ESTIMATES OF CATCH AND MORTALITY OF CHINOOK SALMON IN THE 1987 SOUTHEAST ALASKA PURSE SEINE FISHERY

By:

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ABSTRACT

Provisions of the 1985 Pacific Salmon Treaty require that incidental and induced fishing mortalities of chinook salmon be monitored and assessed as part of a coordinated coastwide natural stock rebuilding program. During the 1987 fishing season, chinook salmon non-retention regulations were implemented in the Southeast Alaska purse seine fishery prior to 1 August. This regulation was implemented to limit the purse seine landed catch of large (≥28" total length) chinook salmon to 11,400 fish (excluding Alaska hatchery addon) as directed by the Alaska Board of Fisheries. The 1987 regulation was also intended to reduce any targeting on chinook salmon which might be occurring. During the chinook salmon non-retention period, the seine fishery harvested approximately 4.0 million (56%) of the 7.0 million pink salmon harvested, the primary target species.

The primary method used to estimate encounter of chinook salmon during the non-retention period was through skipper interviews and observing landed catches. During the non-retention period, a total of 1,432 chinook salmon were observed and accounted for through interviews in 164 landings from 6 seine openings in Districts 101 to 104, and 109 to 114. During the retention period, a total of 507 chinook salmon were observed in 83 landings from 9 seine openings in Districts 101 to 104, 109, 110, 112, and 114.

In Southeast Alaska, regulations concerning chinook salmon included three size classes during the 1987 fishing season. Small chinook salmon (≤ 21") could be retained and sold at all times. Medium chinook salmon (21 - 28") could be retained for personal use but could not be sold at any time. And large chinook salmon (≥ 28") could be retained and sold only during chinook salmon retention periods. Retention and non-retention periods are specified by the Alaska Department of Fish and Game in an effort to maintain a seine fleet chinook salmon quota of 11,400 fish. Small chinook salmon do not count against this quota. Thus the dockside interview and observation program was designed to account for incidental catches of these three size classes of chinook salmon, and, stratified by time periods which relate to retention and non-retention of chinook salmon.

Total catches of chinook salmon are estimated at 18,456 (dockside interview and observation method) and 21,115 (sales slip method) during both the non-retention and retention portions of the fishing season. The majority of small and medium chinook salmon (67% and 57%, respectively) were encountered during the non-retention period, while most large chinook salmon (61%) were estimated to have been encountered during the retention period.

Direct estimates of delayed mortality rates were not available for this study. To estimate total mortalities, mortality rates were assumed for the two disposition categories as follows: released alive - 70%, and dead - 100%. For chinook salmon released alive, 2,358 (65.32%) small, 466 (12.91%) medium, and 786 (21.77%) large fish are estimated to have died after release. Combined with the estimated catch of fish that were kept or otherwise dead, we estimate a total mortality of 16,242 chinook salmon by the seine fleet.

INTRODUCTION

This report has not undergone final review and the data analysis should be considered preliminary.

Sales slips do not accurately record the actual catch of chinook salmon in the Southeast Alaska purse seine fishery. Due to the complex regulations (involving size restrictions, and retention and non-retention periods of chinook salmon harvest) instituted by the Alaska Board of Fish to conserve chinook salmon stocks, the traditional sales slip method of catch enumeration has not been adequate in recent years. The Alaska Department of Fish and Game has conducted research since 1985 to determine associated catches and mortalities of chinook salmon in the Southeast Alaska purse seine fishery (Van Alen and Seibel 1986, 1987). During 1985, a seine observer program and analyses of sales slips was used to estimate the magnitude of catch and fate of chinook salmon during the large chinook salmon non-retention period (hereafter cited as non-retention period). In 1986, onboard observers coupled with a dockside interview program and analysis of sales slips was used to estimate incidental catch rates and associated mortality of chinook salmon. In this report, for the 1987 season, we used a dockside sampling program coupled with analysis of sales slips to estimate the number of chinook salmon encountered. The associated mortality was determined using previous estimates of mortality rates.

Pacific Salmon Commission Needs

Provisions of the 1985 Pacific Salmon Treaty[2] require that incidental and induced fishing mortalities of chinook salmon be monitored and assessed. These provisions are part of an agreement to rebuild depressed natural chinook salmon stocks by 1998 through a coordinated coastwide program. According to Annex IV, Chapter 3, (1),(e), the Parties agree to "monitor, assess, and report associated fishing mortalities." Furthermore, "the Commission shall annually take into account, starting in 1988, the impacts of fishing mortalities, as determined by the Chinook Technical Committee in implementing the rebuilding program."

One concern to the Commission is estimating the magnitude of new sources of incidental fishing mortality. Such sources, if large, could affect estimates of harvest rate reductions (translated to catch ceilings in some areas) which are necessary to rebuild depressed stocks. Existing sources of associated mortality that occur at a relatively stable rate were implicitly taken into account when the current chinook salmon catch ceilings (that were needed to accomplish the scheduled rebuilding) were derived. Examples of associated

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[2] Treaty between the Government of the United States of America and the Government of Canada concerning Pacific salmon. U.S. Senate Treaty Doc. No. 99-2, [entered into force, March 18, 1985, (hereafter cited as Pacific Salmon Treaty or Treaty)].

mortality include hook and release of sublegal chinook salmon in troll and sport fisheries, gillnet dropout, and non-reporting of small chinook salmon caught incidentally in seine fisheries and processed as pink salmon.

A second concern of the Commission is to better document and understand the coastwide magnitude of associated fishery mortality on chinook salmon. This concern stems from initial estimates that coastwide associated fishery mortality may account for a kill of from 50 to 100% of the landed catch (Chinook Technical Committee, Pacific Salmon Commission 1987).

Southeast Alaska Purse Seine Fishery

Regulation of the Southeast Alaska purse seine fishery is based primarily on harvesting surplus numbers of pink salmon, and to a lesser degree, on surplus numbers of sockeye, chum, and coho salmon. Annual catches of all species by purse seine since 1970 are shown in Table 1. An associated catch of chinook salmon occurs in the seine fishery throughout Southeast Alaska (Figure 1). In recent years, 52 to 72% of the seine chinook salmon catch has occurred in District 104. Along with the amount of fishing effort, abundance is an important factor in determining annual catches. Increased coastwide abundance in response to the rebuilding program, and lack of a directed troll fishery in the seine areas (i.e., allotted chinook quotas had been previously reached by the troll fleet) have probably been significant factors affecting the seine fishery catches of chinook salmon. The final variable, catchability of chinook salmon, is not believed to have changed in recent years since no gear changes have been instituted for the seine fleet. Since 1976, the annual landed chinook salmon catches in the purse seine fishery have ranged from 1,400 to 31,400 (Figure 2). During these same years, chinook salmon have accounted for 0.02 to 0.13 percent of total salmon landings (Table 1). The primary factor contributing to the number of chinook salmon landed appears to be the amount of fishing effort exerted in a given year to harvest high pink salmon returns (Figure 3). The recent increased landings may also be partially attributed to increased prices for chinook salmon which may encourage more careful sorting of chinook salmon in the seine catch. Finally, removal of the size limit on seine caught chinook salmon, from 1979 to 1985, may also have contributed to the increased landings during those years.

Minimum chinook salmon size limits were in effect for the seine fishery prior to 1979 and since 1986. From 1960 through 1970, the minimum legal size was 26 inches measured from tip of snout to fork of tail; and from 1971 to 1977, the minimum legal size was 26 inches from tip of snout to tip of tail. In 1978, the minimum legal size was raised to 28 inches from tip of snout to tip of tail. From 1979 to 1985, no size limits in effect. Since 1986, regulations determined by the Alaska Board of Fisheries established three size classes of chinook salmon (measurements are from tip of snout to fork of tail): small fish ($\leq$ 21") could be retained at all times; medium fish (> 21" but < 28") could be retained for personal uses but could not be sold at any time; and large chinook salmon ($\leq$ 28") could be retained and sold only during periods

specified by the Department of Fish and Game in an effort to constrain the landed catch to 11,400 fish.

The 1987 Purse Seine Fishery

During the 1987 season, the Southeast Alaska purse seine fishery was closed to the taking of large (≥28") chinook salmon in all fishing periods prior to 1 August, except in the waters adjacent to the Hidden Falls hatchery (District 112-22) (non-retention was in effect from 21 July to 1 August) and in Neets Bay (District 101-90). As in 1986, the Alaska Board of Fisheries directed that the purse seine catch of large chinook salmon be limited to 11,400 (excluding Alaska hatchery addon). To accomplish this, non-retention regulations were imposed for the first weeks of the fishery, when pink salmon catches were small and a greater proportion of the incidentally caught chinook salmon could be released alive. Throughout the 1987 season, fishermen were encouraged to immediately release chinook salmon smaller than 28" in length. Chinook salmon less than or equal to 21" (or approximately 5 lb) in length could be retained and sold as small chinook salmon. Medium chinook salmon, between 21" and 28" in length, could be kept but could not be sold. These regulations were implemented both to limit the purse seine chinook salmon harvest, and to reduce any targeting on chinook salmon that might occur. For the most part, targeting on chinook salmon does not occur in the purse seine fishery due to the very low relative abundance of this species, as compared to target species. The regulation to allow retention of small chinook salmon less than five pounds was implemented by the Board of Fisheries to prevent fishermen from being legally liable for those small chinook salmon which are incidentally retained and processed as pink salmon.

In 1987, purse seine gear harvested 8.7 million salmon, including 7 million pink salmon, 311 thousand sockeye salmon, and 6,288 chinook salmon (Table 2). Four million pink salmon were harvested prior to 2 August, when retention of large chinook salmon became legal. Three million pink salmon were harvested after 2 August (until the season closure) during the chinook salmon retention period (Table 3).

The total harvest of large chinook salmon was 4,473 fish (Table 4), including 3,970 (89%) fish harvested during the retention period, 63 fish harvested near Neets Bay terminal hatchery area, 178 fish harvested near Hidden Falls Hatchery (District 112-22) prior to instigation of non-retention on 21 July, and 262 fish either illegally sold or mis-reported by size class and/or district on sales slips. Seventy-nine percent of the large chinook salmon were harvested in District 104, 9% in District 112 (including the Hidden Falls subdistrict), 3.5% in District 101, 3% in District 102, and less than 0.2% in each of the remaining districts (Districts 103, 105, 109, 111, 113, and 114). A total of 1,801 small (≤21") chinook salmon were reported caught by seine gear in 1987, including 300 (16.6%) fish caught near Hidden Falls hatchery (District 112-22), 561 (31%) fish caught in District 104, 243 (13.5%) fish caught in District 110, 236 (13.1%) fish caught in district 113, and 158 (9%) fish caught in District 1 (Table 5).

METHODS

1987 Dockside Sampling Project

To estimate the number of chinook salmon caught in the seine fishery, we monitored the unloading process of vessels and interviewed skippers at fish processing facilities in Petersburg, Craig, Ketchikan, Pelican, Sitka, and Excursion Inlet. Monitoring of the unloading process involved three basic elements. First, all fish sold as chinook salmon were counted, and the species and size class was verified. Second, as individual seine boats were off-loaded at the docks, catches of sockeye, pink, chum, and coho salmon were observed by Fish and Game personnel (and/or sorted by processor personnel) for chinook salmon which had not been found previously. Third, when feasible, a visual inspection from the dock was made for chinook salmon which were retained onboard the vessel. The size class (large, medium, or small) was recorded for each chinook salmon observed. During the interview, each skipper was asked if any chinook salmon had been previously sold during this opening, and if any chinook salmon caught during this opening had been retained for personal use, given away, discarded at sea, released alive, or disposed of in some other way. Ancillary information, such as permit numbers, dates, and sales of other species, needed to identify the sales slip(s) associated with the current fishery opening was recorded to permit comparison of alternative estimates of catch (Figure 4). Sampling was conducted throughout the season during both non-retention and retention periods.

Dockside Program Sample Effort

Goals of the dockside interview and observation program were to sample several boats per statistical week in each district. Due to time and personnel constraints this was not accomplished in several instances. In cases when no dockside samples were collected during a statistical week in a given district that was open to fishing, the average rate of chinook per boat-hour was calculated from samples obtained during all other weeks. The estimated catch of each size class of chinook salmon was calculated from this average rate multiplied by the total reported fishing effort in respective districts and statistical weeks. This problem occurred primarily in districts 102, 103, 113, and 114 (Tables 7, 8). Often boats were either not available to sample (i.e., if only a small number of boats fished in the district), or individual boats would off-load catches from these districts to tenders, or boats would fish in more than one district before off-loading at the docks.

Catch Estimation By Size Class

Table 6 provides an outline summary of the methods of catch estimation of chinook salmon in the 1987 purse seine fishery. This includes two estimates of catch, one utilizing dockside interview data and the second primarily utilizing sales slip data. Catch estimations were made by size class for both methods, and also by final disposition (i.e., fish that were released alive, or fish that were dead) for the dockside interview method.

Small

Utilizing the dockside interview data, estimates of the number of small chinook salmon caught were stratified by fishing districts and statistical weeks, and grouped by periods when retention and non-retention regulations were in effect. Stratification by district was used in an attempt to account for possible differences in abundance. Temporal stratification was used because differences in attitude and/or uncertainty in interpretation of retention regulations may cause skippers to sort the catch and/or treat small chinook salmon differently. Stratification by time also reduced our reliance on the assumption that abundance was constant through time. Numbers of fish caught (within districts, by statistical weeks, and by final disposition) were transformed into catches per boat hour of effort fished (CPUE). These rates of catch per boat hour of fish released alive, and of dead fish (including discarded, kept, or sold) were then expanded over the total number of boat hours of fishing effort reported in each district for each statistical week. Also, we compared this dockside data based estimate of catch with the catch estimate recorded on sales slips. Catch estimates recorded on sales slips account only for landed catches, however.

Medium

Because medium chinook salmon cannot be sold, no estimate of catch is maintained on sales slips. An estimate was obtained, however, for the retention period, by expanding the catch of large fish (recorded on sales slips during the retention period) with ratios of medium/large chinook salmon calculated (by district) from the estimated catches from dockside interview data during the retention period. During the non-retention period, an estimate of large chinook salmon (based on CPUE of large fish reported on sales slips during the retention period) was expanded in the same manner, i.e., with ratios of medium/large fish estimated by district during the non-retention period from dockside data.

An estimated catch of medium chinook salmon was also made utilizing dockside observations during the off-loading process, coupled with interviews with skippers. Again, estimates were made by fishing district and statistical week. Estimated rates of encounter, including fish released alive and dead fish, were expanded by total fishing effort in each strata to determine total estimated encounter.

