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Coded Wire Tag Estimates of Abundance, Harvest, and Survival Rates of Selected Coho Salmon Stocks in Southeast Alaska, 1981–1986

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ABSTRACT

Wild coho salmon stocks throughout Southeast Alaska and Yakutat were coded-wire tagged to determine harvest rates, harvest distributions, migratory timing, and survival rates. A total of 87,740 coho salmon smolts and 318,954 rearing juveniles were captured, coded-wire tagged, and released at 23 sites during July 1, 1981 to June 30, 1986. During this period, coded-wire tagged adult coho salmon returned to 16 of these sites, of which 10 were sampled for total escapement and recovery of coded-wire tags. The spatial and temporal distribution of the fishery harvests was estimated for 14 stocks. In addition, total return, harvest, and removal rates by fishery and survival rates were estimated for those stocks for which escapements were enumerated and sampled. Four stocks were selected for continued annual tagging and recovery based on the success of tagging and escapement enumeration efforts.

Most stocks exhibited broad spacial and temporal distributions in the fisheries. Northern stocks were harvested primarily in northern Southeast Alaska, and southern stocks were harvested from northern Southeast Alaska and Yakutat to northern British Columbia. All stocks were available to the troll fishery for periods of 2.5- 3.0 months; however, the major Lynn Canal stocks (Berners, Chilkoot and Chilkat Rivers) peaked in the first week of September, compared with mid-July to late August for most other stocks. Total harvest rate estimates for 28 stocks ranged from 20.4% to 89.6% and averaged 59.7%. All stocks were subjected to harvest by the troll fishery which had an average estimated harvest rate of 44.4% for all stocks and years. The highest total harvest rates were incurred by stocks that were not only subjected to troll, purse seine, and marine sport fisheries, but also to intense near-terminal drift gill net and freshwater sport fisheries close to their spawning destination. Overall, fishing pressure on Southeast Alaska coho salmon stocks was moderate compared with stocks in the state of Washington and southern British Columbia.

The estimated coho salmon run averaged over several years for each of five stocks in lake systems varied from 1,116 to 5,255 (mean 3,446); the Berners River run was an estimated average of 29,748 fish. Estimated marine survival rates from the Auke Lake stock were more variable than numbers of smolts produced. This demonstrates the importance of marine survival factors on adult production in a lake stock with stable smolt production. Further research needs to be directed at estimating stock-recruitment parameters for different types of stocks and the influence of potentially predictive variables on stock strength.

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INTRODUCTION

Coho salmon *Oncorhynchus kisutch* are an important species to commercial, sport and subsistence fisheries in Southeast Alaska. Annual commercial catches increased until the early 1950s with a peak decade average catch of 2.05 million in the 1940s (Figure 1). The commercial catch remained at a depressed level from the mid-1950s to early 1980s, averaging 1.10 million fish annually, followed by a resurgence during the early to mid-1980s: the 1981–86 average catch was 2.21 million fish. The 1986 commercial harvest of 3.31 million coho salmon was the largest on record. During the 1970s and 1980s, the commercial fisheries accounted for the vast majority of the total harvest; sport and subsistence fisheries combined took an average of only 3%. The 1970–84 average percentages of the total commercial catch by gear type were 60% troll, 20% purse seine, 13% drift gill net, and 7% set gill net.

The majority of the coho salmon harvested in Southeast Alaska originate from its more than 2,000 streams. Important contributions are also made by the Canadian portions of three major transboundary rivers (Stikine, Taku and Alsek) and by streams along the British Columbia coast. Management of fisheries for coho salmon in Southeast Alaska is complicated by the scattered distribution of the spawning stocks and the highly mixed stock nature of most of its fisheries. Effective management requires an understanding of the migratory characteristics, status, productivity, harvest rates, and contributions to the fisheries by contributing stocks or groups of stocks.

The migratory patterns of wild coho salmon stocks and harvest rates by the fisheries in Southeast Alaska were not well understood. Therefore, a juvenile and smolt marking program was initiated in 1972 to provide data essential to effective management of coho salmon stocks. In initial studies during 1972 to 1974, fish were marked with fluorescent pigment (Gray et al. 1978). This was replaced with coded wire tags beginning in 1976. Through 1986, wild coho salmon have been marked in 22 stream systems throughout Southeast Alaska (Figure 2) and in five river systems near Yakutat (Figure 3). Coded wire tag data for the Salmon Lake stock near Sitka was reported by Schmidt (1985, 1986, 1987).

The majority of Southeast Alaska coho salmon that were tagged as age-1 or older rearing juveniles returned as adults 2 years later. Most fish tagged as outmigrating smolts returned to spawn the following year (Gray et al. 1981).

This report includes a summary and analysis of tag release and recovery data for selected wild Southeast Alaska coho salmon stocks for the period 1981 through 1986. Related data from prior years was included for those selected stocks which were tagged before 1981.

METHODS

Smolt and Juvenile Tagging

Wild coho salmon smolts and rearing juveniles were coded wire tagged in 17 stream systems in Southeast Alaska and five rivers near Yakutat. Rearing juveniles were tagged in seven systems in northern Southeast including Speel Lake (1981, 1983, 1984), Berners River (1981 and 1983–86), Chilkoot Lake (1981, 1985), Kadashan River (1986), Chilkat River (1981, 1982, 1984), Ford Arm Lake (1981 and 1983-86) and Politofski Lake (1981). Outmigrating smolts were tagged annually at Auke Creek near Juneau from

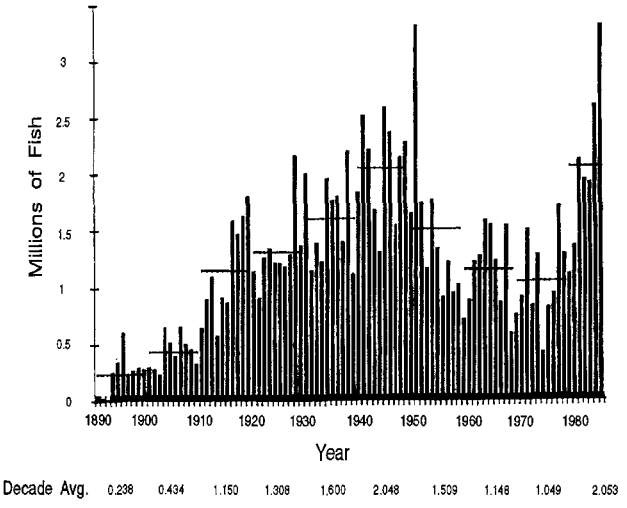

FIGURE 1.—Annual commercial catch of coho salmon in Southeast Alaska and decade averages, in millions of fish, 1890-1986.

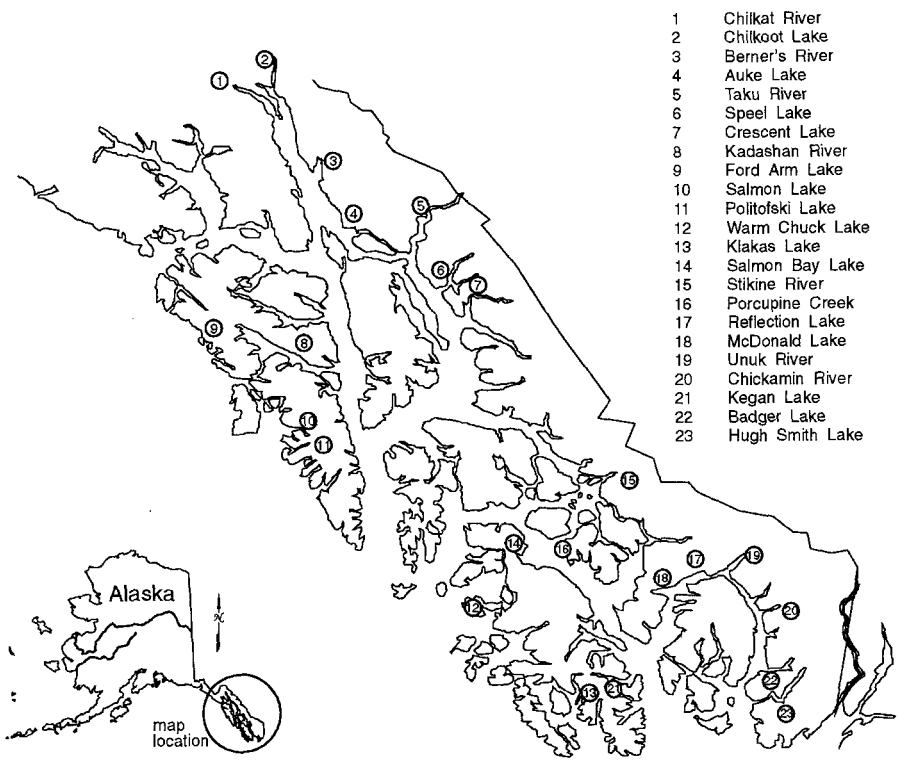

FIGURE 2.—Wild coho salmon coded-wire tagging locations in Southeast Alaska, 1976-1986.

1981 through 1986 and in the Kadashan River in 1986. Rearing fish were also tagged in eight systems in southern Southeast including Warm Chuck Lake (1981, 1983, 1984, 1985), Klakas Lake (1981, 1986), Kegan Lake (1981), Salmon Bay Lake (1984–86), Hugh Smith Lake (1981), Reflection Lake (1981), Unuk River (1983–86), and Chickamin River (1983-86). Smolts were tagged annually at Hugh Smith Lake during 1981 to 1986 and at McDonald Lake in 1982. In the Yakutat area, smolts were tagged in the Situk River (1984) and Alsek River (1985), and rearing juveniles were tagged in the Lost, Akwe and Tsiu-Tsivat Rivers in 1984.

Outmigrating smolts were captured daily for tagging in smolt-weir traps at the outlets of Auke and Hugh Smith Lakes. Fyke traps were operated at the outlet of McDonald Lake and in the lower Kadashan River. Smolts in the lower Situk and Alsek Rivers were captured daily with a small-mesh beach seine, tagged, and released (Kissner 1985). Wire-mesh minnow traps were used to capture age-1 and older juveniles on other systems. Fifty traps baited with salmon roe were checked and set four times daily at 2-h intervals at Ford Arm Lake, Speel Lake, Chilkoot Lake, Salmon Bay Lake, Politofski Lake, Warm Chuck Lake, Klakas Lake, Kegan Lake, Reflection Lake, Berners River, Chilkat River, Lost River, Akwe River, and Tsiu-Tsivat Rivers. Gray and Marriott (1986) describe the minnow trapping method in detail. Traps were moved as frequently as necessary to maintain the highest possible catch rates. Juveniles were held in pens until 1,000 to 4,000 were available for tagging, but for periods not longer than 4 d. On the Unuk and Chickamin Rivers, traps were checked once daily and captured fish were tagged and released. The adipose fins on all tagged fish were removed with

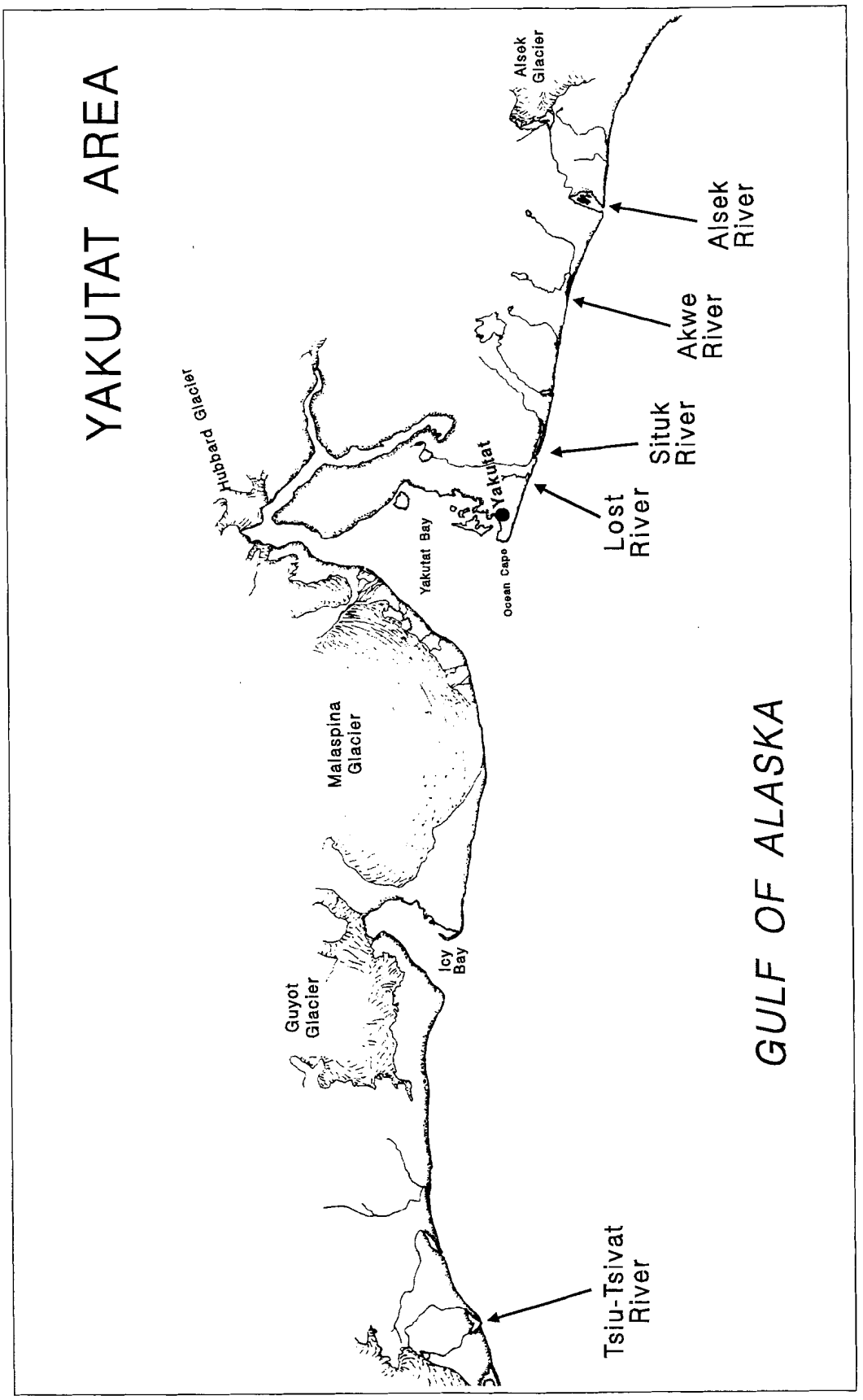

FIGURE 3.—Yakutat area streams where wild coho salmon were coded wire tagged, 1984-1985.

clippers to make it possible to identify them when they were recaptured in the fisheries and spawning streams. A description of the coded wire tagging technique under field conditions is found in Koerner (1977).

