STOCK COMPOSITIONS OF SOCKEYE SALMON CATCHES IN SOUTHEAST ALASKA'S DISTRICTS 106 & 108 AND IN THE STIKINE RIVER, 1988 ESTIMATED WITH SCALE PATTERN ANALYSIS

By

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Regional Information Report No.[1] 1J89-44

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

September 1989

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ACKNOWLEDGEMENTS

We are grateful to personnel of the Port Sampling Project of the Division of Commercial Fisheries, Southeast Region, Alaska Department of Fish and Game and to personnel of the Canadian Department of Fisheries and Oceans for their assistance in gathering samples from catches and escapements. In particular, we would like to thank Ben Van Alen, Brian Lynch, Cathy Robinson, and Lane Johnson of ADF&G Commercial Fisheries and Sandy Johnson and Peter Etherton of CDFO for their smooth coordination of sampling efforts. We gratefully acknowledge the efforts of Renate Riffe for aging scales and of Scott McPherson for scale aging consultations and for age composition analysis of the commercial catches.

PROJECT SPONSORSHIP

This investigation was partially financed with Anadromous Fish Conservation Act (P.L. 89-304 as amended) funds under Project No. AFC-72 and with U.S./Canada Pacific Salmon Treaty funds, under Cooperative Agreement NA-88-ABH-00045.

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ABSTRACT

Linear discriminant function analysis of scale patterns was used to estimate the 1988 sockeye salmon (*Onchorynchus nerka*) stock compositions in the commercial gill net fisheries in Southeast Alaska's Districts 106 and 108, in the Stikine River test fishery, and in the Canadian lower river commercial fishery. Contributions of the Alaska I, Alaska II, Canadian Nass/Skeena, Tahltan, and non-Tahltan Stikine stock groups to Alaska's District 106 and 108 fisheries were estimated to be 45,599, 35,534, 9,832, 2,035, and 775 sockeye salmon, respectively. The commercial fishery stock specific weekly CPUE is an indicator of migratory timing. The CPUE in District 106 was greatest in early to mid-July for the Alaska I, Alaska II, and Nass/Skeena stock groups and late June-early July for the Tahltan stock group. The catch of non-Tahltan Stikine stock group was too small to be used to estimate migratory timing. Canada's Stikine River commercial and food fishery catches were estimated to be 4,336 Tahltan and 10,955 non-Tahltan Stikine fish, while estimated escapements were 2,536 Tahltan and 15,211 non-Tahltan Stikine fish. The 1988 Stikine River sockeye run was estimated to be 35,848 fish. An additional 407 Tahltan and 839 non-Tahltan Stikine sockeye salmon were caught in inriver test fisheries and 138 Tahltan and 374 non-Tahltan Stikine sockeye salmon in District test fisheries. Tahltan stocks contributed more than 70% of the weekly Canadian commercial catch through July 2, while the non-Tahltan Stikine stocks contributed more than 80% of the weekly catch after July 17.

Key words: sockeye salmon, linear discriminant function, scale pattern analysis, stock composition, transboundary, migratory timing, in-season analysis, Stikine sockeye, Tahltan, non-Tahltan Stikine, *Oncorhynchus nerka*

INTRODUCTION

Sockeye salmon (*Oncorhynchus nerka*) are harvested in marine net fisheries throughout Southeast Alaska and northern British Columbia. Drift gill net fisheries in Alaska's commercial fishing Districts 106 and 108 harvest sockeye salmon of Alaskan origin, but also catch some sockeye salmon of transboundary Stikine River origin and some fish destined to spawn in the Nass and Skeena Rivers of Canada. Interception of salmon bound for one country's rivers as they migrate through the territorial waters of the other country has become a research and management concern in recent years with the implementation of the U.S./Canada Pacific Salmon Treaty. Cooperative international management of Stikine River sockeye salmon is mandated by this treaty under Annex IV, Chapter 1. Knowledge and control of stock-specific harvest is, therefore, needed to fulfill requirements of and assess compliance with the harvest sharing guidelines outlined in the treaty.

Objectives

The purpose of this study is to determine the contributions of major sockeye stock groups to: (1) gill net fisheries in Alaska's Subdistricts 106-41 and 106-30 and District 108, (2) Canada's commercial fisheries in the Stikine River, and (3) the Stikine River test fishery. This study provides in-season information on the abundances of local sockeye stocks that is used by managers in making harvest level decisions. Postseasonally it provides revised stock compositions which are used to finalize stock specific harvest estimates. An estimate of the total Stikine River sockeye run is derived from data analyzed in this study. Estimation of the interception rates and relative abundance of Stikine River sockeye salmon is of major importance in helping managers from the Alaska Department of Fish and Game (ADF&G) and the Canadian Department of Fisheries and Oceans (CDFO) implement treaty guidelines.

Study Area

Sockeye salmon harvested in the Districts 106 and 108 commercial fisheries originate from lake systems and their tributaries throughout Southeast Alaska, from the sloughs and lakes of the transboundary Stikine River, and from the Canadian Nass and Skeena Rivers (Figure 1). Tagging studies have shown that few stocks from other than the above areas pass through District 106 (Steve Hoffman, Alaska Department of Fish and Game, personal communication). In the above studies adult sockeye salmon were tagged in 1982 and 1983 in several Alaskan and Canadian fishing districts to determine migratory pathways and interception rates of various stocks. The majority of terminal area recoveries from fish tagged in District 106 occurred along the northeast coast of Prince of Wales Island and upper Behm Canal. Tags applied in this district were also recovered in Alaskan systems as far south as the U.S./Canada border, and in the Stikine, Nass, and Skeena Rivers. There were few or no recoveries of tags applied in more southern districts in either the northern Prince of Wales Island lake systems or the Stikine River.

Numerous sockeye salmon producing lakes are scattered throughout the achipelago and mainland of Southeast Alaska. They range in size from small lakes of a few hectares to large systems greater than 500 hectares (e.g., McDonald and Klawock Lakes) and include multi-lake systems like the Sarkar and Galea-Sweetwater complexes

(Figure 2). Sockeye salmon production is limited by the quantity and quality of spawning areas, the available rearing area, or other environmental conditions as well as the number of spawners. Sockeye productivity varies greatly, even among systems of roughly equivalent size (McGregor 1983; McGregor et al. 1984; McGregor and McPherson 1985; McPherson and McGregor 1986; and McPherson et al. 1988a, 1988b). Typical small systems, such as Alecks and Kutlaku Lakes on Kuiu Island, produce estimated runs of a few thousand fish. While total run size is not known escapements in two intermediate systems, which had enumeration weirs, Karta Lake on eastern Prince of Wales Island and Salmon Bay Lake on northeast Prince of Wales Island averaged 18,426 and 18,040 sockeye salmon (1982 to 1988, excluding 1984 when the weirs were not installed). The single largest producer of sockeye salmon in recent years in southern Southeast Alaska has been McDonald Lake, located in upper Behm Canal. Escapements to this system have ranged from 56,000 in 1983 to 175,000 in 1987 and averaged 113,500 (1981 to 1988, excluding 1982 when the weir washed out).

The Stikine River is a transboundary river that originates in British Columbia, crosses the Alaskan panhandle, and flows into Frederick Sound north of Wrangell. Approximately 90% of the river system is inaccessible to anadromous fish due to natural barriers and velocity blocks. The majority of the accessible sockeye spawning habitat is located above the U.S./Canada border. The largest single contributor to the Stikine River sockeye run is the Tahltan Lake group, hereafter referred to as Tahltan. This system has a weir and sockeye escapement counts have ranged from 1,800 fish in 1963 to 67,300 fish in 1985 and averaged 19,954 (1959 to 1988, excluding 1962 when the weir installation date was unspecified and 1965 when a large slide hindered access into the lake) (TTC 1989). The remainder of the Stikine River sockeye stocks (the non-Tahltan Stikine stock group), spawn in small lakes, sloughs, and side channels of the mainstem river and its tributaries, most of which are glacially occluded. Non-Tahltan Stikine sockeye escapement estimates have ranged from 13,400 in 1979 to 63,000 in 1985 and averaged 32,200 (1979 to 1988). A Canadian subsistence fishery operating near Telegraph Creek has harvested a yearly average of 3,445 fish (1972 to 1988) (TTC 1989). Canadian commercial fisheries on the upper and lower portions of the river have harvested an average of 628 and 14,917 sockeye salmon, respectively (1980 to 1988, excluding 1984 when both were closed).

