TECHNICAL FISHERY REPORT 93-15

Alaska Department of Fish and Game
Division of Commercial Fisheries
P.O. Box 25526
Juneau, Alaska 99802-5526

September 1993

Stock Composition of Sockeye Salmon Catches in Southeast Alaska District 111 and the Taku River, 1989, Estimated with Scale Pattern Analysis

by

Kathleen A. Jensen,

Elisabeth L. Jones

and

Andrew J. McGregor

State of Alaska Walter J. Hickel, Governor

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.

STOCK COMPOSITION OF SOCKEYE SALMON CATCHES IN SOUTHEAST ALASKA DISTRICT 111 AND THE TAKU RIVER, 1989, ESTIMATED WITH SCALE PATTERN ANALYSIS

By

Kathleen A. Jensen,

Elisabeth L. Jones,

and

Andrew J. McGregor

Technical Fishery Report No. 93-15

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

September 1993

AUTHORS

Kathleen A. Jensen is a Region 1 fishery biologist who conducts research on transboundary river salmon stocks for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 20, Douglas, Alaska 99824.

Elisabeth L. Jones worked as a Region 1 fishery technician for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 20, Douglas, Alaska 99824.

Andrew J. McGregor is a Region 1 fisheries biologist and project leader for transboundary river salmon research for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 20, Douglas, Alaska 99824.

ACKNOWLEDGMENTS

The authors wish to thank numerous individuals and organizations involved in the collection of data used in this report. Alaska Department of Fish and Game (ADF&G) personnel that assisted in collecting scales included Clyde Andrews, Courtney Fleek, Iris Frank, Dennis Lemond, Craig McKinstry, Renate Riffe, Cathy Robinson, and Andy Starostka. Jim and Rita Odegaard, owners and operators of the tender "Apache," housed and assisted our samplers working on their vessel throughout the season. Joe Muir offered his insight into the management of the District 111 fishery and aided in logistic arrangements for sampling. Pat Milligan supervised personnel from the Canadian Department of Fisheries and Oceans who assisted in collecting scales from Taku River escapements and the Canadian inriver fishery.

PROJECT SPONSORSHIP

This investigation was financed with U.S./Canada Pacific Salmon Treaty funds under Cooperative Agreement NA-90AA-H-FM010.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF APPENDICES (Continued)

ABSTRACT

A total of 74,019 sockeye salmon were harvested in the District 111 gillnet fishery. The Kuthai stock contributed an estimated 7.7% of the catch, Trapper/Mainstem 61.6%, Tatsamenie 15.6%, Crescent 5.1%, and Speel 10.0%. Port Snettisham stocks composed an estimated 15.1% of the catch and Taku River fish composed the remaining 84.9%. The Canadian inriver commercial fishery harvested an estimated 990 Kuthai, 13,792 Trapper/Mainstem, and 3,763 Tatsamenie sockeye salmon for a total harvest of 18,545 fish. The estimated total Port Snettisham sockeye run was 24,637 fish, and the estimated above-border Taku River run was 177,622 fish. Port Snettisham escapements totalled 13,338 sockeye salmon, and the escapement to Canadian portions of the Taku River drainage was estimated at 95,263 fish. The U.S. harvested 59.6% to 65.1% of the total allowable catch of above-border Taku River sockeye salmon, and Canada harvested 17.4% to 19.1%.

Key Words: sockeye salmon, stock identification, scale pattern analysis, Taku River, District 111

INTRODUCTION

The Taku River is a transboundary river which originates in central British Columbia and flows southwest through the Coastal Range mountains and Southeast Alaska to the Pacific Ocean (Figure 1). The Taku River supports numerous stocks of salmon that are harvested in U.S. and Canadian fisheries. The U.S. gillnet fishery in District 111 targets Taku River and Port Snettisham sockeye salmon *Oncorhynchus nerka* stocks, and the Canadian fishery in the river targets Taku River sockeye stocks. The U.S./Canada Pacific Salmon Treaty of 1985 established conservation and harvest sharing objectives for the Taku River sockeye run. Cooperative international management of transboundary river sockeye salmon is mandated by this treaty. Provisions specified by the Treaty for the Taku River in 1985 and 1986 were to achieve a spawning escapement goal of 71,000 to 80,000 sockeye salmon into Canadian portions of the Taku River. Harvest sharing arrangements were to allow the U.S. an 85% and Canada a 15% share of the total allowable catch (TAC) of sockeye salmon of above-border Taku River origin. Negotiations between the two governments to develop harvest sharing agreements for the 1987 fishing season were unsuccessful and fishing proceeded without such an agreement. In 1988 the two nations agreed to a 5-year harvest sharing plan that allowed the U.S. 82% and Canada 18% of the TAC. The agreement was contingent upon initiation of cooperative international sockeye salmon enhancement projects on the transboundary Taku and Stikine Rivers. Knowledge of stock-specific harvest is needed to (1) implement and assess compliance with the harvest sharing guidelines of the Treaty, and (2) develop long-term stock-specific run reconstructions for use in stock assessment and fisheries management.

Objectives

The purpose of this ongoing study is to generate timely stock composition estimates of sockeye catches in the District 111 gillnet fishery. Inseason estimates are generated weekly during the commercial fishery and are revised postseasonally after escapement samples have been collected. Estimates of the stock composition of weekly sockeye catches for the Canadian commercial fishery in the Taku River are also generated postseasonally. Differences between inseason and postseason estimates are calculated. We provide basic statistics for use in assessing the treaty performance of the U.S. and Canadian fisheries targeting on Taku River sockeye salmon and to reconstruct runs for major sockeye stock groups.

Fisheries

The U.S. allotment of Taku River sockeye salmon is taken primarily in the District 111 gillnet fishery, which includes Taku Inlet, Stephens Passage, and Port Snettisham (Figure 2); however, unknown but assumed small numbers of Taku sockeye salmon may be taken in other Southeast Alaska fishing districts (McGregor 1985). Sockeye salmon bound for spawning sites in Crescent and Speel Lakes in Port Snettisham, Southeast Alaska, are also harvested in the District 111 fishery. The 1979 to 1988 annual catches in District 111 have averaged 76,248 sockeye salmon and have ranged from 31,627 to 123,117 fish. The majority of the District 111 harvest is generally taken in Taku Inlet. In recent years Port Snettisham has been closed to commercial fishing during much of the season to reduce the catch of Snettisham stocks and begin rebuilding these runs.

The Canadian allotment of Taku River sockeye salmon is taken in a gillnet fishery that operates in the Taku River within 20km upstream of the Alaska-British Columbia border (Figure 1). Annual inriver catches have averaged 14,910 sockeye salmon since the fishery began in 1979 and have ranged from 3,144 to 27,242 fish.

Stock Identification and Escapement Estimation

Scale pattern analysis (SPA) has been used since 1983 to estimate the contributions of Taku River and Port Snettisham sockeye salmon to the District 111 fishery on a postseasonal basis. Originally, two composite stock groups were identified in the catches: the Taku group, represented by scales collected from fish wheel catches at Canyon Island in the Taku River, and the Snettisham group, represented by scales collected from the Crescent and Speel Lake weirs (McGregor 1985, 1986). The scale patterns of Taku River fish changed through the migration and it became apparent that early-migrating stocks had different patterns than late-migrating stocks. To better reflect this temporal variation in scale patterns, scales used to represent the Taku River run were taken from fish wheel catches in 1985 and were grouped into five sequential periods. A temporal series of five linear discriminant functions was developed using these grouped samples and samples from the Port Snettisham systems. The weekly catch in District 111 was classified with the appropriate function with an assumed 1-week lag between the District 111 fishery and Canyon Island (Oliver and McGregor 1986). In 1986, models were further refined by using separate standards for the Kuthai, Little Trapper, and Little Tatsamenie Lake systems and for the mainstem composite group composed of mainstem, tributary, and small lake spawners. The Crescent and Speel stocks were also separated and the District 111 discriminant functions were developed for six stock groups (McGregor and Jones 1987, 1988, 1989). Since 1986, inseason SPA based on escapement standards from the previous year has been used to estimate stock compositions of District 111 catches. Inriver samples from the Canadian fishery and the Canyon Island fish wheel catches have been classified postseasonally to stock group of origin since 1986.

An adult mark-recapture program has been jointly operated on the Taku River at Canyon Island and the inriver fisheries by the Alaska Department of Fish and Game (ADF&G) and the Canadian Department of Fisheries and Oceans (DFO) since 1984 (McGregor and Clark 1987, 1988, 1989, 1990; McGregor et al. 1991). The mark-recapture program provides inseason and postseason estimates of sockeye escapement to the Taku River.

METHODS

Numbers of Fish

We obtained catch statistics for District 111 from ADF&G records of fishery sales receipts (*fish tickets*); these records were taken from the database on September 5, 1990. Harvest statistics for the Canadian inriver fishery were taken from a Transboundary Technical Committee Report (TTC 1991). Catches were reported by fishing period and were assigned to a statistical week. Each statistical week began at 12:01 p.m. Sunday and ended the following Saturday at midnight. Weeks were sequentially numbered beginning with the first Sunday of the calendar year.

The escapement to Port Snettisham was enumerated at counting weirs located at the outlets of Crescent and Speel Lakes. Tagging and recapture methods were used to estimate the sockeye salmon run size to the Taku River upstream of the U.S./Canada border (McGregor et al. 1991). DFO operated weirs at Little Trapper and Little Tatsamenie Lakes to count escapements of these spawning stocks.

Collection and Preparation of Scale Samples

Scales were taken from the left side of the fish approximately two rows above the lateral line along a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963). Scales on salmon fry first develop in this area, and thus, for purposes of aging and digitizing, it is the preferred area. Scales were mounted on gum cards and impressions made in cellulose acetate (Clutter and Whitesel 1956).

Employees of the ADF&G, Commercial Fisheries Division, sampled District 111 catches aboard tenders, fishing vessels, and at the fishing ports of Douglas, Petersburg, and Excursion Inlet. Samplers recorded the sex of each fish sampled and collected one scale. The Canadian inriver harvest was sampled by DFO and ADF&G employees. Samplers recorded the sex of each fish sampled and took five scales as required by DFO sampling guidelines. Fish captured in the Canyon Island fish wheels were sampled by ADF&G and DFO employees.

Similar procedures were used to sample escapements; one to three scales per fish were taken from Alaskan systems and five scales per fish were taken from headwater systems in Canada. Scales were collected at enumeration weirs at Crescent and Speel Lakes in the Port Snettisham drainages, and at Little Trapper and Little Tatsamenie Lakes in the Taku drainage. Samples were collected periodically throughout the run from fish captured in traps at each of the weir sites. Other Taku River spawning sites, including Kuthai Lake, Nahlin River, and sloughs, side channels, and spawning areas on the mainstem river, were sampled on one or several days. Scale samples were also taken in conjunction with the escapement estimation program at Canyon Island. Fish wheels were used at this location to capture fish for tagging and sampling throughout the duration of the run. The abundance and age composition of the Taku River run past Canyon Island were estimated using this data.

Sex was determined by examination of external sexual maturation characteristics, including kype development, belly, vent, and jaw shapes, or, when possible, by examination of gonads. A study conducted by ADF&G to determine the accuracy of its samplers in sexing ocean-caught salmon showed that an average of 94% of the sockeye salmon sampled were sexed correctly (Pahlke 1988). The accuracy of determining sockeye salmon sex from inriver fishery catches or the spawning grounds is probably higher, because of the pronounced secondary maturation characteristics of fish at these locations.

Scale sampling goals of 700 fish per statistical week were used to determine the age composition of the District 111 harvest. A sample of 500 ageable scales enabled the proportion of each major age group in the catch during each fishing period to be estimated to within 5% of the true proportion 95% of the time (Cochran 1977; McPherson et al. 1990). However, additional scales were needed to account for a scale regeneration rate of approximately 20% and to ensure adequate numbers of scales from minor age classes were available each week for digitizing. Sampling goals were met for most fishing periods in the District 111 commercial fishery. Because of low catches and limited fish availability in the Canadian commercial catch the scale sampling goal was 700 fish per 3-week period. Age composition of catches often changed significantly between fishing periods; therefore, samples from several periods were seldom combined. This resulted in relatively low levels of accuracy and precision of age composition estimates for the Canadian fishery. All fish caught in the Canyon Island fish wheels were sampled for scales. Sample goals for Kuthai Lake and the mainstem Taku River were 700 fish; because sampling of these systems was conducted over a short time, all samples were pooled to represent the age composition of each escapement. DFO personnel sampled sockeye salmon from Little Trapper and Little Tatsamenie Lake weirs and ADF&G personnel sampled fish from Crescent and Speel Lake weirs. The sampling goal for each weir escapement was 750 samples collected throughout the salmon migration.

Age Composition

Fish ages, determined by visually examining images of scale impressions magnified to 70x on a microfiche reader, were recorded in European notation. Criteria used to determine ages were similar to those of Moser (1968).

Scales from fish sampled on the spawning grounds occasionally exhibited resorption along the outer edges. Sockeye salmon length was used to help determine marine ages because fish length is highly correlated with marine age (McPherson et al. 1990). In cases where scale resorption made distinguishing marine age difficult, sex-specific length frequency histograms were used to assist in determining the correct marine age.

Scale Digitizing

Scale images magnified at 100X were projected onto a digitizing tablet using equipment similar to that described by Ryan and Christie (1976). Scale measurements were made and recorded with an IBM microcomputer-controlled digitizing system.

An axis approximately perpendicular to the anterior edge of the unsculptured posterior field is best for consistently measuring sockeye scales (Clutter and Whitesel 1956; Narver 1963). All circuli counts and scale measurements in the lacustrine and first-year marine zone were made along this axis, which is approximately 20° dorsal or ventral from the anterior-posterior axis. Measurements were made in three or four zones: (1) the first freshwater zone or the scale center to the last circulus of the first freshwater annulus, (2) when present, the second freshwater zone or the first circuli of the second year of freshwater growth to the end of the second freshwater annulus, (3) the plus growth zone or the scale growth after the last freshwater annulus and before the first marine circulus (Moser 1968), and (4) the first year marine growth zone, the first marine circulus to the end of the first marine annulus (Figure 4). A total of 76 variables, including circuli counts, incremental distances, and ratios and/or combinations of the measured variables were calculated for samples with a single freshwater annular zone and 108 variables for samples with two freshwater annular zones (Appendix A.2).

Discriminant Function Analysis

We used linear discriminant function analysis (LDF) to develop classification rules used to assign a sockeye salmon sampled in a mixed stock fishery to a stock of origin. The variables calculated from the circuli counts and incremental distances on scales from fish of known origin provided a set of measurements used to define these rules. A sample of p selected scale variables from a number of fish in a stock or stock group defined a single region in p-space characteristic of that group of fish. The set of all p-dimensional vectors of measurements for the population formed a multivariate distribution. Discriminant analysis derived the decision surfaces that "best" discriminated between or separated the populations. A sockeye salmon harvested in a mixed stock fishery was classified according to which region its p-dimensional vector occupied. The accuracy of classification depended upon the precision with which the regions defining each stock or group were described and the inherent separation between them. The LDF was the linear combination of p observed variables which maximized the between-group variance relative to the within-group variance (Fisher 1936).

LDF provides the best discriminant rule, in the sense of minimizing the expected probability of misclassification provided that (1) the groups being investigated are discrete and identifiable, (2) the parent distributions of the measured variables are multivariate normal, and (3) the variance-covariance matrices for all groups are equal. Gilbert (1969) found LDF satisfactory if the variance-covariance matrices were not too different. In addition, large sample sizes appear to make the LDF robust to the assumption of common variance-covariance matrices (Issacson 1954; Anas and Murai 1969). The method also appears to be robust to violations of the normality assumption for some discrete distributions; however, it is not robust for continuous non-Gaussian parent distributions (Lachenbruch et al. 1973; Krzanowski 1977). Unpublished results from ADF&G studies which compared LDF, QDF (quadratic discriminant analysis), NNN (nearest neighbor analysis), and MLE (maximum likelihood estimation) indicated that LDF had a higher classification accuracy than QDF or NNN and had an accuracy nearly identical to MLE. The test was run with five sets of known-origin scales. The sets were divided into learning sets used to establish classification rules and test sets where the stocks were combined and classified to test the accuracy of the four estimators. The results indicated that the assumptions for LDF were met or that LDF was robust to violations of them for the variables used in SPA of Southeast Alaska mixed stock sockeye catches.

Scale variables used in the LDF were selected with a stepwise procedure. Variables were added until the partial F-statistic of all variables available for entry into the model was less than 4.00 and all variables in the model had F-values greater than 4.00 (Enslein et al. 1987). An almost unbiased estimate of classification accuracy for each LDF was determined using a leaving-one-out procedure

(Lachenbruch 1967). One sample was left out, the discriminant rule was estimated, and the left-out sample was classified using the discriminant rule and checked to see if it was classified correctly. This procedure was repeated for all samples. Thus, when an LDF was run using the leaving-one-out procedure, a classification matrix was developed which gave the proportion of correctly identified fish and the proportion of misclassification of each stock to each of the other stocks (Appendix B).

When more than two stock groups were analyzed, the stepwise procedure did not always result in maximum classification accuracies or the most balanced classification matrix. Frequently, well separated groups were separated even further, while poorly separated groups remained poorly separated (Habbema and Hermans 1977). Scale variables that provided the best discrimination between the groups that most often misclassified as each other were occasionally added to or substituted for other variables used in the LDF to provide either a better balance to the classification matrix or to increase the mean classification accuracy.

