

## **TECHNICAL FISHERY REPORT 92-21**

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Alaska Department of Fish and Game  
Division of Commercial Fisheries  
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### **Contribution, Exploitation, and Migratory Timing of Lynn Canal Sockeye Salmon Runs in 1988 Based on Analysis of Scale Patterns**

by

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The Technical Fishery Report Series was established in 1987, replacing the Technical Data Report Series. The scope of this new series has been broadened to include reports that may contain data analysis, although data oriented reports lacking substantial analysis will continue to be included. The new series maintains an emphasis on timely reporting of recently gathered information, and this may sometimes require use of data subject to minor future adjustments. Reports published in this series are generally interim, annual, or iterative rather than final reports summarizing a completed study or project. They are technically oriented and intended for use primarily by fishery professionals and technically oriented fishing industry representatives. Publications in this series have received several editorial reviews and at least one *blind* peer review refereed by the division's editor and have been determined to be consistent with the division's publication policies and standards.

CONTRIBUTION, EXPLOITATION, AND MIGRATORY TIMING OF  
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## ABSTRACT

Visual interpretation of scale circuli patterns from three sockeye salmon *Oncorhynchus nerka* escapements provided the basis for estimating commercial catch contributions of three stocks in the Southeast Alaska commercial gillnet fishery in Lynn Canal (District 115). Circuli patterns in the freshwater growth zone provided the principal discriminatory characteristics. Chilkat Lake stocks exhibited the largest freshwater growth zone, Chilkoot Lake the smallest, and the stock to Berners Bay and the mainstem of the Chilkat River exhibited zones intermediate in size. The minimum estimate of the total sockeye run to Lynn Canal in 1988 was 462,451 fish, of which 351,551 (76%) were harvested and 110,900 escaped to spawn. The Chilkat Lake run contributed 104,066 fish, of which 76,473 (73%) were harvested and 27,593 escaped to spawn. Chilkoot Lake contributed 335,242 fish, of which 253,968 (76%) were harvested and 81,274 escaped to spawn. The Berners Bay/Chilkat Mainstem stock contribution included a harvest of 21,110 fish in District 115; these stocks were enumerated only for peak single day escapement, not for total escapement. Peak single day escapement counts in the surveyed areas totaled 2,050 sockeye salmon. Mean length of Chilkat Lake fish was greater than fish from Chilkoot Lake of the same sex and age. The mean date of harvest of the three runs was 2 July for Berners Bay/Chilkat Mainstem, 31 July for Chilkoot Lake, and 5 August for Chilkat Lake. The mean date of escapement was 26 July for the Chilkoot run and 31 August for Chilkat. Historical age composition data revealed that the Chilkoot Lake run was composed principally of age-1. fish and Chilkoot Lake run principally of age-2. fish. Chilkoot Lake has produced more fish per spawner than Chilkat Lake.

**KEY WORDS:** Sockeye salmon, *Oncorhynchus nerka*, scale pattern analysis, stock contributions, Chilkoot Lake, Chilkat Lake, Lynn Canal, total run, escapement, exploitation rate, mean length, brood year returns.

## INTRODUCTION

The population of sockeye salmon *Oncorhynchus nerka* which returns to Lynn Canal (District 115) each year is presently the largest that spawns in Southeast Alaska. From 1982 to 1988, catches in Lynn Canal have accounted for an average of 23% of the total sockeye salmon catch in Southeast Alaska including set net catches in the Yakutat area (ADF&G 1989). During that same period Lynn Canal catches represented 47% of the drift gillnet catch of sockeye salmon in the region. The Lynn Canal sockeye salmon population is intensively managed by the Alaska Department of Fish and Game (ADF&G) using a detailed information system (McPherson 1990).

The Lynn Canal drift gillnet fishery operates in the waters of Southeast Alaska north of Little Island (Figure 1). Although all five species of eastern Pacific salmon *Oncorhynchus* are harvested, the fleet targets on sockeye salmon from June through late August. Sockeye salmon harvested in Lynn Canal originate primarily from the Chilkoot Lake and Chilkat Lake drainages, but small spawning populations which use river habitats are found in several locations along the mainstem of the Chilkat River and along three rivers in Berners Bay: the Berners, Lace, and Antler-Gilkey.

Stockley (1950) first documented the obvious differences in freshwater scale patterns of adult sockeye salmon from Chilkoot Lake and Chilkat Lake. Bergander (1974) demonstrated the feasibility of identifying fish from the respective lakes using circuli counts and size of the freshwater zone in a dichotomous key. Bergander (1982) used this method to estimate inseason and postseason catch contributions of Chilkoot and Chilkat Lakes from 1975 to 1980. In 1981 the sample design was improved, and inseason and postseason stock contributions were estimated using linear discriminant function (LDF) analysis to discriminate linear scale measurements on a mainframe computer (Marshall et al. 1982). In 1981 and 1982 (McPherson et al. 1983) scale measurements from the catch were classified using LDF to estimate stock contributions for age-1.3 fish. The ratio of age-1.3 fish to other age classes in the escapement of each lake was used to estimate the catch contributions of other age classes. McPherson and Marshall (1986) demonstrated, using the 1983 data, that visual classification of scale patterns could be used to accurately classify all age classes of Chilkoot Lake and Chilkat Lake fish. This method was simpler and faster, and the classification of all catch samples enabled the calculation of a variance estimate around the entire stock contribution. A third stock, composed of Berners Bay and Chilkat Mainstem, was added to the visual classification technique to analyze the 1985-87 data (McPherson 1987; McPherson and Jones 1987; McPherson 1989).

Estimation of the numbers of fish harvested by stock is essential to sound management. Data of the stock contributions to catch and escapement provide estimates of total return by brood year, as well as rates of exploitation. Brood-year return data are needed to evaluate optimal escapement requirements and to forecast annual returns. Exploitation rates by stock and age class provide managers with additional information with which to adjust the time and location of openings. The temporal distribution of catches by stock and age can be integrated with average timing data and historical cumulative time densities (Mundy 1979) to form the basis for inseason abundance forecasting.

This annual investigation adds quantitative details of the 1988 migration to the historical database for Lynn Canal sockeye salmon. The purposes of this report are to (1) document the accuracy of visually classifying the Lynn Canal sockeye salmon catch into the Chilkoot Lake, Chilkat Lake, and combined Berners Bay/Chilkat River mainstem stocks; (2) document the catch, escapement, total run, and exploitation rates of each stock by age; (3) provide average length and migratory timing data; (4) compare

visual classification and linear discriminant function estimates and precision of stock contributions; and (5) expand brood year tables and catch and escapement data.

## METHODS

### *Numbers of Fish*

Commercial catch data for District 115 was compiled from fish-sale receipts, or fish tickets, documenting fishermen sales to processors. Catch statistics used were those available on 1 March 1989. Subsequent statistics may differ slightly because subsequent errors may be detected and corrected. Catches were reported by fishing period and assigned to a statistical week which begin at 0001 hours each Sunday and end the following Saturday at 2400 hours. Weeks are numbered sequentially beginning with the first week in January.

ADF&G weir crews count escapements into Chilkoot and Chilkat Lakes (Figure 1). The Chilkoot River weir, located approximately 0.5 km upstream of the river mouth, was operated from 9 June through 25 October. The Chilkat Lake weir, located at the lake outlet approximately 35 km upstream from the mouth of Chilkat River, was operated from 18 June through 14 November.

### *Age, Sex, and Length*

Commercial catches and escapements at the two weirs were sampled throughout the season for scale, sex, and length data. ADF&G employees collected sockeye salmon scales from vessel and tender landings in the ports of Excursion Inlet, Petersburg, Sitka, Pelican, Hoonah, and Juneau, dividing the weekly sampling goal among ports in approximate proportion to the number of sockeye salmon delivered. The weekly catch sampling goal, 1,000 scales, was designed to obtain at least 800 ageable scales to estimate, using standard binomial equations in Cochran (1977), the proportion of each age class for the most abundant stock to within 5% of the true proportion 90% of the time. The weir sampling goal was to collect sufficient scale samples to estimate the proportion of each age biweekly to within 5% of the true proportion 90% of the time. Samples were taken from the spawning grounds on the Lace and Antler-Gilkey Rivers in Berners Bay and along the mainstem of the Chilkat River in locations where sockeye salmon were concentrated in clear tributaries. These samples were spatially and temporally limited and may not be representative of the entire Berners Bay/Chilkat Mainstem population.

Scales were obtained from the left side of the fish as shown in Mosher (et al. 1961). Scales were mounted on gummed cards and impressions made in cellulose acetate (Clutter and Whitesel 1956). Age was determined by visual examination of scale impressions magnified 70x on a microfiche reader; criteria used to determine age followed those of Mosher (1968) in addition to criteria developed by Region I fishery biologists (Craig Farrington, Alaska Department of Fish and Game, Douglas, personal communication). Length frequency analysis was used to determine age on scales from escapement collections that exhibited a high degree of resorption of the marine growth zone. Ages were reported in European notation. Length was measured from mid-eye to fork-of-tail to the nearest 5 mm. Sex was determined by examining external dimorphic sexual maturation characteristics, such as kipe development, belly shape, and trunk depth. Sex determination in the catch was most often made by two samplers, and where disagreement

occurred, verified by inspecting gonads through a small incision in the belly. An experiment to determine the accuracy of this method was implemented during the 1987 season. Subsequent examination by incision of 1,623 sockeye salmon from the commercial fishery in Lynn Canal that had been sexed by five samplers using the above method resulted in 94.5% sexing accuracy (K. Pahlke, Alaska Department of Fish and Game, Douglas, personal communication). Accuracy of sexing fish sampled from the escapements is believed to be higher because sexual dimorphism is more pronounced than they are in salt water, where the fishery occurs.

Estimates of the total catch and escapement of each age class were made by applying each age proportion data to the catch and escapement during each period and summing the estimates across periods. Standard errors in each stratum were calculated using a standard binomial equation with correction for finite population size:

$$SE_{ij} = \sqrt{\frac{[(\hat{P}_{ij})(1-\hat{P}_{ij})]}{n_j - 1} \cdot [1 - \frac{n_j}{C_j}]}, \quad (1)$$

where:

- $i$  = age class,
- $j$  = time period,
- $\hat{P}_{ij}$  = estimated proportion of fish of age  $i$  in stratum  $j$ ,
- $n_j$  = sample size for stratum  $j$ , and
- $C_j$  = catch or escapement of fish in stratum  $j$ .

The standard error for each age class summed across strata in the total Lynn Canal commercial catch (or the escapements) to Chilkoot Lake or Chilkat Lake was calculated by weighting it's standard error for each sample period by the total catch (or escapement) during the sample period as follows:

$$SE_i = \sqrt{\frac{\sum_1^j (SE_{ij})^2 C_j^2}{C^2}}. \quad (2)$$

Changes in age composition among periods were tested for statistical significance using a test to compare two proportions described in Zar (1984).

Average lengths by age and sex and associated standard errors were calculated for catches/escapements from each run, weighted by catches/escapements, by period.

### *Scale Pattern Measurements*

Linear scale pattern measurements were recorded into an electronic database to provide quantitative illustration of the pattern differences in various scale-growth zones between stock groups. In addition, we believe that these data can be combined with the spawner-recruit database to forecast future returns.

Scale images were magnified 100 times and projected onto a Talos digitizing tablet using equipment similar to that described by Ryan and Christie (1976). Scale features were measured and recorded electronically using a FORTRAN program. Measurements were made along the anterior-posterior axis of the scale in specific zones dependent on freshwater age class (Figure 2). Within each zone the digitizer recorded the linear distance between each circuli. A series of FORTRAN programs were used to transform and summarize the digitized scale characteristics.

Scales from escapements were digitized for the four major age classes in Lynn Canal in 1988: ages 1.2, 1.3, 2.2, and 2.3. Age-1.3 scales were digitized for all three stock groups; scales from the other three age classes were only digitized for fish from Chilkoot and Chilkat Lakes because these age classes were not available in sufficient numbers from the Berners Bay/Chilkat Mainstem group.

### *Blind Tests*

Scale samples collected each week from District 115 were classified by stock of origin. Scales were projected onto a microfiche reader and aged, each scale was then assigned to one of the three stocks based on scale characteristics. The proportions of each stock were projected each week to provide timely estimates of stock contribution for inseason management. Temporal and spatial adjustments were partly based inseason forecasts of total run abundance for Chilkoot Lake and catch for Chilkat Lake in order to achieve the escapement goals of 60,000 to 80,000 fish for Chilkoot Lake and 70,000 to 90,000 fish for Chilkat Lake.

Catch statistics were updated postseason, the estimated stock proportions were corrected for misclassification, and the current data was added to the historical Lynn Canal sockeye salmon stock identification database. To test the accuracy of the inseason allocation and to correct for misclassification between stocks, a blind testing procedure was used.

Scales from the escapement were used to develop a blind test for the Chilkoot Lake, Chilkat Lake, and Berners Bay/Chilkat Mainstem stock groups. A separate test was designed for each individual age class common to two or more stocks: a technician selected scales from each of the three escapements in amounts randomly generated by a computer and, for some tests, limited by availability. Scales were visually classified to stock of origin and compared to the true origin. This defined the accuracy and misclassification rates of the method.

Eight blind tests were developed for fish aged 1.2, 1.3, 1.4, 2.2, 2.3, 2.4, 3.2, and 3.3 (Table 1). The tests for fish aged 1.2 and 1.3 included scales from the escapements of all three stock groups; the other tests were composed only of Chilkoot and Chilkat Lake scales. Fish aged 0. were found only in the escapements to Berners Bay/Chilkat Mainstem; a blind test was not needed for these fish.

Although we primarily used the size of the freshwater annulus and the number of circuli in the freshwater growth zones to distinguish between stocks, we also considered the total size of the freshwater growth zone, size of the freshwater plus growth zone, completeness of the freshwater circuli, and the spacing between the circuli in the freshwater growth zone.

## *Mixed Stock Analysis*

### **Visual Classification**

The results of the blind tests were used to build a correction matrix to compensate for misclassifications in each age class (Table 1). The correction matrix is a square matrix with one column and one row for each group. Each row represents the true stock of origin and each column element is the proportion of the scales in each row that were visually classified to each stock. Diagonal elements in the matrix represent correctly classified scales, and off-diagonal elements represent misclassified scales.

The proportional estimates of stock composition from the inseason analysis, referred to as initial estimates, were adjusted by application of a model and its correction matrix (Cook and Lord 1978). A vector containing adjusted proportions, referred to as corrected estimates, was the result. One vector of corrected estimates was calculated for each stock in each age class for every fishing period of the season using a FORTRAN program. In cases where corrected proportions for any stock were less than zero, the entire catch sample was reclassified with a model excluding that stock group. The corrected estimates for visual classification of all scales are the final stock contribution estimates presented in this report.

The standard error of the corrected estimates of stock proportions were computed using the procedures of Pella and Robertson (1979). The variance-covariance matrices for the misclassification matrix and for the mixed stock proportion vector were determined from the multinomial probability distribution. These two variance-covariance matrices were combined to give variances and covariances for the corrected estimates of stock proportions. The variances for the proportions of each stock were the diagonal elements of this combined matrix, i.e. they are an additive combination of (1) the sampling variation in estimation of the probability of assignment of the known stock, and (2) the sampling variation in estimation of the assignment of the mixed stock samples.

Catch samples were classified to stock and age class within each statistical week, corrected for misclassification, and expanded to the catch size of that week.

The variance of the entire weekly and seasonal proportion for one stock, across the 12 age classes was estimated with the delta method (Seber 1982) using a program written by David Bernard and modified to output weekly variance estimates. The variance estimate was a function of (1) age composition of the catch, (2) stock proportions within each age class, (3) standard errors of stock proportions due to misclassification (from Pella-Robertson calculation), (4) weekly scale sample size, and (5) catch size. See Appendix C in Oliver et al. (1985) for a detailed description of this procedure.

The visual classification methods were used to estimate the final stock contributions presented in this report.

### **Comparison of Visual Classification and Linear Discriminant Function**

The visual classification technique described above is only used in Lynn Canal to estimate sockeye stock contributions. In other sockeye fisheries, linear discriminant function analysis (LDF) of digitized scale patterns is most often used to estimate stock contributions (Marshall et al. 1987; Oliver et al. 1985).

As part of this report, we completed an LDF analysis in order to compare LDF stock contribution estimates with those from visual classification. A subset of approximately 100 age-1.3 scales were

randomly selected from the 1988 fishery sample each week. Escapement scales of known origin were digitized from each of the three stock groups to calculate a basis for correction of misclassified scale bias for LDF, similar to that computed from the blind test for age-1.3 visual classification. Visual classification of the same subset of age-1.3 scales was also performed.

Estimates for the subset of age-1.3 scales from each of the two methods were corrected for misclassification. The corrected stock proportions were expanded to the weekly age-1.3 catch and summed for season totals. Standard errors in numbers of fish were calculated using the delta method mentioned earlier. Contribution estimates and standard errors for both subset methods, LDF and visual classification, were compared to the final results from visual classification of all age-1.3 scales.

### *Migratory Timing and Dispersion*

Migratory timing, i.e., abundance as a function of time, is the driving force behind management strategies which regulated the time and location of openings to harvest specific stocks or species. An index of relative timing using the methods of Mundy (1979, 1982) were prepared for the harvest of all three stocks and the weired escapements.

To calculate mean and variance, the empirical migratory time density is defined as the time series of daily or weekly proportions,  $P_t$ , where:

$$P_t = \frac{n_t}{N} \quad , \quad (3)$$

where:

$$\begin{aligned} n_t &= \text{abundance on time interval } t, \text{ and} \\ N &= \text{total annual abundance.} \end{aligned}$$

For a migration over a time interval of  $n$  days or weeks, the mean of  $t$  is estimated by

$$\bar{t} = \sum_{t=1}^n t (P_t) \quad , \quad (4)$$

and its variance is estimated by

$$S_t^2 = \sum_{t=1}^n (t - \bar{t})^2 P_t \quad . \quad (5)$$

The mean day and mean week of weired escapements and catch by stock were calculated.

## RESULTS

### *Scale Pattern Measurements*

Photographs which illustrate typical scale patterns for fish aged 1. and 2. from each of the three stocks are shown in Figures 3 and 4.

Average values of selected variables from the digitized age-1.2, -1.3, -2.2, and -2.3 escapement scales are shown in Table 2. Standard errors and ranges appear in Appendices A.1-A.4. Stock specific frequency distributions of measurements for selected variables from each age class are depicted in Appendices A.5-A.8.

Differences in average number of circuli (NC) and incremental distances (ID) between stock groups were large and consistent among age classes. Average NC in the first freshwater year for fish aged 1.3 were 6.4 in Chilkoote Lake, 8.5 in Chilkat Lake, and 14.5 in Berners Bay/Chilkat Mainstem (B/M) patterns (Table 2; Appendix A.2). The value for B/M was 33% greater and the value for Chilkat Lake 127% greater than that for Chilkoote Lake. The differences in the freshwater ID for fish aged 1.3 was even larger; the value for B/M (89.2) was 53% greater and for Chilkat Lake (160.3) 175% greater than for Chilkoote Lake (58.4). Frequency plots indicate that there was little overlap in age-1.3 ID values between the three stock groups (Appendix A.6) and that the classification rates for age-1.3 fish in Table 1 were accurate.

Differences in the first freshwater year NC and ID values for fish aged 1.2 between Chilkoote and Chilkat Lakes were similar to trends seen for age-1.3 fish (Table 2; Appendices A.1, A.5). Average NC was 175% greater for Chilkat Lake (16.7 versus 5.7) and average ID 230% greater (183.0 versus 55.5).

Similar trends between age-2.2 and -2.3 scales from Chilkoote and Chilkat Lakes showed that large differences in average NC and ID were evident between the two lakes (Table 2; Appendices A.3, A.4, A.7, and A.8). Values for NC and ID within the same lake were virtually the same for age-2.2 and -2.3 fish; e.g., NC1 was 8.2 and 8.4, NC2 was 16.0 and 16.6, and the total size of the freshwater zone was 275.0 and 268.4 for Chilkat Lake; similar trends were observed for Chilkoote Lake (Table 2). Differences between age-2. fish in the two lakes were large in both complete freshwater years, but this difference was more apparent in the second freshwater year. For example, in the first freshwater year for age-2.2 Chilkat Lake fish, NC was 86% larger (8.2 vs. 4.4) and ID was 118% larger (91.9 versus 42.1) than age-2.2 Chilkoote Lake fish, but in the second freshwater year NC was 125% larger (16.0 vs. 7.1) and ID was 210% or three times greater (168.8 vs. 54.5) for Chilkat Lake. In fact, there was no overlap between Chilkoote and Chilkat Lakes in frequency plots of ID and NC values from digitized escapement scales in the second freshwater year (Appendices A.7, A.8), verifying the classification accuracies of 99%-100% for age-2. fish from the blind tests in Table 1.

### *Blind Tests*

Results of the eight blind tests used for determining the accuracy of the visual classification of fish from the Chilkoote, Chilkat, and Berners Bay/Chilkat Mainstem systems are summarized in Table 1. Overall

accuracy was high in all tests and ranged from 94% to 100%. Among age-1.3 fish, the most abundant single age class in the fishery, overall classification accuracy was 94%; 2% of the Chilkoot Lake and 11% of the Chilkat Lake fish were classified to Berners/Mainstem, and 6% of the Berners/Mainstem fish were classified to each of the other two stocks. This indicates that the initial inseason estimates for this age class contained a slightly greater percentage of Berners Bay/Chilkat Mainstem fish than the corrected estimates.

The corrected postseason stock proportions are compared to the inseason estimates in Table 3. The corrected proportions were similar to the initial estimates. Postseason estimates were 0.011 greater for Chilkoot Lake, 0.004 greater for Chilkat Lake, and 0.015 less for Berners Bay/Chilkat Mainstem.

### *Harvest*

Annual harvests in Lynn Canal have ranged between 18,388 and 415,815 sockeye salmon from 1960 to 1987 and averaged 148,219 fish (Table 4). Annual harvests during the most recent five years (1983-1987) averaged 342,717 fish. The 1988 harvest of 351,551 was the third highest since 1960.

The 1988 harvest of sockeye salmon in Lynn Canal occurred over a 14-week period (Table 5). Management strategies to selectively harvest or protect stocks of sockeye, chinook *O. tshawytscha*, coho *O. kisutch*, pink *O. gorbuscha*, or chum *O. keta* salmon resulted in considerable variation in the time and locations open to fishing each week (Table 4).

Sockeye aged 1.3 dominated the catch (67.5%), followed by fish aged 2.3 (18.0%), 1.2 (6.3%), and 2.2 (5.9%); fish of all other age classes accounted for <3% of the catch (Appendix B.1). Temporal trends in age composition of the catch were evident (Figure 5). The percentage of fish aged 1.3 decreased significantly ( $P < 0.01$ ) during the season whereas those aged 2.3 and 2.2 increased (Appendix B.1).

### **Visual Classification**

The total harvest of 351,551 sockeye salmon was estimated to be composed of 253,968 Chilkoot Lake fish (72%), 76,473 Chilkat Lake fish (22%), and 21,110 fish (6%) from Berners Bay/Chilkat Mainstem (Table 6). Contribution estimates were derived from visual classification of all age classes. Contributions from Chilkoot Lake were greater than 50% in all but three weeks. Contributions from Chilkat Lake were greater than 50% only during the last two catch strata at the end of the season when catches were relatively low. Berners Bay/Chilkat Mainstem fish were present in appreciable numbers (>1,000 fish) only during 5 weeks early in the season and contributed the majority of the catch during the second week of the season.

The 1988 catch of 253,968 Chilkoot Lake sockeye salmon was the second largest in Lynn Canal since stock contribution estimates were begun in 1976 and was 84% above the 1976-88 average (Table 4). The 1988 Chilkat Lake catch of 76,473 sockeye salmon was the second lowest since 1981 and 17% below average. The 1988 harvest of 21,110 Berners Bay/Chilkat Mainstem sockeye salmon was the highest since 1976 and almost 3 times the 1976-88 average.

Stock contributions estimated from visual classification were extremely precise for all three Lynn Canal stock groups. The standard error for the season catch of 253,968 Chilkoot sockeye salmon was 1,937 fish, or a coefficient of variation (CV) of <1% and a 95% confidence interval of 250,171 to 257,765 fish (Table 6). The CV for Chilkat Lake was 2% and that for B/M was 6%.

Contributions by stock and age class are presented in Appendix B.3. Chilkoot Lake contributed the vast majority (84%) of the age-1. catch, Chilkat Lake dominated age-2. catches, and B/M contributed the age-0. catch. Sample numbers used for misclassification corrections and variance calculations are presented in Appendix B.4.

The harvest of Chilkoot Lake fish was composed of 78.7% fish aged 1.3, but included important contributions from fish aged 2.3 (10.0%) and 1.2 (7.5%; Appendix B.5). The percentage of fish aged 1.3 was the third highest estimated from 1976 to 1988. The age composition did not change dramatically during the season; however, fish aged 2.3 increased significantly ( $P < 0.01$ ) at the end of the season (Figure 6a), a trend seen only in 1977 and 1983.

The catch of Chilkat Lake fish was predominantly age 2.3 (49.8%), followed by age 1.3 (30.4%) and 2.2 (16.3%; Appendix B.6). Early in the run, age-1.3 fish dominated, accounting for 48.4% to 88.7% of the Chilkat Lake harvest (Figure 6b). The percentage of fish aged 1.3 dropped to 26.8% of the catch during week 32 (31 July to 6 August) and continued to decrease steadily to <1% of the harvest during the last three sampling periods. The relative abundance of fish aged 2.3 and 2.2 increased significantly ( $P < 0.01$ ) during the season, accounting for the majority of the catch after 30 July.

The harvest of Berners Bay/Chilkat Mainstem fish was composed principally of two age classes: 1.3 (68.3%) and 0.3 (25.8%; Appendix B.7).

Scales collected from specific sites in the commercial fishery were collected to gauge migration patterns for inseason management. The stock composition of these samples is presented in Appendix B.8.

### **Comparison of Visual Classification and Linear Discriminant Function**

Comparison of age-1.3 stock contribution estimates from 3 analyses are shown in Table 7. A subset of approximately 100 age-1.3 scales per week was used to compare the linear discriminant function (LDF) with the visual classification (VC), and with the visual classification of all age-1.3 scales (ALLVC).

Seasonal estimates of stock contribution for Chilkoot Lake, the most abundant stock in 1988, were similar from all three analyses, ranging from 193,512 (VC) to 201,564 (LDF; Table 7). The 95% confidence intervals overlapped for all three estimates.

The VC estimate of 32,008 age-1.3 fish for the Chilkat Lake contribution was, however, significantly different from the 23,276 fish estimated from ALLVC (Table 7). The difference in the two visual classification estimates for Chilkat Lake was due to a bias in the selection of the subset of age-1.3 scales used in the VC analyses, even though selection was done randomly. A total of 1,199 scales was used in the VC and LDF analyses, whereas 6,935 scales were used for ALLVC. The difference was not due to the misclassification correction because the same correction matrix was used for both VC and ALLVC, e.g., in week 33 initial and corrected estimates were the same for VC and ALLVC.

Similar to Chilkoot Lake estimates, none of the three contribution estimates for the total catch of Berners Bay/Chilkat Mainstem (B/M) were significantly different, ranging from 8,788 for LDF to 14,408 for

ALLVC (Table 7). However, the estimate for LDF was 39% or 5,620 fish lower than that for ALLVC. Over half of this discrepancy was probably due to the difference in classification matrices between the LDF and visual analyses. The remainder was due to the smaller sample size in the LDF analysis. Together, these two factors resulted in B/M estimates of stock contributions of zero age-1. fish after week 29 in the LDF analysis. Realistically, age-1. B/M fish were present in the fishery after week 29, based on age-0. contributions being present in those weeks and escapement age composition data which show that B/M fish contained a significant age-1. component.

