TAKU RIVER AND PORT SNETTISHAM SOCKEYE SALMON STOCK PROPORTIONS IN 1988 SOUTHEAST ALASKA AND CANADIAN FISHERIES

By

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ABSTRACT

Linear discriminant function analysis of scale patterns and age composition data were used to calculate estimates of the stock compositions of District 111 and Canadian Taku River commercial catches and the Canadian Taku River escapement of sockeye salmon (*Oncorhynchus nerka*). The District 111 harvest of 39,168 sockeye salmon was comprised of an estimated 66% bound for spawning sites in the Taku River drainage and 34% destined for lake systems in the Port Snettisham drainages. The contribution of specific stock groups were: 31% from Mainstem Taku River, 27% from Crescent Lake, 16% from Little Trapper Lake, 12% from Kuthai Lake, 8% from Little Tatsamenie Lake and 7% from Speel Lake. The Canadian commercial inriver harvest of 12,014 sockeye salmon was comprised of 42% Little Trapper Lake, 34% Mainstem Taku River, 14% Kuthai Lake and 10% Little Tatsamenie Lake fish. The total run of Taku River sockeye salmon was an estimated 113,001 fish, of which 74,055 escaped to spawn. United States fishermen harvested 61%-69% of the total allowable catch (TAC), while Canadian fishermen took the remainder. The total return of Snettisham stocks was an estimated 15,363 fish. The District 111 fishery exploited Snettisham stocks at a much higher rate (86%) than Taku River stocks (23%). Changes in the distribution of fishing effort within District 111 may account for this dramatic difference. The possibility that the presence of Lynn Canal sockeye salmon stocks in catch samples could have caused Snettisham stock contributions to be overestimated is also explored.

KEY WORDS: Scale pattern analysis, sockeye salmon (*Oncorhynchus nerka*), discriminant function analysis, age composition, stock composition, exploitation rates, Taku River, Snettisham, transboundary river.

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.-Canada Pacific Salmon Treaty of 1985 established conservation and harvest sharing objectives for the Taku River sockeye salmon (*Oncorhynchus nerka*) run. Provisions specified by the Treaty for the Taku River in 1985 and 1986 were to achieve an interim spawning escapement goal of 71,000 to 80,000 sockeye salmon into Canadian portions of the Taku River and allow the U.S. an 85% share and Canada a 15% share of the additional sockeye salmon of Canadian Taku River origin available for harvest (the total allowable catch, or TAC). 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.

The U.S. allotment of Taku River sockeye salmon is taken primarily in the District 111 gill net fishery in the Taku Inlet-Stephens Passage-Port Snettisham area (Figure 2), although unknown but assumed small numbers are taken in other Southeast Alaskan fisheries (McGregor 1985). Sockeye salmon bound for Alaskan spawning sites in Port Snettisham (Crescent and Speel Lakes) are also harvested in the District 111 fishery. Catches in District 111 have averaged 72,884 sockeye salmon annually from 1976-87, and have ranged from 31,821 to 123,451 fish. The majority of the District 111 harvest is generally taken in Taku Inlet. Port Snettisham sockeye salmon stocks are extremely depressed relative to historical levels. Port Snettisham has been closed to commercial fishing during much of the season in recent years to reduce the catch of Snettisham stocks and begin rebuilding these runs.

The Canadian allotment of Taku River sockeye salmon is taken in a gill net fishery that occurs in the Taku River within 20 kilometers upstream of the border between Alaska and Canada (Figure 1). Catches have averaged 15,060 sockeye salmon since the fishery began in 1979, and have ranged from 3,144 to 27,242 fish.

Stock assessment programs have recently been developed to provide in-season estimates of the sockeye salmon escapement to the Taku River and the contribution of Taku River and Port Snettisham stocks to the District 111 fishery. An adult mark-recapture program has been jointly operated on the Taku River at Canyon Island by the Alaska Department of Fish and Game (ADF&G) and the Canadian Department of Fisheries and Oceans (CDFO) since 1984 to provide in-season escapement estimates. 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 postseason basis. Since 1986, in-season SPA based on data from prior years scale collections has been used to allocate District 111 catches. In addition, since 1986 inriver samples from the Canadian fishery and the Taku River return by Canyon Island have been classified to stock group of origin.

The purpose of this report is to document the methodology used and results obtained from 1988 SPA studies of Taku River and Port Snettisham sockeye salmon. The data provide basic statistics for use in assessing the treaty performance of the U.S. and Canadian fisheries targeting on Taku River sockeye salmon and in developing a more stock-specific data base than was previously available.

METHODS

Numbers of Fish

We obtained catch statistics for District 111 from ADF&G records of fishermen sales receipts (fish tickets). These records were updated as of 9 August 1989. Harvest statistics for the Canadian inriver fishery were provided by the CDFO (P. Milligan, CDFO, Whitehorse, Yukon Territory, personal communication). 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 Lake and Speel Lake. Tagging and recapture methods were used to estimate the sockeye salmon run size to Canadian portions of the Taku River drainage (McGregor and Clark 1989). Weirs were operated by the CDFO at Little Trapper and Little Tatsamenie Lakes and at the Hackett River to count escapements of these specific spawning stocks in the Taku River drainage.

Sample Collection and Processing

Fish scales were collected and prepared using procedures described by Clutter and Whitesel (1956). Scales were taken from the 'preferred area' of the fish, located on the left side of the fish approximately two rows above the lateral line and on the diagonal row of scales downward from the posterior insertion of the dorsal fin. Scales were mounted on gummed cards.

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 took one scale. The Canadian inriver harvest was sampled by CDFO and ADF&G employees. Samplers recorded the sex of each fish sampled and took five scales, according to CDFO sampling guidelines.

Similar procedures were used to sample escapements; one to three scales per fish were taken from Alaskan systems, while five scales per fish were taken from Canadian headwater systems. Scales were collected at counting weirs at Crescent and Speel Lakes in the Snettisham drainages, and in the Taku River drainage at Little Trapper Lake, Little Tatsamenie Lake, and the Hackett River. Samples were periodically taken throughout the return in weir traps at each of the weir sites. Numerous other spawning sites in the Taku River drainage were sampled with beach seines, gill nets, spears, and by carcass sampling. These locations were sampled on only one or several days, thus samples might not have represented the true age composition of spawners from these sites over the entire season as closely as did samples collected through time at the weirs. Scale samples were also taken in conjunction with the escapement enumeration 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 kipe development, belly and jaw shapes, and vent disposition or, when possible, by examination of gonads. The accuracy of sex determination from external morphometric characteristics alone was not tested.

Permanent transparent impressions of the scales were made by attaching strips of cellulose acetate to the gummed cards containing the scales and subjecting them to heat and pressure in a hydraulic scale press. Scale images were enlarged and projected by transmitted light onto a reflective surface for aging and digitizing.

Age Composition

Ages were determined by visually examining images of scale impressions projected at moderate (80X) magnification with a microfiche reader. Criteria used to determine ages were similar to those of Mosher (1968). Scales from fish sampled on the spawning grounds occasionally exhibited resorption along their outer edges. 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. Ages were recorded in European notation.

Sampling goals for determining the age composition of the harvests were designed to enable the proportion of each major (>10%) age group in the catch during each fishing period to be estimated to within 5 percentage points 90% of the time using standard binomial formulae (Cochran 1977). Sample goals were met for most fishing periods in the District 111 commercial fishery. Low catches and limited availability of fish to sample in the Canadian inriver fishery prevented desired sample sizes from being achieved in each fishing period for this fishery. Because the age composition of catches often changed significantly between fishing periods, samples from several periods were seldom combined, and lower levels of the accuracy and precision of age composition estimates resulted for this fishery. All sockeye salmon taken in the District 111 test gill net fishery were sampled for scales.