Estimation of Coded wire Tag Contributions to Catches

Coded wire tag recovery was conducted in marine fisheries in Southeast Alaska and northern British Columbia and in selected stream systems in Southeast Alaska. Commercial catch sampling for coded wire tagged coho salmon was conducted by the Alaska Department of Fish and Game (ADF&G) which had samplers stationed at fish processors and buying stations located throughout Southeast Alaska. The samplers watched for adipose clipped coho salmon during off-loading and sorting operations. Skippers of fishing vessels and tenders were interviewed to determine fishing districts in which the catch was taken (Appendix A.1). The heads of all adipose-clipped fish were sent to the ADF&G Coded wire Tag Laboratory in Juneau for removal and decoding of tags. Random tag recoveries from the net and trap fisheries were expanded and stratified by *PMFC area* (Pacific Marine Fisheries Commission; Appendix A.2). The methods and calculations used for estimating coded wire tag contributions was detailed by Clark and Bernard (1987).

Random tag recoveries from the troll fishery were expanded into a variety of estimates:

(1) total season catch from all areas,

(2) total catch by *period* (i.e., periods when the troll fishery was open),

(3) total catch by districts combined into four *quadrants* (groupings of fishing districts; see Appendix B.2),

(4) catch by statistical week (Appendix A.3) by quadrant for analysis of migratory timing, and

(5) catch by PMFC area by period for analysis of harvest distribution.

Catch samples from the troll fishery frequently contain fish caught in more than one district or PMFC area because the boundaries of two or more districts often intersect an area of intensive fishing effort. Therefore, expanding tag recoveries from the troll fishery by district or PMFC area requires eliminating a significant proportion of the recoveries from the analysis. In addition, there is potential bias in resulting estimates because samples from certain fishing locations near district boundaries are more frequently eliminated than others located more centrally within districts. Stratification into four quadrants was done, where possible, to reduce this problem.

Randomly recovered tags were expanded by the inverse of the proportion of the catch that was sampled within an area, gear type or weekly stratum, and adjustments were made to account for lost samples (Clark and Bernard 1987). The adjustment for heads lost in processing and transit was made by dividing by the proportion of total adipose clipped fish observed from which heads were successfully removed and sent to the tag lab for dissection. The adjustment for tags lost in the lab before decoding was made by dividing total tags recovered by the proportion of tags found that were successfully decoded. Very few tags were lost after being detected in the lab.

The ADF&G Sport Fish Division conducted a creel census and survey of the Juneau and Ketchikan marine recreational fisheries. Tags recovered from random samples were expanded to the total season catch. Two expansion factors were generated for sport fisheries, including one for recoveries from fish sampled during random creel surveys and another for fish entered in salmon derbies. Fish entered in the salmon derbies were sampled at a 100% rate.

Sampling of British Columbia coastal fisheries and reporting of coded wire tag recoveries was done by the Canada Department of Fisheries and Oceans (DFO). Tags were expanded by area, week and gear type (Bailey et al. 1983).

Escapement Enumeration and Tag Recovery

Coho salmon escapements were estimated at Auke Lake, Speel Lake, Chilkoot Lake, Chilkat Lake, Ford Arm Lake, Politofski Lake, Warm Chuck Lake, Klakas Lake, Hugh Smith Lake, and the Berners River. Total counts were obtained in most cases, but when necessary, mark-recapture methods were used to estimate the number of fish that passed weirs uncounted during periods of high water. Methods followed in making these estimates and their confidence intervals for 1981–84 returns are described in Shaul (1983, 1985, 1986, 1987). The escapement to Hugh Smith Lake in 1982 was estimated using the stratified method introduced by Schaefer (1951); other estimates were made using a modified Peterson method

described in Ricker (1975). Total counts were obtained at weir sites at Auke, Ford Arm, Warm Chuck, and Hugh Smith Lakes in 1985 as described by Wood and Van Alen (1987). The Berners River was surveyed intensively during late October. Although survey counts should be considered conservative, excellent visibility in this system and observations on the migratory characteristics of the stock indicate that the annual ground survey count is probably close to the total escapement. However, this remains to be verified.

As many fish as possible were examined for adipose clips at weir sites or otherwise sampled instream with beach seines. In 1982 and 1983, 20 to 30 marked fish from each system were initially sacrificed; their heads sent to the tag lab for tag removal and decoding. If all had tags, the tag retention rate was assumed to be 100%. However, if one or more marked fish did not have a tag, an additional sample of up to 50 marked fish was sacrificed to estimate tag retention. This method had drawbacks because of the undesirability of sacrificing fish from small escapements and because of the lack of precision in the resulting estimates. Consequently, beginning in 1985 all marked fish counted at the weir were examined with a magnetic field detector to determine if a tag was present. Only fish that did not register a positive signal were sacrificed; their heads were sent to the tag lab for further verification. This greatly increased the sample size for tag retention estimates and usually required sacrificing fewer than 20 adults.

The number of tags in the escapement was estimated using the same expansion method used to estimate catch contributions of tagged fish. The number of tags recovered in the escapement sample was divided by the number of fish sampled to estimate the proportion of the escapement that was tagged. The total escapement estimate was multiplied by this proportion to estimate the total number of tagged fish in the escapement. Estimates of the contribution of tagged fish to the fisheries by each stock were divided by the proportion tagged in the escapements to estimate total fishery contributions.

Harvest Estimators

We defined four different harvest-related parameters in our study.

(1) *Catch/escapement proportions by stock* are the distribution of the total catch and escapement expressed as a proportion of the total run.

(2) *Harvest proportions by fishery* are the distribution of catch among fisheries by area and/or gear type expressed as a proportion of the total catch.

(3) *Removal rate* is the total harvest within a defined fishery divided by the total number of fish available within that fishery.

(4) *Harvest rate* is the total harvest of a stock by all fisheries divided by the total run (catch and escapement).

In sequential fisheries such as occur for coho salmon in Southeast Alaska, removal rate estimates for distinct fisheries provide a clearer understanding of management options for achieving desired escapement than do catch proportions. Removal rates are independent of catch by previous fisheries and therefore provide a measure of the effect of a particular fishery on a migrating population of fish. Therefore, removal rate estimates are an important component of postseason management assessment and are useful for developing future management strategies.

In our analyses, the number of fish available to a fishery was considered to be the total number of fish that migrated through the fishery area. The number of fish that passed through a fishing area was the estimated total run (catch and escapement) minus fish harvested in preceding fisheries. We assumed that returning coho salmon migrated by the most direct route or routes from the open ocean toward their systems of origin.

The harvest rate, H, for a stock was estimated as follows:

$$H = \frac{F}{F+E} ,$$

where

F = estimated number of tagged fish harvested (expanded sum of random fishery recoveries), and

E = estimated number of tagged fish in the escapement.

Migratory Timing

The migratory timing of several coho salmon stocks in troll fishing districts was estimated from the distribution of the harvest of tagged fish by week. Troll fishery tag recoveries were expanded to total catch by quadrant and week. The weekly proportion of the total troll catch of each stock was estimated for each year when data were available (Appendices B.1-B.14). These estimates were based on the dates of landing of tagged fish at fishing ports. Because the average trip length for a troll vessel is about 6 d, the average time of capture of landed fish probably occurred about 3 d previously.

Smolt Outmigration Estimates

Coho salmon smolts were enumerated at a smolt weir at Auke Creek from 1980 through 1986. Prior to that, estimates were made of the total outmigration in 1976, 1977, and 1979 using the Peterson mark-recapture technique (Ricker 1975). Tagged smolts were the marked group, and returning adults at the weir were the recapture sample.

Peterson estimates were made for the smolt outmigration from Hugh Smith Lake from 1982 through 1986. These estimates were also made through coded wire tagging of smolts and recapture of adults.

Survival Rate Estimates

Survival, S, from the time of tagging (smolt or age-1 juvenile) to the adult stage (age .1) was estimated as follows:

$$S = \frac{F+E}{T},$$

where

F = expanded number of marked fish harvested,

E = expanded number of marked fish in the escapement, and

T = number of smolts or juveniles tagged.

We assumed that all adipose-clipped fish in the escapement were tagged as juveniles or smolts in that system. There was no allowance for straying of tagged fish or for the occurrence of naturally missing adipose fins. Survival rate estimates for tagged fish represent the entire population under the assumption of no tagging mortality.

TABLE 1.—Estimated harvest and (percent) by gear type, escapement and total return of coho salmon returning to Auke Lake, 1980-85.

		Harvest: Number of Fish and (Percent) by Gear Type						
Year	Fishery Sample Size[a]	Troll	Purse Seine	Drift Gill Net	Sport	Total Harvest	Escapement	Run
1980	15	123	0	30	26	179	698	877
		(14.0)		(3.4)	(3.0)	(20.4)	(79.6)	(100)
1981	70	295	2	32	15	344	647	991
		(29.8)	(0.2)	(3.2)	(1.5)	(34.7)	(65.3)	(100)
1982	44	152	132	24	1	309	447	756
		(20.1)	(17.5)	(3.2)	(0.1)	(40.9)	(59.1)	(100)
1983	129	402	10	30	98	540	694	1,234
		(32.6)	(0.8)	(2.4)	(8.0)	(43.8)	(56.2)	(100)
1984	124	372	0	85	43	500	651	1,151
		(32.3)	(7.4)	(3.7)	(43.4)	(56.6)	(100)	
1985	178	594	3	71	79	747	942	1,689
		(35.1)	(0.2)	(4.2)	(4.7)	(44.2)	(55.8)	(100)
Avg. Number of Fish		323	24	45	44	436	680	1,116
Avg. Percent of Total		27.3	3.1	4.0	3.5	37.9	62.1	100

[a]Includes only expandable random recoveries.

TABLE 2.—Estimated harvest and (percent) by gear type, escapement, and total return of coho salmon returning to Speel Lake, 1981–83.

		Harvest: Number of Fish and (Percent) by Gear Type						
Year	Fishery Sample Size[a]	Troll	Purse Seine	Drift Gill Net	Sport	Total Catch	Escapement	Run
1981	36	1,382	129	109	70	1,690	1,935	3,625
		(38.1)	(3.6)	(3.0)	(1.9)	(46.6)	(53.4)	(100)
1982	35	1,393	1,392	172	0	2,957	1,165	4,122
		(33.8)	(33.7)	(4.2)		(71.7)	(28.3)	(100)
1983	98	1,482	193	59	11	1,745	1,797	3,542
		(41.8)	(5.5)	(1.7)	(0.3)	(49.3)	(50.7)	(100)
Avg. Number of Fish		1,419	572	113	27	2,131	1,632	3,763
Avg. Percent of Total		37.9	14.3	3.0	0.7	55.9	44.1	100

TABLE 3.—Estimated harvest and (percent) by gear type, escapement, and total return of coho salmon returning to Berners River, 1982, 1983 and 1985.

		Harvest: Number of Fish and (Percent) by Gear Type						
Year	Fishery Sample Size[a]	Troll	Purse Seine	Drift Gill Net	Sport	Total Catch	Escapement	Run
1982	48	12,887	0	10,568	0	23,445	7,505	30,960
		(41.6)		(34.1)		(75.7)	(24.3)	(100)
1982	125	17,153	0	6,978	65	24,196	9,840	34,036
		(50.4)	(20.5)		(0.2)	(71.1)	(28.9)	(100)
1983	93	10,865	198	7,015	0	18,078	6,169	24,247
		(41.8)	(5.5)	(1.7)	(0.3)	(49.3)	(50.7)	(100)
Avg. Number of Fish		13,635	66	8,187	22	21,910	7,838	29,748
Avg. Percent of Total		45.6	0.2	27.8	0.1	73.7	26.3	100

[a]Includes only expandable random recoveries.

RESULTS

Numbers of Fish Tagged

A total of 87,740 outmigrating smolts and 318,954 rearing juveniles were tagged between July 1, 1981 and June 30, 1986. Numbers tagged by system, year and code are listed in Appendices C.1. to C.3. More detailed information on these tag releases is found in Shaul et al. (1983, 1985, 1986, 1987) and in Johnson (1987).

Locations selected for continued annual tagging were Berners River, Auke Lake, Ford Arm Lake, and Hugh Smith Lake. Fish are more highly available for capture and tagging in these systems, and returning tagged adults can be counted or estimated.

Escapement and Harvest by Fishery

The estimated harvest, escapement, and harvest proportion by gear type and escapement were computed for coho salmon returns to 10 systems (Tables 1–9).

Auke Lake

From 1980 through 1985 the total adult coho salmon return to Auke Lake near Juneau averaged an estimated 1,116 fish (range 756–1,689; Table 1). On the average an estimated 27.3% of the total return was

TABLE 4.—Estimated harvest and percent by gear type, escapement and total return of coho salmon returning to Chilkoot and Chilkat Lakes, 1983.

	Harvest: Number of Fish and (Percent)		
GearType/ Escapement	Chilkoot Lake	Chilkat Lake (Direct Est.)	Chilkat Lake (Adj. Est.)[a]
Troll	5,315	29,503	29,503
	(50.4)	(56.7)	(46.4)
PurseSeine	369	693	693
	(3.5)	(1.3)	(1.1)
Drift Gill Net	3,056	20,845	20,845
	(29.0)	(40.0)	(32.7)
Inriver Sport	707		
	(6.7)		
Total Catch	9,447	51,041	51,041
	(89.6)	(98.0)	(80.2)
Escapement	1,100	1,028	12,601
	(10.4)	(2.0)	(19.8)
Total Run	10,547	52,069	63,642
	(100)	(100)	(100)
Fishery Sample Size	81	114	114

[a]Estimates adjusted under the assumption that the combined troll and purse seine harvest rate for Chilkat Lake was the same as the average estimate for the Berners River and Chilkoot Lake stocks.

harvested by the troll fishery, 7.1% were harvested by net fisheries, and 3.5% were harvested by the Juneau marine sport fishery.

Speel Lake

Estimates of total harvest and escapement for the Speel Lake stock are presented for 1981 to 1983 in Table 2. The estimated total return to Speel Lake in Port Snettisham averaged 3,763 fish (range: 3,542–4,122). The estimated proportion harvested by troll gear averaged 37.9%, gill net fisheries and purse seine fisheries harvested an average of 17.3%, and the Juneau sport fishery took 0.7%.

Berners River

During 1982, 1983, and 1985 the total return to the Berners River in lower Lynn Canal averaged an estimated 29,748 fish (range: 24,247–34,036; Table 3). Of the total return, an estimated average of 45.6% was harvested by troll gear, gill net and purse seine fisheries harvested an average of 28.0%, and the Juneau sport fishery took 0.1%.

Chilkoot Lake

In 1983 an estimated 10,547 coho salmon returned to Chilkoot Lake in upper Lynn Canal (Table 4). Of the total an estimated 50.4% were harvested by the troll fishery; 3.5% and 29.0% were harvested by the purse seine and drift gill net fisheries, respectively. An estimated 707 fish or 6.7% of the total run was harvested in the Chilkoot River sport fishery. The escapement (1,100 fish) accounted for only an estimated 10.4% of the total run to Chilkoot Lake.

Chilkat Lake

Chilkat Lake drains through a short outlet stream to the Tsirku River, a major tributary of the Chilkat River. An adult salmon weir was operated on this outlet stream. Coho salmon spawn in inlet streams to

TABLE 5.—Estimated harvest and percent by gear type, escapement and total return of coho salmon returning to Ford Arm Lake, 1982, 1983 and 1985.