Standard errors for the seasonal contributions were much lower for ALLVC than those for either VC or LDF, which were generally similar. The ALLVC standard errors ranged from 70% lower, for the Chilkoot VC and B/M VC, to 157% lower for the Chilkat VC. Weekly standard error estimates exhibited similar trends, i.e., VC and LDF standard errors were 2 to 3 times greater than those for ALLVC.

### *Escapement*

Annual escapements from 1976 to 1988 averaged 84,375 sockeye salmon to Chilkoot Lake and 71,222 to Chilkat Lake (Table 4). The escapement in 1988 of 81,274 fish to Chilkoot Lake was 96% of the average; the escapement to Chilkat Lake of 27,593 fish was 61% below average. Escapement to Chilkoot Lake in 1983, the principal parent year of the 1988 returns, was 80,343. The 1988 Chilkat Lake returns were primarily from escapements to Chilkat Lake in 1982 of 80,221 fish and 134,207 fish in 1983. The 1988 escapement goals were 60,000-80,000 for Chilkoot Lake and 70,000-90,000 for Chilkat Lake.

The Chilkat Lake weir was operated from 18 June to 14 November (Appendix C.1). More than 72% of the escapement past the weir occurred after 15 August. The escapement has been classified into two periods, before and after 15 August (Figure 7), based on historical data for early and late stocks. The Chilkoot Lake weir was operated from 9 June through 25 October (Appendix C.2). The Chilkoot Lake escapement also occurs in two distinct periods, peaks occurring at the end of June and in mid-August (Figure 7). The escapement to Chilkoot Lake was less dispersed than the Chilkat Lake escapement (SD=25 d versus 29 d). Both escapements were more dispersed in 1988 than the 1981-87 averages of 22 d for Chilkoot Lake and 24 d for Chilkat Lake.

Escapements to the rivers of Berners Bay and at various locations along the Chilkat River mainstem were not enumerated for total counts. Instead, surveys were conducted to count the total number of live and dead fish on specific days. A survey of Berners Bay conducted on August 4 resulted in a total peak count of 600 fish from counts of 300 fish in both the Lace and Antler-Gilkey Rivers (Figure 1). Peak counts for surveys along the Chilkat Mainstem were 1,450 fish and included 250 fish at Mosquito Lake, 450 fish at Mule Meadows, 550 fish at Bear Flats, and 200 fish in the Kellsall River (200 fish).

Scale samples collected from Lace River in Berners Bay were primarily composed of age-1.3 fish (82.6%), followed by age-1.2 fish (10.1%; Appendix C.3). Age-0. fish were relatively scarce in Berners Bay, accounting for only 7.3% of the samples.

Scale samples from Bear Flats along the Chilkat River Mainstem indicate that age-0.2 fish were most abundant (36.6%), followed by age 0.3 (32.3%) and age-1.2 fish (23.7%; Appendix C.4). The percentages of fish aged 0.2 and 1.2 were the highest observed since scale sampling began in the Chilkat River Mainstem in 1983.

The Chilkat Lake escapement, like the catch, was primarily age-2.3 fish (60.3%); with ages 1.3 (26.6%) and 2.2 (12.1%) accounted for all but 1% of the remainder (Appendix C.5). Period estimates of age composition showed that, as in past years, fish aged 1.3 decreased significantly ( $P < 0.01$ ) in relative abundance during the season and fish aged 2.2 and 2.3 increased significantly ( $P < 0.01$ ; Figure 8b; Appendix C.6). Male fish composed 72% of the total escapement and were preponderant in all age classes.

In the Chilkoot Lake escapement fish aged 1.3 (78.1%) dominated samples, fish aged 2.3 were common (13.6%), and fish aged 1.2 (4.0%), 2.2 (2.6%), and 1.4 (1.3%) were relatively scarce (Appendix C.7). The relative abundance of the three major ages classes was relatively constant (Figure 8a; Appendix C.8). Males were more abundant (55%), a trend evident across all age classes except age 2.3; males were most prevalent in age-1.2 fish. The dominance of males was observed in the 1985-87 data.

### *Exploitation Rates*

The total run of sockeye salmon from Chilkoot Lake was 335,242 fish of which 253,968 were caught and 81,274 escaped to spawn (Table 8); the exploitation rate was 76%. The total run of Chilkat Lake sockeye salmon was 104,049, of which 76,473 were harvested and 27,593 escaped to spawn; the exploitation rate was 73%.

### *Length at Age by Sex and Stock*

The mean lengths of Chilkat Lake sockeye salmon were greater than those of Chilkoot Lake and Berners Bay/Chilkat Mainstem from the same age group and sex in both the catch and escapement ( $P < 0.01$ ; Table 9). Differences were greatest among age-2.2 fish; Chilkat Lake fish were 45 mm longer than Chilkoot Lake fish in the catch and 70 mm longer in the escapement. Across all age classes the average length of Chilkat Lake fish was 14 mm longer in the catch and 43 mm longer in the escapement.

Age-.3 Chilkoot Lake fish sampled from catches were slightly smaller (10 and 12 mm;  $P < 0.01$ ) than those sampled from escapements (Table 9). A greater difference was observed among age-.2 fish; fish aged 1.2 were an average of 25 mm shorter and age 2.2 12 mm shorter in escapements than in catches. Males were generally larger in all age classes.

Chilkat Lake fish sampled from escapements ranged between 12 to 20 mm longer in length compared to those sampled from catches (Table 9). Males in catches and escapements were longer than females in all age classes.

The data for Berners Bay/Chilkat Mainstem is not adequate to make comparisons between average lengths in catches and escapements as only a portion of the spawning grounds were sampled and may not have been representative of the entire spawning population. Lace River fish were 15 to 51 mm longer than Chilkat Mainstem fish within the same age class (Table 9).

## *Migratory Timing and Dispersion*

### **Catch**

The mean date of harvest (MDH) of Berners Bay/Chilkat Mainstem fish, on 2 July, was earliest, followed by Chilkoot Lake on 31 July, and Chilkat Lake on 5 August (Table 10).

In the Chilkoot Lake harvest small differences in timing were seen between freshwater age classes (Table 10). The MDH of the earliest arriving ages 1.2 and 1.3 was 31 July, 5 d earlier than that for age-2.3 fish and 7 d earlier than that for age-2.2 fish. Approximately 67% of the harvest occurred during 5 weeks, 17 July to 20 August. The age-2.3 harvest was the most dispersed as indicated by a standard error (SE) of 2.5 weeks; fish aged 1.2 were the least dispersed, SE = 2.0 weeks.

In the Chilkat Lake harvest fish aged 1.3 and 1.2 migrated earliest (MDH = 17 July and 26 July); fish aged 2.2 (12 August) and 2.3 (14 August) arrived much later (Table 10). These trends were similar to those observed in earlier years (McPherson 1989). The central 50% of the run was harvested from 17 July to 20 August. The harvest of age-2.2 fish was the most dispersed, SE = 2.8 weeks, and that of fish aged 1.2 the least, SE = 2.1 weeks.

Age-1.3 fish from Berners Bay/Chilkat Mainstem were harvested earlier in the season, MDH = 30 June, than age-0.3 fish, MDH = 8 July. Age-0.3 fish from this system originate primarily from the Chilkat River Mainstem; timing for these stocks is later than fish from Berners Bay, which were mostly aged 1.3 fish in 1988.

### **Escapement**

The mean dates of escapement (MDE) for Chilkoot Lake and Chilkat Lake exhibited trends similar to those observed in the catch (Table 10). The overall MDE for Chilkoot Lake, 26 July, was much earlier than the 31 August date for Chilkat Lake.

Age-1.2 (22 July) and -1.3 (25 July) fish arrived earliest at Chilkoot Lake weir, followed by fish aged 2.3 (29 July) and 2.2 (31 July). Fish aged 2.3 were again most dispersed: SE of 3.8 weeks. At Chilkat Lake weir, fish aged 1.3 were much earlier, MDE of 29 July, than fish age 2.3 (11 Sept.) and 2.2 (14 Sept.). Unlike the catch, where fish aged 2.2 were most dispersed, fish aged 1.3 were the most dispersed in the escapement: SE = 3.2 weeks.

## *Historical Database*

Some of the major elements of the historical database for Lynn Canal sockeye salmon, which are being used for management and research purposes, are presented below.

The total yearly catch, escapement, total run, and exploitation by run are presented in Table 4. Escapements for Chilkat Lake and catches in Lynn Canal are shown from 1960 to 1988. Catches, escapements, total runs, and exploitation rates for Chilkoot and Chilkat Lake are presented for 1976 to 1988. Catches are shown for Berners Bay/Chilkat Mainstem for 1976 to 1988; escapements for this stock

were not entirely enumerated and were not included. Catches for this period have been composed of 53% Chilkoot Lake fish and 44% Chilkat Lake fish. Total runs, i.e., catch plus escapement, averaged 222,648 fish to Chilkoot Lake and 163,380 to Chilkat Lake. The total run of 335,242 Chilkoot Lake sockeye salmon in 1988 was the second largest on record for that lake. The 1988 Chilkat total run of 104,066 fish was the second lowest on record and 36% below average. Runs to Chilkoot Lake have been larger from 1982 to 1988 than from 1976 to 1981, but the same is not true for Chilkat Lake. The total run to Lynn Canal, all stocks combined, has averaged approximately 393,000; the smallest total run of 211,462 fish was observed in 1978 and the largest, 583,862 fish, in 1983. Average exploitation from 1976 to 1988 of the Lynn Canal total run has been 57%; however, exploitation has been higher than 57% in every year since 1982 because run sizes have been larger.

Age-1.3 fish have been the single largest age class in the Chilkoot Lake total run every year since 1976, averaging 69% of the total (Table 11). Most of the remainder was age-2.3 fish, but age-1.2 fish contributed more than 10% in some years prior to 1983. On average, Chilkoot Lake fish were 79% age-1. fish. Age-2 fish (primarily ages 1.2 and 2.2) were exploited at a lower rate, approximately 48%, than age-3 fish (ages 1.3 and 2.3) for which average exploitation has been 57% from 1976 to 1988.

The age composition of Chilkat Lake sockeye salmon was dominated by age-2.2 or age-2.3 fish each year; on average, age-2.3 fish composed 38% and age-2.2 fish 37% of the run (Table 12). Age-1.3 fish composed an average of 20% of the run. Whereas the Chilkat Lake run was composed of an average of 77% age-2. fish, the Chilkoot Lake run was composed of 79% age-1. fish. Exploitation of the Chilkat run has averaged 55% compared to 54% for Chilkoot Lake. Exploitation by age for the Chilkat Lake fish indicates that age-2 fish were exploited at a lower rate than age-3 fish, but the difference among Chilkoot Lake fish was greater because age-2 Chilkoot Lake fish were smaller than age-2 Chilkat Lake fish (Table 8): gillnets used in the fishery are more selective for larger fish.

Brood year returns for Chilkoot Lake are shown in Table 13 for the parent years 1976 to 1983. The average brood year return for those eight escapements was 288,410 fish, representing a total return-per-spawner (TR/S) ratio of 3.8:1. Escapements averaged approximately 83,000 fish for those brood years. The largest return was 419,345 from the 1983 escapement of 80,343 fish. Returns from unenumerated escapements from 1971 to 1975 were poor with the exception of the 1972 brood. Returns have been comprised of 74% age-1.3 fish, on average, for the 1976-83 brood years. Chilkoot Lake was dominated by age-1. fish, however, the relatively large contributions of age-2.3 fish in the brood year returns for 1977, 1981, and 1983 indicated that escapements above 95,000 probably have produced fry densities large enough to reduce growth to an extent to cause a large proportion of the fry population to hold an additional year in freshwater.

Brood year returns for Chilkat Lake indicate that this system was less productive than Chilkoot Lake (Table 14). Brood year returns from 1971 to 1983 averaged 167,639 fish and the TR/S averaged 2.6:1. It is surprising that Chilkat Lake has been less productive because its primary productivity levels are greater (Barto and Koenings *in press*), and it is 6 to 8 °C warmer than Chilkoot Lake during summer months. It is also a clear lake, whereas Chilkoot Lake is glacial. In addition, Chilkat Lake is dominated by age-2. fish because spawning occurs from July until the following February (F. Bergander, Commercial Fisheries Division and B. Sele, F.R.E.D., personal communication); in Chilkoot Lake, on the other hand, most spawning is completed by late September. The extended spawning period for Chilkat Lake means that offspring from late spawning fish, which compose the majority of the escapement, emerge so late the following year that the fry do not grow enough that year to smolt as age-1. fish (McPherson 1989, 1990).

## DISCUSSION

The visual classification technique used to determine stock groups in Lynn Canal has been successful this season for several reasons. First, all age classes were included; because all fish were classified to one of three groups, a standard error estimate was possible for each groups' contributions. Second, high classification accuracies for all age classes meant that the inseason stock contribution estimates were similar to postseason estimates. Third, estimates of stock contribution from visual classification are more precise and less biased than those from analyses which rely upon a subset of scales that can be aged. Finally, the visual technique was cost effective and required less time than other methods which rely on scale pattern measurements generated from computers, genetic data, other biological markers, etc.

In 1988 the escapement to Chilkoot Lake was slightly above the upper range of the goal, 80,000 fish, for that system; the Chilkat Lake escapement was approximately 42,000 fish below the lower range of 70,000 fish. The escapement levels were primarily the result of two factors. First, the Chilkoot run was large and the Chilkat run was very weak. Second, Chilkat fish do not arrive at the weir for 3 to 5 weeks after leaving the fishery area, making it difficult to judge appropriate time and area openings for exploitation of that run. An index of escapement from lower Chilkat River that is precise and available inseason, would be an invaluable tool for management of the Chilkat Lake run.

The accumulated stock identification catch and escapement data for Lynn Canal sockeye salmon has been compiled into a management information system to intensively manage the fishery (McPherson 1990). Cumulative migratory time densities in conjunction with curve fitting techniques were used to forecast the total run abundance of Chilkoot fish and catch of Chilkat Lake fish during the 1988 fishing season. Age composition of the catch and escapement of each stock enables us to build return-per-spawner tables which will be used in the future to calculate optimum escapement levels. The spawner-recruit database, coupled with fish length and environmental data, can be used to develop a pre-season abundance forecast for each stock.

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Table 1. Classification matrices for visual classification models of individual age classes of sockeye salmon stocks contributing to the Lynn Canal (District 115) drift gillnet fishery, 1988.

Model: Fish aged 1.2

Actual Stock of Origin	Sample Size	Classified Group of Origin			
		Chilkoot	Chilkat	Berners/Mainstem	
Chilkoot	58	0.966		0.034	
Chilkat	11		1.000		
Berners/Mainstem	31		0.097	0.903	
Total	100	Overall Classification Accuracy =			0.95

Model: Fish aged 1.3

Actual Stock of Origin	Sample Size	Classified Group of Origin			
		Chilkoot	Chilkat	Berners/Mainstem	
Chilkoot	120	0.975	0.008	0.017	
Chilkat	107		0.888	0.112	
Berners/Mainstem	73	0.041	0.014	0.945	
Total	300	Overall Classification Accuracy =			0.937

Model: Fish aged 1.4

Actual Stock of Origin	Sample Size	Classified Group of Origin			
		Chilkoot	Chilkat	Berners/Mainstem	
Chilkoot	36	1.000			
Chilkat	4		1.000		
Total	40	Overall Classification Accuracy =			1.000

Model: Fish aged 2.2

Actual Stock of Origin	Sample Size	Classified Group of Origin			
		Chilkoot	Chilkat	Berners/Mainstem	
Chilkoot	45	0.978	0.022		
Chilkat	55		1.000		
Total	100	Overall Classification Accuracy =			0.990

-Continued-

Table 1. (page 2 of 2)

Model: Fish aged 2.3				
Actual Stock of Origin	Sample Size	Classified Group of Origin		
		Chilkoot	Chilkat	Berners/Mainstem
Chilkoot	44	0.977	0.023	
Chilkat	56		1.000	
Total	100	Overall Classification Accuracy =		0.990

Model: Fish aged 2.4				
Actual Stock of Origin	Sample Size	Classified Group of Origin		
		Chilkoot	Chilkat	Berners/Mainstem
Chilkoot	8	1.000		
Chilkat	2		1.000	
Total	10	Overall Classification Accuracy =		1.000

Model: Fish aged 3.2				
Actual Stock of Origin	Sample Size	Classified Group of Origin		
		Chilkoot	Chilkat	Berners/Mainstem
Chilkoot	1	1.000		
Chilkat	9		1.000	
Total	10	Overall Classification Accuracy =		1.000

Model: Fish aged 3.3				
Actual Stock of Origin	Sample Size	Classified Group of Origin		
		Chilkoot	Chilkat	Berners/Mainstem
Chilkoot	2	1.000		
Chilkat	4		1.000	
Total	6	Overall Classification Accuracy =		1.000

Table 2. Average number of circuli and incremental distances in various scale growth zones for Lynn Canal sockeye salmon escapements by age class, 1988.

Stock	Age Class	Freshwater								1st Marine		N
		NC1	NC2	NCPGZ	NCTFW	S1	S2	SPGZ	TSEW	NCM	SM	
Chilkat Lake	1.2	16.7		3.2	19.9	183.0		29.7	212.7	25.4	361.0	9
	1.3	14.5		2.9	17.4	160.3		31.3	191.6	25.5	361.7	100
	2.2	8.2	16.0	1.1	25.4	91.9	168.8	14.3	275.0	23.9	368.6	49
	2.3	8.4	16.6	1.2	26.1	89.7	165.5	13.1	268.4	23.3	351.5	100
Chilkoot Lake	1.2	5.7		4.7	10.4	55.5		42.1	97.5	27.8	402.1	50
	1.3	6.4		2.9	9.4	58.4		27.1	85.6	28.9	405.0	99
	2.2	4.4	7.1	1.5	13.0	42.1	54.5	13.2	109.8	29.0	428.3	36
	2.3	4.4	7.4	1.7	13.5	39.7	57.8	14.9	112.4	28.2	407.9	50
Berners Bay/ Chilkat Mainstem	1.3	8.5		2.7	11.3	89.2		23.7	112.9	28.6	379.5	53

NC1 = number of circuli in the first freshwater year.  
 NC2 = number of circuli in the second freshwater year.  
 NCPGZ = number of circuli in the plus growth zone.  
 NCTFW = number of circuli in the total freshwater zone.  
 S1 = size of the first freshwater year.  
 S2 = size of the second freshwater year.  
 SPGZ = size of the plus growth zone.  
 TSEW = size of the total freshwater growth zone.  
 NCM = number of circuli in the first marine year.  
 SM = size of the first marine year.  
 N = number of scales digitized

Table 3. Comparison of inseason and postseason weekly stock composition estimates of the Lynn Canal sockeye salmon harvest, 1988. All estimates are from the visual classification technique.

Statistical Week	Chilkoot		Chilkat		Berners/Mainstem	
	Inseason	Postseason	Inseason	Postseason	Inseason	Postseason
26	0.568	0.578	0.277	0.300	0.154	0.122
27	0.375	0.371	0.210	0.217	0.415	0.412
28	0.590	0.599	0.194	0.201	0.216	0.200
29	0.652	0.665	0.193	0.201	0.155	0.135
30	0.816	0.836	0.125	0.125	0.059	0.039
31	0.813	0.833	0.146	0.145	0.041	0.022
32	0.831	0.854	0.143	0.136	0.026	0.009
33	0.744	0.762	0.235	0.232	0.021	0.006
34	0.659	0.674	0.328	0.322	0.013	0.005
35	0.748	0.761	0.244	0.236	0.009	0.004
36	0.614	0.570	0.370	0.422	0.016	0.008
37	0.344	0.353	0.647	0.643	0.009	0.004
38-41	0.152	0.155	0.836	0.834	0.013	0.010
Total <sup>a</sup>	0.711	0.722	0.214	0.218	0.075	0.060

<sup>a</sup> Weighted by weekly catches.

Table 4. Catches, escapements, annual total runs, and exploitation rates of Lynn Canal (District 115) sockeye salmon stocks, 1960 to 1988.

Year	Spawning Stock																
	Chilkat Lake					Chilkoot Lake					Berners Bay + Chilkat Mainstem		Lynn Canal Total				
	Catch	Esc.	Annual Total Run	Percent Total Catch	Expl. Rate	Catch	Esc.	Annual Total Run	Percent Total Catch	Expl. Rate	Catch	Catch	Percent Total	Catch	Esc.	Annual Total Run	Expl. Rate
1960																	59,604
1961																	67,860
1962																	103,696
1963																	57,518
1964																	68,200
1965																	89,046
1966																	108,087
1967		20,111															66,621
1968		41,246															80,004
1969		44,555															127,869
1970		41,085															79,115
1971		49,342															75,147
1972		51,850															81,010
1973		50,527															193,701
1974		82,811															152,015
1975		41,520															18,338
1976	59,328	69,729	129,057	46.9	0.46	62,452	71,297	133,749	49.3	0.47	4,842	3.8	126,622	141,026	267,648	0.47	
1977	41,389	41,044	82,433	25.9	0.50	113,313	97,051	210,364	70.8	0.54	5,377	3.4	160,079	138,095	298,174	0.54	
1978	89,558	67,528	157,086	82.6	0.57	14,264	35,454	49,718	13.1	0.29	4,658	4.3	108,480	102,982	211,462	0.51	
1979	115,994	80,589	196,583	60.1	0.59	69,864	95,946	165,810	36.2	0.42	7,116	3.7	192,974	176,535	369,509	0.52	
1980	30,681	95,347	126,028	57.8	0.24	20,846	96,512	117,358	39.3	0.18	1,558	2.9	53,085	191,859	244,944	0.22	
1981	48,460	84,089	132,549	51.9	0.37	43,792	83,372	127,164	46.9	0.34	1,071	1.1 <sup>a</sup>	93,323	167,461	260,784	0.36	
1982	127,036	80,221	207,257	46.4	0.61	144,592	102,973	247,565	52.9	0.58	1,908	0.7 <sup>a</sup>	273,536	183,194	456,730	0.60	
1983	123,888	134,207	258,095	33.5	0.48	241,469	80,343	321,812	65.4	0.75	3,955	1.1 <sup>a</sup>	369,312	214,550	583,862	0.63	
1984	98,233	115,269	213,502	29.4	0.46	231,792	100,417	332,209	69.3	0.70	4,348	1.3 <sup>a</sup>	334,373	215,686	550,059	0.61	
1985	148,590	57,724	206,314	46.4	0.72	155,773	69,026	224,799	48.6	0.69	16,178	5.0	320,541	126,750	447,291	0.72	
1986	168,361	23,947	192,308	58.0	0.88	110,430	88,024	198,454	38.1	0.56	11,414	3.9	290,205	111,971	402,176	0.72	
1987	70,069	48,593	118,662	16.9	0.59	334,995	95,185	430,180	80.6	0.78	10,751	2.6	415,815	143,778	559,593	0.74	
1988	76,473	27,593	104,066	21.8	0.73	253,968	81,274	335,242	72.2	0.76	21,110	6.0	351,551	108,867	460,418	0.76	
1976-1988																	
Mean	92,158	71,222	163,380	44.4	0.55	138,273	84,375	222,648	52.5	0.54	7,253	0.03	237,684	155,596	393,281	0.57	
Min	30,681	23,947	82,433	16.9	0.24	14,264	35,454	49,718	13.1	0.18	1,071	0.01	53,085	102,982	211,462	0.22	
Max	168,361	134,207	258,095	82.6	0.88	334,995	102,973	430,180	80.6	0.78	21,110	0.06	415,815	215,686	583,862	0.76	

<sup>a</sup> Catch broken out for age-0. fish only.

Table 5. Fishery openings, effort, harvest, and CPUE of sockeye salmon in Lynn Canal (District 115) by date and statistical week, 1988.

Week	Dates Fished	Hours open			Weekly District Maximum	Boats	Catch	CPUE Fish/Boatday	Average Weight Pounds	Catch Dollar Value
		15-A	15-B	15-C						
26	06/19-06/22	72	0	0	72	41	7,938	65	6.78	\$108,180
27	06/26-06/28	48	48	48	48	109	16,054	74	6.67	\$230,299
28	07/03-07/06	72	48	48	72	134	24,471	61	6.86	\$382,532
29	07/10-07/13	72	48	48	72	142	37,859	89	6.97	\$622,757
30	07/17-07/19	48	0	0	48	139	27,183	98	7.01	\$462,803
31	07/24-07/27	72	0	48	72	162	58,744	121	6.94	\$1,173,868
32	07/31-08/02	48	0	48	48	220	47,603	108	7.09	\$1,079,331
33	08/08-08/10	48	0	0	48	227	57,712	127	7.10	\$1,328,423
34	08/14-08/16	24	0	0	24	210	21,053	100	7.14	\$526,449
35	08/21-08/24	72	0	48	72	189	28,562	50	7.23	\$691,648
36	08/28-08/31	72	0	48	72	221	15,710	24	7.33	\$385,558
37	09/04-09/06	48	0	48	48	225	5,472	12	7.58	\$138,901
38	09/11-09/13	48	0	48	48	237	1,709	4	7.62	\$43,620
39	09/18-09/20	48	0	48	48	241	1140	2	7.48	\$28,484
40	09/25-09/26	24	0	24	24	117	245	2	7.63	\$6,261
41	10/02-10/03	24	0	24	24	62	96	2	8.00	\$2,573
Total		840	144	528	840	2,676	351,551	938	7.04	\$7,030,579

Notes to openings:

SECTION 15-A

1. June 19-22: open south of the latitude of the southernmost tip of Talsani Island.
2. June 26-28: open south of the latitude of the southernmost tip of Seduction Point.
3. July 3-6: open in the waters of Lynn Canal south of the latitude of the southernmost tip of Seduction Point through 12:00 noon, Tuesday, July 5 and in the waters of Chilkoot Inlet north of the latitude of Mud Bay Point ( Flat Bay Point )through 12:00 noon, Wednesday, July 6.
4. July 10-13: open in the waters of Lynn Canal south of the latitude of the southernmost tip of Seduction Point through 12:00 noon, Tuesday, July 12 and in the waters of Chilkoot Inlet north of the latitude of Mud Bay Point ( Flat Bay Point ) through 12:00 noon, Wednesday, July 13; Lutak Inlet closed north and west of a point from 59°18' N. latitude, 135°30'42" W. longitude to 59°18'42" N latitude, 132°29'48" W. longitude.
5. July 17-19: open in the waters of Lynn Canal south of the latitude of the southernmost tip of Seduction Point and in the waters of Chilkoot Inlet north of the latitude of Mud Bay Point (Flat Bay Point); Lutak Inlet closed same as on July 10-13.
6. July 24-27: open in the waters of Lynn Canal south of the latitude of the southernmost tip of Talsani Island through 12:00 noon, Tuesday, July 26 and in the waters of Chilkoot Inlet north of the latitude of Mud Bay Point (Flat Bay Point) through 12:00 noon, Wednesday, July 27; Lutak Inlet closed same as on July 10-13.

