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Chinook Salmon Catch and Mortality Associated with the 1987 Southeast Alaska Purse Seine Fishery

by
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State of Alaska Steve Cowper, Governor

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ABSTRACT

Provisions of the 1985 Pacific Salmon Treaty require that incidental 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 (*Oncorhynchus tshawytscha*) non-retention regulations were implemented in the Southeast Alaska purse seine fishery prior to 1 August. This regulation limited the purse seine sale (landed catch) of large (≥28 in total length) chinook salmon to 11,400 fish (excluding Alaska hatchery addon). Small chinook salmon (≤ 21 in) could be retained and sold at all times. Medium chinook salmon (21-28 in) could be retained for personal use but could not be sold at any time.

Through dockside observations of catch and skipper interviews, the gross chinook salmon catch (all chinook salmon caught, including those landed and sold, retained for personal use, released alive, and discarded) was estimated to be 10,784 fish during the non-retention period and 7,636 fish during the retention period. A separate method of catch enumeration based primarily on sales receipt (fish ticket) data yielded 4,209 fish during the non-retention period and 6,051 fish during the retention period. Dockside data indicated that the gross catch of small and medium chinook salmon was greater (67% and 59%, respectively) during the non-retention period than during the retention period; most large chinook salmon (61%) were taken during the retention period. Because delayed mortality among chinook salmon released alive was not evaluated in this study, mortality rates were assumed to be 70% for all fish released alive; 2,358 (63.8%) small, 447 (12.1%) medium, and 889 (24.1%) were assumed to have died after release. Combined with the estimated catch (derived from dockside data) that were either retained for personal use, discarded, or sold, we estimated a total mortality of 16,837 chinook salmon by the seine fleet in 1987.

KEY WORDS: Chinook salmon, release mortality, purse seine, gross catch, landed catch, personal use, Southeast Alaska

INTRODUCTION

Provisions of the 1985 Pacific Salmon Treaty between the United States of America and Canada (U.S. Senate Treaty Doc. No. 99-2, entered into force, March 18, 1985), hereafter referred to as Pacific Salmon Treaty or Treaty, require that incidental fishing mortalities of chinook salmon (*Oncorhynchus tshawytscha*) be monitored and assessed. Incidental fishing mortality includes all fish that die as a result of fishing that are neither sold nor retained for personal use. The 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 incidental 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. Primary sources of incidental fishing mortality include (1) immediate or delayed mortalities of released sublegal chinook salmon taken in seine, troll, and sport fisheries, (2) gill net dropouts, (3) fish discarded at the dock, and (4) non-reporting of small chinook salmon caught incidentally in seine fisheries and processed as pink salmon. Such mortalities, if large, could affect harvest rate reductions (translated to catch ceilings in some areas) which are necessary to rebuild depressed stocks. Existing sources of incidental 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.

A second concern of the Commission is to better document and understand the coastwide magnitude of incidental fishery mortality on chinook salmon. This concern stems from initial estimates that coastwide incidental fishery mortality may account for a kill of from 50 to 100% of the landed catch (CTC/PSC 1987).

In the Southeast Alaska purse seine fishery, complex regulations involving size restrictions, and retention and non-retention periods of chinook salmon harvest have been instituted by the Alaska Board of Fisheries to conserve chinook salmon stocks. The traditional sales receipt (fish ticket) method of catch enumeration has not been adequate in recent years because fish tickets do not accurately record the *gross catch* of chinook salmon: i.e., all chinook salmon caught by seiners including fish that were released alive, landed, sold, discarded at the dock, and retained for personal use.

The Alaska Department of Fish and Game (ADF&G) began research in 1985 to determine catches and incidental 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 fish tickets were used to estimate the magnitude of the gross catch and the fate of all size classes of chinook salmon taken during the large chinook salmon non-retention period (hereafter referred to as non-retention period). In 1986 onboard observations were combined with a dockside interview program and analysis of fish tickets to estimate the gross catch and incidental mortality of chinook salmon. We used a dockside observation and skipper interview sampling program combined with an analysis of fish tickets to estimate the gross catch and incidental fishing mortality of chinook salmon.

Regulation of the Southeast Alaska purse seine fishery is based primarily on harvesting surplus numbers of pink salmon (*O. gorbuscha*), and to a lesser degree, on surplus numbers of sockeye (*O. nerka*), chum (*O. keta*), and coho (*O. kisutch*) salmon. Annual catches of all species by purse seine since 1970 are shown in Table 1. Incidental catches of chinook salmon occur in the seine fishery throughout Southeast Alaska (Figure 1). In recent years, 52% to 72% of the purse seine chinook salmon catch has occurred in District 104. The amount of fishing effort and chinook abundance influence annual chinook catches. Increased coastwide chinook abundance in response to the rebuilding program and lack of a directed troll fishery in the seine areas have probably been significant factors affecting the seine fishery catches of chinook salmon. Catchability of chinook salmon is not believed to have changed in recent years since no gear changes have been instituted in the seine fleet. Since 1976 the annual chinook salmon landed catch in the purse seine fishery has ranged from 1,400 to 31,400 (Figure 2). During these same years, chinook salmon have accounted for 0.02% to 0.13% 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 have encouraged 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.

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 in measured from tip of snout to fork of tail; from 1971 to 1977 the minimum legal size was reduced to 26 in from tip of snout to tip of tail. In 1978 the minimum legal size was raised to 28 in from tip of snout to tip of tail. From 1979 to 1985, no size limits were in effect. Since 1986, regulations promulgated by the Alaska Board of Fisheries have established three size classes of chinook salmon based on measurements from tip of snout to tip of tail: small fish ($\leq$21 in) could be retained at all times; medium fish (>21 in but <28 in) could be retained for personal uses but could not be sold at any time; and large chinook salmon ($\geq$28 in) could be retained and sold only during periods specified by the ADF&G in an effort to constrain the landed catch to 11,400 fish.

METHODS

1987 Purse Seine Fishery

As in 1986, the Alaska Board of Fisheries directed that the 1987 purse seine catch of large chinook salmon be limited to 11,400; this excludes the Alaskan hatchery addon (defined as an adjustment to the quota based on predicted Alaskan hatchery production). 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. The fishery was closed to the taking of large chinook salmon in all fishing periods prior to 2 August, except in the waters adjacent to the Hidden Falls Hatchery (District 112-22) and in Neets Bay (District 101-90) where non-retention was in effect from 23 July through 1 August (Appendices A.1 to A.3).

Throughout the 1987 season, seine fishermen were encouraged to immediately release chinook salmon smaller than 28 in. However, small chinook salmon could be retained and sold, and medium chinook salmon could be kept for personal use but could not be sold. The regulation to allow retention of small chinook salmon was implemented by the Board of Fisheries to prevent fishermen from being legally liable for those small chinook salmon which were incidentally retained and processed as pink salmon.

Dockside Sampling

To estimate the gross catch of chinook salmon 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 vessel unloading process involved three basic elements. First, all fish sold to the processors as chinook salmon were counted, and the species and size classes were verified by ADF&G personnel. Second, as individual seine boats were off-loaded at the docks and sorted by processor personnel, catches of sockeye, pink, chum, and coho salmon were observed by ADF&G personnel for chinook salmon which had not been correctly sorted. Third, a visual inspection of the vessel deck (from the dock) was made for chinook salmon which were removed onboard by the vessel crew and retained for personal use. The size class (large, medium, or small) was recorded for each chinook salmon observed. During interviews, each skipper was asked if he had previously sold any chinook salmon 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 (e.g., permit numbers, dates, and sales of other species) needed to identify the fish tickets(s) associated with the current fishery opening was recorded to enable a comparison of alternative estimates of catch (Appendix B.1.). Sampling was conducted throughout the season during both non-retention and retention periods.

A total of 246 skippers were interviewed and their catches observed during off-loading on the docks during the 1987 purse seine season; 164 of these dockside samples were conducted during the non-retention period and 82 samples were conducted during the retention period (Appendices C.1, C.2). Throughout the season, interviews were made on 35 landings in District 101, 15 landings in District 102, 4 landings in District 103, 70 landings in District 104, 12 landings in District 109, 29 landings in District 110, 3 landings in District 113, and 20 landings in District 114 (Appendix C.3). A total of 12 tenders were sampled in Districts 104 (5 tenders), 112 (5 tenders), 113 (1 tender), and 112/114 (1 tender) (Appendix C.4).

Catch Estimation By Size Class

Two estimates of catch were made, one utilizing dockside observation and skipper interview data and the second utilizing primarily fish ticket data. Catch estimations were made by size class for both methods, and also by final disposition for the dockside observation/skipper interview method. Fish fell into either one of two categories based on final disposition: (1) chinook salmon released alive from the net or vessel deck, and (2) chinook salmon that were

dead, including dead fish sorted immediately from other species and discarded, fish kept for personal use, fish sold, and fish sorted and discarded at the dock.

Small

Gross catch estimates for small chinook salmon based on dockside observation/skipper interview data 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 to account for possible differences in abundance. Temporal stratification was used because seiners' attitudes may differ regarding the amount of care taken to sort small chinook salmon from pink salmon catches during retention and non-retention periods. Stratification by time also reduced our reliance on the assumption that small chinook salmon abundance was constant through time. Gross catch of small chinook salmon within each seine fishing district by statistical week and final disposition (fish released alive, or dead fish) were transformed into catch per boat hour of effort fished (CPUE). CPUE rates were then expanded over the total number of boat hours of fishing effort reported in each district for each statistical week. In using the CPUE estimate we assumed that fishermen did not target on chinook salmon in any district at any time during the fishing season. This assumption represents the goal of the regulations established by the Board of Fisheries. Another assumption made was that all small fish captured were accounted for by either being sorted out of pink catches on the dock, were observed by ADF&G personnel, or were reported to have been released or discarded by skippers in the interviews.

Fish ticket data from the retention period were used to estimate landed catch of small chinook salmon in two ways: (1) during the retention period, the number of small chinook salmon reported on fish tickets was assumed to equal the landed catch; and (2) for the non-retention period, small chinook salmon were estimated by expanding the retention period rates of small chinook CPUE from fish ticket data over the total effort in the non-retention period, by district. The fish ticket catch estimate assumed that any small fish were sold and reported when they were sorted out of pink catches on the dock during the retention period, and that processor facilities recorded accurate numbers of fish sold as well as accurate weights.

We contrasted the dockside observation/skipper interview based estimate of gross catch with the catch estimate derived from fish tickets. However, catch estimates derived from fish tickets for small chinook salmon account only for landed catches.

Medium

An estimated gross catch of medium chinook salmon was also made using dockside observation/skipper interview data. Again, estimates were stratified by fishing district, statistical week, and final disposition. The assumptions and justifications for temporal and spatial stratification stated above for small chinook salmon applied also to medium fish. We also assumed that medium fish were representatively accounted for in the dockside observation/skipper interview program. Gross catch estimates of medium fish were derived by expanding CPUE

rates from dockside observation/skipper interview data with the total fishing effort in each strata.

Because medium chinook salmon could not be sold throughout the fishing season, there was no record of catch data recorded on fish tickets. An estimate of the gross catch of medium fish was obtained for the retention period by expanding the fish ticket gross catch estimate of large fish during the retention period with ratios of medium to large chinook salmon; ratios were derived from dockside observation/skipper interview estimates of gross catch during the retention period. During the non-retention period, the gross catch of medium fish was derived by expanding the estimated fish ticket gross catch of large chinook salmon from the non-retention period in the same manner, with ratios of medium to large fish by district during the non-retention period from dockside observation/skipper interview data. A comparison of gross catch estimated by both the fish ticket and dockside observation/skipper interview methods was made.