		Harvest: No. of Fish and (Percent) by Gear Type				
Year	Fishery Sample Size[a]	Troll	Purse Seine	Total Catch	Escapement	Total Run
1982	38	1,948	107	2,055	2,662	4,717
		(41.3)	(2.3)	(43.6)	(56.4)	(100)
1983	93	3,412	931	4,343	1,944	6,287
		(54.3)	(14.8)	(69.1)	(30.9)	(100)
1985	49	2,438	0	2,438	2,324	4,762
		(51.2)	(0.0)	(51.2)	(48.8)	(100)
Average Number of Fish		2,599	346	2,945	2,310	5,255
Average Percent of Total		48.9	5.7	54.6	45.4	100

[a]Includes only expandable random recoveries.

TABLE 6.—Estimated harvest and (percent) by gear type, escapement and total return of coho salmon returning to Politofski Lake, 1982–83.

Year	Fishery Sample Size[a]	Harvest: No. of Fish and (Percent) by Gear Type Troll	Purse Seine	Total Harvest	Escapement	Run
1982	27	806	-	806	1,731	2,537
		(31.8)	(31.8)		(68.2)	(100)
1983	10	303	-	303	732	1,035
		(29.3)		(29.3)	(70.7)	(100)
Avg. Number of Fish		554	-	554	1,232	1,786
Avg. Percent of Total		30.6	-	30.6	69.4	100

[a]Includes only expandable random recoveries.

Chilkat Lake and at other locations throughout the Chilkat River drainage including the delta where the Tsirku River joins the Chilkat River.

The total return to Chilkat Lake in 1983 was estimated at 52,069 fish, of which 56.7% was harvested by the troll fishery, 1.3% by purse seine fisheries, and 40.0% was harvested by the Lynn Canal drift gill net fishery for a total harvest rate of 98.0%. This harvest rate appears to be inflated because it is likely that only a portion of the tagged fish returning to Chilkat Lake were counted and sampled at the weir site. Significant portions of the escapement may have remained downstream from the weir which was removed for the season on November 13. A total of 2,500 coho salmon were counted during a survey of the lower Chilkat River on November 13. Some of these fish may have been destined for Chilkat Lake. Another possibility is that some fish that reared in Chilkat Lake returned to spawn elsewhere in the drainage and therefore did not return to the weir. The undercount is supported by a comparison of the troll fishery harvest rates of the Chilkat Lake (56.7%), Chilkoot Lake (50.4%) and Berners River (41.8%) stocks. These three stocks have similar migratory timing and harvest patterns in the mixed stock troll fishery preceding Lynn Canal where troll effort is negligible. Therefore, the three stocks should have similar harvest rates in the troll fishery. The Chilkat Lake troll harvest rate estimate, however, was 6.3 percentage points greater than the Chilkoot Lake estimate and 14.9 percentage points greater than the Berners River estimate, indicating that the Chilkat Lake harvest rate estimate was inflated.

Considering these possibilities, an adjustment was made to equalize the troll harvest rate for Chilkat Lake with the average (46.4%) for the Berners River and Chilkoot Lake. This resulted in an adjusted total adult

TABLE 7.—Estimated harvest and (percent) by gear type, escapement and total return of coho salmon returning to Warm Chuck Lake, 1982, 1983, and 1985.

Year	Fishery Sample Size[a]	Harvest: No. of Fish and (Percent) by Gear Type Purse Troll	Total Seine	Total Harvest	Escapement	Run
1982	28	1,320	418	1,738	1,017	2,755
	(47.9)	(15.2)	(63.1)	(36.9)	(100)	
1983	11	551	618	1,169	1,238	2,407
	(22.9)	(25.7)	(48.6)	(51.4)	(100)	
1985	29	1,906	975	2,881	956	3,837
	(49.7)	(25.4)	(75.1)	(24.9)	(100)	
Avg. Number of Fish		1,259	670	1,929	1,070	2,999
Avg. Percent of Total		40.2	22.1	62.3	37.7	100

[a]Includes only expandable random recoveries.

TABLE 8.—Estimated harvest and (percent) by gear type, escapement and total return of coho salmon returning to Klakas Lake, 1982–83.

Year	Fishery Sample Size[a]	Harvest: No. of Fish and (Percent) by Gear Type			Escapement	Run
		Troll	Purse Seine	Total Harvest		
1982	14	761	1,705	2,466	627	3,093
		(24.6)	(55.1)	(79.7)	(20.3)	(100)
1983	26	1,866	674	2,540	1,328	3,868
		(48.3)	(17.4)	(65.7)	(34.3)	(100)
Avg. Number of Fish		1,314	1,189	2,503	978	3,481
Avg. Percent of Total		36.5	36.2	72.7	27.3	100

TABLE 9.—Estimated harvest and (percent) by gear type, escapement and total return of coho salmon returning to Hugh Smith Lake, 1982–85.

Year	Fishery Sample Size[a]	Harvest: No. of Fish and (Percent) by Gear Type								
		Alaska Troll	B.C. Troll	Alaska Seine	Alaska Gill Net	B.C. Gill Net	Alaska Trap	Total Harvest	Escapement	Run
1982	93	2,780	264	640	243	78	0	4,005	2,144	6,149
		(45.2)	(4.3)	(10.4)	(4.0)	(1.2)		(65.1)	(34.9)	(100)
1983	200	1,374	211	399	292	50	49	2,375	1,490	3,865
		(35.5)	(5.5)	(10.3)	(7.6)	(1.3)	(1.3)	(61.5)	(38.5)	(100)
1984	152	1,225	316	493	461	27	18	2,540	1,367	3,907
		(31.3)	(8.1)	(12.6)	(11.8)	(0.7)	(0.5)	(65.0)	(35.0)	(100)
1985	227	867	199	338	137	13	5	1,559	903	2,462
		(35.2)	(8.1)	(13.7)	(5.6)	(0.5)	(0.2)	(63.3)	(36.7)	(100)
Avg. Number of Fish			1,561	248	468	283	42	18	2,620	1,476
Avg. Percent of Total		36.8	6.5	11.8	7.2	0.9	0.5	63.7	36.3	100

[a]Includes only expandable random recoveries.

TABLE 10.—Estimated harvest proportions of wild Auke Lake coho salmon by area and gear type, 1980–85.

Area	Gear Type	Percent by Year						
		1980	1981	1982	1983	1984	1985	Avg.
North Outside	Troll	27.6	16.3	6.7	44.2	10.6	16.5	20.3
Central Outside	Troll	20.9	16.0	7.9	4.9	30.2	27.6	17.9
Southern Outside	Seine	0	0	0	1.0	0	0	0.2
Central Intermediate	Troll	17.9	52.3	35.7	20.3	33.4	30.1	31.6
	Seine	0	0.4	2.8	1.2	0	0.5	5.8
Total		17.9	52.7	68.5	21.5	33.4	30.6	37.4
Southern Intermediate	Troll	4.0	0	0	1.7	0	0	1.0
	Seine	0	0	9.0	0	0	0	1.5
Total		4.0	0	9.0	1.7	0	0	2.5
Lynn Canal	Gill Net	0	9.3	2.4	4.9	14.5	11.0	7.0
Stephens Passage	Sport	13.7	4.1	0.3	20.5	8.6	13.3	10.1
	Gill Net	15.9	0	5.2	1.3	2.7	1.0	4.3
Total		29.6	4.1	5.5	21.8	11.3	14.3	14.4
Northern B.C.	Troll	0	1.6	0	0	0	0	0.3
Grand Total		100	100	100	100	100	100	100
Sample Size (Tag Recoveries)		11	55	31	90	94	121	-

TABLE 11.—Estimated harvest proportions for Speel Lake coho salmon by area and gear type, 1981, 1982, 1983, and 1985.

Area	Gear Type	Percent by Year				
		1981	1982	1983	1985	Avg.
Northern Outside	Troll	3.9	4.7	25.9	28.5	15.8
Central Outside	Troll	21.1	16.7	28.2	18.4	21.1
	Seine	0	0	0	0.8	0.2
	Combined	21.1	16.7	28.2	19.2	21.3
Southern Outside	Troll	0	5.9	0	0	1.5
Central Intermediate	Troll	32.5	22.6	22.1	16.9	23.5
	Seine	9.7	28.7	8.9	0	11.8
	Combined	42.2	51.3	31.0	16.9	35.3
Southern Intermediate	Troll	19.4	15.9	10.4	3.2	12.2
	Seine	0	0	0	3.0	0.8
	Combined	19.4	15.9	10.4	6.2	13.0
Lynn Canal	Gill Net	0	1.3	1.5	2.7	1.4
Stephens Passage	Sport	5.2	0	0.6	2.3	2.0
	Gill Net	8.2	4.2	1.9	24.2	9.6
	Combined	13.4	4.2	2.5	26.5	11.6
Central Inside	Seine	0	0	0.5	0	0.1
Grand Total		100	100	100	100	100
Sample Size (Tag Recovered)		22	30	82	93	-

coho salmon return estimate for 1983 of 63,642 fish and a total harvest rate estimate of 80.2%.

Ford Arm and Politofski Lakes

The estimated total return to Ford Arm Lake on the outer coast of Chichagof Island averaged 5,255 fish (range: 4,717–6,287) during 1982, 1983, and 1985 (Table 5). An average of 48.9% of the estimated total return was harvested by the troll fishery, and 5.7% was taken by purse seines.

The total return to Politofski Lake on the outer coast of Baranof Island was estimated at 2,537 fish in 1982 and 1,035 fish in 1983 (average 1,786; Table 6). An average of 30.6% of the estimated total return to Politofski Lake was harvested by troll gear; no catch was estimated for other gear types.

Warm Chuck and Klakas Lakes

The estimated total return to Warm Chuck Lake on the southern outside coast (Heceta Island) averaged 2,999 fish (range: 2,407–3,837) during 1982, 1983 and 1985 (Table 7). An average of 40.2% of the total return was taken by troll gear and 22.1% was taken by purse seine gear.

The estimated total return to Klakas Lake on the southern outside coast of Prince of Wales Island was 3,093 fish in 1982 and 3,868 fish in 1983 (average 3,481; Table 8). On the average, the catch was nearly evenly split between troll and purse seine gear at 36.5% and 36.2% of the total return, respectively.

Hugh Smith Lake

The total return to Hugh Smith Lake in Boca de Quadra, southeast of Ketchikan, averaged an estimated 4,096 fish (range: 2,462–6,149) during 1982 to 1985 (Table 9). The harvest of Hugh Smith Lake coho salmon was distributed across a variety of fisheries. On the average, an estimated 43.3% of the total return was harvested by troll gear, of which 36.8% was taken in Alaska and 6.5% in British Columbia. An estimated average of 11.8%, of the total run was harvested by Alaska purse seine, 7.2% by the drift gill net fisheries, and 0.9% by British Columbia net fisheries. An average of 0.5% of the estimated total run was harvested by Annette Island fish traps.

Harvest Proportions by Fishery

Harvest distributions of tagged stocks in the fisheries were examined by PMFC area (Tables 10–20; Appendix A.2).

TABLE 12.—Estimated harvest proportions for Berners River coho salmon by area and gear type, 1982, 1983 and 1985.

Area	Gear Type	Precent by Year 1982	1983	1985	Average
Northern Outside	Troll	20.3	29.6	18.3	22.7
Central Outside	Troll	3.7	11.7	15.5	10.3
Central Intermediate	Troll	35.6	26.9	23.3	28.6
	Seine	0	0	1.2	0.4
	Combined	35.6	26.9	24.5	29.0
Southern Intermediate	Troll	0	1.0	0	0.3
Stephens Passage	Sport	0	0.3	0	0.1
Lynn Canal	Gill Net	40.4	30.5	41.7	37.6
Grand Total	100	100	100	100	
Sample Size (Tag Recovered)		40	98	81	-

Auke Lake

Major harvests of Auke Lake coho salmon occurred in the Central Intermediate, Northern Outside, Central Outside, and Stephens Passage areas which accounted for an estimated 1980–85 average of 90.0% of its harvest (Table 10). Minor harvests occurred in the Lynn Canal (7.0%), Southern Intermediate (2.5%), and Southern Outside (0.2%) areas and in northern British Columbia (0.3%).

Speel Lake

The same major harvest areas for the Auke Lake stock also applied to the Speel Lake stock, with the addition of the Southern Intermediate Area in which an estimated average of 13.0% of the harvest occurred during 1981, 1982, 1983, and 1985 (Table 11). Speel Lake coho salmon were also harvested in the Southern Outside (1.5%), Lynn Canal (1.4%), and Central Inside (0.1%) areas.

TABLE 13.—Estimated marine harvest proportions for Chilkoot Lake and Chilkat River coho salmon by area and gear type, 1983–84.

Area	Gear Type	Percent by Location and Year: Chilkoot L. 1983	Chilkat R. 1983	Chilkat R. 1984	Average
Northern Outside	Troll	35.1	25.2	11.6	24.0
Central Outside	Troll	10.6	7.9	10.6	9.7
	Seine	0	1.5	0	0.5
	Combined	10.6	9.4	10.6	10.2
Southern Outside	Troll	0	0	1.0	0.3
	Seine	3.8	0	0	1.3
	Combined	3.8	0	1.0	1.6
Central Intermediate	Troll	12.6	19.7	21.2	17.9
	Seine	0.7	0	2.6	1.1
I	Combined	13.3	19.7	23.8	19.0
Southern Intermediate	Troll	0	1.1	0	0.4
	Seine	0	0	1.4	0.4
	Combined	0	1.1	1.4	0.8
Stephens Passage	Gill Net	4.3	0	0	1.4
Lynn Canal	Gill Net	32.9	43.9	51.6	42.8
Southern Inside	Troll	0	0.7	0	0.2
Grand Total		100	100	100	100
Sample Size (Tag Recovered)		66	95	72	-

TABLE 14.—Estimated harvest proportions for Ford Arm Lake coho salmon by area and gear type, 1982, 1983, and 1985.

Area	Gear Type	Percent by Year 1982	1983	1985	Average
Northern Outside	Troll	9.4	19.2	15.3	14.6
Central Outside	Troll	62.4	51.0	84.7	66.0
	Seine	0	23.0	0	7.7
	Combined	62.4	74.0	84.7	73.7
Southern Outside	Troll	5.3	1.0	0	2.1
	Seine	5.0	0	0	1.7
	Combined	10.3	1.0	0	3.8
Central Intermediate	Troll	13.0	5.8	0	6.3
Central Inside	Troll	4.9	0	0	1.6
Grand Total		100	100	100	100
Sample Size (Tag Recovered)		31	71	31	-

Lynn Canal

The harvest of Lynn Canal coho stocks was restricted largely to northern fishing areas (Northern Outside, Central Outside, Central Intermediate, and Lynn Canal areas; Tables 12, 13). These areas accounted for an estimated average of 99.6% of the harvest of Berners River coho salmon during 1982, 1983 and 1985. These areas also accounted for an estimated average of 96.0% of the harvest of Chilkat River fish in 1983 and 1984 and 91.9% of the harvest of Chilkoot Lake fish in 1983.