Large

During the period when retention of large size chinook salmon was permitted, a record of catch derived from sales slips is available. While we believe this data to generally be accurate, we also compared it with a catch estimate generated from our dockside observations and interviews and expanded by boat-hours of effort. During the non-retention period two estimates of the catch of large chinook salmon were also made. The first was based on CPUE rates derived from sales slip data recorded during the retention period. The second estimate was based on dockside observation and interview data. Both estimates were expanded by total fishing effort which is reported by fishing district and time period.

Mortality Estimation By Size Class

Mortality of chinook salmon that were released alive was determined for each size class by district and time period. An assumed level of mortality of 70% was applied to the estimated number of fish released alive. In a report to the Pacific Salmon Commission, ADF&G and NMFS (1987) related the lack of previous research and literature available concerning mortality due to catch and release of chinook salmon in the commercial seine fishery. A wide range of mortality, 50% to 90% was adopted with the intention of incorporating the unknown (but anticipated high) level of delayed mortality of fish caught and released. In this study we have adopted the median of this range, 70%, as a mortality level for chinook salmon caught and released in the Southeast Alaska purse seine fishery.

Stratifying the mortality estimates by size class, district, and time period (i.e., non-retention and retention periods) was used because: 1) onboard observer data (chinook per set catch estimates) documented a difference between size classes and injury status of fish released alive. Injury status of small chinook salmon released alive was 40% uninjured vs. 60% injured, while that of large chinook salmon released alive was 76% uninjured vs. 24% injured, and that of medium chinook salmon released alive was 32% uninjured vs. 68% injured (Van Alen and Seibel 1987). 2) stratification by retention vs. non-retention period is considered due to the the dynamics of the fishery. During the main pink salmon runs, it may be difficult to get to (or see) small and medium chinook salmon until they have been brought aboard. Also, the small fish tend to get gilled in the net and killed when the net is pulled through the power block (Van Alen and Seibel 1987). During the non-retention period, prior to large pink salmon catches, fishermen are encouraged to release chinook prior to bringing fish on board and to handle chinook quickly and with care when they are brought on board. That is, it may be more feasible to release chinook salmon in a healthy condition when fewer fish of other species are being caught and more care can be taken to handle the chinook salmon. 3) stratification by district reduces possibilities of geographical differences in abundance.

RESULTS

1987 Dockside Sampling Project

Non-retention Period

During the chinook salmon non-retention period (28 June to 1 August) a total of 1,432 chinook salmon were observed on the docks or accounted for (released alive or dead) in 164 interviews (Table 7). Of the 812 small chinook salmon recorded, 250 (30.79%) were released alive, 202 (24.88%) were released dead, and 360 (44.33%) were kept or sold. Primary districts where small chinook were recorded caught were 101, 104, 110, and 113. Of the 352 medium chinook salmon caught, 53 (15.06%) were released alive, 126 (35.8%) were released dead, and 173 (49.15%) were kept or discarded in some other way (Table 7). Primary districts where medium chinook salmon were recorded caught were 101, 104, and 113. Of the 268 large chinook salmon recorded, 174 (64.93%) were released alive, 41 (15.3%) were released dead, and 53 (19.78%) were kept or discarded in some other way (Table 7). The primary district where large chinook salmon were encountered was 104.

Retention Period

During the retention period (2 August to 3 October), a total of 507 chinook salmon were observed on the docks or accounted for in 83 interviews (Table 8). Of the 201 small chinook salmon recorded, 59 (29.35%) were released alive, 32 (15.92%) were released dead, and 110 (54.73%) were kept or sold. Primary districts of encounter of small chinook salmon were 101, 102, 104, and 110. Of the 104 medium chinook salmon recorded in samples from the retention period, 35 (33.65%) were released alive, 13 (12.5%) were released dead, and 56 (53.85%) were kept (Table 8). Districts 104 and 110 were the primary areas of catch. Of the 202 large chinook salmon recorded in dockside samples from the retention period, 21 (10.4%) were released alive, 3 (1.49%) were released dead, and 178 (88.12%) were kept or sold. District 104 was the primary area of catch (Table 8).

Dockside Program Sample Effort

Throughout the season, interviews were made on 35 landings in District 101, 15 landings in 102, 4 landings in District 103, 71 landings in 104, 12 landings in District 109, 29 landings in District 110, 3 landings in District 113, and 20 landings in District 114 (Table 9). A total of 12 tenders were sampled in Districts 104 (5 tenders), 112 (5 tenders), 113 (1 tender), and 113/114 (1 tender) (Table 10).

Total dockside sampling effort of individual boats varied considerably compared to total boats fished by district and time period. Such sample variability is

tied to the availability of "acceptable" boats to sample in a given port. That is, many boats off-load partial or entire catches to tenders on the fishing grounds. Also, total sample effort is related to the total number of boats that fished in a district in a given week. The more boats that fished, the more observations and interviews tend to be conducted as catch off-loading is observed at the docks. Table 11 shows the percent of total boat-hours sampled by district and time period. Overall, a higher percentage of sample effort occurred during non-retention period than during the retention period.

Catch Estimation by Size Class

The total catch estimate based on dockside interview data is 18,456 chinook salmon (Tables 12, 13). The total sales slip estimated catch is 21,115 chinook salmon (Table 14). These estimates are comparable by size class and district as follows:

Small

The dockside data derived catch estimate includes an estimated 10,282 (55.71%) small chinook salmon. Nearly sixty-seven percent of the estimated catch of small chinook salmon were caught during the non-retention period (early season). The primary districts of encounter of small chinook salmon based on catch per unit of effort (CPUE) were: 101 (23.91%), 112 (15.75%), 104 (13.37%), 114 (12.72%), and 22.28% in all other districts (Table 14).

The sales slip derived catch estimate includes an estimated 2,614 (12.38%) small chinook salmon. Again, a high percentage (72.04%) of the small chinook salmon were estimated to have been encountered during the non-retention portion of the season (Table 15). The primary districts where small chinook were estimated to have been encountered were 104 (49.08%), 113 (16.88%), 110 (14.08%), 110 (12.05%), and 5.97% in all other districts (Table 15).

Medium

The dockside data derived catch estimate includes an estimated 3,741 medium chinook salmon. Fifty-seven percent of these were estimated to have been caught in the non-retention period. Based on this CPUE analysis, medium chinook salmon were encountered primarily in districts 104 (23.5%), 113 (22.64%), 112 (18.04%), 101 (11.28%), 114 (9.54%), and 15.0% in all other districts (Table 14).

The sales slip catch estimate includes an estimated 7,577 medium chinook salmon. Seventy-nine percent of these were estimated to have been caught in the non-retention period (Table 16). Medium chinook salmon were encountered primarily in districts 104 (44.12%), 113 (22.34%), 112 (15.14%), 101 (6.59%), and 11.81% in all other districts (Tables 16, 17).

Large

The dockside data derived catch estimate includes 4,433 (24.02%) large chinook salmon. Sixty-one percent of these large chinook salmon were encountered during the retention period. The primary areas of encounter, based on CPUE, were districts 104 (61.45%), 112 (11.03%), 110 (7.35%), and 20.17% in all other districts (Table 14).

The sales slip catch estimate includes an estimated 10,924 large chinook salmon. Sixty-four percent (6,954) of these were estimated to have been encountered during the non-retention period (Table 18). The primary districts of catch were 104 (81.04%), 112 (7.25%), 110 (4.07%), and 7.63% in all other districts (Tables 14, 18).

Disposition of Estimated Catches

Forty-six percent (5,824) of the chinook salmon estimated to have been encountered throughout the 1987 purse seine season were released alive. The remaining catch (54%) were either released dead, kept, or sold (Table 13). Of the fish released alive, 3,954 (67.89%) were released during the non-retention period; including 2,521 (63.76%) small fish, 305 (7.71%) medium fish and 1,128 (28.53%) large fish. During the retention period, 1,870 (32.11%) chinook salmon were released alive, including 846 (45.24%) small chinook salmon, 361 (19.3%) medium fish, and 663 (35.45%) large fish (Table 13).

Mortality Estimation by Size Class

The total mortality estimate during 1987 for those fish that were released alive was 3,610 (Table 19). This includes 2,358 (65.32%) small, 466 (12.91%) medium, and 786 (21.77%) large chinook salmon. Over seventy-six percent (2,766 fish) of the estimated mortality occurred during the non-retention period. The highest mortality levels of small chinook salmon occurred in districts 114 (37.6%), 101 (35.73%), and 104 (15.29%). For medium and large chinook salmon, the highest mortality levels occurred in district 104, 58.41% and 55.98%, respectively.

DISCUSSION

We should be cautious of the limitations of these data and subsequent catch estimates. Notably, sample sizes are limited in some districts and periods. Other possible sources of bias include: 1) not sampling the entire catch of a boat that was interviewed (e.g., if portions of the catch were off-loaded to tenders prior to landing at the dock); 2) fishermen not providing accurate interview records of catches that were released dead and alive; 3) failure to report small chinook salmon on sales slips; 4) use of average weights of fish

by processor personnel to determine total catch, as opposed to counting individual fish; 5) inability of Fish and Game personnel to accurately observe catches of medium chinook salmon; and, 6) single boats catching a disproportionately high number of chinook salmon (i.e., possible targeting).

The chinook/boat-hour estimate assumes: 1) that fishermen do not target on chinook salmon in any district at any time during the season; 2) that medium fish are representatively sampled in the dockside interview program; 3) that all small fish caught are accounted for by either grading out of pink catches on the dock, observed by Fish and Game personnel, or reported released or discarded by fishermen during the interview; 4) that all large chinook salmon caught during the non-retention period are reported in dockside interviews, and all large chinook salmon caught during the retention period are sold; and 5) that abundance of chinook salmon does not change significantly in Southeast Alaska throughout the season.

Likewise, the sales slip catch estimate assumes: 1) that any small fish are sold and reported when they are graded out of pink catches at the processor; 2) that only large fish (i.e., not medium) are recorded as large fish in the fish ticket system; 3) that all large chinook salmon caught during the retention period are sold; and 4) that processor facilities record accurate numbers of fish sold, as well as accurate weights.

Comparison of Catch Estimates

Realizing the uncertainty surrounding the assumptions inherent in these two methods of catch estimation, we consider it critical to compare the estimates by size class and district. That is, the total estimates (18,456 vs. 21,115) appear to be quite close in estimating total catch of chinook salmon. However, estimates by size class and district may differ considerably.

Small

For small fish, the dockside data estimate is 10,282 fish and the sales slip estimate is 2,614 fish. The discrepancy here indicates obvious under-reporting (in several possible ways) of small chinook salmon on sales slips. First, small chinook salmon are frequently not sorted out of pink catches and are ultimately sold as pink salmon. This appears to be dependent on the processor facility, and the level of expertise by the grading crew. Second, the method of reporting small fish on fish tickets is often based on applying an average weight of small chinook salmon to the total pounds sold to determine the number sold. Dockside interviews (where actual numbers of small chinook salmon were recorded) indicated that a total of 361 small chinook salmon crossed the dock, while only 211 small chinook salmon were reported on fish tickets for the same boats (Table 10). This difference can only be attributed to: 1) the processors using average weights to determine numbers of fish; or 2) the fact that observers may not know precisely what is sold (i.e., small chinook salmon may cross the dock, but be discarded or given away rather than sold).

In making this comparison, we must also keep in mind that the sales slip estimate does not include small fish released alive or discarded prior to off-loading. The dockside interview catch estimate includes 3,367 small fish released alive, but small fish discarded or kept were not separately estimated in the analysis. Also, the dockside data estimate has a slight downward bias because a number of boats that were interviewed had off-loaded pink salmon catches previously to tenders. This bias includes 11 boats that fished in district 101, 43 boats that fished in district 104, 3 boats from district 102, 1 boat from 103, 1 boat from 110, 1 boat from 112, and 14 boats from 114 (total boats = 74). These samples were included in the analysis because information on the other size classes of chinook salmon, as well as interview information are still available. Ratios of small chinook per boat hour derived from five tender samples from district 104 and 1 tender sampled from district 114 during the non-retention period indicate that an average of five small chinook salmon per boat per fishing day (15 hour period) may be attributed to the underestimation of small chinook salmon from boats that were not completely sampled in districts 104 and 114. For the 41 boats that fished during the non-retention period in these two districts, this amounts to an estimate of 205 small chinook salmon that are not included in the total catch estimate. No tender loads were sampled from the other districts or during the retention period (Table 10), thus we are uncertain of the total underestimation of small chinook salmon. Given all of these sources of bias, we feel the true encounter estimate of small chinook salmon is more closely approximated by the dockside interview estimate than the fish ticket estimate, and that the dockside interview derived estimate represents a slight underestimate.

Medium

A comparison of the catch estimates of medium chinook salmon also shows a wide variation between the two methods used (3,741 vs. 7,577). Since no reporting of medium chinook salmon is required, the estimate derived from dockside interview data is most likely an underestimate. Fish may be kept or given away, and some fishermen may choose not to disclose such information. The dockside interview is presently the only means for obtaining catch information on these medium chinook salmon.

The catch estimate of medium chinook salmon using sales slip data is also quite limited. Again, since no medium fish are reported on sales slips, the "best" estimate of catch is derived from a combination of reported (sales slips) catches of large chinook salmon and observed (dockside program) catch ratios of medium/large fish. Both retention and non-retention period estimates of medium chinook salmon indicate large catches of medium chinook salmon in district 104. Since this estimate is based on catch ratios of medium/large fish, it is apparent that this estimate is being driven, to some extent, by the high catches of large chinook salmon in district 104 (Tables 16, 17). A second factor to consider in the sales slip estimate is that during the non-retention period, the ratios of medium to large chinook salmon (derived from dockside interviews) in districts 101 and 113 are artificially high because one skipper (in each district) reported large incidental catches of medium chinook salmon. Thus one boat's catch has driven the catch per boat hour ratio (and

consequently the catch estimate) up. These high catches are outliers in the dockside interview data, but it is known that occasionally a boat will set its net on a school of chinook salmon. Again, the original assumption is that fishermen are not targeting on known areas with high densities of chinook salmon, however, it is also considered inappropriate to exclude such catches from the database. It is not presently known what percentage of the fleet actually obtains periodic high incidental catches of chinook salmon. Such high catches are dependent upon individual fishing strategies, and district and time of fishing in relation to local abundance and distribution of sub-legal chinook salmon. Given these limitations of each estimate, it is assumed that the dockside interview derived catch estimate is an underestimation, and the fish ticket derived catch estimate is an overestimate of the true encounter of medium chinook salmon.

Large

Estimates of large chinook salmon during the retention period are rather similar (2,687 vs. 3,970), while the estimates during the non-retention period are considerably different (1,746 vs. 6,954). During the retention period, the reported catch of large chinook salmon on sales slips must be assumed to be the "best" estimate of catch. That is, most fishermen will sell the highly valued large chinook salmon to processors when it is legal to do so. The discrepancies between dockside interview and sales slip estimates during the retention period are reflected in the summary of sampled landings (Table 10). Nearly all districts show more large fish reported on sales slips than what was actually observed at dockside. The best explanation for these discrepancies is that processors use an average weight to calculate the number of fish caught rather than actually counting individual fish. Given that we consider the sales slip method of catch estimation to be most accurate, we recommend that this discrepancy between weights and numbers of fish be examined further.