The Nass and Skeena Rivers also contribute substantial numbers of sockeye salmon to the District 106 and 108 harvests in some years. The Nass River originates in British Columbia and drains into Portland Canal, just south of the U.S./Canada border. Estimated sockeye escapements to this system have averaged 218,805 from 1980 to 1988. The Skeena River also originates in British Columbia and drains into the ocean about 50 km south of the Nass River. Estimated sockeye escapements have averaged 1,186,803 from 1980 to 1988 (CDFO 1986; TCNB 1988).

Stock Separation Studies

The United States and Canada initiated research programs in 1982 to assess the feasibility of various stock separation techniques applicable to sockeye salmon stocks harvested by both countries. Several methods of stock separation have been used, including; the incidence of the parasite *Myxobolus neurobius*, differences in genotypes, adult tagging studies, and scale pattern analysis. Of these, scale pattern analysis has been used most extensively to determine stock composition of the harvests in Alaskan mixed stock commercial fisheries (Oliver et al. 1984; Oliver and Walls 1985; Oliver and Jensen 1986; Jensen and Frank 1988; Jensen et al. 1989).

Scale pattern analysis has proven highly successful in determining the contribution rates of sockeye stocks to Southeast Alaska's commercial fisheries because of significant and persistent differences in the freshwater and early marine growth among stocks originating in various Alaskan and Canadian systems. The original stock groupings used by ADF&G were the Alaska group (comprised of samples taken from 22 to 28 Alaska escapements), Nass/Skeena group (comprised of samples taken from inriver test fisheries on the Nass and Skeena Rivers), and Stikine River group (comprised of scale samples collected from the Canadian inriver commercial fishery). The stock groupings were expanded in 1983 by creating separate standards for the Tahltan Lake escapement and for the non-Tahltan Stikine escapement (samples from mainstem river and side slough spawners and Chutine, Skud, and Iskut River spawners). Standards were further refined in 1986 to separate two distinct Alaska patterns (Alaska I, typified by Salmon Bay and Hugh Smith Lake patterns and Alaska II, typified by the McDonald Lake pattern).

MATERIALS AND METHODS

Collection and Preparation of Scale Samples

One to three scales were taken from each of 700 sockeye salmon randomly sampled from the commercial catches in Alaska's Subdistricts 106-41 and 106-30 and District 108 during each week the fisheries were open. Scale samples from the Stikine River test fishery and from the Canadian commercial catch were collected by CDFO personnel. Stock group standards used in postseason analysis were developed from scales sampled from 1988 escapements. Approximately 500 scales were collected from each of 19 lake systems throughout Southeast Alaska (Figure 2), 850 scales at the Tahltan weir (Figure 3), 450 from non-Tahltan Stikine escapements, and approximately 1000 to 1500 from each test fishery operating in the lower reaches of the Nass and Skeena Rivers (Figure 1). The standards used in the in-season analysis were developed from scales collected in the same areas in 1987.

Scales were taken from the left side of each fish approximately two rows above the lateral line along a diagonal line between the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963). Scales of salmon fry develop first 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).

Age Determination and Measurement of the Scales

A sampling goal of scales from 700 fish per district per week was established for the age composition estimation. Individual fish ages were determined from scale images magnified 70X on a microfiche reader and were recorded in European notation. The sample size used for the scale pattern analysis varied on a weekly basis and was dependent on age composition. Generally scales from 100 age-1.3 fish and as many scales as possible (up to 100) from each of the age-1.2, -2.2, and -2.3 groups were analyzed for each district or subdistrict and week. 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 a microcomputer-controlled digitizing system with fortran programs.

Previous studies have established that 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). This axis is approximately 20° dorsal or ventral from the anterior-posterior axis, and all circuli counts and scale measurements in the lacustrine and first year marine zone were made along it. Marshall et al. (1984) established the separability of major stock groups by measurements in three (or four) zones: (1) the scale center to the last circulus of the first freshwater annulus, (2) when present, the first circuli of the second year of freshwater growth to the end of the second freshwater annulus, (3) the plus growth or scale growth after the last freshwater annulus and before the first marine circulus (Mosher 1968), and (4) the first year marine growth (i.e. the first marine circulus to the end of the first marine annulus)(Figure 4). A total of 74 variables, including circuli counts, incremental distances, and ratios and/or combinations of the measured variables are calculated for samples with a single freshwater annular zone and 106 variables for samples with two freshwater annular zones.

Analytical Procedures

The ability to differentiate salmon stocks based on scale patterns depends upon the degree of difference in the scale characters among stocks (Marshall et al. 1987). Linear discriminant function (LDF) analysis of scale patterns has been used to estimate stock contribution to southern Southeast Alaska mixed stock sockeye salmon fisheries since 1982 (Oliver et al. 1984; Oliver and Walls 1985; Oliver and Jensen 1986; Jensen and Frank 1988; Jensen et al. 1989).

LDF is a multivariate technique that is used 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 provide a set of measurements used to define these rules. A sample of p selected scale variables from a number of salmon stocks or stock groups defines a single region in *p-space* characteristic of that group of fish. Based on probability theory, the established regions in *p-space* are uniquely defined or separated by decision surfaces. A sockeye salmon harvested in a mixed stock fishery may be classified according to which region its *p-tuple* occupies. The accuracy of classification depends upon the precision with which the regions defining each stock or group are described and the inherent separation between them. The LDF is the linear combination of p observed variables which maximizes the between-group variance relative to the within-group variance (Fisher 1936).

The major assumptions underlying LDF analysis are: (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 from each other. 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 discrete distributions, however, it is not robust for continuous non-Gaussian parent distributions (Lachenbruch et al. 1973; Krzanowski 1977).

The 2 to 10 scale variables to be used in the LDF are selected from among 106 variables using a stepwise regression procedure (Enslein et al. 1977). In this process variables are added until the partial F-statistic of each variable not yet entered into the model is less than 4.00. An almost unbiased estimate of classification accuracy for each LDF was determined using a leaving-one-out procedure (Lachenbruch 1967). One sample is "left-out", the discriminant rule is estimated, and the "left-out" sample is classified using the discriminant rule and checked to see if it was classified correctly. This procedure is repeated for all samples. Thus, when an LDF is run using the leaving-one-out procedure, a classification matrix is developed which gives the proportion of correctly identified fish and the proportion of missclasification of each stock to each of the other stocks.

When more than two stock groups are being analyzed, the stepwise regression procedure does not always result in maximum classification accuracies or the most balanced classification matrix. Frequently, well-separated groups are separated even further, while poorly separated groups remain poorly separated (Habbema and Hermans 1977). Scale variables that provided the best discrimination between the groups (high F value) 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 estimates of stock composition proportions 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 composition sample are classified with the LDF. The vector of estimates for each stock or stock group is multiplied by the 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 adjusted estimated proportions for a stock group were less than zero, the entire catch sample was reclassified with a model excluding 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 proportion vector are determined from the multinomial probability distribution. These two variance-covariance matrices are combined to give variances and covariances for the adjusted estimates of stock proportions. The variances for the proportions of each stock are the diagonal elements of this combined matrix, i.e. they are an additive combination of: (1) the sampling variation in estimation of the probability of assignment of the known stock group, and (2) the sampling variation in estimation of the assignment composition of the mixed stock group.

Developing Standards

The four major age groups (1.2, 1.3, 2.2, and 2.3) have generally contributed more than 98% of the catch in Districts 106 and 108. Standards were developed for each age class for the Alaska I, Alaska II, and Nass/Skeena groups and for age-1.2, -1.3, and -2.3 fish for the Tahltan group. Non-Tahltan Stikine standards were developed for age-1.2 and -1.3 fish only. Standards were not developed for age classes which contributed only a minor fraction of the escapement for a given stock or stock group since insufficient scales were available to build them. Age-specific models, where standards from age-1.3 fish were used to classify catches of age-1.3 fish, were used in the analysis to: (1) account for differences in age composition among stocks, (2) remove potential bias due to differences in migratory timing of different age fish, and (3) eliminate the effect of different environmental conditions on the scale patterns of different age fish.

