely met in the survey. Creel technicians felt confident in assessing whether a fish was mature or immature. All hatchery chinook released in the area were adipose finclipped and coded wire tagged. While some wild fish were given an adipose finclip and coded wire tagged, this was not a problem because tags were decoded inseason.

The 1993 estimated harvest of large chinook salmon was similar to the harvest during the last three years the fishery was open (1988, 1989, and 1990), even though less area was open to fishing (Table 5; Figure 4). Sport fishing effort was also similar to that observed in 1989 and 1990. The 1993 effort and harvest did not approach the levels that prompted fishery restrictions in 1987.

Charter boat anglers harvested 30% of the chinook salmon yet accounted for only 18% of the salmon effort. Thus, fishing success was greater for charter boat anglers than for nonchartered anglers. This was expected, since charter boat anglers generally enjoy higher chinook salmon catch rates than other anglers (P. M. Suchanek, Alaska Department of Fish and Game, Douglas, personal communication).

Table 5. Estimated angler effort, and large chinook salmon catch and harvest in the Haines marine boat sport fishery for comparable sample periods, 1984-1993.

Year	Survey dates	Effort				Large (>28") chinook salmon			
		Total angler hours	SE ^a	Salmon-hours	SE	Catch	SE	Harvest	SE
1984 ^b	5/06-6/30	10,253		9,855		1,072		1,072	
1985 ^c	4/15-7/15	21,598		20,582		1,705		1,696	
1986 ^d	4/14-7/13	33,857		32,533		1,659		1,638	
1987 ^e	4/20-7/12	26,621	2,557	22,848	2,191	1,094	189	1,094	189
1988 ^f	4/11-7/10	36,222	3,553	32,723	3,476	505	103	481	101
1989 ^g	4/24-6/25	10,526	999	9,363	922	237	42	235	42
1990 ^h	4/23-6/21			11,972	1,169	248	60	241	57
1993 ⁱ	4/26-7/18	11,919	1,559	9,069	1,479	349	63	314	55

^a Estimates of variance not provided until 1987.

^b Neimark (1985).

^c Mecum and Suchanek (1986).

^d Mecum and Suchanek (1987).

^e Bingham et al. (1988).

^f Suchanek and Bingham (1989).

^g Suchanek and Bingham (1990).

^h Suchanek and Bingham (1991); no estimate of total angler effort and harvest was provided.

ⁱ Fishery was closed in 1991 and 1992.