During the non-retention period, the sales slip derived estimated catch of large chinook salmon was calculated using the catch ratio of large chinook per boat-hour (during the retention period) and the total number of boat hours fished (during the non-retention period) by district (Table 18). This method assumes the abundance and distribution of large chinook salmon is the same in each district throughout the season. The reality of this has not been confirmed, however, Figure 5 indicates that catch estimates of chinook salmon (based on effort and using dockside interview data) vary randomly by week until early September (statistical week 36). At this time, catches of all size classes drop off and fishing effort shifts from targeting on pink salmon to fall chum salmon runs. Pooling this data by weeks of non-retention (early season in 1987) and retention (late season in 1987) shows that more small chinook salmon are caught early in the season, while more large chinook salmon are caught later in the season (Figure 6). However, another factor which surely interacts with this trend is the lack of reporting of large chinook salmon caught and released and/or kept in the non-retention portion of the season. It is beyond the scope of this study to evaluate the extent of this factor or the validity of the interview data. Likewise, catch estimates by district show that large chinook salmon are predominantly caught in district 104 (outside waters) while small chinook salmon catches are scattered

throughout Southeast Alaska (districts 101, 102, 104, 110, 112, 113, and 114) (Figures 7, 8). Thus, the concept of apportioning a late-season catch ratio to the early season fishery is currently the only means of obtaining a sales slip based estimate of catch of large chinook. It most likely produces an elevated estimate of the catch of large chinook salmon in the non-retention period in certain districts where abundance is not the same throughout the season. The dockside interview estimate is considered to be more accurate , during the non-retention period, although it is based on the assumption that the fishermen report all chinook salmon caught (both kept and released) during the interview process.

Mortality Estimation

In estimating total encounter of chinook salmon, we must consider the delayed mortality that occurs after a fish has been caught and released. Direct estimates of delayed mortality rates are not currently available but previous estimates have assumed a range of 50 to 90%, depending on condition and size of the fish released. The median, 70%, was assumed in this study as a delayed mortality level. The estimated mortality of fish released alive simply confirms our expectations. That is, the primary mortality (76%) occured during the non-retention period when fishermen are required to release fish (alive if possible). And, that over 65% of the total estimated mortality occurs to the small chinook size class.

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Table 1. Annual salmon catches by species in numbers (thousands) and percent in the Southeast Alaska purse seine fishery, 1970-87.

Year	Chinook		Sockeye		Coho		Pink		Chum		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
1970	6	0.05	308	2.53	295	2.42	9,629	79.09	1,937	15.91	12,175
1971	5	0.05	163	1.55	326	3.11	8,506	81.04	1,496	14.25	10,496
1972	17	0.12	324	2.27	390	2.73	11,371	79.67	2,170	15.20	14,272
1973	9	0.12	349	4.77	130	1.78	5,610	76.66	1,220	16.67	7,318
1974	7	0.13	236	4.23	167	2.99	4,174	74.75	1,000	17.91	5,584
1975	2	0.05	62	1.58	70	1.78	3,411	86.88	381	9.70	3,926
1976	1	0.02	136	2.71	88	1.75	4,288	85.32	513	10.21	5,026
1977	5	0.04	329	2.65	161	1.29	11,600	93.27	342	2.75	12,437
1978	14	0.07	274	1.36	245	1.22	19,045	94.71	530	2.64	20,108
1979	10	0.10	397	3.96	177	1.77	9,000	89.77	442	4.41	10,026
1980	13	0.09	527	3.74	194	1.38	12,315	87.49	1,027	7.30	14,076
1981	10	0.06	445	2.51	286	1.61	16,453	92.80	535	3.02	17,729
1982	31	0.13	463	1.91	449	1.85	22,475	92.57	862	3.55	24,280
1983	14	0.04	794	2.18	399	1.09	34,635	95.02	610	1.67	36,452
1984	21	0.08	467	1.88	373	1.50	21,509	86.72	2,434	9.81	24,804
1985	23	0.05	690	1.40	387	0.79	46,827	95.06	1,334	2.71	49,261
1986	13	0.03	590	1.27	560	1.21	43,078	92.83	2,164	4.66	46,405
Ave. 70-86	12	0.07	386	2.50	276	1.78	16,702	87.27	1,117	8.37	18,493
1987	6	0.07	311	3.54	131	1.49	7,082	80.64	1,252	14.26	8,782

Table 2. Southeast Alaska purse seine salmon catches by district, 1987.

District	Numbers of Fish					
	Chinook [a]	Sockeye	Coho	Pink	Chum	Totals
101	314	43,947	17,136	900,728	128,473	1,090,598
102	159	17,476	16,386	400,527	128,608	563,156
103	29	1,581	20,249	225,427	87,364	334,650
104	4,102	171,214	48,992	1,674,018	71,153	1,969,479
105	2	1	203	51	3,526	3,783
109	178	4,600	4,178	323,385	57,722	390,063
110	283	9,784	3,098	864,795	32,071	910,031
111	43	363	144	44,120	1,020	45,690
112 [b]	193	41,490	9,403	1,411,273	110,969	1,573,328
112-22	553	3,276	1,664	330,867	410,442	746,802
113	300	13,704	7,784	367,733	100,247	489,768
114	132	3,751	2,206	539,298	120,153	665,540
Totals	6,288	311,187	131,443	7,082,222	1,251,748	8,782,888

[a] Includes 1801 small (<21") chinook salmon.
[b] Includes all waters of District 112, except 112-22 (Hidden Falls).

Table 3. Southeast Alaska commercial purse seine harvest of pink salmon by district and week, 1987.

Stat Week	Inclusive Dates	District 101	102	103	104	105	109	110	111	112 [a]	112-22	113	114	Totals
26	21 Jul - 27 Jul													
27	28 Jul - 4 Jul									7,368	3,788		12,546	23,702
28	5 Jul - 11 Jul	195	52		9,015					38,974	40,014	400	481,759	570,409
29	12 Jul - 18 Jul	57,908	191		86,421			296,203	5,680	261,920	39,226	83,992		831,541
30	19 Jul - 25 Jul	238,691			103,043				38,440	514,278	174,544	68,318	32,227	1,169,541
31	26 Jul - 1 Aug	121,617	36,163		145,499		61,536	460,601		332,183		198,320	7,397	1,363,316
Totals	(Weeks 27-31)	418,411	36,406	0	343,978	0	61,536	756,804	44,120	1,154,723	257,572	351,030	533,929	3,958,509
32	2 Aug - 8 Aug	257,882	190,889		1,019,301		169,738	98,475		131,632	65,138			1,933,055
33	9 Aug - 15 Aug	215,201	88,556		226,766		76,894	9,516		82,617	7,258	10,371		717,179
34	16 Aug - 22 Aug			173,568	83,973		11,574			42,301	899	2,811	5,166	320,292
35	23 Aug - 29 Aug						3,643							3,643
36	30 Aug - 5 Sep	7,792	74,210	41,394		51						3,409		126,856
37	6 Sep - 12 Sep	1,436	10,080	10,163								111	189	21,979
38	13 Sep - 19 Sep		313	280									14	607
39	20 Sep - 26 Sep	5	73	22								1		101
40	27 Sep - 3 Oct	1												1
Totals	(Weeks 32-40)	482,317	364,121	225,427	1,330,040	51	261,849	107,991	0	256,550	73,295	16,703	5,369	3,123,713
Totals	(all season)	900,728	400,527	225,427	1,674,018	51	323,385	864,795	44,120	1,411,273	330,867	367,733	539,298	7,082,222

[a] Includes all waters of District 112, except 112-22 (Hidden Falls).

Table 4. Southeast Alaska commercial purse seine harvest of large (>28") chinook salmon by district and week, 1987.

Stat Week	District 101	102	103	104	105	109	110	111	112 [a]	112-22	113	114	Totals
Non-Retention:													
26													
27									10	54		4	68
28	63[b]			8					32	82	1	68	254
29								9	31	42			82
30								1	5	55	5		66
31						12			20		1		33
Totals:	63			8		12		10	98	233	7	72	503
Retention:													
32	50	82		2,812		34	39		25	18			3,060
33	42	3		252		8	1		13	2	2		323
34			5	456		2			4			3	470
35													0
36		38	3			2					50		93
37		9	5								5		19
38												1	1
39		1										2	3
40	1												1
Totals:	93	133	13	3,520		46	40		42	20	57	6	3,970
Season Totals:	156	133	13	3,528	0	58	40	10	140	253	64	78	4,473

[a] Includes all waters of District 112, except 112-22 (Hidden Falls).
[b] Harvest of large chinook salmon in Neets Bay terminal harvest area.

Table 5. Southeast Alaska commercial purse seine harvest of small (<21") chinook salmon by district and week, 1987.

	District												
Week	101	102	103	104	105	109	110	111	112 [a]	112-22	113	114	Totals
Non-Retention:													
26										38		5	43
27									11	97		41	150
28				1			124	22	11	39	4		206
29				6				11	10	119	14		336
30	153			29		100	86		3	6	134		335
31				6									
Totals:	153			42		100	210	33	35	299	152	46	1,070
Retention:													
32	2			463		7	31		14	1			518
33	3			33		1	2		2			4	41
34				23		11			2				40
35											84		0
36		17	13		2	1						4	117
37		8	3										15
38													0
39													0
40													0
Totals:	5	25	16	519	2	20	33		18	1	84	8	731
Season Totals:	158	25	16	561	2	120	243	33	53	300	236	54	1,801

[a] Includes all waters of District 112, except 112-22 (Hidden Falls).

Table 6. Methods of catch and mortality estimation of chinook salmon in the Southeast Alaska purse seine fishery, 1987.

Size Class	Period	
	Non-Retention	Retention
Small	Dockside sampling + Interview Data vs. Expand CPUE of small chinook from Sales Slip Data during retention period by total effort during non-retention period. (does not include fish released/discarded/sold as pinks)	Dockside sampling + Interview Data vs. Sales Slip Data (does not include fish released/ discarded/sold as pinks)
Medium	Dockside sampling + Interview Data vs. Expand CPUE of large chinook from Sales Slip data during retention period with total effort during non-retention period, then apply ratio of medium/large chinook from Dockside Data during non-retention period.	Dockside sampling + Interview Data vs. Apply ratio of medium/ large chinook from dockside data during retention period to Sales Slip estimate of large chinook during retention period.
Large	Expand CPUE of large chinook from Sales Slip data during retention period by total effort during non-retention. (does not include fish released/ discarded/sold as pinks).	Dockside sampling + Interview Data vs. Sales Slip Data (does not include fish released/ discarded/sold as pinks).

Table 7. Summary of data collected from dockside interviews with purse seine fishermen during the 1987 chinook salmon non-retention period, 5 July to 1 August, in Southeast Alaska.

District:	101	102	103	104	109	110	111	112 [a]	112-22	113	114	Totals
No. Landings Sampled:	24	3	0	45	3	22	3	10	23	12	19	164
Catch and Percent of Total Catch by Participating Vessels:												
Chum Salmon: No.	1,445	277	0	2,444	2,180	4,791	261	2,607	17,152	3,757	4,002	38,916
	2.26%	2.76%		4.48%	15.73%	3.94%	2.24%	6.82%	40.09%	7.78%	4.96%	8.01%
Pink Salmon: No.	59,490	7,926	0	35,799	11,401	115,370	11,234	35,034	25,164	43,435	76,049	420,902
	93.20%	79.07%		65.59%	82.27%	94.81%	96.56%	91.68%	58.82%	89.91%	94.20%	86.67%
Coho Salmon: No.	511	499	0	4,226	86	387	32	108	162	390	223	6,624
	0.80%	4.98%		7.74%	0.62%	0.32%	0.28%	0.28%	0.38%	0.81%	0.28%	1.36%
Sockeye Salmon: No.	2,259	1,312	0	11,899	178	1,065	92	428	294	641	419	18,587
	3.54%	13.09%		21.80%	1.28%	0.88%	0.79%	1.12%	0.69%	1.33%	0.52%	3.83%
Chinook Salmon: No.	125	10	0	215	14	71	15	38	13	89	35	619
	0.20%	0.10%		0.39%	0.10%	0.06%	0.13%	0.10%	0.03%	0.18%	0.04%	0.13%
Total Catch: No.	63,830	10,024	0	54,583	13,859	121,684	11,634	38,215	42,785	48,312	80,728	485,648
Catch and Percent of Chinook Salmon (by disposition and size class):												
Released Alive												
Small: No.	87	10	0	88	2	18	0	0	10	0	35	250
	32.58%	41.67%		60.27%	10.53%	16.67%	0.00%	0.00%	20.41%	0.00%	70.00%	30.79%
Medium: No.	6	2	0	31	0	8	1	0	2	1	2	53
	6.32%	40.00%		46.97%	0.00%	25.81%	7.14%	0.00%	50.00%	1.37%	6.67%	15.06%
Large: No.	9	2	0	115	8	26	0	3	0	7	4	174
	30.00%	40.00%		77.18%	100.00%	66.67%		37.50%	0.00%	46.67%	80.00%	64.93%
Released Dead												
Small: No.	138	13	0	37	2	4	0	0	1	7	0	202
	51.69%	54.17%		25.34%	10.53%	3.70%	0.00%	0.00%	2.04%	6.86%	0.00%	24.88%
Medium: No.	81	2	0	28	0	7	0	7	0	0	1	126
	85.26%	40.00%		42.42%	0.00%	22.58%	0.00%	24.14%	0.00%	0.00%	3.33%	35.80%
Large: No.	3	0	0	31	0	1	0	2	0	3	1	41
	10.00%	0.00%		20.81%	0.00%	2.56%		25.00%	0.00%	20.00%	20.00%	15.30%
Kept/Other/Sold												
Small: No.	42	1	0	21	15	86	13	34	38	95	15	360
	15.73%	4.17%		14.38%	78.95%	79.63%	100.00%	100.00%	77.55%	93.14%	30.00%	44.33%
Medium: No.	8	1	0	7	5	16	13	22	2	72	27	173
	8.42%	20.00%		10.61%	100.00%	51.61%	92.86%	75.86%	50.00%	98.63%	90.00%	49.15%
Large: No.	18	3	0	3	0	12	1	3	8	5	0	53
	60.00%	60.00%		2.01%	0.00%	30.77%	100.00%	37.50%	100.00%	33.33%	0.00%	19.78%
Totals												
Small: No.	267	24	0	146	19	108	13	34	49	102	50	812
Medium: No.	95	5	0	66	5	31	14	29	4	73	30	352
Large: No.	30	5	0	149	8	39	1	8	8	15	5	268

[a] Includes all waters of District 112, except 112-22 (Hidden Falls).