Classification of Catches

Commercial catches were analyzed in-season with standards developed from the previous year's escapements. Stock contributions for the Subdistrict 106-41 and 106-30 and the District 108 commercial harvests were estimated and summaries provided to managers within 48 h of the fishery closures from mid-June through early August. Three of the four major age groups (1.2, 1.3, and 2.3) were analyzed; the fourth, age-2.2, comprised primarily of the Alaska I and Nass/Skeena stocks was not digitized in-season due to time constraints. Stock compositions for the Canadian commercial catches on the Stikine River were also estimated in-season, however, there was a 3- to 5- d lag between fishery closures and catch analyses due to logistical difficulties in receiving the data. The commercial catches were reclassified postseasonally with standards built from the 1988 escapements. Commercial catches which had occurred after the cessation of the in-season analysis and catches from the Stikine River test fishery were also classified postseasonally.

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's sample. The proportion of each stock in a week's catch sample was expanded to the week's catch by:

$$C_{ijt} = C_t * P_{it} * S_{ijt} \quad (1)$$

where:

C_{ijt} = Catch of fish of age i and group j in time period t

C_t = total catch in time period t,

P_{it} = estimated proportion of fish of age i in the catch in time period t, and

S_{ijt} = proportion of fish of age i and group j in the catch in time period t estimated with LDF.

The stock apportionment of the minor age groups not classified with LDF assumes that the proportion of the minor ages belonging to any given stock is equal to the combined proportion of all LDF classified age classes:

$$C_{mjt} = C_t * P_{mt} * S_{.jt} \quad (2)$$

where:

C_{mjt} = estimated catch of fish of minor age classes of group j in time period t and

P_{mt} = estimated proportion of fish of minor age groups in the catch in time period t.

$S_{.jt}$ = proportion of fish in all age classes in group j in the catch in time period t estimated with LDF.

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 are 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 is a minimum estimate of variance since it does not include any variance associated with the age classes not classified with LDF, any variance for stocks contributing no fish during a given week, nor any estimator of aging errors.

Variances of the proportions of stock contributions were calculated by

$$V(P_j) = P_j^{\,2} * \left(\frac{V(C_j)}{C_j^2} + \frac{V(C.)}{C.^2}\right) \tag{3}$$

where:

P_j = Proportion of stock j or C_j/C.

The postseason classifications of the Stikine River commercial and test fishery catches were run with 2-way Tahltan versus non-Tahltan Stikine models for age-1.2, -1.3, -2.2, and -2.3 fish. All age-0. fish were assumed to be of non-Tahltan Stikine origin since no age-0. fish have been found in samples from Tahltan weir.

Estimation of the Stikine River Sockeye Run

The weir counts at Tahltan weir added to the number of Tahltan fish in the inriver sockeye salmon catches were used to estimate the total inriver run of Tahltan fish. A drift and set gill net inriver test fishery, operated by CDFO and ADF&G personnel, was located just above the U.S./Canada border (Figure 3). The CPUE of the drift gill net test fishery was used to estimate migratory timing, while stock composition was estimated from the combined catches of the drift and set test nets. The magnitude of the inriver run of the non-Tahltan Stikine stock group was estimated by multiplying the inriver run of Tahltan fish by the proportion of non-Tahltan fish in the test fish catch and dividing the sum by the proportion of Tahltan fish in the test fishery catch:

$$R_{1\cdot} = \frac{R_{2\cdot} * P'_{1\cdot}}{P'_{2\cdot}} \tag{4}$$

where:

$R_{1\cdot}$ = run size of non-Tahltan Stikine fish past the Canadian inriver test fishery,

$R_{2\cdot}$ = run size of Tahltan fish past the Canadian inriver test fishery,

$P'_{1\cdot}$ = adjusted proportion of non-Tahltan Stikine fish in the season's test fishery catch, and

$P'_{2\cdot}$ = adjusted proportion of Tahltan fish in the season's test fishery catch. note $P'_{2\cdot} = 1 - P'_{1\cdot}$

and:

$$P'_{jt} = P_{jt} * \frac{C_t}{\sum_{t=1}^{N} C_t} \quad (5)$$

where:

P'_{jt} = adjusted proportion of total sockeye run belonging to stock j and occurring in week t,

P_{jt} = proportion of stock j in week t from test fishery catch analysis,

C_t = CPUE from test fishery in week t, and

N = number of weeks in fishing season.

The test fishery effort was standardized to 60 drifts per week in all weeks and the catch extrapolated to that level.

Comparison of In- and Postseason Estimates

Adjusted in-season and postseason weekly stock composition estimates for Subdistricts 106-41 and 106-30, District 108, and for the Stikine River were compared to test whether the in-season estimates differed significantly from the postseason estimates for each fishery. The actual numbers of fish in the sample which were classified to each group in the in-season analysis were compared to those in the postseason analysis. Only the ages done in-season were compared; however, in some weeks time was insufficient to digitize a full sample in-season and thus, the number of fish used in the postseason analysis was larger than that used in-season. Data was set up in a standard contingency table format and tested with the G statistic (log-likelihood ratio test) (Zar 1984).

RESULTS

The stock compositions of the sockeye salmon caught in Subdistricts 106-41 and 106-30, in District 108, and in the Stikine River were estimated from mid-June through late August (statistical weeks 26-35). Of the 93,775 sockeye salmon harvested in Districts 106 and 108, 49% were of Alaska I origin, 38% of Alaska II, 10% of Nass/Skeena, 2% of Tahltan, and 1% of non-Tahltan Stikine origin (Appendix A). Of the Canadian lower Stikine

River commercial catch of 12,766 sockeye salmon (TTC 1989) 16% were of Tahltan and 84% were of non-Tahltan Stikine origin (Appendix B).

Stock Composition of the Subdistrict 106-30 Catch

Stock composition by age-class was estimated for the Subdistrict 106-30 sockeye harvest (Appendix A.1). Of the 35,192 sockeye salmon harvested in the drift gill net fishery in 1988, 88.4% were of Alaska I and Alaska II origin, 9.5% were of Nass/Skeena origin, and 2.1% were of transboundary Stikine River origin. The peak harvests of all five stock groups occurred in mid-July (statistical week 29). The Alaska I stock group dominated the catch during June and early July with greater than 65% of the catch and remained more than 39% of the catch throughout the season. The Alaska II group dominated the catch from early July through early August. The Nass/Skeena group contributed less than 10% of the catch prior to early August after which it comprised 25% of the catch. Tahltan fish were not present after late July and no non-Tahltan Stikine fish were harvested.

Stock Composition of the Subdistrict 106-41 Catch

Of the 57,337 sockeye salmon harvested in the Subdistrict 106-41 drift gill net fishery in 1988, 86.8% were of Alaska I and Alaska II origin, 6,426 were of Nass/Skeena origin, and 1,135 were of transboundary Stikine River origin (combined from Appendix A.3). The peak harvests of Alaska I fish occurred in mid-July (statistical week 29) of Alaska II fish in mid-July and late July (weeks 29 and 31), of Nass/Skeena fish in mid-July (week 30) and of Tahltan fish in late June (week 27). Non-Tahltan Stikine fish were harvested only in early August (week 32). The Alaska I group dominated the catch throughout the season and contributed more than 50% of the total through mid July. The Alaska II group contributed more than 35% of the catch from mid-July through early August. The Nass/Skeena group was present in low to moderate abundance, 3 to 14% of the catch, through early August after which it contributed 44% of the catch. The Tahltan group was present in low numbers, less than 10% of the catch, through late July.

Stock Composition of the District 108 Catch

Of the 1,246 sockeye salmon harvested in the District 108 drift gill net fishery, 21.3% were of Alaska I and Alaska II origin, 3.9% were of Nass/Skeena origin, and 74.9% were of transboundary Stikine River origin (combined from Appendix A.5). The non-Tahltan Stikine group dominated the catch while the Tahltan group was the second most abundant stock group.

Stock Composition of the Stikine River Catches

Stock contributions were estimated by age-class for the Canadian commercial sockeye harvest in the lower Stikine River. The contributions of the Tahltan and non-Tahltan Stikine stock groups to the 12,766 (TTC 1989) drift and set gill net fishery harvest were estimated at 16.2% and 83.8%, respectively (Appendix B.1). Tahltan fish dominated the catch through early July (week 28) and non-Tahltan fish were predominate thereafter.