Large

CPUE rates derived from dockside data for large chinook salmon by final disposition were expanded over total fishing effort by district and statistical week to obtain a gross catch estimate. Justifications for temporal and spatial stratification of large chinook salmon are the same as stated above for small and medium chinook salmon. Another assumption was that all large chinook salmon caught during the non-retention period were reported by skippers during the dockside interviews.

An estimate of gross catch of large chinook salmon during the retention period was available from fish ticket data. We assumed that the fish ticket reported landed catch of large chinook salmon during the retention period was the equivalent of gross catch because fishermen were likely to sell the highly valued large chinook salmon whenever possible. During the non-retention period a CPUE estimate of gross catch of large chinook salmon was derived from fish ticket CPUE rates reported during the retention period. Again, we assumed that chinook salmon abundance did not change throughout the season. These CPUE rates were simply expanded by total fishing effort as reported by district and time period during the non-retention period. In deriving catch estimates from fish ticket data, we assumed that only large fish were sold and recorded as large fish (i.e., no medium fish) in the fish ticket system. While we believed fish ticket catch estimates for large chinook salmon were generally accurate, we compared those estimates with gross CPUE estimates derived from the dockside observation/skipper interview data.

Goals of the dockside observation and skipper interview 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 district that was open to fishing, the average rate of chinook salmon per boat-hour was calculated from samples obtained during all other weeks sampled for that district. The estimated catch of each size class of chinook salmon was calculated by multiplying this average rate by the total reported fishing effort in respective districts and statistical weeks. This problem occurred primarily in Districts 102, 103, 109, 113, and 114 (Appendix D.1). Sample variability between districts was high and was 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 or fish more than one district during an opening. Also, total sample effort was related to the total number of boats that fished in a district in a given week (Appendix A.3); the more boats that fished, the more observations and interviews were conducted due to increased availability (Table 2).

Standard deviations associated with the gross catch estimates from dockside observation/skipper interview data were calculated using the binomial formulas:

$$SD = \sqrt{\sum(N_{ij} * q/p)} \quad = \quad \sqrt{\sum V(N_{ij})} \qquad \text{where,}$$

$$N_{ij} = n_{ij}/p \quad , \quad V(N_{ij}) = N_{ij} * q/p \qquad \text{and,}$$

i = size class,

j = final disposition,

n_{ij} = no. of fish caught by sampled boats of size class i and disposition j,

N_{ij} = estimated catch of size class i and disposition j,

p = number of boats sampled / total number of boats fished in a district during a given statistical week,

$q = 1 - p$,

$V(N_{ij})$ = variance of the estimated catch of size class i and disposition j.

In applying these calculations, we assumed that boats were randomly sampled by observers on the docks, and that chinook salmon were randomly caught by fishermen. Variances were calculated for each size class by final disposition of chinook salmon and summed for each statistical week (by district) sampled. In cases where boats were sampled but no chinook salmon were caught, we replaced values of zero with values of one to obtain a variance of that sample. Variances of the total catch per statistical week were then summed over all weeks that were sampled by district. Since samples were not obtained for all weeks (in some districts) that were open to fishing, the summed variances by district were weighted by the total weeks open to fishing. The weighted variances for each district were then summed to provide a variance of the total estimated gross catch of chinook salmon.

Mortality Estimation By Size Class

Mortality of chinook salmon that were released alive was estimated for each size class by district and time period. An assumed mortality of 70% was applied to the estimated number of fish released alive. In a report to the Pacific Salmon Commission (PFC), ADF&G and NMFS (1987) related the paucity of information on mortality of chinook salmon caught and released in the commercial seine fishery. The PFC adopted a wide range of mortality, 50% to 90%, reflecting expected high

levels of delayed mortality. In this study we have selected the median of this range, 70% mortality, for the sole purpose of presenting a point estimate of chinook mortality.

Stratifying the mortality estimates by size class, district, and non-retention and retention periods offered three advantages.

1) Estimates of chinook catch per seine set derived from onboard observer data documented a difference between size classes and injury status of fish released alive. Van Alen and Seibel (1987) reported that injury status of small chinook salmon released alive was 40% uninjured and 60% injured, while that of large chinook salmon released alive was 76% uninjured and 24% injured. Medium chinook salmon released alive were 32% uninjured and 68% injured.

2) Stratification by retention and non-retention periods accounted for changes in mortality as the dynamics of the fishery changed between periods. During large pink salmon runs, it may be difficult to see or extract 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 salmon prior to bringing them on board and to handle the fish quickly and with care. That is, it may be more feasible to release chinook salmon in a healthy condition when fewer fish of other species are being caught.

3) Stratification by district reduced possible sources of error caused from geographical differences in abundance.

RESULTS

1987 Purse Seine Fishery

In 1987, purse seine gear harvested 8.7 million salmon, including 7 million pink salmon, 311 thousand sockeye salmon, and 6 thousand chinook salmon (Table 3). Four million pink salmon were harvested prior to 2 August, when retention of large chinook salmon became legal. Three million pink salmon were harvested during the chinook salmon retention period which lasted from 2 August until the season closure (Table 4).

The total reported fish ticket harvest of large chinook salmon was 4,473 fish (Table 5), including 3,970 (88.7%) fish harvested during the retention period, 63 (1.4%) fish harvested near Neets Bay terminal hatchery area, 178 (4.0%) fish harvested near Hidden Falls Hatchery (District 112-22) prior to instigation of non-retention on 21 July, and 262 (5.9%) fish either illegally sold or misreported by size class and/or district on fish tickets. 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) (Table 5). 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 6).

Dockside Sampling

Non-retention Period

During the chinook salmon non-retention period (28 June to 1 August) a total of 1,432 chinook salmon were observed or accounted for through dockside observations and skipper interviews; these included fish sold, released alive, kept for personal use, and discarded (Appendix C.1). Of the 812 small chinook salmon recorded, 30.8% were released alive, 24.9% were discarded, and 44.3% were kept or sold. Small chinook salmon were mostly caught in Districts 101 (32.9%), 104 (18.0%), 110 (13.3%), and 113 (12.6%). Of the 352 medium chinook salmon recorded, 15.06% were released alive, 35.8% were discarded, and 49.2% were kept (Appendix C.1). Medium chinook salmon were mostly caught in Districts 101 (27.0%), 104 (18.8%), and 113 (20.7%). Of the 268 large chinook salmon recorded, 64.9% were released alive, 15.3% were discarded, and 19.8% were kept (Appendix C.1). The majority (55.6%) of large chinook salmon were caught in District 104.

Retention Period

During the retention period (2 August to 3 October), a total of 539 chinook salmon were observed or accounted for through dockside observations and skipper interviews; these included fish sold, released alive, kept for personal use, and discarded (Appendix C.2). Of the 200 small chinook salmon recorded, 29.5% were released alive, 15.5% were discarded, and 55.0% were kept or sold. Small chinook salmon were mostly caught in Districts 101 (20.5%), 102 (27.5%), 104 (18.5%), and 110 (23.5%). Of the 100 medium chinook salmon recorded, 34.0% were released alive, 10.0% were discarded, and 56.0% were kept (Appendix C.2). Medium chinook salmon were mostly caught in Districts 104 (38.0%) and 110 (20.0%). Of the 239 large chinook salmon recorded, less than 1.0% were released alive, and 99.2% were kept or sold. The majority (70.3%) of large chinook salmon were caught in District 104 (Appendix C.2).

Catch Estimation by Size Class

The total gross catch estimate based on dockside observation and skipper interview data was 18,420 chinook salmon (Table 7, Appendix D.1). The total fish ticket estimated catch was 10,183 chinook salmon (Table 8).

Small

The gross catch estimate derived from dockside data includes an estimated 10,291 (55.9%) small chinook salmon; 67.0% of the estimated catch of small chinook salmon were caught during the non-retention period. Dockside data based CPUE

estimates indicated that small chinook salmon were primarily captured in Districts 101 (24.8%), 112 (15.8%), 104 (13.4%), 114 (12.7%), 113 (11.1); 22.2% were captured in all the other districts (Table 8, Figure 4).

The fish ticket derived estimate of landed catch for small chinook salmon was 1,333 (13.0%). As with the dockside observation/skipper interview estimate, a high percentage (45.0%) of the small chinook salmon were estimated to have been captured during the non-retention portion of the season (Appendix E.1). Based on fish ticket catch estimates small chinook salmon were caught primarily in Districts 104 (54.0%), 110 (16.5%), 113 (16.1%), 112 (5.9%); 7.5% were captured in all the other districts (Appendix E.1).

Medium

The gross catch estimate derived from dockside data includes an estimated 3,632 (19.7%) medium chinook salmon; 58.7% of the estimated catch of medium chinook salmon were caught during the non-retention period (early season). Dockside data based CPUE estimates indicated that medium chinook salmon were primarily captured in Districts 104 (21.2%), 113 (23.3%), 112 (18.6%), 101 (11.6%), 114 (9.8%); 15.5% were captured in all the other districts (Table 8, Figure 4).

The fish ticket derived estimate of gross catch for medium chinook salmon was 2,960 (29.7%); 54.4% of these were estimated to have been captured in the non-retention period (Appendix E.2). Based on fish ticket catch estimates medium chinook salmon were caught primarily in Districts 104 (44.9%), 113 (22.1%), 112 (9.8%), 110 (7.5%), 101 (6.8%); 8.9% were captured in all the other districts (Appendices E.2, E.3).

Large

The gross catch estimate derived from dockside data includes an estimated 4,497 (24.4%) large chinook salmon; 60.7% of these large chinook salmon were encountered during the retention period (late season). Dockside data based CPUE estimates indicated that large chinook salmon were primarily captured in Districts 104 (62.0%), 112 (10.9%), 110 (7.3%); 19.8% were captured in all the other districts (Table 8, Figure 4).

The fish ticket derived estimate of gross catch for large chinook salmon was 5,890 (57.4%); 32.6% of these were estimated to have been captured during the non-retention period (Appendix E.4). Based on fish ticket catch estimates large chinook salmon were caught primarily in Districts 104 (83.5%), 112 (3.5%), 110 (4.5%); 8.4% were caught in all other districts (Table 8, Appendix E.4).

Standard deviations of the dockside data estimates of gross catch of chinook salmon are presented by district (Appendix D.1). The standard deviation of the total catch estimate (18,420 fish) was 652.4, which indicates our sample technique was adequate for catch estimation. When examined by district, the standard deviation was higher in proportion to the estimated catch when there were few weeks sampled in relation to the total weeks fished, or when no fish were reported caught from sampled boats.

Disposition of Estimated Catches

Twenty-nine percent (5,277) of the gross catch of chinook salmon (derived from dockside data) was estimated to have been released alive during the 1987 purse seine season. The remaining portion of the catch (71%) was either discarded, kept for personal use, or sold (Table 7). Of the fish released alive, 3,945 (74.8%) were released during the non-retention period, including 2,521 (63.9%) small fish, 305 (7.7%) medium fish, and 1,119 (28.4%) large fish. During the retention period, 1,332 (25.2%) chinook salmon were released alive, including 846 (63.5%) small chinook salmon, 334 (25.1%) medium fish, and 152 (11.4%) large fish (Table 7).

Mortality Estimation by Size Class

The mortality estimate for all chinook salmon released alive was 3,694 fish (Table 9).This includes 2,358 (63.8%) small, 447 (12.1%) medium, and 889 (24.1%) large chinook salmon. Seventy-five percent (2,763 fish) of this estimated mortality occurred during the non-retention period. The highest mortality levels of small chinook salmon occurred in Districts 114 (33.6%), 101 (31.6%), and 104 (12.4%). For medium and large chinook salmon, the highest mortality levels occurred in District 104 (58.4% and 55.3%, respectively) during the non-retention period. Combined with the estimated catch (derived from dockside data) of fish that were either retained for personal use, discarded, or sold, we estimated a total mortality of 16,837 chinook salmon by the seine fleet in 1987.