Table 8. Summary of data collected from dockside interviews with purse seine fishermen during the 1987 chinook salmon retention period, 1 August to 3 October, in Southeast Alaska.

District:	101	102	103	104	109	110	111	112 [a]	112-22	113	114	Totals
No. Landings Sampled:	11	12	4	26	9	7	0	6	7	0	1	83
Catch and Percent of Total Catch by Participating Vessels:												
Chum Salmon: No.	1,716	2,466	5,519	4,320	5,293	1,059	0	1,478	13,108	0	109	35,068
	2.82%	5.98%	62.20%	2.76%	10.33%	2.62%		5.74%	35.86%		22.06%	8.31%
Pink Salmon: No.	55,837	36,305	2,516	142,490	45,187	38,228	0	23,543	23,020	0	339	367,465
	91.71%	88.08%	28.36%	90.89%	88.16%	94.75%		91.38%	62.97%		68.62%	87.04%
Coho Salmon: No.	610	894	814	2,185	284	363	0	298	180	0	12	5,640
	1.00%	2.17%	9.17%	1.39%	0.55%	0.90%		1.16%	0.49%		2.43%	1.34%
Sockeye Salmon: No.	2,654	1,470	18	7,567	479	609	0	432	219	0	34	13,482
	4.36%	3.57%	0.20%	4.83%	0.93%	1.51%		1.68%	0.60%		6.88%	3.19%
Chinook Salmon: No.	70	81	6	211	10	87	0	13	29	0	0	507
	0.11%	0.20%	0.07%	0.13%	0.02%	0.22%		0.05%	0.08%		0.00%	0.12%
Total Catch: No.	60,887	41,216	8,873	156,773	51,253	40,346	0	25,764	36,556	0	494	422,162
Catch and Percent of Chinook Salmon (by disposition and size class):												
Released Alive												
Small: No.	15	27	0	4	0	11	0	0	2	0	0	59
	36.59%	49.09%	0.00%	10.53%	0.00%	23.40%		0.00%	18.18%			29.35%
Medium: No.	7	5	0	18	0	3	0	2	0	0	0	35
	53.85%	45.45%		42.86%	0.00%	15.00%		40.00%	0.00%			33.65%
Large: No.	0	0	1	19	0	0	0	0	1	0	0	21
	0.00%	0.00%	100.00%	14.50%	0.00%	0.00%		0.00%	12.50%			10.40%
Released Dead												
Small: No.	18	8	5	1	0	0	0	0	0	0	0	32
	43.90%	14.55%	100.00%	2.63%	0.00%	0.00%		0.00%	0.00%			15.92%
Medium: No.	6	2	0	5	0	0	0	0	0	0	0	13
	46.15%	18.18%		11.90%	0.00%	0.00%		0.00%	0.00%			12.50%
Large: No.	0	0	0	3	0	0	0	0	0	0	0	3
	0.00%	0.00%	0.00%	2.29%	0.00%	0.00%		0.00%	0.00%			1.49%
Kept/Other/Sold												
Small: No.	8	20	0	33	1	36	0	3	9	0	0	110
	19.51%	36.36%	0.00%	86.84%	100.00%	76.60%		100.00%	81.82%			54.73%
Medium: No.	0	4	0	19	3	17	0	3	10	0	0	56
	0.00%	36.36%		45.24%	100.00%	85.00%		60.00%	100.00%			53.85%
Large: No.	16	15	0	109	6	20	0	5	7	0	0	178
	100.00%	100.00%	0.00%	83.21%	100.00%	100.00%		100.00%	87.50%			88.12%
Totals												
Small: No.	41	55	5	38	1	47	0	3	11	0	0	201
Medium: No.	13	11	0	42	3	20	0	5	10	0	0	104
Large: No.	16	15	1	131	6	20	0	5	8	0	0	202

[a] Includes all waters of District 112, except 112-22 (Hidden Falls).

Table 9. Summary of data collected from dockside interviews with purse seine fishermen during 1987 in Southeast Alaska (non-retention and retention periods combined, 5 July to 3 October).

District:	101	102	103	104	109	110	111	112 [a]	112-22	113	114	Totals
No. Landings Sampled:	35	15	4	71	12	29	3	16	30	12	20	247
Catch and Percent of Total Catch by Participating Vessels:												
Chum Salmon: No.	3,161	2,743	5,519	6,764	7,473	5,850	261	4,085	30,260	3,757	4,111	73,984
	2.53%	5.35%	62.20%	3.20%	11.47%	3.61%	2.24%	6.38%	38.12%	7.76%	5.06%	8.14%
Pink Salmon: No.	115,327	44,231	2,516	178,289	56,588	153,598	11,234	58,577	48,184	43,435	76,388	788,367
	92.27%	86.28%	28.36%	84.30%	86.88%	94.73%	96.45%	91.51%	60.69%	89.72%	93.99%	86.77%
Coho Salmon: No.	1,121	1,393	814	6,411	370	750	32	406	342	390	235	12,264
	0.90%	2.72%	9.17%	3.03%	0.57%	0.46%	0.27%	0.63%	0.43%	0.81%	0.29%	1.35%
Sockeye Salmon: No.	4,913	2,782	18	19,466	657	1,674	92	860	513	641	453	32,069
	3.93%	5.43%	0.20%	9.20%	1.01%	1.03%	0.79%	1.34%	0.65%	1.32%	0.56%	3.53%
Chinook Salmon: No.	462	115	6	572	42	265	28	84	90	190	85	1,939
	0.37%	0.22%	0.07%	0.27%	0.06%	0.16%	0.24%	0.13%	0.11%	0.39%	0.10%	0.21%
Total Catch: No.	124,984	51,264	8,873	211,502	65,130	162,137	11,647	64,012	79,389	48,413	81,272	908,623
Catch and Percent of Chinook Salmon (by disposition and size class):												
Released Alive												
Small: No.	102	37	0	92	2	29	0	0	12	0	35	309
	33.12%	46.84%	0.00%	50.00%	10.00%	18.71%	0.00%	0.00%	20.00%	0.00%	70.00%	30.50%
Medium: No.	13	7	0	49	0	11	1	2	2	1	2	88
	12.04%	43.75%		45.37%	0.00%	21.57%	7.14%	5.88%	14.29%	1.37%	6.67%	19.30%
Large: No.	9	2	1	134	8	26	0	3	1	7	4	195
	19.57%	10.00%	100.00%	47.86%	57.14%	44.07%	0.00%	23.08%	6.25%	46.67%	80.00%	41.49%
Released Dead												
Small: No.	156	21	5	38	2	4	0	0	1	7	0	234
	50.65%	26.58%	100.00%	20.65%	10.00%	2.58%	0.00%	0.00%	1.67%	6.86%	0.00%	23.10%
Medium: No.	87	4	0	33	0	7	0	7	0	0	1	139
	80.56%	25.00%		30.56%	0.00%	13.73%	0.00%	20.59%	0.00%	0.00%	3.33%	30.48%
Large: No.	3	0	0	34	0	1	0	2	0	3	1	44
	6.52%	0.00%	0.00%	12.14%	0.00%	1.69%	0.00%	15.38%	0.00%	20.00%	20.00%	9.36%
Kept/Other/Sold												
Small: No.	50	21	0	54	16	122	13	37	47	95	15	470
	16.23%	26.58%	0.00%	29.35%	80.00%	78.71%	100.00%	100.00%	78.33%	93.14%	30.00%	46.40%
Medium: No.	8	5	0	26	8	33	13	25	12	72	27	229
	7.41%	31.25%		24.07%	100.00%	64.71%	92.86%	73.53%	85.71%	98.63%	90.00%	50.22%
Large: No.	34	18	0	112	6	32	1	8	15	5	0	231
	73.91%	90.00%	0.00%	40.00%	42.86%	54.24%	100.00%	61.54%	93.75%	33.33%	0.00%	49.15%
Totals												
Small: No.	308	79	5	184	20	155	13	37	60	102	50	1,013
Medium: No.	108	16	0	108	8	51	14	34	14	73	30	456
Large: No.	46	20	1	280	14	59	1	13	16	15	5	470

[a] Includes all waters of District 112, except 112-22 (Hidden Falls).

Table 10. Summary of data collected from the purse seine dockside interview program in Southeast Alaska, 1987.

Seiners:

Dist	Number of Landings Sampled	Landed Catch of Chinook Salmon: Reported on Sales Slips [a,b] Small	Reported on Sales Slips [a,b] Large	Observed on Docks [b,c,d] Small	Observed on Docks [b,c,d] Large	Small + Large Chinook Reported on Sales Slips	Small + Large Chinook Observed on the Docks	Chinook Never Landed [c,e] Released	Chinook Never Landed [c,e] Other
101	35	0	15	1	10	15	11	370	76
102	15	6	20	17	15	26	32	71	12
103	4	0	0	0	0	0	0	6	0
104	71	14	170	35	99	184	134	380	55
109	12	9	8	16	6	17	22	12	8
110	29	47	14	106	20	61	126	78	60
111 [f]	3	6	0	13	1	6	14	1	13
112 [f]	16	9	5	20	5	14	25	14	45
112-22	30	24	11	44	9	35	53	16	21
113	12	92	1	95	5	93	100	18	72
114	20	4	1	14	0	5	14	43	28
Totals	247	211	245	361	170	456	531	1,009	390

Tenders:

	Number Sampled	Landed Catch: Chum	Pink	Coho	Sockeye	Chinook Sm	Chinook Med	Chinook Lg	No. Boats Delivered	No. Hours Fished	Total Boat-Hours	Small Chinook/ Boat-Hour
104	5	111	28,147	239	679	153	10	1	32	15	480	0.3188
112-22	4	42,791	8,868	74	155	5	1	1	36	15	540	0.0052
112 [f]	1	757	2	160	260	2	1	0	11	39	429	
113	1	137	22,625	7	5	11	0	0	7	15	105	0.1048
112,114	1	822	16,042	38	48	10	4	4	3	15	45	0.3111
Totals	12	44,618	75,684	518	1,147	181	16	6				

[a] Catch totals were obtained from sales slip data.
[b] Medium chinook could not be sold in 1987.
[c] Data was derived from the Dockside Interview Program.
[d] All fish were observed during unloading, including those sold and not sold.
[e] Includes numbers of medium chinook salmon released, kept, or other.
[f] Includes all waters of District 112, except 112-22 (Hidden Falls).

Table 11. Total sample effort completed for the purse seine Dockside Observation and Interview program in Southeast Alaska, 1987.

District	Non-Retention Period: Percent of Fishery Sampled	Retention Period: Percent of Fishery Sampled
101	26.88%	8.10%
102	28.57%	7.26%
103	------	2.16%
104	16.87%	7.21%
109	23.00%	12.59%
110	13.73%	45.45%
111	7.00%	------
112	6.04%	7.44%
113	15.20%	0.00%
114	12.94%	0.00%

Table 12. Estimated incidental catches of chinook salmon in the Southeast Alaska purse seine fishery based on catch per unit of effort data collected as part of the dockside interview program, 1987.

						Whole District			Sampled Chinook Catches			Chinook Per Boat-Hr			Estimated Chinook Catch			
Dist	St Wk	# Boats Sampled	# Hrs Fished	Boat-Hr Sampled	Percent Sample Effort Boat-Hours	# Boats Fished	Total Boat-Hr	Disposition	Sm	Med	Lg	Sm	Med	Lg	Sm	Med	Lg	Totals
101	30	20	30	600	34.19	58.50	1,755.00	Rel Alive	29	6,	9	0.0483	0.0100	0.0150	85	18	26	129
								Dead	122	87	20	0.2033	0.1450	0.0333	357	254	59	670
	31	3	15	45	6.98	43.00	645.00	Rel Alive	57	0	0	1.2667	0.0000	0.0000	817	0	0	817
								Dead	58	2	1	1.2889	0.0444	0.0222	831	29	14	874
	32	6	39	234	16.00	37.50	1,462.50	Rel Alive	10	5	0	0.0427	0.0214	0.0000	63	31	0	94
								Dead	16	5	12	0.0684	0.0214	0.0513	100	31	75	206
	33	5	39	195	5.08	98.33	3,834.87	Rel Alive	5	2	0	0.0256	0.0103	0.0000	98	39	0	137
								Dead	10	1	4	0.0513	0.0051	0.0205	197	20	79	296
														Totals:	2,548	422	253	3,223
102	31	3	15	45	28.57	10.50	157.50	Rel Alive	10	2	2	0.2222	0.0444	0.0444	35	7	7	49
								Dead	14	3	3	0.3111	0.0667	0.0667	49	11	11	71
	32	4	39	156	11.27	35.50	1,384.50	Rel Alive	15	4	0	0.0962	0.0256	0.0000	133	36	0	169
								Dead	7	2	14	0.0449	0.0128	0.0897	62	18	124	204
	33	4	39	156	9.80	40.83	1,592.37	Rel Alive	12	1	0	0.0769	0.0064	0.0000	122	10	0	132
								Dead	4	1	1	0.0256	0.0064	0.0064	41	10	10	61
	36	0	15	0	0.00	45.33	679.95	Rel Alive				0.0738	0.0140	0.0040	50	10	3	63
								Dead				0.0838	0.0180	0.0359	57	12	24	93
	37	4	36	144	8.51	47.00	1,692.00	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	17	3	0	0.1181	0.0208	0.0000	200	35	0	235
	38	0	12	0	0.00	22.00	264.00	Rel Alive				0.0738	0.0140	0.0040	19	4	1	24
								Dead				0.0838	0.0180	0.0359	22	5	9	36
	39	0	12	0	0.00	39.00	468.00	Rel Alive				0.0738	0.0140	0.0040	35	7	2	44
								Dead				0.0838	0.0180	0.0359	39	8	17	64
	40	0	12	0	0.00	17.00	204.00	Rel Alive				0.0738	0.0140	0.0040	15	3	1	19
								Dead				0.0838	0.0180	0.0359	17	4	7	28
														Totals:	896	180	216	1,292
103	34	2	15	30	2.34	85.50	1,282.50	Rel Alive	0	0	1	0.0000	0.0000	0.0333	0	0	43	43
								Dead	5	0	0	0.1667	0.0000	0.0000	214	0	0	214
	36	0	30	0	0.00	48.33	1,449.90	Rel Alive				0.0000	0.0000	0.0098	0	0	14	14
								Dead				0.0490	0.0000	0.0000	71	0	0	71
	37	2	36	72	5.19	38.50	1,386.00	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
	38	0	12	0	0.00	27.50	330.00	Rel Alive				0.0000	0.0000	0.0098	0	0	3	3
								Dead				0.0490	0.0000	0.0000	16	0	0	16
	39	0	24	0	0.00	11.00	264.00	Rel Alive				0.0000	0.0000	0.0098	0	0	3	3
								Dead				0.0490	0.0000	0.0000	13	0	0	13
														Totals:	314	0	63	377

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Table 12 (p 2 of 4).