Of the 1,246 sockeye salmon caught in the Stikine River drift and set gill net test fishery an estimated 407 (32.7%) were of Tahltan and 839 (67.3%) were of non-Tahltan Stikine origin (Appendix B.3).

Stikine River Run Strength

Adjusted weekly proportions of Tahltan and non-Tahltan fish in the run were estimated using weekly proportions in the test fishery catch weighted by migratory timing determined from test fishery CPUE, as shown in equation (5). Summed over all weeks, this resulted in a total proportion of .208 Tahltan and .792 non-Tahltan fish in the inriver sockeye run (Appendix B.4). The total Canadian catch of Tahltan fish was 4,336 and the weir count for Tahltan escapement was 2,536 (TTC 1989), giving a Tahltan inriver run estimate of 6,872. These numbers, input into equation (4) provide an estimate of 26,166 for the non-Tahltan Stikine inriver sockeye run. The total sockeye salmon inriver run was therefore, 33,038 fish, which, combined with the catch of 2,810 Stikine River fish in Alaska's Districts 106 and 108 indicated a total Stikine River run of 35,848 sockeye salmon. The 407 Tahltan and 839 non-Tahltan Stikine sockeye salmon caught in the inriver test fishery and the 138 Tahltan and 374 non-Tahltan Stikine fish caught in the District test fisheries are not included in the above totals.

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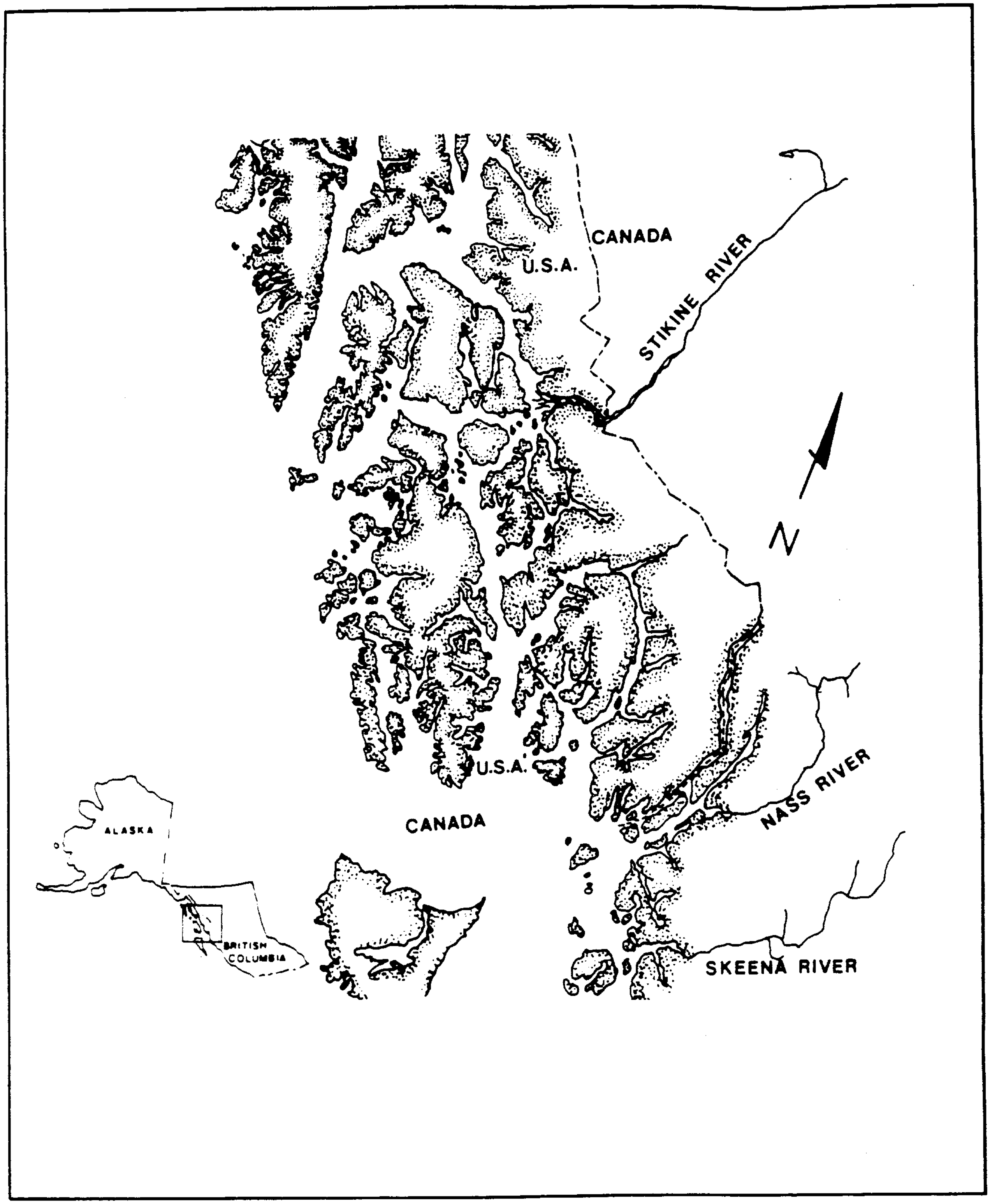

Figure 1. Southeast Alaska, northern British Columbia, and the transboundary Stikine River.

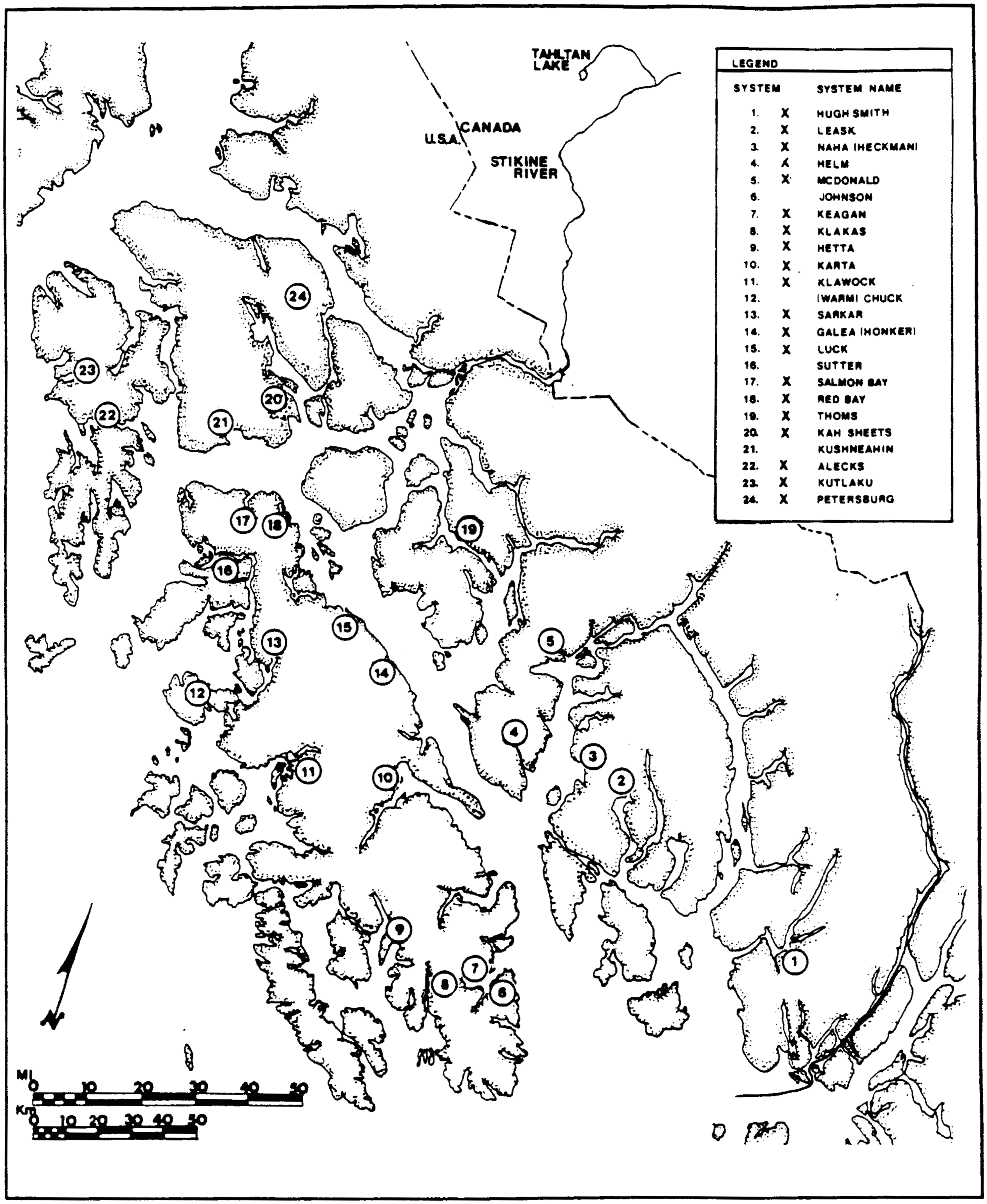

Figure 2. Major sockeye salmon systems of Southeast Alaska. Numbers identify major sockeye producing lakes where scale samples have been collected and x⁻indicates systems where scales were collected in 1988.