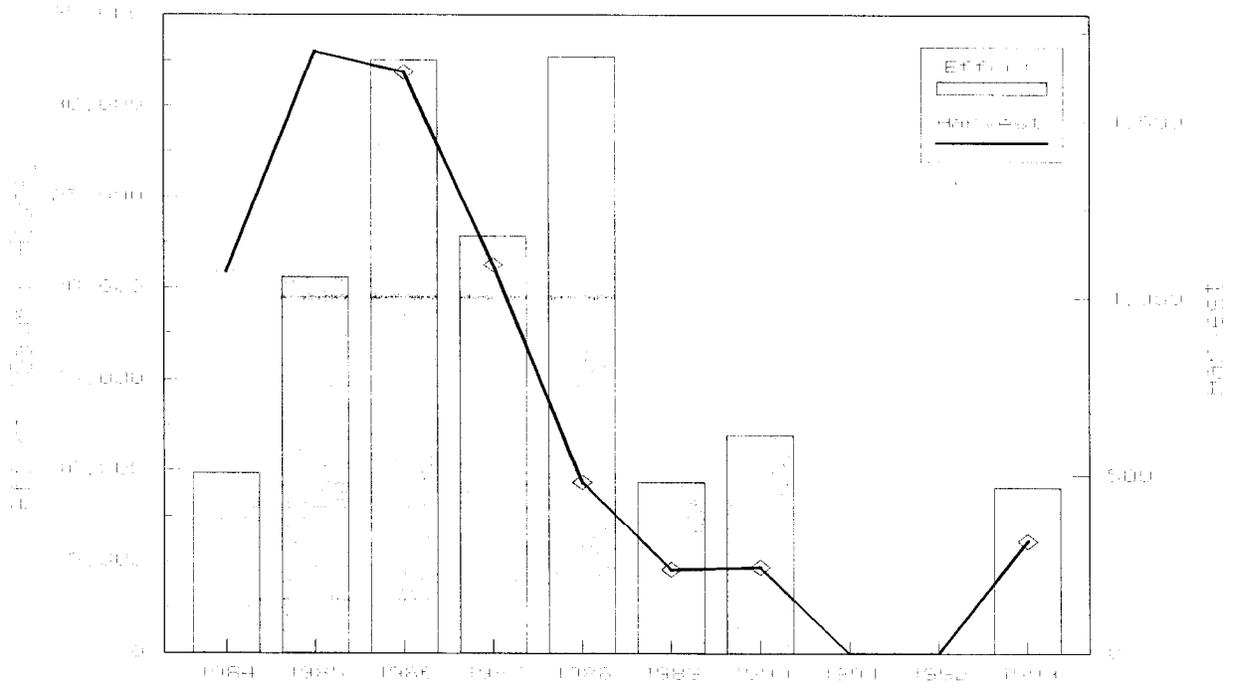


Figure 4. Estimated angler effort and harvest of large chinook salmon in the Haines marine boat sport fishery, 1984-1993. Data taken from Table 5 (fishery closed in 1991 and 1992).

The age composition of chinook salmon sampled at the Small Boat Harbor differs from age composition of those sampled at the other Chilkat Inlet harbors, probably because of two factors. About 40% (28, SE = 16) of chinook salmon landed at this harbor (70, SE = 33) were from a 1988 brood of smolt released in Lutak Inlet in 1990. Secondly, anglers returning to this harbor are more likely to be fishing on mixed and immature stocks of chinook salmon, since they are farther from the Chilkat River.

The 1993 contribution of hatchery fish to the Haines marine fishery was 37 fish, which is high when compared to prior surveys (Table 6). The contribution of hatchery chinook salmon to the sport fishery is expected to increase over the next several years, as a result of increased hatchery production/releases north of Lynn Canal in recent years. Adult chinook salmon returning from these releases will probably mill near Haines, and, therefore, most sport fishery landings of these fish are likely to occur at the Small Boat Harbor, as in 1993.

Recent research has shown that escapement of chinook salmon to the Chilkat River is much higher than previously thought (Johnson et al. 1992, 1993; Johnson *In prep*). This research has also demonstrated that prior indices of abundance were not valid, casting doubt on prior assumptions that Chilkat River chinook stocks were depressed. Current estimates of abundance indicate that between 4,000 and 6,000 large chinook (age-1.3 and older) escape to the Chilkat River. The Chilkat River therefore is the third largest producer of chinook salmon in Southeast Alaska (Pahlke 1993).

The Haines marine creel survey is currently an integral part of the management of Chilkat River chinook salmon stocks. The Haines marine sport fishery has been managed for a maximum harvest level since 1987 (excluding 1991 and 1992 when the fishery was closed). Since that time, a marine creel survey has been considered essential to provide inseason estimates of harvest. This survey can also assess enhancement efforts in upper Lynn Canal and document recoveries of wild coded wire tagged chinook salmon.

Current harvest patterns suggest that future surveys should begin around the first week of May, and end near the last week of June, as little harvest occurred before or after those dates. This will reduce personnel costs without significantly reducing the precision of the estimates. The Small Boat Harbor should be sampled at least one week earlier than in 1993, to monitor early effort and harvest originating from that harbor.

Given current escapements of chinook salmon to the Chilkat River, the sport fishery harvest can and probably will increase. The 1993 estimated harvest of 252 wild mature chinook salmon represents about 6% of the estimated 1993 escapement of 4,472 large chinook (SE = 851) into the Chilkat River drainage (Johnson *In prep*).