Overall, Lynn Canal was the most important single harvest area for Lynn Canal stocks. The most important harvest areas in the troll fishery were the Northern Outside Area (north of Cape Spencer) and the Central Intermediate Area (Icy Strait and Cross Sound). In addition to the major areas listed above, Lynn Canal coho salmon were also harvested in small numbers in the Stephens Passage, Southern Intermediate, Southern Inside, and Southern Outside Areas.

TABLE 15.—Estimated harvest proportion for Politofski Lake coho salmon by area and gear type, 1982–83.

Area	Gear Type	Percent by Year 1982	1983	Avg.
Northern Outside	Troll	7.0	0	3.5
Central Outside	Troll	81.6	100.0	
Central Intermediate	Troll	11.4	0	5.7
Grand Total		100	100	100
Sample Size (Tag Recovered)			24	10

TABLE 16.—Estimated harvest proportions for Warm Chuck Lake coho salmon by area and gear type, 1982, 1983, and 1985.

Area	Type	Percent by Year 1982	1983	1985	Average
Northern Outside	Troll	14.2	0	0	4.7
Central Outside	Troll	15.5	15.3	20.8	17.2
Southern Outside	Troll	42.4	21.4	37.5	33.8
	Seine	25.1	47.4	32.9	35.1
	Combined	67.5	68.8	70.4	68.9
Southern Intermediate	Troll	0	11.0	7.5	6.2
Central Inside	Troll	0	0	1.3	0.4
Southern Inside	Troll	1.2	0	0	0.4
	Seine	1.6	4.9	0	2.2
	Combined	2.8	4.9	0	2.6
Grand Total		100	100	100	100
Sample Size (Tag Recovered)		22	11	28	-

TABLE 17.—Estimated harvest proportions for coho salmon from Kegan and Klakas Lakes by area and gear type, 1982–83.

		Percent by Location and Year			
Area	Gear Type	Kegan L. 1983	Klakas L. 1982	Klakas L. 1983	Klakas L. Average
Northern Outside	Troll	3.5	3.1	0	1.6
Central Outside	Troll	41.8	8.8	19.6	14.2
Southern Outside	Troll	5.9	12.0	38.9	25.4
	Seine	5.2	50.2	26.4	38.3
	Combined	11.1	62.2	65.3	63.7
Southern Intermediate	Troll	3.0	8.0	4.4	6.2
Central Inside	Troll	7.5	0	0	0
	Gill Net	11.2	0	0	0
	Combined	18.7	0	0	0
Southern Inside	Troll	9.2	0	0.7	5.4
	Seine	11.5	17.9	0	8.9
	Gill Net	1.2	0	0	0
	Combined	21.9	17.9	10.7	14.3
Grand Total		100	100	100	100
Sample Size (Tag Recovered)		37	14	26	-

TABLE 18.—Estimated harvest proportions for Hugh Smith Lake coho salmon by area and gear type, 1982–85.

		Percent by Year				
Area	Gear Type	1982	1983	1984	1985	Average
Northern Outside	Troll	0	8.0	5.6	5.6	4.8
Central Outside	Troll	29.8	21.7	19.7	32.0	25.8
	Seine	0	0.4	0	0	0.1
	Combined	29.8	22.1	19.7	32.0	25.9
Southern Outside	Troll	10.9	10.1	7.0	8.3	9.1
	Seine	5.0	3.0	8.2	2.9	4.8
	Combined	15.9	13.1	15.2	11.2	13.8
Central Intermediate	Troll	1.4	2.2	6.8	0	2.6
Southern Intermediate	Troll	10.6	4.4	0.7	2.7	4.6
	Seine	0	0	0.6	0	0.2
	Combined	10.6	4.4	1.3	2.7	4.8
Central Inside	Troll	0.3	2.9	1.2	0.7	1.3
	Seine	0	0.6	0	0	0.1
	Gill Net	1.1	6.1	0.8	0.3	2.1
	Combined	1.4	9.6	2.0	1.0	3.5
Southern Inside	Troll	14.4	9.1	9.3	7.0	9.9
	Seine	12.0	12.6	9.8	18.4	13.2
	Gill Net	5.4	6.0	16.7	8.4	9.1
	Trap	0	2.0	0.7	0.3	0.8
	Combined	31.8	29.7	36.5	34.1	33.0
British Columbia	Troll	7.0	8.8	11.9	12.6	10.1
	Net	2.1	2.1	1.0	0.8	1.5
	Combined	9.1	10.9	12.9	13.4	11.6
Grand Total		100	100	100	100	100
Sample Size (Tag Recovered)		85	182	144	211	-

Ford Arm and Politofski Lakes

The Ford Arm and Politofski Lake coho salmon stocks originate in and were primarily harvested in the Central Outside Area which accounted for an average of 73.7% of the catch of the Ford Arm stock (Table 14) and 90.8% of the catch of the Politofski Lake stock (Table 15). Other important locations where both stocks were harvested included the Northern Outside and Central Intermediate Areas. In addition, some minor harvest of Ford Arm Lake fish was estimated to have occurred in the Southern Outside and Central Inside Areas.

Warm Chuck and Klakas Lakes

The Warm Chuck Lake and Klakas Lake stocks originate in and were primarily harvested by the troll and purse seine fisheries in the Southern Outside Area. That area accounted for an average of 68.9% of the catch of the Warm Chuck Lake stock (Table 16) and 63.7% of the catch of the Klakas Lake stock (Table 17). The troll fishery in the Central Outside area also harvested a significant percentage of both stocks. These stocks were also harvested in the Northern Outside, Southern Intermediate, Central Inside, and Southern Inside areas. The Southern Inside Area accounted for an average of 14.3% of the Klakas Lake stock harvest.

Kegan Lake

In 1983 the harvest of the Kegan Lake stock on the southeast coast of Prince of Wales Island (District 102) was distributed over several fishing areas. The Central Outside Area accounted for an estimated 41.8% of the harvest (Table 17). Other important harvest areas for that stock included the Southern Inside (21.9%), Central Inside (18.7%), and Southern Outside (11.1%) areas. Kegan Lake coho salmon were also harvested in the Northern Outside and Southern Intermediate areas.

TABLE 19.—Estimated harvest proportions for Unuk River and Chickamin River coho salmon by area and gear type, 1984–85.

		Percent by Location and Year			
		Unuk River	Chickamin River		
Area	Gear Type	1985	1984	1985	Average
Northern Outside	Troll	2.8	0	0	0
Central Outside	Troll	27.7	30.3	17.2	23.8
Southern Outside	Troll	11.2	0	9.3	4.6
	Seine	5.9	9.9	4.9	7.4
	Combined	17.1	9.9	14.2	12.0
Central Intermediate	Troll	0	5.0	6.0	5.5
Southern Intermediate	Troll	5.3	8.9	3.0	6.0
	Seine	0.8	0	0	0
	Combined	6.1	8.9	3.0	6.0
Central Inside	Troll	0	1.5	0.4	1.0
	Gill Net	3.1	2.9	4.4	3.6
	Combined	3.1	4.4	4.8	4.6
Southern Inside	Troll	9.3	2.4	4.8	3.6
	Seine	24.7	22.3	26.8	24.5
	Gill Net	1.4	2.4	5.1	3.8
	Sport	0	10.1	0	5.0
	Trap	1.1	1.3	0.9	1.1
	Combined	36.5	38.5	37.6	38.0
British Columbia	Troll	6.7	3.0	13.4	8.2
	Net	0	0	3.8	1.9
	Combined	6.7	3.0	17.2	10.1
Grand Total		100	100	100	100
Sample Size (Tags)		89	23	39	-

TABLE 20.—Estimated harvest proportions for Situk River coho salmon by area and gear type, 1985.

Area	Gear Type	Marine Harvest	Total Harvest
Northern Outside	Troll	79.7	26.6
	Set Gill	Net	0
	Combined	79.7	93.2
Central Outside	Troll	17.2	5.8
Central Intermed.	Troll	3.1	1.0
Grand Total		100	100
Sample Size (Tags)		22	81

Hugh Smith Lake

Hugh Smith Lake coho salmon were harvested over a broad area from Yakutat to northern British Columbia. From 1982 through 1985, the two most important harvest areas were the local Southern Inside Area, which accounted for an average of 33.0% of the catch, and the Central Outside Area, which accounted for 25.9% (Table 18). Catches also occurred in Southern Outside (13.8%), northern British Columbia (11.6%), Northern Outside (4.8%), Central Intermediate (2.6%), Southern Intermediate (4.8%), and Central Inside (3.5%) areas.

Unuk and Chickamin Rivers

Coho salmon runs to the Unuk and Chickamin Rivers in Behm Canal near Ketchikan were also harvested over a large area. The most important harvest area for both stocks was the Southern Inside which accounted for an estimated 36.5% of the total catch of Unuk River fish in 1985 and an average of 38.0% of the catch of Chickamin River fish during 1984 and 1985 (Table 19). Other significant harvest areas for both stocks included the Central Outside and Southern Outside areas and northern British Columbia. Tagged fish from these stocks were also harvested in the Central Intermediate, Southern Intermediate and Central Inside areas.

Situk River

Coho salmon from the Situk River near Yakutat were harvested primarily in the Northern Outside area which accounted for an estimated 93.2% of the total catch (Table 32). Overall, the set gill net fishery in the Situk River was estimated to have harvested 66.6% of the total run. The majority of the marine harvest (79.7%) of Situk River coho salmon was taken by the troll fishery in the Northern Outside Area, which includes waters off the Situk River. The remainder was taken in the Central Outside (17.2%) and Central Intermediate (3.1%) areas.

Harvest and Removal Rates

Estimated removal rates by fishery and harvest rates for Auke Lake, Speel Lake, Berners River, Chilkoot Lake, Chilkat Lake and Hugh Smith Lake are shown in Tables 21 to 25. Outer coastal stocks (Ford Arm, Politofski, Warm Chuck and Klakas Lakes) were considered to be harvested simultaneously by all fisheries. Harvest rate estimates for those stocks are shown as percentages in Tables 17 to 20.

Auke Lake

Adult coho salmon returning to Auke Lake were assumed to be available to the troll and purse seine fisheries before entering the drift gill net and Juneau marine sport fisheries. They were assumed to be available simultaneously to the drift gill net and sport fisheries. Combined removal rate estimates for the

TABLE 21.—Estimated removal rates in percent by fishery for coho salmon returns to Auke Lake, 1980–85.

Year	Troll and Purse Seine	Sport and Sport	Gill Net	Gill Net Total	Grand Total
1980	14.0	4.0	3.4	7.4	20.4
1981	30.0	4.6	2.2	6.8	34.7
1982	37.6	0.2	5.1	5.3	40.9
1983	33.4	11.9	3.7	15.6	43.8
1984	32.3	5.5	10.9	16.4	43.4
1985	35.3	7.2	6.5	13.7	44.2
Average	30.4	5.6	5.3	10.9	37.9

TABLE 22.—Estimated removal rates in percent by fishery for coho salmon returns to Speel Lake, 1981–83.

Year	Troll and Purse Seine	Sport	Dist. 115 Gill Net	Dist. 111 Gill Net	Gill Net and Sport Total	Grand Total
1981	41.7	3.3	0	5.3	8.5	46.6
1982	67.5	0	3.0	10.2	12.9	71.7
1983	47.3	0.6	1.4	1.8	3.7	49.3
Average	52.2	1.3	1.5	5.8	8.4	55.9

TABLE 23.—Estimated removal rate in percent by fishery for coho salmon returns to the Berners River, 1982, 1983, and 1985.

Year	Troll and Purse Seine	Marine Sport	Dist. 115 Gill Net	Gill Net and Sport Total	Grand Total
1982	41.6	0	58.5	58.5	75.7
1983	50.4	0.4	41.5	41.7	71.1
1985	45.6	0	53.2	53.2	74.5
Average	45.9	0.1	51.1	51.1	73.8

troll and purse seine fisheries averaged 30.4% (range: 14.0–37.6%) from 1980 through 1985 (Table 21). The estimates increased from a low of 14.0% in 1980, when relatively restrictive regulations were implemented for the troll fishery, to 37.6% in 1982, when purse seine fishing effort increased dramatically in northern Southeastern to harvest a very large pink salmon return. Estimates from 1983 through 1985 ranged from 32.3–35.3%. The drift gill net and Juneau sport fisheries harvested an estimated 5.3% and 5.6%, respectively, of fish that escaped the troll and purse seine fisheries. Estimated total harvest rates for the Auke Lake stock averaged 37.9% and ranged from 20.4% in 1980 to 44.2% in 1985.

Speel Lake

The Speel Lake stock was subjected to higher removal rates in the troll and purse seine fisheries compared with the Auke Lake stock. The estimated combined troll and purse seine removal rate for the Speel Lake stock increased from 41.7% in 1981 to 67.5% in 1982, largely because of increased purse seine catch. It decreased to 47.3% in 1983 (Table 22). Speel Lake coho salmon were considered to be available concurrently to the Lynn Canal (District 115) drift gill net and Juneau sport fisheries after migrating through troll and purse seine fishing districts. From there, Speel Lake fish migrated through the Stephens Passage (District 111) drift gill net fishery. The Juneau sport and Lynn Canal drift gill net fisheries removed an estimated average of 1.3% and 1.5%, respectively, of remaining Speel Lake fish; the District 111 drift gill net fishery harvested an average of 5.8%. Estimated total harvest rates for the Speel Lake stock averaged 55.9% and ranged from 46.6% to 71.7%.

Berners River

Harvest rate estimates for the Berners River stock were high because the escapement estimate was based on an intensive survey rather than a weir count or mark-recapture estimate, as was the case for other stocks. Because these surveys did not count all of the fish entered the river, the harvest rate estimate was biased upward. The Berners River stock was considered to migrate from the troll and purse seine fisheries through the Juneau sport fishery before entering Lynn Canal. During 1982, 1983, and 1985 the estimated combined troll and purse seine removal rate for the Berners River stock averaged 45.9% (range: 41.6–50.4%; Table 23). In contrast to the Auke Lake and Speel Lake stocks, the lowest estimate for the Berners River stock occurred in 1982, apparently because the

TABLE 24.—Estimated removal rate in percent by fishery for coho salmon returns to Chilkoot and Chilkat Lakes, 1983.

System	Year	Troll and Purse Seine	Dist. 115 Gill Net	Inriver Sport	Gill Net and Sport Total	Grand Total
Chilkoot Lake	1983	53.9	60.0	39.1	77.4	89.6
Chilkat Lake (unadjusted)	1983	58.0	95.3	0	95.3	98.0
Chilkat Lake (adjusted)	1983	47.5	62.3	0	62.3	80.2

TABLE 25.—Estimated removal rate in percent by area for coho salmon returns to Hugh Smith Lake, 1982–85.

Year	Outside and Intermediate	Northern British Columbia	Total[a]	Inside[b]	Grand Total
1982	37.7	5.6	43.3	38.5	65.1
1983	28.9	6.8	35.7	40.0	61.5
1984	29.8	8.8	38.6	43.0	65.0
1985	31.2	8.6	39.8	39.1	63.3
Average	31.9	7.5	39.4	40.2	63.7

[a]Total = outside and intermediate Districts plus northern British Columbia.
[b]Inside area includes Districts 101, 102, 105, 106, 107 and 108.