Estimates of the total catch or escapement by age class were made by multiplying the age composition proportions from each time period by the number of fish present during the corresponding time period and summing the estimates within age classes across time periods. Standard errors of the proportions in each time period were calculated with standard binomial formulae, using a finite correction factor (McGregor and Jones 1989).
The standard error of the total catch or escapement for each age class was calculated by weighting the standard error for each sample period by the abundance during the sample period (McGregor and Jones 1989).

Stock Identification

Age composition data and linear discriminant function (LDF) analysis of scale measurements were used to estimate the stock composition of District 111 and Canadian inriver harvests and the Taku River escapement past Canyon Island.

Scale Measurements

Scale images were magnified to 100 power and projected onto a Talos Digitizing Tablet using equipment similar to that described by Ryan and Christie (1976). Measurements were made and recorded with an IBM microcomputer-controlled digitizing system using software modified by L. Talley (ADF&G, Commercial Fisheries Division, Douglas). Measurements were made along the anterior-posterior axis of the scale. Circuli were counted and distance measurements between circuli were taken in each of three scale zones (Figure 3). The zones were: 1) the center of the scale focus to the last circulus of the first freshwater annulus, 2) the last circulus of the freshwater annulus to the last circulus of freshwater growth (plus growth), and 3) the last circulus of freshwater growth to the last circulus of the first ocean annulus. Seventy-four scale characters, including circuli counts, incremental distances, and ratios and/or combinations of these variables, were calculated from the basic measurements (Appendix A.1).

Discriminant Analysis

Scales from the principal stock groups were collected on the spawning grounds and used as standards (samples of known origin used to build linear discriminant functions). Scales from mixed stock catches were classified using the discriminant functions based on these standards to estimate the contributions of each stock to the catches of fish aged 1.3 and 1.2.

The stock composition of District 111 catch samples of age-1.3 fish was estimated on an in-season basis in 1988. Linear discriminant functions developed with age-1.3 escapement scales from 1987 (McGregor and Jones 1989) were used for this analysis. Stock composition estimates were provided to fishery managers within 24 to 48 hours after each fishing period, prior to the formulation of the following week's fishing plan. Escapement scale samples taken in 1988 were used to develop new current- year standards to reclassify the catches of age-1.3 fish after the fishing season was over. Appropriate LDF's were created to classify inriver samples of the catch (Canadian Taku River gill net harvest) and escapement (Taku River escapement past Canyon Island). In addition, escapement samples were used to create age-1.2 standards for classifying catches of this age class.

We performed the LDF analyses on an IBM-compatible microcomputer using a series of FORTRAN programs. The programs use a stepwise procedure to select scale variables for each LDF; partial F-statistics were used as the main criteria for entry and removal of variables. Only one variable from a group of highly related variables was generally allowed to enter the functions. Variables were added until the partial F-statistics of all the remaining variables available for entry into the function were below a threshold value of 4.0. The stepwise procedure used for variable selection does not necessarily result in maximum classification accuracies or the most balanced classification matrix when discriminating more than two groups. Instead it tends to differentiate well-separated groups further instead of improving differentiation of poorly-separated groups (Habbema and Hermans 1977). Scale variables that provided the best discrimination between the groups that misclassified most often were occasionally added to or substituted for other variables by the operator to either increase the mean classification accuracy or provide better balance to the classification matrix. A nearly unbiased estimate of classification accuracy for each LDF was determined using a leaving-one-out (jackknife) procedure (Lachenbruch 1967). The jackknife procedure was used to reduce bias caused by using the same set of samples both for calculating the discriminant function and for determining its accuracy.

Construction of Standards. Standards were developed for six stock groups. Five of the groups represented individual lake systems, while the remaining 'non-lake' group was a conglomeration of samples taken from river, slough, and stream spawners along the mainstem of the Taku River and several important tributaries. We created standards only for age-1.3 and age-1.2 fish due to the scarcity of scales of other age classes available from several of the stock groups.

Classification of Catches. Age-specific LDF's were used to assign stock group of origin to mixed-stock samples of sockeye salmon aged 1.3 and 1.2. Point estimates of stock composition were adjusted for classification errors using the methods of Cook and Lord (1978). In cases where adjusted proportions for a stock group were less than zero, catch samples were reclassified with an LDF excluding that stock group. Variances and 90% confidence intervals were computed for the adjusted estimates of stock proportions using the methods of Pella and Robertson (1979).

Catch samples were analyzed on an in-season basis with standards developed from escapements in 1986. Catches were reclassified after the fishing season was over using standards built from 1987 escapement samples.

The numbers of fish by stock group for the catch of age-1.3 and age-1.2 fish were computed for each fishing period by multiplying the total estimated catch of each age class by the adjusted LDF estimate of contribution of each group:

$$C_{ij} = C * P_j * S_{ij}$$

where:

C_{ij} = estimated catch of fish aged j returning to group i.

C = total catch in a fishing period.

P_j = estimated proportion of fish aged j in the catch.

S_{ij} = estimated proportion of group i in the catch of fish aged j in a fishing period.

Catches of each stock group for each fishing period were added to compute each group's contribution of fish aged 1.3 and 1.2 for the entire fishing season.

The catches of fish of other age groups were apportioned to stock group of origin based on a function of the estimated proportion of fish aged 1.3 and 1.2 in the catch and the ratio of the estimated proportions of fish aged 1.3 and 1.2 to other age groups in the respective stock groups:

$$S_{ij} = \frac{S_{j\,(1.3+1.2)} \left(\dfrac{E_{ij}}{E_{j\,(1.3+1.2)}} \right)}{\sum_{j=1}^{n} S_{j\,(1.3+1.2)} \left(\dfrac{E_{ij}}{E_{j\,(1.3+1.2)}} \right)}$$

where:

S_{ij} = estimated proportion of stock j in the catch of fish aged i.

$S_{j(1.3+1.2)}$ = estimated proportion of stock j in the catch of fish aged 1.3 and 1.2.

E_{ij} = estimated proportion of fish aged i in the escapement of stock j.

$E_{j(1.3+1.2)}$ = estimated proportion of fish age 1.3 and 1.2 in the escapement of stock j.

n = number of stocks.

The variances of the weekly and seasonal stock composition estimates were approximated using the delta method (Seber 1982). Factors contributing to the variance estimate include: 1) the age composition of the catch, 2) the age-1.3 stock composition estimate made using LDF, 3) the variance of the age-specific stock composition estimates, 4) the sample size used to estimate the age composition of the catch, and 5) the magnitude of the catch. This is a minimum estimate of the variance of the stock composition because no variance component is included for age classes not classified with LDF.

RESULTS

Numbers of Fish

A total of 39,168 sockeye salmon was harvested by the commercial drift gill net fleet in District 111 in 1988. Fishing began in the third week of June and continued through late September. Weekly catches and specific time and area regulatory measures are summarized in Table 1. The fishery was open a total of 31 days. A maximum of 122 boats delivered fish in any one fishing period. Catches were greatest during 17-21 July (statistical week 30), when 9,322 fish were harvested. Catch-per-unit-effort (CPUE) was highest during the following fishing period (31 July-2 August). The majority of the catch (61%) was taken in Taku Inlet (Subdistrict 111-32; Figure 2). The distribution of the catches differed from the normal historical pattern, with approximately 38% being taken in northern Stephens Passage (Subdistrict 111-31) compared to the 1964 to 1987 average of 11%. Catches in Port Snettisham (Subdistrict 111-43) accounted for less than 1% of the harvest. Port Snettisham was closed to fishing until 21 August to allow increased passage of sockeye salmon into Crescent and Speel Lakes and to protect Snettisham Hatchery chum and chinook salmon brood stocks.

Canadian commercial fishermen harvested 12,014 sockeye salmon in the Taku River fishery (Table 2). The fishery was open a total of 14.7 days. The maximum number of fishermen participating in any week of the fishery was 14. The catch and CPUE were highest during the 11-13 July opening (statistical week 29).

CDFO operated an inriver drift gill net test fishery. One fisherman made five standardized drifts in the morning and in the evening each day the commercial fishery was not open between 20 July and 23 September. A total of 714 sockeye salmon was taken in this test fishery (Table 3).