-Continued-

Table 5. (page 2 of 2)

7. July 31 - August 2: open in the waters of Lynn Canal south of the latitude of the southernmost tip of Seduction Point and in the waters of Chilkoot Inlet north of the latitude of Mud Bay Point (Flat Bay Point); Lutak Inlet closed same as on July 10-13.
8. August 8-10 and 14-15: open in the waters of Lynn Canal south of the latitude of the southernmost tip of Talsani Island and in the waters of Chilkoot Inlet north of the latitude of Mud Bay Point (Flat Bay Point) with Lutak Inlet closed same as on July 10-13.
9. August 21-24: open in the waters of Lynn Canal south of the latitude of the southernmost tip of Talsani Island through 12:00 noon, Tuesday, August 23; gillnet mesh restricted to a minimum of not less than six and one-quarter inches; open in the waters of Chilkoot Inlet north of the latitude of Mud Bay Point (Flat Bay Point) through 12:00 noon, Wednesday, August 25; Lutak Inlet open to the mouth of the Chilkoot River and no mesh size restriction.
10. August 28-31: open in the waters of Lynn Canal south of the latitude of the southernmost tip of Seduction Point through 12:00 noon, Tuesday, August 30 with gill net mesh restricted to a minimum of not less than six and one-quarter inches; open in the waters of Chilkoot Inlet north of the latitude of Mud Bay Point (Flat Bay Point) through 12:00 noon, Wednesday, August 31; Lutak Inlet open to the mouth of the Chilkoot River and no mesh size restriction.
11. September 4-6: open with Chilkat Inlet closed north of the latitude of Seduction Point, Chilkoot Inlet closed north of the latitude of the Katzehin River flats buoy; gill net mesh restricted to a minimum of not less than six and one-quarter inches.
12. September 11-13: open with Chilkat Inlet closed north of a line from the Glacier Point marker to the northernmost tip of Twin Coves at 59°06'35" N. latitude, 135°21'42" W. longitude, Chilkoot Inlet closed north of the latitude of Mud Bay Point (Flat Bay Point); gill net mesh restricted to a minimum of not less than six and one-quarter inches.
13. September 18-20: open with Chilkat Inlet closed north of the latitude of the northernmost tip of Kochu Island and Chilkoot Inlet closed the same as on September 11-13.
14. September 25-26: open with Chilkat Inlet the same as on September 18-20 and Chilkoot Inlet closed north of the latitude of Seduction Point.
15. October 2-3: open with Chilkat Inlet the same as on September 11-13 and Chilkoot Inlet closed the same as on September 25-26.

SECTION 15-B

1. June 26-28 and July 3-5 and 10-12: open south of the latitude of the Point St. Mary.

SECTION 15-C

1. June 26-28, July 3-5, 10-12: open within two nautical miles of the western shore of Lynn Canal.
2. July 24-26, July 31 - August 2: open within two nautical miles of the western shore of Lynn Canal north of 58°40'48" N. latitude (the latitude of Point Bridget); Endicott River closed within a radius of one nautical mile of the river mouth and William Henry Bay closed within a radius of one-half nautical mile of the mouth of the Beardslee River.
3. August 21-23: open in the entire section; gill net mesh restricted a minimum of not less than six and one-quarter inches.
4. August 28-30, September 4-6 and 11-13: open south of the latitude of Point Bridget; gill net mesh restricted a minimum of not less than six and one-quarter inches.
5. September 18-20: open south of the latitude of Point Bridget.
6. September 25-26 and October 2-3: open within two nautical miles of the western shore of Lynn Canal.

Table 6. Weekly stock contributions in numbers and percents, and associated standard errors in the Lynn Canal (District 115) sockeye salmon catch by statistical week for 1988. Estimates given are from the visual classification technique.

Statistical Week	Chilkoot Lake			Chilkat Lake			Berners Bay/ Chilkat Mainstem			Total Catch
	Catch	SE	Percent	Catch	SE	Percent	Catch	SE	Percent	
26	4,591	167	57.8%	2,379	177	30.0%	968	155	12.2%	7,938
27	5,961	331	37.1%	3,482	288	21.7%	6,611	371	41.2%	16,054
28	14,662	470	59.9%	4,920	393	20.1%	4,889	423	20.0%	24,471
29	25,161	703	66.5%	7,598	607	20.1%	5,100	617	13.5%	37,859
30	22,721	444	83.6%	3,405	357	12.5%	1,057	329	3.9%	27,183
31	48,921	963	83.3%	8,507	804	14.5%	1,316	641	2.2%	58,744
32	40,664	617	85.4%	6,497	606	13.6%	442	145	0.9%	47,603
33	43,995	982	76.2%	13,369	893	23.2%	348	513	0.6%	57,712
34	14,181	413	67.4%	6,771	412	32.2%	101	59	0.5%	21,053
35	21,734	399	76.1%	6,728	397	23.6%	100	53	0.4%	28,562
36	8,951	294	57.0%	6,637	278	42.2%	122	106	0.8%	15,710
37	1,931	98	35.3%	3,518	96	64.3%	23	26	0.4%	5,472
38-41	495	51	15.5%	2,662	51	83.4%	33	16	1.0%	3,190
Total	253,968	1,937	72.2%	76,473	1,729	21.8%	21,110	1,242	6.0%	351,551

Table 7. Comparison of age-1.3 stock contribution and standard error estimates from three analyses.

Stock contribution estimates by stock group and method <sup>a</sup>										
Stat Week	Chilkoot Lake			Chilkat Lake			Berners Bay/Chilkat Mainstem			Age-1.3 Total
	VC	LDF	ALLVC	VC	LDF	ALLVC	VC	LDF	ALLVC	
26	4,171	4,083	3,860	1,873	1,386	2,109	717	1,291	791	6,760
27	4,569	6,782	5,106	2,815	2,188	2,431	5,413	3,826	5,260	12,797
28	11,610	12,522	12,371	4,655	3,173	3,249	2,736	3,306	3,382	19,002
29	21,553	24,395	20,961	6,987	4,855	5,122	1,066	355	3,523	29,606
30	19,533	19,204	19,183	2,340	2,669	2,012	0	0	678	21,873
31	35,634	36,587	38,668	6,763	6,763	4,118	954	0	564	43,350
32	29,445	30,081	31,756	3,953	3,417	1,742	100	0	0	33,498
33	33,181	33,822	33,822	1,711	1,818	1,711	748	0	107	35,640
34	9,834	10,112	10,219	844	566	459	0	0	0	10,678
35	16,346	16,215	16,084	33	164	295	0	0	0	16,379
36	6,008	6,119	6,113	12	68	0	167	0	74	6,187
37	1,295	1,289	1,292	3	28	12	20	0	13	1,317
38-41	335	350	348	20	21	16	25	9	16	380
Total	193,512	201,564	199,783	32,008	27,115	23,276	11,946	8,788	14,408	237,467
95% Confidence Intervals										
Upper	200,682	208,853	203,964	38,188	32,338	25,677	15,799	13,312	16,678	
Lower	186,342	194,275	195,602	25,828	21,892	20,875	8,093	4,264	12,138	

Standard errors of stock contribution estimates by stock group and method

Stat Week	Chilkoot Lake			Chilkat Lake			Berners Bay/Chilkat Mainstem		
	VC	LDF	ALLVC	VC	LDF	ALLVC	VC	LDF	ALLVC
26	358	471	167	346	285	172	278	440	149
27	696	955	321	629	539	260	648	949	359
28	1,029	1,350	475	935	744	347	857	1,256	385
29	1,500	1,972	724	1,456	1,128	541	948	1,628	566
30	783	781	493	723	723	308	0	0	307
31	2,021	1,744	1,096	1,825	1,609	655	564	0	607
32	1,444	1,213	774	1,242	1,041	404	771	0	0
33	1,449	1,165	1,074	964	786	501	892	0	499
34	503	468	433	322	247	161	0	0	0
35	469	446	443	213	164	164	0	0	0
36	314	274	284	80	62	0	161	0	99
37	89	84	87	17	19	10	30	0	24
38-41	45	53	43	17	15	12	20	32	13
Total	3,658	3,719	2,133	3,153	2,665	1,225	1,966	2,308	1,158

<sup>a</sup> Linear discriminant function (LDF) and visual classification (VC) techniques were applied to approximately 100 scales per strata. Those methods are compared to visual classification of all age-1.3 scales (ALLVC). ALLVC estimates are those reported elsewhere in this report for final stock contributions.

Table 8. Catch, escapement, total run, and exploitation rates of Lynn Canal (District 115) sockeye salmon by age class and system, 1988.

System		Brood Year and Age Class														Total	
		1986		1985		1984			1983			1982			1981		
		0.1	0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4	3.3		
Chilkoot Lake																	
Catch	Number				19,022	34		199,783	8,458	947	25,347		377		253,968		
	Percent				7.5	<0.1		78.7	3.3	0.4	10.0		0.1		100.0		
Escapement	Number				3,266			63,435	2,109	1,087	11,035		290	52	81,274		
	Percent				4.0			78.1	2.6	1.3	13.6		0.4	0.1	100.0		
Total Run	Number				22,288	34		263,218	10,567	2,034	36,382		667	52	335,242		
	Percent				6.6	0.0		78.5	3.2	0.6	10.9		0.2	<0.1	100.0		
Expl. Rate					0.85			0.76	0.80	0.47	0.70		0.57	0.00	0.76		
Chilkat Lake																	
Catch	Number				2,137	21		23,276	12,443	104	38,055	200	34	203	76,473		
	Percent				2.8	<0.1		30.4	16.3	0.1	49.8	0.3	<0.1	0.3	100.0		
Escapement	Number				17	134		7,340	3,333	21	16,647	58	6	37	27,593		
	Percent				0.1	0.5		26.6	12.1	0.1	60.3	0.2	<0.1	0.1	100.0		
Total Run	Number				2,271	21		30,616	15,776	125	54,702	258	40	240	104,049		
	Percent				2.2	<0.1		29.4	15.2	0.1	52.6	0.2	<0.1	0.2	100.0		
Expl. Rate					0.94	1.00		0.76	0.79	0.83	0.70	0.78	0.85	0.85	0.73		
Berners Bay/ Chilkat Mainstem																	
Catch	Number		70		5,438	1,049		95	14,408		50				21,110		
	Percent		0.3		25.8	5.0		0.5	68.3		0.2				100.0		
Lace River Escapement	Percent				7.3	10.1			82.6						100.0		
	Peak Number <sup>a</sup>														600		
Chilkat Mainstem Escapement	Percent	1.1	36.6	1.1	32.3	23.7		5.4							100.0		
	Peak Number <sup>b</sup>														1,450		

<sup>a</sup> Peak escapement count, not total enumeration. Peak daily counts of sockeye salmon were: 300 in the Lace River on 8/4 and 300 in the Antler/Gilkey River on 8/4.

<sup>b</sup> Peak escapement count, not total enumeration. Peak daily counts of sockeye salmon were: 250 at Mosquito Lake on 8/15, 450 in the Mule Meadows area on 8/15, 550 at Bear Flats on 10/12, and 200 in the Kelsall River on 8/15.

Table 9. Average length of sockeye salmon catches and escapements in Lynn Canal (District 115) by sex and age class, 1988.

		Brood Year and Age Class									
		1984		1983		1982			1981		Total
		0.3	1.2	1.3	2.2	1.4	2.3	3.2	2.4	3.3	
Chilkat Lake											
District 115 Catch											
Male	Avg. Length		540	610	557	630	610	567		624	602
	Std. Error		5.3	2.9	3.5		1.4	2.5		2.5	1.4
	Sample Size		7	116	123	1	386	2		2	637
Female	Avg. Length		535	591	549		600	581		569	588
	Std. Error		8.4	1.7	4.1		1.4	5.2		23.2	1.3
	Sample Size		6	168	69		339	4		3	589
All Fish	Avg. Length		539	599	552	630	605	574		583	594
	Std. Error		4.6	1.6	2.7		1.0	4.4		18.4	1.0
	Sample Size		13	285	193	1	725	6		5	1,228
Escapement											
Male	Avg. Length	595	546	619	567	675	633	590		670	622
	Std. Error	10.0	4.9	0.9	3.1	20.0	1.1				0.8
	Sample Size	2	13	717	107	2	594	1		1	1,437
Female	Avg. Length		518	600	559	580	608	555	580		601
	Std. Error		40.4	1.6	4.6	30.0	1.8				1.4
	Sample Size		3	189	44	2	238	1	1		478
All Fish	Avg. Length	595	538	611	565	617	625	573	580	670	616
	Std. Error	10.0	9.0	0.9	2.6	27.4	1.0	17.5			0.8
	Sample Size	2	16	906	151	4	832	2	1	1	1,915
Chilkoot Lake											
District 115 Catch											
Male	Avg. Length		521	597	511	591	590		580		584
	Std. Error		4.1	0.7	4.4	14.5	2.4		34.4		1.0
	Sample Size		112	934	50	7	137		3		1,243
Female	Avg. Length		498	580	506	607	582		577		575
	Std. Error		5.4	0.6	5.6	13.9	1.5		30.0		0.8
	Sample Size		48	1,111	34	5	171		2		1,371
All Fish	Avg. Length		515	588	507	604	586		577		580
	Std. Error		3.4	0.5	3.5	10.0	1.4		21.6		0.7
	Sample Size		160	2,048	84	12	309		5		2,618
Escapement											
Male	Avg. Length		490	587	498	608	584		598	565	579
	Std. Error		4.9	0.8	5.2	7.1	1.9		4.0		1.0
	Sample Size		89	1,126	52	28	176		6	1	1,478
Female	Avg. Length		490	568	490	600	563		566		565
	Std. Error		8.7	0.7	8.9	11.3	1.8		27.5		0.8
	Sample Size		28	946	19	10	174		3		1,180
All Fish	Avg. Length		490	578	495	605	574		589	565	573
	Std. Error		4.2	0.6	4.5	6.1	1.4		9.2		0.7
	Sample Size		117	2,072	71	38	350		9	1	2,658

-Continued-

Table 9. (page 2 of 2)

		Brood Year and Age Class							
		1986	1985		1984		1983		
		0.1	0.2	1.1	0.3	1.2	0.4	1.3	Total
Berners Bay/Chilkat Mainstem									
District 115 Catch									
Male	Avg. Length				588	521	615	594	588
	Std. Error				4.5	10.6		2.2	2.3
	Sample Size				35	10	1	130	176
Female	Avg. Length				582	505	610	577	577
	Std. Error				4.0	9.0		2.2	2.0
	Sample Size				27	2	1	117	147
All Fish	Avg. Length				586	519	614	587	583
	Std. Error				3.1	9.0	2.5	1.6	1.6
	Sample Size				62	12	2	247	323
Lace River Escapement									
Male	Avg. Length				578	498		595	584
	Std. Error				8.7	11.3		3.4	4.8
	Sample Size				5	6		49	60
Female	Avg. Length				555	511		553	549
	Std. Error				17.3	14.8		3.5	3.8
	Sample Size				3	5		40	48
All Fish	Avg. Length				569	504		576	568
	Std. Error				8.8	8.9		3.3	3.6
	Sample Size				8	11		89	108
Chilkat River Mainstem Escapement									
Male	Avg. Length	390	427	385	563	451		567	452
	Std. Error		4.5		23.0	7.6		27.4	7.0
	Sample Size	1	34	1	6	21		3	66
Female	Avg. Length				551	480		523	547
	Std. Error				4.6			2.5	5.0
	Sample Size				24	1		2	27
All Fish	Avg. Length	390	427	385	554	453		549	480
	Std. Error		4.5		5.7	7.4		18.5	6.8
	Sample Size	1	34	1	30	22		5	93

Table 10. Cumulative migratory time densities, mean dates of arrival, and variance for major age classes of sockeye salmon stocks which returned to Lynn Canal, 1988.

Catches in District 115		Stock Group and Age Class														
Statistical Week	Dates	Chilkoot Lake					Chilkat Lake					Berners/Mainstem				
		1.2	1.3	2.2	2.3	Total	1.2	1.3	2.2	2.3	Total	0.3	1.3	Total		
26	6/19-6/25	0.004	0.019	0.003	0.023	0.018	0.011	0.091	0.011	0.002	0.031	0.028	0.055	0.046		
27	6/26-7/02	0.014	0.045	0.011	0.044	0.042	0.028	0.195	0.046	0.017	0.077	0.213	0.420	0.359		
28	7/03-7/09	0.058	0.107	0.044	0.085	0.099	0.158	0.335	0.099	0.036	0.141	0.429	0.655	0.591		
29	7/10-7/16	0.162	0.212	0.091	0.153	0.198	0.343	0.555	0.126	0.082	0.240	0.656	0.899	0.832		
30	7/17-7/23	0.250	0.308	0.139	0.207	0.288	0.377	0.641	0.146	0.110	0.285	0.705	0.946	0.882		
31	7/24-7/30	0.463	0.501	0.342	0.375	0.480	0.569	0.818	0.218	0.190	0.396	0.843	0.985	0.945		
32	7/31-8/06	0.674	0.660	0.478	0.517	0.641	0.757	0.893	0.287	0.280	0.481	0.915	0.985	0.966		
33	8/07-8/13	0.867	0.830	0.699	0.693	0.814	0.956	0.966	0.524	0.496	0.656	0.960	0.993	0.982		
34	8/14-8/20	0.909	0.881	0.801	0.775	0.870	0.956	0.986	0.676	0.610	0.745	0.978	0.993	0.987		
35	8/21-8/27	0.970	0.961	0.898	0.917	0.955	0.980	0.999	0.788	0.738	0.833	0.997	0.993	0.992		
36	8/28-9/03	0.993	0.992	0.992	0.980	0.990	0.997	0.999	0.902	0.873	0.920	0.997	0.998	0.997		
37	9/04-9/10	0.999	0.998	0.999	0.995	0.998	1.000	0.999	0.958	0.945	0.966	0.998	0.999	0.998		
38-41	9/11-10/08	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
Mean Stat. Week		31.6	31.5	32.5	32.2	31.6	30.9	29.5	33.2	33.6	32.2	28.3	27.1	27.4		
Mean Calendar Date		7/31	7/31	8/07	8/05	7/31	7/26	7/17	8/12	8/14	8/5	7/08	6/30	7/02		
Variance		3.9	5.4	4.6	6.3	5.4	4.4	4.8	7.6	6.5	9.5	4.5	2.1	3.1		
Std. Error		2.0	2.3	2.1	2.5	2.3	2.1	2.2	2.8	2.5	3.1	2.1	1.4	1.8		

Escapements

		Stock Group and Age Class											
Mid-Period Dates	Mid-Statistical Week	Chilkoot Lake					Mid-Period Dates	Mid-Statistical Week	Chilkat Lake				
		1.2	1.3	2.2	2.3	Total			1.3	2.2	2.3	Total	
6/13	24.7	0.006	0.011	0.018	0.026	0.014	7/04	27.7	0.338	0.050	0.037	0.120	
6/22	26.0	0.010	0.030	0.031	0.045	0.033	7/28	31.1	0.549	0.059	0.060	0.191	
6/29	27.0	0.199	0.324	0.177	0.321	0.314	8/01	31.7	0.746	0.070	0.085	0.262	
7/04	27.7	0.370	0.396	0.276	0.362	0.386	8/08	32.7	0.769	0.070	0.087	0.269	
7/11	28.7	0.461	0.450	0.335	0.405	0.440	8/18	34.1	0.819	0.074	0.098	0.290	
7/19	29.9	0.522	0.483	0.371	0.420	0.472	8/24	35.0	0.834	0.084	0.106	0.300	
7/26	30.9	0.604	0.550	0.420	0.486	0.538	9/06	36.9	0.990	0.351	0.488	0.606	
8/02	31.9	0.733	0.623	0.490	0.543	0.610	9/18	38.6	1.000	0.609	0.730	0.787	
8/10	33.0	0.805	0.692	0.593	0.608	0.680	9/28	40.0	1.000	0.982	0.977	0.984	
8/17	34.0	0.890	0.821	0.838	0.759	0.814	10/30	44.6	1.000	1.000	1.000	1.000	
8/23	34.9	0.969	0.898	0.936	0.861	0.895							
9/04	36.6	1.000	1.000	1.000	1.000	1.000							
Mean Stat. Week		30.3	30.7	31.5	31.2	30.8			31.3	38.0	37.6	36.0	
Mean Calendar Date		7/22	7/25	7/31	7/29	7/26			7/29	9/14	9/11	8/31	
Variance		8.7	12.5	10.8	14.1	12.7			10.5	9.0	8.7	17.3	
Std. Error		2.9	3.5	3.3	3.8	3.6			3.2	3.0	3.0	4.2	

Table 11. Age composition of sockeye salmon in the Chilkoot Lake total run from 1976 to 1988.

Part A - In Numbers of Fish

Year	Age Class										Total	By Freshwater Age Class		
	1.1	1.2	2.1	1.3	2.2	1.4	2.3	3.2	2.4	3.3		1.	2.	3.
1976	760	30,332		48,038	9,799		44,820				133,749	79,130	54,619	
1977		8,149		154,743	6,066	267	41,139				210,364	163,159	47,205	
1978		6,167		30,258	2,269	78	10,946				49,718	36,503	13,215	
1979		37,827		92,557	7,413		27,925	88			165,810	130,384	35,338	88
1980		8,933		68,923	9,523	25	29,641	313			117,358	77,881	39,164	313
1981	24	9,556		96,992	2,870	270	17,380		22	50	127,164	106,842	20,272	50
1982		30,050		200,862	2,024	1,420	13,097	4		108	247,565	232,332	15,121	112
1983	89	16,866	45	223,061	1,981	980	78,744		46		321,812	240,996	80,816	
1984		10,044		297,669	659	1,403	22,295		139		332,209	309,116	23,093	
1985	196	17,011	7	169,248	3,154	4,342	30,390	56	365	30	224,799	190,797	33,916	86
1986	43	18,293		145,214	3,452	1,016	29,935		325	176	198,454	164,566	33,712	176
1987	27	27,150		290,688	4,574	684	106,465		300	292	430,180	318,549	111,339	292
1988		22,288	34	263,218	10,567	2,034	36,382		667	52	335,242	287,540	47,650	52
Average	190	18,667	29	160,113	4,950	1,138	37,628	115	266	118	222,648	179,830	42,728	90

Part B - Percent of Total

1976	0.6	22.7		35.9	7.3		33.5				100.0	59.2	40.8	
1977		3.9		73.6	2.9	0.1	19.6				100.0	77.6	22.4	
1978		12.4		60.9	4.6	0.2	22.0				100.0	73.4	26.6	
1979		22.8		55.8	4.5		16.8	0.1			100.0	78.6	21.3	0.1
1980		7.6		58.7	8.1		25.3	0.3			100.0	66.4	33.4	0.3
1981		7.5		76.3	2.3	0.2	13.7				100.0	84.0	15.9	
1982		12.1		81.1	0.8	0.6	5.3				100.0	93.8	6.1	
1983		5.2		69.3	0.6	0.3	24.5				100.0	74.9	25.1	
1984		3.0		89.6	0.2	0.4	6.7				100.0	93.0	7.0	
1985	0.1	7.6		75.3	1.4	1.9	13.5		0.2		100.0	84.9	15.1	
1986		9.2		73.2	1.7	0.5	15.1		0.2	0.1	100.0	82.9	17.0	0.1
1987		6.3		67.6	1.1	0.2	24.7		0.1	0.1	100.0	74.1	25.9	0.1
1988		6.6		78.5	3.2	0.6	10.9		0.2		100.0	85.8	14.2	
Average	0.1	9.8		68.9	3.0	0.5	17.8	0.1	0.1	0.0	100.0	79.1	20.8	0.0

Part C - Exploitation Rates by Age Class

1976		0.27		0.44	0.33		0.67				0.47	0.37	0.61	
1977		0.32		0.57	0.28	0.42	0.49				0.54	0.56	0.47	
1978		0.36		0.28	0.14	1.00	0.30				0.29	0.29	0.27	
1979		0.23		0.51	0.19		0.45	0.22			0.42	0.43	0.40	0.22
1980		0.08		0.21	0.05	0.12	0.18	0.06			0.18	0.19	0.15	0.06
1981		0.10		0.40	0.06	0.27	0.20		1.00	1.00	0.34	0.38	0.18	1.00
1982		0.35		0.60	0.75	0.31	0.93	1.00		1.00	0.58	0.56	0.91	1.00
1983		0.42		0.78	0.36	0.75	0.74		1.00		0.75	0.76	0.73	
1984		0.53		0.71	0.48	0.30	0.62		1.00		0.70	0.70	0.62	
1985	0.76	0.51	1.00	0.73	0.44	0.62	0.64	0.18	0.39	1.00	0.69	0.71	0.62	0.47
1986		0.38		0.59	0.39	0.51	0.51		0.68	0.69	0.56	0.57	0.50	0.69
1987	1.00	0.71		0.78	0.54	0.60	0.79		0.53	0.75	0.78	0.78	0.78	0.75
1988		0.85	1.00	0.76	0.80	0.47	0.70		0.57		0.76	0.76	0.72	0.00
Average	0.29	0.39	0.67	0.57	0.37	0.49	0.56	0.36	0.74	0.74	0.54	0.54	0.53	0.52

Table 12. Age composition of sockeye salmon in the Chilkat Lake total run from 1976 to 1988.