The proportional estimates of stock composition in the mixed stock harvests, referred to as initial estimates, were adjusted with a classification matrix correction procedure (Cook and Lord 1978). The fish in the mixed stock sample were classified with the LDF. The vector of proportional estimates for each stock or stock group was multiplied by the inverse transposed classification matrix to give new estimates, referred to as adjusted estimates, for the true proportions of stocks and stock groups in the mixed stock fishery. In cases where the adjusted estimated proportion for a stock group was less than zero, the entire catch sample was reclassified with a function which excluded that stock group. This process was repeated until all adjusted estimated proportions were positive.

The variance and 90% confidence intervals of the adjusted estimates of stock proportions were computed according to Pella and Robertson (1979). The variance-covariance matrices for the misclassification matrix and for the mixed stock proportions vector were determined from the multinomial probability distribution. The two variance-covariance matrices were combined to give variances and covariances for the adjusted estimates of stock proportions. The variances for the proportions of each stock were the diagonal elements of this combined matrix, i.e., they were an additive combination of (1) the sampling variation in estimation of the probability of assignment of the known stock group, and (2) the sampling variation in estimation of the assignment composition of the mixed stock group.

Developing Standards

In 1989 three age groups—1.2, 1.3, and 2.3—contributed 80% to 85% of the sockeye catches in District 111, the Canadian inriver commercial fishery, and the Canyon Island fish wheels. The desired sample size for each age-specific standard was 200 fish per stock group. Only a minimal decrease in the variance of stock composition estimates is achieved by enlarging samples sizes of standards above 200. Standards were developed for each age class for Kuthai Lake, the Trapper Lake/Mainstem conglomerate, Tatsamenie Lake, and Speel Lake. Standards for Crescent Lake were developed only for ages 1.3 and 2.3. Standards were not developed for ages which contributed only a minor fraction (<5%) of the escapement because of insufficient availability of scales. Standards from a specific age class were used to build functions to classify catches of fish of the same age. Age-specific analysis was used to (1) account for differences in age composition among stocks, (2) remove potential bias due to differences in migratory timing of different ages, and (3) eliminate the effect of different environmental conditions on the scale patterns of different ages.

Classification of Catches

Commercial catches were analyzed inseason with discriminant functions developed from the previous year's escapement standards. Stock contributions for the District 111 commercial catches were estimated and summaries were provided to managers within 48 h of the fishery closures from mid-June through mid-August. Ages 1.2 and 1.3 were analyzed inseason but age 2.3 was not because of time constraints. The desired sample size for mixed stock catches was 100 fish per age class per fishing period. Within a wide range of classification accuracies, the variance of stock composition estimates decreases rapidly as the mixed stock sample in increases from 50 to 100. However, further increases in sample size show a reduced effect on the variance. The sample size used for the SPA of mixed stock catches varied on a weekly basis and was dependent on age composition. Generally, 100 scales from age 1.3 and as many scales as possible, up to 100, from ages 1.2 and 2.3 were analyzed for each fishery and each week (Appendix A.1). The District 111 catches were reclassified postseasonally with standards built from the 1989 escapements. The age-2.3 fish from the District 111 catches and the age-1.2 and -1.3 fish from both the Canadian catches in the Taku River and the Canyon Island fish wheel catches were classified postseasonally. The number of samples from age-2.3 fish from the Canadian and fish wheel catches were insufficient to use in stock identification analysis.

Stock contributions were estimated for each week to track temporal patterns. However, in some weeks catches were small, and samples of the less common age groups were insufficient to classify, unless pooled with the adjacent week sample. The proportion of each stock in a weekly catch sample was expanded to the weekly catch by

$$C_{ijt} = C_t \, (P_{it}) \, (S_{ijt})$$

where:
- C_{ijt} = estimated catch of fish of age i in group j in period t;
- C_t = total catch in period t;
- P_{it} = estimated proportion of fish of age i in the catch in period t; and
- S_{ijt} = proportion of fish of age i and estimated with LDF to be in group j in the catch in period t.

Stock proportions of minor ages that were not classified with LDF were assumed to equal the proportion of all LDF-classified ages in the catch for each stock:

$$C_{mjt} = C_t \, (P_{mt}) \, (S_{ljt})$$

where:
- C_{mjt} = estimated catch of fish of minor age class m of group j in period t;

P_{mt} = estimated proportion of fish of minor age group m in the catch in period t; and

S_{1jt} = proportion of fish estimated with LDF (all analyzed ages combined) to be in group j in the catch in period t.

Age-0. fish are absent or extremely rare in Taku River and Port Snettisham systems except for the mainstem Taku and Tatsamenie spawning groups. Age-0. fish were apportioned to the mainstem and Tatsamenie groups by

$$P_{0jt} = S_{1jt} / S_{1 \cdot t}$$

where: j = either the Tatsamenie or Mainstem stock groups; and

P_{0jt} = estimated proportion of catch of age-0. fish of group j in period t.

The variances (V) of the weekly ($C_{\cdot jt}$) and seasonal ($C_{\cdot j \cdot}$) stock composition estimates were approximated with the delta method (Seber 1982). The variance estimates were functions of (1) the accuracy of the age-specific models used to classify the unknowns, (2) the sample size of each standard used to develop the age-specific models, (3) the proportions of each stock in the initial and in the adjusted stock composition estimates, (4) the age-specific stock composition sample sizes, (5) the age composition sample sizes, and (6) the catch size. However, it was a minimum estimate of variance because it did not include any variance associated with the age classes not classified with LDF, stocks not contributing fish during a given week, or aging errors. Variances of proportions of stock contributions and standard errors were calculated with formulae from Pella and Robertson (1979).

Comparison of Inseason and Postseason Estimates

Inseason stock composition estimates were compared to postseason estimates for the District 111 catches. The weekly inseason estimates were derived in a different manner than were the postseason methods. The inseason stock composition estimates were based on LDF analysis of age-1.2 and -1.3 fish; age-2. fish proportions were based on the stock composition estimates from the age-1. fish; age-0. fish were all apportioned to the Mainstem group. Because the Trapper and Mainstem groups were combined in the postseason analysis, the estimates of Trapper and of Mainstem fish in the inseason analysis were combined to facilitate comparison of the inseason and postseason estimates.

The actual numbers of fish in a sample classified to each stock group in the inseason analysis were compared to the postseason numbers. Chi-square analysis was deemed inappropriate because the data did not conform to the general rule that none of the expected frequencies should be <1.0 and no more than 20% of expected frequencies should be <5.0 (Cochran 1954; Roscoe and Byars 1971). Log-likelihood ratio analysis is not as sensitive to small frequencies (Zar 1984) and was therefore deemed the more appropriate analysis to use. One was added to each cell count to avoid calculating the logarithm of zero.

In addition to comparing the weekly inseason estimates with the weekly postseason estimates, the set of weekly differences was also tested for heterogeneity (Sokal and Rohlf 1981). Significant heterogeneity indicated either differences in sign or magnitude among the weekly differences. If heterogeneity was not significant the sum of the weekly G statistic was used to test for an overall seasonal difference.

Because the same scales used for the inseason estimates were also used, along with additional scales, for the postseason analysis, the G-test described above was not entirely appropriate. This test assumes independent samples, i.e., a different set of scales for the inseason and postseason analysis. Because our samples were not independent, the G-test tended to be conservative; i.e., the actual probability was less than that stated. Therefore, some tests may not have been declared significant ($\alpha = 0.05$) when they really were. Unfortunately, methods which would have correctly recognized the dependencies among samples (Agresti 1990), required that each scale be assigned to a specific stock. Although discriminant analysis makes such an assignment, the subsequent adjustments to estimate the mixing proportions address proportions, rather than individual fish, such that individual assignments are lost.

In light of the above, test results were used to bring attention to differences that may need further examination. Significant test results, for example, did not always correspond to practical significant differences.

Test for Presence of Lynn Canal Fish

In 1989, as in 1988, trends in the age composition of late season catches in District 111 suggested the presence of stocks not bound for Taku River or Port Snettisham systems. McGregor and Jones (1989) suggested that Lynn Canal stocks from Chilkat and Chilkoot Lakes may have been present at low levels in samples collected in 1988 in District 111. Therefore, to test for the presence of Lynn Canal fish in 1989, we developed age-1.3 discriminant functions that included Chilkat and Chilkoot stocks as well as Taku River and Port Snettisham stock groups.

RESULTS

Numbers of Fish

A total of 74,019 sockeye salmon were harvested by the commercial drift gillnet fleet in District 111 in 1989 (Table 1), roughly equal to the 1979 to 1988 average of 76,248 fish. The fishery was open 38 d. The majority of the catch, 92%, was taken in Taku Inlet, Subdistrict 111-32, (Figure 2). Approximately 6% of the catch was taken in Stephens Passage, Subdistrict 111-31, which was half the historical average of 12% (1964 to 1988). Catches in Port Snettisham, Subdistrict 111-34, were <1% of the harvest and lower Stephens Passage, Subdistrict 111-20, <2%, of the total harvest. A test fishery in Port Snettisham harvested 85 sockeye salmon (Table 2). The U.S. personal use fishery in the Taku River harvested an estimated 749 sockeye salmon.

The Canadian commercial fishery in the Taku River harvested 18,545 sockeye salmon (Table 2), compared to a 1979–1988 average of 14,910 sockeye salmon. The fishery was open 25.3 d. The Canadian food fishery harvested 53 sockeye salmon and the inriver test fishery catch totaled 207 sockeye salmon.

Age and Sex Composition

Age-1.3 fish were the dominant age class in the District 111 sockeye fishery and composed 69.8% of the catch (Appendix C.1). Age-1.3 fish comprised between 63% and 81% of the weekly catches until the end of the season, mid-August to late September, when they contributed only 54.6%. Other major ages included 0.3, which represented 11.6% of the catch, 1.2, which represented 8.1%, and 2.3 fish, which represented 7.1%. Age-0. fish were uncommon prior to mid-season, statistical week 28. During the final weeks of the season the ages 2.2 at 10.7% and 2.3 at 16.6% represented a much higher contribution rate than either age had contributed earlier in the season. Males composed 49.5% of the total catch.

Age-1.3 fish dominated the Canadian commercial catches in the Taku River, contributed 67.8% of the catch, and ranged from 49.2% to 80.7% (Appendix C.2). Age 0.3 composed 12.5% of the catch, 1.2 composed 11.6%, and 2.3 composed 4.1%. No other age class contributed more than 2% of the total catch. Age-0. fish became relatively more abundant as the season progressed. There was no increase in abundance of the age-2.2 and -2.3 fish in the final weeks of the season as was observed in the District 111 catch. Males composed 49.4% of the total catch.

The Canyon Island fish wheel catches had a more diverse age composition and a higher abundance of younger age fish than did the inriver commercial catch (Appendix C.3). The catch was composed of ages 1.3 (58.7%), 1.2 (19.5%), 0.3 (6.5%), 1.1 (4.3%), 2.2 (3.4%), and 2.3 (3.8%). No other age class composed more than 3% of the catch. Age-1.3 fish were most abundant, >90%, prior to mid-June and declined to 40.5% of the catch by late August. The abundance of age-0. fish increased from <1% of the early June catches to a peak of 20.6% of the catch during the first week of August. Jack sockeye (age-.1) were rare during the early weeks of the season and increased to 11.8% of the catch in early August. Males comprised 54.2% season catch and were more abundant than females in all weeks except in early August and during the final weeks of the season.

Individual Taku River stocks exhibited a wide diversity in age composition (Appendix C.4). Age-0. fish were absent from Kuthai and Little Trapper Lakes, composed 17.5% of the Little Tatsamenie Lake samples, and ranged from 6.4% to 65.0% of the mainstem and slough samples. Age-1.3 fish were the most abundant age class in samples from lake systems, although Little Tatsamenie also had a high abundance of age-1.2 fish. Age-1.2 fish were also abundant in mainstem and slough spawners and Yehring Creek samples.

Port Snettisham escapements were dominated by age-1.3 fish. The escapement into Crescent Lake was 80.1% age 1.3, 6.2% age 1.2, and 9.0% age 2.3; the Speel Lake escapement was 62.7% age 1.3, 27.3% age 1.2, and 7.4% age 2.3 fish. Age-0 fish were rare and composed <1% of the samples in either system.

Escapement Standards

Scales from Kuthai Lake fish exhibited the greatest freshwater growth, followed by fish from Little Tatsamenie Lake. Crescent Lake fish had the smallest freshwater growth. Speel Lake, Little Trapper Lake, and the Mainstem Taku conglomerate had intermediate freshwater growth. The Little Trapper Lake and mainstem Taku fish were indistinguishable based on either freshwater or marine growth. Therefore, the two groups were combined for the 1989 postseason stock composition analysis.

Standards were built for all stock groups for ages 1.3 and 2.3. There was no age-1.2 standard for Crescent Lake fish because this group was a very minor component of the escapement and there were insufficient scales. District 111 catches were initially classified using functions including all stock groups, but Snettisham standards were not included in LDF's used to classify inriver commercial and fish wheel catches.

Mean classification accuracies for age-1.2 functions ranged from 98.9% to 64.8% (Appendix B.1). The Kuthai Lake fish had the highest individual classification rates (>90%), followed by Speel Lake fish. Classification rates for Trapper/Mainstem and for Tatsamenie ranged from 50% to 70%. Mean classification accuracies for age-1.3 fish ranged from 68.7% to 99.4% (Appendix B.2). Kuthai Lake again had the greatest individual classification rates (99.4%). The other stock groups had accuracies ranging from 62.3% to >90%. The age-2.3 models had mean classification accuracies ranging from 74.5% to 81.2% (Appendix B.3). Individual stock classification accuracies were variable among models and ranged from 67.9% to 93.3%.

Stock Composition Estimates

The Trapper/Mainstem group contributed 45,573 fish or 61.6% of the District 111 catch. The Kuthai, Little Tatsamenie, Crescent, and Speel stock groups contributed 5,696, 11,536, 3,789, and 7,425 fish, respectively, to the catch (Appendix C.5). Port Snettisham stocks composed 15.1% of the District 111 harvest, and Taku River sockeye salmon composed the remaining 84.9% of the catch. Kuthai Lake fish contributed 49.3% of the catch during mid-June, statistical week 25, then declined in abundance through the remainder of the season. The Trapper/Mainstem group dominated the catch through late July, statistical week 30, after which the Tatsamenie group was a major catch component. Crescent and Speel fish were most abundant from mid-July through early August, statistical weeks 29 through 31.

The peak catch of 17,345 fish and CPUE of 74 fish per boat day occurred in early July, statistical week 28 (Appendix C.6). The peak CPUE for Kuthai fish occurred during the first week of the season and that of Trapper/Mainstem and Little Tatsamenie occurred in statistical weeks 28 and 32. There was no distinct peak in the Crescent CPUE, but the Speel CPUE peaked in statistical week 30.

Since 1986 the Taku contribution has averaged 78% of the District 111 catch (Appendix D.1). The highest total catch of 75,212 Taku fish and 21,082 Port Snettisham fish occurred in 1987 (Appendix D.2). The catch of 62,805 Taku sockeye salmon in 1989 was the highest catch since 1986.

The Trapper/Mainstem stock group contributed 13,792 fish to the Canadian commercial catch in the Taku River (Appendix C.7). The Kuthai stock contributed 990 fish and Little Tatsamenie group contributed 3,763 fish. The Trapper/Mainstem group was the most abundant catch component during every week of the season, Kuthai Lake fish were rare after early July, statistical week 27, and Tatsamenie fish were most abundant after early August statistical week 31.

The peak catch occurred during early July, statistical week 27, but the peak CPUE of 92 fish per permit day occurred during early August, statistical week 32 (Appendix C.8). The peak CPUEs for Kuthai (21), Trapper/Mainstem (65), and Tatsamenie (36) occurred in weeks 26, 30, and 32, respectively.

The Trapper or Mainstem stock group has dominated the inriver catch every year since 1986, whereas the Kuthai and Tatsamenie stocks have contributed an average of 11.0% of the season catch (Appendix D.3). The sockeye catch in 1989 was the highest since 1986 and was composed of higher than average numbers of Trapper, Mainstem, and Tatsamenie fish and less than average numbers of Kuthai fish (Appendix D.4).

Kuthai was the most abundant stock in the fish wheel catches from late May through late June, statistical weeks 22–25 (Appendices C.10 and C.11). The Trapper/Mainstem group comprised >75% of the weekly catches through the remainder of the season; >10% of the weekly catches in most weeks after late July was composed of Little Tatsamenie fish. As with the commercial catch, the Kuthai fish were relatively less abundant than 1986–88 average but the Tatsamenie catches were near average (Appendix D.5).

Total Run Estimates

The total estimated run of Taku River sockeye salmon was 177,622 fish (Table 2); the mark-recapture estimate of the sockeye salmon run past Canyon Island was 114,068 fish, of which 95,263 escaped to spawn (McGregor et al. 1991). The escapement was above the U.S./Canada goal range of 71,000 to 80,000 fish, thus, the catch of 82,359 fish was below the TAC. Under a TAC range of 97,622 to 106,622, the U.S. harvested 59.6% to 65.1% and Canada harvested 17.4% to 19.1% of the TAC. Estimated exploitation rates on the Tatsamenie stock were 62.8% for the U.S. and 20.5% for Canada. Estimated exploitation rates on the entire Taku run were 35.8% for the U.S. and 10.4% for Canada. Exploitation rates in District 111 were estimated at 77.4% for the Crescent stocks and 37.8% for the Speel stocks. The exploitation rate for the Crescent stocks may have been overestimated because of under-counting the escapement.