Age and Sex Composition

Catch

Fish aged 1.3 dominated the District 111 harvest of sockeye salmon, representing 61% of the total catch (Table 4). Weekly proportions of age-1.3 fish in the catch ranged from a high of 70% during the fifth week of the season to a low of 48% during the last sample period (14 August-12 September). Age-1.2 fish was the second most common age class (16%). The contribution of this age class was highest during the first 2 weeks of the season. Age-0.3 fish comprised the third largest age class in the catch (10%), peaking at 19% during the week of 24-26 July. Fish aged 2.3 and 2.2 comprised 6% and 4% of the harvest respectively, and weekly proportions of these age classes increased as the season progressed. The sex composition of the catch was 46% males and 54% females.

Age-1.3 fish comprised a lower proportion (52%) of the Canadian Taku River harvest (Table 5). Age-1.2 and age-0.3 fish were proportionately more common (23% and 13% respectively) in catches from the inriver fisheries than in District 111. Fish aged 1.2 were most common during the first week of the season, while the contribution of fish aged 0.3 increased through the season. Seasonal trends in the contribution of age-2.2 and age-2.3 fish differed dramatically between the inriver and District 111 fisheries, decreasing during the season within the river and increasing in District 111. Males comprised 46% of the inriver catch.

Escapement

Large differences in age composition were apparent in escapements to the Taku River and Port Snettisham drainages. The age composition of the portion of the Taku River run that migrated upriver past Canyon Island was very diverse, and was comprised of age-1.3 (39%), age-1.2 (30%), age-0.3 (8%), age-0.2 (7%), age-1.1 and age-2.2 (6%), age 2.3(5%) and other age groups (<1%;Table 6). Fish aged 1.3 peaked during the first sampling period of the season (29 May-18 June) at Canyon Island. The most common age group during the following 3 weeks was age-1.2. Age-0. fish were very scarce during the first several weeks of the season, but increased to 31% between 31 July and 6 August before declining late in the season. The contribution of jacks (sockeye salmon aged .1) increased dramatically from 0% during the first 2 weeks to 45% during the last sampling period (21 August-18 September). Males were more common (57%) and increased in proportion throughout the season. The accuracy of Canyon Island sex composition data is unknown but is likely lower than in other collections because live fish in generally ocean-bright condition were sampled at this location and sex determination could not be verified by examining gonads.

Individual Taku River stocks exhibited an extreme diversity in age composition (Table 7), as also seen in other years (McGregor and Jones 1989). Fish classified as age-0. comprised 42% of the ageable scales taken from river spawners, but were absent or represented less than 5% of samples from each lake system. Fish with two freshwater annuli were more common in returns to lake systems than in river spawners. Age-1.2 fish were most common in fish sampled at Kuthai Lake (43%).

Fish from escapements to Port Snettisham drainages also exhibited a large diversity in age composition. Age-1.3 (50%) and age-1.2 (41%) were most common at Speel Lake. Contrastingly, the Crescent Lake return was comprised primarily of 4 age classes: age-1.3 (32%), age-1.4 (25%), age-1.2 (22%) and age-2.3 (13%). The high contribution of age-1.4 fish at Crescent Lake was very distinctive, as returns of this age class in the escapements at all other locations in the Snettisham and Taku River drainages were less than 1%.

Stock Identification

Scale Measurements

The two scale pattern variables that were most valuable for discriminating between stocks were the number of circuli in and the width of the freshwater growth zone (Table 8). Kuthai Lake fish exhibited by far the greatest freshwater growth, followed by fish from Little Tatsamenie Lake. The smallest freshwater growth was exhibited by the Crescent Lake group. Scales from the Mainstem Taku River, Little Trapper Lake and Speel Lake were intermediate to Kuthai Lake and Crescent Lake scales in the amount of freshwater growth. Other scale variables from the freshwater growth zone that were useful in distinguishing between groups included variables 4 (the distance between the scale focus and the fourth freshwater circulus), 14 (the distance from the second freshwater circulus to the end of the first freshwater annular zone), and 17 (variable 4 divided by the distance across the first freshwater annular zone)(Appendix A.1).

Differences in scale growth in the first marine zone between stocks were also apparent. As with freshwater growth, the marine growth of Kuthai and Crescent Lake groups showed the greatest separation between stocks.

Classification Accuracies

The mean classification accuracy of 1987 standards used in-season to classify the District 111 catch of age-1.3 fish was 0.672, while the mean classification accuracy of 1988 standards used on a postseason basis to classify catches was 0.640 (Table 9). The Kuthai Lake run classified most accurately (>0.940) in both in-season and postseason analyses. Crescent, Speel, Little Trapper, and Little Tatsamenie Lake groups were correctly assigned at intermediate values (0.530 to 0.697) with slightly lower accuracies in the postseason analysis. Mainstem Taku River spawners classified with the lowest accuracy in both in-season (0.500) and postseason (0.509) analyses. Classification matrices of all in-season LDF's used to classify District 111 catches are included in McGregor and Jones (1989), while matrices of postseason analyses are included in Appendix B.1.

Catches of age-1.3 fish in the Canadian Taku River fishery and the Canyon Island fish wheels were classified on a postseason basis into four groups, excluding the Snettisham systems. The mean classification accuracy of the four-way LDF was 0.735 (Appendix B.2). The Kuthai Lake group classified correctly most often (0.970), followed by Little Trapper Lake (0.755), Mainstem Taku River (0.683) and Little Tatsamenie Lake (0.545).

The mean classification accuracies of the 1988 age-1.2 standards used to classify District 111 and Canadian inriver catches were similar as for age-1.3 standards (Appendices B.3 and B.4).

Estimates of Stock Composition

Age class-specific stock composition estimates are summarized in Tables 10 (age-1.3) and 11 (age-1.2).

The District 111 harvest of all age classes of sockeye salmon was comprised of the following estimated stock proportions: 31% Mainstem Taku River, 27% Crescent Lake, 16% Little Trapper Lake, 12% Kuthai Lake, 8% Little Tatsamenie Lake and 7% Speel Lake (Table 12). The combined contribution of Taku River stocks equaled 66% of the harvest, or 25,973 fish. Snettisham stocks contributed an estimated 13,195 fish to the catch.

The Canadian Taku River harvest was comprised predominantly of Little Trapper Lake (42%) and Mainstem Taku River groups (34%;Table 13). The remainder of the harvest was contributed by Kuthai Lake (14%) and Little Tatsamenie Lake (10%).

While fishery catch statistics are presumed to be highly accurate, a degree of uncertainty is connected with the mark-recapture estimate of the inriver return. The 95% confidence intervals of the seasonal estimate of inriver return ranged from approximately 68,000 to 106,000 fish (McGregor and Clark 1989). The variances of the weekly inriver abundance indices used to weight the stock composition estimates were large. Due to the uncertainty in these abundance indices, the Canyon Island stock composition estimates are not used in this report to apportion the total inriver return by stock group; these estimates are simply presented as weekly proportions of the fish passing Canyon Island (Table 14).

Total Run Estimates

The mark-recapture estimate of sockeye salmon escapement past Canyon Island was 87,028 sockeye salmon, of which 74,055 escaped to spawn (McGregor and Clark 1989). The escapement falls within the interim U.S. and Canadian escapement goal range of 71,000 to 80,000 sockeye salmon. The total estimated run of Taku

River sockeye salmon was 113,001 (Table 15). The catch of 38,946 fish was midway within the TAC range of 33,001-42,001 fish. The Canadian harvest of 12,793 sockeye salmon comprises 31%-39% of the TAC.

Total run and exploitation rate estimates are available for 4 individual weired systems in the Taku River and Port Snettisham drainages (Table 15). The return of Little Trapper Lake sockeye salmon totaled approximately 22,000 fish, of which 28% were taken in District 111. The Little Tatsamenie Lake return totaled slightly over 4,000 fish, of which 50% were taken in the District 111 fishery. Estimated total runs of Crescent and Speel Lake stocks were 11,629 and 3,734 sockeye salmon, respectively. Exploitation rates on these stocks in District 111 were extremely high (74%-90%).