Part A - In Numbers of Fish

Year	Age Class												Total	By Freshwater Age Class			
	1.1	0.3	1.2	2.1	1.3	2.2	3.1	1.4	2.3	3.2	2.4	3.3		1.	2.	3.	
1976	175		5,743	1,050	21,178	65,584			34,535	656		136	129,057	27,096	101,169	792	
1977			2,793		19,708	41,592			18,340				82,433	22,501	59,932	0	
1978			9,715		16,232	84,795			45,651	693			157,086	25,947	130,446	693	
1979			3,975		55,523	98,469			37,782	165		669	196,583	59,498	136,251	834	
1980			3,053		9,184	68,309			35,322	10,160			126,028	12,237	103,631	10,160	
1981			1,717	83	21,729	50,546		56	57,075	933		20	390	23,502	107,724	1,323	
1982	220		3,503	1,550	32,174	69,986			97,129	1,799			896	35,897	168,665	2,695	
1983	967		6,720	4,478	73,011	69,181		95	103,005	435		23	180	80,793	176,687	615	
1984	134	41	2,438	1,756	68,712	88,155		117	51,630	295		83	141	71,401	141,624	436	
1985	444		1,124	2,229	28,755	52,774	125	666	119,535	582		57	23	30,989	174,595	730	
1986			3,995	251	13,852	56,559		22	114,667	2,493		79	390	17,869	171,556	2,883	
1987	711		1,691	1,555	35,487	36,351		27	41,795	645		95	305	37,916	79,796	950	
1988			2,271	21	30,616	15,776		125	54,702	258		40	240	33,012	70,539	498	
1989	132		1,771	38	113,020	95,071		130	89,442	63			254	115,053	184,551	317	
Average	442	41	3,749	1,441	32,782	61,391	125	158	62,398	1,593		57	337	163,380	36,820	124,817	1,739

Part B - Percent of Total

1976	0.1		4.4	0.8	16.4	50.8			26.8	0.5		0.1	100.0	21.0	78.4	0.6
1977			3.4		23.9	50.5			22.2				100.0	27.3	72.7	0.0
1978			6.2		10.3	54.0			29.1	0.4			100.0	16.5	83.0	0.4
1979			2.0		28.2	50.1			19.2	0.1		0.3	100.0	30.3	69.3	0.4
1980			2.4		7.3	54.2			28.0	8.1			100.0	9.7	82.2	8.1
1981			1.3	0.1	16.4	38.1		0.0	43.1	0.7	0.0	0.3	100.0	17.7	81.3	1.0
1982	0.1		1.7	0.7	15.5	33.8			46.9	0.9		0.4	100.0	17.3	81.4	1.3
1983	0.4		2.6	1.7	28.3	26.8		0.0	39.9	0.2	0.0	0.1	100.0	31.3	68.5	0.2
1984	0.1	0.0	1.1	0.8	32.2	41.3		0.1	24.2	0.1	0.0	0.1	100.0	33.4	66.3	0.2
1985	0.2		0.5	1.1	13.9	25.6	0.1	0.3	57.9	0.3	0.0	0.0	100.0	15.0	84.6	0.4
1986			2.2	0.2	7.2	29.4		0.0	59.4	1.3	0.0	0.2	100.0	9.4	89.1	1.5
1987	0.6		1.4	1.3	29.9	30.6		0.0	35.2	0.5	0.1	0.3	100.0	32.0	67.2	0.8
1988			2.2	0.0	29.4	15.2		0.1	52.6	0.2	0.0	0.2	100.0	31.7	67.8	0.5
1989	0.0		0.6	0.0	37.7	31.7		0.0	29.8	0.0		0.1	100.0	38.4	61.5	0.1
Average	0.2	0.0	2.4	0.7	19.9	38.5	0.1	0.1	37.3	1.1	0.0	0.2	100.0	22.5	76.3	1.2

Part C - Exploitation Rates by Age Class

1976	0.00		0.47	0.00	0.32	0.53			0.42	0.47		1.00	0.46	0.35	0.49	0.56
1977			0.47		0.60	0.43			0.58				0.50	0.58	0.47	
1978			0.33		0.29	0.61			0.64	0.65			0.57	0.31	0.62	0.65
1979			0.89		0.46	0.72			0.39	1.00		0.92	0.59	0.49	0.63	0.93
1980			0.23		0.14	0.22			0.32	0.23			0.24	0.16	0.25	0.23
1981			0.82	1.00	0.53	0.22		0.00	0.42	0.09	1.00	1.00	0.37	0.55	0.33	0.36
1982	0.00		0.54	0.00	0.76	0.45			0.71	0.20		0.29	0.61	0.73	0.59	0.23
1983	0.10		0.44	0.00	0.41	0.37		0.76	0.63	0.45	0.00	0.68	0.48	0.41	0.51	0.52
1984	0.00		0.23	0.00	0.62	0.30		0.40	0.55	0.16	0.57	0.64	0.46	0.61	0.39	0.31
1985	0.00		0.62	0.10	0.78	0.58	0.23	0.76	0.79	0.63	1.00	1.00	0.72	0.76	0.71	0.57
1986			0.60	0.00	0.94	0.90		1.00	0.87	0.85	1.00	0.67	0.88	0.86	0.88	0.82
1987	0.00		0.46	0.00	0.67	0.52		1.00	0.62	0.45	0.98	0.79	0.59	0.65	0.56	0.56
1988			0.94	1.00	0.76	0.79		0.83	0.70	0.78	0.85	0.85	0.73	0.77	0.72	0.81
1989	1.00		0.38	1.00	0.53	0.50		0.00	0.57	0.08		0.18	0.53	0.53	0.53	0.16
Average	0.02		0.54	0.23	0.56	0.51	0.23	0.68	0.59	0.49	0.77	0.78	0.55	0.56	0.55	0.54

Table 13. Brood year returns of sockeye salmon and total return per spawner (TR/S) to Chilkoot Lake, 1976-1983 brood years.

Part A - Numbers of fish by age class.

Year	Esc.	3-Yr			4-Yr		5-Yr		6-Yr			7-Yr		Total Return	TR/S
		1.1	1.2	2.1	1.3	2.2	1.4	2.3	3.2	2.4	3.3				
1971	a				48,038	9,799	267	41,139					99,243		
1972	a		30,332		154,743	6,066	78	10,946					202,165		
1973	a	760	8,149		30,258	2,269		27,925		88			69,449		
1974	a		6,167		92,557	7,413	25	29,641		313	22	50	136,188		
1975	a		37,827		68,923	9,523	270	17,380				108	134,031		
1976	71,297		8,933		96,992	2,870	1,420	13,097		4	46		123,362	1.7	
1977	97,051		9,556		200,862	2,024	980	78,744			139		292,305	3.0	
1978	35,454	24	30,050		223,061	1,981	1,403	22,295			365	30	279,209	7.9	
1979	95,946		16,866	45	297,669	659	4,342	30,390		56	325	176	350,528	3.7	
1980	96,512	89	10,044		169,248	3,154	1,016	29,935			300	292	214,078	2.2	
1981	83,372		17,011	7	145,214	3,452	684	106,465			667	52	273,552	3.3	
1982	102,973	196	18,293		290,688	4,574	2,034	36,382			455	2,277	354,899	3.4	
1983	80,343	43	27,150		263,218	10,567	1,249	117,118					419,345	5.2	
1984	100,417	27	22,288	34											
1985	69,026														
1986	88,024														
1987	95,185														
1988	81,274														
Mean 76-83	82,869	88	17,238	26	210,869	3,660	1,641	54,303	30	328	565	288,410	3.8		
SD 76-83	21,880	71	7,959	20	71,619	3,023	1,162	40,485	28	201	920	91,425	1.9		
Min 76-83	35,454	24	8,933	7	96,992	659	684	13,097	4	46	30	123,362	1.7		
Max 76-83	102,973	196	30,050	45	297,669	10,567	4,342	117,118	56	667	2,277	419,345	7.9		
CV 76-83	26%	81%	46%	78%	34%	83%	71%	75%	93%	61%	163%	32%	51%		

Part B - Brood year return, percent by age class.

Year	1.1	1.2	2.1	1.3	2.2	1.4	2.3	3.2	2.4	3.3	Total
1976	0.0	7.2	0.0	78.6	2.3	1.2	10.6	0.0	0.0	0.0	100.0
1977	0.0	3.3	0.0	68.7	0.7	0.3	26.9	0.0	0.0	0.0	100.0
1978	0.0	10.8	0.0	79.9	0.7	0.5	8.0	0.0	0.1	0.0	100.0
1979	0.0	4.8	0.0	84.9	0.2	1.2	8.7	0.0	0.1	0.1	100.0
1980	0.0	4.7	0.0	79.1	1.5	0.5	14.0	0.0	0.1	0.1	100.0
1981	0.0	6.2	0.0	53.1	1.3	0.3	38.9	0.0	0.2	0.0	100.0
1982	0.1	5.2	0.0	81.9	1.3	0.6	10.3	0.0	0.1	0.6	100.0
1983	0.0	6.5	0.0	62.8	2.5	0.3	27.9	0.0	0.0	0.0	100.0
Mean 76-83	0.0	6.1	0.0	73.6	1.3	0.6	18.2	0.0	0.1	0.1	100.0
SD 76-83	0.0	2.3	0.0	11.0	0.8	0.4	11.6	0.0	0.1	0.2	0.0
Min 76-83	0.0	3.3	0.0	53.1	0.2	0.3	8.0	0.0	0.0	0.0	100.0
Max 76-83	0.1	10.8	0.0	84.9	2.5	1.2	38.9	0.0	0.2	0.6	100.0
CV 76-83	1.5	0.4	2.3	0.2	0.6	0.6	0.6	2.3	0.7	2.1	0.0

<sup>a</sup> Escapements not enumerated.

Table 14. Brood year returns of sockeye salmon and total return per spawner (TR/S) to Chilkat Lake, 1971-1983 brood years.

Brood Year	Esc.	3-Yr		4-Yr			5-Yr			6-Yr			7-Yr		8-Yr	Total Return	TR/S
		1.1	0.3	1.2	2.1	1.3	2.2	3.1	1.4	2.3	3.2	2.4	3.3	4.3			
1971	49,342			3,890		21,178	65,584			18,340						108,992	2.2
1972	51,850			5,743	1,050	19,708	41,592			45,651	693			669		115,106	2.2
1973	50,527	175		2,793		16,232	84,795			37,782	165					141,942	2.8
1974	82,811			9,715		55,523	98,469			35,322	10,160	20	390			209,599	2.5
1975	41,520			3,975		9,184	68,309		56	57,075	933			896		140,428	3.4
1976	69,729			3,053		21,729	50,546			97,129	1,799	23	180			174,459	2.5
1977	41,044			1,717	83	32,174	69,986		95	103,005	435	83	141			207,719	5.1
1978	67,528			3,503	1,550	73,011	69,181		117	51,630	295	57	23			199,367	3.0
1979	80,589	220		6,720	4,478	68,712	88,155		666	119,535	582	79	390			289,537	3.6
1980	95,347	967	41	2,438	1,756	28,755	52,774	125	22	114,667	2,493	95	305			204,438	2.1
1981	84,089	134		1,124	2,229	13,852	56,559		27	41,795	645	40	240	70		116,645	1.4
1982	80,221	444		3,995	251	35,487	36,351		125	54,702	258		184			131,797	1.6
1983	134,207			1,691	1,555	30,616	15,776		130	89,442	63					139,273	1.0
1984	115,269	711		2,271	21												
1985	57,724																
1986	23,947																
1987	48,593																
1988	27,593																
Mean 71-83	71,446	388	41	3,874	1,619	32,782	61,391	125	103	66,621	1,543	44	342	70		167,639	2.6
SD 71-83	25,994	321	0	2,359	1,333	20,559	22,645	0	184	33,591	2,796	35	260	0		52,379	1.0
Min 71-83	41,044	0	0	1,124	0	9,184	15,776	0	0	18,340	63	0	23	0		108,992	1.0
Max 71-83	134,207	967	41	9,715	4,478	73,011	98,469	125	666	119,535	10,160	95	896	70		289,537	5.1
CV 71-83	36%	83%	0%	61%	82%	63%	37%	0%	178%	50%	181%	80%	76%	0%		31%	41%

Part B - Brood year return, percent by age class.

Year	Esc.	1.1	0.3	1.2	2.1	1.3	2.2	3.1	1.4	2.3	3.2	2.4	3.3	4.3	Total
1971	49,342			3.6		19.4	60.2			16.8					100.0
1972	51,850			5.0	0.9	17.1	36.1			39.7	0.6		0.6		100.0
1973	50,527	0.1		2.0		11.4	59.7			26.6	0.1				100.0
1974	82,811			4.6		26.5	47.0			16.9	4.8		0.2		100.0
1975	41,520			2.8		6.5	48.6			40.6	0.7		0.6		100.0
1976	69,729			1.7		12.5	29.0			55.7	1.0		0.1		100.0
1977	41,044			0.8		15.5	33.7			49.6	0.2		0.1		100.0
1978	67,528			1.8	0.8	36.6	34.7		0.1	25.9	0.1				100.0
1979	80,589	0.1		2.3	1.5	23.7	30.4		0.2	41.3	0.2		0.1		100.0
1980	95,347	0.5		1.2	0.9	14.1	25.8	0.1		56.1	1.2		0.1		100.0
1981	84,089	0.1		1.0	1.9	11.9	48.5			35.8	0.6			0.1	100.0
1982	80,221	0.3		3.0	0.2	26.9	27.6		0.1	41.5	0.2		0.1		100.0
1983	134,207			1.2	1.1	22.0	11.3		0.1	64.2					100.0
Mean 1976-83		0.1	<0.1	2.4	0.6	18.8	37.9	<0.1	<0.1	39.3	0.8	<0.1	0.2	<0.1	100.0
SD 1976-83		0.2	<0.1	1.4	0.7	8.2	14.2	<0.1	0.1	14.9	1.3	<0.1	0.2	<0.1	
Min 1976-83		0.1	<0.1	0.8	0.2	6.5	11.3	0.1	0.1	16.8	0.1	<0.1	0.1	<0.1	100.0
Max 1976-83		0.5	<0.1	5.0	1.9	36.6	60.2	0.1	0.2	64.2	4.8	<0.1	0.6	0.1	100.0
CV 1976-83		1.7	3.6	0.6	1.2	0.4	0.4	3.6	1.4	0.4	1.7	1.1	1.2	3.6	

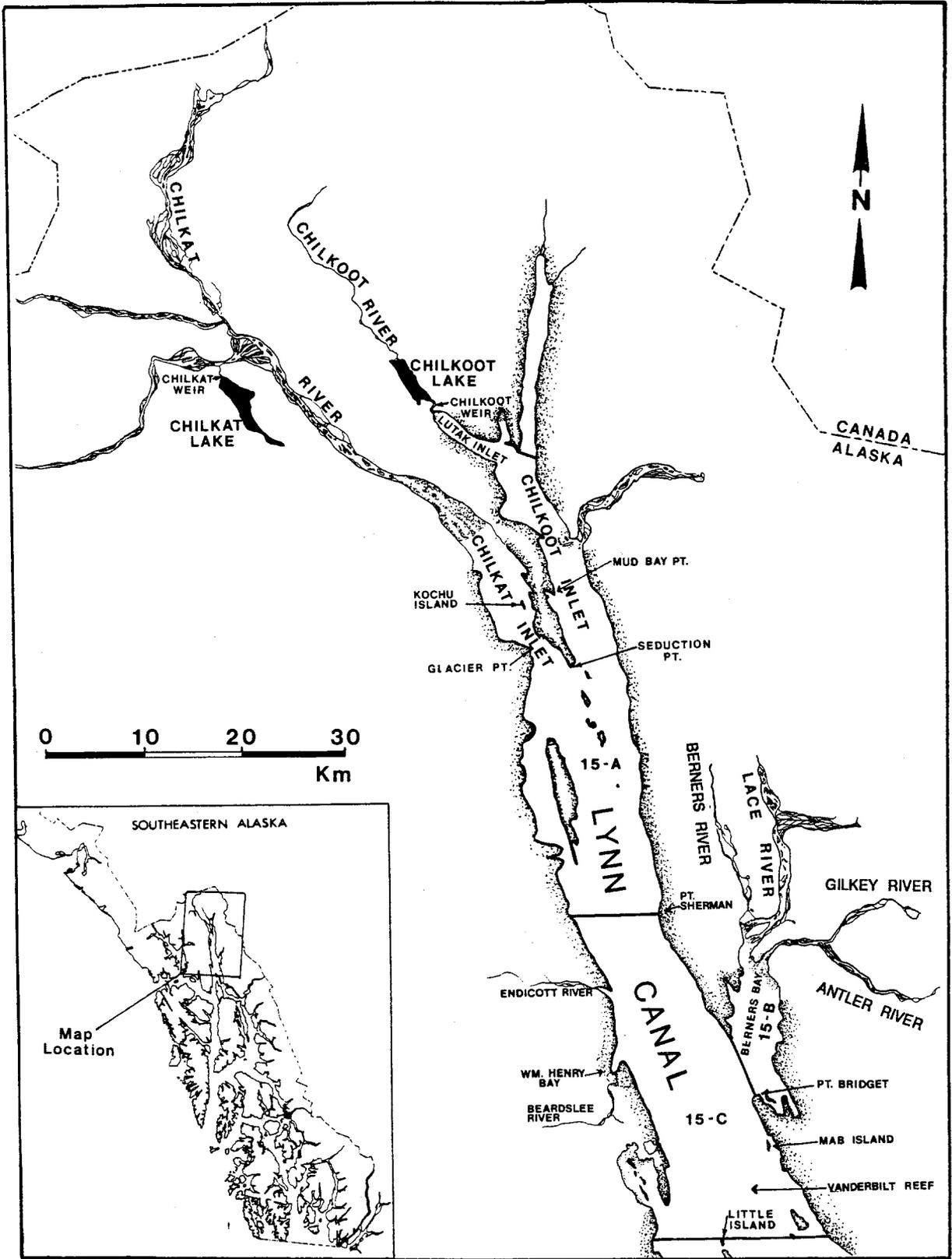


Figure 1. Lynn Canal (District 115) showing the management sections and principal spawning and rearing areas.

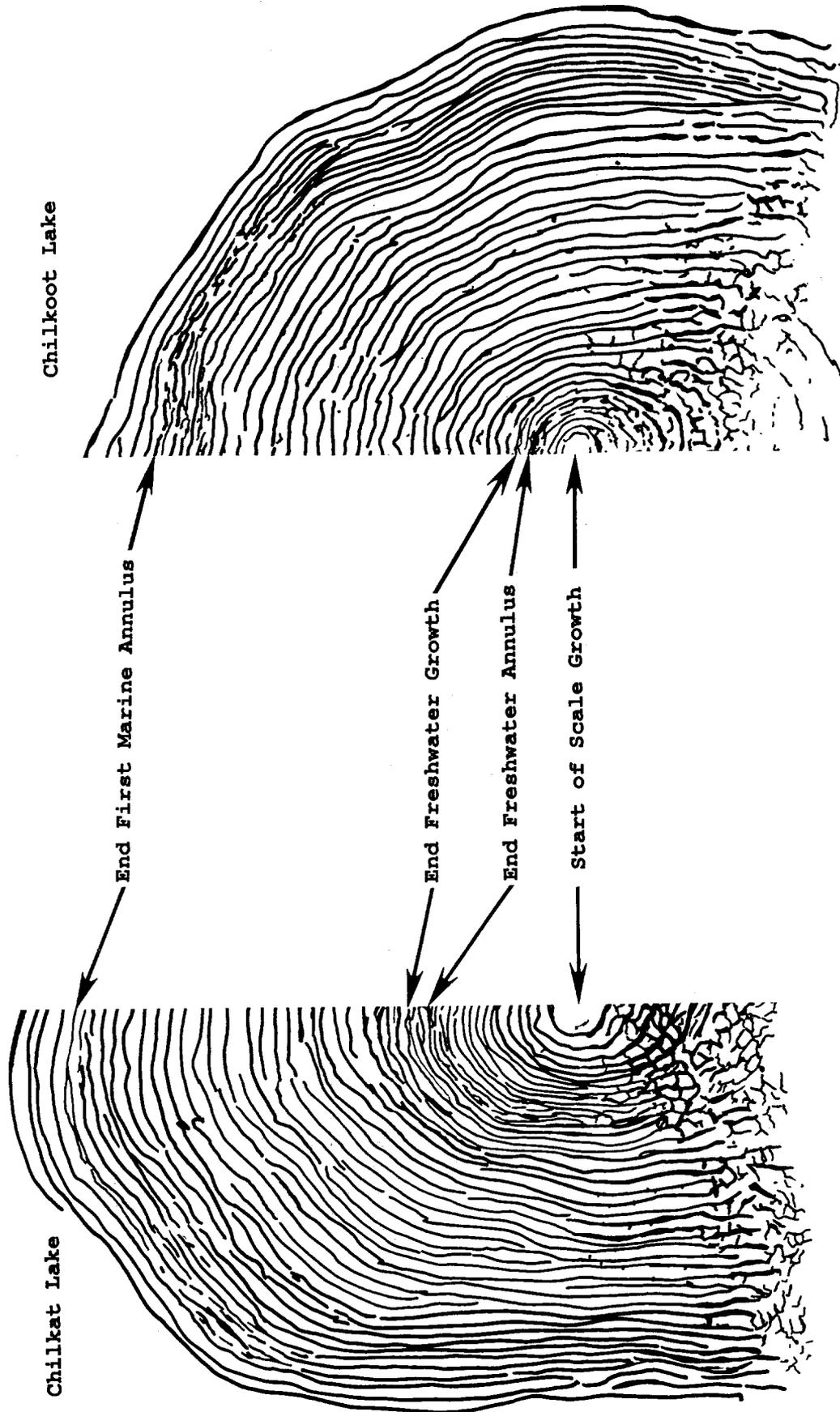


Figure 2. Typical scale patterns for age-1.3 sockeye salmon from Chilkoot and Chilkat Lakes to end of first marine year showing growth zones measured, 1988.

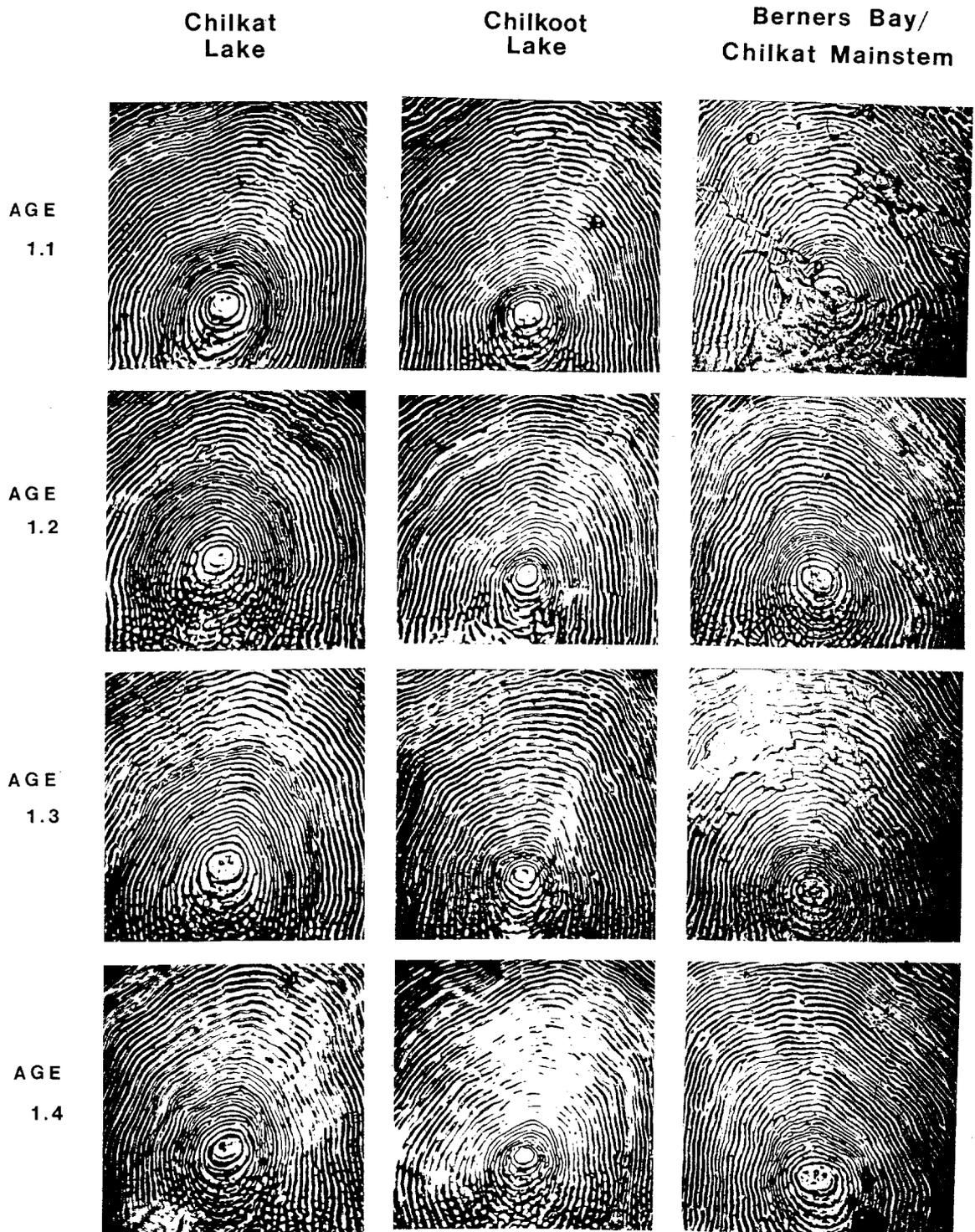


Figure 3. Typical scale patterns of sockeye salmon with one freshwater annulus from Chilkoot Lake, Chilkat Lake, and Berners Bay/Chilkat Mainstem stocks.

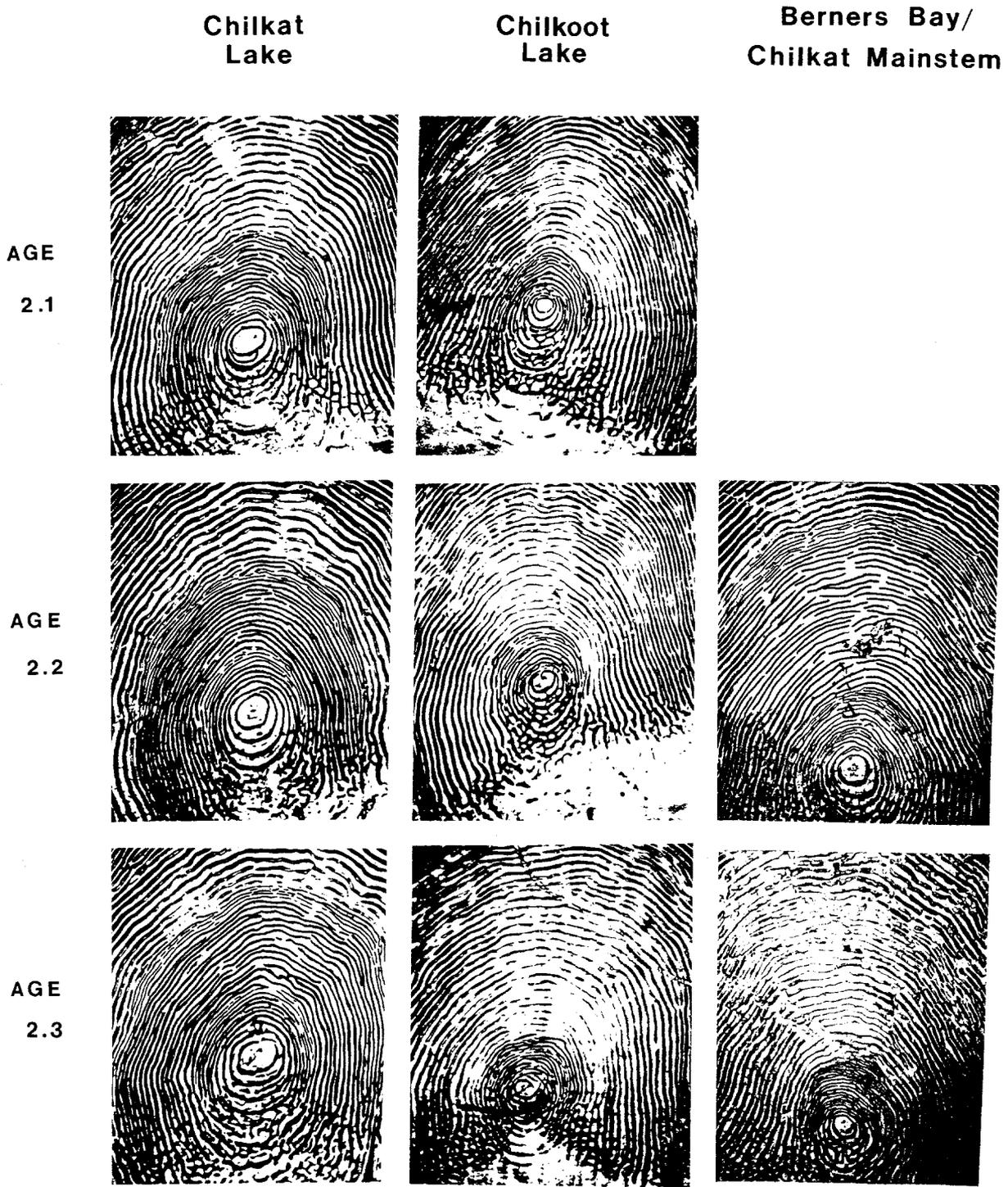


Figure 4. Typical scale patterns of sockeye salmon with two freshwater annuli from Chilkoot Lake, Chilkat Lake, and Berners Bay/Chilkat Mainstem stocks.