Inseason vs Postseason Estimates

The inseason stock composition estimates differed significantly from the postseason estimates (log likelihood ratio analysis, α=0.05) for most weeks of the commercial fishery in District 111 (Table 3). Heterogeneity was also significant. There were only small differences between the inseason and postseason stock composition estimates prior to mid-July. However, after week statistical 28 the Trapper/Mainstem contribution was consistently overestimated in the inseason analysis and the Tatsamenie contribution was underestimated (Appendix E). The inseason analysis tended to overestimate the contribution of Taku River stocks and underestimate the contribution of Port Snettisham stocks.

Test for Presence of Lynn Canal Fish

LDF analysis indicated that there were no age-1.3 Chilkat or Chilkoot sockeye salmon present in the District 111 catches in 1989.

DISCUSSION

The District 111 sockeye catch in 1989 was numerically similar to catches in 1986 and 1987 and much greater than in 1988. However, the stock composition of the catch differed from prior years. The Trapper/Mainstem contribution was larger than average and the Crescent Lake contribution was smaller than average.

The discriminant functions used in the postseason analysis were originally based on the same stock groups used in 1986 through 1988: Kuthai, Trapper, Mainstem, Tatsamenie, Crescent, and Speel. However, the means of variable counts and measurements for both the freshwater and marine growth zones were nearly identical for the Trapper and Mainstem groups for age-1.3 fish in 1989. An example of the similarity of the two groups was apparent in the number of circuli in the freshwater zone: 18.8 for Kuthai, 8.5 for Trapper, 8.7 for Mainstem, 10.4 for Tatsamenie, 6.6 for Crescent, and 10.0 for Speel fish. The width of freshwater growth zone measurements were 203.4 for Kuthai, 101.2 for Trapper, 102.2 for Mainstem, 132.1 for Tatsamenie, 72.9 for Crescent, and 103.0 for Speel. The circuli counts of the Trapper and Mainstem groups were similar to each other as were the counts for the Tatsamenie and Speel groups. The width of the zone was similar for the Trapper, Mainstem, and Speel groups, whereas other groups were well separated.

This combination of variables was used to achieve a fair degree of separation for all groups except the age-1.3 Trapper and Mainstem stocks. The degree of overlap in values of most variables for the two groups was of sufficient magnitude that separation of the groups based on LDF was not viable for age-1.3 fish. Because age-1.3 fish were the dominant components of both the Trapper and Mainstem groups, the stock compositions estimated for the other age classes for these groups were also combined in the postseason analysis in 1989.

The high abundance of age-2.2 and -2.3 fish in the District 111 catch during the final weeks of the season was unusual for this time and area. Typically these ages are very minor components of the stocks caught during this period. However, in 1989, the age-2. fish contributed an estimated 27.3% of the catch after mid-August, compared to 6.3% during August 6–12, statistical week 32. This age composition anomaly did not occur in the inriver catch where the relative contribution of age-2. fish was 3.8% during week 32 and 2.7% after mid-August. The relatively low abundance of 1,155 Port Snettisham fish could not account for the difference in age composition between the District 111 and the inriver catches. It therefore seemed possible that some other Alaskan stock group with a preponderance of age-2. fish was present in the samples collected from the District 111 catch during the final weeks of the fishery.

Late run Lynn Canal stocks had a high abundance of age-2. fish; >73% of the catch in Lynn Canal after statistical week 32 was composed of age-2. fish. Therefore, it seemed possible that samples collected from District 111 may have included Lynn Canal fish. Because age-1.3 fish composed the majority of the District 111 harvest we assumed that an occurrence of non-typical stocks would most likely become apparent in this age class. The Taku-Snettisham standards were augmented with standards for the Chilkat and Chilkoot stocks of Lynn Canal. The mean accuracy for the seven stock group discriminant function was 77.8%, the Chilkat accuracy was 89%, and the Chilkoot accuracy was 97%. The classification of the mixed stock catch in District 111 indicated that there were no Lynn Canal age-1.3 fish present in the catch during any week of the season. In hindsight, due to the preponderance of age-2. fish in Lynn Canal stocks late in the run—an estimated 85% of the Chilkat Lake escapement after August 27—we should have included other ages in the District 111 analysis. We could have digitized age-2.3 fish from the Chilkat and Chilkoot escapements and analyzed the late season catches in District 111 with discriminant functions which included the Lynn Canal standards. Visual inspections of the scale patterns of age-2. fish showed huge freshwater growth zones in most of the scales, which is typical of Chilkat fish. We consider it likely that small numbers of Lynn Canal fish were present in samples taken late in the season from the District 111 catch. These fish may have been harvested in District 111 or may have been sampled from boats which fished in Lynn Canal and District 111 during the same week. We think this source of possible stock composition bias was small (numbers of fish) because we found no evidence of age-1.3 Lynn Canal stocks. Mis-reporting of catches from other districts could have implications on Treaty harvest sharing guidelines if it occurred on a large scale. This potential problem highlights the importance of close review of harvest areas on fish tickets and of samplers taking scales from discrete district deliveries.

Other possible but unlikely explanations for high abundance of age-2. fish during the final weeks of the fishery are gear selectivity for large age-2.3 fish, behavioral changes in late run fish (milling), or a relatively small substock of Taku River or Port Snettisham fish which had a high abundance of 2. fish. Although the age-2.2 and -2.3 fish were proportionally very abundant after mid-August, they composed a small number of fish (382 age-2.2 and 591 age-2.3) and could have represented a small subpopulation of mainstem Taku River or Whiting River spawners.

LITERATURE CITED

Agresti, A. 1990. Categorical data analysis. John Wiley and Sons. New York.

Anas, R. E., and S. Murai. 1969. Use of scale characters and a discriminant function for classifying sockeye salmon (*Oncorhynchus nerka*) by continent of origin. International North Pacific Fisheries Commission, Bulletin 26:157–192.

Clutter, R., and L. Whitesel. 1956. Collection and interpretation of sockeye salmon scales. Bulletin International Pacific Salmon Fisheries Commission 9, New Westminster, British Columbia, Canada.

Cochran, W. 1977. Sampling techniques, 3rd edition. John Wiley & Sons, Inc. New York.

Cook, R. C., and G. E. Lord. 1978. Identification of stocks of Bristol Bay sockeye salmon (*Oncorhynchus nerka*), by evaluating scale patterns with a polynomial discriminant method. Fisheries Bulletin 76(2):415–423.

Enslein, K., A. Ralston, and H. S. Wilf. 1977. Statistical methods for digital computers. John Wiley and Sons, Inc. New York.

Fisher, R. A. 1936. The use of multiple measurements in taxonomic problems. Annals of Eugenics 7:179–188.

Gilbert, E. S. 1969. The effect of unequal variance-covariance matrices on Fisher's linear discriminant function. Biometrics 25(3):505–515.

Habbema, J. D. F., and J. Hermans. 1977. Selection of variables in discriminant function analysis by F-statistic and error rate. Technometrics 19(4):487–493.

INPFC (International North Pacific Fisheries Commission). 1963. Annual Report 1961.

Issacson, S. L. 1954. Problems in classifying populations. Pages 107–117 *in* O. Kempthorne, T. A. Bancroft, J. W. Gowen, and J. L. Lush, editors. Statistics and mathematics in biology. Iowa State College Press, Ames.

Krzanowski, W. J. 1977. The performance of Fisher's linear discriminant function under non-optimal conditions. Technometrics 19(2):191–200.

Lachenbruch, P. A. 1967. An almost unbiased method of obtaining confidence intervals for the probability of misclassification in discriminant analysis. Biometrics 23(4):639–645.

Lachenbruch, P. A., C. Sneeringer, and L. T. Revo. 1973. Robustness of the linear and quadratic discriminant function to certain types of non-normality. Communications in Statistics 1(1):39–56.

McGregor, A. J., 1985. Origins of sockeye salmon (*Oncorhynchus nerka* Walbaum) in theTaku-Snettisham drift gillnet fishery of 1983 based on scale pattern analysis. Alaska Department of Fish and Game, Division of Commercial Fisheries, Informational Leaflet 246, Juneau.

McGregor, A. J., 1986. Origins of sockeye salmon (*Oncorhynchus nerka* Walbaum) in theTaku-Snettisham drift gillnet fishery of 1984 based on scale pattern analysis. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 174, Juneau.

McGregor, A. J., and E. L. Jones. 1987. Separation of principal Taku River and Port Snettisham sockeye salmon (*Oncorhynchus nerka*) stocks in southeastern Alaska and Canadian fisheries of 1986 based on scale pattern analysis. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 213, Juneau.

McGregor, A. J., and E. L. Jones. 1988. Taku River and Port Snettisham sockeye salmon stock proportions in 1987 Southeast Alaska and Canadian fisheries. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fishery Report 89-15, Juneau.

McGregor, A. J., and E. L. Jones. 1989. Taku River and Port Snettisham sockeye salmon stock proportions in 1988 Southeast Alaska and Canadian fisheries. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J89-43, Juneau.

McGregor, A. J., and J. E. Clark. 1987. Migratory timing and escapement of Taku River salmon stocks in 1986. Final Report-1986 salmon research conducted in Southeast Alaska by the Alaska Department of Fish and Game in conjunction with the National Marine Fisheries Auke Bay Laboratory for joint U.S./Canada interception studies, Douglas, Alaska.

McGregor, A. J., and J. E. Clark. 1988. Migratory timing and escapement of Taku River salmon stocks in 1987. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J88-26, Juneau.

McGregor, A. J., and J. E. Clark. 1989. Migratory timing and escapement of Taku River salmon stocks in 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Informational Report 1J89-40, Juneau.

McGregor, A. J., P. A. Milligan, and J. E. Clark. 1990. Adult mark-recapture studies of Taku River salmon stocks in 1989. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fishery Report 91-05, Juneau.

McPherson, S.M., A.J. McGregor, and M.A. Olsen. 1990. Abundance, age, sex, and size of sockeye salmon catches and escapements in Southeast Alaska in 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fisheries Report 90-15, Juneau.

Moser, K. H. 1968. Photographic atlas of sockeye salmon scales. Fishery Bulletin 67(2):243–279.

Narver, D. W. 1963. Identification of adult red salmon groups by lacustrine scale measurement, time of entry, and spawning characteristics. M.S. Thesis, University of Washington, Seattle.

Oliver, G. T., and A. J. McGregor. 1986. Estimated contribution of transboundary river sockeye salmon stocks to commercial fisheries in Alaska Districts 106 and 111 in 1985, based on scale pattern analysis. *In* ADF&G (Alaska Department of Fish and Game) Section Report in 1985 Salmon Research Conducted in Southeast Alaska by the Alaska Department of Fish and Game in Conjunction with the National Marine Fisheries Service Auke Bay Laboratory for Joint U.S./Canada Interception Studies, Division of Commercial Fisheries, Final Report, Contract Report 85-ABC-00142, Douglas, Alaska.

Pella, J., and T. Robertson. 1979. Assessment of composition of stock mixtures. Fishery Bulletin 77:378–389.

Ryan, P., and M. Christie. 1976. Scale reading equipment. Fisheries and Marine Service, Canada, Technical Report PAC/T-75-8. Nanaimo, British Columbia.

Seber, G. 1982. The estimation of animal abundance and related parameters. Charles Griffin & Company Ltd., London.

TTC (Transboundary Technical Committee). 1991. Transboundary river salmon production, harvest, and escapement estimates, 1989. Pacific Salmon Commission Technical Committee Report TCTR (91)-1, Vancouver, British Columbia, Canada.

Zar, J.A. 1984. Biostatistical analysis. Prentice-Hall Inc., Englewood Cliffs, New Jersey.

Table 1. District 111 fishery openings, effort, and harvest of sockeye salmon by subdistrict, 1989.

Stat. Week	Dates Open	Days Open	Number of Boats	Effort (Boat days)	Catch per Subdistrict 20	31	32	34	Total Catch	CPUE
25[a b]	6/18-6/21	3	63	189		398	5,721		6,119	32.38
26[a b]	6/25-6/28	3	65	195		887	6,206		7,093	36.37
27[a b c]	7/02-7/05	3	78	234		1,012	9,366		10,378	44.35
28[b c d]	7/09-7/12	3	84	252	47	542	16,756		17,345	68.83
29[b c d]	7/16-7/19	3	79	237	13	763	14,217		14,993	63.26
30[b c d e]	7/23-7/26	3	71	213	326	358	7,348		8,032	37.71
31[b c e f]	7/31-8/02	3	46	138	713	314	2,949		3,976	28.81
32[b g h]	8/07-8/10	3	20	60	223		2,295		2,518	41.97
33[b c]	8/13-8/16	3	46	138	18	120	1,580		1,718	12.45
34	8/20-8/23	3	68	204		127	1,324	20	1,471	7.21
35	8/27-8/12	3	104	312		11	282	8	301	0.96
36	9/03-9/05	2	62	124		12	36		48	0.39
37	9/10-9/11	2	45	90		1	23		24	0.27
38	9/17-9/18	1	45	45		2	1		3	0.07
Totals		38		2,431	1,340	4,547	68,104	28	74,019	30.45

a Taku Inlet closed north of Jaw Point
b Port Snettisham closed east of a line from Point Styleman to Point Anmer.
c Stephens Passage closed within 2 m. from mainland shore from Circle to Midway Points.
d Statistical area 111c open an additional 2 d.
e Stephens Passage open except from 1 m. North of Point Styleman to 1 m. south of Point Anmer.
f Fishery openings in 111 and 115 delayed from 12:01 p.m. Sunday to 12:01 p.m., Monday (to reduce fishing vessel congestion during the Juneau Salmon Derby).
g Statistical area 111c open an additional day.
h Taku Inlet was closed north of a line from Cooper Point to Greely Point.

Table 2. Catch and escapement of Port Snettisham and Taku River sockeye salmon stocks, 1989.

Port Snettisham Stocks		Crescent	Speel	Total
U.S. Catch				
District 111		3,789	7,425	11,214
Test Fishery[a]				85
Spawning Escapement		1,109	12,229	13,338
Total Run		4,898	19,654	24,637
Exploitation Rate		0.774	0.378	0.455
Taku River Stocks	**Kuthai**	**Tr/Main**	**Tatsamenie**	**Total**
U.S. Catch				
District 111	5,696	45,573	11,536	62,805
Inriver personal use				749
Total U.S. Catch	5,696	45,573	11,536	63,554
Canadian Catch				
Commercial	990	13,792	3,763	18,545
Food				53
Total Canadian Catch	990	13,792	3,763	18,598
Canadian Test Fishery	23	142	42	207
Total Catch	6,709	59,507	15,341	82,359
Spawning Escapement			3,039	95,263
Total Above Border Run[b]				114,068
Total Run (Total Catch + Above Border Escapement)			18,380	177,622
Exploitation Rates				
U.S. Commercial and Personal Use			0.628	0.358
Canadian Commercial and Food			0.205	0.105
Total Exploitation Rate			0.835	0.464
Taku Harvest Plan		**Minimum**		**Maximum**
Escapement Goal		71,000		80,000
Total Allowable Catch		97,622		106,622
Canadian Portion		0.174		0.191
U.S. Portion		0.596		0.651

a The U.S. test fishery was operated in Port Snettisham.
b The above border run includes above border catches and escapements.

Table 3. Log-likelihood (G) ratio test for differences in weekly inseason and postseason stock composition estimates for District 111 sockeye catches, 1989. Maximum change is the greatest stock specific difference between estimates. Ho: inseason and postseason estimates are the same α =0.05.