DISCUSSION

We recommend caution in applying the findings presented. While dockside sample sizes were limited in some districts and periods, there were other possible sources of error, including (1) not sampling the entire catch of a boat that was observed and interviewed (e.g., if portions of the catch were off-loaded to tenders prior to landing at the dock); (2) fishermen not providing accurate enumeration of fish that were released alive and discarded; (3) failure to report small chinook salmon on fish tickets; (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).

Comparison of Catch Estimates By Size Class

Realizing the uncertainty of the assumptions for these two methods of catch estimation, their inherent differences by definition and method, and the limitations of each data base we do not suggest directly comparing the two data bases to indicate the reliability of either estimator. Table 10 shows there are gross differences in CPUE between the two estimators. When examining the two

catch estimates (18,420 for dockside data and 10,260 for fish ticket data) large differences exist in the estimates by size class and district. The strengths and weaknesses of each estimator were therefore examined.

Small

The dockside data estimated gross catch was 10,291 small chinook salmon, while the fish ticket estimated landed catch was 1,333 fish. The fish ticket estimate does not include small fish released alive or discarded prior to off-loading. The dockside observation/skipper interview estimate includes 3,367 small fish released alive, but small fish discarded or kept were not estimated separately in the analyses from small fish that were sold. We anticipated that the dockside data estimate would be the larger of the two estimates. However, the large discrepancy between the two estimates indicated that several problems existed with the fish ticket data.

(1) Underreporting of small chinook salmon on fish tickets is apparent. Small chinook salmon are frequently not sorted from pink catches and are ultimately sold as pink salmon. This varied between processing facilities and was influenced by the level of expertise of their grading crews.

(2) The number of small fish reported on fish tickets is often determined by applying an average weight of small chinook salmon to the total pounds sold. The average weight figure may vary between weeks and between different processors. In dockside observations, where actual numbers of small chinook salmon were accurately counted as they were off-loaded, a total of 361 small chinook salmon crossed the dock, while only 210 small chinook salmon were reported on fish tickets for the same boats (Appendix C.5). These data indicated that processors consistently underestimated the total number of small chinook salmon landed by either applying inaccurate average weights to the total pounds of small fish sold, or by discarding or giving away some small chinook salmon rather than accepting them for processing.

The dockside data estimate of small chinook salmon caught had a slight downward bias because a number of boats that were interviewed had off-loaded pink salmon catches previously to tenders. This bias included 11 boats that fished in District 101, 43 boats that fished in District 104, 3 boats from District 102, 1 boat from District 103, 1 boat from District 110, 1 boat from District 112, and 14 boats from District 114 (total = 74 boats). These samples were included in the analysis because information on the other size classes of chinook salmon, as well as interview information, were still available. To assess the extent of underestimation, several tender boat catches were sampled from which CPUE rates for small chinook salmon by district and time period were obtained (Appendix C.4). CPUE rates from five tenders sampled from District 104 and 1 tender sampled from District 114 during the non-retention period indicated that an average of five small chinook salmon per boat per fishing day (15-h period) could 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 amounted to an estimated 205 small chinook salmon that were not included in the total gross catch estimate. No tender boat catches were sampled from the other districts or during the retention period (Appendix C.4). Even though we were uncertain of

the total underestimation of small chinook salmon, the available tender boat samples indicated that it was small. We feel the true gross catch estimate of small chinook salmon was closely approximated by the dockside observation/skipper interview estimate. The presently reported fish ticket (landed) catch appeared to be considerably lower than the true landed catch due to underreported sales of small chinook salmon.

Medium

A comparison of the gross catch estimates of medium chinook salmon showed similar results with the two methods used. The dockside skipper interviews offered the only means for obtaining catch information on medium chinook salmon because they could not be sold and no reporting of them was required. The dockside observation/skipper interview estimate yielded 3,632 medium fish, while the fish ticket estimate yielded 2,960 medium fish. The estimate derived from dockside observation/skipper interview data most likely underestimated the true gross catch. Fish could be kept or given away, but some fishermen may have chosen not to disclose such information.

The catch estimate of medium chinook salmon using fish ticket data was also considered to be of limited accuracy. Since no medium fish were reported on fish tickets, the only means to estimate catch with fish ticket data was by combining reported fish ticket catches of large chinook salmon and observed dockside catch ratios of medium to large fish. During both retention and non-retention periods, estimated catches of medium chinook salmon were largest in District 104 (52.8% and 44.9%, respectively). This is attributed to the high catches of large chinook salmon in District 104 rather than a high catch ratio of medium to large fish in this district. Another factor with the fish ticket gross catch estimate was that during the non-retention period the ratios of medium to large chinook salmon (derived from dockside data) in Districts 101 and 113 were high because in each district one skipper reported large incidental catches of medium chinook salmon. That is, possible targeting by one or two boats may have upwardly biased the CPUE rates. These high catches were outliers in the dockside interview data, but it is known that boats will occasionally set on a school of chinook salmon. The assumption was still held that fishermen did not target on areas known to have high densities of chinook salmon, and it was considered inappropriate to exclude such catches from the data base. The percentage of the fleet that periodically obtained high incidental catches of chinook salmon was not determined. Such high catches were dependent upon individual fishing strategies, and district and time of fishing in relation to local abundance and distribution of sublegal chinook salmon. Given that both catch estimates were dependent on the skipper interview data, we considered them to be minimum estimates.

Large

A comparison of the gross catch estimates of large chinook salmon showed similar results between the two methods used. The dockside observation/skip-per interview estimate yielded 4,497 large fish, while the fish ticket estimate yielded 5,890 large fish caught over the entire season. The retention period estimates of large chinook gross catch were similar (2,731 fish from dockside data and 3,970 fish from fish ticket data), while the non-retention period estimates were quite close (1,766 fish from dockside data and 1,920 fish from fish ticket data). We

assumed the retention period fish ticket estimate was the best estimate of gross catch because fishermen generally sell the highly valued large chinook salmon when it is legal to do so. The lower dockside data estimate was subjected to errors in the data such as too few samples obtained in some statistical weeks and/or districts.

Since no large chinook salmon could be legally retained or landed, the dockside data estimate relied completely on the validity of skipper interviews. We were unable to evaluate the validity of skipper interview data in this study.

The fish ticket derived estimate of large chinook catch for non-retention was based on rates of CPUE of large chinook salmon caught during the retention period. This estimator relies on the assumption that large chinook abundance is the same in each district throughout the season. However, abundance between districts was known to vary. Figure 4 showed that large chinook salmon were caught primarily in District 104, while small chinook salmon catches were scattered throughout Southeast Alaska (Districts 101, 102, 103, 105, 109, 110, 112, 113, and 114). When districts were pooled by inside and outside waters in Southeast Alaska, large chinook salmon were predominantly caught in outside waters and small chinook salmon were predominantly caught in inside waters (Figure 5). Also, possible changes in abundance throughout the season were unresolved. Estimated gross catch information from dockside data indicated there were no trends in chinook abundance over time (Figure 6). After early September (statistical week 36), estimated catches of all size classes dropped off as fishing effort shifted from targeting on pink salmon to fall chum salmon runs (Figure 6). Pooling this data by periods of retention and non-retention periods showed that more small chinook salmon were estimated to have been caught early in the season (non-retention period) than later; slightly more large chinook salmon were caught later in the season (retention period) than earlier (Figure 7). Several interacting factors were as follows:

(1) There may have been a lack of reporting of large chinook salmon caught and released and/or kept during the non-retention period. In this case, the non-retention period catch estimate of large chinook salmon would have been biased downward. As stated above, this source of error could not be evaluated.

(2) Small chinook salmon may have been sorted more carefully out of pink salmon catches early in the season when pink catches were low than later in the season when pink catches increase. As pink salmon catches increased, it was more difficult for both fishermen and processing personnel to identify and sort small chinook salmon from pink salmon. Thus, our best means of obtaining a fish ticket based catch estimate of large chinook salmon during the non-retention period was by apportioning retention period CPUE rates to the reported fishing effort by district during non-retention. The factors discussed above may have influenced the validity of our assumptions. If abundance of large chinook salmon does increase later in the season, then our non-retention period fish ticket estimate of catch would be biased upward. If abundance does not change over time, then our non-retention period fish ticket estimate of catch is reliable.

Mortality Estimation By Size Class

The estimates of mortality provides only a possible magnitude of true mortality of chinook salmon released alive from the Southeast Alaska purse seine fishing boats. The delayed mortality level used in this study was based on the assumption that chinook salmon released alive in the purse seine fishery are subjected to very high rates of mortality. It was not in the scope of this study to determine delayed mortality levels, and past research does not provide conclusive results of mortality levels. Research has been hampered because there is no adequate means of determining delayed mortality. On the other hand, fish retained for observation can be subjected to other non-fishing related stresses such as temperature increases, being handled, loss of scales or other injuries, and crowding in tanks.

Thus it is valuable to be able to determine the extent of total catch and incidental fishing mortality imposed on chinook salmon populations given the complex regulations set by the Alaska Board of Fisheries. To date, this mortality has been estimated solely on the basis of reported sales of small and large chinook salmon. This fish ticket method did not account for any incidental fishing mortality associated with non-retention regulations, the apparent underreporting of small chinook salmon in the fish ticket system, the regulation allowing fishermen to keep or give away small and medium chinook salmon, or the regulation allowing small chinook salmon to be sold as pink salmon. The dockside observation and skipper interview program allowed a closer examination of these incidental fishing mortalities. While problems will continue to exist concerning the validity of the interview data, the program allows us to approximate the rates of the various mortalities of chinook salmon incidental to the purse seine fishery. This can be done at a relatively low cost to the department given that other port sampling projects continue to be conducted.

CONCLUSIONS

1. The estimates of catch derived from both fish ticket data and dockside observation/skipper interview data can be useful to managers provided the limitations that were discussed above are taken into consideration.

2. Retention period large chinook salmon CPUE rates (derived from fish ticket data) applied to fishing effort during the non-retention period provided the best estimate of large chinook catch, but the associated assumptions should be considered while interpreting this data.

3. Given the limitations of estimating medium chinook salmon catches, we conclude that both the dockside observation/skipper interview catch estimate and the fish ticket catch estimate may have underestimated the gross catch of medium chinook salmon. The extent of underestimation was not determined. For estimating gross catches of medium chinook salmon dockside observation/skipper interview data is currently the only data source available. Interview data may not always be objective because of political tension between the fishing industry and management.

4. The dockside data estimation method was best used for estimating the gross catch of small chinook salmon. Problems identified with obtaining complete samples should be eliminated from the data base in the future. Only boats that have complete loads from a discrete fishing period should be sampled, and all fish species should be observed during the off-loading process. It is common in some ports for boats to off-load large pink salmon catches to tenders and then bring only "money fish" (chinook, coho, sockeye, and chum salmon) to the docks. If this occurs, it would be preferable to get a rate of the number of pink salmon per small chinook salmon from tender boats. This rate could be obtained by observing the off-loading of at least one tender boat per week per district. Then, for individual seine boats that were sampled at the dock, this rate can be applied to the total number of pink salmon previously off-loaded to tenders to apportion a number of small chinook salmon to that boat's total catch. Boats that have fished in more than one district should not be sampled. Also, we recommend obtaining samples of at least three boats from each district during each statistical week in which fishing is allowed.

LITERATURE CITED

ADF&G, and NMFS. (Alaska Department of Fish and Game and National Marine Fisheries Service). 1987. Incidental fishing induced mortalities of chinook salmon in Southeast Alaska. A Report Prepared for the Pacific Salmon Commission by ADF&G, Division of Commercial Fisheries, Juneau, and NMFS, Auke Bay, Alaska.