Berners River stock was not harvested as heavily by the purse seine fishery. On the average, the Berners River stock was estimated to incur the greatest removal rate in the Lynn Canal (District 115) drift gill net fishery with estimates averaging 51.1% (range: 41.5–58.5%). Total harvest rate estimates for the Berners River stock averaged 73.8% (range: 71.1–75.7%).

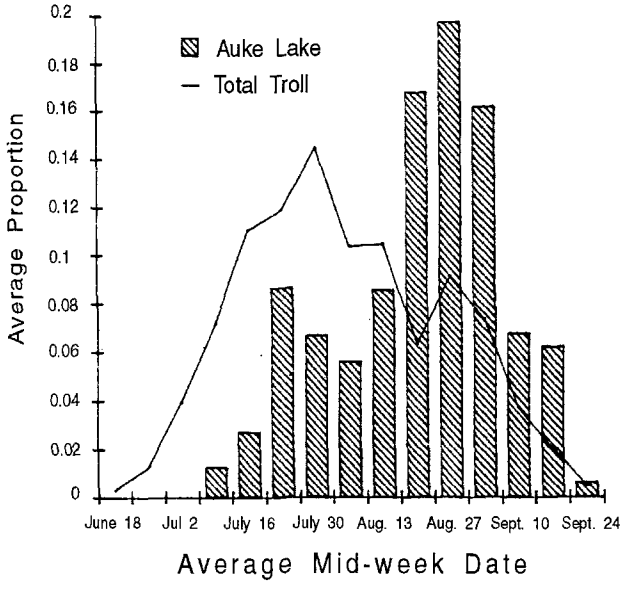

FIGURE 4.—Average weekly proportion of the total coho salmon troll catch (line graph) and estimated troll catch of coded-wire tagged Auke Lake coho salmon (bar graph) in Southeast Alaska, 1980-85.

Chilkoot and Chilkat Lakes

In 1983 an estimated 53.9% of the total return to Chilkoot Lake was removed by troll and purse seine fisheries (Table 24). There was no estimated harvest for the Juneau marine sport fishery, but in Lynn Canal Chilkoot Lake fish were removed at an estimated rate of 60.0% by the drift gill net fishery. The sport fishery in the Chilkoot River was estimated to have harvested 39.1% of fish that escaped other fisheries. The total estimated harvest rate by all fisheries was 89.6%.

The Chilkat Lake stock was also subjected to a very high harvest rate (Table 24). As previously explained, the adjusted estimate probably more accurately reflects the actual harvest rate for that stock. The adjusted removal rate estimate for the Chilkat Lake stock in the Lynn Canal drift gill net fishery was 62.3%.

Ford Arm and Politofski Lakes

Estimated total harvest rates for the Ford Arm Lake stock on the outer coast of Chichagof Island averaged 54.6% during 1982, 1983, and 1985. Total harvest rate

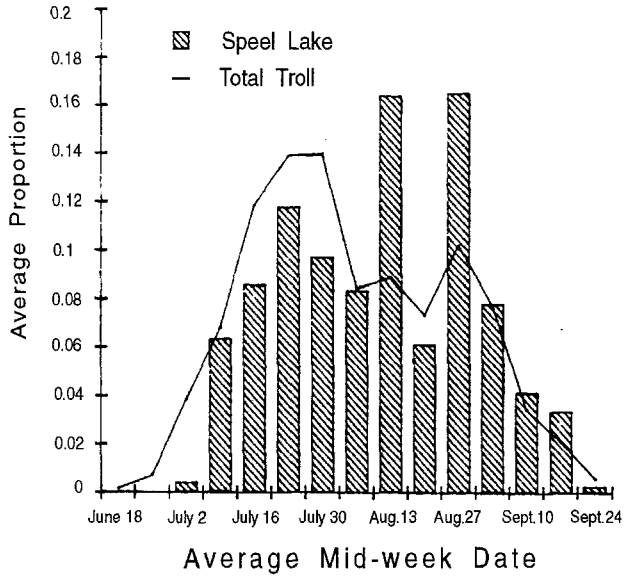

FIGURE 5.—Average weekly proportion of the total coho salmon troll catch (line graph) and estimated troll catch of coded-wire tagged Speel Lake coho salmon (bar graph) in Southeast Alaska, 1981, 1982, 1983, and 1985.

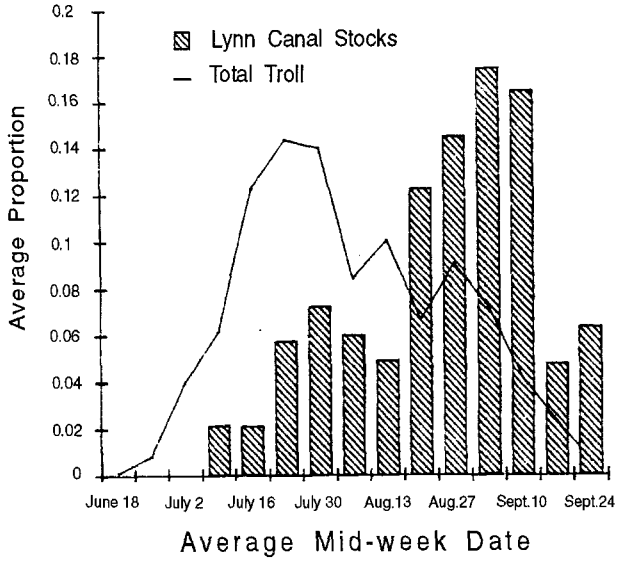

FIGURE 6.—Average weekly proportion of the total coho salmon troll catch (line graph) and estimated troll catch of coded-wire tagged Lynn Canal coho salmon (bar graph) in Southeast Alaska, 1982–85. Tagged stocks included the Berners, and Chilkoot Rivers.

estimates for Politofski Lake on the outer coast of Baranof Island averaged 30.6% during 1982 and 1983.

Warm Chuck and Klakas Lakes

Estimated total harvest rates for the Warm Chuck Lake stock on the southern outside coast averaged 62.3% (range: 48.6–75.1%) during 1982, 1983, and 1985. Total harvest rate estimates for Klakas Lake on the southern outside coast of Prince of Wales Island were 79.7% in 1982 and 65.7% in 1983 (average 72.7%).

Hugh Smith Lake

Coho salmon returning to Hugh Smith Lake were considered to be harvested simultaneously in northern British Columbia and outside and intermediate areas of Southeast Alaska before becoming available in inside areas of southern Southeast. The 1982–85 combined removal rate for northern British Columbia and outside and intermediate areas of Southeast Alaska averaged 39.4% (range: 35.7–43.3%; Table 25). The 1982–85 average removal rate in inside areas was 40.2% (range: 38.5–43.0%), and the total harvest rate for all fisheries averaged 63.7% (range: 61.5–65.1%). The overall harvest rate for the Hugh Smith Lake stock was relatively stable.

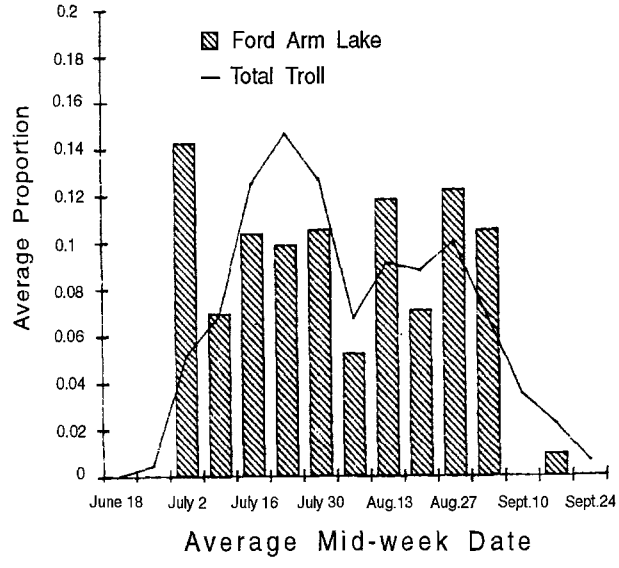

FIGURE 7.—Average weekly proportion of the total coho salmon troll catch (line graph) and estimated troll catch of coded-wire tagged Ford Arm Lake coho salmon (bar graph) in Southeast Alaska, 1982, 1983, and 1985.

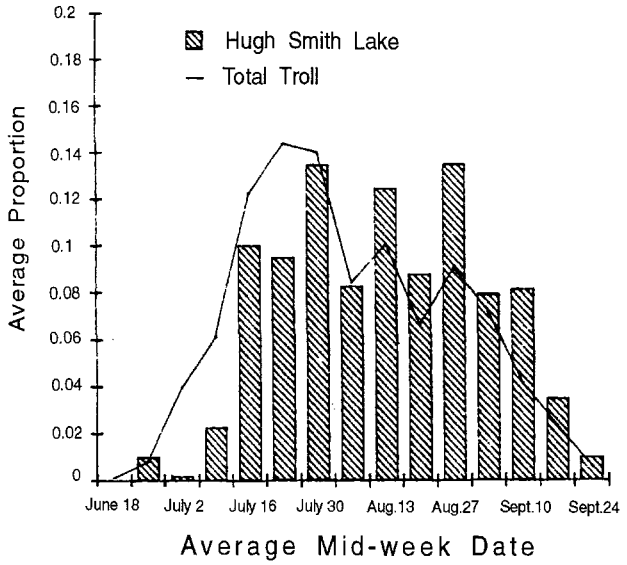

FIGURE 8.—Average weekly proportion of the total coho salmon troll catch (line graph) and estimated troll catch of coded-wire tagged Hugh Smith Lake coho salmon (bar graph) in Southeast Alaska, 1982–1985.

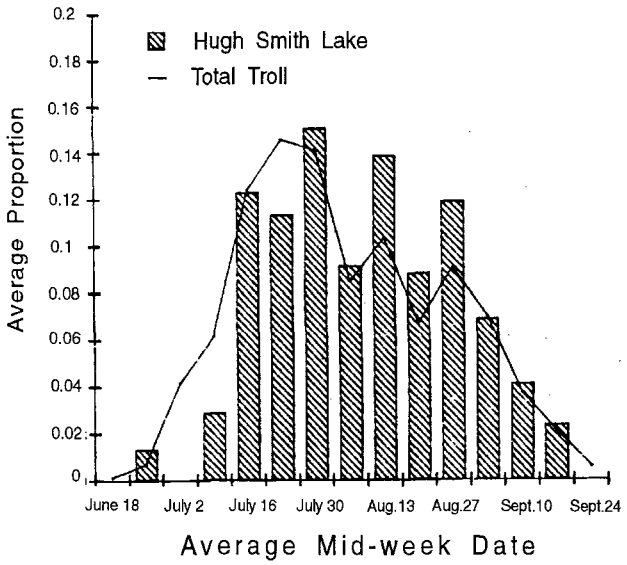

FIGURE 9.—Average weekly proportion of the total coho salmon troll catch (line graph) and estimated troll catch of coded-wire tagged Hugh Smith Lake coho salmon (bar graph) in the Northwest, Northeast and Southwest Quadrants, 1982–1985.

Migratory Timing

On the average, the estimated harvest of Auke Lake fish by the troll fishery peaked during the last week of August (Figure 4; Appendix B.1) compared with the peak of the total troll harvest of coho salmon near the end of July. Overall, Auke Lake fish were available from the second week of July through the end of the summer troll season on September 20 but were most abundant from mid-August through the first week of September.

Speel Lake coho salmon demonstrated protracted migratory timing in the troll fishery and were available, on the average, from the last week of June through September 20 (Figure 5; Appendix B.2). They were available to a significant extent (more than 5% of the catch per week) from the second week of July through the first week of September, with peaks in mid to late August.

Although they are available to some extent during most of the season, major Lynn Canal stocks (Chilkat River, Berners River, Chilkoot Lake) are characteristically late in migratory timing in all fisheries. On the average, stocks in all three systems peaked in the troll fishery during late August through mid-September (Appendices B.3 and B.4). Figure 6, a composite of weekly proportion estimates for all three systems averaged for 1982 through 1985, indicates that the average period of greatest harvest (more than 10% per week) occurred approximately from August 17 to September 13. The peak weekly harvest occurred from August 31 to September 6. On the average, the troll harvest of all coho salmon stocks combined peaked during late July and declined substantially before Lynn Canal stocks began to peak.

The Ford Arm Lake stock was characterized by protracted timing in the troll fishery with significant (greater than 5%) weekly catches occurring from the first week of July through the first week of September (Figure 7; Appendix B.5). Although there were too few tag recoveries to represent the full catch pattern of the Politofski Lake stock, the data indicated it was available to the troll fishery from the last half of June through the first week of September (Appendix B.6).

Few tags were also recovered from the Warm Chuck Lake and Klakas Lake stocks (Appendices B.7-B.8). However, the data indicate that, on the average, the Warm Chuck Lake stock was available from at least the first week of July through the second week of September, whereas the Klakas Lake stock was available from at least the second week of July through the end of August.

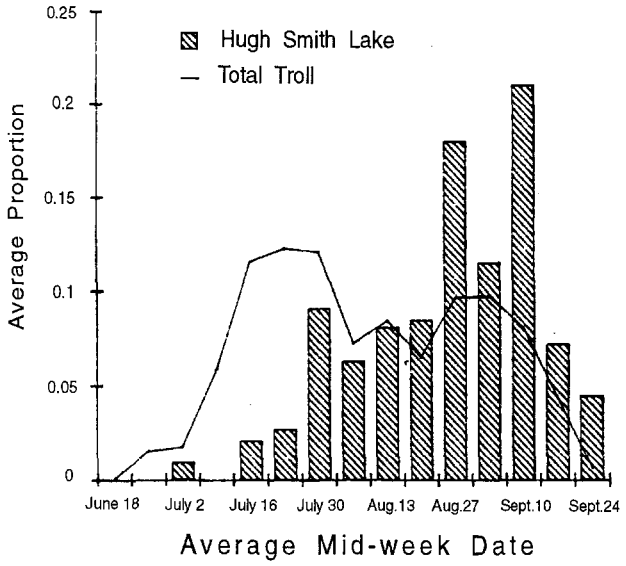

FIGURE 10.—Average weekly proportion of the total coho salmon troll catch (line graph) and estimated troll catch of coded-wire tagged Hugh Smith Lake coho salmon (bar graph) in the Southeast Quadrant, 1982–1985.