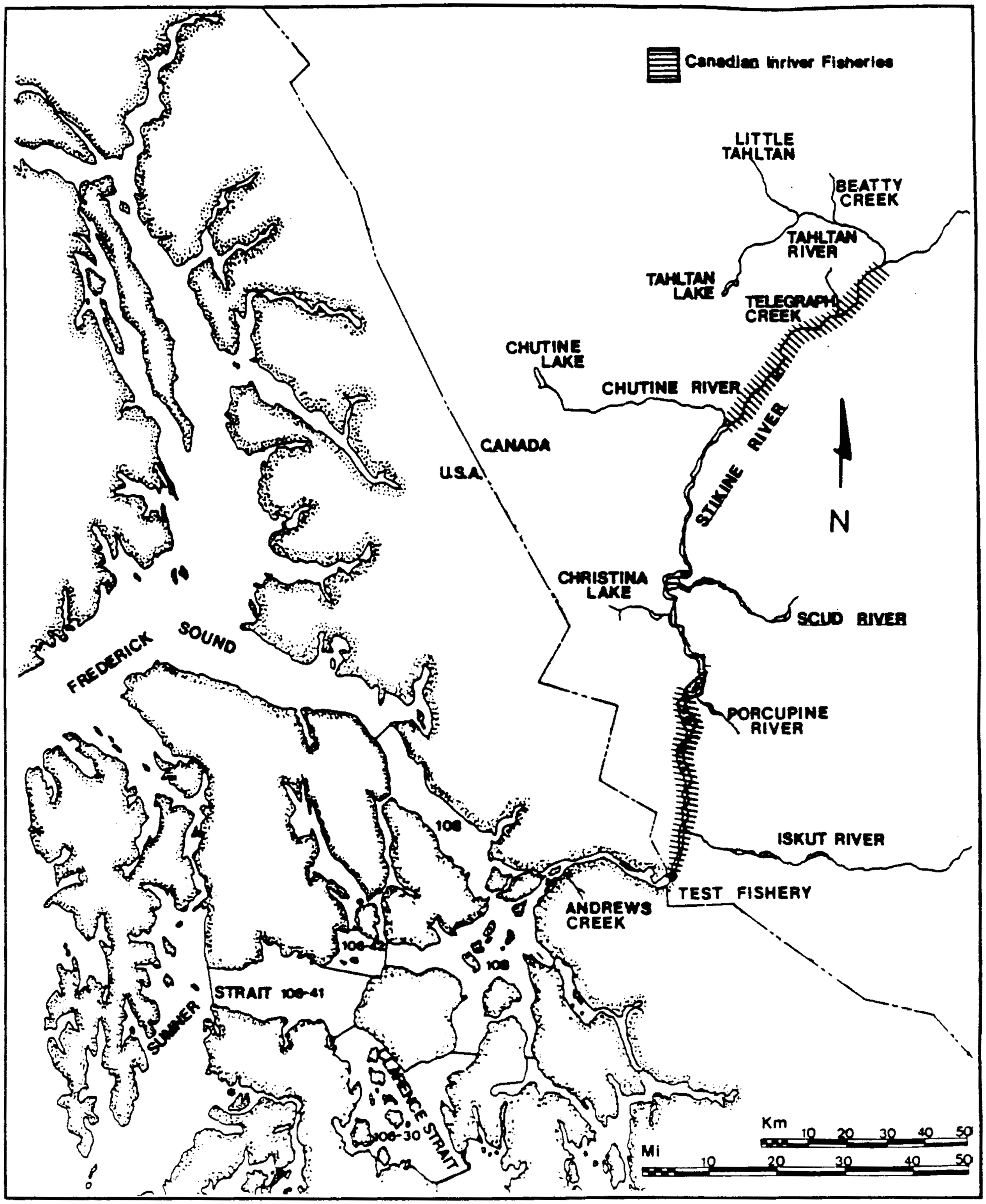

Figure 3. The transboundary Stikine River, major tributaries, and fishery areas.

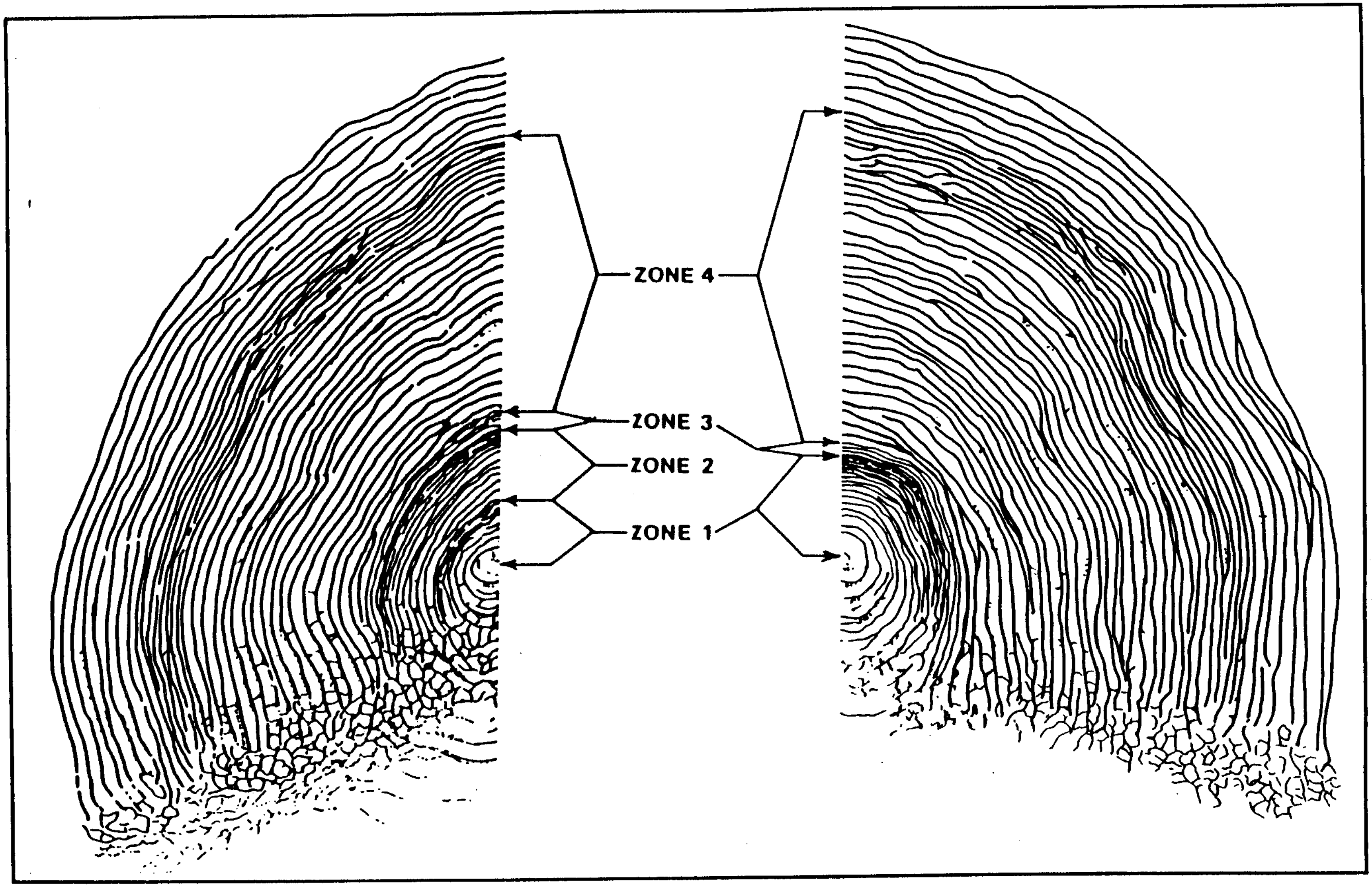

Figure 4. Typical scale for age-2. and -1. sockeye salmon with zones used for scale pattern analysis delineated.