CTC/PSC (Chinook Technical Committee, Pacific Salmon Commission). 1987. 1986 Summary Report. Report TCCHINOOK (87) 4.

Van Alen, B. W., and M. Seibel. 1986. Observations on chinook salmon non-retention in the 1985 Southeast Alaska purse seine fishery. *In*, 1985 salmon research conducted in Southeast Alaska by the Alaska Department of Fish and Game in conjunction with the National Marine Fisheries Service Auke Bay Laboratory for joint U.S./Canada interception studies. Final Report, Contract 85-ABC-00142, Juneau, Alaska.

Van Alen, B. W., and M. Seibel. 1987. Observations on chinook salmon non-retention in the 1986 Southeast Alaska purse seine fishery. *In*, 1986 salmon research conducted in Southeast Alaska by the Alaska Department of Fish and Game in conjunction with the National Marine Fisheries Service Auke Bay Laboratory for joint U.S./Canada interception studies. Final Report, Contract NA-87-ABH-00025, Juneau, Alaska.

Table 1. Annual landed salmon catches reported on fish tickets by species in numbers (thousands) and percents in the Southeast Alaska purse seine fishery, 1970-87.

Year	Chinook No.	Chinook Percent	Sockeye No.	Sockeye Percent	Coho No.	Coho Percent	Pink No.	Pink Percent	Chum No.	Chum Percent	Total 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. Total sample effort (boat-hours sampled/total boat-hours fished) completed for the purse seine dockside observation and skipper interview program in Southeast Alaska, 1987. Total boats fished by district and week were obtained from fish ticket data.

District	Non-Retention Period: Percent of Total Boat-Hours Sampled	Retention Period: Percent of Total Boat-Hours Sampled
101	26.88%	8.10%
102	28.57%	7.26%
103	-----	2.16%
104	16.87%	7.09%
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 3. Landed salmon catches reported on fish tickets for the Southeast Alaska purse seine fishery by district, 1987.

	Numbers of Fish					
District	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 4. Landed catch of pink salmon reported on fish tickets in the 1987 Southeast Alaska commercial purse seine fishery by district and week.

Stat Week	Inclusive Dates	Landed Catch by District (number of pink salmon)												
		101	102	103	104	105	109	110	111	112 *	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

* Includes all waters of District 112, except 112-22 (Hidden Falls).

Table 5. Landed catch of large (>28 in) chinook salmon reported on fish tickets in the 1987 Southeast Alaska commercial purse seine fishery by district and week.

Stat Week	Catch by District (numbers of chinook salmon)												Totals
	101	102	103	104	105	109	110	111	112 [a]	112-22	113	114	
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 6. Landed catch of small (<21 in) chinook salmon reported on fish tickets in the 1987 Southeast Alaska commercial purse seine fishery by district and week.

	Catch by District (numbers of chinook salmon)												
Week	101	102	103	104	105	109	110	111	112 [a]	112-22	113	114	Totals
Non-Retention:													
26													
27										38		5	43
28				1					11	97		41	150
29				6			124	22	11	39	4		206
30	153			29				11	10	119	14		336
31				6		100	86		3	6	134		335
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				41
34				23		11			2			4	40
35													0
36		17	13		2	1					84		117
37		8	3									4	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 7. Summary of estimated gross catches of chinook salmon in the 1987 Southeast Alaska purse seine fishery based on catch per unit of effort data collected as part of the dockside observation/skipper interview program.

Dist	Period	Disposition[a]	Estimated Chinook Salmon Gross 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	619	1,182
		Dead	296	202	244	742
	Retention	Released Alive	33	139	0	172
		Dead	670	251	1,925	2,846
	Total	Released Alive	418	317	619	1,354
		Dead	966	453	2,169	3,588
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 7. (p 2 of 2).

Dist	Period	Disposition	Estimated Chinook Salmon Gross Catch Sm	Med	Lg	Total
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	1,119	3,945
		Dead	4,364	1,828	647	6,839
	Retention	Released Alive	846	334	152	1,332
		Dead	2,560	1,165	2,579	6,304
	All Season	Released Alive	3,367	639	1,271	5,277
		Dead	6,924	2,993	3,226	13,143
Grand Totals:			10,291	3,632	4,497	18,420

[a] Dead includes all fish in the gross catch that were not released alive (i.e., landed catch, discarded fish, and fish retained for personal use).

Table 8. Comparison of catch estimates of chinook salmon caught in the 1987 Southeast Alaska purse seine fishery.

ALL SEASON:

	Estimated Gross Catch of Chinook Salmon (derived from Dockside Data)				Estimated Catch of Chinook Salmon (derived from Fish Ticket Data)			
District	Sm	Med	Lg	Total	Sm [a]	Med [b]	Lg [b]	Total
101	2,548	422	253	3,223	7	201	135	343
102	896	180	216	1,292	26	113	137	276
103	314	0	63	377	16	0	13	29
104	1,384	770	2,788	4,942	720	1,329	4,920	6,969
105				0	2	0	0	2
109	178	77	132	387	26	34	61	121
110	873	272	326	1,471	220	223	266	709
111	30	32	2	64	3	24	4	31
112	1,619	675	489	2,783	78	290	208	576
113	1,141	847	170	2,158	215	654	131	1,077
114	1,308	357	58	1,723	20	92	15	127
Totals	10,291	3,632	4,497	18,420	1,333	2,960	5,890	10,183

NON-RETENTION PERIOD:

District	Sm	Med	Lg	Total	Sm [c]	Med [d]	Lg [e]	Total
101	2,090	301	99	2,490	2	128	42	172
102	84	18	18	120	1	4	4	9
103								0
104	681	380	863	1,924	201	616	1,400	2,217
105								0
109	145	38	61	244	6	9	15	30
110	767	228	284	1,279	187	181	226	594
111	30	32	2	64	3	24	4	31
112	1,416	459	313	2,188	59	214	146	419
113	625	476	93	1,194	131	379	74	584
114	1,047	201	33	1,281	12	55	9	76
Totals	6,885	2,133	1,766	10,784	602	1,687	1,920	4,132

-continued-

Table 8. (p 2 of 2).

RETENTION PERIOD:

District	Estimated Gross Catch of Chinook Salmon (derived from Dockside Data)				Estimated Catch of Chinook Salmon (derived from Fish Ticket Data)			
	Sm	Med	Lg	Total	Sm [f]	Med [g]	Lg [h]	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	703	390	1,925	3,018	519	713	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	3,406	1,499	2,731	7,636	731	1,350	3,970	6,051

[a] Estimated catch of small chinook salmon derived from fish ticket data represents landed catch rather than gross catch.

[b] Estimated catches of medium and large chinook salmon derived from fish ticket data represent gross catches.

[c] Estimated landed catch of small chinook salmon in the non-retention period was calculated with the rates of small chinook per boat-hr from fish ticket data during the retention period and total fishing effort reported during the non-retention period (see Table 15).

[d] Estimated gross catch of medium chinook salmon for the non-retention period was calculated with the rates of estimated gross catches of medium to large chinook salmon derived from dockside observation/skipper interview data and multiplied by the estimated gross catch of large chinook salmon derived from fish ticket data (see Tables 12 and 16).

[e] Estimated gross catch of large chinook salmon in the non-retention period was calculated with the rates of large chinook salmon per boat-hr derived from fish ticket data during the retention period and total fishing effort reported during the non-retention period (see Table 18).

[f] Landed catch reported on fish tickets.

[g] Estimated gross catch of medium chinook salmon for the retention period was calculated using the rates of estimated gross catches of medium to large chinook salmon derived from the dockside observation/skipper interview data during the retention period, and multiplied by the gross catch of large chinook salmon reported on fish tickets during the retention period (see Table 17).

[h] Landed catch of large chinook salmon reported on fish tickets during the retention period was assumed to equal gross catch.

Table 9. Estimated catch and mortality of chinook salmon that were released alive (by size class, district, and time period) in the 1987 Southeast Alaska purse seine fishery.

Dist	Estimated No. Small Chinook Released Alive [a]	Est. Mortality Small Chinook Released Alive [b]	Estimated No. Medium Chinook Released Alive [a]	Est. Mortality Medium Chinook Released Alive [b]	Estimated No. 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	5
103	0	0	0	0	0	0
104	385	270	178	125	619	433
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	1,119	783
Retention period:						
101	161	113	70	49	0	0
102	374	262	70	49	7	5
103	0	0	0	0	63	44
104	33	23	139	97	0	0
105	0	0	0	0	0	0
109	2	1	0	0	9	6
110	60	42	6	4	0	0
111	0	0	0	0	0	0
112	33	23	33	23	16	11
113	0	0	6	4	36	25
114	183	128	10	7	21	15
Total:	846	592	334	233	152	106
Total Mortality: (all size classes)		3,694				

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

Table 10. Evaluation of dockside observation/skipper interview data and fish ticket data for gross catch per unit of effort of small and large chinook salmon by the 1987 Southeast Alaska purse seine fishery.

Sample Method	Sample Results		Districts 101	102	103	104	105	109	110	111	112 [a]	112-22	113	114	Totals
Dockside Observations and Interviews 27 Jun - 1 Aug (non-retention)	Landings		23	3	0	45	0	3	22	3	33		12	19	163
	Boat Hrs. Sampled		345	45	0	855		117	666	45	519		324	285	3,201
	Chinook Salmon (gross catch):														
		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 Observations and Interviews 2 Aug - 3 Oct (retention)	Landings		11	12	4	25	0	9	7	0	13		0	1	82
	Boat Hrs. Sampled		429	456	102	903		351	273		435			15	2,964
	Chinook Salmon (gross catch):														
		sm	41	55	5	37	0	1	47	0	3	11	0	0	200
		med	13	11	0	38	0	3	20	0	5	10	0	0	100
		lg	16	15	1	168	0	6	20	0	5	8	0	0	239
		total	70	81	6	243	0	10	87	0	13	29	0	0	539
	Chin/Boat Hr.														
		sm	0.0956	0.1206	0.0490	0.0410		0.0028	0.1722		0.0069			0	0.0675
		lg	0.0373	0.0329	0.0098	0.1860		0.0171	0.0733		0.0115			0	0.0806
		total	0.1632	0.1776	0.0588	0.2691		0.0285	0.3187		0.0299			0	0.1818
Fish Tickets	Landings		469	364	338	769	25	134	32	0	321 [b]		127	132	2,711
	Chinook Salmon (landed catch):														
		sm	5	25	16	505	2	20	33	0	19 [b]		84	8	731
		lg	93	133	13	3,520	0	46	40	0	62 [b]		57	6	3,970
	# Boat Hours		5,297.37	6,284.82	4,712.40	12,740.37	229.95	2,787.00	858.00	0.00	5,845.50 [b]		2,004.00	1,488.00	42,247.41
2 Aug - 3 Oct (retention)	Chin/Boat Hr	sm	0.0009	0.0040	0.0034	0.0407	0.0087	0.0072	0.0385		0.0033 [b]		0.0419	0.0054	0.0173
		lg	0.0176	0.0212	0.0028	0.2763	0.0000	0.0165	0.0466		0.0106 [b]		0.0284	0.0040	0.0940