Several options are available to quickly increase this harvest, including increasing sport fishing effort (through promotions or reinstating the derby), reducing the area in Chilkat Inlet closed to chinook salmon harvest, or liberalizing the seasonal bag limit. However, measures to expand this harvest should proceed cautiously until optimum escapement goals can be revised to reflect our present knowledge of this important stock.

Table 6. Estimated contributions of hatchery produced chinook salmon to the Haines marine sport boat fishery, 1984-1993.

Year	Hatchery chinook salmon		Percent of harvest
	Contribution	SE	
1984 ^a	0	0	0
1985 ^b	0	0	0
1986 ^c	0	0	0
1987 ^d	14	d	1
1988 ^e	0	0	0
1989 ^f	8	6	3
1990 ^g	16	7	6
1993	37	17	12

^a Neimark (1985).

^b Mecum and Suchanek (1986).

^c Mecum and Suchanek (1987).

^d Bingham et al. (1988); no estimate of variance was provided.

^e Suchanek and Bingham (1989).

^f Suchanek and Bingham (1990).

^g Suchanek and Bingham (1991).

^h Fishery was closed in 1991 and 1992.

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LITERATURE CITED

- Bernard, D. R. 1992. Estimating harvest of salmon with coded wire tags: a short course on the mechanics of estimating contributions of wild and hatchery stocks of salmon to sport and commercial fisheries in Alaska. Alaska Department of Fish and Game, 26-27 March, 1992. Juneau, Alaska.
- Bethers, M. 1986. Annual sport fish management report for northern Southeast Alaska. Unpublished report. Alaska Department of Fish and Game, Division of Sport Fish, Juneau.
- Bingham, A. E., P. M. Suchanek, S. Sonnichsen, and R. D. Mecum. 1988. Harvest estimates for selected sport fisheries in southeast Alaska in 1987. Alaska Department of Fish and Game, Fishery Data Series No. 72, Juneau.
- Cochran, W. G. 1977. Sampling techniques, third edition. John Wiley and Sons, New York.
- Johnson, R. E. *In prep.* Chilkat River chinook salmon studies, 1993. Alaska Department of Fish and Game, Fishery Data Series No. 94- , Anchorage.
- Johnson, R. E., R. P. Marshall, and S. T. Elliott. 1992. Chilkat River chinook salmon studies, 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-49, Anchorage.
- _____. 1993. Chilkat River chinook salmon studies, 1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-50, Anchorage.
- Jones and Stokes Associates, Inc. 1991. Southeast Alaska sport fishing economic study. Final Research Report, December 1991 (JSA 88-028) Sacramento, California. Prepared for Alaska Department of Fish and Game, Division of Sport Fish, Research and Technical Services Section, Anchorage.
- Mecum, R. D., and P. M. Suchanek. 1986. Southeast Alaska sport harvest estimates. Alaska Department of Fish and Game, Federal Aid in Fish Restoration, Annual Performance Report 1985-1986, Project F-10-1, 27 (S-1-1), Juneau.

LITERATURE CITED (Continued)