DISCUSSION

The high exploitation rates estimated for Snettisham stocks may be a result of increased fishing pressure in northern Stephens Passage relative to historical levels. Large returns of summer chum salmon were available in this area in 1988 and the majority of the fleet fished here for several weeks during July when Snettisham sockeye salmon stocks are believed to be present in peak numbers. Estimated contributions of Crescent Lake fish to catches during the month of August in 1988 were much higher than in prior years' SPA analyses. Trends in the age composition of 1988 District 111 catches during August suggest the presence of stocks not bound for Taku River or Snettisham systems. Fish aged 2. comprised high proportions of the catch (20%-25%) during the 8-10 August and 14 August-12 September sample periods. Samples from the Canadian inriver fishery during this same time period were comprised of only 3%-4% age-2. fish, while escapement of this age group to Snettisham systems totaled only 321 fish.

It may be possible that Lynn Canal sockeye salmon stocks were present in samples used to determine the stock composition of District 111 catches. If stocks were present in the District 111 fishery but not in classification functions used to estimate the catch composition, it could cause bias in the resulting stock composition estimates. Returns of Lynn Canal stocks were extremely strong in 1988. The late portion of the Chilkat Lake return is unique among northern Southeast Alaska stocks because it is comprised predominantly of age-2. fish (McPherson personal communication). The other principal Lynn Canal sockeye salmon stock is from Chilkoot Lake. The estimated 1988 run size of this stock was very large (336,000 fish) and was comprised predominantly of age-1.3 fish (McPherson personal communication).

To simulate what would happen to stock composition estimates if Chilkoot and Chilkat Lake sockeye salmon were present in District 111 samples we digitized 100 age-1.3 scales from each system and then used our LDF analysis to classify these samples. All Chilkoot Lake samples were assigned to the Crescent Lake group while a high proportion (.801) of Chilkat Lake samples were assigned to the Little Tatsamenie Lake group (Table 16). Thus, if Lynn Canal stocks were present in District 111 the contributions of the Crescent and Little Tatsamenie Lake groups would be overestimated. The 1988 Chilkat Lake run was much smaller (103,000 fish) than the Chilkoot Lake return and since the late Chilkat Lake run is comprised predominantly of age 2. fish, it is unlikely that the presence of this stock affected our age class-specific LDF stock composition estimates. Presence of Chilkoot Lake fish in catch samples may have been more likely however, and would have caused Crescent Lake age-1.3 contribution estimates to be inflated.

We consider it likely that small numbers of Lynn Canal fish were present in samples taken throughout the season from District 111 catches. These fish may indeed be harvested in this area or their presence may simply be a result of fishermen not telling port samplers that they had fish aboard that had been harvested both in District 115 (Lynn Canal) and District 111. The presence of small numbers of Lynn Canal fish in District 111 catch samples would likely go unnoticed in our analysis unless abundance of Taku River and Port Snettisham stocks had dropped to low levels, as they typically are during the month of August. In future years it may be appropriate to include Chilkat and Chilkoot stocks in our classification functions if the extent of this problem is deemed sufficient and if reasonable classification accuracies can be attained when 8 stocks are included in LDF functions.

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Table 1. District 111 fishery openings, effort, and harvest of sockeye salmon by statistical week and subdistrict, 1988.

Statistical Week	Dates Fished	# of Days Fished	# of Boats	Effort (Boat Days)	Catch: Subdistrict 31	Catch: Subdistrict 32	Catch: Subdistrict 34	Total Catch	CPUE Catch/Boat Day
26[a,b]	6/19-6/22	3	26	78	224	2,525		2,749	35.24
27[a,b]	6/26-6/29	3	73	219	458	4,403		4,861	22.20
28[a,b]	7/3-7/5	2	48	96	1,071	2,872		3,943	41.07
29[b,c]	7/10-7/13	3	61	183	3,736	2,361		6,097	33.32
30[b,d,e]	7/17-7/21	4	90	360	3,388	5,934		9,322	25.89
31[b]	7/24-7/26	2	56	112	1,809	2,447		4,256	38.00
32[b]	7/31-8/2	2	33	66	1,232	1,574		2,806	42.52
33[b,f]	8/8-8/10	2	46	92	1,438	647		2,085	22.66
34[b,g]	8/14-8/16	2	122	244	1,287	780		2,067	8.47
35[g,h]	8/21-8/23	2	99	198	209	149	32	390	1.97
36[a]	8/28-8/30	2	97	194	194	227	13	434	2.24
37[a]	9/4-9/6	2	96	192	27	120		147	0.77
38[a]	9/11-9/12	1	45	45	3	8		11	0.24
39[g]	9/18-9/19	1	12	12					0.00
Total		31		2,091	15,076	24,047	45	39,168	18.73

[a] Taku Inlet closed north of Jaw Point.

[b] Port Snettisham closed east of a line from Point Styleman to Point Amner.

[c] Taku Inlet was open north of the latitude of Grave Point light from 12:01 p.m. on July 10 to 12:00 noon on July 11. Fishing was allowed south of the latitude of Grave Point light from 12:01 p.m. on July 10 to 12:00 noon on July 13.

[d] Fishing north of the latitude of Grave Point light was allowed from 12:01 p.m. on July 17 to 12:00 noon on July 20. Fishing was allowed south of the latitude of Grave Point light from 12:01 p.m. on July 17 to 12:00 noon on July 21.

[e] Minimum gill net mesh of 6 inches allowed south of Grave Point light.

[f] Fishery opening was delayed from 12:01 p.m. Sunday to 12:01 p.m. Monday (to reduce fishing vessel conjestion during the Juneau Salmon Derby).

[g] Taku Inlet was closed north of a line from Cooper Point to Greely Point.

[h] Speel Arm closed north of a line from Bogert Point to Prospect Point.

Table 2. Canadian commercial gill net harvest of sockeye salmon in the Taku River, 1988.

Statistical Week	Dates Fished	# Days Fished	Number of Fishermen	Effort (Boat Days)	Catch	CPUE Catch/Boat Day
27	6/27-6/29	2	10	20	1,758	87.90
28	7/4-7/5	1	12	12	721	60.08
29	7/11-7/13	2	14	28	2,645	94.46
30	7/18-7/20	2	14	28	2,164	77.29
31	7/25-7/27	2	13	26	1,749	67.27
32	8/1-8/2	1	13	13	859	66.08
33	8/8-8/9	1	13	13	864	66.46
34	8/15-8/16	1	12	12	803	66.92
35	8/22-8/23	1	13	13	314	24.15
36	8/29-8/31	1.7	12	20.4	137	6.72
Total		14.7	126	185.4	12,014	48.23

Table 3. Test fishery catches of sockeye salmon in the Taku River, 1988.

Statistical Week	Inclusive Dates	Catch
26	(6/20-6/25)	54
27	(6/26-7/2)	91
28	(7/3-7/9)	125
29	(7/10-7/16)	105
30	(7/17-7/23)	70
31	(7/24-7/30)	78
32	(7/31-8/6)	88
33	(8/7-8/13)	36
34	(8/14-8/20)	41
35	(8/21-8/27)	20
36	(8/28-9/3)	2
37	(9/4-9/10)	2
38	(9/11-9/17)	1
39	(9/18-9/23)	1
Total		714

Table 4. Age and sex composition of the District 111 gill net harvest of sockeye salmon by statistical week, 1988.