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

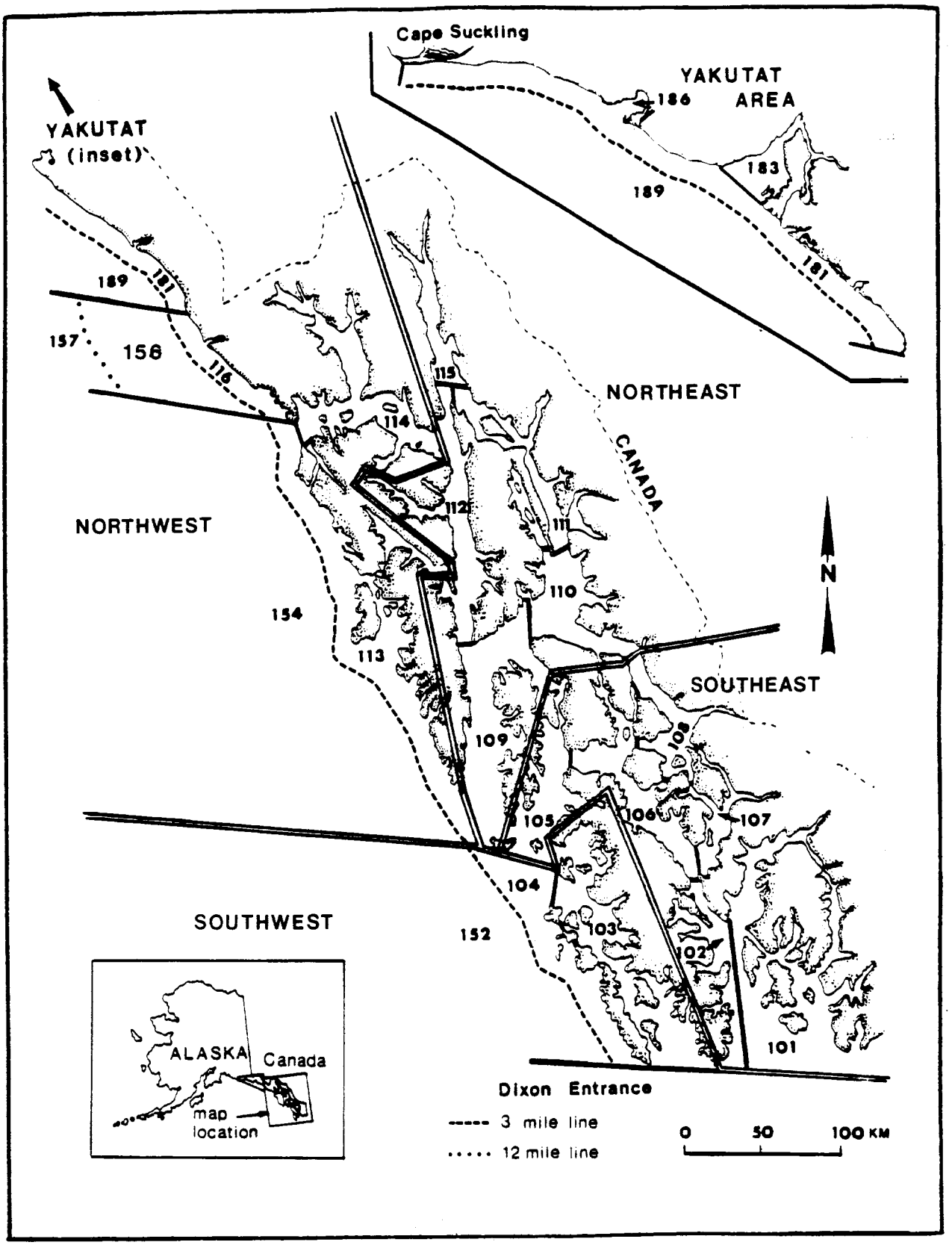

Figure 1. Southeast Alaska commercial fishing districts.

file: graph2

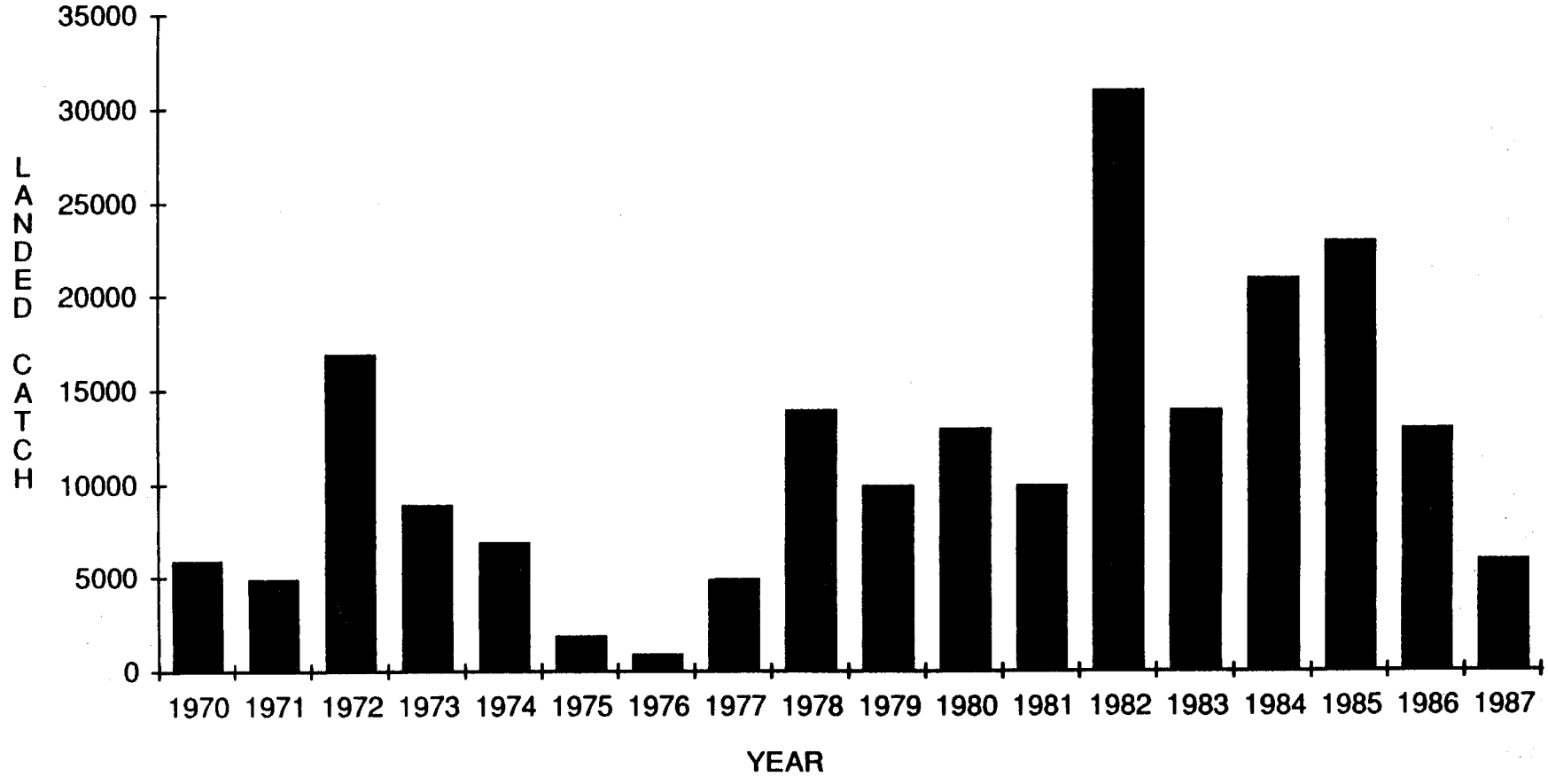

Figure 2. Annual landed catch of chinook salmon by the Southeast Alaska purse seine fishery, 1970 to 1987.

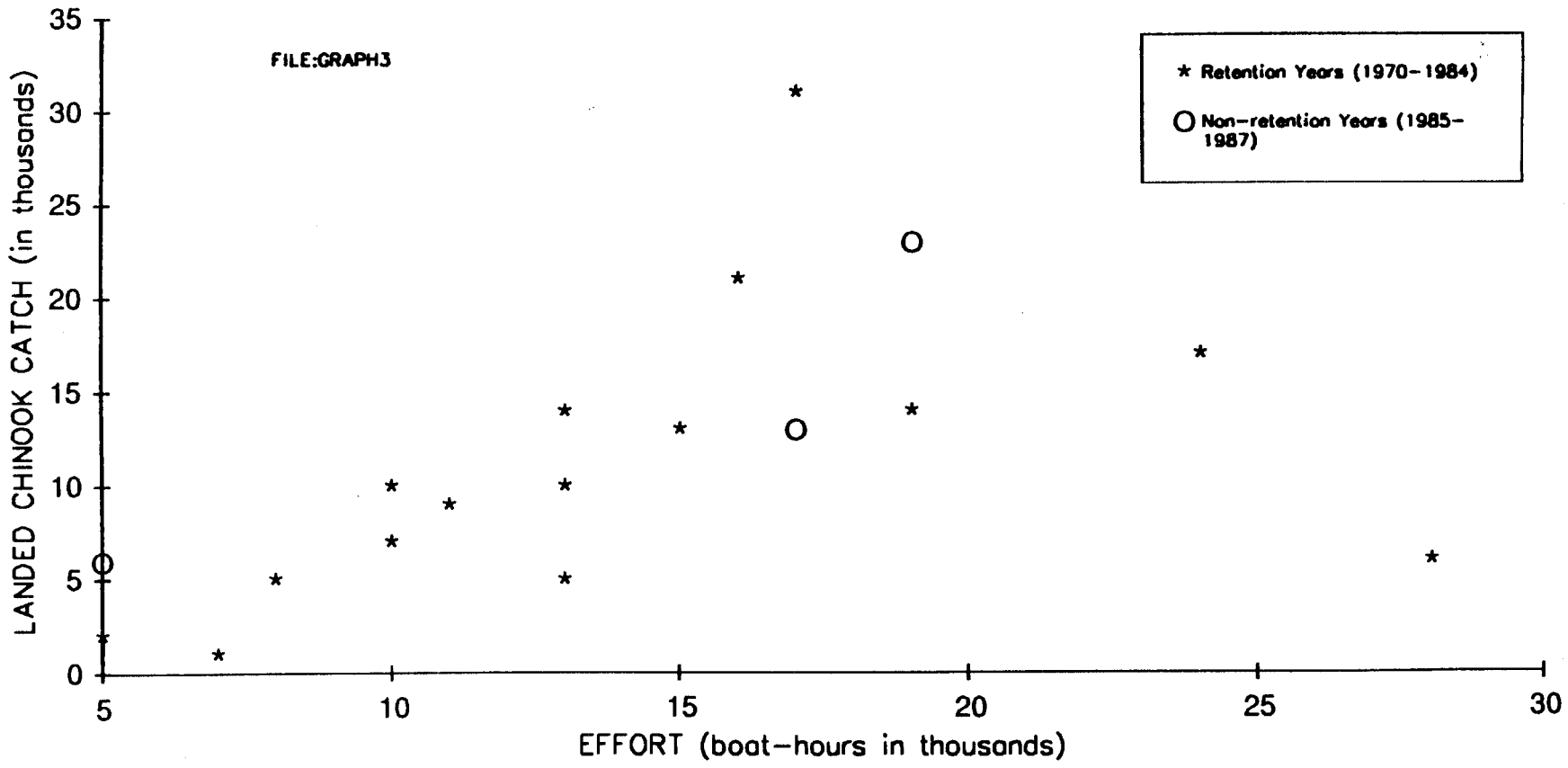

Figure 3. Relationship between number of boat-hours fished and landed catch of chinook salmon by the Southeast Alaska purse seine fishery, 1970 to 1987.