- _____. 1987. Harvest estimates for selected sport fisheries in southeast Alaska in 1986. Alaska Department of Fish and Game, Fishery Data Series No. 21, Juneau.
- Neimark, L. M. 1985. Harvest estimates for selected fisheries throughout southeast Alaska. Alaska Department of Fish and Game, Federal Aid in Fish Restoration, Annual Performance Report 1984-1985, Project F-9-17, 26 (AFS-41-12B), Juneau.
- Olsen, M. A. 1992. Abundance, age, sex, and size of chinook salmon catches and escapements in Southeast Alaska in 1987. Alaska Department of Fish and Game Technical Data Report No. 92-07, Juneau.
- Pahlke, K. A. 1993. Escapements of chinook salmon in southeast Alaska and Transboundary rivers in 1992. Alaska Department of Fish and Game, Division of Sport Fish, Fishery Data Series No. 93-46, Juneau.
- Suchanek, P. M., and A. E. Bingham. 1989. Harvest estimates for selected sport fisheries in southeast Alaska in 1988. Alaska Department of Fish and Game, Fishery Data Series No. 114, Juneau.
- _____. 1990. Harvest estimates for selected marine boat sport fisheries in southeast Alaska in 1989. Alaska Department of Fish and Game, Fishery Data Series No. 90-51, Anchorage.
- _____. 1991. Harvest estimates for selected marine boat sport fisheries in southeast Alaska during 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-48, Anchorage.

APPENDIX A

EVALUATION CRITERIA USED TO DETERMINE CHINOOK SALMON MATURITY

Appendix A1. Evaluation criteria used to determine chinook salmon maturity in the Haines Marine boat sport fishery during 1993.

Spring Spawners: (Maturing chinook salmon in April, May, June, or July of final year of life).

- A) Scales difficult to remove with tweezers
 - 1) Scales won't flake off with knife
 - 2) Scales not missing
- B) Reproductive tracts well developed
 - 1) Females - individual eggs greater than 4.0 mm in diameter
 - 2) Males - gonads large, easily seen in body cavity
- C) Darker - Especially on head, fish seen in June or July are generally very dark

Immature and Fall Spawners: (Fish which will not spawn during 1993 or fish that will not enter fresh water for spawning until at least September 1993).

- A) Scales easily removed with tweezers
 - 1) Scales flake off with knife easily
 - 2) Scales often missing from landing fish
- B) Reproductive tracts not well developed
 - 1) Females - eggs small, less than 4.0 mm in diameter (BB size)
 - 2) Males - gonads not easily observed in body cavity
- C) Silver - lighter colored than spring spawners

APPENDIX B

CREEL SURVEY STATISTICS AND DATA ARCHIVE

Appendix B1. Estimated effort, catch, and harvest of chinook salmon, for the Haines marine boat sport fishery, by sampling site and week, April 26 through July 18, 1993.

	April 26 May 02	May 03 May 09	May 10 May 16	May 17 May 23	May 24 May 30	May 31 June 06	June 07 June 13	June 14 June 20	June 21 June 27	June 28 July 04	July 05 July 11	July 12 July 18	Total
<u>Letnikof Cove</u>													
Boats Counted	2	1	8	47	45	56	44	25	27	9	3	9	276
Angler-hs. Sampled	10	4	54	486	402	566	438	214	290	51	18	101	2,634
Salmon-hs. Sampled	10	4	50	460	390	507	414	214	261	41	0	6	2,357
Chinook Sampled*	0	0	0	6	13	19	29	16	18	0	0	0	101
Angler-hours													
Estimate	23	14	162	504	625	985	617	558	722	122	62	354	4,748
Variance	311	140	8,424	492	320	889	12,827	9,997	11,600	201	2,757	26,469	74,427
Salmon-hours													
Estimate	23	14	152	478	602	884	593	558	654	99	0	21	4,078
Variance	311	140	8,206	492	62	648	12,827	9,997	11,450	365	0	315	44,813
Large Chinook Catch													
Estimate	0	0	0	6	21	34	41	51	55	0	0	0	208
Variance	0	0	0	0	27	33	240	487	815	0	0	0	1,602
Large Chinook Kept													
Estimate	0	0	0	6	21	34	41	46	46	0	0	0	194
Variance	0	0	0	0	27	33	240	363	466	0	0	0	1,129
Wild Mature Chinook Kept													
Estimate	0	0	0	3	17	25	37	46	46	0	0	0	174
Variance	0	0	0	0	19	35	184	363	466	0	0	0	1,067
Small Chinook Catch													
Estimate	0	0	0	2	25	28	10	7	2	0	0	0	74
Variance	0	0	0	0	39	23	9	28	3	0	0	0	102
<u>Chilkat State Park Boat Launch</u>													
Boats Counted				0	5	11	6	5	9	4			40
Angler-hs. Sampled				0	35	105	46	28	43	35			292
Salmon-hs. Sampled				0	35	105	31	28	34	14			247
Chinook Sampled				0	0	1	3	0	3	0			7
Angler-hours													
Estimate				0	245	811	319	193	299	163			2,030
Variance				0	51,450	324,572	19,415	6,563	4,854	12,029			418,883
Salmon-hours													
Estimate				0	245	811	214	193	238	65			1,766
Variance				0	51,450	324,572	14,375	6,563	168	890			398,018
Large Chinook Catch													
Estimate				0	0	8	21	14	28	0			71
Variance				0	0	54	378	168	672	0			1,272