Statistical Week	Sample Size	Sex Composition (% Males)		Brood Year and Age Class 1985	1984			1983			1982			1981	Total
				0.2	1.1	0.3	1.2	0.4	1.3	2.2	1.4	2.3	3.2	2.4	
26	297	48.0	%			1.3	27.6		63.0	3.0	0.3	4.7			
(6/19-6/22)			S.E.			0.6	2.5		2.7	0.9	0.3	1.2			
			Catch			37	759		1,731	83	9	130			2,749
27	560	48.5	%	0.7		3.9	34.6		53.4	2.9	0.4	4.1			
(6/26-6/29)			S.E.	0.3		0.8	1.9		2.0	0.7	0.2	0.8			
			Catch	35		191	1,684		2,595	139	17	200			4,861
28	483	51.6	%	0.8		5.4	14.9		68.7	5.0	0.2	4.8		0.2	
(7/3-7/5)			S.E.	0.4		1.0	1.5		2.0	0.9	0.2	0.9		0.2	
			Catch	33		212	588		2,710	196	8	188		8	3,943
29	963	52.5	%	0.5		8.7	11.9	0.1	67.0	3.4	1.5	6.9			
(7/10-7/13)			S.E.	0.2		0.8	1.0	0.1	1.4	0.5	0.4	0.7			
			Catch	32		532	728	6	4,084	209	88	418			6,097
30	778	43.4	%	1.9		12.7	8.2		70.4	1.9	0.8	4.0			
(7/17-7/21)			S.E.	0.5		1.1	0.9		1.6	0.5	0.3	0.7			
			Catch	180		1,186	767		6,566	180	72	371			9,322
31	693	46.0	%	0.6		18.5	13.4		55.0	4.2	0.7	7.6			
(7/24-7/26)			S.E.	0.3		1.3	1.2		1.7	0.7	0.3	0.9			
			Catch	25		786	571		2,340	178	31	325			4,256
32	573	37.8	%	0.9		15.2	12.7	0.3	54.5	7.0	1.0	8.2	0.2		
(7/31-8/2)			S.E.	0.3		1.3	1.2	0.2	1.9	1.0	0.4	1.0	0.2		
			Catch	24		426	357	10	1,529	196	29	230	5		2,806
33	703	44.2	%	0.3	1.0	9.1	19.3		49.5	7.5	0.6	12.7			
(8/8-8/10)			S.E.	0.2	0.3	0.9	1.2		1.5	0.8	0.2	1.0			
			Catch	6	21	190	403		1,032	157	12	264			2,085
34-38	235	42.5	%			8.5	17.4	0.9	48.1	11.5	0.4	12.8	0.4		
(8/14-9/12)			S.E.			1.8	2.4	0.6	3.1	2.0	0.4	2.1	0.4		
			Catch			259	532	26	1,467	350	13	389	13		3,049
Total	5,285	46.4	%	0.9	0.1	9.8	16.3	0.1	61.4	4.3	0.7	6.4	<0.1	<0.1	
			S.E.	0.1	<0.1	0.4	0.5	<0.1	0.7	0.3	0.1	0.3	<0.1	<0.1	
			Catch	335	21	3,819	6,389	42	24,054	1688	279	2,515	18	8	39,168

Table 5. Age and sex composition of the Canadian Taku River gill net harvest of sockeye salmon by statistical week, 1988.

Statistical Week	Sample Size	Sex Composition (% Males)		1986	1985		1984			1983		1982		
				0.1	0.2	1.1	0.3	1.2	0.4	1.3	2.2	1.4	2.3	Total
27	152	45.4	%				0.7	44.1		46.7	3.3		5.3	
(6/27-6/29)			S.E.				0.6	3.9		3.9	1.4		1.7	
			Catch				12	775		820	58		93	1,758
28	111	51.4	%		0.9		5.4	28.8		50.5	5.4	0.9	8.1	
(7/4-7/5)			S.E.		0.8		2.0	4.0		4.4	2.0	0.8	2.4	
			Catch		6		39	208		365	39	6	58	721
29	112	43.8	%				7.1	20.5		58.9	1.8	0.9	10.7	
(7/11-7/13)			S.E.				2.4	3.8		4.6	1.2	0.9	2.9	
			Catch				188	543		1,558	48	24	284	2,645
30	139	49.6	%		4.3		11.5	16.5	0.7	60.4	2.9		3.6	
(7/18-7/20)			S.E.		1.7		2.6	3.1	0.7	4.0	1.4		1.5	
			Catch		93		249	358	16	1,308	62		78	2,164
31	108	44.4	%		1.9		16.7	18.5		51.9	1.9	1.9	7.4	
(7/25-7/27)			S.E.		1.3		3.5	3.6		4.7	1.3	1.3	2.5	
			Catch		32		292	324		907	32	32	130	1,749
32	105	51.9	%		6.7	1.0	25.7	15.2		48.6	1.9		1.0	
(8/1-8/2)			S.E.		2.3	0.9	4.0	3.3		4.6	1.3		0.9	
			Catch		57	8	221	131		418	16		8	859
33	109	49.5	%	0.9	5.5		28.4	23.9		37.6	0.9		2.8	
(8/8-8/9)			S.E.	0.9	2.1		4.1	3.8		4.4	0.9		1.5	
			Catch	8	48		246	205		325	8		24	864
34-36	152	39.7	%		2.6	2.0	27.0	19.1		46.7	0.7		2.0	
(8/15-8/31)			S.E.		1.2	1.1	3.4	3.0		3.8	0.6		1.1	
			Catch		33	25	338	239		586	8		25	1,254
Total	988	46.2	%	0.1	2.2	0.3	13.2	23.2	0.1	52.3	2.3	0.5	5.8	
			S.E.	0.1	0.4	0.1	1.0	1.4	0.1	1.7	0.5	0.3	0.8	
			Catch	8	269	33	1,585	2,783	16	6,287	271	62	700	12,014

(Header note: "Brood Year and Age Class" spans the columns 0.1 through 2.3.)

Table 6. Age and sex composition of the Canyon Island (Taku River) fish wheel catch of sockeye salmon by statistical week, 1988.

				Brood Year and Age Class										
		Sex		1986	1985		1984			1983		1982		
Statistical Week	Sample Size	Composition (% Males)		0.1	0.2	1.1	0.3	1.2	2.1	1.3	2.2	1.4	2.3	3.2
23-25	163	29.0	%					17.2		72.4	1.8	0.6	8.0	
(5/29-6/18)			S.E.					3.0		3.5	1.1	0.6	2.1	
26	141	32.1	%		0.7			56.0		34.8	2.1		6.4	
(6/19-6/25)			S.E.		0.7			4.2		4.0	1.2		2.1	
27	191	42.9	%		1.6	0.5	1.0	60.7		28.3	4.2		3.7	
(6/26-7/2)			S.E.		0.9	0.5	0.7	3.5		3.3	1.4		1.4	
28	284	54.1	%		2.1	1.1	3.2	38.7		38.4	9.9	0.4	6.0	0.4
(7/3-7/9)			S.E.		0.8	0.6	1.0	2.9		2.9	1.8	0.3	1.4	0.3
29	415	59.4	%		5.3	0.5	4.1	25.1		50.1	6.7		8.0	0.2
(7/10-7/16)			S.E.		1.1	0.3	1.0	2.1		2.4	1.2		1.3	0.2
30	302	63.5	%		7.9	1.0	8.9	23.2	0.7	45.4	9.3		3.6	
(7/17-7/23)			S.E.		1.5	0.6	1.6	2.4	0.5	2.8	1.7		1.1	
31	260	62.9	%		11.2	4.2	16.2	24.2		33.1	6.5		4.6	
(7/24-7/30)			S.E.		1.9	1.2	2.3	2.6		2.9	1.5		1.3	
32	224	66.1	%	1.3	13.4	8.0	16.1	22.3	0.9	29.9	6.3		1.8	
(7/31-8/6)			S.E.	0.8	2.3	1.8	2.4	2.8	0.6	3.0	1.6		0.9	
33	245	62.4	%	1.2	12.7	13.5	13.5	24.5	0.4	29.4	2.9	0.4	1.6	
(8/7-8/13)			S.E.	0.7	2.1	2.2	2.2	2.7	0.4	2.9	1.1	0.4	0.8	
34	130	66.2	%	0.8	8.5	29.2	15.4	20.8		25.4				
(8/14-8/20)			S.E.	0.8	2.4	4.0	3.2	3.6		3.8				
35-38	95	73.7	%		2.1	45.3	9.5	23.2	2.1	14.7	1.1		2.1	
(8/21-9/18)			S.E.		1.5	5.1	3.0	4.3	1.5	3.6	1.1		1.5	
Total	2,450	56.6	%	0.3	6.5	6.2	8.0	29.8	0.3	38.7	5.6	0.1	4.6	0.1
			S.E.	0.1	0.5	0.5	0.5	0.9	0.1	0.9	0.4	0.1	0.4	0.1

Table 7. Age and sex composition of Taku River and Port Snettisham drainage sockeye salmon escapements, 1988.