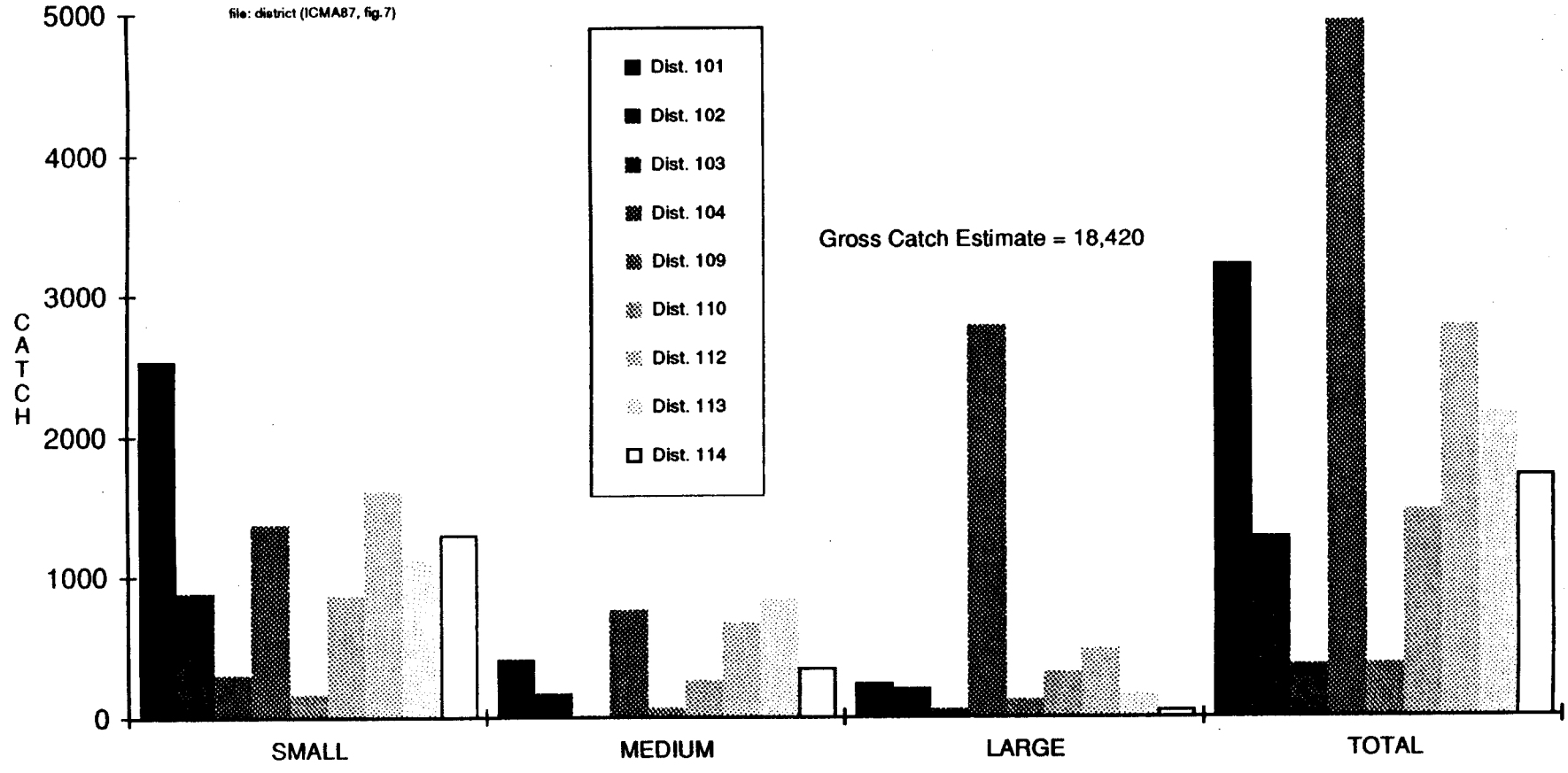

Figure 4. Estimated gross catch of chinook salmon in the 1987 Southeast Alaska purse seine fishery by size class and district. Data was collected as part of the dockside observation/skipper interview program, and expanded by boat-hour of effort.

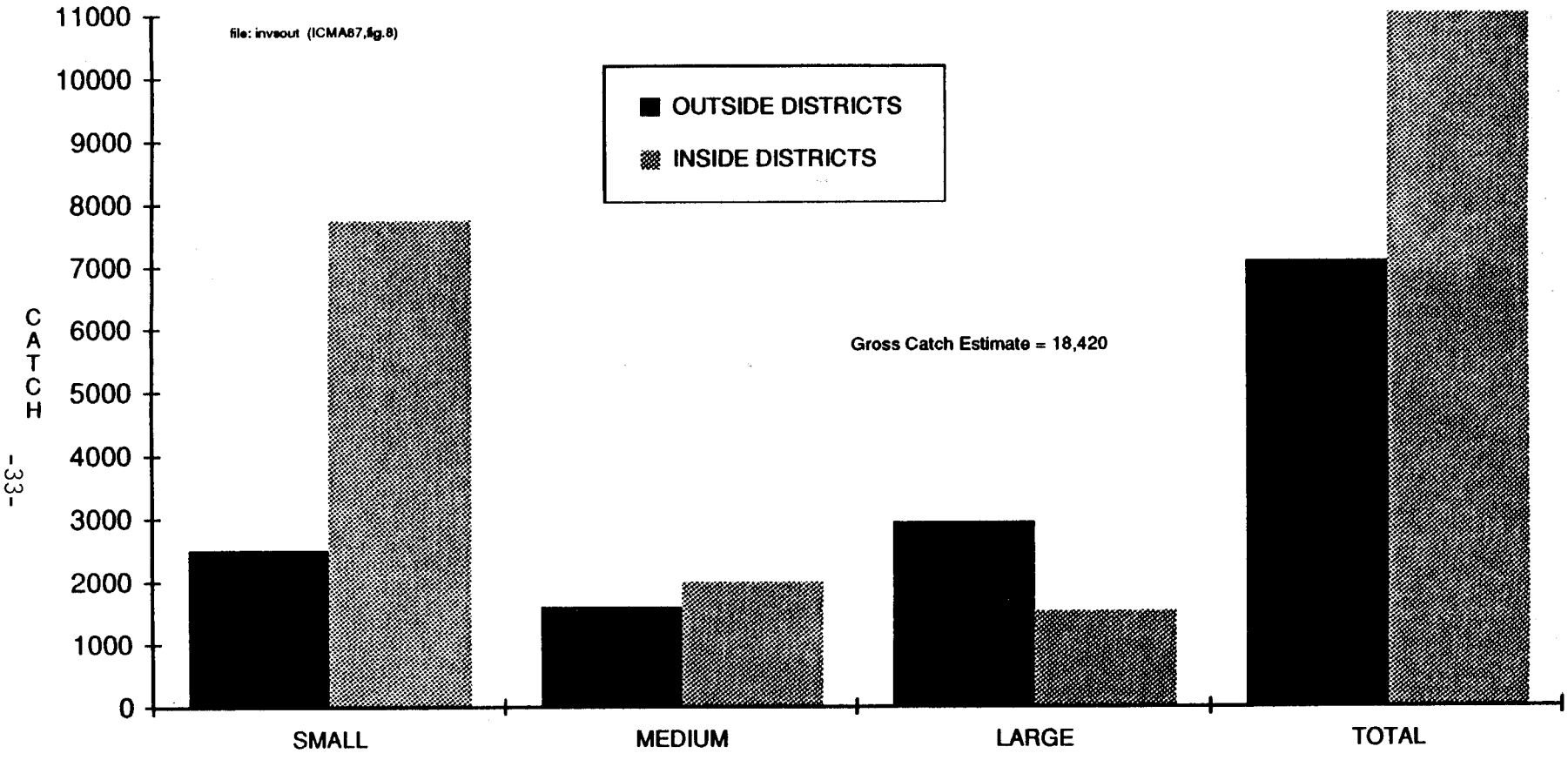

Figure 5. Estimated gross catch of chinook salmon in the 1987 Southeast Alaska purse seine fishery by size class and outside and inside districts. Data was collected as part of the dockside observation/skipper interview program, and expanded by boat-hour of effort.

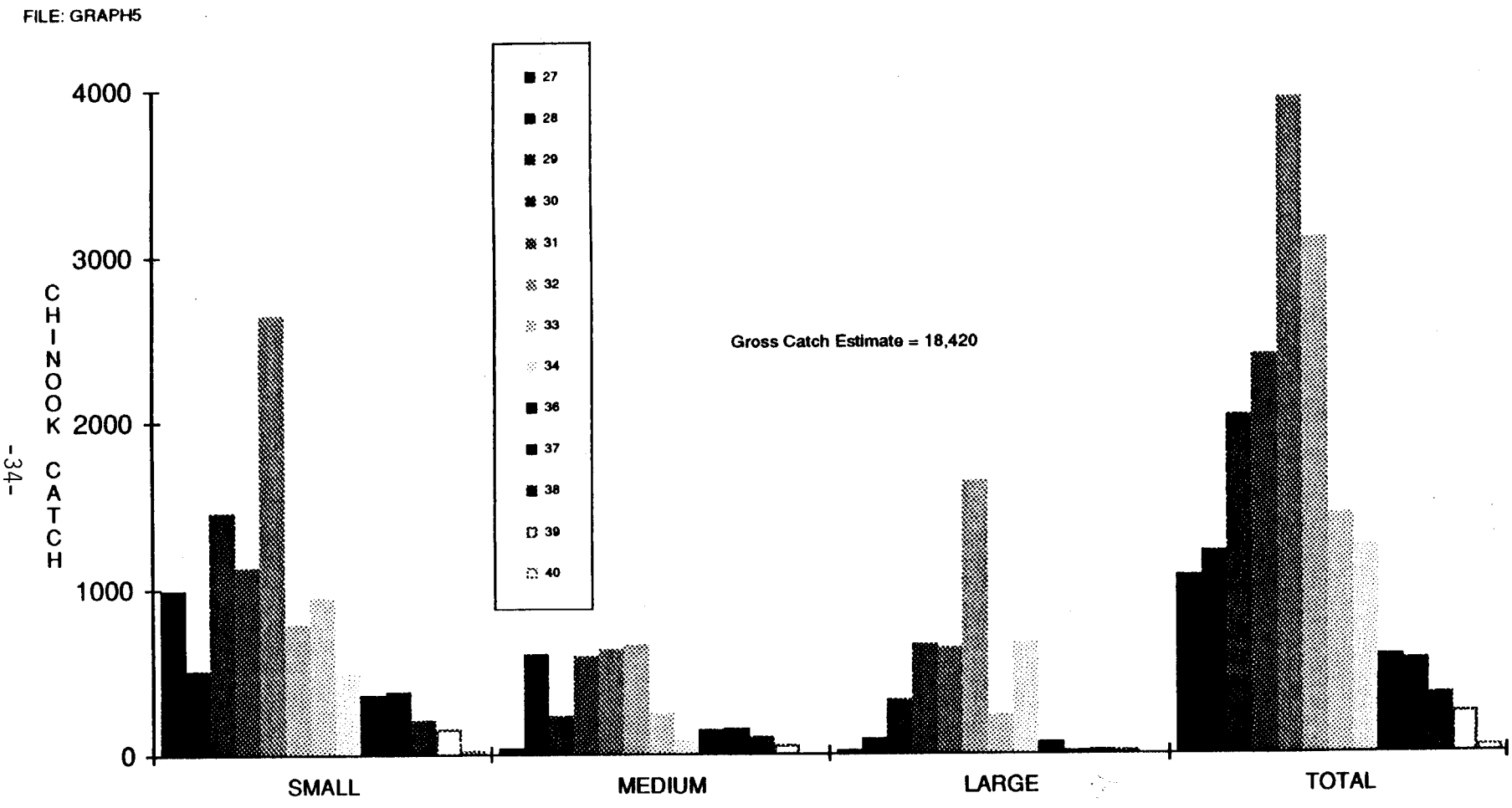

Figure 6. Estimated gross catch of chinook salmon in the 1987 Southeast Alaska purse seine fishery by size class and statistical weeks. Data was collected as part of the dockside observation/skipper interview program, and expanded by boat-hour of effort.