Statistical Week	df	G	P	Maximum Change: Proportion	Maximum Change: Catch	Total Catch
25	4	4.9	NS	0.037	226	6,119
26	4	2.1	NS	0.051	-365	7,093
27	4	13.0	<0.025	0.081	840	10,378
28	4	22.9	<0.001	-0.189	-3271	17,345
29	4	26.3	<0.001	-0.242	-3625	14,993
30	4	159.1	<0.001	-0.609	-4891	8,062
31	4	109.5	<0.001	-0.544	-2164	3,976
32	4	31.4	<0.001	-0.271	-683	2,518
33	4	68.0	<0.001	-0.258	-1278	3,565
Total	28	437.4	<0.001			
Pooled	2	338.4	<0.001	-0.227	-16825	74,019
Heterogeneity	26	99.0	<0.001			

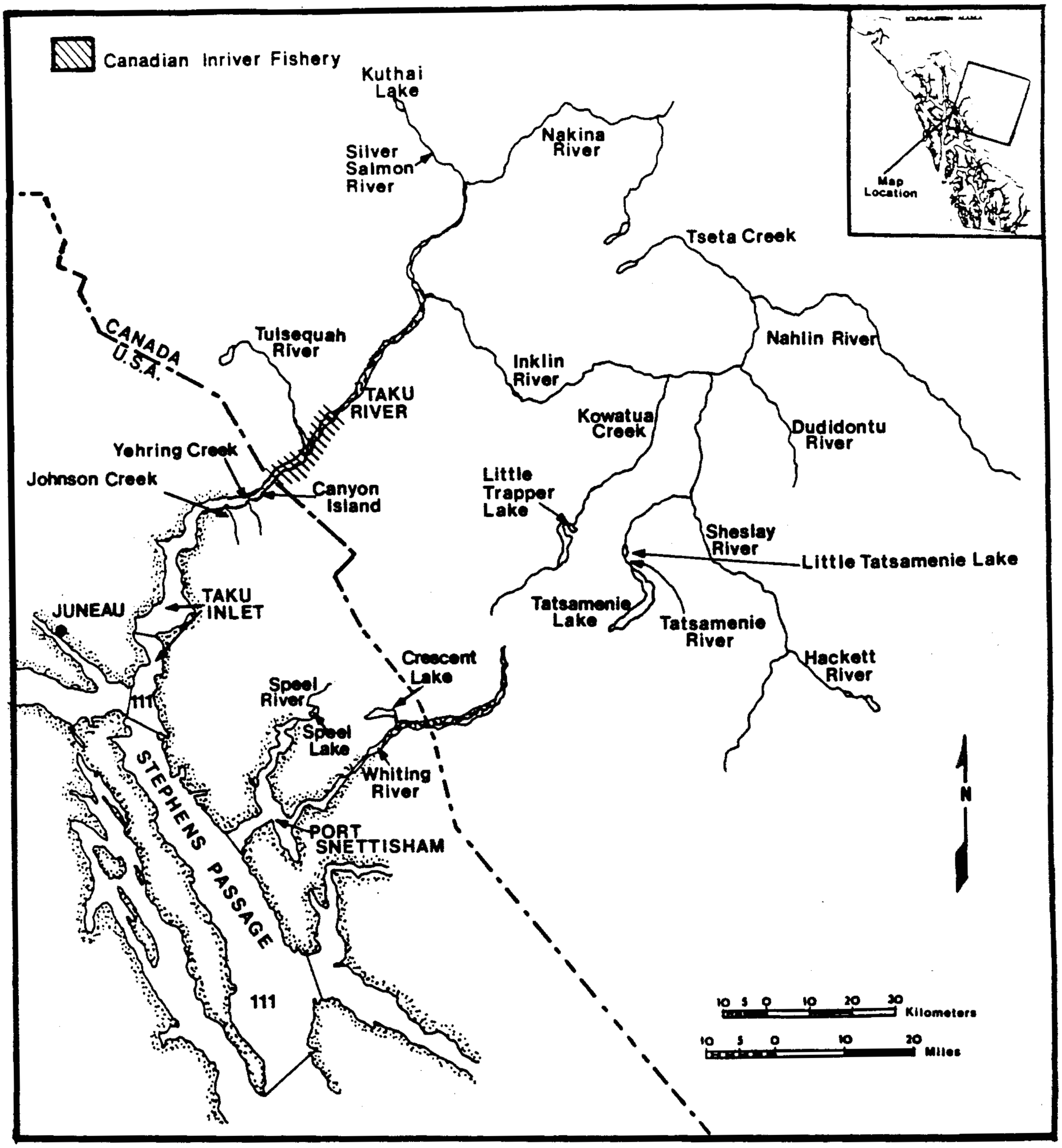

Figure 1. The Taku River and Port Snettisham drainages.

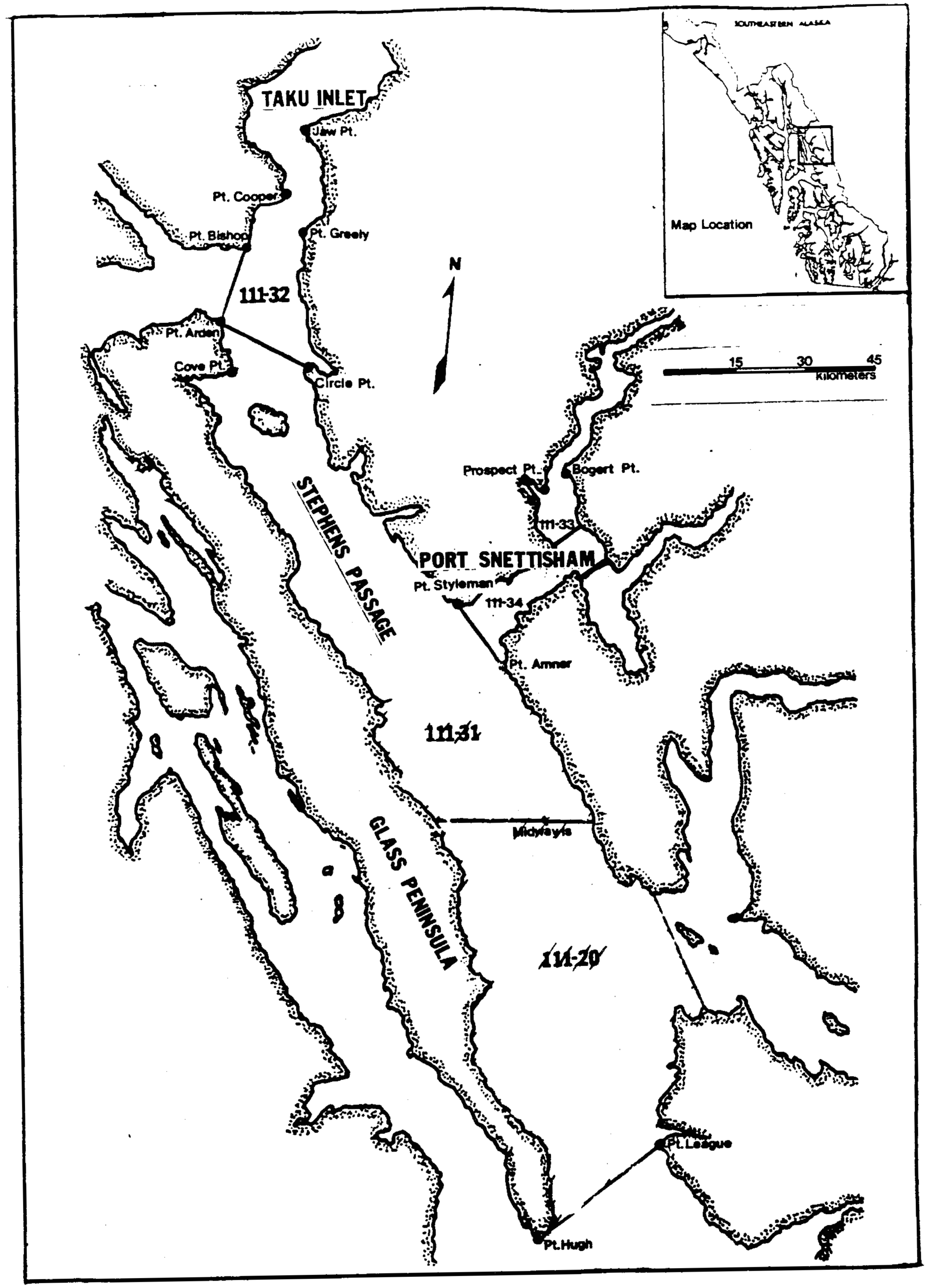

Figure 2. District 111 commercial fishing areas.

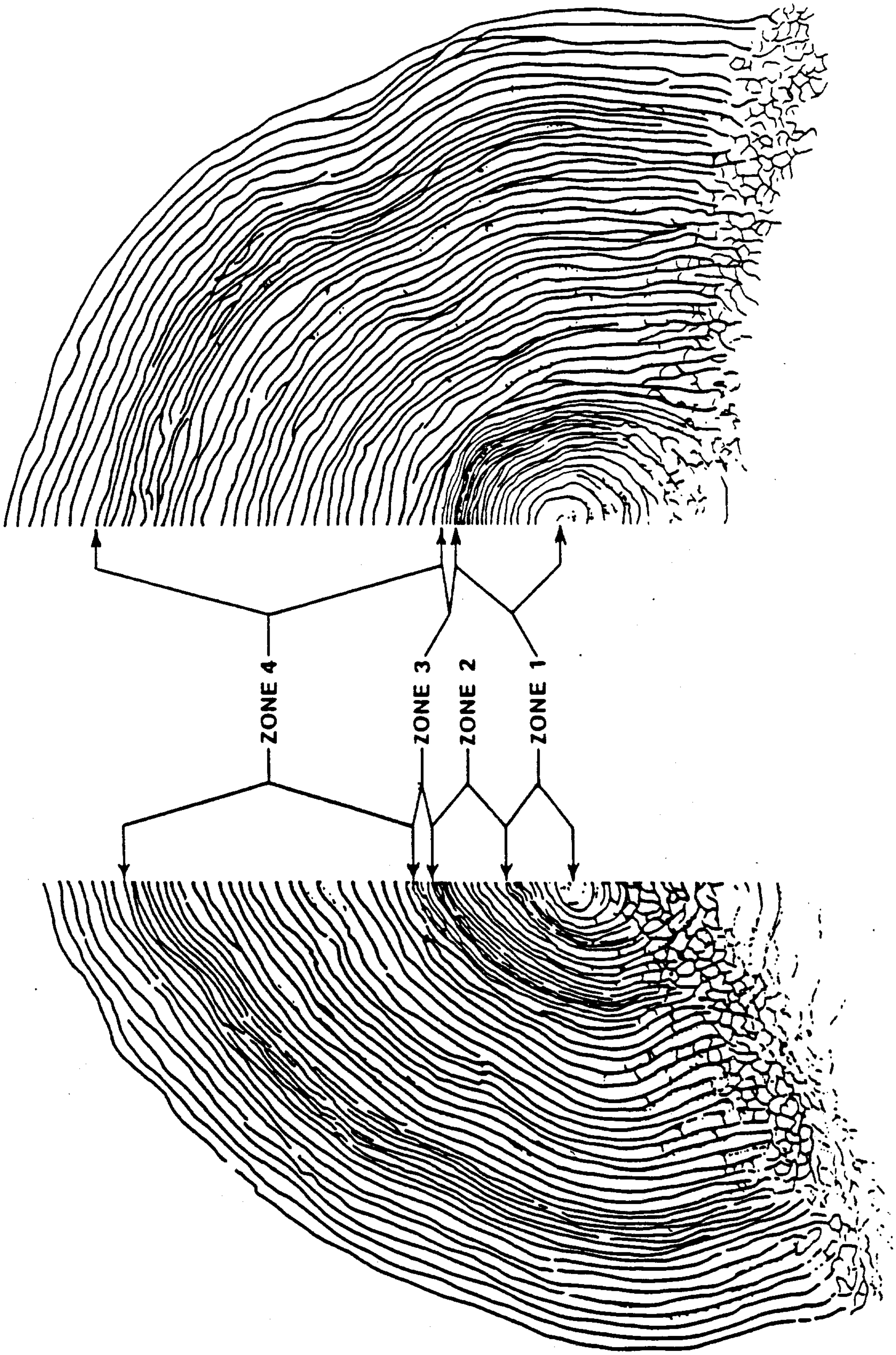

Figure 3. Typical scale for age 2. (left) and 1. (right) sockeye salmon with zones used for scale pattern analysis delineated.

APPENDIX

Appendix A.1. Sample sizes from the inseason and postseason sockeye salmon stock composition analysis of catches in District 111, the Taku River, and in the Canyon Island fish wheels, 1989.

	Stat. Week	Date	Sample Size by Age Group 1.2	1.3	2.3	Total
Inseason Analysis						
U.S. District 111						
	25	6/18-6/24	52	100		152
	26	6/25-7/01	45	100		145
	27	7/02-7/08	33	100		133
	28	7/09-7/15	33	100		133
	29	7/16-7/22	43	100		143
	30	7/23-7/29	63	99		162
	31	7/30-8/05	48	100		148
	32	8/06-8/12	37	99		136
	33	8/13-8/19	30	99		129
Postseason Analysis						
U.S. District 111						
	25	6/18-6/24	52	100	41	193
	26	6/25-7/01	45	100	39	184
	27	7/02-7/08	33	100	49	182
	28	7/09-7/15	33	100	34	167
	29	7/16-7/22	43	100	35	178
	30	7/23-7/29	63	99	30	192
	31	7/30-8/05	48	100	23	171
	32	8/06-8/12	37	99	7	143
	33	8/13-8/19	30	100	64	194
Canadian Inriver						
	26	6/25-7/01	23	100		123
	27	7/02-7/08	13	100		113
	28	7/09-7/15	9	93		102
	29	7/16-7/22	18	100		118
	30	7/23-7/29	30	84		114
	31	7/30-8/05	16	78		94
	32	8/06-8/12	13	100		113
	33	8/13-8/19	9	43		52
	34	8/20-8/26	12	41		53
Canyon Island Fish Wheel						
	23	6/04-6/10		100		100
	24	6/11-6/17		100		100
	25	6/18-6/24	60	100		160
	26	6/25-7/01	100	100		200
	27	7/02-7/08	80	100		180
	28	7/09-7/15	98	100		198
	29	7/16-7/22	96	100		196
	30	7/23-7/29	75	100		175
	31	7/30-8/05	92	100		192
	32	8/06-8/12	82	100		182
	33	8/13-8/19	80	66		146
	34	8/20-8/26		57		57

Appendix A.2. Scale variables used for age-1.2, -1.3, -2.2, and -2.3 sockeye salmon scale pattern analysis.

Variable Number	Description
	First Freshwater (FW) Annular Zone
1	Number of circuli in the zone
2	Distance across the zone
3	Distance: scale focus (CO) to the second circulus in zone (C2)
4	Distance: C0 to C4
5	Distance: C0 to C6
6	Distance: C0 to C8
7	Distance: C2 to C4
8	Distance: C2 to C6
9	Distance: C2 to C8
10	Distance: C4 to C6
11	Distance: C4 to C8
12	Distance: fourth from the last circulus of zone to end of zone
13	Distance: second from the last circulus of zone to end of zone
14	Distance: C2 to end of zone
15	Distance: C4 to end of zone
16	Relative Distance: (Variable #3)/(Variable #2)
17	Relative Distance: (Variable #4)/(Variable #2)
18	Relative Distance: (Variable #5)/(Variable #2)
19	Relative Distance: (Variable #6)/(Variable #2)
20	Relative Distance: (Variable #7)/(Variable #2)
21	Relative Distance: (Variable #8)/(Variable #2)
22	Relative Distance: (Variable #9)/(Variable #2)
23	Relative Distance: (Variable #10)/(Variable #2)
24	Relative Distance: (Variable #11)/(Variable #2)
25	Relative Distance: (Variable #12)/(Variable #2)
26	Relative Distance: (Variable #13)/(Variable #2)
27	Average Distance between circuli: (Variable #2)/(Variable #1)
28	Number of circuli in the first 3/4 of the zone
29	Maximum distance between two adjacent circuli in the zone
30	Relative Distance: (Variable #29)/(Variable #2)
	Second Freshwater (FW) Annular Zone
31	Number of circuli in the zone
32	Distance across the zone
33	Distance: end first annular zone (E1FW) to second circulus in zone
34	Distance: E1FW to C4
35	Distance: E1FW to C6
36	Distance: E1FW to C8
37	Distance: C2 to C4
38	Distance: C2 to C6
39	Distance: C2 to C8

-Continued-

Variable Number	Description
40	Distance: C4 to C6
41	Distance: C4 to C8
42	Distance: fourth from the last circulus of zone to end of zone
43	Distance: second from the last circulus of zone to end of zone
44	Distance: C2 to end of zone
45	Distance: C4 to end of zone
46	Relative Distance: Variable #33/Variable #32
47	Relative Distance: Variable #34/Variable #32
48	Relative Distance: Variable #35/Variable #32
49	Relative Distance: Variable #36/Variable #32
50	Relative Distance: Variable #37/Variable #32
51	Relative Distance: Variable #38/Variable #32
52	Relative Distance: Variable #39/Variable #32
53	Relative Distance: Variable #40/Variable #32
54	Relative Distance: Variable #41/Variable #32
55	Relative Distance: Variable #42/Variable #32
56	Relative Distance: Variable #43/Variable #32
57	Average Distance between circuli: Variable 32/Variable 31
58	Number of circuli in first 3/4 of zone
59	Maximum distance between two adjacent circuli in the zone
60	Relative Distance: Variable 59/Variable 32
	Freshwater Plus Growth (PG)
61	Number of circuli in the zone
62	Distance across the zone
	Combined Freshwater Zones
63	Total number annular circuli, Variable 1 + Variable 31
64	Total distance across freshwater zones, Variable 2 + Variable 32
65	Total number of circuli in the combined zones, NC1FW+NC2FW+NCPG
66	Total distance across the combined zones, S1FW+S2FW+SPGZ
67	Relative Distance: (Variable #2)/(Variable #66)
	First Marine (C) Annular Zone
70	Number of circuli in the zone
71	Distance across the zone
72	Distance: end of FW (EFW) to the third circulus in zone (C3)
73	Distance: EFW to C6
74	Distance: EFW to C9
75	Distance: EFW to C12
76	Distance: EFW to C15

-Continued-

Appendix A.2. (page 3 of 3)

Variable Number	Description
77	Distance: C3 to C6
78	Distance: C3 to C9
79	Distance: C3 to C12
80	Distance: C3 to C15
81	Distance: C6 to C9
82	Distance: C6 to C12
83	Distance: C6 to C15
84	Distance: C9 to C15
85	Distance: sixth from the last circulus of zone to end of zone
86	Distance: third from the last circulus of zone to end of zone
87	Distance: C3 to end of zone
88	Distance: C9 to end of zone
89	Distance: C15 to end of zone
90	Relative Distance: (Variable #72)/(Variable #71)
91	Relative Distance: (Variable #73)/(Variable #71)
92	Relative Distance: (Variable #74)/(Variable #71)
93	Relative Distance: (Variable #75)/(Variable #71)
94	Relative Distance: (Variable #76)/(Variable #71)
95	Relative Distance: (Variable #77)/(Variable #71)
96	Relative Distance: (Variable #78)/(Variable #71)
97	Relative Distance: (Variable #79)/(Variable #71)
98	Relative Distance: (Variable #80)/(Variable #71)
99	Relative Distance: (Variable #81)/(Variable #71)
100	Relative Distance: (Variable #82)/(Variable #71)
101	Relative Distance: (Variable #83)/(Variable #71)
102	Relative Distance: (Variable #84)/(Variable #71)
103	Relative Distance: (Variable #85)/(Variable #71)
104	Relative Distance: (Variable #86)/(Variable #71)
105	Relative Distance: (Variable #87)/(Variable #71)
106	Number of circuli in the first 1/2 of the zone
107	Maximum distance between two adjacent circuli in the zone
108	Relative Distance: (Variable #107)/(Variable #71)

Appendix B.1. Classification matrices from discriminant functions used postseasonally to classify age-1.2 sockeye salmon from District 111 and Canadian inriver fishery catches and from Canyon Island fish wheel catches, 1989. All functions were used in the final classification.