System	Sample Size	Sex Composition (% Males)		Brood Year and Age Class: 1986	1985		1984		1983			1982		1981		Total
				0.1	0.2	1.1	0.3	1.2	0.4	1.3	2.2	1.4	2.3	2.4	3.3	
Port Snettisham																
Crescent Lake	412	41.7	%					22.4	0.5	32.2	5.9	24.7	13.4	0.7	0.2	
			S.E.					1.7	0.3	1.9	1.0	1.7	1.4	0.4	0.2	
			Number					269	5	386	71	296	161	9	2	1,199
Speel Lake	659	56.0	%			0.1		40.8		49.9	7.3	0.1	1.7			
			S.E.			0.1		1.1		1.1	0.6	0.1	0.3			
			Number			1		393		485	72	1	17			969
Taku River																
Lake Systems:																
Little Trapper Lake	692	47.4	%				0.1	10.6		71.8	7.0		10.5			
			S.E.				0.1	1.1		1.6	0.9		1.1			
			Number				14	1,126		7,627	748		1,114			10,629
Little Tatsamenie Lake	552	42.9	%		2.8	2.0	1.9	40.1		43.1	6.7		3.5			
			S.E.		0.6	0.5	0.5	1.8		1.8	0.9		0.7			
			Number		55	40	38	797		859	134		69			1,992
Kuthai Lake	375	63.2	%					42.9		46.4	2.9		7.7			
			S.E.					2.5		2.6	0.9		1.4			
Mainstem, River and Slough Spawners:																
Hackett River	403	60.0	%	0.2	16.4		53.6	14.1		15.4			0.2			
			S.E.	0.1	0.6		0.8	0.6		0.6			0.1			
			Number	1	75		244	64		70			1			455
Nahlin River	256	48.8	%	0.4	0.4		19.9	8.2		69.5	0.4	0.8	0.4			
			S.E.	0.4	0.4		2.5	1.7		2.9	0.4	0.5	0.4			
Shustahini Slough	111	57.3	%		9.0	2.7	27.9	9.0		50.5			0.9			
			S.E.		2.7	1.5	4.3	2.7		4.8			0.9			
Coffee's Slough	1	100.0	%		100.0											
			S.E.													

Table 7. (page 2 of 2).

System	Sample Size	Sex Composition (% Males)		Brood Year and Age Class: 1986	1985		1984		1983			1982		1981		Total
				0.1	0.2	1.1	0.3	1.2	0.4	1.3	2.2	1.4	2.3	2.4	3.3	
Tuskwa Slough	109	59.6	%		29.4	3.7	29.4	5.5		31.2			0.9			
			S.E.		4.4	1.8	4.4	2.2		4.5			0.9			
Yonakina Slough	50	70.0	%	2.0	16.0	6.0	14.0	32.0		28.0			2.0			
			S.E.	2.0	5.2	3.4	5.0	6.7		6.4			2.0			
Yehring Creek	190	49.5	%		2.1		1.1	26.8		68.4	0.5		1.1			
			S.E.		1.6		0.5	2.0		2.1	0.3		0.5			
Subtotal River Spawners	1,120		%	0.3	10.9	0.9	30.3	14.4		42.3	0.2	0.2	0.6			

Table 8. Means and standard errors (in parentheses) of basic age-1.3 and age-1.2 scale variables used in postseason 1988 discriminant analyses (scale measurements are in 0.01's of inches at 100X).

Age-1.3

	First Freshwater Zone		First Marine Zone	
Group	No. Circuli Var. No. 1	Width Zone Var. No. 2	No. Circuli Var. No. 1	Width Zone Var. No. 2
Kuthai Lake	17.11 (.17)	197.69 (1.52)	21.71 (.18)	315.44 (2.47)
L. Trapper Lake	8.96 (.10)	105.58 (1.13)	26.58 (.20)	395.48 (2.92)
Mainstem[a]	8.54 (.12)	106.77 (1.52)	29.07 (.23)	437.72 (3.25)
L. Tatsamenie Lake	10.45 (.16)	129.63 (2.27)	27.28 (.21)	418.29 (2.66)
Crescent Lake	6.39 (.17)	73.56 (1.57)	29.35 (.28)	461.19 (4.25)
Speel Lake	8.57 (.10)	96.46 (0.94)	27.39 (.21)	432.07 (3.07)

Age-1.2

	First Freshwater Zone		First Marine Zone	
Group	No. Circuli Var. No. 1	Width Zone Var. No. 2	No. Circuli Var. No. 1	Width Zone Var. No. 2
Kuthai Lake	17.30 (.17)	203.89 (1.72)	22.82 (.20)	335.45 (2.71)
L. Trapper Lake	8.38 (.15)	101.30 (1.76)	29.45 (.32)	433.25 (5.00)
Mainstem[a]	8.72 (.22)	110.07 (3.05)	30.97 (.32)	460.22 (4.56)
L. Tatsamenie Lake	10.41 (.24)	131.00 (3.08)	28.68 (.33)	436.82 (4.64)
Crescent Lake	6.53 (.19)	77.68 (2.20)	31.87 (.32)	498.35 (4.46)
Speel Lake	9.36 (.15)	100.79 (1.57)	28.97 (.24)	456.09 (3.32)

[a] Comprised of samples taken from mainstem, river, and slough spawners at the lower Taku River and the Hackett and Nahlin Rivers.

Table 9. Proportions of age-1.3 standards used to estimate stock composition of District 111 sockeye salmon catches that were classified correctly with in-season and postseason LDF analysis.

	Proportion Correctly Classified	
Stock Group	In-Season	Postseason
Kuthai Lake	0.968	0.946
L.Trapper Lake	0.615	0.605
Mainstem Taku River	0.500	0.509
L.Tatsamenie Lake	0.614	0.530
Crescent Lake	0.697	0.672
Speel Lake	0.640	0.580
Mean	0.672	0.640

Table 10. Age class-specific stock composition estimates and 90% confidence intervals calculated from scale pattern analysis of age-1.3 sockeye salmon by fishery and statistical week in 1988.

Fishery	Stat Week	Sample Size	Classification Group					
			Kuthai	L.Trapper	Mainstem	L.Tatsamenie	Crescent	Speel
District 111	26	100	.553±.118	.258±.082	Trace	.147±.079	.021±.028	.021±.061
	27	100	.163±.134	.666±.107	Trace	.045±.094	.126±.047	Trace
	28	100	.028±.088	.772±.113	Trace	.108±.107	.092±.044	Trace
	29	140	.010±.067	.120±.082	.240±.091	.112±.075	.518±.074	Trace
	30	120	.009±.043	Trace	.594±.143	.009±.112	.187±.063	.201±.089
	31	164	Trace	Trace	.565±.101	.125±.086	.310±.056	Trace
	32	100	Trace	Trace	.447±.118	.076±.096	.477±.077	Trace
	33	96	.022±.019	.015±.079	.449±.095	Trace	.515±.083	Trace
	34-38	99	Trace	.019±.079	.311±.087	Trace	.670±.085	Trace
Taku River Escapement[a]	23-25	112	.799±.042	.124±.045	.045±.043	.031±.058		
	26	41	.664±.076	.233±.092	.103±.079	Trace		
	27	41	.296±.072	.677±.117	.028±.096	Trace		
	28	89	.075±.030	.708±.097	.116±.092	.101±.102		
	29	100	.037±.020	.822±.084	.141±.084	Trace		
	30	100	.004±.011	.660±.094	.128±.094	.209±.108		
	31	82	Trace	.530±.099	.320±.107	.151±.101		
	32	61	.007±.018	.367±.111	.613±.139	.014±.121		
	33	66	Trace	.496±.112	.504±.112	Trace		
	34-38	40	Trace	.383±.141	.617±.141	Trace		
Taku River Catch	27	58	.440±.068	.368±.097	.146±.095	.045±.098		
	28	52	.072±.038	.661±.115	.268±.115	Trace		
	29	78	.020±.019	.695±.104	.113±.102	.172±.116		
	30	71	.012±.014	.867±.096	.122±.097	Trace		
	31	60	Trace	.458±.114	.247±.124	.294±.130		
	32-33	89	.002±.013	.393±.094	.595±.117	.012±.103		
	34-36	78	Trace	.238±.094	.740±.119	.022±.097		

[a] Escapement samples were taken in fish wheels at Canyon Island.