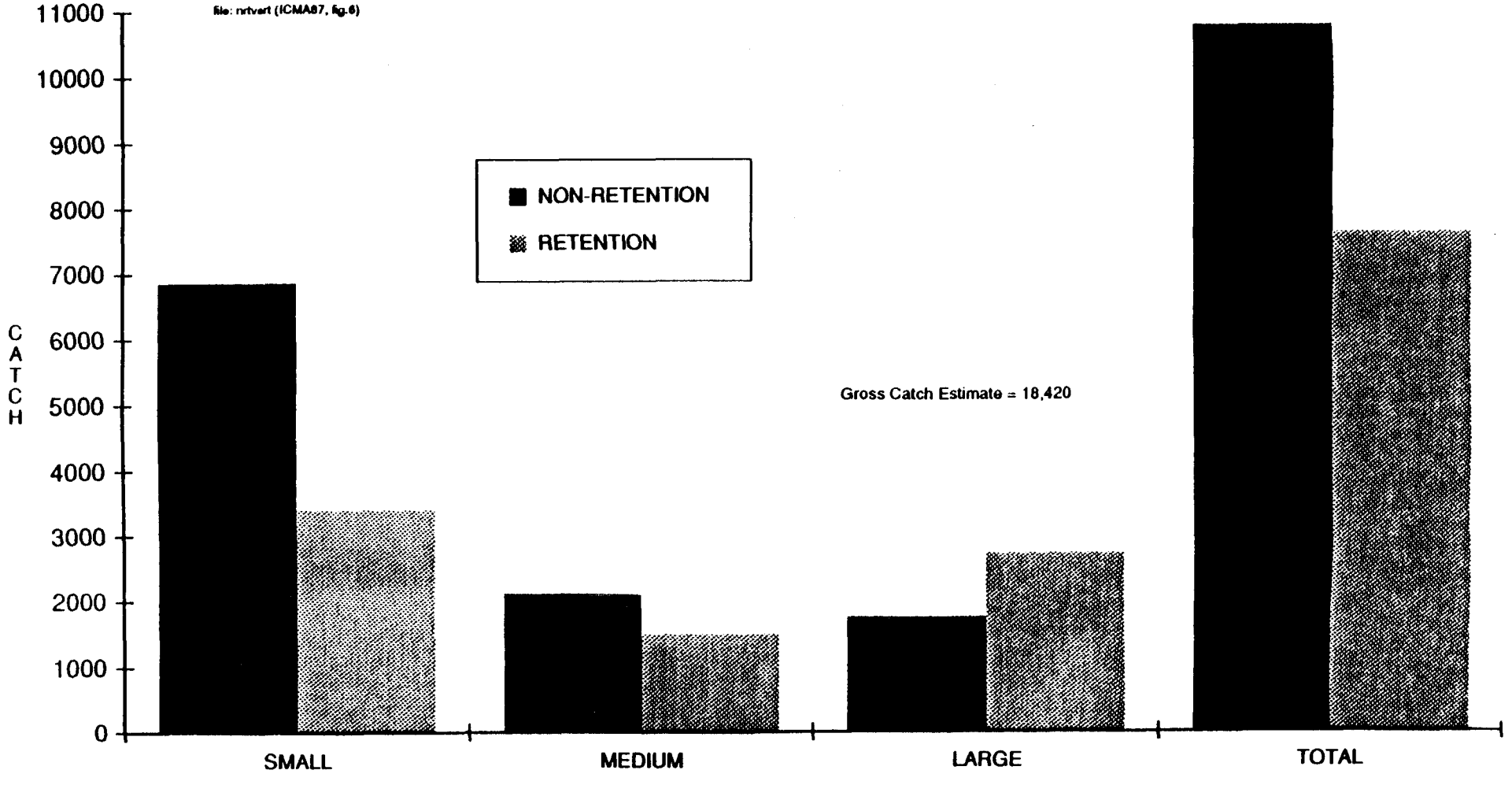

Figure 7. Estimated gross catch of chinook salmon in the 1987 Southeast Alaska purse seine fishery by size class and retention and non-retention periods. Data was collected as part of the dockside observation/skipper interview program, and expanded by boat-hour of effort.

APPENDICES

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 101	102	103	104	105	109	110	111	112	113	114	Total
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	2,000

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

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: _____
(preferably in fathoms)

Fish Ticket Numbers:
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:

Appendix B.1. Purse seine dockside observation/skipper interview data form.

Appendix C.1. Summary of dockside observation and skipper interview data collected during the large chinook salmon non-retention period (5 July to 1 August) of the 1987 Southeast Alaska purse seine fishery.

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
Gross Catch and Percent of Total Catch by Participating Vessels[b]:												
Chum Salmon: No.	1,445	277	0	2,444	2,180	4,791	261	2,607	17,152	3,757	4,002	38,916
	2.25%	2.76%		4.47%	15.71%	3.93%	2.24%	6.82%	40.04%	7.76%	4.95%	8.00%
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
	92.81%	78.88%		65.41%	82.16%	94.73%	96.45%	91.60%	58.75%	89.72%	94.15%	86.52%
Coho Salmon: No.	511	499	0	4,226	86	387	32	108	162	390	223	6,624
	0.80%	4.97%		7.72%	0.62%	0.32%	0.27%	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
	3.52%	13.06%		21.74%	1.28%	0.87%	0.79%	1.12%	0.69%	1.32%	0.52%	3.82%
Chinook Salmon: No.	392	34	0	361	32	178	28	71	61	190	85	1,432
	0.61%	0.34%		0.66%	0.23%	0.15%	0.24%	0.19%	0.14%	0.39%	0.11%	0.29%
Gross Catch: No.	64,097	10,048	0	54,729	13,877	121,791	11,647	38,248	42,833	48,413	80,778	486,461
Gross 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%
Discarded												
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).
[b] Chum, pink, sockeye, and coho salmon catches reported as landed on fish tickets were assumed equivalent to gross catch. Chinook salmon gross catches were obtained from dockside observation and skipper interviews and include all size classes and dispositions.

Appendix C.2. Summary of dockside observation and skipper interview data collected during the large chinook salmon retention period, (2 August to 3 October) of the 1987 Southeast Alaska purse seine fishery.

District:	101	102	103	104	109	110	111	112 [a]	112-22	113	114	Totals
No. Landings Sampled:	11	12	4	25	9	7	0	6	7	0	1	82
Gross Catch and Percent of Total Catch by Participating Vessels[b]:												
Chum Salmon: No.	1,716	2,466	5,519	4,200	5,293	1,059	0	1,478	13,108	0	109	34,948
	2.82%	5.98%	62.20%	2.72%	10.33%	2.62%		5.74%	35.86%		22.06%	8.32%
Pink Salmon: No.	55,837	36,305	2,516	140,539	45,187	38,228	0	23,543	23,020	0	339	365,514
	91.71%	88.08%	28.36%	90.90%	88.16%	94.75%		91.38%	62.97%		68.62%	87.03%
Coho Salmon: No.	610	894	814	2,138	284	363	0	298	180	0	12	4,779
	1.00%	2.17%	9.17%	1.38%	0.55%	0.90%		1.16%	0.49%		2.43%	1.14%
Sockeye Salmon: No.	2,654	1,470	18	7,494	479	609	0	432	219	0	34	13,409
	4.36%	3.57%	0.20%	4.85%	0.93%	1.51%		1.68%	0.60%		6.88%	3.19%
Chinook Salmon: No.	70	81	6	243	10	87	0	13	29	0	0	539
	0.11%	0.20%	0.07%	0.16%	0.02%	0.22%		0.05%	0.08%		0.00%	0.13%
Gross Catch: No.	60,887	41,216	8,873	154,614	51,253	40,346	0	25,764	36,556	0	494	420,003
Gross 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%	10.81%	0.00%	23.40%		0.00%	18.18%			29.50%
Medium: No.	7	5	0	17	0	3	0	2	0	0	0	34
	53.85%	45.45%		44.74%	0.00%	15.00%		40.00%	0.00%			34.00%
Large: No.	0	0	1	0	0	0	0	0	1	0	0	2
	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%		0.00%	12.50%			0.84%
Discarded												
Small: No.	18	8	5	0	0	0	0	0	0	0	0	31
	43.90%	14.55%	100.00%	0.00%	0.00%	0.00%		0.00%	0.00%			15.50%
Medium: No.	6	2	0	2	0	0	0	0	0	0	0	10
	46.15%	18.18%		5.26%	0.00%	0.00%		0.00%	0.00%			10.00%
Large: No.	0	0	0	0	0	0	0	0	0	0	0	0
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%			0.00%
Kept/Other/Sold												
Small: No.	8	20	0	33	1	36	0	3	9	0	0	110
	19.51%	36.36%	0.00%	89.19%	100.00%	76.60%		100.00%	81.82%			55.00%
Medium: No.	0	4	0	19	3	17	0	3	10	0	0	56
	0.00%	36.36%		50.00%	100.00%	85.00%		60.00%	100.00%			56.00%
Large: No.	16	15	0	168	6	20	0	5	7	0	0	237
	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%		100.00%	87.50%			99.16%
Totals												
Small: No.	41	55	5	37	1	47	0	3	11	0	0	200
Medium: No.	13	11	0	38	3	20	0	5	10	0	0	100
Large: No.	16	15	1	168	6	20	0	5	8	0	0	239

[a] Includes all waters of District 112, except 112-22 (Hidden Falls).
[b] Chum, pink, sockeye, and coho salmon catches reported as landed on fish tickets were assumed equivalent to gross catch. Chinook salmon gross catches were obtained from dockside observation and skipper interviews and include all size classes and dispositions.

Appendix C.3. Summary of dockside observation and skipper interview data collected during the 1987 Southeast Alaska purse seine fishery (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	70	12	29	3	16	30	12	20	246
Gross Catch and Percent of Total Catch by Participating Vessels[b]:												
Chum Salmon: No.	3,161	2,743	5,519	6,644	7,473	5,850	261	4,085	30,260	3,757	4,111	73,864
	2.53%	5.35%	62.20%	3.18%	11.47%	3.61%	2.24%	6.38%	38.12%	7.76%	5.06%	8.15%
Pink Salmon: No.	115,327	44,231	2,516	176,338	56,588	153,598	11,234	58,577	48,184	43,435	76,388	786,416
	92.27%	86.28%	28.36%	84.29%	86.88%	94.73%	96.45%	91.51%	60.69%	89.72%	93.99%	86.76%
Coho Salmon: No.	1,121	1,393	814	6,364	370	750	32	406	342	390	235	12,217
	0.90%	2.72%	9.17%	3.04%	0.57%	0.46%	0.27%	0.63%	0.43%	0.81%	0.29%	1.35%
Sockeye Salmon: No.	4,913	2,782	18	19,393	657	1,674	92	860	513	641	453	31,996
	3.93%	5.43%	0.20%	9.27%	1.01%	1.03%	0.79%	1.34%	0.65%	1.32%	0.56%	3.53%
Chinook Salmon: No.	462	115	6	604	42	265	28	84	90	190	85	1,971
	0.37%	0.22%	0.07%	0.22%	0.06%	0.16%	0.24%	0.13%	0.11%	0.39%	0.10%	0.22%
Gross Catch: No.	124,984	51,264	8,873	209,343	65,130	162,137	11,647	64,012	79,389	48,413	81,272	906,464
Gross 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%	50.27%	10.00%	18.71%	0.00%	0.00%	20.00%	0.00%	70.00%	30.53%
Medium: No.	13	7	0	48	0	11	1	2	2	1	2	87
	12.04%	43.75%		46.15%	0.00%	21.57%	7.14%	5.88%	14.29%	1.37%	6.67%	19.25%
Large: No.	9	2	1	115	8	26	0	3	1	7	4	176
	19.57%	10.00%	100.00%	36.28%	57.14%	44.07%	0.00%	23.08%	6.25%	46.67%	80.00%	34.71%
Discarded												
Small: No.	156	21	5	37	2	4	0	0	1	7	0	233
	50.65%	26.58%	100.00%	20.22%	10.00%	2.58%	0.00%	0.00%	1.67%	6.86%	0.00%	23.02%
Medium: No.	87	4	0	30	0	7	0	7	0	0	1	136
	80.56%	25.00%		28.85%	0.00%	13.73%	0.00%	20.59%	0.00%	0.00%	3.33%	30.09%
Large: No.	3	0	0	31	0	1	0	2	0	3	1	41
	6.52%	0.00%	0.00%	9.78%	0.00%	1.69%	0.00%	15.38%	0.00%	20.00%	20.00%	8.09%
Kept/Other/Sold												
Small: No.	50	21	0	54	16	122	13	37	47	95	15	470
	16.23%	26.58%	0.00%	29.51%	80.00%	78.71%	100.00%	100.00%	78.33%	93.14%	30.00%	46.44%
Medium: No.	8	5	0	26	8	33	13	25	12	72	27	229
	7.41%	31.25%		25.00%	100.00%	64.71%	92.86%	73.53%	85.71%	98.63%	90.00%	50.66%
Large: No.	34	18	0	171	6	32	1	8	15	5	0	290
	73.91%	90.00%	0.00%	53.94%	42.86%	54.24%	100.00%	61.54%	93.75%	33.33%	0.00%	57.20%
Totals												
Small: No.	308	79	5	183	20	155	13	37	60	102	50	1,012
Medium: No.	108	16	0	104	8	51	14	34	14	73	30	452
Large: No.	46	20	1	317	14	59	1	13	16	15	5	507