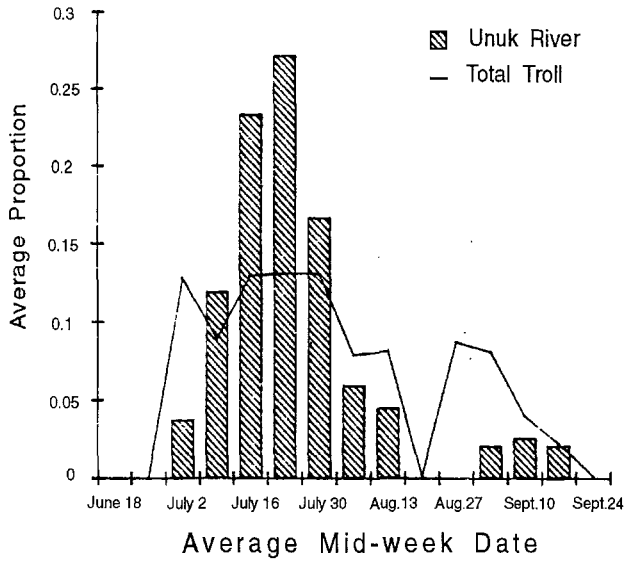

FIGURE 11.—Average weekly proportion of the total coho salmon troll catch (line graph) and estimated troll catch of coded-wire tagged Unuk River coho salmon (bar graph) in Southeast Alaska, 1985.

On the average, Hugh Smith Lake coho salmon were available to the troll fishery from late June through September 20 during 1982 through 1985 (Figure 8; Appendix B.9). They were most available from mid-July through the end of August. Significant differences existed in the timing of the Hugh Smith Lake stock in intermediate and outer coastal areas compared with inside waters. In the Northeast, Northwest, and Southwest Quadrants, this stock was available over most of the season (Figure 9; Appendix B.10). However, in the Southeast Quadrant it displayed substantially later timing compared temporally with the total troll harvest of coho salmon (Figure 10; Appendix B.11). In the Southeast Quadrant, the Hugh Smith Lake stock was most available during the last week of August through the second week of September, on the

TABLE 26.—Age distribution of coho salmon smolts coded wire tagged at Hugh Smith Lake, 1981–86.

		Smolt Age in Years				
Year		1	2	3	4	Total Sample
1981	Number	100	396	104	0	600
	Percent	16.7	66.0	17.3	0	
1982	Number	45	158	50	0	253
	Percent	17.8	62.4	19.8	0	
1983	Number	68	151	86	0	305
	Percent	22.3	49.5	28.2	0	
1984	Number	33	141	93	2	269
	Percent	12.3	52.4	34.6	0.7	
1985	Number	61	207	72	0	340
	Percent	17.9	60.9	21.2	0	
1986	Number	49	179	78	0	306
	Percent	16.0	58.5	25.5	0	
Average Percent		17.2	58.3	24.4	0.1	

TABLE 27.—Estimated numbers of coho salmon smolt emigrating from Hugh Smith Lake by age class and brood year, 1977–84.

	Smolt Age in Years				
Brood Year	1	2	3	4	Total
1977			7,634	0	
1978		29,074	5,786	0	
1979	7,343	18,287	14,740	237	40,607
1980	5,209	25,878	11,064	0	42,151
1981	11,651	16,776	4,964	0	33,391
1982	3,927	14,270	5,552		
1983	4,205	12,742			
1984	3,488				

average, whereas the total catch of all stocks peaked during late July.

In 1985 the Unuk River stock peaked in late July, displaying somewhat earlier timing in the troll fishery than the Hugh Smith Lake stock (Figure 11; Appendix B.12). Overall, it was available from at least the end of June through September 20. Relatively few tags were recovered from the nearby Chickamin River stock during 1984 and 1985. However, those recoveries indicated that the Chickamin River stock was available from at least early July through early to mid-September (Appendix B.12). Kegan Lake coho salmon were available during at least mid-August through September 20. Too few tags were recovered from the McDonald Lake and Reflection Lake stocks to draw any conclusions about their timing in the troll fishery (Appendix B.13).

Coho salmon from the Situk River near Yakutat were available to the troll fishery during at least mid- to late July through mid-September (statistical weeks 30-38; Appendix B.14).

Smolt Emigration Estimates

Overall, the smolt production from Auke Creek ranged from estimates of 8,790 to 18,395 during 1976 to 1980; this declined to 5,601 in 1985 and 5,666 in 1986 (Appendix C.2.). Total smolt population estimates for Hugh Smith Lake from 1982 through 1986 ranged from 21,782 to 52,269 and averaged 31,755 (Appendix C.3.). From 1981 through 1985, an estimated average of 58.3% of the coho salmon smolt population at Hugh Smith Lake was age-2, 17.2% were age-1, and 24.4% were age-3 (Table 26). Age-4 smolts were identified in samples only in 1984. The estimated smolt outmigration by brood year is shown in Table 39.

Survival Rates

Survival rates for coho salmon smolts outmigrating from Auke and Hugh Smith Lakes are listed in Tables 28 and 29; survival rates for juvenile coho

TABLE 28.—Estimated survival rate of coded-wire tagged wild Auke Creek coho salmon smolts, 1979–84.

	Survival Rates (%)[a]	
Year of Smolt Emigration	Age .1	Age .0 and .1
1979	10.0	
1980	13.0	16.2
1981	11.1	13.1
1982	17.9	23.3
1983	17.7	22.0
1984	25.0	29.5
Average	15.8	20.8

[a]Survival rate estimates are based on total run (estimated harvest and escapement) for age-.1 fish and escapement only for age-.0 fish (jacks).

TABLE 29.—Estimated survival rate of coded-wire tagged wild Hugh Smith Lake coho salmon smolts, 1981–84.

Year of Smolt Emigration	Estimated Survival Rate to Age .1
1981	10.4–14.5[a]
1982	13.2
1983	7.4
1984	7.8

[a]Range depending on whether tag loss estimates were attributed to juvenile tagging in 1980 or smolt tagging in 1981.

TABLE 30.—Estimated survival rate of predominantly age-1 and older wild juvenile coho salmon from the time of tagging until entry into the fisheries, 1979–83.

	Percent by Year of Tagging					
Stock	1979	1980	1981	1982	1983	Avg.
Speel Lake	6.0	6.0	6.0			6.0
Berners River		2.9	6.7		5.9	5.2
Chilkoot Lake			7.0			7.0
Chilkat Lake (unadjusted)			13.6			13.6
Chilkat Lake (adjusted)			16.7			16.7
Ford Arm Lake		6.3	9.6		14.3	10.1
Politofski Lake		4.8	2.2			3.5
Warm Chuck Lake		5.8	2.4		4.7	4.3
Klakas Lake		2.5	4.0			3.2
Hugh Smith Lake		8.5-10.4[a]	6.2			7.8
Average	6.0	5.4	6.8	[b]	8.3	6.5[c]

[a]Range depending on whether tag loss estimates were attributed to juvenile tagging in 1980 or smolt tagging 1981. The mid-point of the range was used to compute overall averages.

[b]No data for 1982.

[c]Overall average for all estimates using the adjusted estimate for the escapement to Chilkat Lake.

salmon tagged in 20 experiments in nine systems are shown in Table 30.

Tagged coho salmon smolts that emigrated from Auke Creek in 1979 to 1984 survived to adult return at age .1 at an estimated average rate of 15.8% (range: 10.0–25.0%; Table 28). The estimated survival rate was lowest (10.0–13.0%) for the 1979–81 emigrants and increased (17.7–17.9%) in 1982 and 1983, reaching 25.0% in 1984. When jacks (age-.0 fish) were included, estimated survival rates for 1980 to 1984 averaged 20.8% (range: 16.2–29.5%).

The smolt to age-.1 adult survival rate for Hugh Smith Lake smolts was estimated at 10.4–14.5% in 1981, 13.2% in 1982, 7.4% in 1983, and 7.8% in 1984 (Table 29), which contrasted with the increasing survival noted for the Auke Lake stock. The range for 1981 resulted from uncertainty in whether estimated tag loss was attributed to smolts tagged in 1981 or rearing juveniles tagged in 1980.

Survival rate estimates for predominantly age-1 rearing juveniles tagged during the summers of 1979 through 1983 ranged from 2.2% to 16.7% (average 6.5%; Table 30). Estimates were low (2.2–2.9%) for fish tagged at the Berners River (1980), Klakas Lake (1980), Politofski Lake (1981), and Warm Chuck Lake (1981). High estimates (8.5-16.7%) were observed for tagging at Hugh Smith Lake (1980), Ford Arm Lake (1981 and 1983), and Chilkat Lake (1981).

DISCUSSION

During the study the five stocks from lake systems had adult runs that averaged from 1,116 to 5,255 (mean 3,446). The Berners River was a large producer having an estimated average run of 29,748 coho salmon. Estimated total adult production for the six stocks showed moderate variability (averaged 79–129% of the mean) during the study. Much of that variability may have resulted from changes in marine survival. For example, after a period of decline during the late 1970s through 1980, the smolt emigration from Auke Lake stabilized within a range of 87–110% of the mean (1981–86), while estimated marine survival rates to age-.1 fish varied from 66–148% of the 1980–85 mean. It should be noted that five of the stocks were in systems heavily influenced by lakes and therefore may have had different population characteristics and dynamics compared to stocks living predominantly in stream habitats that are more susceptible to freezing, drying and flooding.

The reason for the decline in coho smolt production from Auke Lake from 1976 to 1986 is not fully

understood. Sockeye salmon smolt production declined even more dramatically during that period (Taylor and James 1986). One suspected reason for the decline is a developing problem with the spawning habitat in Lake Creek; its flows appear to have been reduced during low runoff periods suggesting a possible lowering of the water table (Jerry Taylor, National Marine Fisheries Service, Auke Bay Laboratory, personal communication).

Unanswered questions remain about harvest rates and total returns to Chilkat Lake. Although the adjusted harvest rate estimate of 80.2% for 1983 is reasonable for this heavily fished stock, both adjusted and unadjusted run estimates are much higher than would be expected for a lake of this size. The large run estimate for 1983 was probably, in part, the result of an exceptional survival rate that was estimated at 13.6% (unadjusted) and 16.7% (adjusted). However, the high total return estimate also supports the hypothesis that Chilkat Lake served as a portion of the rearing habitat for a larger overall spawning population that may have included other tributaries in the Chilkat River system. Perhaps movement patterns of juveniles in the system have been altered since 1981 when glacial water from the Tsirku River began to infiltrate rearing habitat in Chilkat Lake (Shaul et al. 1983).

Most stocks were characterized by broad harvest distributions in the fisheries, and all stocks were subjected to significant average harvest rates by the troll fishery (27–50%). More northern stocks were harvested primarily in northern Southeast Alaska, whereas southern stocks were harvested over a broader range from northern Southeast Alaska and Yakutat to northern British Columbia. Troll fishing effort is distributed to take advantage of these migratory patterns the most concentrated effort occurring along the outer coast from Sitka Sound to Cross Sound, an area where all stocks in the region are available. The total harvest rate for the Hugh Smith Lake stock has been stable (range: 62-65%), possibly because its harvest has occurred in mixed stock fisheries distributed over a large area with only limited harvest by southern inside net fisheries.

In spite of their availability to more fisheries over a broader area, southern stocks were, on the average, harvested at similar rates to northern stocks. Twenty-eight total harvest rate estimates made for nine stocks between 1980 and 1985 ranged from 20.4% for Auke Lake to 89.6% for Chilkoot Lake and averaged 59.7%. The percent of the estimated total return harvested by the troll fishery averaged 44.4% for all stocks and years. Moderate harvest rates (30–65%) were experienced by stocks taken only by the troll and purse seine fisheries in outside and intermediate areas, whereas stocks that migrated through the Lynn Canal drift gill net fishery were subjected to higher total harvest rates (up to 80–90%).

Harvest pressure on Southeast Alaska coho salmon stocks by the highly mixed stock fisheries has been moderate compared with indicator stocks in southern British Columbia and Washington. For example, from 1979 through 1985 estimated total harvest rates for the Big Qualicum River stock located on the east coast of Vancouver Island ranged from 68.7–81.2% (Technical Committee on Coho 1986). Combined effort by highly mixed stock fisheries and near-terminal fisheries, such as the Lynn Canal drift gill net fishery, result in high total harvest rates for some Southeast Alaska stocks.

All stocks studied had broad migratory timing distributions in the troll fishery and were available for most of the season (2.5–3.0 months). Catches of some stocks (Speel Lake, Ford Arm Lake, Hugh Smith Lake and the Unuk River) coincided temporally with the total troll catch. Other stocks, including Auke and Lynn Canal, were late, peaking several weeks after the peak of the overall troll catch in late July. The Lynn Canal stocks were latest; their peak contribution to the troll catch typically occurred in the first week of September. Timing and area distribution data indicate that Lynn Canal stocks contribute a substantial portion of the troll catch in Districts 112, 114, 116 and northern 113 during September. They migrate through inside waters very late in the season after effort in the purse seine and marine sport fisheries has declined; therefore, harvest rates on Lynn Canal stocks by those fisheries are very low.

Although the Hugh Smith Lake migration was distributed across the troll catch in the northern and outside areas, it peaked late in late August to mid-September in the southern inside areas. Hatchery stocks in the Ketchikan area also demonstrated this late timing pattern in southern inside districts (Shaul et al. 1983). The low contribution of tagged local late-run stocks to catches in southern inside areas early in the

season suggests that other stocks must be important contributors during that period.

Harvest patterns and rates of Southeast Alaska coho salmon stocks were well documented during the project. Continued research needs to be directed at determining (1) stock-recruitment relationships for stocks from different habitat types, and (2) predictive relationships that can be used to forecast returns before and during the fishing season.

We recommend that continued coded wire tagging studies be conducted on four of the systems studied. These include Auke Creek, Berners River, Ford Arm Lake and Hugh Smith Lake. These systems were selected based on location and the feasibility of tagging and recovering tagged fish.

CONCLUSIONS

(1) There appears to be only limited potential to harvest specific stock groups by adjusting the temporal distribution of fishing effort in the troll fishery. The major Lynn Canal stocks offer the most temporal and spacial separability of the stock groups that were studied.

(2) Southeast Alaska coho salmon stocks have been harvested at relatively moderate rates averaging about 60%. However, variability in harvest rates among stocks has been large, ranging from a low of 35 to 40% to a high of 80 to 90%.

(3) Stocks with the lowest harvest rates were those that were harvested primarily by fisheries in outside and intermediate areas of northern Southeast Alaska. The most heavily fished stocks in Lynn Canal were harvested by intensive near-terminal fisheries in addition to the more mixed stock fisheries.

(4) The indicator stock in the Ketchikan area experienced stable, moderate harvest rates (62–65%) that were widely distributed across fishing areas, management jurisdictions and gear types. The potential to manage southern stock groups for fixed escapement levels through inseason management is very limited.

(5) Variability in marine survival rates is sufficient to account for most of the variability observed in total adult runs. Therefore, marine survival must be taken into account in any useful method of forecasting abundance of Southeast Alaska coho salmon stocks.

(6) Apparent discrepancies in harvest rate and run estimates for Chilkat Lake coho salmon indicate that potential problems exist in meeting assumptions required to estimate runs and harvest rates for populations in tributaries of larger systems.