Dist	St Wk	# Boats Sampled	# Hrs Fished	Boat-Hr Sampled	Percent Sample Effort Boat-Hours	Whole District # Boats Fished	Whole District Total Boat-Hr	Disposition	Sampled Chinook Catches Sm	Med	Lg	Chinook Per Boat-Hr Sm	Med	Lg	Estimated Chinook Catch Sm	Med	Lg	Totals
104	28	13	15	195	20.31	64.00	960.00	Rel Alive	16	6	0	0.0821	0.0308	0.0000	79	30	0	109
								Dead	17	7	1	0.0872	0.0359	0.0051	84	34	5	123
	29	20	15	300	37.86	52.83	792.45	Rel Alive	55	11	52	0.1833	0.0367	0.1733	145	29	137	311
								Dead	27	12	21	0.0900	0.0400	0.0700	71	32	55	158
	30	12	30	360	14.91	80.50	2,415.00	Rel Alive	17	14	63	0.0472	0.0389	0.1750	114	94	423	631
								Dead	14	16	12	0.0389	0.0444	0.0333	94	107	81	282
	31	0	15	0	0.00	60.00	900.00	Rel Alive				0.0519	0.0276	0.0756	47	25	68	140
								Dead				0.0519	0.0333	0.0823	47	30	74	151
	32	18	39	702	12.20	147.50	5,752.50	Rel Alive	4	17	0	0.0057	0.0242	0.0000	33	139	0	172
								Dead	18	18	89	0.0256	0.0256	0.1268	148	148	729	1,025
	33	4	39	156	2.90	137.83	5,375.37	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	11	3	3	0.0705	0.0192	0.0192	379	103	103	585
	34	4	15	60	3.72	107.50	1,612.50	Rel Alive	0	1	19	0.0000	0.0167	0.3167	0	27	511	538
								Dead	5	3	20	0.0833	0.0500	0.3333	134	81	538	753
														Totals:	1,375	879	2,724	4,978
109	31	3	39	117	13.04	23.00	897.00	Rel Alive	2	0	8	0.0171	0.0000	0.0684	15	0	61	76
								Dead	17	5	0	0.1453	0.0427	0.0000	130	38	0	168
	32	3	39	117	10.00	30.00	1,170.00	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	1	3	5	0.0085	0.0256	0.0427	10	30	50	90
	33	6	39	234	21.43	28.00	1,092.00	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	0	0	1	0.0000	0.0000	0.0043	0	0	5	5
	34	0	15	0	0.00	16.50	247.50	Rel Alive				0.0043	0.0000	0.0171	1	0	4	5
								Dead				0.0385	0.0171	0.0128	10	4	3	17
	36	0	15	0	0.00	18.50	277.50	Rel Alive				0.0043	0.0000	0.0171	1	0	5	6
								Dead				0.0385	0.0171	0.0128	11	5	4	20
														Totals:	178	77	132	387
110	29	8	15	120	13.45	59.50	892.50	Rel Alive	6	0	2	0.0500	0.0000	0.0167	45	0	15	60
								Dead	59	13	5	0.4917	0.1083	0.0417	439	97	37	573
	31	14	39	546	13.79	101.50	3,958.50	Rel Alive	12	8	24	0.0220	0.0147	0.0440	87	58	174	319
								Dead	27	10	8	0.0495	0.0183	0.0147	196	73	58	327
	32	9	39	351	50.00	18.00	702.00	Rel Alive	30	3	0	0.0855	0.0085	0.0000	60	6	0	66
								Dead	11	15	19	0.0313	0.0427	0.0541	22	30	38	90
	33	1	39	39	25.00	4.00	156.00	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	6	2	1	0.1538	0.0513	0.0256	24	8	4	36
														Totals:	873	272	326	1,471

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Table 12 (p 3 of 4).

Dist	St Wk	# Boats Sampled	# Hrs Fished	Boat-Hr Sampled	Percent Sample Effort Boat-Hours	Whole District # Boats Fished	Whole District Total Boat-Hr	Disposition	Sampled Chinook Catches Sm	Med	Lg	Chinook Per Boat-Hr Sm	Med	Lg	Estimated Chinook Catch Sm	Med	Lg	Totals
111	30	3	15	45	42.86	7.00	105.00	Rel Alive	0	1	0	0.0000	0.0222	0.0000	0	2	0	2
								Dead	13	13	1	0.2889	0.2889	0.0222	30	30	2	62
														Totals:	30	32	2	64
112	27	0	15	0	0.00	83.00	1,245.00	Rel Alive				0.0095	0.0032	0.0032	12	4	4	20
								Dead				0.0670	0.0339	0.0189	83	42	24	149
	28	6	15	90	7.69	78.00	1,170.00	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	20	29	5	0.2222	0.3222	0.0556	260	377	65	702
	29	5	15	75	2.90	172.33	2,584.95	Rel Alive	0	0	2	0.0000	0.0000	0.0267	0	0	69	69
								Dead	19	0	0	0.2533	0.0000	0.0000	655	0	0	655
	30	21	30	630	10.82	194.00	5,820.00	Rel Alive	10	2	0	0.0159	0.0032	0.0000	92	18	0	110
								Dead	34	2	8	0.0540	0.0032	0.0127	314	18	74	406
	31	1	39	39	1.31	76.50	2,983.50	Rel Alive	0	0	1	0.0000	0.0000	0.0256	0	0	77	77
								Dead	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
	32	6	39	234	6.15	97.50	3,802.50	Rel Alive	2	2	1	0.0085	0.0085	0.0043	33	33	16	82
								Dead	8	10	8	0.0342	0.0427	0.0342	130	163	130	423
	33	4	39	156	10.13	39.50	1,540.50	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	4	2	3	0.0256	0.0128	0.0192	40	20	30	90
	34	3	15	45	8.96	33.50	502.50	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
														Totals:	1,619	675	489	2,783
113	28	1	15	15	100.00	1.00	15.00	Rel Alive	0	0	1	0.0000	0.0000	0.0667	0	0	1	1
								Dead	11	3	0	0.7333	0.2000	0.0000	11	3	0	14
	29	0	15	0	0.00	29.33	439.95	Rel Alive				0.0000	0.0025	0.0176	0	1	8	9
								Dead				0.2575	0.1818	0.0202	113	80	9	202
	30	2	15	30	10.81	18.50	277.50	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
								Dead	4	5	0	0.1333	0.1667	0.0000	37	46	0	83
	31	9	39	351	18.75	48.00	1,872.00	Rel Alive	0	1	6	0.0000	0.0028	0.0171	0	5	32	37
								Dead	87	64	8	0.2479	0.1823	0.0228	464	341	43	848
	33	0	39	0	0.00	5.50	214.50	Rel Alive				0.0000	0.0025	0.0176	0	1	4	5
								Dead				0.2575	0.1818	0.0202	55	39	4	98
	34	0	15	0	0.00	15.00	225.00	Rel Alive				0.0000	0.0025	0.0176	0	1	4	5
								Dead				0.2575	0.1818	0.0202	58	41	5	104
	36	0	15	0	0.00	45.50	682.50	Rel Alive				0.0000	0.0025	0.0176	0	2	12	14
								Dead				0.2575	0.1818	0.0202	176	124	14	314
	37	0	36	0	0.00	14.00	504.00	Rel Alive				0.0000	0.0025	0.0176	0	1	9	10
								Dead				0.2575	0.1818	0.0202	130	92	10	232

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Table 12 (p 4 of 4).

Dist	St Wk	# Boats Sampled	# Hrs Fished	Boat-Hr Sampled	Percent Sample Effort Boat-Hours	Whole District # Boats Fished	Whole District Total Boat-Hr	Disposition	Sampled Chinook Catches Sm	Med	Lg	Chinook Per Boat-Hr Sm	Med	Lg	Estimated Chinook Catch Sm	Med	Lg	Totals
113	38	0	12	0	0.00	27.50	330.00	Rel Alive				0.0000	0.0025	0.0176	0	1	6	7
								Dead				0.2575	0.1818	0.0202	85	60	7	152
	39	0	24	0	0.00	2.00	48.00	Rel Alive				0.0000	0.0025	0.0176	0	0	1	1
								Dead				0.2575	0.1818	0.0202	12	9	1	22
														Totals:	1,141	847	170	2,158
114	27	1	15	15	3.85	26.00	390.00	Rel Alive	35	0	0	2.3333	0.0000	0.0000	910	0	0	910
								Dead	0	0	0	0.0000	0.0000	0.0000	0	0	0	0
	28	18	15	270	18.00	100.00	1,500.00	Rel Alive	0	2	4	0.0000	0.0074	0.0148	0	11	22	33
								Dead	15	28	1	0.0556	0.1037	0.0037	83	156	6	245
	30	0	15	0	0.00	6.50	97.50	Rel Alive				0.1228	0.0070	0.0140	12	1	1	14
								Dead				0.0526	0.0982	0.0035	5	10	0	15
	31	0	39	0	0.00	5.50	214.50	Rel Alive				0.1228	0.0070	0.0140	26	2	3	31
								Dead				0.0526	0.0982	0.0035	11	21	1	33
	34	0	15	0	0.00	26.00	390.00	Rel Alive				0.1228	0.0070	0.0140	48	3	5	56
								Dead				0.0526	0.0982	0.0035	21	38	1	60
	37	0	12	0	0.00	27.00	324.00	Rel Alive				0.1228	0.0070	0.0140	40	2	5	47
								Dead				0.0526	0.0982	0.0035	17	32	1	50
	38	0	12	0	0.00	35.50	426.00	Rel Alive				0.1228	0.0070	0.0140	52	3	6	61
								Dead				0.0526	0.0982	0.0035	22	42	1	65
	39	0	12	0	0.00	29.00	348.00	Rel Alive				0.1228	0.0070	0.0140	43	2	5	50
								Dead				0.0526	0.0982	0.0035	18	34	1	53
														Totals:	1,308	357	58	1,723
														Grand Totals:	10,282	3,741	4,433 =	18,456

Table 13. Summary of estimated catches of chinook salmon in the Southeast Alaska purse seine fishery based on catch per unit of effort data collected as part of the dockside interview program, 1987.

Dist	Period	Disposition	Estimated Chinook Catch Sm	Med	Lg	Total
101	Non-retention	Released Alive	902	18	26	946
		Dead	1,188	283	73	1,544
	Retention	Released Alive	161	70	0	231
		Dead	297	51	154	502
	Total	Released Alive	1,063	88	26	1,177
		Dead	1,485	334	227	2,046
102	Non-retention	Released Alive	35	7	7	49
		Dead	49	11	11	71
	Retention	Released Alive	374	70	7	451
		Dead	438	92	191	721
	Total	Released Alive	409	77	14	500
		Dead	487	103	202	792
103	Retention	Released Alive	0	0	63	63
		Dead	314	0	0	314
104	Non-retention	Released Alive	385	178	628	1,191
		Dead	296	203	215	714
	Retention	Released Alive	33	166	511	710
		Dead	661	332	1,370	2,363
	Total	Released Alive	418	344	1,139	1,901
		Dead	957	535	1,585	3,077
109	Non-retention	Released Alive	15	0	61	76
		Dead	130	38	0	168
	Retention	Released Alive	2	0	9	11
		Dead	31	39	62	132
	Total	Released Alive	17	0	70	87
		Dead	161	77	62	300
110	Non-retention	Released Alive	132	58	189	379
		Dead	635	170	95	900
	Retention	Released Alive	60	6	0	66
		Dead	46	38	42	126
	Total	Released Alive	192	64	189	445
		Dead	681	208	137	1,026

-continued-

Table 13. (p 2 of 2).

111	Non-retention	Released Alive	0	2	0	2
		Dead	30	30	2	62
112	Non-retention	Released Alive	104	22	150	276
		Dead	1,312	437	163	1,912
	Retention	Released Alive	33	33	16	82
		Dead	170	183	160	513
	Total	Released Alive	137	55	166	358
		Dead	1,482	620	323	2,425
113	Non-retention	Released Alive	0	6	41	47
		Dead	625	470	52	1,147
	Retention	Released Alive	0	6	36	42
		Dead	516	365	41	922
	Total	Released Alive	0	12	77	89
		Dead	1,141	835	93	2,069
114	Non-retention	Released Alive	948	14	26	988
		Dead	99	187	7	293
	Retention	Released Alive	183	10	21	214
		Dead	78	146	4	228
	Total	Released Alive	1,131	24	47	1,202
		Dead	177	333	11	521
Totals:						
	Non-retention	Released Alive	2,521	305	1,128	3,954
		Dead	4,364	1,829	618	6,811
	Retention	Released Alive	846	361	663	1,870
		Dead	2,551	1,246	2,024	5,821
	All Season	Released Alive	3,367	666	1,791	5,824
		Dead	6,915	3,075	2,642	12,632
Grand Totals:			10,282	3,741	4,433	18,456

Table 14. Comparison of estimates of chinook salmon caught in the Southeast Alaska purse seine fishery, 1987.

All Season:	Estimated Chinook Catch (derived from Dockside Data)				Estimated Chinook Catch (derived from Sales Slip Data)			
District	Sm	Med	Lg	Total	Sm	Med	Lg	Total
101	2,548	422	253	3,223	12	499	233	744
102	896	180	216	1,292	26	113	137	276
103	314	0	63	377	16	0	13	29
104	1,375	879	2,724	4,978	1,283	3,343	8,853	13,479
105				0	2	0	0	2
109	178	77	132	387	26	34	61	121
110	873	272	326	1,471	368	367	445	1,180
111	30	32	2	64	3	64	4	71
112	1,619	675	489	2,783	315	1,147	792	2,254
113	1,141	847	170	2,158	492	1,693	334	2,519
114	1,308	357	58	1,723	71	317	52	440
Totals	10,282	3,741	4,433	18,456	2,614	7,577	10,924	21,115

Non-retention Period: District	Sm	Med	Lg	Total	Sm [a]	Med [b]	Lg [c]	Total
101	2,090	301	99	2,490	7	426	140	573
102	84	18	18	120	1	4	4	9
103								0
104	681	381	843	1,905	764	2,411	5,333	8,508
105								0
109	145	38	61	244	6	9	15	30
110	767	228	284	1,279	335	325	405	1,065
111	30	32	2	64	3	64	4	71
112	1,416	459	313	2,188	296	1,071	730	2,097
113	625	476	93	1,194	408	1,418	277	2,103
114	1,047	201	33	1,281	63	280	46	389
Totals	6,885	2,134	1,746	10,765	1,883	6,008	6,954	14,845

-continued-

Table 14. (p 2 of 2).