[a] Includes all waters of District 112, except 112-22 (Hidden Falls).
[b] Chum, pink, sockeye, and coho salmon catches reported as landed on fish tickets were assumed equivalent to gross catch. Chinook salmon gross catches were obtained from dockside observation and skipper interviews and include all size classes and dispositions.

Appendix C.4. Summary of data collected and small chinook salmon catch per boat-hour from tender boats during the 1987 purse seine dockside observation program in Southeast Alaska.

District	# of Tenders Sampled	Landed Catch							No. Boats Delivered	No. Hours Fished	Total Boat-Hrs	Small Chinook/ Boat-Hour
		Chum[a]	Pink[a]	Coho[a]	Sockeye[a]	Chinook[b] Sm	Med	Lg				
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
									11	39	429	
112[c]	1	757	2	160	260	2	1	0				
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 fish ticket data.
[b] All fish were observed during unloading, including those sold and not sold.
[c] Includes all waters of District 112, except 112-22 (Hidden Falls).

Appendix C.5. Comparison of data collected from dockside observations/skipper interviews and data recorded on fish tickets for individual seine boat deliveries from the 1987 Southeast Alaska purse seine fishery.

Dist	Period	No. of Landings Sampled	Landed Catch of Small Chinook Salmon		Small Chinook Salmon Never Landed	
			Reported on Sales Slips [a]	Observed on Docks [b,c]	Released Alive [b]	Kept or Discarded [b]
1	Non-Ret	24	0	0	87	180
	Retention	11	0	1	15	25
2	Non-Ret	3	0	0	10	14
	Retention	12	6	17	27	11
3	Non-Ret					
	Retention	4	0	0	0	5
4	Non-Ret	45	7	15	86	43
	Retention	25	7	20	4	13
9	Non-Ret	3	8	15	2	2
	Retention	9	1	1	0	0
10	Non-Ret	22	27	80	18	9
	Retention	7	19	26	11	10
11	Non-Ret	3	6	13	0	0
	Retention					
12	Non-Ret	33	27	55	10	18
	Retention	13	6	9	2	3
13	Non-Ret	12	92	95	0	7
	Retention					
14	Non-Ret	19	4	14	35	1
	Retention	1	0	0	0	0
Total	Non-Ret	164	171	287	248	274
	Retention	82	39	74	59	67
Grand Total		246	210	361	307	341

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Dist	Period	No. of Landings Sampled	Landed Catch of Large Chinook Salmon: Reported on Sales Slips [a]	Landed Catch of Large Chinook Salmon: Observed on Docks [b,c]	Large Chinook Salmon Never Landed: Released Alive [b]	Large Chinook Salmon Never Landed: Kept or Discarded [b]
1	Non-Ret	24	0	0	9	21
	Retention	11	10	10	0	1
2	Non-Ret	3	0	0	2	3
	Retention	12	20	15	0	0
3	Non-Ret					
	Retention	4	0	0	1	0
4	Non-Ret	45	0	2	115	34
	Retention	25	165	158	0	7
9	Non-Ret	3	0	0	8	0
	Retention	9	8	6	0	0
10	Non-Ret	22	0	0	26	13
	Retention	7	14	20	0	0
11	Non-Ret	3	0	1	0	0
	Retention					
12[d]	Non-Ret	33	8	5	3	8
	Retention	13	8	9	1	3
13	Non-Ret	12	1	5	7	3
	Retention					
14	Non-Ret	19	1	0	4	5
	Retention	1	0	0	0	0
Total	Non-Ret	164	10	13	60	87
	Retention	82	225	218	2	11
Grand Total		246	235	231	62	98

[a] Catch totals were obtained directly from fish tickets.
[b] Catch totals were obtained directly from dockside observations or skipper interviews.
[c] All fish were observed during unloading, including those sold and not sold.
[d] Includes all waters of District 112, including 112-22 (Hidden Falls).

Appendix D.1. Estimated gross catches of chinook salmon in the 1987 Southeast Alaska purse seine fishery based on catch per unit of effort data collected as part of the dockside observation/skipper interview program.

						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	Standard Deviation
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	185.8
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	128.2
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	223.4

-continued-

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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	Sampled Chinook Catches Med	Sampled Chinook Catches Lg	Chinook Per Boat-Hr Sm	Chinook Per Boat-Hr Med	Chinook Per Boat-Hr Lg	Estimated Chinook Catch Sm	Estimated Chinook Catch Med	Estimated Chinook Catch Lg	Estimated Chinook Catch Totals	Standard Deviation
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				0.0523	0.0273	0.0654	47	25	59	131	
								Dead				0.0518	0.0319	0.1149	47	29	103	179	
	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	148	0.0256	0.0256	0.2108	148	148	1213	1,509	
	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	3	15	45	2.79	107.50	1,612.50	Rel Alive	0	0	0	0.0000	0.0000	0.0000	0	0	0	0	
								Dead	4	0	17	0.0889	0.0000	0.3778	143	0	609	752	
														Totals:	1,384	770	2,788	4,942	292.5
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	83.5
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	91.9

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Appendix D.1. (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	Sampled Chinook Catches Med	Sampled Chinook Catches Lg	Chinook Per Boat-Hr Sm	Chinook Per Boat-Hr Med	Chinook Per Boat-Hr Lg	Estimated Chinook Catch Sm	Estimated Chinook Catch Med	Estimated Chinook Catch Lg	Estimated Chinook Catch Totals	Standard Deviation
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	9.7
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	313.8
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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Appendix D.1. (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	Sampled Chinook Catches Med	Sampled Chinook Catches Lg	Chinook Per Boat-Hr Sm	Chinook Per Boat-Hr Med	Chinook Per Boat-Hr Lg	Estimated Chinook Catch Sm	Estimated Chinook Catch Med	Estimated Chinook Catch Lg	Estimated Chinook Catch Totals	Standard Deviation
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	127.2
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	330.4
														Gross Catch Estimate:	10,291	3,632	4,497 =	18,420	652.4

* Chinook salmon per boat-hour rates were averaged over all weeks in a district and applied to weeks when no boats were sampled for that district.

Appendix E.1. Estimated landed catch of small chinook salmon in the 1987 Southeast Alaska purse seine fishery when the fishery was closed to the retention of large chinook salmon (5 July to 1 August).

Dist	Non-Retention Period: Total Boat-Hours Fished	Retention Period: Landed Catch Small Chinook per Boat-Hr [a]	Non-Retention Period: Estimated Landed Catch Small Chinook
101	2,400.00	0.0009	2
102	180.00	0.0040	1
103	0.00	0.0034	0
104	5,067.45	0.0407	201
105	0.00	0.0087	0
109	897.00	0.0072	6
110	4,851.00	0.0385	187
111	120.00	0.0229 [b]	3
112	13,803.45	0.0033	59
113	2,604.45	0.0419	131
114	2,202.00	0.0054	12
Totals			602

[a] Landed catch of small chinook per boat-hour from fish ticket data during the retention period. See Table 10.
[b] Number of small chinook per boat-hour was calculated by averaging rates from Districts 9 and 10.

Appendix E.2. Estimated gross catch of medium chinook salmon in the 1987 Southeast Alaska purse seine fishery when the fishery was closed to the retention of large chinook salmon (5 July to 1 August).

Dist	Non-Retention Period: Estimated Gross Catch of Large Chinook Salmon [a]	Non-Retention Period: Gross Catch Rates of Medium to Large Chinook Salmon [b]	Non-Retention Period: Estimated Gross of Catch Medium Chinook Salmon
101	42	3.0404	128
102	4	1.0000	4
103	0	0.0000	0
104	1,400	0.4403	616
105	0	0.0000	0
109	15	0.6230	9
110	226	0.8028	181
111	4	6.0000	24
112	146	1.4665	214
113	74	5.1183	379
114	9	6.0909	55
Totals	1,920		1,610

[a] Estimated gross catch of large chinook salmon derived from fish ticket data.

[b] Medium to large chinook salmon gross catch rates were calculated from the estimated gross catches derived from dockside observation/skipper interview data during the non-retention period.

Appendix E.3. Estimated gross catch of medium chinook salmon in the 1987 Southeast Alaska purse seine fishery when the fishery was open to the retention of large chinook salmon (2 August to 3 October).

Dist	Retention Period: Landed Catch of Large Chinook Salmon[a]	Retention Period: Gross Catch Rates of Medium to Large Chinook Salmon[b]	Retention Period: Estimated Gross Catch of Medium Chinook Salmon
101	93	0.7857	73
102	133	0.8182	109
103	13	0.0000	0
104	3,520	0.2026	713
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		1,350

[a] Landed catch of large chinook salmon reported on fish tickets during the retention period was assumed to equal gross catch.

[b] Medium to large chinook gross catch rates were calculated from the estimated gross catches derived from dockside observation/skipper interview data during the retention period.

Appendix E.4. Estimated gross catch of large chinook salmon in the 1987 Southeast Alaska purse seine fishery when the fishery was closed to the retention of large chinook salmon (5 July to 1 August).

Dist	Non-Retention Period: Total Boat-Hours Fished	Retention Period: Landed Catch Large Chinook Salmon per Boat-Hour	Non-Retention Period: Estimated Gross Catch of Large Chinook Salmon
101	2,400.00	0.0176	42
102	180.00	0.0212	4
103	0.00	0.0028	0
104	5,067.45	0.2763	1,400
105	0.00	0.0000	0
109	897.00	0.0165	15
110	4,851.00	0.0466	226
111	120.00	0.0316 [b]	4
112	13,803.45	0.0106	146
113	2,604.45	0.0284	74
114	2,202.00	0.0040	9
Totals			1,920

[a] Landed catch of large chinook salmon per boat-hour from fish ticket data during the retention period was assumed to equal gross catch.
[b] Number of large chinook salmon per boat-hour was calculated by averaging rates from Districts 9 and 10.

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