Table 11. Age class-specific stock composition estimates and 90% confidence intervals calculated from scale pattern analysis of age-1.2 sockeye salmon by fishery and statistical week in 1988.

Fishery	Stat Week	Sample Size	Kuthai	L.Trapper	Mainstem	L.Tatsamenie	Crescent	Speel
			Classification Group					
District 111	26	78	.962±.022	.029±.022	Trace	Trace	Trace	.009±.016
	27	99	.868±.034	Trace	Trace	.018±.028	Trace	.087±.034
	28	62	.724±.057	Trace	Trace	.083±.049	Trace	.193±.060
	29	90	.134±.037	.393±.120	Trace	.058±.085	.088±.098	.327±.086
	30	56	.057±.037	.214±.155	Trace	.398±.144	.190±.085	.141±.092
	31	80	Trace	Trace	.367±.143	.208±.126	.116±.072	.309±.082
	32	62	.036±.029	Trace	Trace	.446±.093	.372±.094	.147±.089
	33	69	Trace	.085±.099	.305±.149	.279±.111	.203±.084	.228±.082
	34-38	34	Trace	.348±.308	.071±.150	Trace	.274±.134	.308±.129
Taku River Escapement[a]	23-25	33	.895±.061	.023±.058	.021±.068	.061±.087		
	26	77	.926±.037	Trace	.423±.037	.032±.045		
	27	94	.843±.042	.097±.053	.030±.049	.030±.054		
	28	101	.610±.051	.152±.074	.152±.082	.086±.071		
	29	94	.315±.050	.212±.097	.068±.107	.404±.113		
	30	65	.005±.026	Trace	.603±.137	.393±.135		
	31	61	Trace	.394±.122	.473±.156	.133±.142		
	32	42	.000±.027	.003±.147	.365±.205	.632±.190		
	33	59	.045±.036	.033±.129	.481±.176	.441±.153		
	34-38	46	Trace	Trace	.822±.147	.178±.147		
Taku River Catch	27-28	96	.892±.032	.038±.032	Trace	.070±.038		
	29-31	63	.199±.053	.347±.134	.233±.143	.221±.125		
	32-36	71	.012±.022	.390±.143	.425±.159	.172±.125		

[a] Escapement samples were taken in fish wheels at Canyon Island.

Table 12. Estimated contribution of sockeye salmon stocks by age class to the District 111 drift gill net fishery, 1988.

Statistical Week		Age Groups						90% C.I. [a]			Effort	
		1.3	1.2	0.+	2.+	Others	Total	Lower	Upper	Percent	Boat Days	CPUE
26	Kuthai	958	730	0	120	0	1,808	1,639	1,977	0.657		23.170
(6/19-6/22)	L. Trapper	447	22	0	61	0	530	293	767	0.193		6.789
	Mainstem	0	0	0	0	0	0	0	0	0.000		0.000
	L. Tatsamenie	254	0	37	20	0	311	85	537	0.113		3.993
	Crescent	36	0	0	8	9	53	0	133	0.019		0.683
	Speel	36	7	0	4	0	47	0	222	0.017		0.610
	Total	1,731	759	37	213	9	2,749				78	
27	Kuthai	423	1,460	0	99	0	1,982	1,760	2,204	0.408		9.050
(6/26-6/29)	L. Trapper	1,728	0	0	167	0	1,895	1,424	2,366	0.390		8.653
	Mainstem	0	0	0	0	0	0	0	0	0.000		0.000
	L. Tatsamenie	117	77	226	11	0	431	22	840	0.089		1.971
	Crescent	327	0	0	51	17	395	193	597	0.081		1.804
	Speel	0	147	0	11	0	158	63	253	0.032		0.720
	Total	2,595	1,684	226	339	17	4,861				219	
28	Kuthai	76	426	0	33	0	535	413	657	0.136		5.567
(7/3-7/5)	L. Trapper	2,092	0	0	262	0	2,354	1,839	2,869	0.597		24.520
	Mainstem	0	0	0	0	0	0	0	0	0.000		0.000
	L. Tatsamenie	293	49	245	28	0	615	136	1,094	0.156		6.400
	Crescent	249	0	0	58	8	315	119	511	0.080		3.284
	Speel	0	113	0	11	0	124	63	185	0.032		1.301
	Total	2,710	588	245	392	8	3,943				96	
29	Kuthai	41	98	0	10	0	149	62	236	0.024		0.809
(7/10-7/13)	L. Trapper	490	286	1	97	0	874	304	1,444	0.143		4.773
	Mainstem	980	0	549	8	0	1,537	924	2,150	0.252		8.403
	L. Tatsamenie	457	42	14	35	0	548	34	1,062	0.090		2.999
	Crescent	2,116	64	6	454	88	2,728	2,212	3,244	0.447		14.904
	Speel	0	238	0	23	0	261	153	369	0.043		1.425
	Total	4,084	728	570	627	88	6,097				183	
30	Kuthai	59	44	0	8	0	111	0	259	0.012		0.307
(7/17-7/21)	L. Trapper	0	164	0	22	0	186	0	384	0.020		0.516
	Mainstem	3,900	0	1,358	36	2	5,296	3,745	6,847	0.568		14.711
	L. Tatsamenie	59	305	8	27	0	399	0	1,623	0.043		1.109
	Crescent	1,228	146	0	310	70	1,754	1,064	2,444	0.188		4.872
	Speel	1,320	108	0	148	0	1,576	607	2,545	0.169		4.377
	Total	6,566	767	1,366	551	72	9,322				360	

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Table 12. (page 2 of 2).