Retention Period: District	Estimated Chinook Catch (derived from Dockside Data) Sm	Med	Lg	Total	Estimated Chinook Catch (derived from Sales Slip Data) Sm [d]	Med [e]	Lg [f]	Total
101	458	121	154	733	5	73	93	171
102	812	162	198	1,172	25	109	133	267
103	314	0	63	377	16		13	29
104	694	498	1,881	3,073	519	932	3,520	4,971
105				0	2		0	2
109	33	39	71	143	20	25	46	91
110	106	44	42	192	33	42	40	115
111				0				0
112	203	216	176	595	19	76	62	157
113	516	371	77	964	84	275	57	416
114	261	156	25	442	8	37	6	51
Totals	3,397	1,607	2,687	7,691	731	1,569	3,970	6,270

[a] Estimate of small chinook salmon in the non-retention period was calculated with the ratios of small chinook/boat hr from sales slip data during the retention period (see table 15).

[b] Estimate of medium chinook salmon caught in the non-retention period was calculated with the ratios of estimated catches of medium/large chinook salmon derived from dockside interview data and multiplied by the estimated catch of large chinook salmon (see tables 12 and 16).

[c] Estimate of large chinook salmon caught in the non-retention period was calculated with the ratios of large chinook/boat hour derived from sales slip data during the retention period (see table 18).

[d] Direct numbers of fish reported on sales slips.

[e] Estimate of medium chinook salmon in the retention period was calculated using the ratios of estimated catches of medium/large chinook salmon derived from the dockside interview data during the retention period, and multiplied by the catch of large chinook salmon reported on sales slips (see table 17).

[f] Direct numbers of fish reported on sales slips.

Table 15. Estimated catch of small chinook salmon in the 1987 Southeast Alaska purse seine fishery when the fishery was closed to the retention of chinook salmon (28 June to 1 August).

Dist	Number Hours Fished	Number Boats Fished	Total Boat-Hr Fished	Catch Small Chinook per Boat-Hr [a]	Estimated Catch Small Chinook
101	60	133.00	7,980.00	0.0009	7
102	15	12.00	180.00	0.0037	1
103	0	0.00	0.00	0.0034	0
104	75	257.33	19,299.75	0.0396	764
105	0	0.00	0.00	0.0087	0
109	39	23.00	897.00	0.0072	6
110	54	161.00	8,694.00	0.0385	335
111	15	8.00	120.00	0.0229 [b]	3
112	114	603.83	68,836.62	0.0043	296
113	84	96.83	8,133.72	0.0502	408
114	84	138.00	11,592.00	0.0054	63
Totals					1,883

[a] Catch of small chinook per boat-hr from sales slip data during retention period.

[b] Number of small chinook per boat-hr was calculated by averaging ratios from Districts 9 and 10.

Table 16. Estimated catch of medium chinook salmon in the 1987 Southeast Alaska purse seine fishery when the fishery was closed to the retention of chinook salmon (28 June to 1 August).

Dist	Number Hours Fished	Number Boats Fished	Total Boat-Hr Fished	Catch Large Chinook per Boat-Hr [a]	Estimated Catch Large Chinook	Ratio Med/Lg Chinook [c]	Estimated Catch Medium Chinook
101	60	133.00	7,980.00	0.0176	140	3.0404	426
102	15	12.00	180.00	0.0198	4	1.0000	4
103	0	0.00	0.00	0.0028	0	0.0000	0
104	75	257.33	19,299.75	0.2763	5,333	0.4520	2,411
105	0	0.00	0.00	0.0000	0	0.0000	0
109	39	23.00	897.00	0.0165	15	0.6230	9
110	54	161.00	8,694.00	0.0466	405	0.8028	325
111	15	8.00	120.00	0.0316 [b]	4	6.0000	64
112	114	603.83	68,836.62	0.0106	730	1.4665	1,071
113	84	96.83	8,133.72	0.0341	277	5.1183	1,418
114	84	138.00	11,592.00	0.0040	46	6.0909	280
Totals					6,954		6,008

[a] Catch of large chinook per boat-hr from sales slip data during retention period.
[b] Number of large chinook per boat-hr was calculated by averaging catches from Districts 9 and 10.
[c] Medium/large chinook ratios calculated from the estimated catches for the non-retention period derived from dockside observation and interview data.

Table 17. Estimated catch of medium chinook salmon in the 1987 purse seine fishery when the fishery was open to the retention of chinook salmon (2 August to 3 October).

Dist	Catch Large Chinook [a]	Ratio Medium/Large Chinook [b]	Estimated Catch Medium Chinook
101	93	0.7857	73
102	133	0.8182	109
103	13	0.0000	0
104	3,520	0.2648	932
105	0	0.0000	0
109	46	0.5493	25
110	40	1.0476	42
111	0	0.0000	0
112	62	1.2273	76
113	57	4.8182	275
114	6	6.2400	37
Total	3,970		1,569

[a] Reported on sales slips during retention period.
[b] Medium/Large chinook ratios calculated from the estimated catches for the retention period derived from dockside interview data.

Table 18. Estimated catch of large chinook salmon in the 1987 Southeast Alaska purse seine fishery when the fishery was closed to the retention of chinook salmon (28 June to 1 August).

Dist	Number Hours Fished	Number Boats Fished	Total Boat-Hr Fished	Catch Large Chinook per Boat-Hr [a]	Estimated Catch Large Chinook
101	60	133.00	7,980.00	0.0176	140
102	15	12.00	180.00	0.0198	4
103	0	0.00	0.00	0.0028	0
104	75	257.33	19,299.75	0.2763	5,333
105	0	0.00	0.00	0.0000	0
109	39	23.00	897.00	0.0165	15
110	54	161.00	8,694.00	0.0466	405
111	15	8.00	120.00	0.0316 [b]	4
112	114	603.83	68,836.62	0.0106	730
113	84	96.83	8,133.72	0.0341	277
114	84	138.00	11,592.00	0.0040	46
Totals					6,954

[a] Catch of large chinook per boat-hr from sales slip data during retention period.

[b] Number of large chinook per boat-hr was calculated by averaging ratios from Districts 9 and 10.

Table 19. Estimated catch and mortality of chinook salmon released alive (by size class, district and time period) in the Southeast Alaska purse seine fishery, 1987.

Dist	Est. Catch Small Chinook Released Alive[a]	Est. Mortality Small Chinook Released Alive[b]	Est. Catch Medium Chinook Released Alive[a]	Est. Mortality Medium Chinook Released Alive[b]	Est. Catch Large Chinook Released Alive[a]	Est. Mortality Large Chinook Released Alive[b]
Non-retention period:						
101	902	631	18	13	26	18
102	35	25	7	5	7	1
103	0	0	0	0	0	0
104	385	270	178	125	628	440
105	0	0	0	0	0	0
109	15	11	0	0	61	43
110	132	92	58	41	189	132
111	0	0	2	1	0	0
112	104	73	22	15	150	105
113	0	0	6	4	41	29
114	948	664	14	10	26	18
Total:	2,521	1,766	305	214	1,128	786
Retention period:						
101	161	113	70	49		
102	374	262	70	49		
103	0	0	0	0		
104	33	23	166	116		
105	0	0	0	0		
109	2	1	0	0		
110	60	42	6	4		
111	0	0	0	0		
112	33	23	33	23		
113	0	0	6	4		
114	183	128	10	7		
Total:	846	592	361	252		
Total Mortality: (all size classes)		3,610				

[a] Catch estimate derived from dockside interview data.
[b] Mortality calculated assuming a 70% rate of mortality of fish released alive.

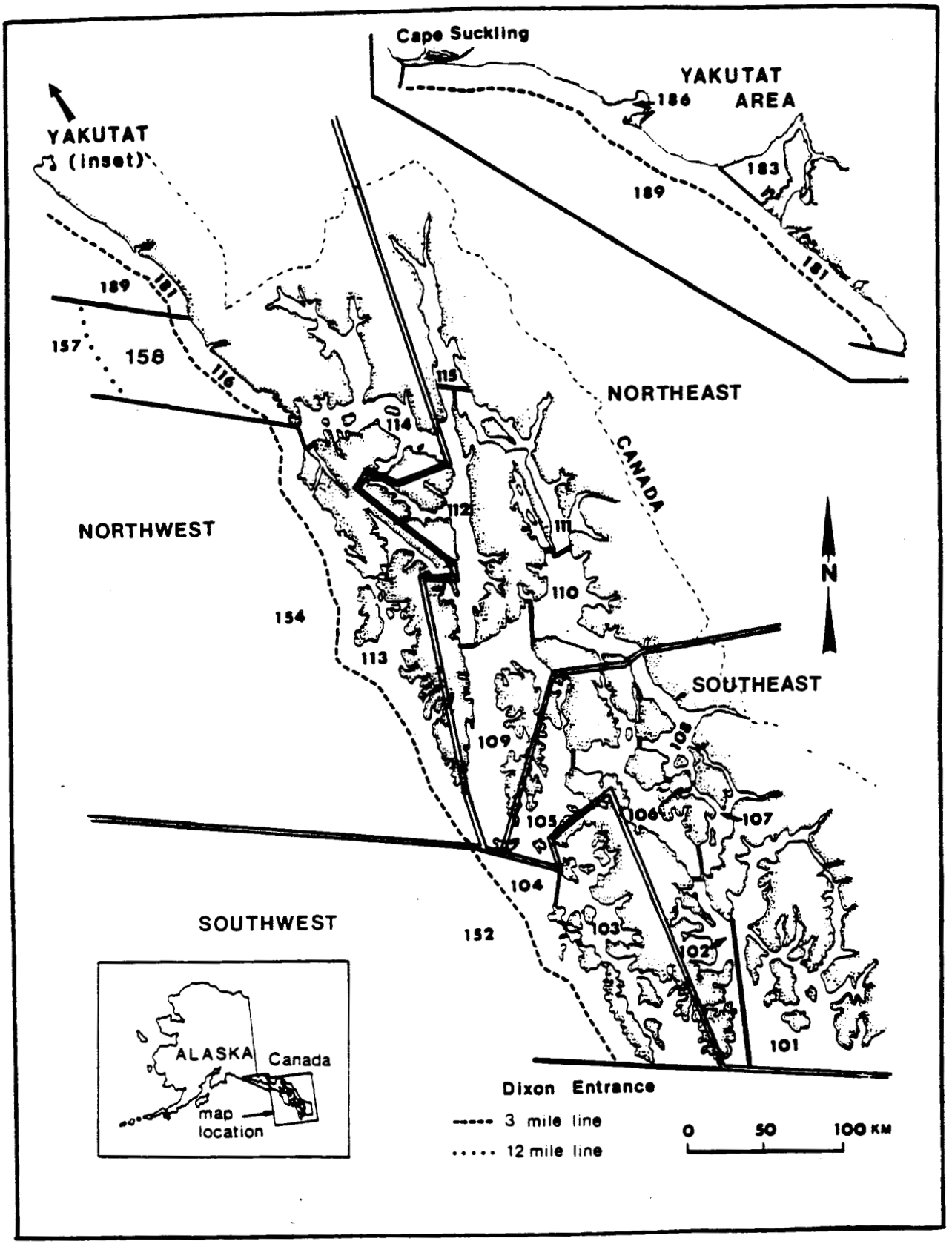

Figure 1. Southeast Alaska commercial fishing districts.

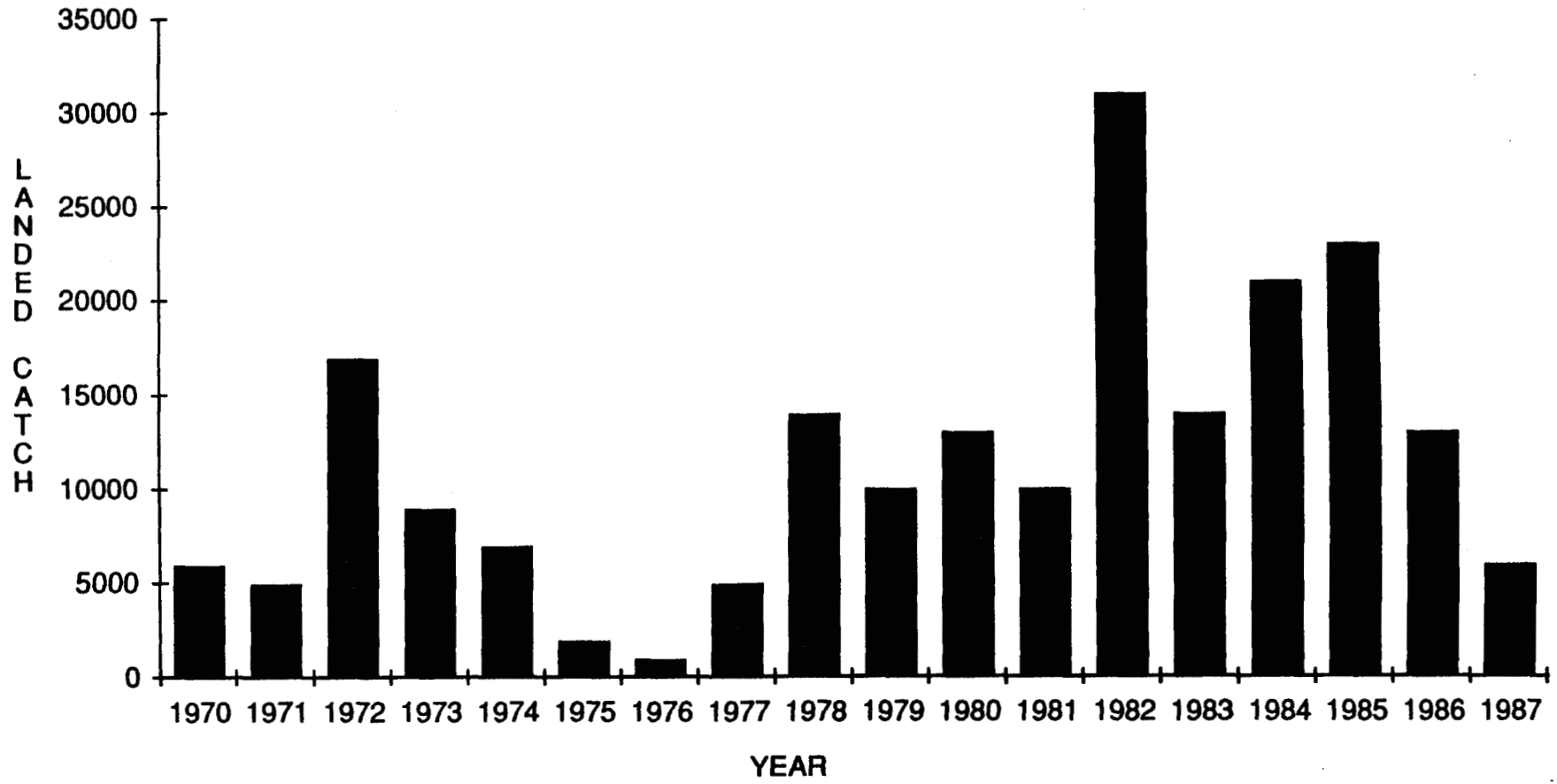

Figure 2. Annual landed catch of chinook salmon by the Southeast Alaska purse seine fishery, 1970 to 1987.