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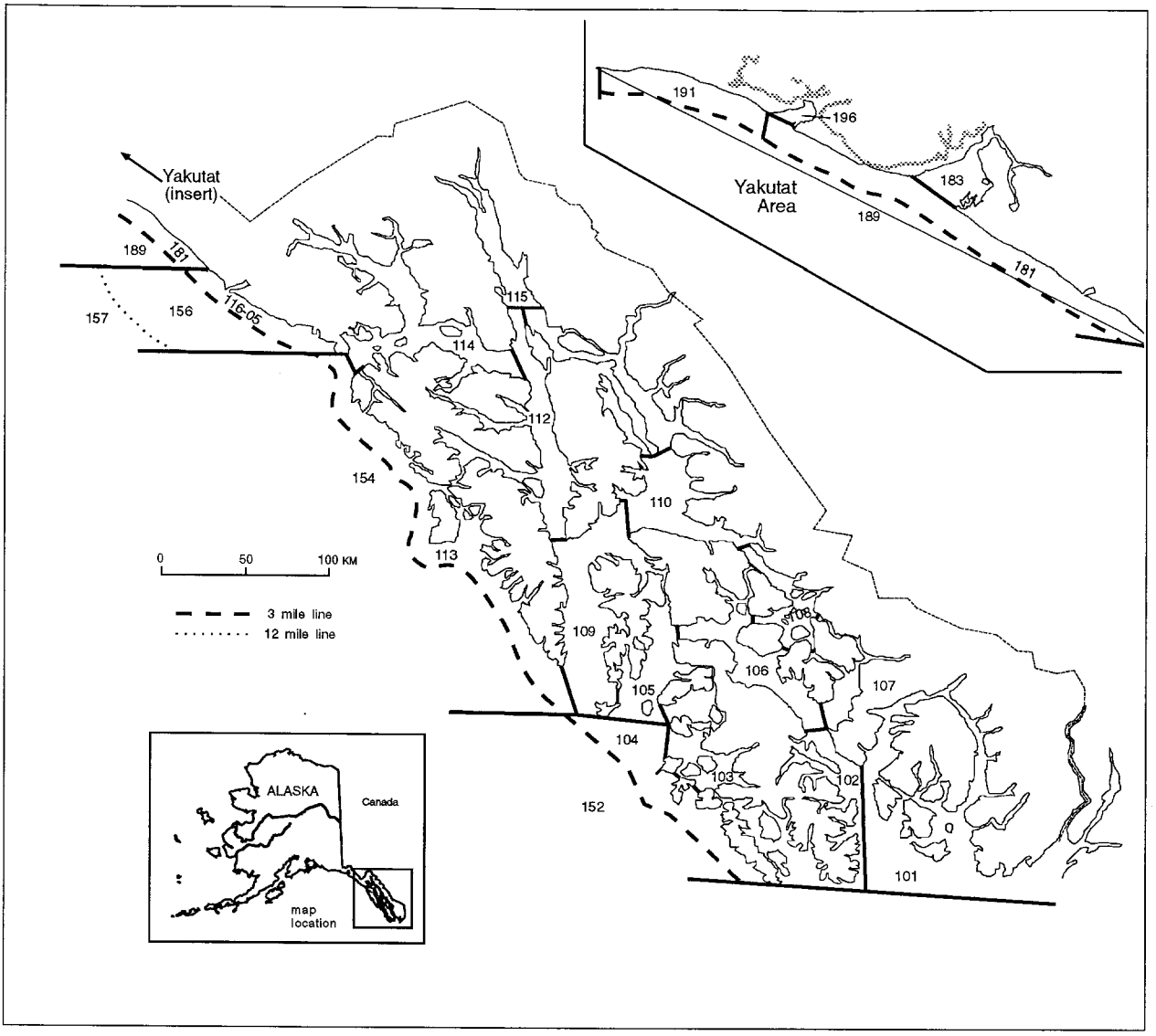
APPENDIX



Appendix A.1.—Southeast Alaska statistical fishing districts.

Appendix A.2.—Statistical areas of Southeast Alaska belonging to Pacific Marine Fisheries Commission (PMFC) areas and quadrants.

PMFC Area	Abbreviation	Statistical Areas (Districts)
Northern Outside	NOUT	116, 156, 157, 181, 183, 186, 189, 191
Central Outside	COUT	113, 154
Southern Outside	SOUT	103, 104, 152
Southern Inside	SIN	101, 102, 150
Southern Intermed.	SNTR	105, 109, 110
Central Inside	CIN	106, 107, 108
Stephens Passage	STEP	111
Central Intermed.	CNTR	112, 114
Lynn Canal	LYNN	115

Quadrant	Statistical (Districts)	Areas
Northwest	NW	113, 114, 116, 154, 156, 157, 181, 183, 186, 189, 191
Northeast	NE	109, 110, 111, 112, 115
Southwest	SW	103, 104, 150, 152
Southeast	SE	101, 102, 105, 106, 107, 108

Appendix A.3.—Statistical weeks used in recording and compiling Southeast Alaska commercial fisheries catch data.

STAT WEEK	YEAR/DATE 1980	YEAR/DATE 1981	YEAR/DATE 1982	YEAR/DATE 1983	YEAR/DATE 1984	YEAR/DATE 1985	YEAR/DATE 1986	YEAR/DATE 1987
1	0101-0105	0101-0103	0101-0102	0101-0101	0101-0107	0101-0105	0101-0104	0101-0103
2	0106-0112	0104-0110	0103-0109	0102-0108	0108-0114	0106-0112	0105-0111	0104-0110
3	0113-0119	0111-0117	0110-0116	0109-0115	0115-0121	0113-0119	0112-0118	0111-0117
4	0120-0126	0118-0124	0117-0123	0116-0122	0122-0128	0120-0126	0119-0125	0118-0124
5	0127-0202	0125-0131	0124-0130	0123-0129	0129-0204	0127-0202	0126-0201	0125-0131
6	0203-0209	0201-0207	0131-0206	0130-0205	0205-0211	0203-0209	0202-0208	0201-0207
7	0210-0216	0208-0214	0207-0213	0206-0212	0212-0218	0210-0216	0209-0215	0208-0214
8	0217-0223	0215-0221	0214-0220	0213-0219	0219-0225	0217-0223	0216-0222	0215-0221
9	0224-0301	0222-0228	0221-0227	0220-0226	0226-0303	0224-0302	0223-0301	0222-0228
10	0302-0308	0301-0307	0228-0306	0227-0305	0304-0310	0303-0309	0302-0308	0301-0307
11	0309-0315	0308-0314	0307-0313	0306-0312	0311-0317	0310-0316	0309-0315	0308-0314
12	0316-0322	0315-0321	0314-0320	0313-0319	0318-0324	0317-0323	0316-0322	0315-0321
13	0323-0329	0322-0328	0321-0327	0320-0326	0325-0331	0324-0330	0323-0329	0322-0328
14	0330-0405	0329-0404	0328-0403	0327-0402	0401-0407	0331-0406	0330-0405	0329-0404
15	0406-0412	0405-0411	0404-0410	0403-0409	0408-0414	0407-0413	0406-0412	0405-0411
16	0413-0419	0412-0418	0411-0417	0410-0416	0415-0421	0414-0420	0413-0419	0412-0418
17	0420-0426	0419-0425	0418-0424	0417-0423	0422-0428	0421-0427	0420-0426	0419-0425
18	0427-0503	0426-0502	0425-0501	0424-0430	0429-0505	0428-0504	0427-0503	0426-0502
19	0504-0510	0503-0509	0502-0508	0501-0507	0506-0512	0505-0511	0504-0510	0503-0509
20	0511-0517	0510-0516	0509-0515	0508-0514	0513-0519	0512-0518	0511-0517	0510-0516
21	0518-0524	0517-0523	0516-0522	0515-0521	0520-0526	0519-0525	0518-0524	0517-0523
22	0525-0531	0524-0530	0523-0529	0522-0528	0527-0602	0526-0601	0525-0531	0524-0530
23	0601-0607	0531-0606	0530-0605	0529-0604	0603-0609	0602-0608	0601-0607	0531-0606
24	0608-0614	0607-0613	0606-0612	0605-0611	0610-0616	0609-0615	0608-0614	0607-0613
25	0615-0621	0614-0620	0613-0619	0612-0618	0617-0623	0616-0622	0615-0621	0614-0620
26	0622-0628	0621-0627	0620-0626	0619-0625	0624-0630	0623-0629	0622-0628	0621-0627
27	0629-0705	0628-0704	0627-0703	0626-0702	0701-0707	0630-0706	0629-0705	0628-0704
28	0706-0712	0705-0711	0704-0710	0703-0709	0708-0714	0707-0713	0706-0712	0705-0711
29	0713-0719	0712-0718	0711-0717	0710-0716	0715-0721	0714-0720	0713-0719	0712-0718
30	0720-0726	0719-0725	0718-0724	0717-0723	0722-0728	0721-0727	0720-0726	0719-0725
31	0727-0802	0726-0801	0725-0731	0724-0730	0729-0804	0728-0803	0727-0802	0726-0801
32	0803-0809	0802-0808	0801-0807	0731-0806	0805-0811	0804-0810	0803-0809	0802-0808
33	0810-0816	0809-0815	0808-0814	0807-0813	0812-0818	0811-0817	0810-0816	0809-0815
34	0817-0823	0816-0822	0815-0821	0814-0820	0819-0825	0818-0824	0817-0823	0816-0822
35	0824-0830	0823-0829	0822-0828	0821-0827	0826-0901	0825-0831	0824-0830	0823-0829
36	0831-0906	0830-0905	0829-0904	0828-0903	0902-0908	0901-0907	0831-0906	0830-0905
37	0907-0913	0906-0912	0905-0911	0904-0910	0909-0915	0908-0914	0907-0913	0906-0912
38	0914-0920	0913-0919	0912-0918	0911-0917	0916-0922	0915-1921	0914-0920	0913-0919
39	0921-0927	0920-0926	0919-0925	0918-0924	0923-0929	0922-0928	0921-0927	0920-0926
40	0928-1004	0927-1003	0926-1002	0925-1001	0930-1006	0929-1005	0928-1004	0927-1003
41	1005-1011	1004-1010	1003-1009	1002-1008	1007-1013	1006-1012	1005-1011	1004-1010
42	1012-1018	1011-1017	1010-1016	1009-1015	1014-1020	1013-1019	1012-1018	1011-1017

Appendix B.1.—Estimated weekly proportion of the total troll catch of coded wire tagged Auke Lake coho salmon, 1980–85.

Stat. Week	Year 1980	1981	1982	1983	1984	1985	Average
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0.0633	0	0	0	0	0.0131	0.0127
29	0	0.0341	0.0588	0	0.0329	0.0376	0.0272
30	0.3566	0	0.0208	0.0432	0.0816	0.0184	0.0868
31	0	0.0732	0.0621	0.1084	0.0968	0.0627	0.0672
32	0	0.1000	0	0.0478	0.1533	0.0400	0.0568
33	0.2509	0.0509	0.0811	0	0.0793	0.0541	0.0861
34	0.2671	0.1763	0.4269	0.1375	0	0	0.1680
35	0	0.1899	0.1679	0.2953	0.3419	0.1883	0.1972
36	0.0621	0.2368	0.0592	0.1916	0.1199	0.3014	0.1618
37	0	0	0.0741	0.0598	0.0535	0.2191	0.0678
38	0	0.1388	0.0491	0.0790	0.0408	0.0653	0.0622
39	0	0	0	0.0374	0	0	0.0062
Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Sample Size	14	63	32	103	93	148	

Appendix B.2.—Estimated weekly proportion of the total troll catch of coded wire tagged Speel Lake coho salmon, 1981, 1982, 1983, and 1985.

Stat. Week	Year 1981	1982	1983	1985	Average
25	0	0	0	0	0
26	0	0	0	0	0
27	0	0.0174	0	0	0.0043
28	0	0.0196	0.1395	0.0948	0.0635
29	0.1117	0.0794	0.0971	0.0545	0.0857
30	0.1450	0.0507	0.1030	0.1736	0.1181
31	0.1600	0.0504	0.0991	0.0795	0.0972
32	0.1092	0	0.1970	0.0290	0.0838
33	0.1511	0.4637	0	0.0418	0.1642
34	0	0.1978	0.0478	0	0.0614
35	0.2076	0.1010	0.1090	0.2445	0.1655
36	0.1154	0	0.0885	0.1092	0.0783
37	0	0.0200	0.0381	0.1080	0.0415
38	0	0	0.0697	0.0651	0.0337
39	0	0	0.0112	0	0.0028
Total	1.0000	1.0000	1.0000	1.0000	1.0000
Sample Size	32	28	86	87	-

Appendix B.3.—Estimated weekly proportion of the total troll catch of coded wire tagged Berners River coho salmon, 1982, 1983, and 1985.

Stat.	Year			
Week	1982	1983	1985	Average
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0.0193	0.0370	0.0188
29	0	0	0	0
30	0.0244	0.0761	0.1039	0.0681
31	0.0486	0.0566	0.0664	0.0572
32	0	0.0832	0.0377	0.0403
33	0.0952	0	0	0.0317
34	0.3578	0.2010	0	0.1862
35	0.0985	0.1663	0.1227	0.1292
36	0	0.1655	0.3482	0.1712
37	0.1449	0.1165	0.2380	0.1665
38	0	0.1155	0.0461	0.0539
39	0.2306	0	0	0.0769
Total	1.0000	1.0000	1.0000	1.0000
Sample Size	25	77	50	-

Appendix B.4.—Estimated weekly proportion of the total troll catch of coded wire tagged Chilkoot River coho salmon, 1983, and Chilkat River coho salmon, 1983 and 1984.

Stat.	Chilkoot R.	Chilkat R.		
Week	1983	1983	1984	Average
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0.0524	0.0236	0.0380
29	0.0349	0	0.0764	0.0382
30	0.0653	0.0796	0.0271	0.0534
31	0.1053	0.0769	0.0998	0.0884
32	0.0203	0.0983	0.1301	0.1142
33	0	0	0.1022	0.0511
34	0	0.1365	0	0.0682
35	0.1511	0.1594	0.1983	0.1788
36	0.0896	0.1636	0.2023	0.1829
37	0.2980	0.1385	0.1086	0.1236
38	0.1790	0.0639	0.0316	0.0478
39	0.0565	0.0309	0	0.0154
Total	1.0000	1.0000	1.0000	1.0000
Sample Size	45	57	43	-

Appendix B.5.—Estimated weekly proportion of the total troll catch of coded wire tagged Ford Arm Lake coho salmon, 1982, 1983, and 1985.

Statistical	Year			
Week	1982	1983	1985	Average
25	0	0	0	0
26	0	0	0	0
27	0	0	0.4280	0.1426
28	0	0.1662	0.0429	0.0697
29	0.1584	0.1326	0.0205	0.1038
30	0.0844	0.1376	0.0752	0.0991
31	0.1006	0.1775	0.0385	0.1055
32	0	0.1025	0.0546	0.0524
33	0.2394	0.0157	0.1003	0.1185
34	0.1235	0.0895	0	0.0710
35	0.1020	0.0991	0.1660	0.1224
36	0.1917	0.0567	0.0673	0.1052
37	0	0	0	0
38	0	0.0226	0.0067	0.0098
39	0	0	0	
Total	1.0000	1.0000	1.0000	1.0000
Sample Size	37	83	49	-

Appendix B.6.—Estimated weekly proportion of the total troll catch of coded wire tagged Politofski Lake coho salmon, 1982 and 1983.