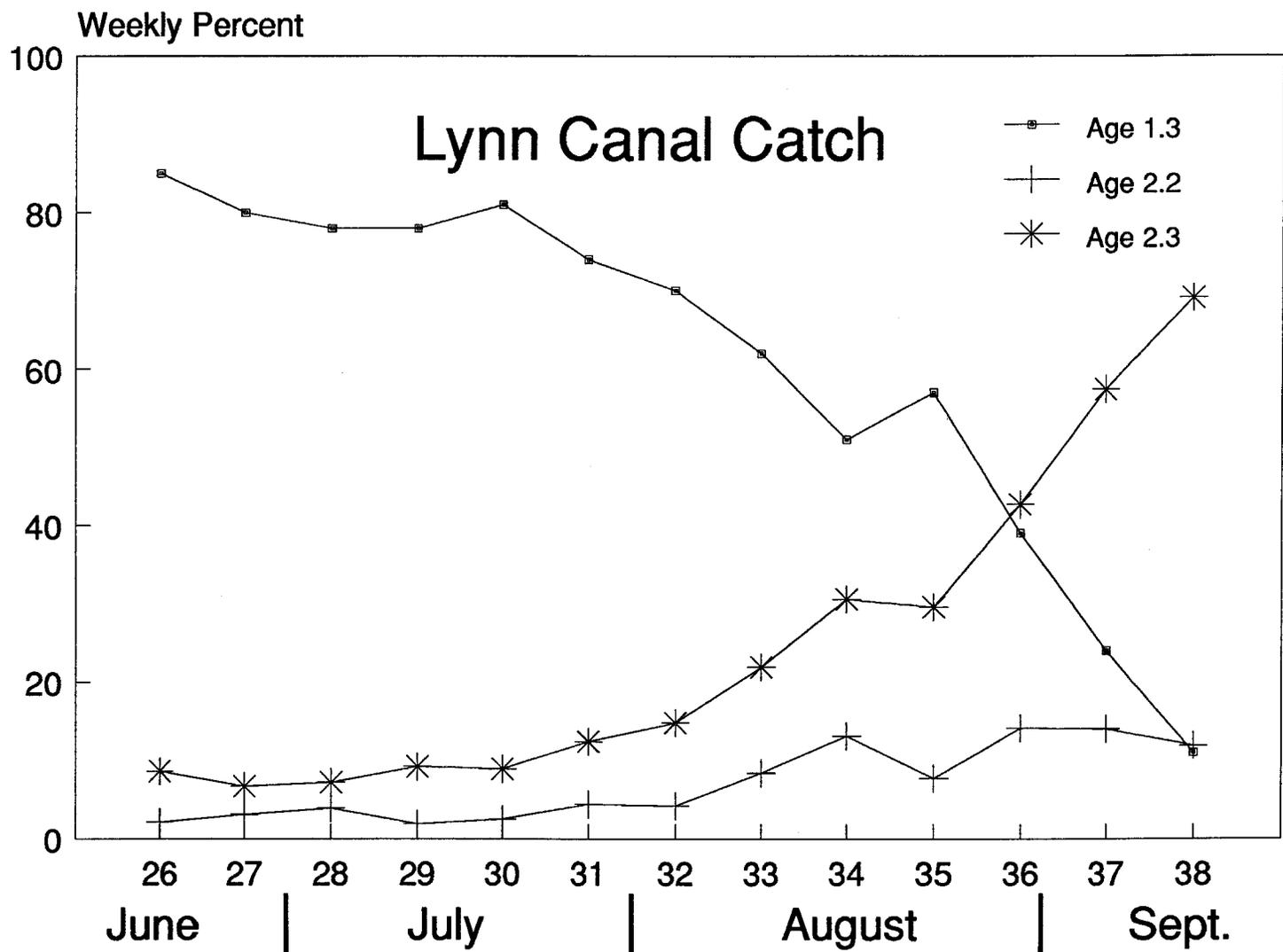


Figure 5. Weekly age composition of sockeye salmon harvested in Lynn Canal, 1988.

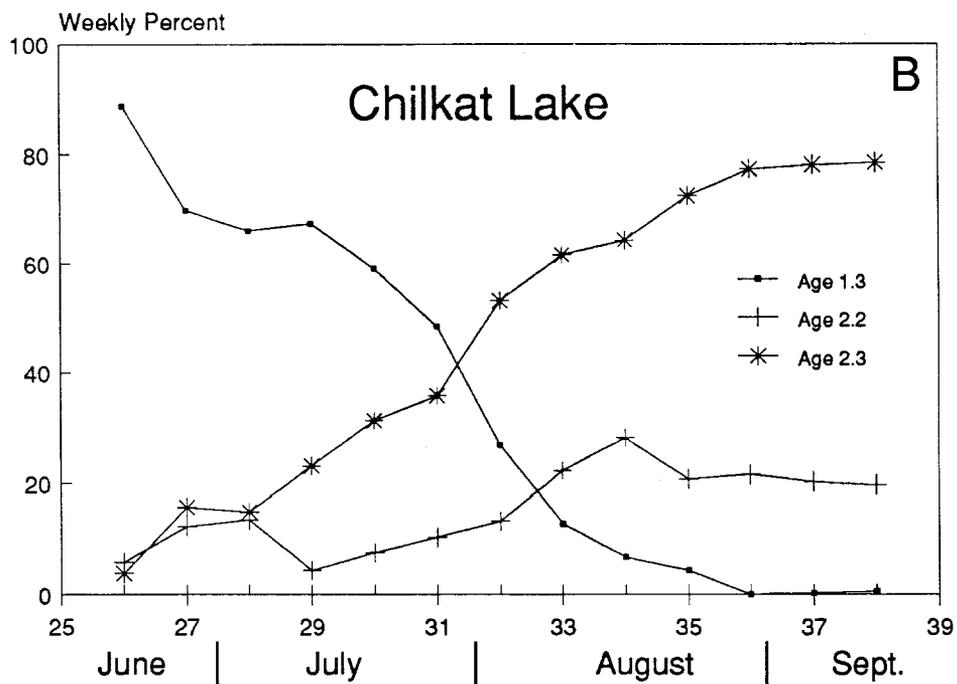
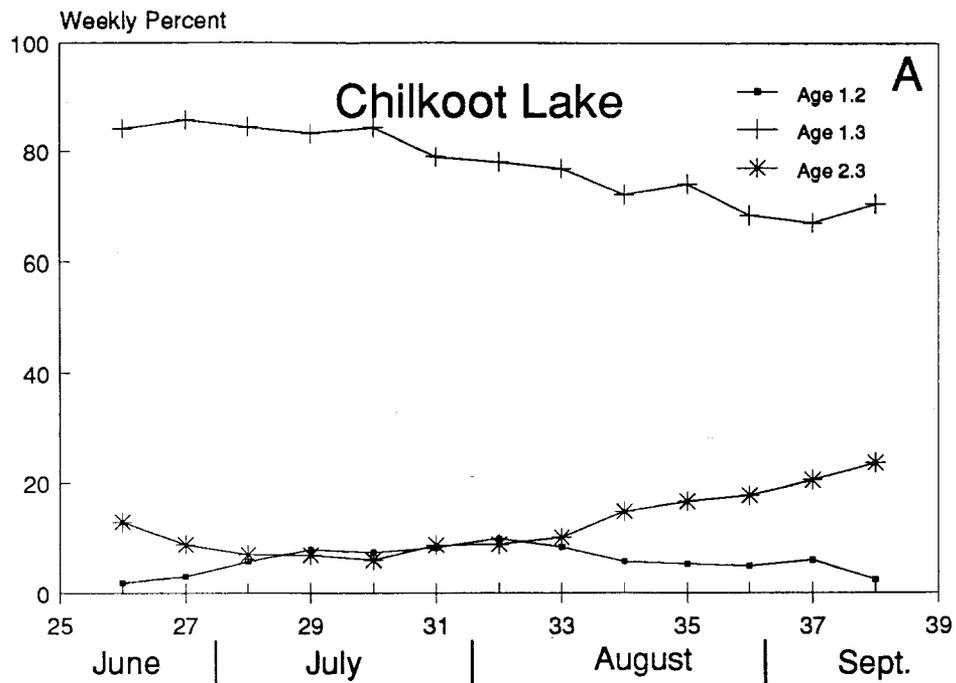


Figure 6. Weekly age composition of Chilkoot (A) and Chilkat Lake (B) sockeye salmon harvested in Lynn Canal, 1988.

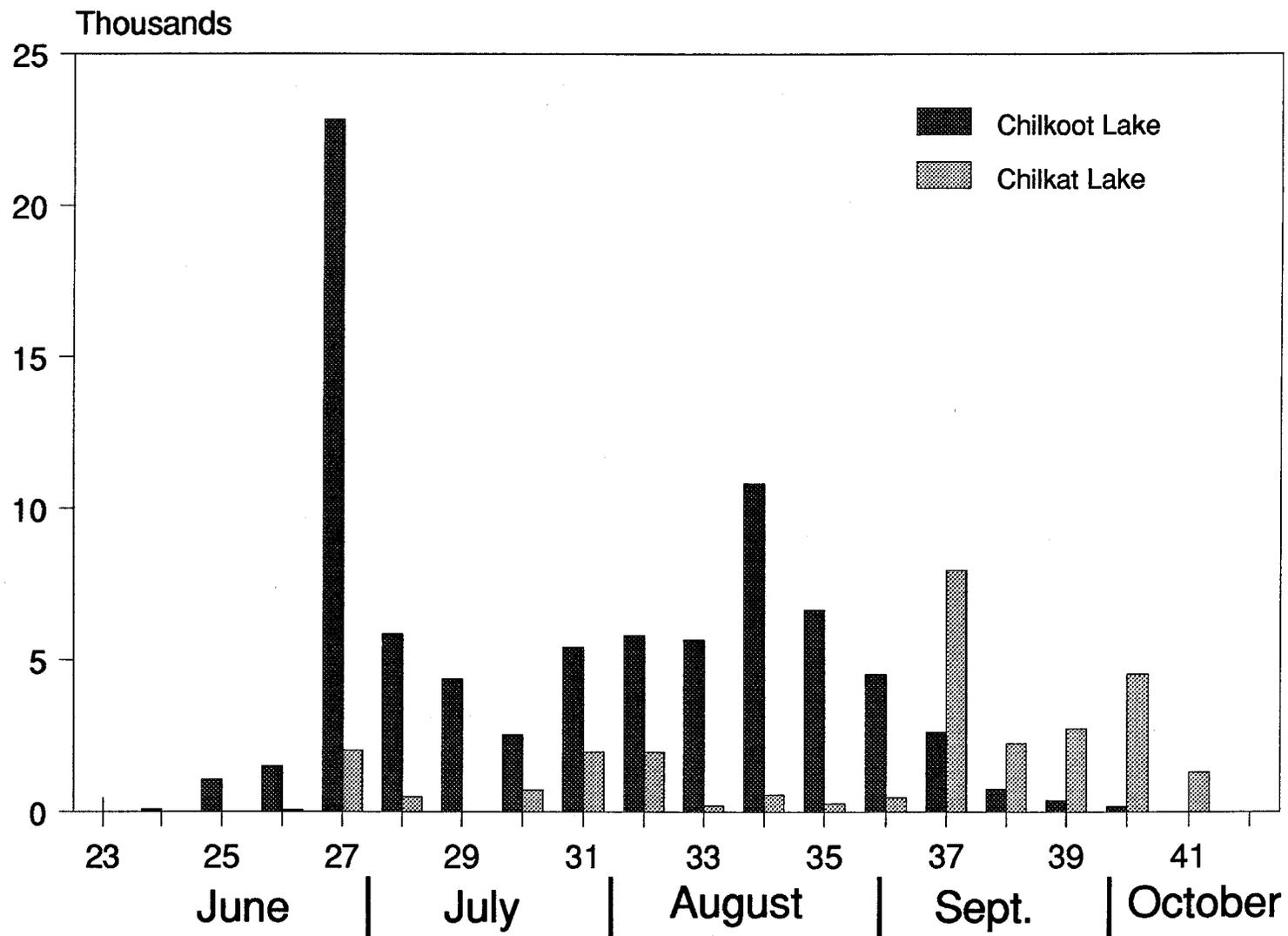


Figure 7. Weekly escapements of sockeye salmon into Chilkat and Chilkoot Lakes, 1988.

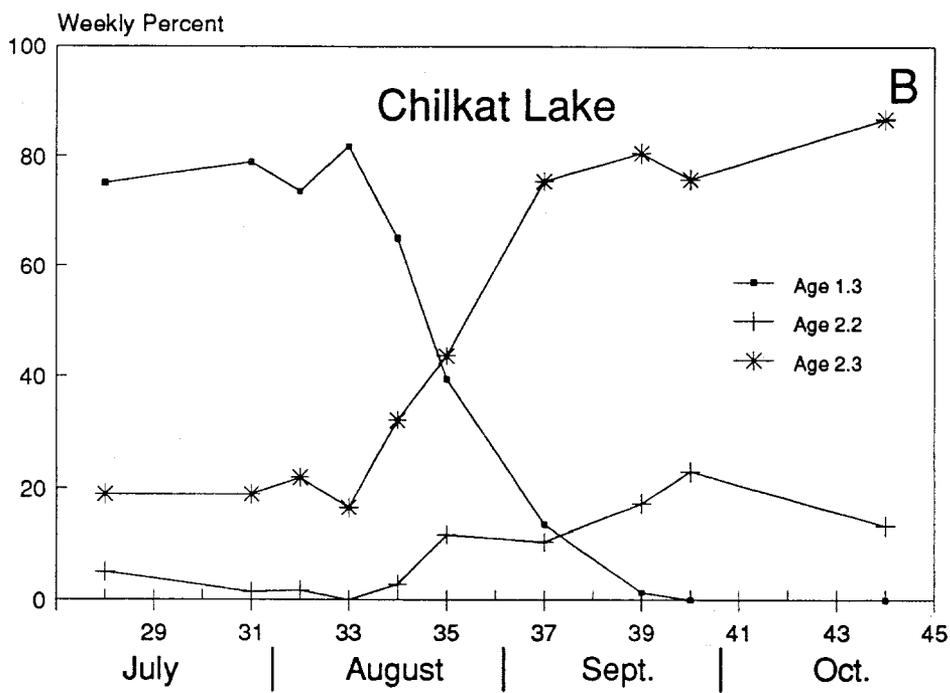
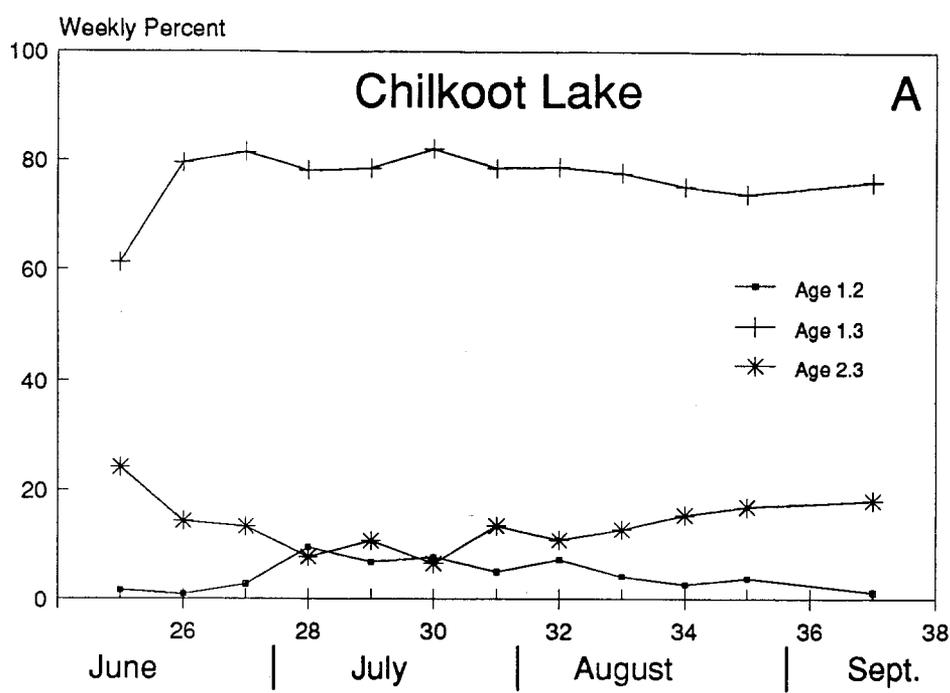


Figure 8. Period age composition of sockeye salmon escapements to Chilkat (B) and Chilkoot (A) Lakes, 1988.

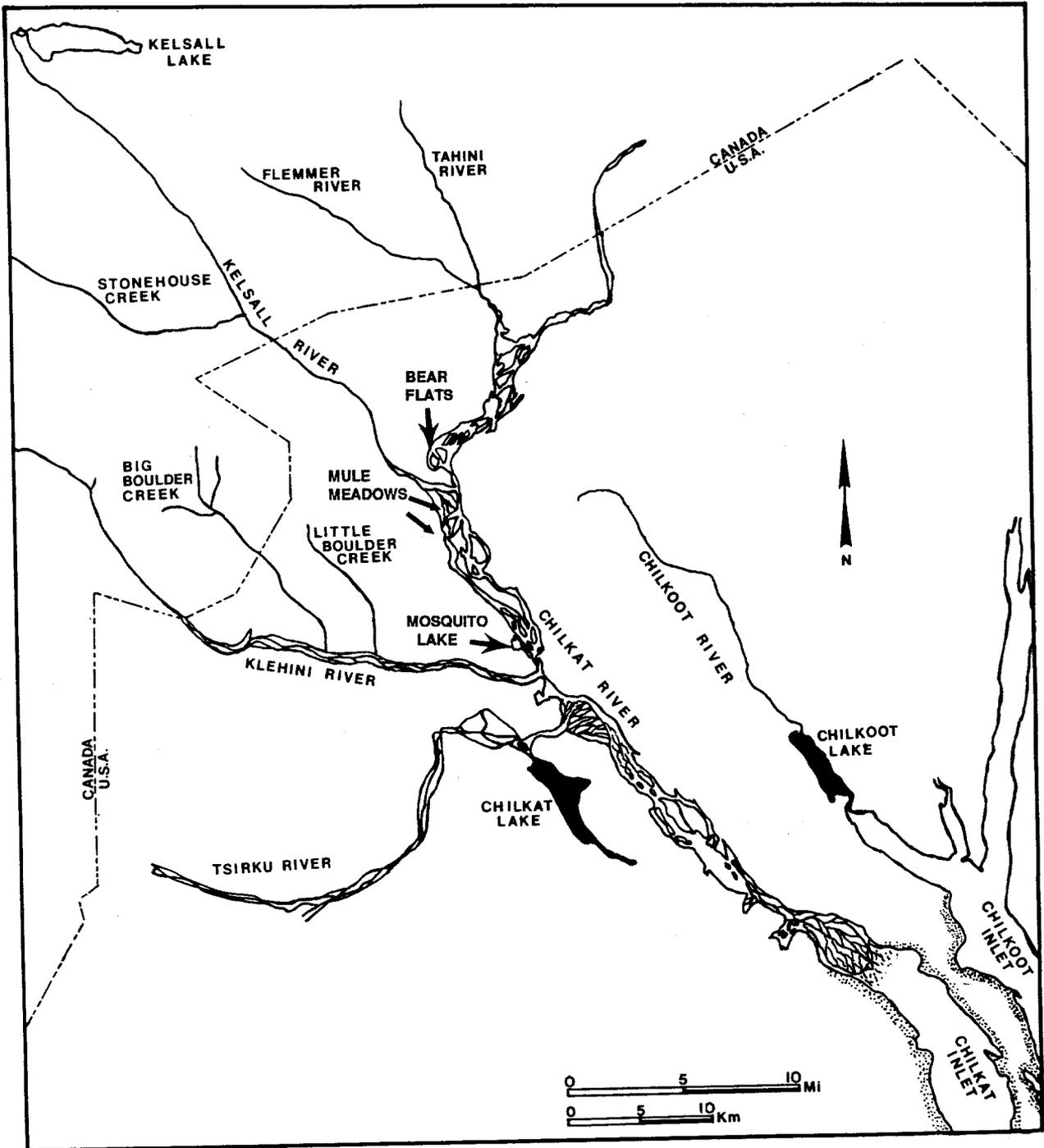


Figure 9. The Chilkoot and Chilkat River drainages.



## APPENDICES

Appendix A.1. Scale pattern measurements for age-1.2 sockeye salmon in escapements to Lynn Canal, 1988.

Variable	Stock	Mean	SE	Min	Max
1. Number of circuli in 1st freshwater year.	Chilkoot Lake	5.7	0.17	3	9
	Chilkat Lake	16.7	0.71	14	21
2. Size of 1st freshwater year.	Chilkoot Lake	55.5	1.6	34	90
	Chilkat Lake	183	8.86	145	226
3. Number of circuli in freshwater plus growth zone.	Chilkoot Lake	4.7	0.26	2	9
	Chilkat Lake	3.2	0.72	1	8
4. Size of freshwater plus growth zone.	Chilkoot Lake	42.1	2.41	13	78
	Chilkat Lake	29.7	5.85	9	65
5. Number of circuli in total freshwater growth zone.	Chilkoot Lake	10.4	0.25	6	13
	Chilkat Lake	19.9	0.48	18	22
6. Size of total freshwater growth zone	Chilkoot Lake	97.5	2.31	65	124
	Chilkat Lake	212.7	4.32	196	236
7. Number of circuli in 1st marine year.	Chilkoot Lake	27.8	0.46	21	36
	Chilkat Lake	25.4	0.82	23	30
8. Size of 1st marine year.	Chilkoot Lake	402.1	6.12	311	520
	Chilkat Lake	361	17.23	297	454
Number of scales digitized.	Chilkoot Lake	50			
	Chilkat Lake	9			

Appendix A.2. Scale pattern measurements for age-1.3 sockeye salmon in escapements to Lynn Canal, 1988.

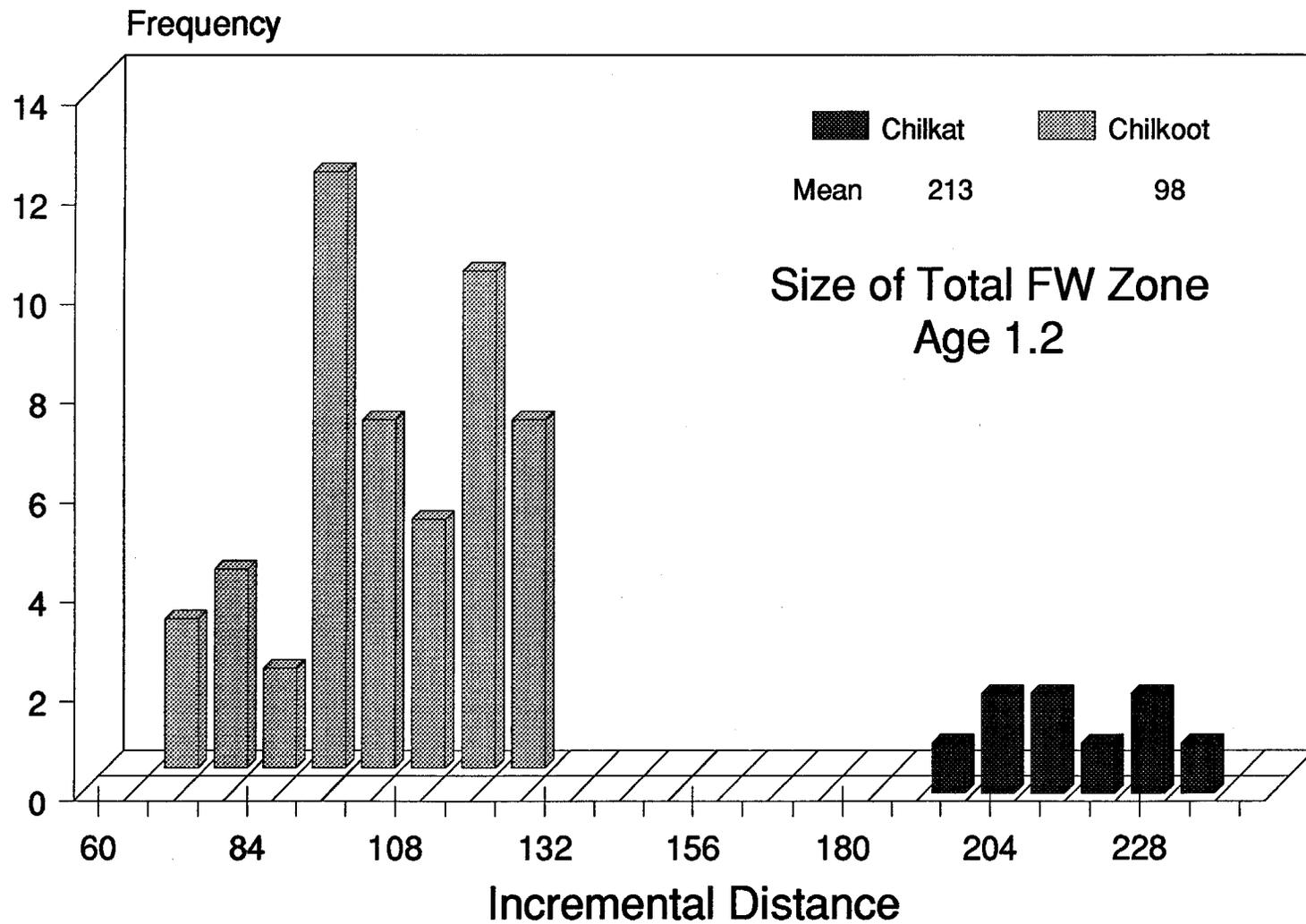
Variable	Stock	Mean	SE	Min	Max
1. Number of circuli in 1st freshwater year.	Chilkoot Lake	6.4	0.13	4	10
	Chilkat Lake	14.5	0.18	11	20
	Berners/Mainstem	8.5	0.26	5	17
2. Size of 1st freshwater year.	Chilkoot Lake	58.4	1.11	36	88
	Chilkat Lake	160.3	1.82	127	211
	Berners/Mainstem	89.2	2.64	55	157
3. Number of circuli in freshwater plus growth zone.	Chilkoot Lake	2.9	0.1	1	7
	Chilkat Lake	2.8	0.18	1	9
	Berners/Mainstem	2.7	0.21	1	7
4. Size of freshwater plus growth zone.	Chilkoot Lake	27.1	0.98	8	53
	Chilkat Lake	31.3	1.86	7	87
	Berners/Mainstem	23.7	2.08	7	72
5. Number of circuli in total freshwater growth zone.	Chilkoot Lake	9.4	0.15	6	13
	Chilkat Lake	17.4	0.25	12	26
	Berners/Mainstem	11.3	0.28	8	18
6. Size of total freshwater growth zone	Chilkoot Lake	85.6	1.5	55	121
	Chilkat Lake	191.6	2.56	140	244
	Berners/Mainstem	112.9	2.75	83	167
7. Number of circuli in 1st marine year.	Chilkoot Lake	28.9	0.27	23	35
	Chilkat Lake	25.5	0.31	19	33
	Berners/Mainstem	28.6	0.39	23	35
8. Size of 1st marine year.	Chilkoot Lake	405	3.75	302	503
	Chilkat Lake	361.7	4.27	263	466
	Berners/Mainstem	379.5	5.84	288	484
Number of scales digitized.	Chilkoot Lake	99			
	Chilkat Lake	100			
	Berners/Mainstem	53			

Appendix A.3. Scale pattern measurements for age-2.2 sockeye salmon in escapements to Lynn Canal, 1988.