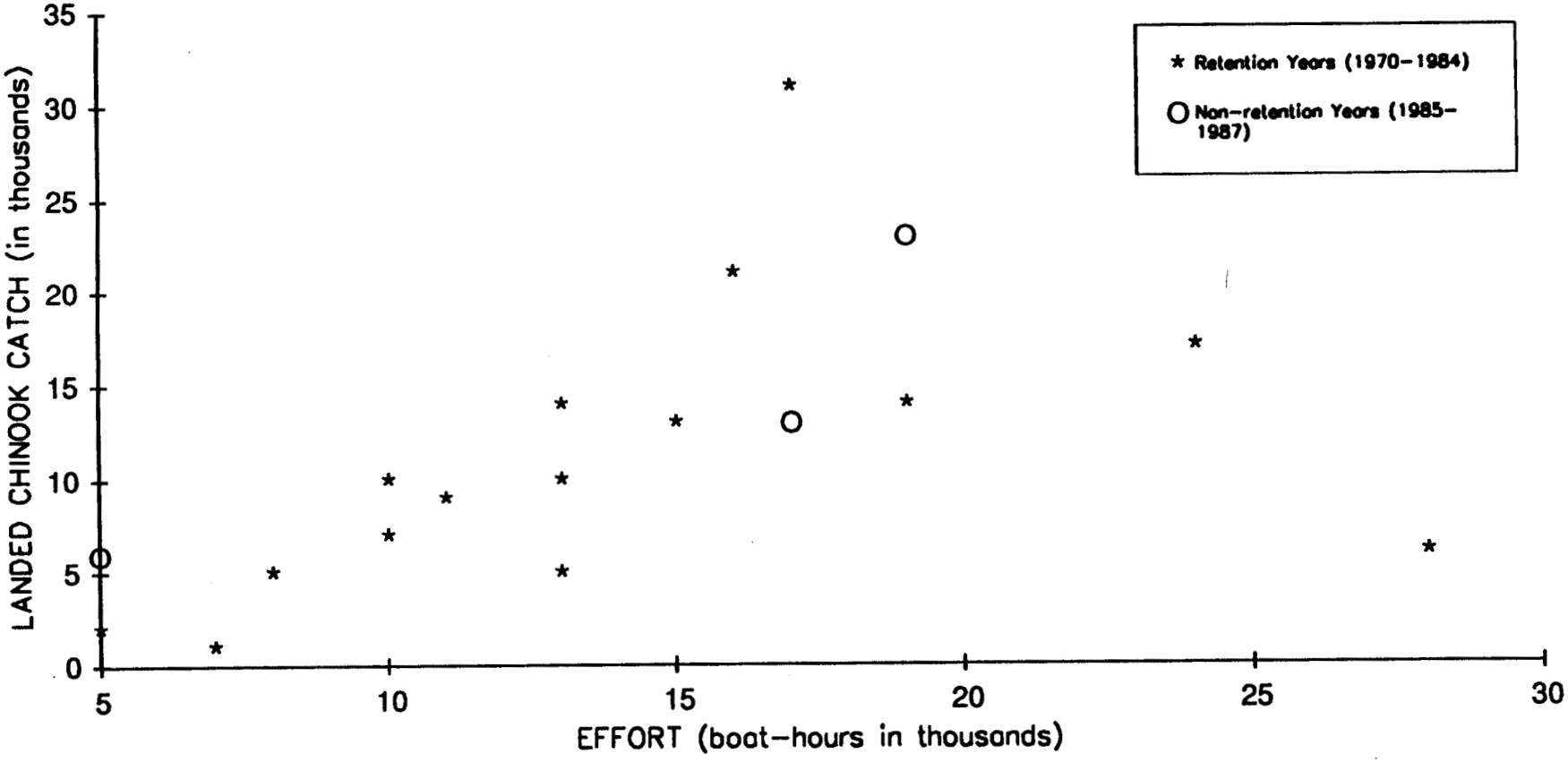

Figure 3. Relationship between number of boat-hours fished and landed catch of chinook salmon by the Southeast Alaska purse seine fishery, 1970 to 1987.

CONFIDENTIAL

Alaska Department of Fish and Game
Incidential Chinook Mortality Assessment
1987 Dockside Sampling Of Purse Seine Landings Data Form

Port: _____ Date sold: _____

Processor: _____ Stat. week: _____

Sampler: _____ Opening Dates: _____

Vessel name: _____ District-subdistrict: _____

ADF&G Number: _____ Tender: Yes No

Seine Net Depth: _____ Fish Ticket Numbers:
(preferably in fathoms) This Delivery: _____
Prior Deliveries: _____

Logbook Participant: Yes No

Catch By Species For This Opening:

	Reported on Fish Ticket	Data[1] Source	Not reported on this Fish Ticket: Sold Earlier	Released Alive	Released Dead	Other[2]	Opening Total
Chinook:							
Small ≤21"	_____	___	_____	_____	_____	_____	_____
Medium ≥21-≤28"				_____	_____	_____	_____
Large ≥28"	_____	___	_____	_____	_____	_____	_____
Chum:	_____	___	_____			_____	_____
Pink:	_____	___	_____			_____	_____
Coho:	_____	___	_____			_____	_____
Sockeye:	_____	___	_____			_____	_____

1 Data Source: Counted (C) or Fish Ticket (FT).
2 Fish not sold, reported as pinks, given away, discarded, etc. (Note disposition of fish in comments.)

Comments:

Figure 4. Purse Seine dockside interview data form, 1987.

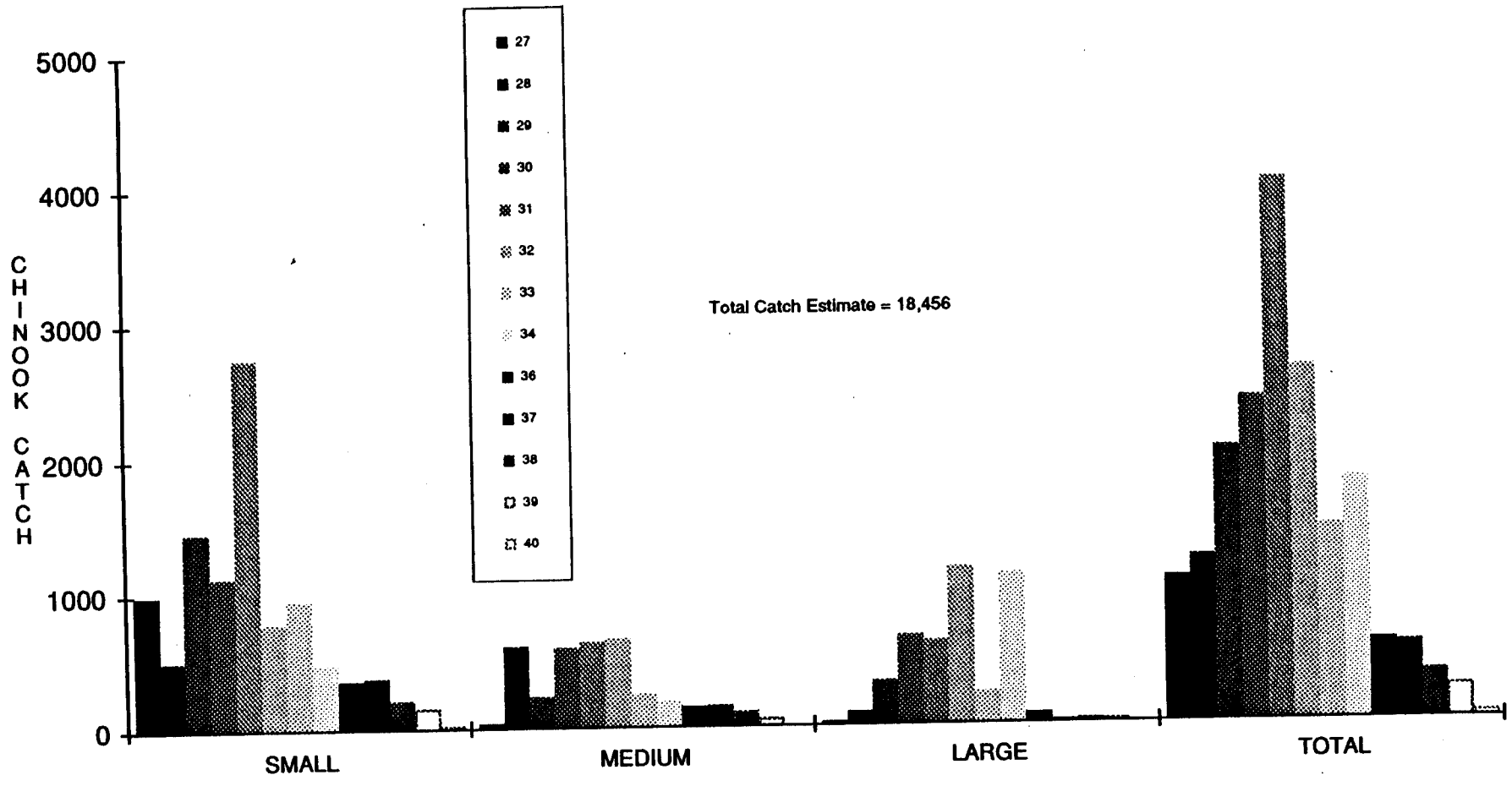

Figure 5. Estimated incidental catch of chinook salmon in the Southeast Alaska purse seine fishery by size class and statistical weeks. Data was collected as part of the dockside interview program, and expanded by boat-hour of effort.

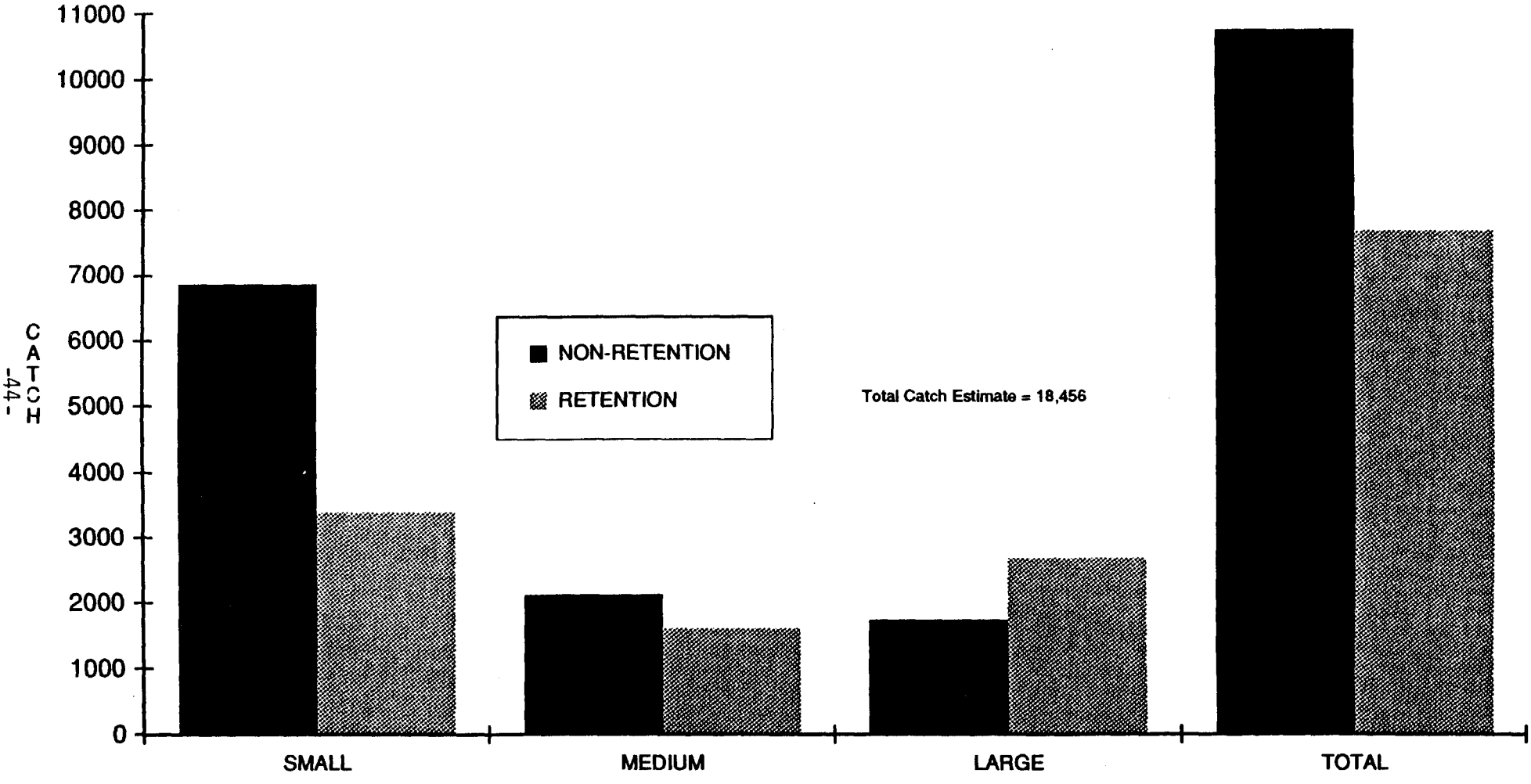

Figure 6. Estimated incidental catch of chinook salmon in the Southeast Alaska purse seine fishery by size class and retention vs. non-retention periods. Data was collected as part of the dockside interview program, and expanded by boat-hour of effort.