Statistical	Year		
Week	1982	1983	Avg.
25	0	0	0
26	0.0823	0	0.0412
27	0	0	0
28	0.0694	0.4610	0.2652
29	0.1688	0	0.0844
30	0.1198	0.4199	0.2698
31	0.1487	0	0.0744
32	0	0.0651	0.0326
33	0.1165	0	0.0582
34	0.1314	0	0.0657
35	0.1206	0.0540	0.0873
36	0.0425	0	0.0212
37	0	0	0
38	0	0	0
39	0	0	0
Total	1.0000	1.0000	1.0000
Sample Size	29	10	-

Appendix B.7.—Estimated weekly proportion of the total troll catch of coded wire tagged Warm Chuck Lake coho salmon, 1982, 1983, and 1985.

Statistical Week	Year 1982	1983	1985	Average
25	0	0	0	0
26	0	0	0	0
27	0	0	0.2885	0.0962
28	0	0	0.1146	0.0382
29	0.1390	0.2013	0.1145	0.1516
30	0.0275	0.6805	0.1387	0.2823
31	0.1065	0.1182	0.1698	0.1315
32	0	0	0	0
33	0.5831	0	0.0377	0.2069
34	0.0241	0	0	0.0080
35	0.1198	0	0	0.0399
36	0	0	0.1191	0.0397
37	0	0	0.0171	0.0057
38	0	0	0	0
39	0	0	0	0
Total	1.0000	1.0000	1.0000	1.0000
Sample Size	20	6	21	-

Appendix B.8.—Estimated weekly proportion of the total troll catch of coded wire tagged Klakas Lake coho salmon, 1982 and 1983.

Statistical Week	Year 1982	1983	Average
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0.1537	0.0768
29	0.1247	0.1022	0.1135
30	0.1327	0.3173	0.2250
31	0.7426	0.1762	0.4594
32	0	0.1541	0.0771
33	0	0	0
34	0	0.0637	0.0318
35	0	0.0328	0.0164
36	0	0	0
37	0	0	0
38	0	0	0
39	0	0	0
Total	1.0000	1.0000	1.0000
Sample Size	6	21	-

Appendix B.9.—Estimated weekly proportion of the total troll catch of coded-wire tagged Hugh Smith Lake coho salmon, 1981, 1982, 1983, and 1985.

Statistical Week	Year 1982	1983	1984	1985	Average.
25	0	0	0	0	0
26	0	0	0.0402	0	0.0100
27	0.0085	0	0	0	0.0021
28	0	0.0415	0	0.0492	0.0227
29	0.1134	0.0867	0.0655	0.1351	0.1002
30	0.0628	0.1481	0	0.1689	0.0949
31	0.0950	0.1010	0.2028	0.1394	0.1346
32	0	0.1224	0.1365	0.0713	0.0826
33	0.2632	0.0154	0.1014	0.1189	0.1247
34	0.1111	0.2405	0	0	0.0879
35	0.2396	0.0745	0.0764	0.1498	0.1351
36	0.0481	0.0626	0.1317	0.0747	0.0793
37	0.0170	0.0686	0.1871	0.0521	0.0812
38	0.0055	0.0348	0.0584	0.0406	0.0348
39	0.0358	0.0039	0	0	0.0099
Total	1.0000	1.0000	1.0000	1.0000	1.0000
Sample Size	64	107	67	114	-

Appendix B.10.—Estimated weekly proportion of the troll catch of coded wire tagged Hugh Smith Lake coho salmon in the Northwest, Northeast and Southwest Quadrants, 1982–85.

Statistical Week	Year				Average
	1982	1983	1984	1985	
25	0	0	0	0	0
26	0	0	0.0534	0	0.0134
27	0	0	0	0	0
28	0	0.0556	0	0.0601	0.0289
29	0.1453	0.1084	0.0871	0.1515	0.1231
30	0.0735	0.1800	0	0.2001	0.1134
31	0.0861	0.1144	0.2695	0.1310	0.1503
32	0	0.1322	0.1814	0.0516	0.0913
33	0.2845	0.0207	0.1348	0.1147	0.1387
34	0.1229	0.2301	0	0	0.0882
35	0.2728	0.0562	0	0.1470	0.1190
36	0.0149	0.0593	0.1263	0.0748	0.0688
37	0	0.0231	0.1062	0.0359	0.0413
38	0	0.0200	0.0413	0.0333	0.0236
39	0	0	0	0	0
Total	1.0000	1.0000	1.0000	1.0000	1.0000
Sample Size	44	73	44	87	-

Appendix B.11.—Estimated weekly proportion of the troll catch of coded wire tagged Hugh Smith Lake coho salmon in the Southeast Quadrant, 1982–85.

Statistical Week	Year				Average
	1982	1983	1984	1985	
25	0	0	0	0	0
26	0	0	0	0	0
27	0.0386	0	0	0	0.0096
28	0	0	0	0	0
29	0	0.0227	0	0.0614	0.0210
30	0.0250	0.0542	0	0.0292	0.0271
31	0.1266	0.0613	0	0.1771	0.0912
32	0	0.0934	0	0.1595	0.0632
33	0.1874	0	0	0.1377	0.0813
34	0.0692	0.2711	0	0	0.0851
35	0.1213	0.1284	0.3086	0.1622	0.1801
36	0.1659	0.0723	0.1483	0.0745	0.1153
37	0.0774	0.2026	0.4327	0.1247	0.2094
38	0.0253	0.0784	0.1104	0.0737	0.0720
39	0.1633	0.0156	0	0	0.0447
Total	1.0000	1.0000	1.0000	1.0000	1.0000
Sample Size	20	34	23	27	-

Appendix B.12.—Estimated weekly proportion of the total troll catch of coded wire tagged Unuk River and Chickamin River coho salmon, 1984–85.

Statistical Week	Unuk R. 1985	Chickamin R. 1984	Chickamin R. 1985	Average
25	0	0	0	0
26	0	0	0	0
27	0.0376	0	0.5594	0.2797
28	0.1194	0.0996	0	0.0498
29	0.2328	0.0519	0.0324	0.0422
30	0.2715	0.1142	0.0180	0.0661
31	0.1665	0.1054	0.0890	0.0972
32	0.0593	0.2309	0.0492	0.1400
33	0.0449	0	0.1139	0.0570
34	0	0	0	0
35	0	0.1748	0.0620	0.1184
36	0.0209	0.1067	0.0761	0.0914
37	0.0261	0.1165	0	0.0582
38	0.0210	0	0	0
39	0	0	0	0
Total	1.0000	1.0000	1.0000	1.0000
Sample Size	49	11	17	-

Appendix B.13.—Estimated weekly proportion of the total troll catch of coded wire tagged Kegan, McDonald and Reflection Lake coho salmon, 1983.

Statistical Week	Kegan Lake	McDonald Lake	Reflection Lake
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0.7219
29	0.0940	0.4374	0.2781
30	0.1487	0	0
31	0.2723	0.2371	0
32	0.2048	0.1624	0
33	0	0	0
34	0	0	0
35	0.0904	0.1631	0
36	0.1003	0	0
37	0.0239	0	0
38	0.0656	0	0
39	0	0	0
Total	1.0000	1.0000	1.0000
Sample Size	26	4	2

Appendix B.14.—Estimated weekly proportion of the total troll catch of coded wire tagged Situk River coho salmon, 1985.

Stat. Week	Proportion
25	0
26	0
27	0
28	0
29	0
30	0.1979
31	0.1687
32	0.1436
33	0.0969
34	0
35	0.1559
36	0.1106
37	0.0605
38	0.0659
39	0
Total	1.0000
Sample Size	27

Appendix C.1.—Number of juvenile coho salmon tagged by area, year, and tag code, 1978–84.

Location	Year	Code	No. Marked
Speel Lake	1976	4-04-10	7,535
	1977	4-16-48	5,358
	1979	4-17-52	6,702
	1980	4-19-10	5,614
		4-19-11	1,616
	Total 1980		7,230
	1981	4-21-22	4,210
		4-21-45	7,910
	1981 Total		12,120
	1983	4-22-49	4,467
		4-23-22	5,534
	1983 Total		9,801
	1984	4-23-11	2,447
		4-23-12	1,661
		4-23-29	2,574
		4-24-33	5,712
	1984 Total		12,394
Berners River	1974	Fluorescent pigment	8,066
	1976	4-02-15	10,817
		4-03-08	526
	1976 Total		11,343
	1977	4-16-37	380
		4-17-29	10,758
	1977 Total		11,138
	1980	4-20-15	10,145
		4-20-30	780
	1980 Total		10,925
	1981	4-19-21	7,826
	1983	4-22-08	1,278
		4-22-43	9,070
	1983 Total		10,348
	1984	4-24-34	4,499
		4-24-36	10,827
	1984 Total		15,326
	1985	4-24-46	10,110
	1986	4-23-05	8,740
Chilkoot Lake	1976	4-03-07	1,503
	1977	4-16-23	2,545
		4-16-24	539
	1977 Total		3,084
	1981	4-21-26	5,359
	1985	4-24-55	4,529
		4-21-35	1,776
	1985 Total		6,305
Kadashan River	1986	4-23-31	849
		4-24-48	1,401
	1986 Total		2,250
Chilkat Lake, Mosquito Lake, Ponds	1972	Fluorescent pigment	4,320
Chilkat Lake	1976	4-05-02	2,985
Mosquito Lake	1976	4-03-02	3,347
Airport Ponds	1976	4-05-03	3,339
		4-05-04	1,731
	1976 Total		5,070
Upper River Ponds	1976	4-03-06	1,019
Chilkat Lake	1977	4-16-25	2,284

Continued

Appendix C.1.—Continued.

Location	Year	Code	No. Marked
Mosquito Lake	1977	4-16-46	5,741
		4-16-26	264
	1977 Total		6,005
Airport Ponds	1977	4-16-20	4,060
Upper River Ponds	1977	4-16-27	1,987
		4-16-27	742
	1977 Total		2,729
Chilkat Lake	1981	4-21-24	2,603
Upper River Ponds	1982[a]	4-21-37	807
		4-21-38	764
		4-21-39	889
		4-21-40	950
		4-22-09	1,362
		4-22-10	758
		4-22-07	2,985
	1982 Total		8,515
Upper River Ponds	1984[a]	4-23-10	4,262
		4-23-62	1,620
		4-24-16	1,692
		4-24-17	1,792
		4-24-18	1,038
		4-24-19	2,018
		4-24-20	805
		4-24-21	1,315
	1984 Total		14,542
Ford Arm Lake	1980	4-20-21	5,925
		4-20-24	444
	1980 Total		6,369
	1981	4-21-23	4,914
		4-21-33	2,012
	1981 Total		6,926
	1983	4-23-23	3,882
	1984	4-23-28	2,033
		4-24-35	5,629
	1984 Total		7,662
	1985	4-24-47	7,626
	1986	4-23-03	10,392
Politofski Lake	1980	4-20-22	5,814
	1981	4-20-26	1,225
		4-21-25	5,366
	1981 Total		6,591
Warm Chuck Lake	1980	4-20-17	4,391
	1981	4-20-25	1,053
		4-21-41	1,710
	1981 Total		2,763
	1983	4-23-26	4,735
	1984	4-23-18	1,715
		4-23-25	5,059
	1984 Total		6,774
	1985	4-23-27	1,887
		4-24-54	2,912
	1985 Total		4,799
Klakas Lake	1980	4-20-23	3,517
	1981	4-20-19	3,009
	1986	4-23-13	2,516
		4-23-14	2,534
		4-23-16	2,521
	1986 Total		7,571

Continued

Appendix C.1.—Continued.

Location	Year	Code	No. Marked
Kegan Lake	1981	4-21-29	3,449
Salmon Bay Lake	1984	4-23-24	4,943
	1985	4-21-34	1,701
		4-24-53	3,979
	1985 Total		5,680
	1986	4-21-36	1,839
		4-24-60	4,943
	1986 Total		6,782
Hugh Smith Lake	1980	4-20-16	5,345
	1981	4-20-20	3,737
Reflection Lake	1981	4-21-31	4,185
McDonald Lake	1982	4-21-32	119
		4-21-42	246
	1982 Total		365
Unuk River[b]	1983	4-20-60	5,696
	1984	4-21-47	6,085
	1985	4-21-55	2,392
		4-25-21	8,708
	1985 Total		11,100
	1986	4-25-46	5,421
Chickamin River[b]	1983	4-20-27	1,312
		4-21-44	900
	1983 Total		2,212
	1984	4-20-63	3,790
	1985	4-21-56	1,848
		4-25-22	6,226
	1985 Total		8,074
	1986	4-25-47	3,430
Situk River	1984	4-24-01	9,699
Lost River	1984	4-21-27	4,947
		4-23-32	1,851
		4-23-20	9,512
		4-23-33	614
	1984 Total		16,924
Akwe River	1984	4-24-37	10,037
		4-23-34	1,515
	1984 Total		11,552
Tsiu-Tsivat Rivers	1984	4-24-38	8,973
		4-23-09	5,108
		4-23-08	4,191
		4-21-28	1,134
	1984 Total		19,406
Alsek River	1985	4-25-23	105

[a]Tagged by the ADF&G, FRED Division.
[b]Tagged by the ADF&G, Sport Fish Division.

Appendix C.2.— Total coho salmon smolt emigration and number of fish tagged at Auke Creek, 1976–86.

Year	Total Smolt Outmigration	95% C.I.	Code	Number Tagged
1976	9,902[a]	9,044-10,996	4-03-10	765
			4-03-11	2,227
1976 Total				2,992
1977	18,395[a]	15,824-22,341	4-05-06	3,038
1978	No Data	-	-	-
1979	8,790[a]	8,136-9,590	4-19-46	3,872
1980	9,951	Total Count	4-19-49	5,491
			4-19-54	1,526
1980 Total				7,017
1981	6,915	Total Count	3-17-29	6,372
1982	6,607	Total Count	3-17-50	6,245
1983	6,721	Total Count	3-17-57	6,115
1984	7,036	Total Count	3-18-25	6,731
1985	5,601	Total Count	3-18-40	5,502
1986	5,666	Total Count	3-19-00	4,259
			3-20-20	1,230
1986 Total				5,489

Appendix C.3.—Estimated total coho salmon smolt emigration, number counted, and number tagged by code at Hugh Smith Lake, 1981–86.

Year	Total Smolt Outmigration[a]	95% C.I.	Weir Count	Code	Number Tagged
1981	-	-	5,961	4-20-18	2,777
1982	29,282	-	5,925	4-21-30	4,873
				4-21-43	700
1982 Total					5,573
1983	52,269	45,987–58,551	27,552	4-20-28	2,489
				4-20-29	1,289
				4-22-06	5,869
1983 Total					9,647
1984	32,004	29,932–34,076	22,803	4-23-06	5,227
				4-23-07	1,576
				4-23-19	9,944
1984 Total					16,747
1985	23,439	21,377–25,501	11,111	4-24-50	5,352
				4-24-51	3,102
				4-24-52	1,379
1985 Total					9,833
1986	21,782	18,627–24,937	6,819	4-24-41	5,689

[a]Peterson mark-recapture estimates.