-continued-

Appendix B1. (Page 2 of 2).

	April 26 May 02	May 03 May 09	May 10 May 16	May 17 May 23	May 24 May 30	May 31 June 06	June 07 June 13	June 14 June 20	June 21 June 27	June 28 July 04	July 05 July 11	July 12 July 18	Total
Large Chinook Kept													
Estimate				0	0	8	21	0	21	0			50
Variance				0	0	54	378	0	378	0			810
Wild Mature Chinook Kept													
Estimate				0	0	8	21	0	21	0			50
Variance				0	0	54	378	0	378	0			810
Small Chinook Catch													
Estimate				0	14	0	0	0	0	0			14
Variance				0	168	0	0	0	0	0			168
Small Boat Harbor													
Boats Counted				26	8	3	8	6	16	4	11	13	95
Angler-hs. Sampled				234	25	23	44	20	132	28	105	97	708
Salmon-hs. Sampled				234	20	17	37	5	106	3	18	19	459
Chinook Sampled				3	2	0	2	0	3	0	0	0	10
Angler-hours													
Estimate				1,635	172	161	306	140	921	392	735	679	5,141
Variance				1,654,895	263	42	80,391	16,800	36,551	0	146,202	3,402	1,938,546
Salmon-hours													
Estimate				1,635	137	119	259	35	739	42	126	133	3,225
Variance				1,654,895	2,363	1,050	57,498	1,050	12,862	0	1,512	12,138	1,743,368
Large Chinook Catch													
Estimate				21	14	0	14	0	21	0	0	0	70
Variance				378	168	0	168	0	378	0	0	0	1,092
Large Chinook Kept													
Estimate				21	14	0	14	0	21	0	0	0	70
Variance				378	168	0	168	0	378	0	0	0	1,092
Wild Mature Chinook Kept													
Estimate				7	7	0	14	0	0	0	0	0	28
Variance				42	42	0	168	0	0	0	0	0	252
Small Chinook Catch													
Estimate				7	0	7	0	0	0	0	0	14	28
Variance				42	0	42	0	0	0	0	0	168	252

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^a One chinook was landed by a boat-party but was lost overboard prior to docking; this fish was considered "sampled" for purposes of harvest estimates, but was not sampled for maturity or adipose finclips.

Appendix B2. Estimates of sample variance for targeted salmon effort, and catch and harvest of large chinook salmon at the Letnikof Cove Dock, by stratum, in the Haines marine boat sport fishery, 1993.