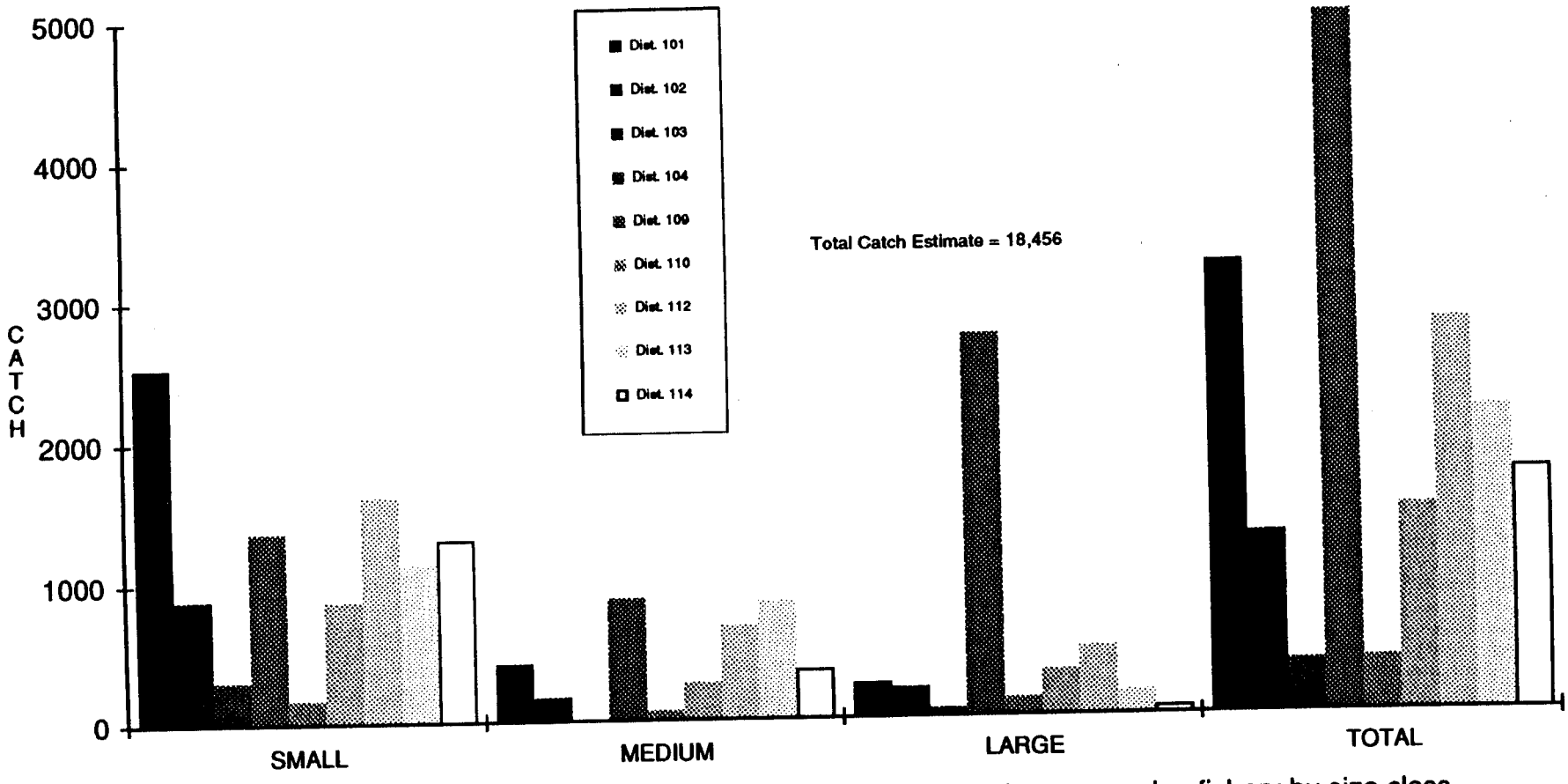

Figure 7. Estimated incidental catch of chinook salmon in the Southeast Alaska purse seine fishery by size class and district. Data was collected as part of the dockside interview program, and expanded by boat-hour of effort.

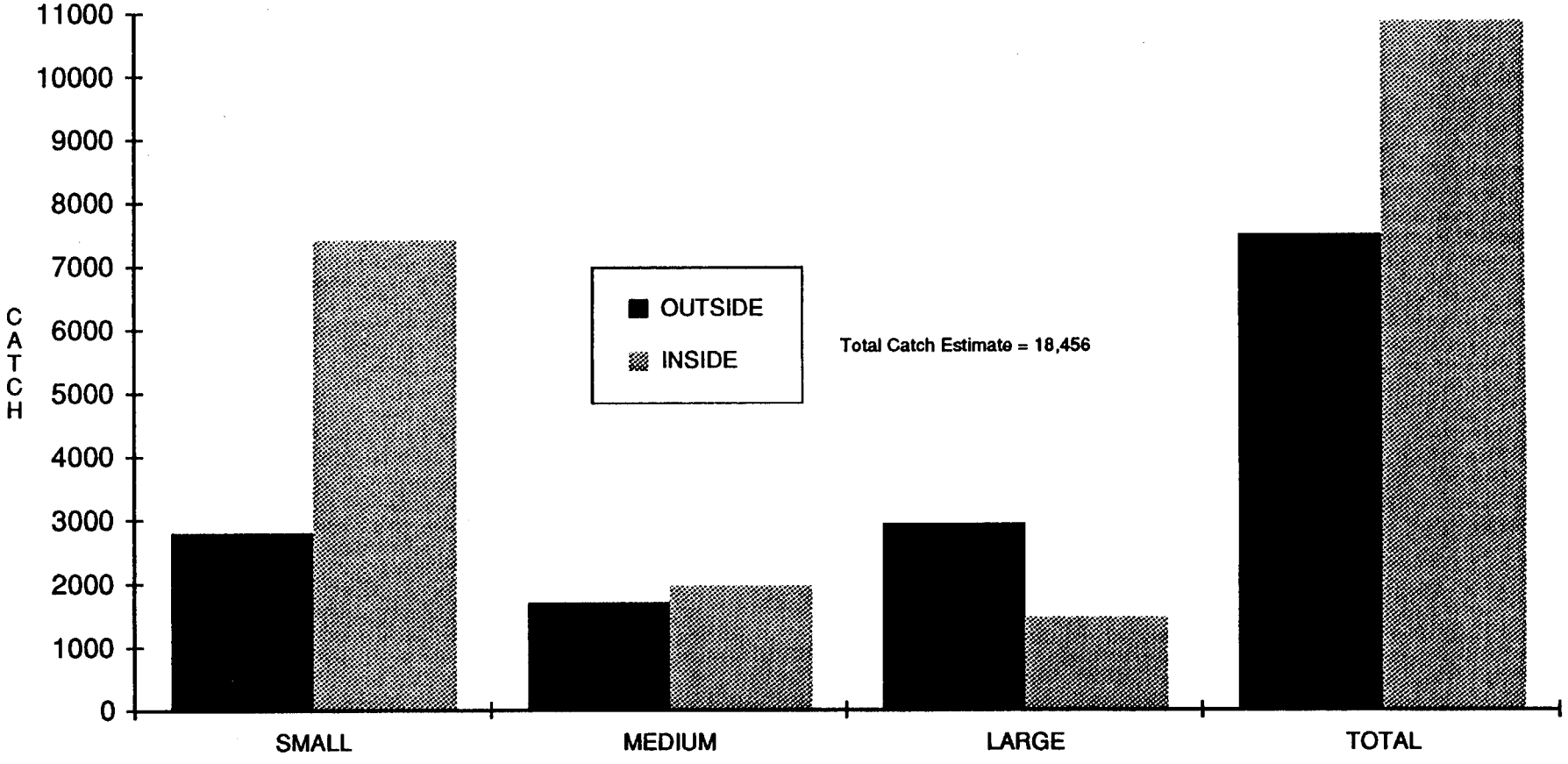

Figure 8. Estimated incidental catch of chinook salmon in the Southeast Alaska purse seine fishery by size class and outside vs. inside districts. Data was collected as part of the dockside interview program, and expanded by boat-hour of effort.

APPENDIX A

Appendix A.1. Number of days fished by district and statistical week for the Southeast Alaska purse seine fishery, 1987.

Stat Week	Fishing Dates	District											Total
		101	102	103	104	105	109	110	111	112	113	114	
Non-Retention Period:													
27	Jun 28									1		1	2
28	Jul 5				1					1	1	1	4
29	Jul 12	1			1			1		1	1		5
30	Jul 19	1			1				1	1	1	1	6
30	Jul 23	1			1					1			3
31	Jul 26-27	1	1		1		2	2		2	2	2	13
Retention Period:													
32	Aug 2-3	2	2		2		2	2		2			12
33	Aug 9-10	2	2		2		2	2		2	2		14
34	Aug 16	closed											0
34	Aug 22			1	1		1			1	1	1	6
36	Aug 30		1	1							1		3
36	Sep 4			1		1	1			1			4
37	Sep 10		2	2							2	1	7
38	Sep 17		1	1							1	1	4
39	Sep 20		1	1							1		3
39	Sep 24		1	1							1	1	4
40	Oct 1		1										1
41	Oct 4		3										3
41-43	Oct 6-23		18										18
Total Days:		8	33	8	10	1	8	7	1	13	14	9	112

Appendix A.2. Number of boat hours fished by district and statistical week for the Southeast Alaska purse seine fishery, 1987.

Stat Week	Fishing Dates	District 101	102	103	104	105	109	110	111	112	113	114	Total
Non-Retention:													
27	Jun 28									15		15	30
28	Jul 5				15					15	15	15	60
29	Jul 12	15			15			15		15	15		75
30	Jul 19	15			15				15	15	15	15	90
30	Jul 23	15			15					15			45
31	Jul 26-27	15	15		15		39	39		39	39	39	240
Retention:													
32	Aug 2-3	39	39		39		39	39		39			234
33	Aug 9-10	39	39		39		39	39		39	39		273
34	Aug 16	closed											0
34	Aug 22			15	15		15			15	15	15	90
36	Aug 30		15	15							15		45
36	Sep 4			15		15	15			15			60
37	Sep 10		36	36							36	12	120
38	Sep 17		12	12							12	12	48
39	Sep 20		12	12							12		36
39	Sep 24		12	12							12	12	48
40	Oct 1		12										12
41	Oct 4		62										62
41-43	Oct 6-23		432										432
Total Boat Hours:		138	686	117	168	15	147	132	15	222	225	135	2000

Appendix A.3. Effort (number of unique boats fished) by district and by statistical week in the Southeast Alaska purse seine fishery, 1987.

Dist	Stat Week	Effort	District Totals	Dist	Stat Week	Effort	District Totals
101	28	3.00		105	36	15.33	15.33
	29	28.50					
	30	58.50		109	31	23.00	
	31	43.00			32	30.00	
	32	37.50			33	28.00	
	33	98.33			34	16.50	
	35	1.00			36	18.50	116.00
	36	5.00					
	37	3.50		110	29	59.50	
	38	3.00			31	101.50	
	39	40.00			32	18.00	
	40	31.00	352.33		33	4.00	183.00
102	28	1.00		111	29	1.00	
	29	0.50			30	7.00	8.00
	31	10.50					
	32	35.50		112	27	83.00	
	33	40.83			28	78.00	
	36	45.33			29	172.33	
	37	47.00			30	194.00	
	38	22.00			31	76.50	
	39	39.00			32	97.50	
	40	17.00			33	39.50	
					34	33.50	774.33
103	34	85.50					
	36	48.33		113	28	1.00	
	37	38.50			29	29.33	
	38	27.50			30	18.50	
	39	11.00	210.83		31	48.00	
					33	5.50	
104	28	64.00			34	15.00	
	29	52.83			36	45.50	
	30	80.50			37	14.00	
	31	60.00			39	2.00	178.83
	32	147.50					
	33	137.83		114	27	26.00	
	34	107.50	650.16		28	100.00	
					30	6.50	
					31	5.50	
					34	26.00	
					37	27.00	
					38	35.50	
					39	29.00	255.50

Appendix A.4. Comparison of Dockside Interview data and Fish Ticket data for evaluation of incidental catch of chinook salmon by the Southeast Alaska purse seine fishery, 1987.

Sample Method	Sample Results		Districts 101	102	103	104	105	109	110	111	112 [a]	112-22	113	114	Totals
Dockside	Landings		23	3	0	45	0	3	22	3	33		12	19	163
Interviews	Boat Hrs. Sampled		345	45	0	855		117	666	45	519		324	285	3,201
	Pink Salmon		59,490	7,926	0	35,799	0	11,401	115,370	11,234	35,034	25,164	43,435	76,049	420,902
	Money Fish		4,215	2,088	0	18,569	0	2,444	6,243	385	3,143	17,608	4,788	4,644	64,127
27 Jun - 1 Aug	Chinook Salmon														
(non-retention)		sm	267	24	0	146	0	19	108	13	83		102	50	812
		med	95	5	0	66	0	5	31	14	33		73	30	352
		lg	30	5	0	149	0	8	39	0	16		15	5	267
		total	392	34	0	361	0	32	178	27	132		190	85	1,431
	Chin/Boat Hr.														
		sm	0.7739	0.5333		0.1708		0.1624	0.1622	0.2889	0.1599		0.3148	0.1754	0.2537
		lg	0.0870	0.1111		0.1743		0.0684	0.0586	0	0.0308		0.0463	0.0175	0.0834
		total	1.1362	0.7556		0.4222		0.2735	0.2673	0.6000	0.2543		0.5864	0.2982	0.4470
Dockside	Landings		11	12	4	26	0	9	7	0	13		0	1	83
Interviews	Boat Hrs. Sampled		429	456	102	918		351	273		435			15	2,979
	Pink Salmon		55,837	36,305	2,516	142,490	0	45,167	38,228	0	23,543	23,020	0	339	367,465
	Money Fish		4,980	4,830	6,351	14,072	0	6,056	2,031	0	2,208	13,507	0	155	54,190
2 Aug - 3 Oct	Chinook Salmon														
(retention)		sm	41	55	5	38	0	1	47	0	3	11	0	0	201
		med	13	11	0	42	0	3	20	0	5	10	0	0	104
		lg	16	15	1	131	0	6	20	0	5	8	0	0	202
		total	70	81	6	211	0	10	87	0	13	29	0	0	507
	Chin/Boat Hr.														
		sm	0.0956	0.1206	0.0490	0.0414		0.0028	0.1722		0.0069			0	0.0675
		lg	0.0373	0.0329	0.0098	0.1427		0.0171	0.0733		0.0115			0	0.0678
		total	0.1632	0.1776	0.0588	0.2298		0.0285	0.3187		0.0299			0	0.1702
Fish	Landings		469	364	338	769	25	134	32	0	321 [b]		127	132	2,711
Tickets	Chinook Salmon	lg	93	133	13	3,520	0	46	40	0	62 [b]		57	6	3,970
		sm	5	25	16	505	2	20	33	0	19 [b]		84	8	731
	# Boat Hours		5,297.37	6,752.82	4,712.40	12,740.37	229.95	2,787.00	858.00	0.00	5,845.50		1,674.00	1,488.00	42,385.41
2 Aug - 3 Oct															
(retention)	Chin/Boat Hr	lg	0.0176	0.0198	0.0028	0.2763	0.0000	0.0165	0.0466		0.0106 [b]		0.0341	0.0040	0.0937
		sm	0.0009	0.0037	0.0034	0.0407	0.0087	0.0072	0.0385		0.0033 [b]		0.0502	0.0054	0.0172

[a] Includes all waters of District 112, except 112-22 (Hidden Falls).
[b] Includes all waters of District 112.