Actual Group of Origin	Sample Size	Classified Group of Origin: Kuthai	Trapper/ Mainstem	Tatsamenie	Speel
4-Stock Function:					
Kuthai	157	0.901	0.000	0.019	0.000
Trap/Main	132	0.008	0.530	0.242	0.220
Tatsamenie	149	0.007	0.362	0.664	0.027
Speel	200	0.000	0.135	0.045	0.820
		Mean Prop. Correctly Class.			0.734
3-Stock Functions:					
Kuthai	157	0.987	0.000	0.013	
Trap/Main	132	0.008	0.705	0.288	
Tatsamenie	149	0.013	0.342	0.644	
		Mean Prop. Correctly Class.			0.779
Trap/Main	132		0.553	0.242	0.205
Tatsamenie	149		0.356	0.661	0.034
Speel	200		0.170	0.050	0.780
		Mean Prop. Correctly Class.			0.648
2-Stock Functions:					
Kuthai	157	0.994	0.006		
Trap/Main	132	0.015	0.985		
		Mean Prop. Correctly Class.			0.989
Trap/Main	132		0.735	0.265	
Tatsamenie	149		0.295	0.705	
		Mean Prop. Correctly Class.			0.720

Appendix B.2. Classification matrices from discriminant functions used postseasonally to classify age-1.3 sockeye salmon from District 111 and Canadian inriver fisheries and Canyon Island fish wheel catches, 1989. * Indicates functions used in final classification, others were used only for intermediate steps.

Actual Group of Origin	Sample Size	Classified Group of Origin: Kuthai	Trapper/ Mainstem	Tatsamenie	Crescent	Speel
5-Stock Function:						
Kuthai	155	0.994	0.000	0.006	0.000	0.000
Trap/Main	361	0.003	0.654	0.105	0.053	0.186
Tatsamenie	154	0.006	0.305	0.617	0.026	0.045
Crescent	197	0.000	0.162	0.020	0.660	0.157
Speel	200	0.000	0.160	0.040	0.035	0.765
		* Mean Proportion Correctly Classified				0.738
4-Stock Functions:						
Kuthai	155	0.994	0.000	0.000		0.006
Trap/Main	361	0.000	0.623	0.222		0.155
Tatsamenie	154	0.000	0.253	0.071		0.675
Speel	200	0.000	0.140	0.815		0.045
		Mean Proportion Correctly Classified				0.777
Kuthai	155	0.994	0.000		0.000	0.006
Trap/Main	361	0.006	0.740		0.058	0.197
Crescent	197	0.000	0.147		0.706	0.147
Speel	200	0.000	0.200		0.025	0.775
		* Mean Proportion Correctly Classified				0.803
Kuthai	155	0.994	0.000	0.006	0.000	
Trap/Main	361	0.003	0.770	0.108	0.119	
Tatsamenie	154	0.006	0.312	0.656	0.026	
Crescent	197	0.000	0.269	0.020	0.711	
		Mean Proportion Correctly Classified				0.783
Trap/Main	361		0.695	0.094	0.064	0.147
Tatsamenie	154		0.338	0.623	0.026	0.013
Crescent	197		0.173	0.020	0.690	0.117
Speel	200		0.185	0.040	0.035	0.740
		* Mean Proportion Correctly Classified				0.687
3-Stock Function:						
Kuthai	155	0.994	0.000	0.006		
Trap/Main	361	0.003	0.867	0.130		
Tatsamenie	154	0.006	0.338	0.656		
		* Mean Proportion Correctly Classified				0.839
2-Stock Functions:						
Kuthai	155	0.994	0.006			
Trap/Main	361	0.006	0.994			
		* Mean Proportion Correctly Classified				0.994
Trap/Main	361		0.864	0.136		
Tatsamenie	154		0.273	0.727		
		* Mean Proportion Correctly Classified				0.796

Appendix B.3. Classification matrices from discriminant functions including Taku River, Port Snettisham, and Lynn Canal stocks used postseasonally to determine if Lynn Canal age-1.3 sockeye salmon were present in gillnet catches from Alaskan District 111 commercial gillnet fishery, 1989.

Actual Group of Origin	Sample Size	Classified Group of Origin						
		Kuthai	Trapper/ Mainstem	Tatsamenie	Crescent	Speel	Chilkat	Chilkoot
Kuthai	155	0.955	0.000	0.000	0.000	0.000	0.045	0.000
Trap/Main	361	0.000	0.637	0.106	0.055	0.166	0.006	0.026
Tatsamenie	154	0.006	0.253	0.636	0.026	0.052	0.019	0.006
Crescent	197	0.000	0.178	0.020	0.594	0.117	0.000	0.091
Speel	200	0.000	0.155	0.050	0.030	0.765	0.000	0.000
Chilkat	100	0.050	0.010	0.050	0.000	0.000	0.890	0.000
Chilkoot	99	0.000	0.000	0.000	0.020	0.010	0.000	0.970
		Mean Proportion Correctly Classified						0.778

Appendix B.4. Classification matrices from discriminant functions used postseasonally to classify age-2.3 sockeye salmon from District 111 and Canadian inriver fishery catches and from Canyon Island fish wheel catches, 1989. All functions were used in the final classification.

Actual Group of Origin	Sample Size	Classified Group of Origin: Kuthai	Trapper/ Mainstem	Tatsamenie	Crescent	Speel
5-Stock Function:						
Kuthai	44	0.864	0.114	0.023	0.000	0.000
Trap/Main	66	0.061	0.712	0.121	0.076	0.030
Tatsamenie	28	0.107	0.179	0.714	0.000	0.000
Crescent	69	0.014	0.116	0.014	0.710	0.145
Speel	69	0.000	0.043	0.000	0.232	0.725
		Mean Proportion Correctly Classified				0.745
4-Stock Functions:						
Kuthai	44	0.773	0.136	0.091		0.000
Trap/Main	66	0.091	0.803	0.045		0.061
Tatsamenie	28	0.179	0.143	0.679		0.000
Speel	69	0.000	0.043	0.000		0.957
		Mean Proportion Correctly Classified				0.803
Kuthai	44	0.932		0.068	0.000	0.000
Tatsamenie	28	0.179		0.821	0.000	0.000
Crescent	69	0.014		0.043	0.754	0.188
Speel	69	0.014		0.014	0.232	0.739
		Mean Proportion Correctly Classified				0.812

Appendix C.1. Age and sex composition of the District 111 gillnet harvest of sockeye salmon, 1989.

			Brood Year and Age Class									
			1986	1985			1984			1983		
Stat. Week	Percent Males		0.2	0.3	1.2	2.1	0.4	1.3	2.2	1.4	2.3	Total
6/18-6/24	49.2	Sample	0	14	53	0	1	483	7	1	43	602
Week 25		Percent		2.3	8.8		0.2	80.2	1.2	0.2	7.1	
		S.E.		0.6	1.1		0.2	1.5	0.4	0.2	1.0	
		Catch		142	539		10	4,910	71	10	437	6,119
6/25-7/01	49.8	Sample	0	29	48	0	0	449	4	3	43	576
Week 26		Percent		5.0	8.3			78.0	0.7	0.5	7.5	
		S.E.		0.9	1.1			1.7	0.3	0.3	1.1	
		Catch		357	590			5,529	50	37	530	7,093
7/02-7/08	50.1	Sample	5	42	33	0	0	434	7	0	52	573
Week 27		Percent	0.9	7.3	5.8			75.7	1.2		9.1	
		S.E.	0.4	1.1	0.9			1.7	0.4		1.2	
		Catch	90	761	598			7,860	127		942	10,378
7/09-7/15	53.3	Sample	4	63	35	0	0	347	4	3	34	490
Week 28		Percent	0.8	12.9	7.1			70.8	0.8	0.6	6.9	
		S.E.	0.4	1.5	1.1			2.0	0.4	0.3	1.1	
		Catch	142	2,230	1,239			12,282	142	106	1,204	17,345
7/16-7/22	48.0	Sample	12	110	45	0	0	369	14	0	37	587
Week 29		Percent	2.0	18.7	7.7			62.9	2.4		6.3	
		S.E.	0.6	1.6	1.1			2.0	0.6		1.0	
		Catch	307	2,810	1,149			9,425	357		945	14,933
7/23-7/29	48.1	Sample	8	96	64	1	1	401	9	2	27	609
Week 30		Percent	1.3	15.8	10.5	0.2	0.2	65.8	1.5	0.3	4.4	
		S.E.	0.4	1.4	1.2	0.2	0.2	1.8	0.5	0.2	0.8	
		Catch	106	1,266	844	13	13	5,289	119	26	356	8,032
7/30-8/05	50.6	Sample	6	76	49	0	0	358	23	1	24	537
Week 31		Percent	1.1	14.2	9.1			66.7	4.3	0.2	4.5	
		S.E.	0.4	1.4	1.2			1.9	0.8	0.2	0.8	
		Catch	44	563	363			2,651	170	7	178	3,976
8/06-8/12	45.2	Sample	3	49	39	0	0	280	18	0	7	396
Week 32		Percent	0.8	12.4	9.8			70.7	4.5		1.8	
		S.E.	0.4	1.5	1.4			2.1	1.0		0.6	
		Catch	19	312	248			1,780	114		45	2,518
8/13-9/23	41.2	Sample	3	20	48	0	0	214	42	0	65	392
Wk. 33-38		Percent	0.8	5.1	12.2			54.6	10.7		16.6	
		S.E.	0.4	1.0	1.6			2.4	1.5		1.8	
		Catch	27	182	437			1,946	382		591	3,565
	49.5	Sample	41	499	414	1	2	3,335	128	10	332	4,762
Season		Percent	1.0	11.6	8.1	0.1	0.1	69.8	2.1	0.3	7.1	
Totals		S.E.	0.2	0.5	0.4	0.1	0.1	0.7	0.2	0.1	0.4	
		Catch	735	8,623	6,007	13	23	51,672	1,532	186	5,228	74,019

Appendix C.2. Age and sex composition of the Canadian gillnet sockeye harvest in the Taku River, 1989.

			Brood Year and Age Class									
			1986		1985		1984			1983		
Stat. Week	Percent Males		0.2	1.1	0.3	1.2	0.4	1.3	2.2	1.4	2.3	Total
6/25-7/01	46.6	Sample	2	0	7	24	0	104	3	1	7	148
Week 26		Percent	1.4		4.7	16.2		70.3	2.0	0.7	4.7	
		S.E.	0.9		1.7	2.9		3.6	1.1	0.6	1.7	
		Catch	21		74	253		1,097	32	11	74	1,562
7/02-7/08	49.7	Sample	1	0	4	13	1	111	1	0	12	143
Week 27		Percent	0.7		2.8	9.1	0.7	77.6	0.7		8.4	
		S.E.	0.7		1.4	2.4	0.7	3.4	0.7		2.3	
		Catch	26		103	335	26	2,861	26		309	3,687
7/09-7/15	59.7	Sample	0	0	12	9	0	96	1	0	1	119
Week 28		Percent			10.1	7.6		80.7	0.8		0.8	
		S.E.			2.7	2.4		3.5	0.8		0.8	
		Catch			210	158		1,684	18		18	2,088
7/16-7/22	48.2	Sample	2	0	11	19	0	101	2	1	5	141
Week 29		Percent	1.4		7.8	13.5		71.6	1.4	0.7	3.5	
		S.E.	1.0		2.2	2.8		3.7	1.0	0.7	1.5	
		Catch	32		178	307		1,630	32	16	80	2,275
7/23-7/29	44.4	Sample	8	0	41	30	0	92	5	0	11	187
Week 30		Percent	4.3		21.9	16.0		49.2	2.7		5.9	
		S.E.	1.4		2.9	2.6		3.6	1.1		1.7	
		Catch	140		717	525		1,610	87		192	3,271
7/30-8/05	54.1	Sample	4	1	28	16	1	83	1	0	2	136
Week 31		Percent	2.9	0.7	20.6	11.8	0.7	61.0	0.7		1.5	
		S.E.	1.4	0.7	3.4	2.7	0.7	4.1	0.7		1.0	
		Catch	68	17	470	268	17	1,390	17		34	2,281
8/06-8/12	49.5	Sample	4	0	31	13	0	126	3	1	4	182
Week 32		Percent	2.2		17.0	7.1		69.2	1.6	0.5	2.2	
		S.E.	1.1		2.7	1.8		3.3	0.9	0.5	1.1	
		Catch	60		469	196		1,905	45	15	60	2,750
8/13-8/25	33.6	Sample	3	0	24	24	0	92	4	0	0	147
Wk. 33-34		Percent	2.0		16.3	16.3		62.6	2.7			
		S.E.	1.0		2.7	2.7		3.5	1.2			
		Catch	13		103	103		395	17			631
	49.4	Sample	24	1	158	148	2	805	20	3	42	1,203
Season		Percent	1.9	0.1	12.5	11.6	0.2	67.8	1.5	0.2	4.1	
Totals		S.E.	0.4	0.1	0.9	0.9	0.2	1.3	0.3	0.1	0.6	
		Catch	360	17	2,324	2,145	43	12,572	274	42	768	18,545

Appendix C.3. Age and sex composition of sockeye salmon caught in the Canyon Island fish wheels, 1989.

			Brood Year and Age Class										
			1987	1986		1985			1984		1983		
Stat. Week	Percent Males		0.1	0.2	1.1	0.3	1.2	2.1	1.3	2.2	1.4	2.3	Total
5/28-6/10 Wks 22-23	56.2	Sample	0	0	0	1	4	0	120	0	0	5	130
		Percent				0.8	3.1		92.3			3.8	
		S.E.				0.8	1.5		2.3			1.7	
6/11-6/17 Week 24	57.4	Sample	0	0	0	10	17	0	404	1	0	16	448
		Percent				2.2	3.8		90.2	0.2		3.6	
		S.E.				0.7	0.9		1.4	0.2		0.9	
6/18-6/24 Week 25	59.0	Sample	0	3	0	6	42	0	203	9	0	20	283
		Percent		1.1		2.1	14.8		71.7	3.2		7.1	
		S.E.		0.6		0.9	2.1		2.7	1.0		1.5	
6/25-7/01 Week 26	56.8	Sample	0	6	5	7	108	1	254	8	2	20	411
		Percent		1.5	1.2	1.7	26.3	0.2	61.8	1.9	0.5	4.9	
		S.E.		0.6	0.5	0.6	2.2	0.2	2.4	0.7	0.3	1.1	
7/02-7/08 Week 27	57.2	Sample	0	6	16	22	92	0	275	7	2	29	449
		Percent		1.3	3.6	4.9	20.5		61.2	1.6	0.4	6.5	
		S.E.		0.5	0.9	1.0	1.9		2.2	0.6	0.3	1.1	
7/09-7/15 Week 28	54.8	Sample	0	10	26	49	104	1	357	27	2	30	606
		Percent		1.7	4.3	8.1	17.2	0.2	58.9	4.5	0.3	5.0	
		S.E.		0.5	0.8	1.1	1.5	0.2	1.9	0.8	0.2	0.9	
7/16-7/22 Week 29	61.9	Sample	0	32	28	38	111	0	198	20	1	19	447
		Percent		7.2	6.3	8.5	24.8		44.3	4.5	0.2	4.3	
		S.E.		1.2	1.1	1.3	2.0		2.3	1.0	0.2	0.9	
7/23-7/29 Week 30	55.5	Sample	2	22	30	35	73	3	199	15	0	10	389
		Percent	0.5	5.7	7.7	9.0	18.8	0.8	51.2	3.9		2.6	
		S.E.	0.4	1.1	1.3	1.4	1.9	0.4	2.5	1.0		0.8	
7/30-8/05 Week 31	45.4	Sample	6	26	17	65	118	4	205	18	0	11	470
		Percent	1.3	5.5	3.6	13.8	25.1	0.9	43.6	3.8		2.3	
		S.E.	0.5	1.0	0.8	1.6	2.0	0.4	2.2	0.9		0.7	
8/06-8/12 Week 32	55.8	Sample	4	14	35	42	72	3	140	16	1	4	331
		Percent	1.2	4.2	10.6	12.7	21.8	0.9	42.3	4.8	0.3	1.2	
		S.E.	0.6	1.1	1.7	1.8	2.2	0.5	2.7	1.2	0.3	0.6	
8/13-8/19 Week 33	45.2	Sample	0	3	9	13	40	3	71	13	0	3	155
		Percent		1.9	5.8	8.4	25.8	1.9	45.8	8.4		1.9	
		S.E.		1.1	1.9	2.2	3.5	1.1	4.0	2.2		1.1	
8/20-10/7 Wks 34-40	45.1	Sample	0	6	14	9	49	3	62	6	1	3	153
		Percent		3.9	9.2	5.9	32	2.0	40.5	3.9	0.7	2.0	
		S.E.		1.6	2.3	1.9	3.8	1.1	4.0	1.6	0.6	1.1	
Season Totals	54.2	Sample	12	128	180	297	830	18	2,488	140	9	170	4,272
		Percent	0.2	2.8	4.3	6.5	19.5	0.6	58.7	3.4	0.2	3.8	
		S.E.	0.1	0.3	0.3	0.4	0.6	0.1	0.8	0.3	0.1	0.3	

Appendix C.4. Age and sex composition of Taku River and Port Snettisham sockeye salmon escapements, 1989. Escapement numbers are from systems which had weirs, the other systems were sampled during spawning ground surveys.