APPENDICES

Appendix A.1. Estimated contributions of sockeye salmon stocks originating in Alaska and Canada to Alaska's Subdistrict 106-30 drift gill net fishery, 1988.

		Catch By Age Class								90% C.I. *	
Dates	Group	1.2	1.3	2.2	2.3	Other	Total	Percent	Standard Error	Lower	Upper
6/19-6/25	Ak. I	108	280	0	38	4	430	76.8	34.24	374	486
Week 26	Ak. II	0	38	69	0	1	108	19.3	34.39	51	165
	Nas/Ske	1	5	7	8	0	21	3.8	16.65	0	48
	Tahltan	0	0	0	1	0	1	0.2	2.54	0	5
	Stikine	0	0	0	0	0	0	0.0			
	Total	109	323	76	47	5	560				
6/26-7/02	Ak. I	536	1,515	0	182	25	2,258	81.8	86.72	2,115	2,401
Week 27	Ak. II	0	0	343	0	4	347	12.6	69.15	233	461
	Nas/Ske	4	0	33	40	1	78	2.8	67.89	0	190
	Tahltan	0	71	0	5	1	77	2.8	65.39	0	185
	Stikine	0	0	0	0	0	0	0.0			
	Total	540	1,586	376	227	31	2,760				
7/03-7/09	Ak. I	582	1,109	0	290	22	2,003	68.9	148.53	1,759	2,247
Week 28	Ak. II	0	129	413	145	7	694	23.9	153.39	442	946
	Nas/Ske	8	159	43	0	2	212	7.3	96.74	53	371
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	590	1,397	456	435	31	2,909				
7/10-7/16	Ak. I	1,354	1,885	0	642	32	3,913	39.9	479.02	3,125	4,701
Week 29	Ak. II	0	2,498	957	619	33	4,107	41.9	542.47	3,215	4,999
	Nas/Ske	144	935	219	0	11	1,309	13.4	404.86	643	1,975
	Tahltan	0	419	0	44	4	467	4.8	290.60	0	945
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,498	5,737	1,176	1,305	80	9,796				
7/17-7/23	Ak. I	1,258	1,138	457	233	27	3,113	39.5	403.01	2,450	3,776
Week 30	Ak. II	0	2,842	368	687	34	3,931	49.9	455.71	3,181	4,681
	Nas/Ske	271	358	0	0	5	634	8.1	274.51	182	1,086
	Tahltan	0	195	0	0	2	197	2.5	202.87	0	531
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,529	4,533	825	920	68	7,875				
7/24-7/30	Ak. I	754	355	129	79	13	1,330	42.2	147.75	1,087	1,573
Week 31	Ak. II	0	1,326	199	245	19	1,789	56.8	158.00	1,529	2,049
	Nas/Ske	23	10	0	0	0	33	1.0	76.19	0	158
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	777	1,691	328	324	32	3,152				
7/31-8/06	Ak. I	1,374	340	234	198	15	2,161	40.0	243.34	1,761	2,561
Week 32	Ak. II	0	2,192	344	312	20	2,868	53.1	250.18	2,456	3,280
	Nas/Ske	339	3	0	30	3	375	6.9	148.20	131	619
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,713	2,535	578	540	38	5,404				
8/07-9/03	Ak. I	741	287	200	121	14	1,363	49.8	126.50	1,155	1,571
Wks 33-36	Ak. II	0	295	287	88	7	677	24.7	130.14	463	891
	Nas/Ske	543	146	0	0	7	696	25.4	90.60	547	845
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,284	728	487	209	28	2,736				
	Ak. I	6,707	6,909	1,020	1,783	152	16,571	47.1	720.86	15,385	17,757
	Ak. II	0	9,320	2,980	2,096	125	14,521	41.3	793.44	13,216	15,826
Season	Nas/Ske	1,333	1,616	302	78	29	3,358	9.5	537.92	2,473	4,243
Totals	Tahltan	0	685	0	50	7	742	2.1	360.39	149	1,335
	Stikine	0	0	0	0	0	0	0.0			
	Total	8,040	18,530	4,302	4,007	313	35,192				

* The standard errors are minimum estimates since no estimates of the variance for stocks contributing 0 fish during a given week or for the 'other' age class are available. The 90% confidence intervals are affected in like manner.

Appendix A.2. Estimated CPUE and migratory timing of sockeye salmon stocks in Alaska's Subdistrict 106-30 commercial drift gill net fishery, 1988.

CPUE

Stat Week	Days Open	Average Number Boats	Catch per Boat Day Ak. I	Ak. II	Nas-Ske	Tahltan	Stikine	Total
26	2	9	24	6	1	0	0	31
27	2	30	38	6	1	1	0	46
28	2	31	32	11	3	0	0	47
29	3	31	42	44	14	5	0	105
30	2	55	28	36	6	2	0	72
31	2	41	16	22	0	0	0	38
32	2	40	27	36	5	0	0	68
33-36	4	41	8	4	4	0	0	17
Total			216	165	35	8	0	424

Migratory Timing

Stat Week	Proportion of Catch per Boat Day Ak. I	Ak. II	Nas-Ske	Tahltan	Stikine	Total
26	0.11	0.04	0.03	0.01	0.00	0.07
27	0.17	0.04	0.04	0.16	0.00	0.11
28	0.15	0.07	0.10	0.00	0.00	0.11
29	0.20	0.27	0.40	0.62	0.00	0.25
30	0.13	0.22	0.16	0.22	0.00	0.17
31	0.08	0.13	0.01	0.00	0.00	0.09
32	0.13	0.22	0.13	0.00	0.00	0.16
33-36	0.04	0.03	0.12	0.00	0.00	0.04
Total	1.00	1.00	1.00	1.00	0.00	1.00

Appendix A.3. Estimated contributions of sockeye salmon stocks originating in Alaska and Canada to Alaska's Subdistrict 106-41,42 drift gill net fishery, 1988.