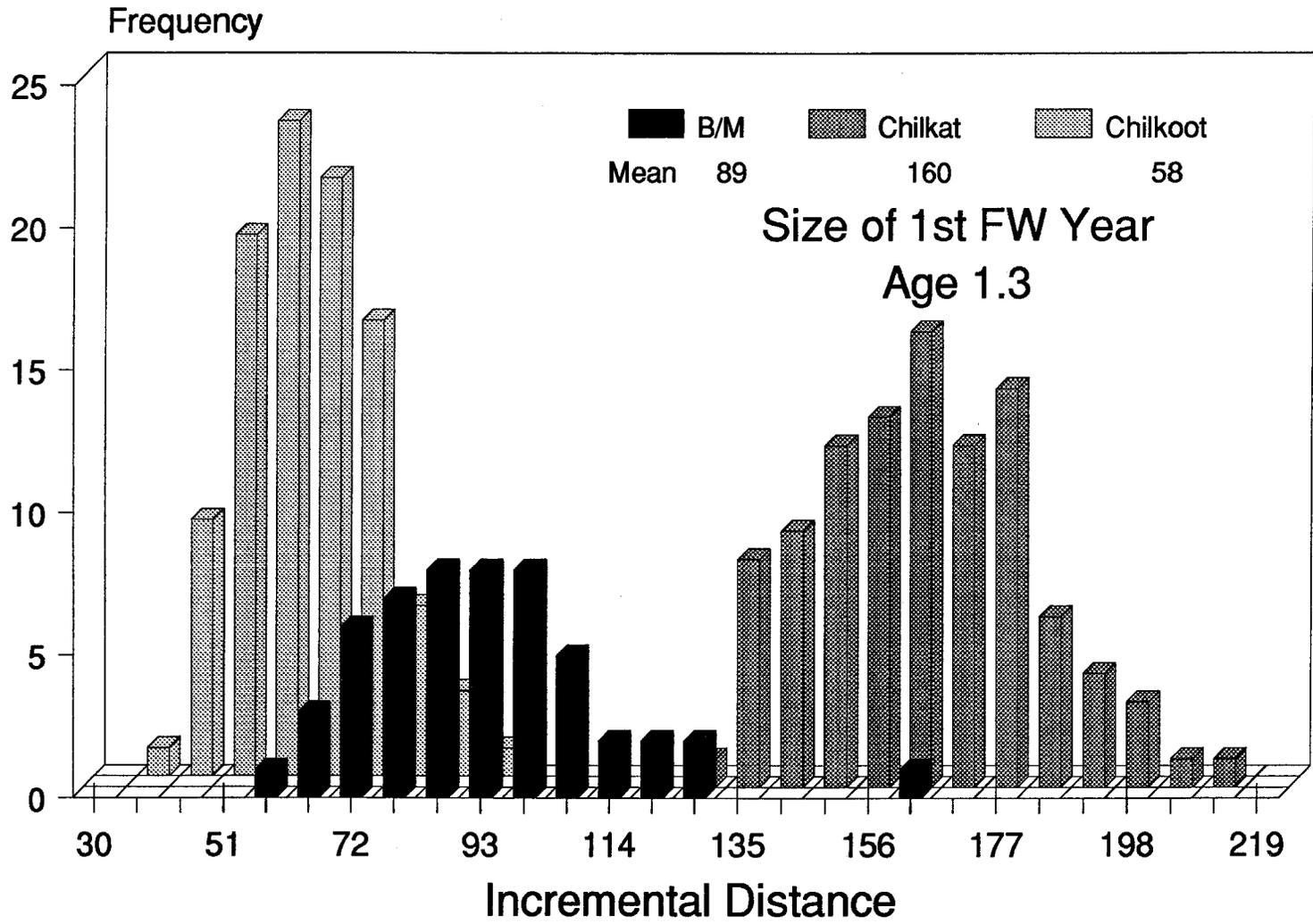
Variable	Stock	Mean	SE	Min	Max
1. Number of circuli in 1st freshwater year.	Chilkoot Lake	4.4	0.13	3	6
	Chilkat Lake	8.2	0.37	5	18
2. Size of 1st freshwater year.	Chilkoot Lake	42.1	1.4	25	59
	Chilkat Lake	91.9	4.53	49	209
3. Number of circuli in 2nd freshwater year.	Chilkoot Lake	7.1	0.19	6	10
	Chilkat Lake	16	0.34	11	21
4. Size of 2nd freshwater year.	Chilkoot Lake	54.5	1.62	37	74
	Chilkat Lake	168.8	3.75	111	224
5. Number of circuli in freshwater plus growth zone.	Chilkoot Lake	1.5	0.13	1	4
	Chilkat Lake	1.1	0.05	1	2
6. Size of freshwater plus growth zone.	Chilkoot Lake	13.2	1.24	5	39
	Chilkat Lake	14.3	0.63	7	27
7. Number of circuli in 1st two freshwater years.	Chilkoot Lake	11.5	0.23	9	15
	Chilkat Lake	24.2	0.46	18	35
8. Size of first two freshwater years.	Chilkoot Lake	96.6	2.35	75	121
	Chilkat Lake	260.7	5.28	193	401
9. Number of circuli in total freshwater growth zone.	Chilkoot Lake	13	0.24	10	16
	Chilkat Lake	25.4	0.45	19	36
10. Size of total freshwater growth zone.	Chilkoot Lake	109.8	2.41	84	133
	Chilkat Lake	275	5.16	202	408
11. Number of circuli in 1st marine year.	Chilkoot Lake	29	0.36	25	33
	Chilkat Lake	23.9	0.36	20	29
12. Size of 1st marine year.	Chilkoot Lake	428.3	6.74	363	523
	Chilkat Lake	368.6	5.54	265	464
Number of scales digitized.	Chilkoot Lake	36			
	Chilkat Lake	49			

Appendix A.4. Scale pattern measurements for age-2.3 sockeye salmon in escapements to Lynn Canal, 1988.

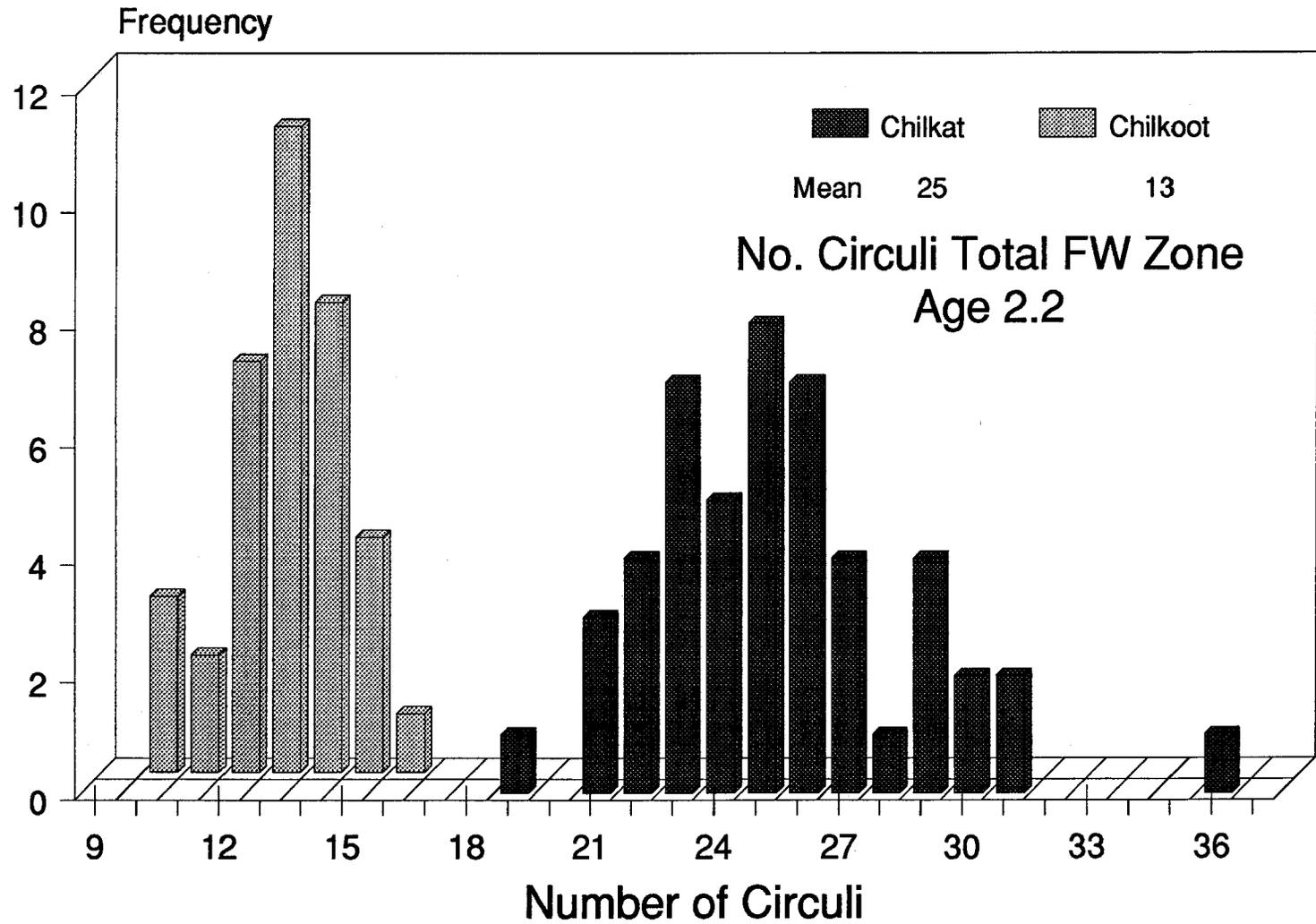
Variable	Stock	Mean	SE	Min	Max
1. Number of circuli in 1st freshwater year.	Chilkoot Lake	4.4	0.14	3	7
	Chilkat Lake	8.4	0.22	4	15
2. Size of 1st freshwater year.	Chilkoot Lake	39.7	1.07	26	56
	Chilkat Lake	89.7	2.54	46	160
3. Number of circuli in 2nd freshwater year.	Chilkoot Lake	7.4	0.18	5	11
	Chilkat Lake	16.6	0.21	11	22
4. Size of 2nd freshwater year.	Chilkoot Lake	57.8	1.56	38	80
	Chilkat Lake	165.5	2.24	95	223
5. Number of circuli in freshwater plus growth zone.	Chilkoot Lake	1.7	0.11	0	3
	Chilkat Lake	1.2	0.04	1	3
6. Size of freshwater plus growth zone.	Chilkoot Lake	14.9	0.97	0	30
	Chilkat Lake	13.1	0.48	6	33
7. Number of circuli in 1st two freshwater years.	Chilkoot Lake	11.8	0.21	9	16
	Chilkat Lake	25	0.26	20	33
8. Size of first two freshwater years.	Chilkoot Lake	97.5	1.9	71	133
	Chilkat Lake	255.3	2.88	188	333
9. Number of circuli in total freshwater growth zone.	Chilkoot Lake	13.5	0.25	10	18
	Chilkat Lake	26.1	0.25	21	34
10. Size of total freshwater growth zone.	Chilkoot Lake	112.4	2.11	71	144
	Chilkat Lake	268.4	2.82	202	345
11. Number of circuli in 1st marine year.	Chilkoot Lake	28.2	0.38	22	36
	Chilkat Lake	23.3	0.25	16	31
12. Size of 1st marine year.	Chilkoot Lake	407.9	5.65	323	495
	Chilkat Lake	351.5	3.76	243	461
Number of scales digitized.	Chilkoot Lake	50			
	Chilkat Lake	100			



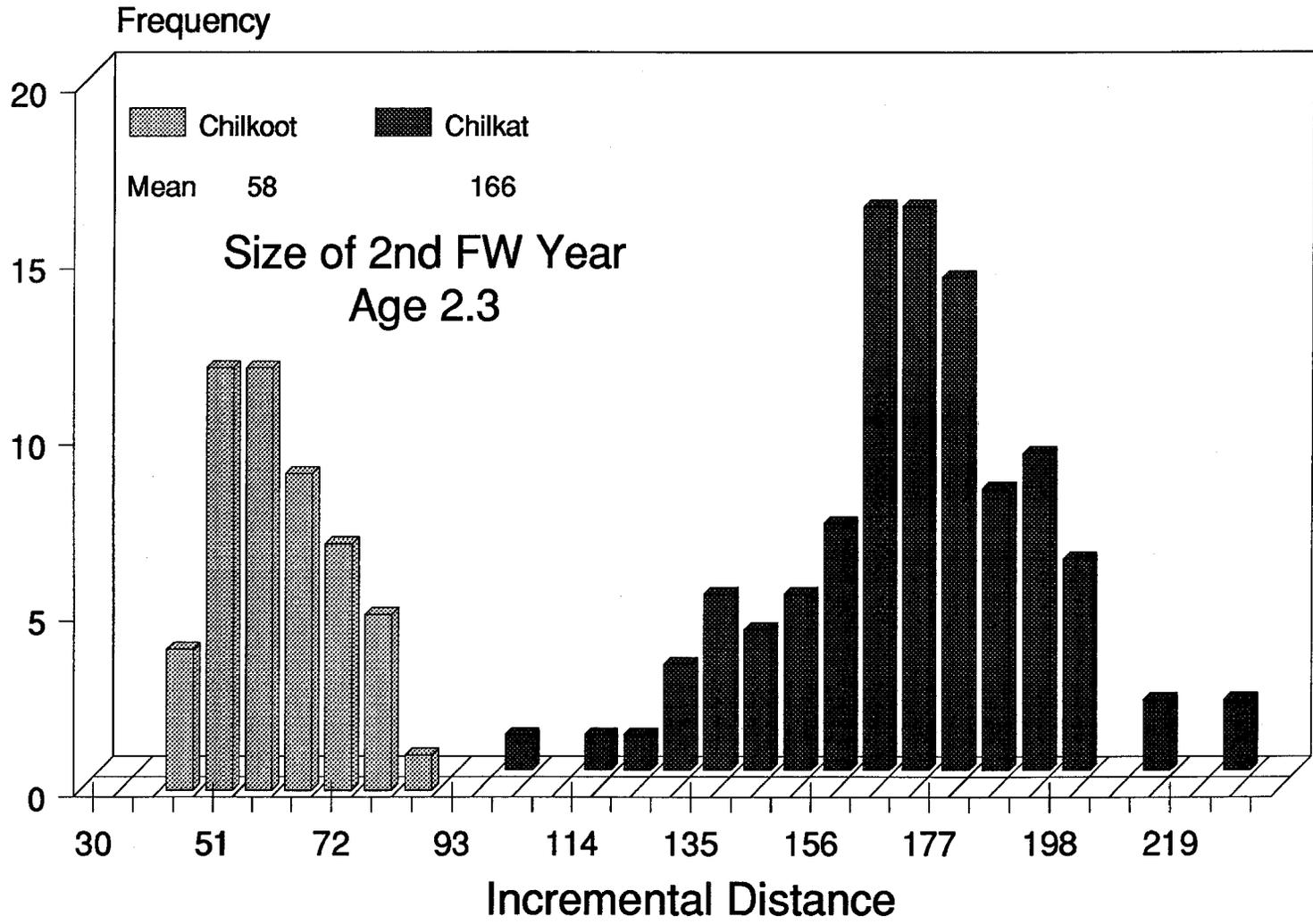
Appendix A.5. Incremental distances in the total freshwater zone for fish aged 1.2 from Chilkoote and Chilkat Lake escapements, 1988.



Appendix A.6. Incremental distances in the first freshwater year for fish aged 1.3 from Chilkoot Lake, Chilkat Lake, and Berners Bay/Chilkat Mainstem (B/M) escapements, 1988.



Appendix A.7. Number of circuli in the total freshwater zone for fish aged 2.2 from Chilkoote and Chilkat Lake escapements, 1988.



Appendix A.8. Incremental distances in the second freshwater year for fish aged 2.3 from Chilkoot and Chilkat Lake escapements, 1988.

Appendix B.1. Age composition of sockeye salmon harvested in the Lynn Canal drift gillnet fishery by age class and fishing period, 1988.

	Brood Year and Age Class											Total		
	1985		1984			1983			1982				1981	
	0.2	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4		3.3	
Statistical Week	26	(June 19 - 25)												
Sample Size		13	9		2	574	14	4	58				674	
Percent		1.9	1.3		0.3	85.2	2.1	0.6	8.6				100.0	
Std. Error		0.5	0.4		0.2	1.3	0.5	0.3	1.0					
Number		153	106		24	6760	165	47	683				7938	
Statistical Week	27	(June 26 - July 2)												
Sample Size		47	24	1	2	597	23	4	50		1		749	
Percent		6.3	3.2	0.1	0.3	79.7	3.1	0.5	6.7		0.1		100.0	
Std. Error		0.9	0.6	0.1	0.2	1.4	0.6	0.3	0.9		0.1			
Number		1007	514	21	43	12797	493	86	1072		21		16054	
Statistical Week	28	(July 3 - 9)												
Sample Size		42	51		1	681	34	5	63				877	
Percent		4.8	5.8		0.1	77.7	3.9	0.6	7.2				100.0	
Std. Error		0.7	0.8		0.1	1.4	0.6	0.2	0.9					
Number		1172	1423		28	19002	948	140	1758				24471	
Statistical Week	29	(July 10 - 16)												
Sample Size		1	29	63		696	17	2	82				890	
Percent		0.1	3.3	7.1		78.2	1.9	0.2	9.2				100.0	
Std. Error		0.1	0.6	0.8		1.4	0.5	0.2	1.0					
Number		43	1234	2680		29606	723	85	3488				37859	
Statistical Week	30	(July 17 - 23)												
Sample Size		1	10	69		820	25	3	91				1019	
Percent		0.1	1.0	6.8		80.5	2.5	0.3	8.9				100.0	
Std. Error		0.1	0.3	0.8		1.2	0.5	0.2	0.9					
Number		27	267	1841		21873	667	80	2428				27183	
Statistical Week	31	(July 24 - 30)												
Sample Size		13	77			749	45	4	126				1015	
Percent		1.3	7.6			73.8	4.4	0.4	12.4			1	100.0	
Std. Error		0.4	0.8			1.4	0.6	0.2	1.0			0.1		
Number		752	4456			43350	2604	232	7292			58	58744	
Statistical Week	32	(July 31 - August 6)												
Sample Size		8	90			684	41	2	144		2	1	972	
Percent		0.8	9.3			70.4	4.2	0.2	14.8		0.2	0.1	100.0	
Std. Error		0.3	0.9			1.5	0.6	0.1	1.1		0.1	0.1		
Number		392	4408			33498	2008	98	7052		98	49	47603	
Statistical Week	33	(August 7 - 13)												
Sample Size		4	68			591	80	2	210		1	1	957	
Percent		0.4	7.1			61.8	8.4	0.2	21.9		0.1	0.1	100.0	
Std. Error		0.2	0.8			1.6	0.9	0.1	1.3		0.1	0.1		
Number		241	4101			35640	4824	122	12664		60	60	57712	
Statistical Week	34	(August 14 - 20)												
Sample Size		3	24	1		318	82	3	192	1	3		627	
Percent		0.5	3.8	0.2		50.7	13.1	0.5	30.6	0.2	0.5		100.0	
Std. Error		0.3	0.8	0.2		2.0	1.3	0.3	1.8	0.2	0.3			
Number		101	806	34		10678	2753	101	6445	34	101		21053	

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Brood Year and Age Class													
	1985		1984		1983			1982			1981		
	0.2	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4	3.3	Total
Statistical Week	35	(August 21 - 27)											
Sample Size		4	48		652	88	2	337	4	1	1		1137
Percent		0.4	4.2		57.3	7.7	0.2	29.6	0.4	0.1	0.1		100.0
Std. Error		0.2	0.6		1.4	0.8	0.1	1.3	0.2	0.1	0.1		
Number		100	1206		16379	2211	50	8466	100	25	25		28562
Statistical Week	36	(August 28 - September 3)											
Sample Size			27		319	114	1	346	1			2	810
Percent			3.3		39.4	14.1	0.1	42.7	0.1			0.2	100.0
Std. Error			0.6		1.7	1.2	0.1	1.7	0.1			0.2	
Number			524		6187	2211	19	6711	19			39	15710
Statistical Week	37	(September 4 - 10)											
Sample Size		1	18		188	109	5	448	5	6	1		781
Percent		0.1	2.3		24.1	14.0	0.6	57.4	0.6	0.8	0.1		100.0
Std. Error		0.1	0.5		1.4	1.1	0.3	1.6	0.3	0.3	0.1		
Number		7	126		1317	764	35	3139	35	42	7		5472
Weeks	38 - 41	(September 11 - October 8)											
Sample Size		2	3		66	92	1	383	2	1	4		554
Percent		0.4	0.5		11.9	16.6	0.2	69.1	0.4	0.2	0.7		100.0
Std. Error		0.2	0.3		1.3	1.4	0.2	1.8	0.2	0.2	0.3		
Number		12	17		380	530	6	2204	12	6	23		3190
Combined Periods (Percentages are weighted by period catches)													
Male													
Sample Size	2	87	418	1	4	3154	482	25	1253	5	12	5	5448
Percent	<0.1	0.8	4.7	<0.1	<0.1	31.0	3.7	0.2	8.6	<0.1	0.1	<0.1	49.0
Std. Error	<0.1	0.1	0.2	<0.1	<0.1	0.5	0.2	<0.1	0.3	<0.1	<0.1	<0.1	0.5
Number	70	2699	16199	34	83	107476	12668	701	29714	74	279	98	170095
Female													
Sample Size		85	144	1	1	3656	266	12	1238	8	4	5	5420
Percent		0.8	1.7	<0.1	<0.1	36.5	2.3	0.1	9.5	<0.1	<0.1	<0.1	51.0
Std. Error		0.1	0.1	<0.1	<0.1	0.5	0.2	<0.1	0.3	<0.1	<0.1	<0.1	0.5
Number		2632	5770	21	12	126613	8004	378	33118	126	132	105	176911
All Fish													
Sample Size	2	176	571	2	5	6935	764	38	2530	13	16	10	11062
Percent	<0.1	1.5	6.3	<0.1	<0.1	67.5	5.9	0.3	18.0	0.1	0.1	0.1	100.0
Std. Error	<0.1	0.1	0.3	<0.1	<0.1	0.5	0.2	0.1	0.4	<0.1	<0.1	<0.1	
Number	70	5438	22208	55	95	237467	20901	1101	63402	200	411	203	351551

Appendix B.2. Length composition of sockeye salmon harvested in the Lynn Canal gillnet fishery by sex, age class, and fishing period, 1988.

		Brood Year and Age Class										Total
		1984		1983			1982			1981		
		0.3	1.2	0.4	1.3	2.2	1.4	2.3	3.2	2.4	3.3	
Statistical Week	26	(June 19 - 25)										
Male	Avg. Length	590	518		593	527	608	581				590
Female	Avg. Length	555	545	610	580	514	615	587				579
All Fish	Avg. Length	576	527	610	586	520	610	584				584
	Std. Error	9.5	11.7		1.3	13.2	13.7	5.4				1.4
	Sample Size	10	3	1	319	9	4	32				378
Statistical Week	27	(June 26 - July 2)										
Male	Avg. Length	572	539		589	534	600	598				585
Female	Avg. Length	586	497		574	546		582				574
All Fish	Avg. Length	579	534		582	538	600	589				580
	Std. Error	6.6	11.6		1.7	10.8		5.1				1.7
	Sample Size	17	8		215	6	1	21				268
Statistical Week	28	(July 3 - 9)										
Male	Avg. Length	588	516	615	590	516	575	589				585
Female	Avg. Length	584	502		576	507		583				572
All Fish	Avg. Length	586	511	615	583	510	575	586				578
	Std. Error	6.4	8.0		1.6	10.2		4.9				1.8
	Sample Size	12	8	1	240	13	1	22				297
Statistical Week	29	(July 10 - 16)										
Male	Avg. Length	594	514		594	524	660	581				585
Female	Avg. Length	579	483		578	551		585				575
All Fish	Avg. Length	588	504		586	528	660	583				580
	Std. Error	7.9	7.0		1.5	11.9		5.3				1.8
	Sample Size	10	19		270	6	1	33				339
Statistical Week	30	(July 17 - 23)										
Male	Avg. Length		508		591	508	610	584				575
Female	Avg. Length		495		571	485		578				569
All Fish	Avg. Length		506		580	504	610	581				572
	Std. Error		9.6		1.8	15.2		7.4				2.4
	Sample Size		16		162	6	1	13				198
Statistical Week	31	(July 24 - 30)										
Male	Avg. Length	592	508		599	525		581				587
Female	Avg. Length	579	521		578	510		590		605		573
All Fish	Avg. Length	587	515		586	515		587		605		578
	Std. Error	7.0	8.2		1.6	11.8		4.6				2.0
	Sample Size	5	21		226	12		35		1		300
Statistical Week	32	(July 31 - August 6)										
Male	Avg. Length	605	510		597	512		606				581
Female	Avg. Length	603	489		579	528		581			530	572
All Fish	Avg. Length	603	502		588	517		590			530	576
	Std. Error	7.3	4.7		1.3	8.3		3.3				1.8
	Sample Size	3	45		337	22		64			1	472
Statistical Week	33	(August 7 - 13)										
Male	Avg. Length	610	530		599	544	545	616				590
Female	Avg. Length		502		584	539	605	599		545		580
All Fish	Avg. Length	610	524		591	542	575	608		545		585
	Std. Error		9.1		1.6	6.0	30.0	3.8				2.1
	Sample Size	1	17		172	32	2	66		1		291

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		Brood Year and Age Class										
		1984		1983			1982			1981		
		0.3	1.2	0.4	1.3	2.2	1.4	2.3	3.2	2.4	3.3	Total
Statistical Week	34 (August 14 - 20)											
Male	Avg. Length		539		608	554		628		573		597
Female	Avg. Length				589	548	660	600				589
All Fish	Avg. Length		539		598	551	660	613		573		593
	Std. Error		12.2		2.7	6.8		4.6		47.5		2.8
	Sample Size		10		86	20	1	49		2		168
Statistical Week	35 (August 21 - 27)											
Male	Avg. Length		542		604	561		618				603
Female	Avg. Length	578	502		593	551	580	601	583		610	591
All Fish	Avg. Length	578	526		597	558	580	610	583		610	597
	Std. Error	2.5	9.8		1.2	6.1		1.8	12.5			1.3
	Sample Size	2	20		310	42	1	213	2		1	591
Statistical Week	36 (August 28 - Sept. 3)											
Male	Avg. Length		553		604	570		622	565		625	603
Female	Avg. Length		558		594	532	590	605			565	593
All Fish	Avg. Length		554		599	557	590	613	565		595	598
	Std. Error		17.1		1.8	5.9		2.1			30.0	1.8
	Sample Size		14		151	46	1	159	1		2	374
Statistical Week	37 (Sept. 4 - 10)											
Male	Avg. Length	590	586		609	584		622	570	635		612
Female	Avg. Length				591	527		606	580			594
All Fish	Avg. Length	590	586		600	569		615	576	635		605
	Std. Error		11.6		2.6	8.7		2.1	3.3			2.0
	Sample Size	1	3		70	35		161	3	1		274
Statistical Weeks	38 - 41 (Sept. 11 - October 8)											
Male	Avg. Length	620	590		620	589		626			620	619
Female	Avg. Length				597	593		613				609
All Fish	Avg. Length	620	590		612	591		620			620	615
	Std. Error				4.2	5.8		1.9				1.8
	Sample Size	1	1		22	28		166			1	219
Combined Periods (Lengths weighted by period catches)												
Male	Avg. Length	597	523	615	598	533	593	600	566	585	624	589
	Std. Error	4.5	3.6		0.7	3.5	13.2	1.3	2.5	34.4	2.5	0.8
	Sample Size	35	129	1	1180	173	8	523	2	3	2	2056
Female	Avg. Length	584	504	610	581	529	607	591	582	575	561	578
	Std. Error	4.0	4.9		0.6	3.9	13.9	1.1	5.2	30.0	23.2	0.7
	Sample Size	27	56	1	1396	103	5	510	4	2	3	2107
All Fish	Avg. Length	593	519	614	589	530	605	595	576	577	568	583
	Std. Error	3.1	3.0	2.5	0.5	2.7	9.4	0.9	4.4	21.6	18.4	0.5
	Sample Size	62	185	2	2580	277	13	1034	6	5	5	4169

Appendix B.3. Estimated contribution of sockeye salmon stocks to the Lynn Canal (District 115) drift gillnet fishery by age class and fishing period, 1988.