			Brood Year and Age Class										
			1987	1986		1985			1984		1983		
System	Percent Males		0.1	0.2	1.1	0.3	1.2	2.1	1.3	2.2	1.4	2.3	Total
Port Snettisham													
Crescent Lake	28.0	Sample	0	2	0	5	47	0	624	30	0	71	779
		Percent		0.3		0.6	6.2		80.1	3.8		9.0	
		S.E.		0.1		0.2	0.5		0.8	0.4		0.5	
		Escape.		3		7	68		890	42		99	1,109
Speel Lake	43.3	Sample	0	1	0	0	323	0	703	28	1	72	1,128
		Percent		0.1			27.3		62.7	2.7	0.1	7.4	
		S.E.		0.1			1.6		1.8	0.6	0.1	1.0	
		Escape.		3			3,338		7,663	325	1	899	12,229
Taku River													
Lake Systems:													
Kuthai Lake	64.7	Sample	0	0	0	0	7	0	292	1	0	45	345
		Percent					2.0		84.7	0.3		13.0	
		S.E.					0.7		1.9	0.3		1.8	
Little Trapper Lake	61.7	Sample	0	0	0	0	66	0	460	37	1	67	631
		Percent					10.2		77.1	3.4	0.4	8.9	
		S.E.					1.8		2.5	1.0	0.4	1.6	
		Escape.					975		7,370	325	42	854	9,556
Little Tatsamenie Lake	55.0	Sample	0	25	0	58	165	0	169	53	1	11	482
		Percent		5.3		12.2	34.3		35.2	10.5	0.2	2.2	
		S.E.		0.9		1.4	2.0		2.0	1.2	0.2	0.6	
		Escape.		161		371	1,043		1,072	320	6	66	3,039
Mainstem, River, and Slough Spawners:													
Nahlin River	68.1	Sample	0	0	0	3	4	0	38	0	0	2	47
		Percent				6.4	8.5		80.9			4.3	
		S.E.				3.6	4.1		5.8			3.0	
Tuskwa Slough	60.0	Sample	0	4	1	9	3	0	3	0	0	0	20
		Percent		20.0	5.0	45.0	15.0		15.0				
		S.E.		9.2	5.0	11.4	8.2		8.2				
Yonakina Slough	65.4	Sample	2	7	1	9	12	0	47	0	0	0	78
		Percent	2.6	9.0	1.3	11.5	15.4		60.3				
		S.E.	1.8	3.2	1.3	3.6	4.1		5.6				
Chunk Mountain Slough	71.7	Sample	0	14	3	6	8	0	15	0	0	0	46
		Percent		30.4	6.5	13.0	17.4		32.6				
		S.E.		6.8	3.7	5.0	5.6		7				
Tulsequah Tributary	41.7	Sample	0	0	0	3	9	0	11	1	0	0	24
		Percent				12.5	37.5		45.8	4.2			
		S.E.				6.9	10.1		10.4	4.2			
South Fork Slough	61.8	Sample	0	6	0	9	18	0	21	0	0	1	55
		Percent		10.9		16.4	32.7		38.2			1.8	
		S.E.		4.2		5	6.4		6.6			1.8	
Yehring Creek	62.2	Sample	0	1	2	1	28	1	76	2	0	0	111
		Percent		0.9	1.8	0.9	25.9	0.9	67.9	1.8			
		S.E.		0.9	1.2	0.9	4.1	0.9	4.4	1.2			

Appendix C.5. Estimated contributions of sockeye salmon stocks originating in Alaska and Canada to Alaskan District 111 drift gill net fishery, 1989.

Dates	Group	Catch By Age Class 1.2	1.3	2.2	2.3	0.+	Other	Total	Percent [a]	Standard Error [b]	90% C.I. [b] Lower	Upper
6/18-6/24 Week 25	Kuthai	395	2,509	36	68	0	6	3,014	49.3	254.7	2,595	3,433
	Trapper/Main	47	2,121	30	289	145	4	2,636	43.1	380.5	2,010	3,262
	L. Tatsamenie	60	0	1	52	7	0	120	2.0	55.3	29	211
	Crescent	0	98	1	0	0	0	99	1.6	150.2	0	346
	Speel	37	182	3	28	0	0	250	4.1	270.4	0	695
	Total	539	4,910	71	437	152	10	6,119				
6/25-7/01 Week 26	Kuthai	432	597	8	82	0	6	1,125	15.9	201.3	794	1,456
	Trapper/Main	51	4,479	37	353	319	28	5,267	74.3	468.4	4,496	6,038
	L. Tatsamenie	66	453	4	62	38	3	626	8.8	21.0	592	660
	Crescent	0	0	0	0	0	0	0	0.0			
	Speel	41	0	1	33	0	0	75	1.1	61.8	0	177
	Total	590	5,529	50	530	357	37	7,093				
7/02-7/08 Week 27	Kuthai	30	692	12	146	0	0	880	8.5	262.7	448	1,312
	Trapper/Main	305	6,555	101	626	766	0	8,353	80.5	659.2	7,269	9,437
	L. Tatsamenie	103	613	11	111	85	0	923	8.9	19.0	892	954
	Crescent	0	0	0	0	0	0	0	0.0			
	Speel	160	0	3	59	0	0	222	2.1	91.8	71	373
	Total	598	7,860	127	942	851	0	10,378				
7/09-7/15 Week 28	Kuthai	62	86	2	67	0	2	219	1.3	148.9	0	464
	Trapper/Main	633	9,211	105	942	2,136	76	13,103	75.5	1554.5	10,546	15,660
	L. Tatsamenie	213	921	11	58	236	9	1,448	8.3	18.7	1,417	1,479
	Crescent	0	1,032	10	40	0	8	1,090	6.3	640.2	37	2,143
	Speel	331	1,032	14	97	0	11	1,485	8.6	959.7	0	3,064
	Total	1,239	12,282	142	1,204	2,372	106	17,345				
7/16-7/22 Week 29	Kuthai	57	66	5	53	0	0	181	1.2	261.2	0	611
	Trapper/Main	587	5,881	224	739	2,513	0	9,944	66.3	1329.4	7,757	12,131
	L. Tatsamenie	198	1,489	54	45	604	0	2,390	15.9	40.3	2,324	2,456
	Crescent	0	688	22	31	0	0	741	4.9	487.7	0	1,543
	Speel	307	1,301	52	77	0	0	1,737	11.6	781.6	451	3,023
	Total	1,149	9,425	357	945	3,117	0	14,993				
7/23-7/29 Week 30	Kuthai	7	95	2	7	0	1	112	1.4	79.7	0	243
	Trapper/Main	267	1,577	34	27	727	11	2,643	32.9	626.8	1,612	3,674
	L. Tatsamenie	466	1,052	31	174	658	10	2,391	29.8	147.1	2,149	2,633
	Crescent	0	450	9	36	0	3	498	6.2	147.1	256	740
	Speel	104	2,115	43	112	0	14	2,388	29.7	258.3	1,963	2,813
	Total	844	5,289	119	356	1,385	39	8,032	100.0	454.9	7,284	8,780
7/30-8/05 Week 31	Kuthai	3	72	4	4	0	0	83	2.1	58.5	0	179
	Trapper/Main	115	626	40	14	240	2	1,037	26.1	411.0	361	1,713
	L. Tatsamenie	200	869	62	86	367	2	1,586	39.9	260.4	1,158	2,014
	Crescent	0	485	27	18	0	1	531	13.4	165.7	258	804
	Speel	45	599	37	56	0	2	739	18.6	224.6	370	1,108
	Total	363	2,651	170	178	607	7	3,976				
8/06-8/12 Week 32	Kuthai	0	0	0	1	0	0	1	0.0	4.0	0	8
	Trapper/Main	157	1,013	64	0	206	0	1,440	57.2	234.7	1,054	1,826
	L. Tatsamenie	87	591	39	31	125	0	873	34.7	167.1	598	1,148
	Crescent	0	142	8	3	0	0	153	6.1	89.0	7	299
	Speel	4	34	3	10	0	0	51	2.0	104.7	0	223
	Total	248	1,780	114	45	331	0	2,518				
8/13-9/23 Wks 33-38	Kuthai	0	54	9	18	0	0	81	2.3	65.8	0	189
	Trapper/Main	277	651	119	0	103	0	1,150	32.3	290.6	672	1,628
	L. Tatsamenie	153	387	123	410	106	0	1,179	33.1	112.7	994	1,364
	Crescent	0	566	77	34	0	0	677	19.0	143.3	441	913
	Speel	7	288	54	129	0	0	478	13.4	165.5	206	750
	Total	437	1,946	382	591	209	0	3,565				
Season Totals	Kuthai	986	4,171	78	446	0	15	5,696	7.7	500.3	4,873	6,519
	Trapper/Main	2,439	32,114	754	2,990	7,155	121	45,573	61.6	2336.7	41,729	49,417
	L. Tatsamenie	1,546	6,375	336	1,029	2,226	24	11,536	15.6	156.3	11,279	11,793
	Crescent	0	3,461	154	162	0	12	3,789	5.1	885.1	2,333	5,245
	Speel	1,036	5,551	210	601	0	27	7,425	10.0	1367.8	5,175	9,675
	Total	6,007	51,672	1,532	5,228	9,381	199	74,019				

[a] Percents may not sum to 100.0 due to rounding.
[b] The standard errors are minimum estimates because no estimates of the variance for stocks contributing 0 fish during a given week or for fish other than age-1.2, -1.3, or -2.3 are available. The 90% confidence intervals are affected in like manner.

Appendix C.6. Estimated CPUE and migratory timing of sockeye salmon stocks in Alaskan District 111 drift gillnet fishery, 1989.

CPUE

Stat Week	Days Open	Average Number Boats	Catch per Boat Day: Kuthai	Trapper/ Mainstem	Little Tatsamenie	Crescent	Speel	Total
25	3	63	16	14	1	1	1	32
26	3	63	6	28	3	0	0	38
27	3	74	4	38	4	0	1	47
28	3	78	1	56	6	5	6	74
29	3	69	1	48	12	4	8	72
30	3	59	1	15	14	3	13	45
31	3	38	1	9	14	5	6	35
32	3	18	0	27	16	3	1	47
33-38	13	60	0	1	2	1	1	5
Total			29	236	71	20	39	395

Migratory Timing

Stat Week	Proportion of Catch per Boat Day: Kuthai	Trapper/ Mainstem	Little Tatsamenie	Crescent	Speel	Total
25	0.55	0.06	0.01	0.03	0.03	0.08
26	0.20	0.12	0.05	0.00	0.01	0.10
27	0.14	0.16	0.06	0.00	0.03	0.12
28	0.03	0.24	0.09	0.23	0.16	0.19
29	0.03	0.20	0.16	0.18	0.22	0.18
30	0.02	0.06	0.19	0.14	0.35	0.11
31	0.02	0.04	0.20	0.23	0.17	0.09
32	0.00	0.11	0.23	0.14	0.02	0.12
33-38	0.00	0.01	0.02	0.04	0.02	0.01
Total	1.00	1.00	1.00	1.00	1.00	1.00

Appendix C.7. Estimated contributions of sockeye salmon stocks to the Taku River gillnet fishery, 1989.

Dates	Group	Catch By Age Class 1.2	1.3	2.2	2.3	0.+	Other	Total	Percent [a]	Standard Error [b]	90% C.I. [b] Lower	Upper
6/25-7/01	Kuthai	127	327	11	25	0	3	493	31.6	5.5	484	502
Week 26	Trapper/Main	75	770	20	46	95	8	1,014	64.9	75.2	890	1,138
	L. Tatsamenie	51	0	1	3	0	0	55	3.5	44.8	0	129
	Total	253	1,097	32	74	95	11	1,562				
7/02-7/08	Kuthai	168	192	3	35	0	0	398	10.8	38.4	335	461
Week 27	Trapper/Main	99	2,406	20	243	140	0	2,908	78.9	267.5	2,468	3,348
	L. Tatsamenie	68	263	3	32	15	0	381	10.3	242.1	0	779
	Total	335	2,861	26	310	155	0	3,687				
7/09-7/15	Kuthai	4	12	0	0	0	0	16	0.8	34.8	0	73
Week 28	Trapper/Main	114	1,465	16	16	184	0	1,795	86.0	156.8	1,537	2,053
	L. Tatsamenie	40	207	2	2	26	0	277	13.3	147.4	34	520
	Total	158	1,684	18	18	210	0	2,088				
7/16-7/22	Kuthai	9	11	0	1	0	0	21	0.9	54.0	0	110
Week 29	Trapper/Main	220	1,523	29	72	198	15	2,057	90.4	187.9	1,748	2,366
	L. Tatsamenie	78	96	3	7	12	1	197	8.7	177.4	0	489
	Total	307	1,630	32	80	210	16	2,275				
7/23-7/29	Kuthai	18	0	1	2	0	0	21	0.6	11.7	2	40
Week 30	Trapper/Main	373	1,430	73	162	761	0	2,799	85.6	195.4	2,478	3,120
	L. Tatsamenie	134	180	13	28	96	0	451	13.8	170.9	170	732
	Total	525	1,610	87	192	857	0	3,271				
7/30-8/05	Kuthai	9	0	0	0	0	0	9	0.4	23.7	0	48
Week 31	Trapper/Main	190	686	9	18	273	9	1,185	52.0	224.7	815	1,555
	L. Tatsamenie	69	704	8	16	282	8	1,087	47.7	224.1	718	1,456
	Total	268	1,390	17	34	555	17	2,281				
8/06-8/12	Kuthai	0	30	1	1	0	0	32	1.2	22.8	0	70
Week 32	Trapper/Main	52	1,180	26	35	333	9	1,635	59.5	192.1	1,319	1,951
	L. Tatsamenie	144	695	18	24	196	6	1,083	39.4	188.6	773	1,393
	Total	196	1,905	45	60	529	15	2,750				
8/13-8/19	Kuthai	0	0	0	0	0	0	0	0.0			
Week 33	Trapper/Main	28	279	10	0	82	0	399	63.2	71.5	281	517
	L. Tatsamenie	75	116	7	0	34	0	232	36.8	70.8	116	348
	Total	103	395	17	0	116	0	631				
	Kuthai	335	572	16	64	0	3	990	5.3	74.3	868	1,112
Season	Trapper/Main	1,151	9,739	203	592	2,066	41	13,792	74.4	500.0	12,970	14,614
Totals	L. Tatsamenie	659	2,261	55	112	661	15	3,763	20.3	464.7	2,999	4,527
	Total	2,145	12,572	274	768	2,727	59	18,545				

[a] Percents may not sum to 100.0 due to rounding.

[b] The standard errors are minimum estimates because no estimates of the variance for stocks contributing 0 fish during a given week or for the fish other than age-1.2 and -1.3 are available. The 90% confidence intervals are affected in like manner.

Appendix C.8. Estimated CPUE and migratory timing of sockeye salmon stocks caught in the Taku River commercial fishery, 1989.

CPUE

Stat. Week	Days Open	Average Number Permits	Catch per Permit Day: Kuthai	Trapper/ Mainstem	Little Tatsamenie	Total
26	2.0	11.5	21	44	2	68
27	4.0	11.3	9	64	8	82
28	4.0	8.8	0	51	8	59
29	3.0	12.0	1	57	5	63
30	4.0	10.8	0	65	10	76
31	3.0	11.0	0	36	33	69
32	3.0	10.0	1	55	36	92
33–34	2.3	10.0	0	17	10	27
Total			33	389	114	536

Migratory Timing

Stat. Week	Proportion of Catch per Boat Day: Kuthai	Trapper/ Mainstem	Little Tatsamenie	Total
26	0.65	0.11	0.02	0.13
27	0.27	0.17	0.07	0.15
28	0.01	0.13	0.07	0.11
29	0.02	0.15	0.05	0.12
30	0.01	0.17	0.09	0.14
31	0.01	0.09	0.29	0.13
32	0.03	0.14	0.32	0.17
33–34	0.00	0.04	0.09	0.05
Total	1.00	1.00	1.00	1.00

Appendix C.9. Estimated stock-specific sockeye salmon catch in the Canyon Island fish wheels, 1989.