		Catch By Age Class								90% C.I.*	
Dates	Group	1.2	1.3	2.2	2.3	Other	Total	Percent	Standard Error*	Lower	Upper
6/19-6/25	Ak. I	284	901	50	149	10	1,394	82.3	98.1	1,233	1,555
Week 26	Ak. II	0	39	62	0	1	102	6.0	88.8	0	248
	Nas/Ske	3	37	2	11	0	53	3.1	55.0	0	144
	Tahltan	8	117	0	18	1	144	8.5	21.0	110	178
	Stikine	0	0	0	0	0	0	0.0			
	Total	295	1,094	114	178	12	1,693				
6/26-7/02	Ak. I	1,036	2,802	11	108	104	4,061	70.6	334.1	3,511	4,611
Week 27	Ak. II	0	260	380	101	20	761	13.2	309.2	252	1,270
	Nas/Ske	141	170	198	0	14	523	9.1	194.9	202	844
	Tahltan	0	375	0	25	11	411	7.1	19.0	380	442
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,177	3,607	589	234	149	5,756				
7/03-7/09	Ak. I	1,070	2,416	0	320	93	3,899	66.3	297.0	3,411	4,387
Week 28	Ak. II	0	90	589	206	22	907	15.4	273.2	458	1,356
	Nas/Ske	61	520	156	21	19	777	13.2	228.8	401	1,153
	Tahltan	39	183	0	67	7	296	5.0	18.7	265	327
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,170	3,209	745	614	141	5,879				
7/10-7/16	Ak. I	2,928	3,898	294	251	151	7,522	50.4	829.0	6,158	8,886
Week 29	Ak. II	0	3,996	961	783	119	5,859	39.3	880.9	4,410	7,308
	Nas/Ske	399	845	31	75	28	1,378	9.2	550.4	473	2,283
	Tahltan	0	160	0	0	3	163	1.1	40.3	97	229
	Stikine	0	0	0	0	0	0	0.0			
	Total	3,327	8,899	1,286	1,109	301	14,922				
7/17-7/23	Ak. I	1,291	1,587	498	549	95	4,020	38.9	544.0	3,125	4,915
Week 30	Ak. II	0	3,734	146	866	114	4,860	47.0	621.2	3,838	5,882
	Nas/Ske	398	921	0	51	33	1,403	13.6	418.8	714	2,092
	Tahltan	0	25	0	31	1	57	0.6	147.1	0	299
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,689	6,267	644	1,497	243	10,340				
7/24-7/30	Ak. I	1,367	1,306	0	568	48	3,289	37.0	455.2	2,540	4,038
Week 31	Ak. II	286	3,770	952	104	74	5,186	58.3	502.5	4,359	6,013
	Nas/Ske	334	41	6	28	6	415	4.7	260.4	0	843
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,987	5,117	958	700	128	8,890				
7/31-8/06	Ak. I	1,964	977	577	181	24	3,723	53.2	364.0	3,124	4,322
Week 32	Ak. II	0	1,877	115	585	17	2,594	37.0	353.3	2,013	3,175
	Nas/Ske	613	0	0	6	4	623	8.9	167.1	348	898
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	64	0	0	0	64	0.9	316.7	0	585
	Total	2,577	2,918	692	772	45	7,004				
8/07-8/27	Ak. I	521	264	51	150	6	992	34.8	134.0	772	1,212
Wks 33-35	Ak. II	0	258	248	97	4	607	21.3	102.7	438	776
	Nas/Ske	1,022	216	7	2	7	1,254	44.0	112.7	1,069	1,439
	Tahltan	0	0	0	0	0	0	0.0			
	Stikine	0	0	0	0	0	0	0.0			
	Total	1,543	738	306	249	17	2,853				
	Ak. I	10,461	14,151	1,481	2,276	531	28,900	50.4	1245.1	26,852	30,948
	Ak. II	286	14,024	3,453	2,742	371	20,876	36.4	1314.4	18,714	23,038
Season	Nas/Ske	2,971	2,750	400	194	111	6,426	11.2	824.7	5,069	7,783
Totals	Tahltan	47	860	0	141	23	1,071	1.9	156.3	814	1,328
	Stikine	0	64	0	0	0	64	0.1	316.7	0	585
	Total	13,765	31,849	5,334	5,353	1,036	57,337				

* The standard errors are minimum estimates since no estimates of the variance for stocks contributing 0 fish during a given week or for the 'other' age class are available. The 90% confidence intervals are affected in like manner.

Appendix A.4. Estimated CPUE and migratory timing of sockeye salmon stocks in Alaska's Subdistrict 106-41,42 drift gill net fishery, 1988.

CPUE

Stat Week	Days Open	Average Number Boats	Catch per Boat Day					
			Ak. I	Ak. II	Nas/Ske	Tahltan	Stikine	Total
26	2	36	19	1	1	2	0	24
27	2	48	42	8	5	4	0	60
28	2	44	44	10	9	3	0	67
29	2	48	78	61	14	2	0	155
30	2	59	34	41	12	0	0	88
31	2	75	22	35	3	0	0	59
32	2	38	49	34	8	0	1	92
33-35	3	21	16	9	20	0	0	45
Total			305	200	72	12	1	589

Migratory Timing

Stat Week	Proportion of Catch per Boat Day					
	Ak. I	Ak. II	Nas/Ske	Tahltan	Stikine	Total
26	0.06	0.01	0.01	0.17	0.00	0.04
27	0.14	0.04	0.08	0.36	0.00	0.10
28	0.15	0.05	0.12	0.28	0.00	0.11
29	0.26	0.31	0.20	0.14	0.00	0.26
30	0.11	0.21	0.17	0.04	0.00	0.15
31	0.07	0.17	0.04	0.00	0.00	0.10
32	0.16	0.17	0.11	0.00	1.00	0.16
33-35	0.05	0.05	0.27	0.00	0.00	0.08
Total	1.00	1.00	1.00	1.00	1.00	1.00

Appendix A.5. Estimated contributions of sockeye salmon stocks originating in Alaska and Canada to Alaska's District 108 drift gill net fishery, 1988.

		Catch By Age Class									90% C.I.*	
Dates	Group	1.2	1.3	2.2	2.3	0.	Other	Total	Percent	Standard Error*	Lower	Upper
6/19-7/02	Ak. I	0	21	8	15	0	0	44	8.0	19.4	12	76
Wks 26-27	Ak. II	0	62	0	8	0	0	70	12.8	22.8	33	107
	Nas/Ske	22	2	1	0	0	0	25	4.6	24.4	0	65
	Tahltan	14	82	0	25	0	0	121	22.1	29.5	72	170
	Stikine	81	159	0	0	48	0	288	52.6	34.7		
	Total	117	326	9	48	48	0	548				
7/03-7/16	Ak. I	37	17	21	9	0	0	84	12.0	46.3	8	160
Wks 28-29	Ak. II	0	62	0	5	0	0	67	9.6	45.1	0	141
	Nas/Ske	13	8	2	0	0	0	23	3.3	36.7	0	83
	Tahltan	19	57	0	25	0	0	101	14.5	38.7	37	165
	Stikine	66	268	0	0	87	2	423	60.6	63.0		
	Total	135	412	23	39	87	2	698				
	Ak. I	37	38	29	24	0	0	128	10.3	44.5	55	201
	Ak. II	0	124	0	13	0	0	137	11.0	44.3	64	210
Season	Nas/Ske	35	10	3	0	0	0	48	3.9	40.4	0	114
Totals	Tahltan	33	139	0	50	0	0	222	17.8	44.2	149	295
	Stikine	147	427	0	0	135	2	711	57.1	65.5	603	819
	Total	252	738	32	87	135	2	1,246				

* The standard errors are minimum estimates since no estimates of the variance for stocks contributing 0 fish during a given week or for the 'other' age class are available. The 90% confidence intervals are affected in like manner.

Appendix A.6. Estimated CPUE and migratory timing of sockeye salmon stocks in Alaska's District 108 drift gill net fishery, 1988.

CPUE

Stat Week	Days Open	Average Number Boats	Catch per Boat Day Ak. I	Ak. II	Nas-Ske	Tahltan	Stikine	Total
26-27	4	8	1	2	1	4	10	18
28-29	4	7	3	3	1	4	16	27
Total			5	5	2	8	26	45

Migratory Timing

Stat Week	Proportion of Catch per Boat Day Ak. I	Ak. II	Nas-Ske	Tahltan	Stikine	Total
26-27	0.31	0.48	0.49	0.51	0.37	0.40
28-29	0.69	0.52	0.51	0.49	0.63	0.60
Total	1.00	1.00	1.00	1.00	1.00	1.00

Appendix B.1. Estimated contribution of sockeye salmon stocks of Tahltan and non-Tahltan origin to Canada's Stikine inriver commercial fishery, 1988.