Stat Week	Stock	Brood Year and Age Class											Catch	Prop.	SE		
		1985		1984			1983			1982						1981	
		0.2	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4				3.3	
26	Chilkoot L.			82			3,860	24	35	590				4,591	0.578	0.036	
	Chilkat L.			24			2,109	141	12	93				2,379	0.300	0.074	
	Berners/Mainstem		153			24	791							968	0.122	0.160	
	Total	0	153	106	0	24	6,760	165	47	683	0	0	0	7,938	1.000		
27	Chilkoot L.			177			5,106	66	86	526				5,961	0.371	0.056	
	Chilkat L.			36	21		2,431	427		546		21		3,482	0.217	0.083	
	Berners/Mainstem		1,007	301		43	5,260							6,611	0.412	0.056	
	Total	0	1,007	514	21	43	12,797	493	86	1,072	0	21	0	16,054	1.000		
28	Chilkoot L.			839			12,371	285	140	1,027				14,662	0.599	0.032	
	Chilkat L.			277			3,249	663		731				4,920	0.201	0.080	
	Berners/Mainstem		1,172	307		28	3,382							4,889	0.200	0.086	
	Total	0	1,172	1,423	0	28	19,002	948	140	1,758	0	0	0	24,471	1.000		
29	Chilkoot L.			1,983			20,961	391	85	1,741				25,161	0.665	0.028	
	Chilkat L.			397			5,122	332		1,747				7,598	0.201	0.080	
	Berners/Mainstem	43	1,234	300			3,523							5,100	0.135	0.121	
	Total	43	1,234	2,680	0	0	29,606	723	85	3,488	0	0	0	37,859	1.000		
30	Chilkoot L.			1,684			19,183	409	80	1,365				22,721	0.836	0.020	
	Chilkat L.			72			2,012	258		1,063				3,405	0.125	0.105	
	Berners/Mainstem	27	267	85			678							1,057	0.039	0.309	
	Total	27	267	1,841	0	0	21,873	667	80	2,428	0	0	0	27,183	1.000		
31	Chilkoot L.			4,046			38,668	1,716	174	4,259		58		48,921	0.833	0.020	
	Chilkat L.			410			4,118	888	58	3,033				8,507	0.145	0.095	
	Berners/Mainstem		752				564							1,316	0.022	0.483	
	Total	0	752	4,456	0	0	43,350	2,604	232	7,292	0	58	0	58,744	1.000		
32	Chilkoot L.			4,007			31,756	1,151	48	3,604		98		40,664	0.854	0.015	
	Chilkat L.			401			1,742	857		3,448			49	6,497	0.136	0.093	
	Berners/Mainstem		392						50					442	0.009	0.337	
	Total	0	392	4,408	0	0	33,498	2,008	98	7,052	0	98	49	47,603	1.000		

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		Brood Year and Age Class														
Stat Week	Stock	1985		1984		1983			1982			1981		Catch	Prop.	SE
		0.2	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4	3.3			
33	Chilkoot L.			3,674		33,822	1,872	122	4,445		60			43,995	0.762	0.022
	Chilkat L.			427		1,711	2,952		8,219			60		13,369	0.232	0.067
	Berners/Mainstem		241			107								348	0.006	1.518
	Total	0	241	4,101	0	0	35,640	4,824	122	12,664	0	60	60	57,712	1.000	
34	Chilkoot L.			806	34	10,219	859	67	2,095		101			14,181	0.674	0.029
	Chilkat L.					459	1,894	34	4,350	34				6,771	0.322	0.061
	Berners/Mainstem		101											101	0.005	0.564
	Total	0	101	806	34	0	10,678	2,753	101	6,445	34	101	0	21,053	1.000	
35	Chilkoot L.			1,155		16,084	822	50	3,598		25			21,734	0.761	0.018
	Chilkat L.			51		295	1,389		4,868	100		25		6,728	0.236	0.059
	Berners/Mainstem		100											100	0.004	0.468
	Total	0	100	1,206	0	0	16,379	2,211	50	8,466	100	25	25	28,562	1.000	
36	Chilkoot L.			441		6,113	794	19	1,584					8,951	0.570	0.033
	Chilkat L.			35			1,417		5,127	19		39		6,637	0.422	0.042
	Berners/Mainstem			48		74								122	0.008	0.876
	Total	0	0	524	0	0	6,187	2,211	19	6,711	19	0	39	15,710	1.000	
37	Chilkoot L.			116		1,292	57	35	396		35			1,931	0.353	0.051
	Chilkat L.			7		12	707		2,743	35	7	7		3,518	0.643	0.027
	Berners/Mainstem		7	3		13								23	0.004	1.177
	Total	0	7	126	0	0	1,317	764	35	3,139	35	42	7	5,472	1.000	
38-41	Chilkoot L.			12		348	12	6	117					495	0.155	0.103
	Chilkat L.					16	518		2,087	12	6	23		2,662	0.834	0.019
	Berners/Mainstem		12	5		16								33	0.010	0.484
	Total	0	12	17	0	0	380	530	6	2,204	12	6	23	3,190	1.000	
Combined Periods (Percentages are weighted by period catches)																
38-41	Chilkoot L.	0	0	19,022	34	0	199,783	8,458	947	25,347	0	377	0	253,968	0.722	0.008
	Chilkat L.	0	0	2,137	21	0	23,276	12,443	104	38,055	200	34	203	76,473	0.218	0.023
	Berners/Mainstem	70	5,438	1,049	0	95	14,408	0	50	0	0	0	0	21,110	0.060	0.059
	Total	70	5,438	22,208	55	95	237,467	20,901	1,101	63,402	200	411	203	351,551	1.000	

Appendix B.4. Number of scales classified to Chilkoote Lake, Chilkat Lake, and Berners Bay/Chilkat Mainstem by age class and fishing period, 1988.

Stat Week	Stock	Brood Year and Age Class											Total	
		1985		1984		1983			1982		1981			
		0.2	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	3.2	2.4		3.3
26	Chilkoot L.		0	7			322	2	3	49				383
	Chilkat L.		0	2			163	12	1	9				187
	Berners/Mainstem		13	0		2	89							104
	Total		13	9		2	574	14	4	58				674
27	Chilkoot L.			8			242	3	4	24				281
	Chilkat L.			3	1		106	20		26		1		157
	Berners/Mainstem		47	13		2	249							311
	Total		47	24	1	2	597	23	4	50		1		749
28	Chilkoot L.			29			437	10	5	36				517
	Chilkat L.			11			109	24		27				171
	Berners/Mainstem		42	11		1	135							189
	Total		42	51		1	681	34	5	63				877
29	Chilkoot L.			45			484	9	2	40				580
	Chilkat L.			10			112	8		42				172
	Berners/Mainstem	1	29	8			100							138
	Total	1	29	63			696	17	2	82				890
30	Chilkoot L.			61			703	15	3	50				832
	Chilkat L.			3			73	10		41				127
	Berners/Mainstem	1	10	5			44							60
	Total	1	10	69			820	25	3	91				1,019
31	Chilkoot L.			69			652	29	3	72		1		826
	Chilkat L.			7			69	16	1	54				147
	Berners/Mainstem		13	1			28							42
	Total		13	77			749	45	4	126		1		1,015
32	Chilkoot L.			80			630	23	1	72		2		808
	Chilkat L.			8			40	18		72			1	139
	Berners/Mainstem		8	2			14		1					25
	Total		8	90			684	41	2	144		2	1	972
33	Chilkoot L.			60			547	30	2	72		1		712
	Chilkat L.			7			30	49		138			1	225
	Berners/Mainstem		4	1			14	1						20
	Total		4	68			591	80	2	210		1	1	957
34	Chilkoot L.			24	1		297	25	2	61		3		413
	Chilkat L.						16	57	1	131	1			206
	Berners/Mainstem		3				5							8
	Total		3	24	1		318	82	3	192	1	3		627
35	Chilkoot L.			46			629	32	2	140		1		850
	Chilkat L.			2			17	56		197	4		1	277
	Berners/Mainstem		4				6							10
	Total		4	48			652	88	2	337	4	1	1	1,137
36	Chilkoot L.			22			309	40	1	80				452
	Chilkat L.			2			1	74		266	1		2	346
	Berners/Mainstem			3			9							12
	Total			27			319	114	1	346	1		2	810
37	Chilkoot L.			16			180	8	5	55		5		269
	Chilkat L.			1			3	101		393	5	1	1	505
	Berners/Mainstem		1	1			5							7
	Total		1	18			188	109	5	448	5	6	1	781
38-41	Chilkoot L.			2			59	2	1	20				84
	Chilkat L.						3	90		363	2	1	4	463
	Berners/Mainstem		2	1			4							7
	Total		2	3			66	92	1	383	2	1	4	554
Combined Periods (Percentages are weighted by period catches)														
38-41	Chilkoot L.			469	1		5,491	228	34	771		13		7,007
	Chilkat L.			56	1		742	535	3	1,759	13	3	10	3,122
	Berners/Mainstem	2	176	46		5	702	1	1					933
	Total	2	176	571	2	5	6,935	764	38	2,530	13	16	10	11,062

Appendix B.5. Age composition of Chilkoot Lake sockeye salmon harvested in Lynn Canal by fishing period, 1988.

Brood Year and Age Class								
1984		1983		1982		1981	Total	
1.2	2.1	1.3	2.2	1.4	2.3	2.4		
Statistical Week	26	(June 19 - 25)						
Percent	1.8	84.1	0.5	0.8	12.9		100.0	
SE	31	167	17	20	82		167	
Catch	82	3,860	24	35	590		4,591	
Statistical Week	27	(June 26 - July 2)						
Percent	3.0	85.7	1.1	1.4	8.8		100.0	
SE	63	321	38	41	107		331	
Catch	177	5,106	66	86	526		5,961	
Statistical Week	28	(July 3 - 9)						
Percent	5.7	84.4	1.9	1.0	7.0		100.0	
SE	154	475	90	64	169		470	
Catch	839	12,371	285	140	1,027		14,662	
Statistical Week	29	(July 10 - 16)						
Percent	7.9	83.3	1.6	0.3	6.9		100.0	
SE	292	724	130	57	273		703	
Catch	1,983	20,961	391	85	1,741		25,161	
Statistical Week	30	(July 17 - 23)						
Percent	7.4	84.4	1.8	0.4	6.0		100.0	
SE	214	493	107	47	191		444	
Catch	1,684	19,183	409	80	1,365		22,721	
Statistical Week	31	(July 24 - 30)						
Percent	8.3	79.0	3.5	0.4	8.7	0.1	100.0	
SE	468	1,096	314	101	493	58	963	
Catch	4,046	38,668	1,716	174	4,259	58	48,921	
Statistical Week	32	(July 31 - August 6)						
Percent	9.9	78.1	2.8	0.1	8.9	0.2	100.0	
SE	425	774	238	49	416	68	617	
Catch	4,007	31,756	1,151	48	3,604	98	40,664	

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Brood Year and Age Class									
1984		1983		1982		1981	Total		
1.2	2.1	1.3	2.2	1.4	2.3	2.4			
Statistical Week		33	(August 7 - 13)						
Percent	8.4		76.9	4.3	0.3	10.1	0.1	100.0	
SE	455		1,074	338	83	519	59	982	
Catch	3,674		33,822	1,872	122	4,445	60	43,995	
Statistical Week		34	(August 14 - 20)						
Percent	5.7	0.0	72.1	6.1	0.5	14.8	0.7	100.0	
SE	163	38	433	169	49	258	59	413	
Catch	806	34	10,219	859	67	2,095	101	14,181	
Statistical Week		35	(August 21 - 27)						
Percent	5.3		74.0	3.8	0.2	16.6	0.1	100.0	
SE	167		443	144	38	295	27	399	
Catch	1,155		16,084	822	50	3,598	25	21,734	
Statistical Week		36	(August 28 - Sept. 3)						
Percent	4.9		68.3	8.9	0.2	17.7		100.0	
SE	93		284	123	17	173		294	
Catch	441		6,113	794	19	1,584		8,951	
Statistical Week		37	(Sept. 4 - 10)						
Percent	6.0		66.9	3.0	1.8	20.5	1.8	100.0	
SE	29		87	21	15	52	16	98	
Catch	116		1,292	57	35	396	35	1,931	
Statistical Week		38 - 41	(Sept. 11 - October 8)						
Percent	2.4		70.3	2.4	1.2	23.6		100.0	
SE	8		43	9	6	27		51	
Catch	12		348	12	6	117		495	
Combined Periods (Percentages are weighted by period catches)									
Percent	7.5	<0.1	78.7	3.3	0.4	10.0	0.1	100.0	
SE	911	38	2,133	610	188	1,015	127	1,937	
Catch	19,022	34	199,783	8,458	947	25,347	377	253,968	

Appendix B.6. Age composition of Chilkat Lake sockeye salmon harvested in Lynn Canal by fishing period, 1988.

Brood Year and Age Class											
		1984		1983		1982		1981			
		1.2	2.1	1.3	2.2	1.4	2.3	3.2	2.4	3.3	Total
Statistical Week	26	(June 19 - 25)									
Percent	1.0			88.7	5.9	0.5	3.9				100.0
SE	16			172	41	12	37				177
Catch	24			2,109	141	12	93				2,379
Statistical Week	27	(June 26 - July 2)									
Percent	1.0	0.6		69.8	12.3		15.7		0.6		100.0
SE	42	19		260	95		108		19		288
Catch	36	21		2,431	427		546		21		3,482
Statistical Week	28	(July 3 - 9)									
Percent	5.6			66.0	13.5		14.9				100.0
SE	94			347	135		145				393
Catch	277			3,249	663		731				4,920
Statistical Week	29	(July 10 - 16)									
Percent	5.2			67.4	4.4		23.0				100.0
SE	138			541	120		273				607
Catch	397			5,122	332		1,747				7,598
Statistical Week	30	(July 17 - 23)									
Percent	2.1			59.1	7.6		31.2				100.0
SE	47			308	86		170				357
Catch	72			2,012	258		1,063				3,405
Statistical Week	31	(July 24 - 30)									
Percent	4.8			48.4	10.4	0.7	35.7				100.0
SE	154			655	231	59	426				804
Catch	410			4,118	888	58	3,033				8,507
Statistical Week	32	(July 31 - August 6)									
Percent	6.2			26.8	13.2		53.1		0.8		100.0
SE	139			404	207		408		48		606
Catch	401			1,742	857		3,448		49		6,497
Statistical Week	33	(August 7 - 13)									
Percent	3.2			12.8	22.1		61.5		0.4		100.0
SE	160			501	417		668		59		893
Catch	427			1,711	2,952		8,219		60		13,369

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Brood Year and Age Class											
1984		1983		1982			1981				
1.2	2.1	1.3	2.2	1.4	2.3	3.2	2.4	3.3	Total		
Statistical Week		34	(August 14 - 20)								
Percent			6.8	28.0	0.5	64.2	0.5			100.0	
SE			161	242	35	345	38			412	
Catch			459	1,894	34	4,350	34			6,771	
Statistical Week		35	(August 21 - 27)								
Percent		0.8	4.4	20.6		72.4	1.5	0.4		100.0	
SE		36	164	184		331	53	27		397	
Catch		51	295	1,389		4,868	100	25		6,728	
Statistical Week		36	(August 28 - Sept. 3)								
Percent		0.5		21.4		77.2	0.3	0.6		100.0	
SE		28		160		264	17	25		278	
Catch		35		1,417		5,127	19	39		6,637	
Statistical Week		37	(Sept. 4 - 10)								
Percent		0.2	0.3	20.1		78.0	1.0	0.2	0.2	100.0	
SE		7	10	66		98	15	7	6	96	
Catch		7	12	707		2,743	35	7	7	3,518	
Statistical Week		38 - 41	(Sept. 11 - October 8)								
Percent			0.6	19.5		78.4	0.5	0.2	0.9	100.0	
SE			12	50		65	9	6	11	51	
Catch			16	518		2,087	12	6	23	2,662	
Combined Periods (Percentages are weighted by period catches)											
Percent		2.8	<0.1	30.4	16.3	0.1	49.8	0.3	<0.1	0.3	100.0
SE		320	19	1,225	668	69	1,116	69	21	85	1,729
Catch		2,137	21	23,276	12,443	104	38,055	200	34	203	76,473

Appendix B.7. Age composition of Berners/Chilkat Mainstem sockeye salmon harvested in Lynn Canal by fishing period, 1988.

Brood Year and Age Class							
1985		1984		1983		1982	Total
0.2	0.3	1.2	0.4	1.3	1.4		
Statistical Week	26	(June 19 - 25)					
Percent	15.8		2.5	81.7			100.0
SE	42		17	149			155
Catch	153		24	791			968
Statistical Week	27	(June 26 - July 2)					
Percent	15.2	4.6	0.7	79.6			100.0
SE	142	87	32	359			371
Catch	1,007	301	43	5,260			6,611
Statistical Week	28	(July 3 - 9)					
Percent	24.0	6.3	0.6	69.2			100.0
SE	177	105	26	385			423
Catch	1,172	307	28	3,382			4,889
Statistical Week	29	(July 10 - 16)					
Percent	0.8	24.2	5.9	69.1			100.0
SE	40	227	144	566			617
Catch	43	1,234	300	3,523			5,100
Statistical Week	30	(July 17 - 23)					
Percent	2.6	25.3	8.0	64.1			100.0
SE	27	85	82	307			329
Catch	27	267	85	678			1,057
Statistical Week	31	(July 24 - 30)					
Percent		57.1		42.9			100.0
SE		209		607			641
Catch		752		564			1,316
Statistical Week	32	(July 31 - August 6)					
Percent		88.7			11.3		100.0
SE		136			50		145
Catch		392			50		442

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Brood Year and Age Class							
	1985		1984		1983		1982
	0.2	0.3	1.2	0.4	1.3	1.4	Total
Statistical Week	33		(August 7 - 13)				
Percent	69.3				30.7		100.0
SE	118				499		513
Catch	241				107		348
Statistical Week	34		(August 14 - 20)				
Percent	100.0						100.0
SE	59						59
Catch	101						101
Statistical Week	35		(August 21 - 27)				
Percent	100.0						100.0
SE	53						53
Catch	100						100
Statistical Week	36		(August 28 - Sept. 3)				
Percent			39.3			60.7	100.0
SE			39			99	106
Catch			48			74	122
Statistical Week	37		(Sept. 4 - 10)				
Percent	30.4	13.0			56.5	100.0	
SE	6	8			24	26	
Catch	7	3			13	23	
Statistical Week	38 - 41		(Sept. 11 - October 8)				
Percent	36.4	15.2			48.5	100.0	
SE	9	5			13	16	
Catch	12	5			16	33	
Combined Periods (Percentages are weighted by period catches)							
Percent	0.3	25.8	5.0	0.5	68.3	0.2	100.0
SE	46	441	219	45	1,158	50	1,242
Catch	70	5,438	1,049	95	14,408	50	21,110

Appendix B.8. Stock composition estimates of sockeye salmon scales collected from various sites in Lynn Canal, by statistical week, 1988.

Location: Pt. Sherman (from commercial fishery)

Stat Week	Dates	Sample Size	Chilkoot Lake	Chilkat Lake	Berners + Chilkat Mainstem	Total
28	7/4	119	66.4	28.6	5.0	100.0
29	7/11-12	133	60.1	24.1	15.8	100.0
30	7/19	274	81.0	13.9	5.1	100.0
31	7/25	126	62.7	31.8	5.6	100.0
32	7/31-8/2	533	75.1	21.6	3.4	100.0
33	8/8-8/10	544	74.8	22.3	2.9	100.0
34	8/16	83	67.5	30.1	2.4	100.0
35	8/23	184	62.5	36.4	1.1	100.0
36	8/30	38	55.3	44.7	0.0	100.0

Location: Pt. Sherman (from test fishery)

Stat Week	Dates	Sample Size	Chilkoot Lake	Chilkat Lake	Berners/ Mainstem	Total
33	8/12	86	61.6	36.1	2.3	100.0
34	8/17	30	56.7	43.3	0.0	100.0

Various locations

Stat Week	Location	Dates	Sample Size	Chilkoot Lake	Chilkat Lake	Berners/ Mainstem	Total
28	Mud Bay	7/6	77	71.4	22.1	6.5	100.0
29	Mud Bay	7/11	84	85.7	3.6	10.7	100.0
	Piling Pt.	7/11	67	73.1	14.9	12.0	100.0
30	Rockwall	7/17	60	95.0	5.0	0.0	100.0
31	O. Sullivan	7/25	97	49.5	39.2	11.3	100.0
	Horton	7/26	128	25.8	68.0	6.2	100.0
	Mud Bay East	7/27	122	91.8	6.6	1.6	100.0
	Mud Bay Mid	7/27	45	77.8	22.2	0	100.0
32	Rockwall (Upper)	8/1	12	100.0			100.0
	Horton	8/1	61	34.4	62.3	3.3	100.0
	Horton/Sull.	8/1	40	5	92.5	2.5	100.0
	Pt. Seduction	8/1	96	64.6	32.3	3.1	100.0
	Mud Bay Line	7/31	35	94.3	2.9	2.9	100.0
33	Horton	8/08	55	14.6	81.8	3.6	100.0
	Piling Pt.	8/08	51	61.0	39.0	0.0	100.0
	Katzehin	8/09	22	95.0	5.0	0.0	100.0
	Mud/Rockwall	8/09	73	88.0	10.0	2.0	100.0
34	I. Sullivan	8/16	63	6.4	88.9	4.8	100.0
	Horton/Sullivan	8/16	67	11.9	85.1	3.0	100.0
	Horton	8/16	65	3.1	95.4	1.5	100.0
	Rockwall	8/17	66	68.2	31.8	0.0	100.0
	Piling Pt.	8/16-8/17	150	79.3	20.0	0.7	100.0
35	Mud Bay	8/22-8/23	253	56.5	43.6	0.0	100.0
	Rockwall @ Mud B.	8/22	32	59.4	40.6	0.0	100.0
36	Mab Is.	8/30	12	33.3	66.7	0.0	100.0

Appendix C.1. Daily sockeye salmon counts and associated statistics from Chilkat Lake weir, 1988.

Date	Daily Count	Cumulative Count	Daily of Total	Proportion of Total	Cumulative Proportion of Total
June 18	0	0		0.0000	0.0000
June 19	0	0		0.0000	0.0000
June 20	0	0		0.0000	0.0000
June 21	22	22		0.0008	0.0008
June 22	0	22		0.0000	0.0008
June 23	0	22		0.0000	0.0008
June 24	24	46		0.0009	0.0017
June 25	13	59		0.0005	0.0021
June 26	0	59		0.0000	0.0021
June 27	23	82		0.0008	0.0030
June 28	493	575		0.0179	0.0208
June 29	575	1150		0.0208	0.0417
June 30	503	1653		0.0182	0.0599
July 1	154	1807		0.0056	0.0655
July 2	267	2074		0.0097	0.0752
July 3	491	2565		0.0178	0.0930
July 4	5	2570		0.0002	0.0931
July 5	0	2570		0.0000	0.0931
July 6	0	2570		0.0000	0.0931
July 7	0	2570		0.0000	0.0931
July 8	0	2570		0.0000	0.0931
July 9	0	2570		0.0000	0.0931
July 10	0	2570		0.0000	0.0931
July 11	0	2570		0.0000	0.0931
July 12	3	2573		0.0001	0.0932
July 13	2	2575		0.0001	0.0933
July 14	3	2578		0.0001	0.0934
July 15	0	2578		0.0000	0.0934
July 16	1	2579		0.0000	0.0935
July 17	18	2597		0.0007	0.0941
July 18	48	2645		0.0017	0.0959
July 19	169	2814		0.0061	0.1020
July 20	168	2982		0.0061	0.1081
July 21	105	3087		0.0038	0.1119
July 22	164	3251		0.0059	0.1178
July 23	50	3301		0.0018	0.1196
July 24	30	3331		0.0011	0.1207
July 25	193	3524		0.0070	0.1277
July 26	75	3599		0.0027	0.1304
July 27	153	3752		0.0055	0.1360
July 28	253	4005		0.0092	0.1451
July 29	881	4886		0.0319	0.1771
July 30	384	5270		0.0139	0.1910
July 31	623	5893		0.0226	0.2136
Aug. 1	1060	6953		0.0384	0.2520
Aug. 2	58	7011		0.0021	0.2541
Aug. 3	58	7069		0.0021	0.2562
Aug. 4	90	7159		0.0033	0.2594
Aug. 5	47	7206		0.0017	0.2612
Aug. 6	29	7235		0.0011	0.2622
Aug. 7	84	7319		0.0030	0.2652
Aug. 8	28	7347		0.0010	0.2663
Aug. 9	24	7371		0.0009	0.2671
Aug. 10	11	7382		0.0004	0.2675
Aug. 11	19	7401		0.0007	0.2682
Aug. 12	27	7428		0.0010	0.2692
Aug. 13	7	7435		0.0003	0.2695
Aug. 14	28	7463		0.0010	0.2705
Aug. 15	11	7474		0.0004	0.2709
Aug. 16	8	7482		0.0003	0.2712
Aug. 17	38	7520		0.0014	0.2725
Aug. 18	189	7709		0.0068	0.2794
Aug. 19	282	7991		0.0102	0.2896
Aug. 20	10	8001		0.0004	0.2900
Aug. 21	11	8012		0.0004	0.2904
Aug. 22	45	8057		0.0016	0.2920
Aug. 23	0	8057		0.0000	0.2920
Aug. 24	31	8088		0.0011	0.2931
Aug. 25	8	8096		0.0003	0.2934
Aug. 26	165	8261		0.0060	0.2994
Aug. 27	20	8281		0.0007	0.3001
Aug. 28	42	8323		0.0015	0.3016
Aug. 29	234	8557		0.0085	0.3101
Aug. 30	15	8572		0.0005	0.3107
Aug. 31	67	8639		0.0024	0.3131

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Appendix C.1. (page 2 of 2)

Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
Sept. 1	24	8663	0.0009	0.3140
Sept. 2	7	8670	0.0003	0.3142
Sept. 3	80	8750	0.0029	0.3171
Sept. 4	940	9690	0.0341	0.3512
Sept. 5	467	10157	0.0169	0.3681
Sept. 6	3796	13953	0.1376	0.5057
Sept. 7	162	14115	0.0059	0.5115
Sept. 8	1129	15244	0.0409	0.5525
Sept. 9	1459	16703	0.0529	0.6053
Sept. 10	20	16723	0.0007	0.6061
Sept. 11	11	16734	0.0004	0.6065
Sept. 12	0	16734	0.0000	0.6065
Sept. 13	9	16743	0.0003	0.6068
Sept. 14	1158	17901	0.0420	0.6488
Sept. 15	808	18709	0.0293	0.6780
Sept. 16	177	18886	0.0064	0.6844
Sept. 17	91	18977	0.0033	0.6877
Sept. 18	218	19195	0.0079	0.6956
Sept. 19	732	19927	0.0265	0.7222
Sept. 20	95	20022	0.0034	0.7256
Sept. 21	43	20065	0.0016	0.7272
Sept. 22	36	20101	0.0013	0.7285
Sept. 23	1609	21710	0.0583	0.7868
Sept. 24	14	21724	0.0005	0.7873
Sept. 25	1343	23067	0.0487	0.8360
Sept. 26	565	23632	0.0205	0.8564
Sept. 27	1050	24682	0.0381	0.8945
Sept. 28	1513	26195	0.0548	0.9493
Sept. 29	54	26249	0.0020	0.9513
Sept. 30	11	26260	0.0004	0.9517
Oct. 1	15	26275	0.0005	0.9522
Oct. 2	158	26433	0.0057	0.9580
Oct. 3	497	26930	0.0180	0.9760
Oct. 4	0	26930	0.0000	0.9760
Oct. 5	0	26930	0.0000	0.9760
Oct. 6	0	26930	0.0000	0.9760
Oct. 7	0	26930	0.0000	0.9760
Oct. 8	0	26930	0.0000	0.9760
Oct. 9	0	26930	0.0000	0.9760
Oct. 10	0	26930	0.0000	0.9760
Oct. 11	0	26930	0.0000	0.9760
Oct. 12	0	26930	0.0000	0.9760
Oct. 13	0	26930	0.0000	0.9760
Oct. 14	12	26942	0.0004	0.9764
Oct. 15	36	26978	0.0013	0.9777
Oct. 16	22	27000	0.0008	0.9785
Oct. 17	25	27025	0.0009	0.9794
Oct. 18	3	27028	0.0001	0.9795
Oct. 19	12	27040	0.0004	0.9800
Oct. 20	34	27074	0.0012	0.9812
Oct. 21	36	27110	0.0013	0.9825
Oct. 22	34	27144	0.0012	0.9837
Oct. 23	26	27170	0.0009	0.9847
Oct. 24	22	27192	0.0008	0.9855
Oct. 25	31	27223	0.0011	0.9866
Oct. 26	8	27231	0.0003	0.9869
Oct. 27	31	27262	0.0011	0.9880
Oct. 28	57	27319	0.0021	0.9901
Oct. 29	38	27357	0.0014	0.9914
Oct. 30	49	27406	0.0018	0.9932
Oct. 31	20	27426	0.0007	0.9939
Nov. 1	34	27460	0.0012	0.9952
Nov. 2	37	27497	0.0013	0.9965
Nov. 3	3	27500	0.0001	0.9966
Nov. 4	13	27513	0.0005	0.9971
Nov. 5	9	27522	0.0003	0.9974
Nov. 6	10	27532	0.0004	0.9978
Nov. 7	15	27547	0.0005	0.9983
Nov. 8	5	27552	0.0002	0.9985
Nov. 9	6	27558	0.0002	0.9987
Nov. 10	9	27567	0.0003	0.9991
Nov. 11	8	27575	0.0003	0.9993
Nov. 12	1	27576	0.0000	0.9994
Nov. 13	4	27580	0.0001	0.9995
Nov. 14	13	27593	0.0005	1.0000

Mean Day of Migration = Aug. 31 Variance = 854.9 Days squared

Appendix C.2. Daily sockeye salmon counts and associated statistics from  
Chilkoot Lake weir, 1988.

Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
June 9	3	3	0.0000	0.0000
June 10	50	53	0.0006	0.0007
June 11	42	95	0.0005	0.0012
June 12	252	347	0.0031	0.0043
June 13	73	420	0.0009	0.0052
June 14	337	757	0.0041	0.0093
June 15	177	934	0.0022	0.0115
June 16	160	1094	0.0020	0.0135
June 17	68	1162	0.0008	0.0143
June 18	15	1177	0.0002	0.0145
June 19	73	1250	0.0009	0.0154
June 20	218	1468	0.0027	0.0181
June 21	237	1705	0.0029	0.0210
June 22	334	2039	0.0041	0.0251
June 23	370	2409	0.0046	0.0296
June 24	153	2562	0.0019	0.0315
June 25	121	2683	0.0015	0.0330
June 26	112	2795	0.0014	0.0344
June 27	256	3051	0.0031	0.0375
June 28	2117	5168	0.0260	0.0636
June 29	6446	11614	0.0793	0.1429
June 30	10000	21614	0.1230	0.2659
July 1	2402	24016	0.0296	0.2955
July 2	1513	25529	0.0186	0.3141
July 3	1689	27218	0.0208	0.3349
July 4	1814	29032	0.0223	0.3572
July 5	493	29525	0.0061	0.3633
July 6	478	30003	0.0059	0.3692
July 7	131	30134	0.0016	0.3708
July 8	817	30951	0.0101	0.3808
July 9	450	31401	0.0055	0.3864
July 10	1017	32418	0.0125	0.3989
July 11	1409	33827	0.0173	0.4162
July 12	814	34641	0.0100	0.4262
July 13	257	34898	0.0032	0.4294
July 14	219	35117	0.0027	0.4321
July 15	113	35230	0.0014	0.4335
July 16	560	35790	0.0069	0.4404
July 17	378	36168	0.0047	0.4450
July 18	479	36647	0.0059	0.4509
July 19	355	37002	0.0044	0.4553
July 20	856	37858	0.0105	0.4658
July 21	286	38144	0.0035	0.4693
July 22	99	38243	0.0012	0.4705
July 23	101	38344	0.0012	0.4718
July 24	820	39164	0.0101	0.4819
July 25	1422	40586	0.0175	0.4994
July 26	1352	41938	0.0166	0.5160
July 27	427	42365	0.0053	0.5213
July 28	763	43128	0.0094	0.5306
July 29	280	43408	0.0034	0.5341
July 30	352	43760	0.0043	0.5384
July 31	402	44162	0.0049	0.5434

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Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
Aug. 1	1338	45500	0.0165	0.5598
Aug. 2	804	46304	0.0099	0.5697
Aug. 3	1361	47665	0.0167	0.5865
Aug. 4	493	48158	0.0061	0.5925
Aug. 5	830	48988	0.0102	0.6028
Aug. 6	596	49584	0.0073	0.6101
Aug. 7	377	49961	0.0046	0.6147
Aug. 8	595	50556	0.0073	0.6220
Aug. 9	901	51457	0.0111	0.6331
Aug. 10	820	52277	0.0101	0.6432
Aug. 11	779	53056	0.0096	0.6528
Aug. 12	397	53453	0.0049	0.6577
Aug. 13	1814	55267	0.0223	0.6800
Aug. 14	915	56182	0.0113	0.6913
Aug. 15	904	57086	0.0111	0.7024
Aug. 16	1475	58561	0.0181	0.7205
Aug. 17	2029	60590	0.0250	0.7455
Aug. 18	2280	62870	0.0281	0.7736
Aug. 19	2181	65051	0.0268	0.8004
Aug. 20	1067	66118	0.0131	0.8135
Aug. 21	1808	67926	0.0222	0.8358
Aug. 22	1509	69435	0.0186	0.8543
Aug. 23	1120	70555	0.0138	0.8681
Aug. 24	131	70686	0.0016	0.8697
Aug. 25	702	71388	0.0086	0.8784
Aug. 26	628	72016	0.0077	0.8861
Aug. 27	752	72768	0.0093	0.8953
Aug. 28	806	73574	0.0099	0.9053
Aug. 29	760	74334	0.0094	0.9146
Aug. 30	514	74848	0.0063	0.9209
Aug. 31	344	75192	0.0042	0.9252
Sept. 1	251	75443	0.0031	0.9283
Sept. 2	907	76350	0.0112	0.9394
Sept. 3	962	77312	0.0118	0.9513
Sept. 4	665	77977	0.0082	0.9594
Sept. 5	809	78786	0.0100	0.9694
Sept. 6	502	79288	0.0062	0.9756
Sept. 7	380	79668	0.0047	0.9802
Sept. 8	150	79818	0.0018	0.9821
Sept. 9	92	79910	0.0011	0.9832
Sept. 10	48	79958	0.0006	0.9838
Sept. 11	99	80057	0.0012	0.9850
Sept. 12	68	80125	0.0008	0.9859
Sept. 13	160	80285	0.0020	0.9878
Sept. 14	75	80360	0.0009	0.9888
Sept. 15	118	80478	0.0015	0.9902
Sept. 16	165	80643	0.0020	0.9922
Sept. 17	74	80717	0.0009	0.9931
Sept. 18	23	80740	0.0003	0.9934
Sept. 19	30	80770	0.0004	0.9938
Sept. 20	84	80854	0.0010	0.9948
Sept. 21	26	80880	0.0003	0.9952
Sept. 22	37	80917	0.0005	0.9956
Sept. 23	93	81010	0.0011	0.9968
Sept. 24	88	81098	0.0011	0.9978
Sept. 25	37	81135	0.0005	0.9983

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Appendix C.2. (page 3 of 3)

Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
Sept. 26	27	81162	0.0003	0.9986
Sept. 27	16	81178	0.0002	0.9988
Sept. 28	8	81186	0.0001	0.9989
Sept. 29	15	81201	0.0002	0.9991
Sept. 30	9	81210	0.0001	0.9992
Oct. 1	13	81223	0.0002	0.9994
Oct. 2	15	81238	0.0002	0.9996
Oct. 3	13	81251	0.0002	0.9997
Oct. 4	15	81266	0.0002	0.9999
Oct. 5	0	81266	0.0000	0.9999
Oct. 6	0	81266	0.0000	0.9999
Oct. 7	0	81266	0.0000	0.9999
Oct. 8	0	81266	0.0000	0.9999
Oct. 9	0	81266	0.0000	0.9999
Oct. 10	0	81266	0.0000	0.9999
Oct. 11	0	81266	0.0000	0.9999
Oct. 12	1	81267	0.0000	0.9999
Oct. 13	1	81268	0.0000	0.9999
Oct. 14	1	81269	0.0000	0.9999
Oct. 15	0	81269	0.0000	0.9999
Oct. 16	0	81269	0.0000	0.9999
Oct. 17	0	81269	0.0000	0.9999
Oct. 18	1	81270	0.0000	1.0000
Oct. 19	0	81270	0.0000	1.0000
Oct. 20	0	81270	0.0000	1.0000
Oct. 21	0	81270	0.0000	1.0000
Oct. 22	0	81270	0.0000	1.0000
Oct. 23	2	81272	0.0000	1.0000
Oct. 24	1	81273	0.0000	1.0000
Oct. 25	1	81274	0.0000	1.0000

Mean Day of Migration = July 26      Variance = 619.1 Days squared

Appendix C.3. Age composition of sockeye salmon  
in the Lace River (Berners Bay)  
escapement by sex and age class, 1988.

	Brood Year and Age Class			Total
	1984	1984	1983	
	0.3	1.2	1.3	
Sample Date: (August 20)				
Male				
Sample Size	5	6	49	60
Percent	4.6	5.5	45.0	55.0
Std. Error	2.0	2.2	4.8	4.8
Female				
Sample Size	3	5	41	49
Percent	2.8	4.6	37.6	45.0
Std. Error	1.6	2.0	4.6	4.8
All Fish				
Sample Size	8	11	90	109
Percent	7.3	10.1	82.6	100.0
Std. Error	2.5	2.9	3.6	

Appendix C.4. Age composition of sockeye salmon in the Bear Flats (Chilkat River Mainstem) escapement by sex and age class, 1988.

Brood Year and Age Class							
	1986	1985		1984		1983	
	0.1	0.2	1.1	0.3	1.2	1.3	Total
Sample Date:	(October 20)						
Male							
Sample Number	1	34	1	6	21	3	66
Percent	1.1	36.6	1.1	6.5	22.6	3.2	71.0
Std. Error	1.1	5.0	1.1	2.6	4.3	1.8	4.7
Female							
Sample Number				24	1	2	27
Percent				25.8	1.1	2.2	29.0
Std. Error				4.6	1.1	1.5	4.7
All Fish							
Sample Number	1	34	1	30	22	5	93
Percent	1.1	36.6	1.1	32.3	23.7	5.4	100.0
Std. Error	1.1	5.0	1.1	4.9	4.4	2.3	

Appendix C.5. Age composition of sockeye salmon in the Chilkat Lake escapement by sex, age class, and escapement period, 1988.

	Brood Year and Age Class									Total
	1984		1983		1982			1981		
	0.3	1.2	1.3	2.2	1.4	2.3	3.2	2.4	3.3	
Escapement Dates:	(June 10 - July 23)									
Sample Dates:	(July 12 - 23)									
Male (67%)	1	1	151	9		36				198
Female (33%)		1	72	6		20				99
All Fish										
Sample Size	1	2	223	15		56				297
Percent	0.3	0.7	75.1	5.1		18.9				100.0
Std. Error	0.3	0.5	2.4	1.2		2.2				
Number	11	22	2,479	167		622				3,301
Escapement Dates:	(July 24 - 30)									
Sample Dates:	(July 24 - 30)									
Male (81%)		2	175	3		39				219
Female (19%)			38	1		12				51
All Fish										
Sample Size		2	213	4		51				270
Percent		0.7	78.9	1.5		18.9				100.0
Std. Error		0.5	2.3	0.7		2.2				
Number		15	1,553	29		372				1,969
Escapement Dates:	(July 31 - August 6)									
Sample Dates:	(July 31 - August 6)									
Male (77%)	1	4	189	4	1	53				252
Female (23%)			51	2	2	18		1		74
All Fish										
Sample Size	1	4	240	6	3	71		1		326
Percent	0.3	1.2	73.6	1.8	0.9	21.8		0.3		100.0
Std. Error	0.3	0.6	2.2	0.7	0.5	2.1		0.3		
Number	6	24	1,447	36	18	428		6		1,965
Escapement Dates:	(August 7 - 13)									
Sample Dates:	(August 7 - 12)									
Male (94%)		2	87			19				108
Female (6%)			7							7
All Fish										
Sample Size		2	94			19				115
Percent		1.7	81.7			16.5				100.0
Std. Error		0.8	2.4			2.3				
Number		3	164			33				200
Escapement Dates:	(August 14 - 20)									
Sample Dates:	(August 14 - 19)									
Male (88%)			60	1		30				91
Female (12%)			7	2		3				12
All Fish										
Sample Size			67	3		33				103
Percent			65.0	2.9		32.0				100.0
Std. Error			4.3	1.5		4.2				
Number			369	16		181				566
Escapement Dates:	(August 21 - 27)									
Sample Dates:	(August 21 - 26)									
Male (81%)		3	32	7	1	33				76
Female (19%)		1	5	4		8				18
All Fish										
Sample Size		4	37	11	1	41				94
Percent		4.3	39.4	11.7	1.1	43.6				100.0
Std. Error		1.7	4.1	2.7	0.9	4.2				
Number		12	110	33	3	122				280

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	Brood Year and Age Class									Total
	1984		1983		1982		1981			
	0.3	1.2	1.3	2.2	1.4	2.3	3.2	2.4		
Escapement Dates:	(August 28 - September 10)									
Sample Dates:	(August 28 - September 9)									
Male (77%)			24	18		132			1	175
Female (23%)			7	6		40				53
All Fish										
Sample Size			31	24		172			1	228
Percent			13.6	10.5		75.4			0.4	100.0
Std. Error			2.2	2.0		2.8			0.4	
Number			1,148	888		6,369			37	8,442
Escapement Dates:	(September 11 - 24)									
Sample Dates:	(September 17 - 23)									
Male (65%)		1	1	25		113				140
Female (35%)			2	12		59	1			74
All Fish										
Sample Size		1	3	37		173	1			215
Percent		0.5	1.4	17.2		80.5	0.5			100.0
Std. Error		0.5	0.8	2.5		2.7	0.5			
Number		23	70	861		4,024	23			5,001
Escapement Dates:	(September 25 - October 22)									
Sample Dates:	(September 25 - October 21)									
Male (64%)				27		72	1			100
Female (36%)		1		9		47				57
All Fish										
Sample Size		1		36		119	1			157
Percent		0.6		22.9		75.8	0.6			100.0
Std. Error		0.6		3.3		3.4	0.6			
Number		35		1,243		4,107	35			5,420
Escapement Dates:	(October 23 - November 14)									
Sample Dates:	(October 24 - November 7)									
Male (71%)				13		67				80
Female (39%)				2		31				33
All Fish										
Sample Size				15		98				113
Percent				13.3		86.7				100.0
Std. Error				2.8		2.8				
Number				60		389				449
Combined Periods (Percentages are weighted by period escapements)										
Male										
Sample Size	2	13	719	107	2	594	1		1	1,439
Percent	0.1	0.3	20.2	8.7	<0.1	42.0	0.1		0.1	71.6
Std. Error	<0.1	0.1	0.8	0.9	<0.1	1.4	0.1		0.1	1.3
Number	17	85	5,584	2,404	9	11,566	35		37	19,737
Female										
Sample Size		3	189	44	2	238	1	1		478
Percent		0.2	6.4	3.4	<0.1	18.3	0.1	<0.1		28.4
Std. Error		0.1	0.5	0.6	<0.1	1.2	0.1	<0.1		1.3
Number		49	1,756	929	12	5,057	23	6		7,832
All Fish										
Sample Size	2	16	908	151	4	833	2	1	1	1,918
Percent	0.1	0.5	26.6	12.1	0.1	60.3	0.2	<0.1	0.1	100.0
Std. Error	<0.1	0.2	0.8	1.0	<0.1	1.2	0.1	<0.1	0.1	
Number	17	134	7,340	3,333	21	16,647	58	6	37	27,593

Appendix C.6. Test for significant changes among periods in the age composition of sockeye salmon in the Chilkat Lake escapement by age class, 1988.

Periods Compared	Brood Year and Age Class									
	1984		1983		1982			1981		
	0.3	1.2	1.3	2.2	1.4	2.3	3.2	2.4	3.3	
1 , 2				S*						
1 , 3				S*						
1 , 4				S*						
1 , 5			S				S**			
1 , 6		S*	S**	S*			S**			
1 , 7			S**	S*			S**			
1 , 8			S**	S**			S**			
1 , 9			S**	S**			S**			
1 , 10			S**	S**			S**			
2 , 3										
2 , 4										
2 , 5			S**				S**			
2 , 6		S	S**	S**			S**			
2 , 7			S**	S**			S**			
2 , 8			S**	S**			S**			
2 , 9			S**	S**			S**			
2 , 10			S**	S**			S**			
3 , 4										
3 , 5							S*			
3 , 6			S**	S**			S**			
3 , 7			S**	S**			S**			
3 , 8			S**	S**			S**			
3 , 9			S**	S**			S**			
3 , 10			S**	S**			S**			
4 , 5			S**				S*			
4 , 6			S**	S**			S**			
4 , 7			S**	S**			S**			
4 , 8			S**	S**			S**			
4 , 9			S**	S**			S**			
4 , 10			S**	S**			S**			
5 , 6			S**	S*						
5 , 7			S**	S*			S**			
5 , 8			S**	S**			S**			
5 , 9			S**	S**			S**			
5 , 10			S**	S*			S**			
6 , 7		S**	S**				S**			
6 , 8		S	S**				S**			
6 , 9			S**	S*			S**			
6 , 10		S	S**				S**			
7 , 8			S**	S						
7 , 9			S**	S**						
7 , 10			S**				S*			
8 , 9										
8 , 10										
9 , 10				S			S*			

S = significant at probability = 0.10  
S\* = significant at probability = 0.05  
S\*\* = significant at probability = 0.01

Appendix C.7. Age composition of sockeye salmon in the Chilkoot Lake escapement by sex, age class, and escapement period, 1988.

	Brood Year and Age Class							Total
	1984	1983		1982		1981		
	1.2	1.3	2.2	1.4	2.3	2.4	3.3	
Escapement Dates:	(June 9 - 18)							
Sample Dates:	(June 13 - 17)							
Male (53%)	1	20	2	2	8			33
Female (47%)		18		4	7			29
All Fish								
Sample Size	1	38	2	6	15			62
Percent	1.6	61.3	3.2	9.7	24.2			100.0
Std. Error	1.6	6.1	2.2	3.7	5.3			
Number	19	721	38	114	285			1177
Escapement Dates:	(June 19 - 25)							
Sample Dates:	(June 19 - 23)							
Male (68%)	1	61	2	3	9			76
Female (32%)		28		1	7			36
All Fish								
Sample Size	1	89	2	4	16			112
Percent	0.9	79.5	1.8	3.6	14.3			100.0
Std. Error	0.9	3.7	1.2	1.7	3.2			
Number	13	1197	27	54	215			1506
Escapement Dates:	(June 26 - July 2)							
Sample Dates:	(June 27 - July 2)							
Male (58%)	9	210	6	2	28		1	256
Female (42%)	3	151		2	31			187
All Fish								
Sample Size	12	361	6	4	59		1	443
Percent	2.7	81.5	1.4	0.9	13.3		0.2	100.0
Std. Error	0.8	1.8	0.5	0.4	1.6		0.2	
Number	619	18617	309	206	3043		52	22846
Escapement Dates:	(July 3 - July 9)							
Sample Dates:	(July 3 - July 9)							
Male (56%)	14	69	4	2	5			94
Female (44%)	2	63	2		8			75
All Fish								
Sample Size	16	132	6	2	13			169
Percent	9.5	78.1	3.6	1.2	7.7			100.0
Std. Error	2.2	3.1	1.4	0.8	2.0			
Number	557	4586	208	69	452			5872
Escapement Dates:	(July 10 - July 16)							
Sample Dates:	(July 10 - July 16)							
Male (56%)	10	74	5	1	9			99
Female (44%)	2	65			10		1	78
All Fish								
Sample Size	12	139	5	1	19		1	177
Percent	6.8	78.5	2.8	0.6	10.7		0.6	100.0
Std. Error	1.9	3.0	1.2	0.6	2.3		0.6	
Number	298	3446	124	25	471		25	4389
Escapement Dates:	(July 17 - July 23)							
Sample Dates:	(July 17 - July 23)							
Male (55%)	10	70	4	1	7			92
Female (45%)	3	68	1		4			76
All Fish								
Sample Size	13	138	5	1	11			168
Percent	7.7	82.1	3.0	0.6	6.5			100.0
Std. Error	2.0	2.9	1.3	0.6	1.9			
Number	198	2098	76	15	167			2554

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	Brood Year and Age Class							Total
	1984	1983		1982		1981		
	1.2	1.3	2.2	1.4	2.3	2.4	3.3	
Escapement Dates:	(July 24 - July 30)							
Sample Dates:	(July 24 - July 30)							
Male (54%)	7	111	4	3	16		141	
Female (46%)	6	94	1		19		120	
All Fish								
Sample Size	13	205	5	3	35		261	
Percent	5.0	78.5	1.9	1.1	13.4		100.0	
Std. Error	1.3	2.5	0.8	0.6	2.1			
Number	270	4254	104	62	726		5416	
Escapement Dates:	(July 31 - August 6)							
Sample Dates:	(July 31 - August 6)							
Male (57%)	17	119	4		16	1	157	
Female (43%)	3	99	3	1	14		120	
All Fish								
Sample Size	20	218	7	1	30	1	277	
Percent	7.2	78.7	2.5	0.4	10.8	0.4	100.0	
Std. Error	1.5	2.4	0.9	0.4	1.8	0.4		
Number	421	4584	147	21	630	21	5824	
Escapement Dates:	(August 7 - 13)							
Sample Dates:	(August 7 - 13)							
Male (60%)	9	161	8	4	21	1	204	
Female (40%)	5	102	5		22	1	135	
All Fish								
Sample Size	14	263	13	4	43	2	339	
Percent	4.1	77.6	3.8	1.2	12.7	0.6	100.0	
Std. Error	1.0	2.2	1.0	0.6	1.8	0.4		
Number	235	4408	218	67	721	34	5683	
Escapement Dates:	(August 14 - 20)							
Sample Dates:	(August 14 - 19)							
Male (60%)	7	114	8	5	30	1	165	
Female (40%)		91	5		12		108	
All Fish								
Sample Size	7	205	13	5	42	1	273	
Percent	2.6	75.1	4.8	1.8	15.4	0.4	100.0	
Std. Error	0.9	2.6	1.3	0.8	2.2	0.4		
Number	278	8148	517	199	1669	40	10851	
Escapement Dates:	(August 21 - 27)							
Sample Dates:	(August 23 - 27)							
Male (48%)	3	47	3	1	6	2	62	
Female (52%)	2	49	1		16		68	
All Fish								
Sample Size	5	96	4	1	22	2	130	
Percent	3.8	73.8	3.1	0.8	16.9	1.5	100.0	
Std. Error	1.7	3.8	1.5	0.8	3.3	1.1		
Number	256	4911	205	51	1125	102	6650	
Escapement Dates:	(August 28 - October 25)							
Sample Dates:	(August 28 - September 9)							
Male (41%)	1	72	3	4	21	1	102	
Female (59%)	2	118	1	2	24	1	148	
All Fish								
Sample Size	3	190	4	6	45	2	250	
Percent	1.2	76.0	1.6	2.4	18.0	0.8	100.0	
Std. Error	0.7	2.7	0.8	1.0	2.4	0.6		
Number	102	6465	136	204	1531	68	8506	

-continued-

	Brood Year and Age Class							Total
	1984	1983		1982		1981		
	1.2	1.3	2.2	1.4	2.3	2.4	3.3	
Combined Periods (Percentages are weighted by period escapements)								
Male								
Sample Size	89	1128	53	28	176	6	1	1481
Percent	3.1	42.1	1.9	1.0	6.7	0.3	0.1	55.1
Std. Error	0.3	1.0	0.3	0.2	0.5	0.1	0.1	1.0
Number	2503	34216	1573	806	5453	214	52	44817
Female								
Sample Size	28	946	19	10	174	3		1180
Percent	0.9	36.0	0.7	0.3	6.9	0.1		44.9
Std. Error	0.2	1.0	0.2	0.1	0.5	0.1		1.0
Number	763	29219	536	281	5582	76		36457
All Fish								
Sample Size	117	2074	72	38	350	9	1	2661
Percent	4.0	78.1	2.6	1.3	13.6	0.4	0.1	100.0
Std. Error	0.4	0.9	0.3	0.2	0.7	0.1	0.1	
Number	3266	63435	2109	1087	11035	290	52	81274

Appendix C.8. Test for significant changes in the age composition of sockeye salmon in the Chilkoot Lake escapement by age class and escapement period, 1988.

Periods Compared		Brood Year and Age Class						
		1984	1983		1982		1981	
		1.2	1.3	2.2	1.4	2.3	2.4	3.3
1, 2			S**					
1, 3			S**		S**		S*	
1, 4	S		S**		S**		S**	
1, 5			S**		S**		S**	
1, 6			S**		S**		S**	
1, 7			S**		S**		S**	
1, 8			S**		S**		S**	
1, 9			S**		S**		S*	
1, 10			S*		S**			
1, 11					S**			
1, 12			S*		S*			
2, 3					S			
2, 4	S**							
2, 5	S*							
2, 6	S*					S		
2, 7								
2, 8	S*				S*			
2, 9								
2, 10								
2, 11								
2, 12								
3, 4	S**					S		
3, 5	S*							
3, 6	S**					S*		
3, 7								
3, 8	S**							
3, 9				S*				
3, 10		S		S**				
3, 11		S				S		
3, 12								
4, 5								
4, 6								
4, 7						S		
4, 8								
4, 9	S*							
4, 10	S**					S*		
4, 11	S					S*		
4, 12	S**					S**		
5, 6								
5, 7								
5, 8								
5, 9								
5, 10	S							
5, 11								
5, 12	S**					S		
6, 7						S*		
6, 8								
6, 9						S		
6, 10	S*					S**		
6, 11						S**		
6, 12	S**					S**		
7, 8								
7, 9								
7, 10								
7, 11								
7, 12	S*							
8, 9								
8, 10	S**							
8, 11								
8, 12	S**			S		S*		
9, 10								
9, 11								
9, 12	S					S		
10, 11								
10, 12			S					
11, 12								

S = significant at probability = 0.10  
 S\* = significant at probability = 0.05  
 S\*\* = significant at probability = 0.01

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