Dates	Group	Catch By Age Class 1.2	1.3	2.2	2.3	0.+	Other	Total	Percent [a]	Standard Error [b]	90% C.I. [b] Lower	Upper
5/28-6/10 Wks 22-23	Kuthai	2	97	0	4	0	0	103	79.2	5.3	94	112
	Trapper/Main	1	12	0	1	1	0	15	11.5	5.6	6	24
	L. Tatsamenie	1	11	0	0	0	0	12	9.2	5.8	2	22
	Total	4	120	0	5	1	0	130				
6/11-6/17 Week 24	Kuthai	9	321	1	12	0	0	343	76.6	17.3	315	371
	Trapper/Main	5	46	0	2	6	0	59	13.2	19.6	27	91
	L. Tatsamenie	3	37	0	2	4	0	46	10.3	19.6	14	78
	Total	17	404	1	16	10	0	448				
6/18-6/24 Week 25	Kuthai	22	131	6	13	0	0	172	60.8	11.3	153	191
	Trapper/Main	12	53	2	5	6	0	78	27.6	15.3	53	103
	L. Tatsamenie	8	19	1	2	3	0	33	11.7	14.0	10	56
	Total	42	203	9	20	9	0	283				
6/25-7/01 Week 26	Kuthai	34	27	1	3	0	1	66	16.1	9.9	50	82
	Trapper/Main	74	227	7	17	13	7	345	83.9	11.2	327	363
	L. Tatsamenie	0	0	0	0	0	0	0	0.0		0	
	Total	108	254	8	20	13	8	411				
7/02-7/08 Week 27	Kuthai	13	7	0	2	0	1	23	5.1	6.2	13	33
	Trapper/Main	79	266	7	27	28	17	424	94.4	22.0	388	460
	L. Tatsamenie	0	2	0	0	0	0	2	0.4	19.7	0	34
	Total	92	275	7	29	28	18	449				
7/09-7/15 Week 28	Kuthai	4	10	1	1	0	1	17	2.8	11.3	0	36
	Trapper/Main	100	297	23	26	52	25	523	86.3	30.9	472	574
	L. Tatsamenie	0	50	3	3	7	3	66	10.9	22.0	30	102
	Total	104	357	27	30	59	29	606				
7/16-7/22 Week 29	Kuthai	1	0	0	0	0	0	1	0.2	2.2	0	5
	Trapper/Main	110	198	20	19	70	29	446	99.8	10.0	430	462
	L. Tatsamenie	0	0	0	0	0	0	0	0.0		0	
	Total	111	198	20	19	70	29	447				
7/23-7/29 Week 30	Kuthai	1	0	0	0	0	0	1	0.3	2.3	0	5
	Trapper/Main	72	157	13	8	50	28	328	84.3	17.6	299	357
	L. Tatsamenie	0	42	2	2	9	5	60	15.4	15.9	34	86
	Total	73	199	15	10	59	33	389	100.0			
7/30-8/05 Week 31	Kuthai	0	0	0	0	0	0	0	0.0		0	
	Trapper/Main	87	172	14	9	78	17	377	80.2	23.7	338	416
	L. Tatsamenie	31	33	4	2	19	4	93	19.8	22.3	56	130
	Total	118	205	18	11	97	21	470				
8/06-8/12 Week 32	Kuthai	0	0	0	0	0	0	0	0.0	1.0	0	2
	Trapper/Main	53	111	12	3	46	30	255	77.0	16.4	228	282
	L. Tatsamenie	19	29	4	1	14	9	76	23.0	15.1	51	101
	Total	72	140	16	4	60	39	331				
8/13-8/19 Week 33	Kuthai	0	0	0	0	0	0	0	0.0	1.0	0	2
	Trapper/Main	36	65	12	3	15	11	142	91.6	9.7	126	158
	L. Tatsamenie	4	6	1	0	1	1	13	8.4	8.3	0	27
	Total	40	71	13	3	16	12	155				
8/20-9/23 Wks 34-38	Kuthai	0	0	0	0	0	0	0	0.0	1.0	0	2
	Trapper/Main	44	49	5	2	12	15	127	83.0	14.8	103	151
	L. Tatsamenie	5	13	1	1	3	3	26	17.0	14.1	3	49
	Total	49	62	6	3	15	18	153				

[a] Percents may not sum to 100.0 due to rounding.

[b] The standard errors are minimum estimates because no estimates of the variance for stocks contributing 0 fish during a given week or for fish other than age 1.2 and 1.3 are available. The 90% confidence intervals are affected in like manner.

Appendix C.10. Estimated age-specific stock proportions of sockeye salmon in Canyon Island fish wheel catches, 1989.

		Catch By Age Class[a]					
Dates	Group	1.2	1.3	2.2	2.3	0.+	Other
5/28-6/10	Kuthai	0.519	0.804	0.795	0.795	0.000	0.795
Wks 22-23	Trapper/Main	0.281	0.102	0.108	0.108	0.525	0.108
	L. Tatsamenie	0.200	0.094	0.097	0.097	0.475	0.097
6/11-6/17	Kuthai	0.519	0.794	0.783	0.783	0.000	0.783
Week 24	Trapper/Main	0.281	0.114	0.121	0.121	0.556	0.121
	L. Tatsamenie	0.200	0.092	0.096	0.096	0.444	0.096
6/18-6/24	Kuthai	0.519	0.643	0.622	0.622	0.000	0.622
Week 25	Trapper/Main	0.281	0.263	0.266	0.266	0.703	0.266
	L. Tatsamenie	0.200	0.094	0.112	0.112	0.297	0.112
6/25-7/01	Kuthai	0.312	0.105	0.167	0.167	0.000	0.167
Week 26	Trapper/Main	0.688	0.895	0.833	0.833	1.000	0.833
	L. Tatsamenie	0.000	0.000	0.000	0.000	0.000	0.000
7/02-7/08	Kuthai	0.138	0.027	0.055	0.055	0.000	0.055
Week 27	Trapper/Main	0.862	0.967	0.941	0.941	0.995	0.941
	L. Tatsamenie	0.000	0.006	0.004	0.004	0.005	0.004
7/09-7/15	Kuthai	0.037	0.027	0.029	0.029	0.000	0.029
Week 28	Trapper/Main	0.963	0.834	0.863	0.863	0.889	0.863
	L. Tatsamenie	0.000	0.139	0.108	0.108	0.111	0.108
7/16-7/22	Kuthai	0.006	0.000	0.002	0.002	0.000	0.002
Week 29	Trapper/Main	0.994	1.000	0.998	0.998	1.000	0.998
	L. Tatsamenie	0.000	0.000	0.000	0.000	0.000	0.000
7/23-7/29	Kuthai	0.012	0.000	0.003	0.003	0.000	0.003
Week 30	Trapper/Main	0.988	0.790	0.843	0.843	0.846	0.843
	L. Tatsamenie	0.000	0.210	0.154	0.154	0.154	0.154
7/30-8/05	Kuthai	0.000	0.000	0.000	0.000	0.000	0.000
Week 31	Trapper/Main	0.738	0.841	0.803	0.803	0.803	0.803
	L. Tatsamenie	0.262	0.159	0.197	0.197	0.197	0.197
8/06-8/12	Kuthai	0.000	0.000	0.000	0.000	0.000	0.000
Week 32	Trapper/Main	0.743	0.790	0.774	0.774	0.774	0.774
	L. Tatsamenie	0.257	0.210	0.226	0.226	0.226	0.226
8/13-8/19	Kuthai	0.000	0.000	0.000	0.000	0.000	0.000
Week 33	Trapper/Main	0.892	0.922	0.911	0.911	0.911	0.911
	L. Tatsamenie	0.108	0.078	0.089	0.089	0.089	0.089
8/20-9/23	Kuthai	0.000	0.000	0.000	0.000	0.000	0.000
Wks 34-38	Trapper/Main	0.892	0.785	0.832	0.832	0.832	0.832
	L. Tatsamenie	0.108	0.215	0.168	0.168	0.168	0.168
	Kuthai	0.104	0.238	0.064	0.206	0.000	0.014
Season	Trapper/Main	0.811	0.664	0.821	0.718	0.863	0.865
	L. Tatsamenie	0.086	0.097	0.114	0.076	0.137	0.121

[a] Proportions may not sum to 1.000 due to rounding.

Appendix D.1. Stock compositions of sockeye salmon harvested in Alaskan District 111 drift gillnet fishery, 1986-1989.

Stat. Week	Stock Group	Year and Date of Stat. Week 25 (June) 1986 15-21	1987 14-20	1988 19-25	1989 18-24	Average[a]
25	Kuthai	0.783			0.493	0.783
	Little Trapper	0.048			0.431	0.048
	Mainstem	0.057				0.057
	Little Tatsamenie	0.050			0.020	0.050
	Crescent	0.033			0.016	0.033
	Speel	0.029			0.041	0.029
	Percent Taku	0.938			0.943	0.938
26	Kuthai	0.689	0.615	0.658	0.159	0.654
	Little Trapper	0.123	0.000	0.193	0.743	0.105
	Mainstem	0.125	0.352	0.000		0.159
	Little Tatsamenie	0.015	0.014	0.113	0.088	0.047
	Crescent	0.006	0.018	0.019	0.000	0.015
	Speel	0.041	0.000	0.017	0.011	0.020
	Percent Taku	0.952	0.982	0.964	0.989	0.966
27	Kuthai	0.341	0.311	0.408	0.085	0.354
	Little Trapper	0.319	0.216	0.390	0.805	0.309
	Mainstem	0.208	0.336	0.000		0.181
	Little Tatsamenie	0.005	0.037	0.089	0.089	0.044
	Crescent	0.096	0.013	0.081	0.000	0.063
	Speel	0.031	0.086	0.033	0.021	0.050
	Percent Taku	0.874	0.901	0.886	0.979	0.887
28	Kuthai	0.068	0.097	0.136	0.013	0.100
	Little Trapper	0.666	0.347	0.597	0.755	0.537
	Mainstem	0.103	0.385	0.000		0.163
	Little Tatsamenie	0.042	0.054	0.156	0.083	0.084
	Crescent	0.107	0.072	0.080	0.063	0.086
	Speel	0.013	0.045	0.031	0.086	0.030
	Percent Taku	0.880	0.884	0.889	0.852	0.884
29	Kuthai	0.048	0.067	0.024	0.012	0.046
	Little Trapper	0.384	0.590	0.143	0.663	0.373
	Mainstem	0.303	0.235	0.252		0.263
	Little Tatsamenie	0.116	0.056	0.090	0.159	0.087
	Crescent	0.126	0.016	0.447	0.049	0.197
	Speel	0.022	0.036	0.043	0.116	0.034
	Percent Taku	0.852	0.948	0.510	0.835	0.770
30	Kuthai	0.003	0.044	0.012	0.014	0.019
	Little Trapper	0.249	0.178	0.020	0.329	0.149
	Mainstem	0.292	0.182	0.568		0.347
	Little Tatsamenie	0.234	0.010	0.043	0.298	0.096
	Crescent	0.112	0.304	0.188	0.062	0.201
	Speel	0.111	0.281	0.169	0.297	0.187
	Percent Taku	0.778	0.414	0.643	0.641	0.612
31	Kuthai	0.000	0.000	0.000	0.021	0.000
	Little Trapper	0.171	0.084	0.000	0.261	0.085
	Mainstem	0.392	0.498	0.562		0.484
	Little Tatsamenie	0.288	0.037	0.115	0.399	0.146
	Crescent	0.047	0.301	0.273	0.134	0.207
	Speel	0.102	0.080	0.050	0.186	0.077
	Percent Taku	0.851	0.619	0.677	0.681	0.716
32	Kuthai	0.013	0.022	0.005	0.000	0.013
	Little Trapper	0.082	0.158	0.000	0.572	0.080
	Mainstem	0.262	0.509	0.404		0.392
	Little Tatsamenie	0.399	0.000	0.118	0.347	0.172
	Crescent	0.143	0.139	0.452	0.061	0.245
	Speel	0.100	0.172	0.020	0.020	0.097
	Percent Taku	0.757	0.689	0.528	0.919	0.658
33	Kuthai	0.001	0.000	0.013	0.023	0.005
	Little Trapper	0.003	0.152	0.032	0.323	0.062
	Mainstem	0.474	0.643	0.389		0.502
	Little Tatsamenie	0.416	0.046	0.044	0.331	0.169
	Crescent	0.000	0.159	0.466	0.190	0.209
	Speel	0.107	0.000	0.056	0.134	0.054
	Percent Taku	0.893	0.841	0.478	0.676	0.737
34-40	Kuthai	0.001	0.000	0.000	[b]	0.000
	Little Trapper	0.111	0.000	0.094		0.068
	Mainstem	0.404	0.693	0.252		0.450
	Little Tatsamenie	0.223	0.037	0.000		0.087
	Crescent	0.115	0.035	0.585		0.245
	Speel	0.146	0.234	0.069		0.150
	Percent Taku	0.739	0.731	0.346		0.605
Season Totals	Kuthai	0.062	0.078	0.120	0.077	0.087
	Little Trapper	0.267	0.235	0.159	0.616	0.220
	Mainstem	0.302	0.375	0.305		0.328
	Little Tatsamenie	0.204	0.031	0.083	0.156	0.106
	Crescent	0.090	0.157	0.262	0.051	0.170
	Speel	0.075	0.123	0.071	0.100	0.090
	Total Taku	0.834	0.720	0.667	0.849	0.753
	Total Snettisham	0.166	0.280	0.333	0.151	0.247

[a] Averages do not include 1989 because the Mainstem and Trapper groups were combined.
[b] The last figures in each column include catch from that week through the end of the season.

Appendix D.2. Stock specific weekly catches of sockeye salmon in Alaskan District 111 drift gillnet fisheries, 1986-1989.

		Year and Date of Stat. Week 25 (June)				
Stat. Week	Stock Group	1986 15-21	1987 14-20	1988 19-25	1989 18-24	Average [a]
25	Kuthai	506			3,014	506
	Little Trapper	31			2,636	31
	Mainstem	37				37
	Little Tatsamenie	32			120	32
	Crescent	21			99	21
	Speel	19			250	19
	Total	646			6,119	646
26	Kuthai	1,113	1,607	1,808	1,125	1,509
	Little Trapper	199	0	530	5,267	243
	Mainstem	202	920	0		374
	Little Tatsamenie	25	36	311	626	124
	Crescent	10	48	53	0	37
	Speel	67	0	47	75	38
	Total	1,616	2,611	2,749	7,093	2,325
27	Kuthai	1,486	1,934	1,982	880	1,801
	Little Trapper	1,390	1,344	1,895	8,353	1,543
	Mainstem	904	2,085	0		996
	Little Tatsamenie	23	231	431	923	228
	Crescent	416	80	395	0	297
	Speel	134	535	158	222	276
	Total	4,353	6,209	4,861	10,378	5,141
28	Kuthai	614	531	535	219	560
	Little Trapper	5,994	1,906	2,354	13,103	3,418
	Mainstem	931	2,114	0		1,015
	Little Tatsamenie	381	297	615	1,448	431
	Crescent	960	395	315	1,090	557
	Speel	120	244	124	1,485	163
	Total	9,000	5,487	3,943	17,345	6,143
29	Kuthai	641	935	147	181	574
	Little Trapper	5,138	8,260	862	9,944	4,753
	Mainstem	4,051	3,289	1,516		2,952
	Little Tatsamenie	1,551	781	541	2,390	958
	Crescent	1,690	220	2,691	741	1,534
	Speel	294	507	257	1,737	353
	Total	13,365	13,992	6,014	14,993	11,124
30	Kuthai	31	674	111	112	272
	Little Trapper	2,744	2,756	186	2,643	1,895
	Mainstem	3,222	2,813	5,287		3,774
	Little Tatsamenie	2,582	160	398	2,391	1,047
	Crescent	1,230	4,703	1,751	498	2,561
	Speel	1,222	4,351	1,573	2,388	2,382
	Total	11,031	15,457	9,306	8,032	11,931
31	Kuthai	2	0	0	83	1
	Little Trapper	2,747	1,189	0	1,037	1,312
	Mainstem	6,301	7,024	2,393		5,239
	Little Tatsamenie	4,622	519	488	1,586	1,876
	Crescent	753	4,253	1,161	531	2,056
	Speel	1,634	1,130	214	739	993
	Total	16,059	14,115	4,256	3,976	11,477
32	Kuthai	69	205	15	1	96
	Little Trapper	439	1,508	0	1,440	649
	Mainstem	1,409	4,844	1,135		2,463
	Little Tatsamenie	2,144	0	331	873	825
	Crescent	769	1,327	1,268	153	1,121
	Speel	538	1,637	57	51	744
	Total	5,368	9,521	2,806	2,518	5,898
33	Kuthai	3	0	27	81	10
	Little Trapper	15	628	66	1,150	236
	Mainstem	2,358	2,662	812		1,944
	Little Tatsamenie	2,067	192	91	1,179	783
	Crescent	0	660	972	677	544
	Speel	530	0	117	478	216
	Total	4,973	4,142	2,085	3,565	3,733
34-40	Kuthai	8	0	0	[b] 3	
	Little Trapper	736	0	273		336
	Mainstem	2,688	2,549	729		1,989
	Little Tatsamenie	1,482	138	0		540
	Crescent	767	129	1,696		864
	Speel	969	862	201		677
	Total	6,650	3,678	2,898		4,409
Season Totals	Kuthai	4,473	5,885	4,625	5,696	4,994
	Little Trapper	19,433	17,591	6,166	45,573	14,397
	Mainstem	22,103	28,300	11,872		20,758
	Little Tatsamenie	14,909	2,354	3,206	11,536	6,823
	Crescent	6,616	11,815	10,302	3,789	9,578
	Speel	5,527	9,267	2,748	7,425	5,847
	Total	73,061	75,212	38,918	74,019	62,397
	Total Taku	60,918	54,130	25,868	62,805	46,972
	Total Snettisham	12,143	21,082	13,050	11,214	15,425

[a] Averages do not include 1989 because the Mainstem and Trapper groups were combined.
[b] The last figures in each column include catch from that week through the end of the season.