		Catch by age class									90% C.I.[b]	
Dates	Group	1.2	1.3	2.2	2.3	0.	Other	Total[a]	Percent	Standard Error[b]	Lower	Upper
6/26-7/02	Tahltan	61	178	23	38	0	1	301	76.8	15.6	275	327
Week 27	non-Tahltan	14	49	0	11	17	0	91	23.2	15.1	66	116
	Total	75	227	23	49	17	1	392				
7/03-7/09	Tahltan	110	239	17	23	0	0	389	68.5	23.3	351	427
Week 28	non-Tahltan	38	86	12	4	39	0	179	31.5	22.6	142	216
	Total	148	325	29	27	39	0	568				
7/10-7/16	Tahltan	99	79	12	29	0	1	220	42.4	23.7	181	259
Week 29	non-Tahltan	67	163	8	6	54	1	299	57.6	23.8	260	338
	Total	166	242	20	35	54	2	519				
7/17-7/23	Tahltan	383	112	56	33	0	1	585	27.1	83.1	448	722
Week 30	non-Tahltan	369	852	89	82	175	4	1,571	72.9	85.1	1,431	1,711
	Total	752	964	145	115	175	5	2,156				
7/24-7/30	Tahltan	217	0	15	32	0	0	264	9.7	90.2	116	412
Week 31	non-Tahltan	509	1,493	109	47	297	4	2,459	90.3	94.5	2,304	2,614
	Total	726	1,493	124	79	297	4	2,723				
7/31-8/06	Tahltan	0	0	85	57	0	0	142	3.5	202.3	0	475
Week 32	non-Tahltan	1,021	2,230	124	82	417	0	3,874	96.5	220.9	3,511	4,237
	Total	1,021	2,230	209	139	417	0	4,016				
8/07-8/13	Tahltan	95	0	27	0	0	0	122	7.3	225.4	0	493
Week 33	non-Tahltan	457	831	39	36	172	6	1,541	92.7	227.1	1,167	1,915
	Total	552	831	66	36	172	6	1,663				
8/14-8/20	Tahltan	31	0	10	0	0	0	41	8.9	233.1	0	424
Week 34	non-Tahltan	128	217	15	11	47	3	421	91.1	233.3	37	805
	Total	159	217	25	11	47	3	462				
8/21-9/10	Tahltan	0	0	0	0	0	0	0	0.0	233.2	0	384
Wks 35-37	non-Tahltan	117	121	10	10	9	0	267	100.0	233.2	0	651
	Total	117	121	10	10	9	0	267				
Season	Tahltan	996	608	245	212	0	3	2,064	16.2	280.0	1,603	2,525
Totals	non-Tahltan	2,720	6,042	406	289	1,227	18	10,702	83.8	297.1	10,213	11,191
	Total	3,716	6,650	651	501	1,227	21	12,766				

[a] Weekly catch from the Canadian Department of Fisheries and Oceans, Whitehorse, Yukon.

[b] The standard errors are minimum estimates since no estimates of the variance for stocks contributing 0 fish to an age-group during a given week or for the 'other' age class are available. The 90% confidence intervals are affected in like manner.

Appendix B.2. Estimated CPUE and migratory timing of the Tahltan and non-Tahltan sockeye salmon stock groups in Canada's Stikine River commercial fishery, 1988.[a]

				Catch per Fishing Day by Stock Group		
Stat. Week	Fishing Effort	Days	Fishing Days	Tahltan	non-Tahltan	Total
27	18	1	18	17	5	22
28	16	1	16	24	11	36
29	15	0.5	8	29	40	69
30	15	2	30	20	52	72
31	11	4	44	6	56	62
32	11	4	45	3	86	89
33	13	4	50	2	31	33
34	10	2	20	2	21	23
35-37	12	6	71	0	4	4
Totals				104	306	410

Migratory Timing Estimates

	Proportions		Migratory Timing - Catch Adjusted by Test Index		
Stat. Week	Tahltan	non-Tahltan	Index	Tahltan	non-Tahltan
27	0.768	0.232	0.010	0.008	0.002
28	0.685	0.315	0.063	0.043	0.020
29	0.424	0.576	0.061	0.026	0.035
30	0.271	0.729	0.120	0.033	0.088
31	0.097	0.903	0.096	0.009	0.087
32	0.035	0.965	0.267	0.009	0.257
33	0.073	0.927	0.230	0.017	0.213
34	0.089	0.911	0.120	0.011	0.110
35-37	0.000	1.000	0.031	0.000	0.031
Totals	2.442	6.558	1.000	0.156	0.844

[a] Weekly catch and effort data from the Canadian Department of Fisheries and Oceans, Whitehorse, Yukon.

Appendix B.3. Estimated contribution of sockeye salmon stocks of Tahltan and non-Tahltan origin to the Stikine River test fishery, 1988.

Dates	Group	Catch by age class 1.2	1.3	2.2	2.3	0.	Other	Total[a]	Percent	Standard Error[b]	90% C.I.[b] Lower	Upper
6/19-6/25	Tahltan	0	18	1	6	0	0	25	75.8	3.2	20	30
Week 26	non-Tahltan	0	3	0	1	4	0	8	24.2	2.7	4	12
	Total	0	21	1	7	4	0	33				
6/26-7/02	Tahltan	15	71	2	15	0	1	104	72.2	7.7	91	117
Week 27	non-Tahltan	4	28	1	2	5	0	40	27.8	7.5	28	52
	Total	19	99	3	17	5	1	144				
7/03-7/09	Tahltan	33	63	4	8	0	0	108	52.9	10.3	91	125
Week 28	non-Tahltan	12	58	4	1	21	0	96	47.1	10.1	79	113
	Total	45	121	8	9	21	0	204				
7/10-7/16	Tahltan	46	45	5	13	0	0	109	38.9	12.4	89	129
Week 29	non-Tahltan	25	114	5	2	25	0	171	61.1	12.6	150	192
	Total	71	159	10	15	25	0	280				
7/17-7/23	Tahltan	11	0	7	9	0	0	27	19.4	8.7	13	41
Week 30	non-Tahltan	25	68	7	2	10	0	112	80.6	9.1	97	127
	Total	36	68	14	11	10	0	139				
7/24-7/30	Tahltan	16	0	2	0	0	0	18	12.5	11.3	0	37
Week 31	non-Tahltan	22	87	3	0	14	0	126	87.5	11.8	107	145
	Total	38	87	5	0	14	0	144				
7/31-8/06	Tahltan	2	0	3	5	0	0	10	6.7	16.2	0	37
Week 32	non-Tahltan	33	85	3	5	14	0	140	93.3	16.6	113	167
	Total	35	85	6	10	14	0	150				
8/07-8/13	Tahltan	2	0	3	1	0	0	6	7.1	18.5	0	36
Week 33	non-Tahltan	22	37	3	1	15	0	78	92.9	18.8	47	109
	Total	24	37	6	2	15	0	84				
8/14-8/27	Tahltan	0	0	0	0	0	0	0	0.0	20.6	0	34
Wks 34-35	non-Tahltan	20	40	0	6	2	0	68	100.0	20.6	34	102
	Total	20	40	0	6	2	0	68				
Season	Tahltan	125	197	27	57	0	1	407	32.7	29.4	359	455
Totals	non-Tahltan	163	520	26	20	110	0	839	67.3	30.1	790	888
	Total	288	717	53	77	110	1	1,246				

[a] Weekly catch from the Canadian Department of Fisheries and Oceans, Whitehorse Yukon.
[b] The standard errors are minimum estimates since no estimates of the variance for stocks contributing 0 fish to an age-group during a given week or for the 'other' age class are available. The 90% confidence intervals are affected in like manner.

Appendix B.4. Relative run strength and migratory timing of the Tahltan and non-Tahltan sockeye salmon in the Stikine River test fishery, 1988.[a]

Stat. Week	Drifts	Catch[b] Actual	Adjusted	Prop.	Stock Group Tahltan	non-Tahltan
26	60	6	6	0.010	0.758	0.242
27	60	36	36	0.063	0.722	0.278
28	60	35	35	0.061	0.529	0.471
29	60	69	69	0.120	0.389	0.611
30	50	46	55	0.096	0.194	0.806
31	20	51	153	0.267	0.125	0.875
32	20	44	132	0.230	0.067	0.933
33	20	23	69	0.120	0.071	0.929
34	50	9	11	0.019	0.000	1.000
35	50	6	7	0.013	0.000	1.000
Totals		325	573	1.000		

Migratory Timing Estimates

Stat. Week	Proportion of In-river Run Tahltan	non-Tahltan	Migratory timing Tahltan	non-Tahltan	Total
26	0.008	0.003	0.038	0.003	0.010
27	0.045	0.017	0.218	0.022	0.063
28	0.032	0.029	0.155	0.036	0.061
29	0.047	0.074	0.225	0.093	0.120
30	0.019	0.078	0.090	0.098	0.096
31	0.033	0.234	0.160	0.295	0.267
32	0.015	0.215	0.074	0.272	0.230
33	0.009	0.112	0.041	0.141	0.120
34	0.000	0.019	0.000	0.024	0.019
35	0.000	0.013	0.000	0.016	0.013
Totals	0.208	0.792	1.000	1.000	1.000

[a] Weekly catch and effort data from the Canadian Department of Fisheries and Oceans, Whitehorse, Yukon.
[b] Catch in statistical weeks 30-35 extrapolated to 60 drifts.