Week	Stratum ^a	Effort		Catch		Harvest	
		Stage 1 ^b	Stage 2 ^c	Stage 1	Stage 2	Stage 1	Stage 2
Apr 26 - May 02	AM	0		0		0	
May 03 - May 09	AM	8		0		0	
May 10 - May 16	AM	450	35	0	0	0	0
May 17 - May 23	AM	28	10	0	0	0	0
May 24 - May 30	AM	0		0		0	
May 31 - Jun 06	AM	36	2	0	0	0	0
Jun 07 - Jun 13	AM	25	1	0	0	0	0
Jun 14 - Jun 20	AM	461	69	18	2	10	5
Jun 21 - Jun 27	AM	190	11	1	1	1	1
Jun 28 - Jul 04	AM	5		0		0	
Jul 05 - Jul 11	AM	0		0		0	
Jul 12 - Jul 18	AM	0		0		0	
Apr 26 - May 02	PM	33	8	0	0	0	0
May 03 - May 09	PM	0		0		0	
May 10 - May 16	PM	35	0	0	0	0	0
Jun 14 - Jun 20	PM	167	38	17	1	17	1
Jun 21 - Jun 27	PM	870	130	86	1	49	1
Jun 28 - Jul 04	PM	29	14	0	0	0	0
Jul 05 - Jul 11	PM	0		0		0	
Jul 12 - Jul 18	PM	18	2	0	0	0	0
May 17 - May 23	PM/WE	0		0		0	
May 24 - May 30	PM/WE	2	19	2	0	2	0
May 31 - Jun 06	PM/WE	3	122	8	1	8	1
Jun 07 - Jun 13	PM/WE	1,653	109	32	2	32	2
May 17 - May 23	PM/WD	10,047	33	0	0	0	0
May 24 - May 30	PM/WD	36	52	13	1	13	1
May 31 - Jun 06	PM/WD	2	30	1	0	1	0
Jun 07 - Jun 13	PM/WD	703	55	13	1	13	1

^a AM = morning, PM = evening, PM/WD = weekday evening, PM/WE = weekend evening.

^b Stage 1 sample variance is the variation between estimated total effort, catch or harvest on sampled days.

^c Stage 2 sample variance is the average of variation in effort, catch, or harvest between individual anglers on sampled days.

Appendix B3. Estimates of sample variance for targeted salmon effort, and catch and harvest of large chinook salmon at the low-use harbors, by week, in the Haines marine boat sport fishery, 1993.

Week	Effort		Catch		Harvest	
	Stage 1 ^a	Stage 2 ^b	Stage 1	Stage 2	Stage 1	Stage 2
<u>Chilkat State Park Boat Launch</u>						
May 17 - May 23	0		0		0	
May 24 - May 30	613	15	0	0	0	0
May 31 - Jun 06	3,856	48	1	0	1	0
Jun 07 - Jun 13	171	5	2	1	2	1
Jun 14 - Jun 20	78	12	2	1	0	0
Jun 21 - Jun 27	2	12	8	1	5	1
Jun 28 - Jul 04	17	8	0	0	0	0
<u>Small Boat Harbor</u>						
May 17 - May 23	19,701	46	5	0	5	0
May 24 - May 30	28	4	2	1	2	1
May 31 - Jun 06	13		0		0	
Jun 07 - Jun 13	685	15	2	0	2	0
Jun 14 - Jun 20	13	1	0	0	0	0
Jun 21 - Jun 27	153	69	5	0	5	0
Jun 28 - Jul 04	0		0		0	
Jul 05 - Jul 11	18	50	0	0	0	0
Jul 12 - Jul 18	145	72	0	0	0	0

^a Stage 1 sample variance is the variation between estimated total effort, catch or harvest on sampled days.

^b Stage 2 sample variance is the average of variation in effort, catch, or harvest between individual anglers on sampled days.

Appendix B4. List of data files used to prepare "Effort, catch, and harvest of chinook salmon in the spring marine boat sport fishery near Haines, Alaska, 1993." Data files are archived at and available from the Department of Fish and Game, Division of Sport Fish, Research and Technical Services, 333 Raspberry Road, Anchorage, Alaska 99815-1599.

File name	Description
F0810AA3.DTA	Haines marine halibut length data, 1993
F0810AB3.DTA	Haines marine chinook age-length data, 1993
F0810MA3.DTA	Haines marine angler interview data, 1993
93H1215.TXT	Haines marine CWT recovery report, 1993