Appendix D.3. Stock compositions of sockeye salmon harvested in the Canadian commercial fishery in the Taku River, 1986-1989. The Little Trapper and Mainstem stock groups were combined in the 1989 analysis.

		Year and Start Date of Week 26				
Stat. Week	Stock Group	6/22 1986	6/21 1987	6/19 1988	6/25 1989	Average[a]
26	Kuthai				0.316	
	Little Trapper					
	Mainstem				0.649	
	Little Tatsamenie				0.035	
27	Kuthai	0.694	0.405	0.650	0.108	0.583
	Little Trapper	0.244	0.208	0.218		0.223
	Mainstem	0.060	0.343	0.076	0.789	0.159
	Little Tatsamenie	0.001	0.044	0.057	0.103	0.034
28	Kuthai	0.348	0.405	0.334	0.008	0.362
	Little Trapper	0.475	0.208	0.433		0.372
	Mainstem	0.161	0.343	0.208	0.860	0.237
	Little Tatsamenie	0.016	0.044	0.025	0.133	0.028
29	Kuthai	0.114	0.171	0.060	0.009	0.115
	Little Trapper	0.582	0.623	0.585		0.596
	Mainstem	0.275	0.206	0.192	0.904	0.224
	Little Tatsamenie	0.029	0.000	0.163	0.087	0.064
30	Kuthai	0.039	0.075	0.043	0.006	0.052
	Little Trapper	0.518	0.294	0.641		0.484
	Mainstem	0.323	0.578	0.273	0.856	0.391
	Little Tatsamenie	0.120	0.053	0.043	0.138	0.072
31	Kuthai	0.005	0.019	0.042	0.004	0.022
	Little Trapper	0.351	0.162	0.369		0.294
	Mainstem	0.421	0.762	0.366	0.520	0.516
	Little Tatsamenie	0.224	0.057	0.223	0.477	0.168
32	Kuthai	0.018	0.015	0.003	0.012	0.012
	Little Trapper	0.138	0.150	0.274		0.187
	Mainstem	0.541	0.650	0.685	0.595	0.625
	Little Tatsamenie	0.303	0.186	0.038	0.394	0.176
33	Kuthai	0.001	0.000	0.003	0.000	0.002
	Little Trapper	0.200	0.000	0.272		0.157
	Mainstem	0.484	0.927	0.674	0.632	0.695
	Little Tatsamenie	0.314	0.073	0.051	0.368	0.146
34	Kuthai	0.002	0.000	0.002	0.000	0.001
	Little Trapper	0.136	0.000	0.207		0.114
	Mainstem	0.621	1.000	0.742	0.632	0.788
	Little Tatsamenie	0.241	0.000	0.049	0.368	0.097
Season Totals	Kuthai	0.111	0.062	0.143	0.053	0.105
	Little Trapper	0.397	0.201	0.417		0.338
	Mainstem	0.350	0.649	0.343	0.744	0.447
	Little Tatsamenie	0.143	0.088	0.098	0.203	0.110

[a] Averages do not include 1989 because the Trapper and Mainstem groups were combined.

Appendix D.4. Stock specific weekly catches of sockeye salmon in the Canadian commercial fishery in the Taku River, 1986-1989. The Little Trapper and Mainstem stock groups were combined in the 1989 analysis.

Stat. Week	Stock Group	6/22 1986	6/21 1987	6/19 1988	6/25 1989	Average[a]
		Year and Start Date of Week 26				
26	Kuthai				493	
	Little Trapper					
	Mainstem				1,014	
	Little Tatsamenie				55	
	Total				1,562	
27	Kuthai	484	72	1,142	398	566
	Little Trapper	170	37	383		197
	Mainstem	42	61	133	2,908	79
	Little Tatsamenie	1	8	100	381	36
	Total	697	178	1,758	3,687	878
28	Kuthai	729	206	241	16	392
	Little Trapper	996	106	312		471
	Mainstem	337	174	150	1,795	220
	Little Tatsamenie	34	22	18	277	25
	Total	2,096	508	721	2,088	1,108
29	Kuthai	220	134	158	21	171
	Little Trapper	1,119	487	1,547		1,051
	Mainstem	530	161	508	2,057	400
	Little Tatsamenie	55	0	432	197	162
	Total	1,924	782	2,645	2,275	1,784
30	Kuthai	158	348	92	21	199
	Little Trapper	2,072	1,357	1,388		1,606
	Mainstem	1,293	2,669	591	2,799	1,518
	Little Tatsamenie	480	247	93	451	273
	Total	4,003	4,621	2,164	3,271	3,596
31	Kuthai	14	14	73	9	34
	Little Trapper	1,020	122	646		596
	Mainstem	1,223	572	640	1,185	812
	Little Tatsamenie	650	43	390	1,087	361
	Total	2,907	751	1,749	2,281	1,802
32	Kuthai	21	60	3	32	28
	Little Trapper	165	619	235		340
	Mainstem	647	2,675	588	1,635	1,303
	Little Tatsamenie	362	764	33	1,083	386
	Total	1,195	4,118	859	2,750	2,057
33	Kuthai	1	0	3	0	1
	Little Trapper	162	0	235		132
	Mainstem	391	1,462	582	168	812
	Little Tatsamenie	254	115	44	97	138
	Total	808	1,577	864	265	1,083
34	Kuthai	2	0	3	0	2
	Little Trapper	151	0	259		137
	Mainstem	689	1,019	930	231	879
	Little Tatsamenie	267	0	62	135	110
	Total	1,109	1,019	1,254	366	1,127
Season Totals	Kuthai	1,629	834	1,715	990	1,393
	Little Trapper	5,855	2,728	5,005		4,529
	Mainstem	5,152	8,793	4,122	13,792	6,022
	Little Tatsamenie	2,103	1,199	1,172	3,763	1,491
	Total	14,739	13,554	12,014	18,545	13,436

[a] Averages do not include 1989 because the Trapper and Mainstem groups were combined.

Appendix D.5. Stock compositions of sockeye salmon caught in the Canyon Island fish wheels in the Taku River, 1986-1989. The Little Trapper and Mainstem stock groups were combined in the 1989 analysis.

		Year and Start Date of Week 23				
Week	Stock Group	6/01 1986	5/31 1987	5/29 1988	6/04 1989	Average[a]
23	Kuthai				0.792	
	Little Trapper					
	Mainstem				0.115	
	Little Tatsamenie				0.092	
24	Kuthai				0.766	
	Little Trapper					
	Mainstem				0.132	
	Little Tatsamenie				0.103	
25	Kuthai	0.970	0.810	0.811	0.608	0.800
	Little Trapper	0.000	0.079	0.110		0.063
	Mainstem	0.025	0.091	0.043	0.276	0.109
	Little Tatsamenie	0.005	0.020	0.036	0.117	0.044
26	Kuthai	0.868	0.802	0.819	0.161	0.662
	Little Trapper	0.067	0.000	0.094		0.054
	Mainstem	0.053	0.115	0.067	0.839	0.269
	Little Tatsamenie	0.012	0.083	0.020	0.000	0.029
27	Kuthai	0.748	0.612	0.636	0.051	0.512
	Little Trapper	0.148	0.220	0.286		0.218
	Mainstem	0.104	0.055	0.053	0.944	0.289
	Little Tatsamenie	0.000	0.113	0.025	0.004	0.036
28	Kuthai	0.362	0.334	0.305	0.028	0.257
	Little Trapper	0.418	0.327	0.430		0.392
	Mainstem	0.216	0.291	0.166	0.863	0.384
	Little Tatsamenie	0.004	0.048	0.099	0.109	0.065
29	Kuthai	0.143	0.094	0.111	0.002	0.088
	Little Trapper	0.546	0.469	0.582		0.532
	Mainstem	0.199	0.320	0.175	0.998	0.423
	Little Tatsamenie	0.112	0.117	0.132	0.000	0.090
30	Kuthai	0.057	0.014	0.003	0.003	0.019
	Little Trapper	0.451	0.436	0.390		0.426
	Mainstem	0.268	0.527	0.359	0.843	0.499
	Little Tatsamenie	0.224	0.023	0.248	0.154	0.162
31	Kuthai	0.014	0.008	0.000	0.000	0.006
	Little Trapper	0.218	0.227	0.360		0.268
	Mainstem	0.530	0.723	0.515	0.802	0.643
	Little Tatsamenie	0.238	0.042	0.125	0.198	0.151
32	Kuthai	0.000	0.019	0.002	0.000	0.005
	Little Trapper	0.020	0.202	0.152		0.125
	Mainstem	0.630	0.779	0.607	0.770	0.697
	Little Tatsamenie	0.350	0.000	0.239	0.230	0.205
33	Kuthai	0.028	0.009	0.012	0.000	0.012
	Little Trapper	0.032	0.053	0.184		0.090
	Mainstem	0.565	0.185	0.619	0.916	0.571
	Little Tatsamenie	0.375	0.753	0.185	0.084	0.349
34	Kuthai		0.000	0.009	0.000	0.003
	Little Trapper		0.000	0.096		0.048
	Mainstem		0.951	0.814	0.830	0.865
	Little Tatsamenie		0.049	0.081	0.170	0.100
35	Kuthai			0.012		0.012
	Little Trapper			0.086		0.086
	Mainstem			0.769		0.769
	Little Tatsamenie			0.133		0.133

[a] Averages do not include 1989 because the Trapper and Mainstem groups were combined.

Appendix E.1. Differences between inseason and postseason stock composition estimates for Alaskan District 111 sockeye catches, 1989.

Stat. Week	Stock Group	Proportions In Season	Proportions Post Season	Proportions Change	Catches In Season	Catches Post Season	Catches Change
6/18-6/24 Week 25	Kuthai	0.526	0.493	-0.033	3,219	3,014	-205
	Trapper/Mainstem	0.450	0.431	-0.019	2,754	2,636	-118
	L. Tatsamenie	0.021	0.020	-0.001	128	120	-8
	Crescent	0.000	0.016	0.016	0	99	99
	Speel	0.004	0.041	0.037	24	250	226
6/25-7/01 Week 26	Kuthai	0.132	0.159	0.027	936	1,125	189
	Trapper/Mainstem	0.794	0.743	-0.051	5,632	5,267	-365
	L. Tatsamenie	0.071	0.088	0.017	504	626	122
	Crescent	0.004	0.000	-0.004	28	0	-28
	Speel	0.000	0.011	0.011	0	75	75
7/02-7/08 Week 27	Kuthai	0.105	0.085	-0.020	1,090	880	-210
	Trapper/Mainstem	0.851	0.805	-0.046	8,832	8,353	-479
	L. Tatsamenie	0.008	0.089	0.081	83	923	840
	Crescent	0.022	0.000	-0.022	228	0	-228
	Speel	0.015	0.021	0.006	156	222	66
7/09-7/15 Week 28	Kuthai	0.001	0.013	0.012	17	219	202
	Trapper/Mainstem	0.944	0.755	-0.189	16,374	13,103	-3,271
	L. Tatsamenie	0.045	0.083	0.038	781	1,448	667
	Crescent	0.009	0.063	0.054	156	1,090	934
	Speel	0.000	0.086	0.086	0	1,485	1,485
7/16-7/22 Week 29	Kuthai	0.007	0.012	0.005	105	181	76
	Trapper/Mainstem	0.905	0.663	-0.242	13,569	9,944	-3,625
	L. Tatsamenie	0.056	0.159	0.103	840	2,390	1,550
	Crescent	0.000	0.049	0.049	0	741	741
	Speel	0.032	0.116	0.084	480	1,737	1,257
7/23-7/29 Week 30	Kuthai	0.011	0.014	0.003	88	112	24
	Trapper/Mainstem	0.938	0.329	-0.609	7,534	2,643	-4,891
	L. Tatsamenie	0.051	0.298	0.247	410	2,391	1,981
	Crescent	0.000	0.062	0.062	0	498	498
	Speel	0.000	0.297	0.297	0	2,388	2,388
7/30-8/05 Week 31	Kuthai	0.016	0.021	0.005	64	83	19
	Trapper/Mainstem	0.805	0.261	-0.544	3,201	1,037	-2,164
	L. Tatsamenie	0.110	0.399	0.289	437	1,586	1,149
	Crescent	0.068	0.134	0.066	270	531	261
	Speel	0.001	0.186	0.185	4	739	735
8/06-8/12 Week 32	Kuthai	0.000	0.000	0.000	0	1	1
	Trapper/Mainstem	0.843	0.572	-0.271	2,123	1,440	-683
	L. Tatsamenie	0.086	0.347	0.261	217	873	656
	Crescent	0.072	0.061	-0.011	181	153	-28
	Speel	0.000	0.020	0.020	0	51	51
8/13-8/19 Week 33	Kuthai	0.012	0.023	0.011	43	81	38
	Trapper/Mainstem	0.681	0.323	-0.358	2,428	1,150	-1,278
	L. Tatsamenie	0.070	0.331	0.261	250	1,179	929
	Crescent	0.237	0.190	-0.047	845	677	-168
	Speel	0.000	0.134	0.134	0	478	478
Fishery Totals	Kuthai	0.076	0.077	0.001	5,625	5,696	71
	Trapper/Mainstem	0.843	0.616	-0.227	62,398	45,573	-16,825
	L. Tatsamenie	0.049	0.156	0.107	3,627	11,536	7,909
	Crescent	0.023	0.051	0.028	1,702	3,789	2,087
	Speel	0.009	0.100	0.091	666	7,425	6,759

Appendix E.2. Differences between inseason and postseason estimates of Taku River and Port Snettisham stocks in Alaskan District 111 sockeye catches, 1989.

		Proportions			Catches		
Stat. Week	Stock Group	In Season	Post Season	Change	In Season	Post Season	Change
6/18-6/24	Taku River	0.997	0.943	-0.054	6,101	5,770	-331
Week 25	Port Snettisham	0.004	0.057	0.053	24	349	325
6/25-7/01	Taku River	0.997	0.989	-0.008	7,072	7,018	-54
Week 26	Port Snettisham	0.004	0.011	0.007	28	75	47
7/02-7/08	Taku River	0.964	0.979	0.015	10,004	10,156	152
Week 27	Port Snettisham	0.037	0.021	-0.016	384	222	-162
7/09-7/15	Taku River	0.990	0.852	-0.138	17,172	14,770	-2,402
Week 28	Port Snettisham	0.009	0.148	0.139	156	2,575	2,419
7/16-7/22	Taku River	0.968	0.835	-0.133	14,513	12,515	-1,998
Week 29	Port Snettisham	0.032	0.165	0.133	480	2,478	1,998
7/23-7/29	Taku River	1.000	0.641	-0.359	8,032	5,146	-2,886
Week 30	Port Snettisham	0.000	0.359	0.359	0	2,886	2,886
7/30-8/05	Taku River	0.931	0.681	-0.250	3,702	2,706	-996
Week 31	Port Snettisham	0.069	0.319	0.250	274	1,270	996
8/06-8/12	Taku River	0.929	0.919	-0.010	2,339	2,314	-25
Week 32	Port Snettisham	0.072	0.081	0.009	181	204	23
8/13-8/19	Taku River	0.763	0.676	-0.087	2,720	2,410	-310
Week 33	Port Snettisham	0.237	0.324	0.087	845	1,155	310
Fishery	Taku River	0.915	0.823	-0.092	67,727	60,898	-6,829
Totals	Port Snettisham	0.009	0.100	0.091	666	7,425	6,759

Appendix E.3. Log-likelihood (G) values for a comparison of weekly inseason and postseason stock composition estimates for Alaskan District 111 drift gillnet sockeye harvest, 1989.

Date and Week	Estimate	Kuthai	Trapper/ Mainstem	Tatsamenie	Crescent	Speel	Total	G
		Stock Grouping						
6/18-6/24	In	81	69	4	1	2	157	
Week 25	Post	96	84	5	4	9	198	
	Total	177	153	9	5	11	355	4.857
6/25-7/01	In	20	116	11	2	1	150	
Week 26	Post	30	138	17	1	3	189	
	Total	50	254	28	3	4	339	2.107
7/02-7/08	In	15	114	2	4	3	138	
Week 27	Post	16	148	17	1	5	187	
	Total	31	262	19	5	8	325	13.027
7/09-7/15	In	1	127	7	2	1	138	
Week 28	Post	3	127	15	12	15	172	
	Total	4	254	22	14	16	310	22.911
7/16-7/22	In	2	130	9	1	6	148	
Week 29	Post	3	119	29	10	22	183	
	Total	5	249	38	11	28	331	26.322
7/23-7/29	In	3	153	9	1	1	167	
Week 30	Post	4	64	58	13	58	197	
	Total	7	217	67	14	59	364	159.140
7/30-8/05	In	3	120	17	11	1	152	
Week 31	Post	5	46	69	24	33	177	
	Total	8	166	86	35	34	329	109.548
8/06-8/12	In	1	116	13	11	1	142	
Week 32	Post	1	83	51	10	4	149	
	Total	2	199	64	21	5	291	31.425
8/13-8/19	In	3	89	10	32	1	135	
Week 33	Post	5	64	65	38	27	199	
	Total	8	153	75	70	28	334	68.043
	In	120	1,025	73	56	8	1,282	
Totals [a]	Post	154	864	317	104	167	1,606	
	Total	274	1,889	390	160	175	2,888	338.386

[a] Totals are for weighted weekly samples and thus are not direct sums of weekly samples.