Statistical Week		Age Groups 1.3	1.2	0.+	2.+	Others	Total	90% C.I. [a] Lower	Upper	Percent	Effort Boat Days	CPUE
31	Kuthai	0	0	0	0	0	0	0	0	0.000		0.000
(7/24-7/26)	L. Trapper	0	0	0	0	0	0	0	0	0.000		0.000
	Mainstem	1,322	210	801	29	31	2,393	1,976	2,810	0.562		21.358
	L. Tatsamenie	293	119	10	66	0	488	136	840	0.115		4.351
	Crescent	725	66	0	370	0	1,161	932	1,390	0.273		10.369
	Speel	0	176	0	38	0	214	132	296	0.050		1.917
	Total	2,340	571	811	503	31	4,256				112	
32	Kuthai	0	13	0	2	0	15	0	32	0.005		0.224
(7/31-8/2)	L. Trapper	0	0	0	0	0	0	0	0	0.000		0.000
	Mainstem	683	0	441	11	0	1,135	835	1,435	0.405		17.207
	L. Tatsamenie	116	159	9	47	0	331	82	580	0.118		5.015
	Crescent	730	133	10	361	34	1,268	1,062	1,474	0.452		19.196
	Speel	0	52	0	5	0	57	4	110	0.021		0.874
	Total	1,529	357	460	426	34	2,806				66	
33	Kuthai	23	0	0	4	0	27	0	59	0.013		0.294
(8/8-8/10)	L. Trapper	15	34	0	17	0	66	0	215	0.032		0.717
	Mainstem	463	123	195	13	18	812	621	1,003	0.389		8.824
	L. Tatsamenie	0	72	1	15	3	91	17	165	0.044		0.993
	Crescent	531	82	0	347	12	972	818	1,126	0.466		10.568
	Speel	0	92	0	25	0	117	61	173	0.056		1.275
	Total	1,032	403	196	421	33	2,085				92	
34-39	Kuthai	0	0	0	0	0	0	0	0	0.000		0.000
(8/14-9/19)	L. Trapper	28	184	0	74	1	287	0	619	0.094		0.325
	Mainstem	456	38	259	10	4	767	515	1,019	0.252		0.867
	L. Tatsamenie	0	0	0	0	0	0	0	0	0.000		0.000
	Crescent	983	146	26	608	21	1,784	1,528	2,040	0.585		2.016
	Speel	0	164	0	47	0	211	92	330	0.069		0.238
	Total	1,467	532	285	739	26	3,049				885	
Total	Kuthai	1,580	2,771	0	276	0	4,627	4,275	4,979	0.118		2.211
	L. Trapper	4,800	690	1	700	1	6,192	5,172	7,212	0.158		2.961
	Mainstem	7,804	371	3,603	107	55	11,940	10,167	13,713	0.305		5.710
	L. Tatsamenie	1,589	823	550	249	3	3,214	1,664	4,764	0.082		1.538
	Crescent	6,925	637	42	2,567	259	10,430	9,424	11,436	0.266		4.988
	Speel	1,356	1,097	0	312	0	2,765	1,755	3,775	0.071		1.323
	Total	24,054	6,389	4,196	4,211	318	39,168				2,091	

[a] Confidence intervals are minimum estimates based on the allocation of fish aged 1.3 and 1.2, age composition and sample sizes.

Table 13. Estimated contribution of sockeye salmon stocks by age class to the Taku River gillnet fishery, 1988.

Stat Week		Age Groups 1.3	1.2	0.+	2.+	Others	Total	90% C.I. [a] Lower	Upper	Percent	Effort Boat Days	CPUE
27	Kuthai	361	692	0	89	0	1,142	1,021	1,263	0.649		57.100
(6/27-6/29)	L. Trapper	302	29	0	52	0	383	240	526	0.218		19.150
	Mainstem	120	0	12	1	0	133	4	262	0.076		6.650
	L. Tatsamenie	37	54	0	9	0	100	0	241	0.057		5.000
	Total	820	775	12	151	0	1,758				20	
28	Kuthai	26	185	0	30	0	241	170	312	0.334		20.083
(7/4-7/5)	L. Trapper	241	8	0	63	0	312	219	405	0.433		26.000
	Mainstem	98	0	44	2	6	150	80	220	0.208		12.500
	L. Tatsamenie	0	15	1	2	0	18	0	80	0.025		1.500
	Total	365	208	45	97	6	721				12	
29	Kuthai	31	108	0	19	0	158	83	233	0.060		5.643
(7/11-7/13)	L. Trapper	1,083	188	2	274	0	1,547	1,232	1,862	0.585		55.250
	Mainstem	176	127	176	5	24	508	217	799	0.192		18.143
	L. Tatsamenie	268	120	10	34	0	432	112	752	0.163		15.429
	Total	1,558	543	188	332	24	2,645				28	
30	Kuthai	16	71	0	5	0	92	5	179	0.042		3.286
(7/18-7/20)	L. Trapper	1,132	125	3	128	0	1,388	1,081	1,695	0.642		49.571
	Mainstem	160	83	346	2	0	591	293	889	0.273		21.107
	L. Tatsamenie	0	79	9	5	0	93	0	280	0.043		3.321
	Total	1,308	358	358	140	0	2,164				28	
31	Kuthai	0	64	0	9	0	73	0	182	0.042		2.808
(7/25-7/27)	L. Trapper	416	113	1	116	0	646	322	970	0.369		24.846
	Mainstem	224	75	304	5	32	640	297	983	0.366		24.615
	L. Tatsamenie	267	72	19	32	0	390	70	710	0.223		15.000
	Total	907	324	324	162	32	1,749				26	
32	Kuthai	1	2	0	0	0	3	0	13	0.003		0.231
(8/1-8/2)	L. Trapper	164	51	0	20	0	235	159	311	0.274		18.077
	Mainstem	248	55	276	2	7	588	493	683	0.685		45.231
	L. Tatsamenie	5	23	2	2	1	33	0	109	0.038		2.539
	Total	418	131	278	24	8	859				13	
33	Kuthai	1	2	0	0	0	3	0	23	0.004		0.231
(8/8-8/9)	L. Trapper	128	80	0	27	0	235	93	377	0.272		18.077
	Mainstem	192	88	299	3	0	582	410	754	0.673		44.769
	L. Tatsamenie	4	35	3	2	0	44	0	188	0.051		3.385
	Total	325	205	302	32	0	864				13	

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Table 13. (page 2 of 2).

Stat Week		Age Groups						90% C.I. [a]				
		1.3	1.2	0.+	2.+	Others	Total	Lower	Upper	Percent	Effort Boat Days	CPUE
34-36	Kuthai	0	3	0	0	0	3	0	24	0.002		0.066
(8/15-8/31)	L. Trapper	140	93	0	26	0	259	94	424	0.207		5.705
	Mainstem	433	102	369	4	22	930	734	1,126	0.743		20.485
	L. Tatsamenie	13	41	2	3	3	62	0	214	0.049		1.366
	Total	586	239	371	33	25	1254				45.4	
Total	Kuthai	436	1,127	0	152	0	1,715	1,527	1,903	0.143		9.250
	L. Trapper	3,606	687	6	706	0	5,005	4,445	5,565	0.417		26.996
	Mainstem	1,651	530	1,826	24	91	4,122	3,562	4,682	0.343		22.233
	L. Tatsamenie	594	439	46	89	4	1,172	669	1,675	0.098		6.322
	Total	6,287	2,783	1,878	971	95	12,014				185.4	

[a] Confidence intervals are minimum estimates based on the allocation of fish aged 1.3 and 1.2, age composition and sample sizes.

Table 14. Estimated contribution of sockeye salmon stocks by age class to the Canyon Island fish wheel catches, 1988.

Statistical Week		Age Groups					
		1.3	1.2	0.+	2.+	Others	Total
23-25	Kuthai	0.799	0.895	0.000	0.797	0.000	0.811
(5/29-6/18)	L. Trapper	0.124	0.023	0.000	0.169	0.000	0.110
	Mainstem	0.045	0.021	0.000	0.005	1.000	0.043
	L. Tatsamenie	0.031	0.061	0.000	0.029	0.000	0.036
26	Kuthai	0.664	0.926	0.000	0.820	0.000	0.819
(6/19-6/25)	L. Trapper	0.233	0.000	0.000	0.154	0.000	0.094
	Mainstem	0.103	0.042	0.949	0.008	0.000	0.067
	L. Tatsamenie	0.000	0.032	0.051	0.018	0.000	0.020
27	Kuthai	0.296	0.843	0.000	0.528	0.000	0.637
(6/26-7/2)	L. Trapper	0.677	0.097	0.008	0.447	0.000	0.286
	Mainstem	0.028	0.030	0.914	0.003	0.488	0.053
	L. Tatsamenie	0.000	0.030	0.078	0.022	0.512	0.025
28	Kuthai	0.075	0.610	0.000	0.250	0.000	0.305
(7/3-7/9)	L. Trapper	0.708	0.152	0.004	0.638	0.000	0.430
	Mainstem	0.116	0.152	0.936	0.011	0.602	0.166
	L. Tatsamenie	0.101	0.086	0.060	0.101	0.398	0.099
29	Kuthai	0.037	0.315	0.000	0.091	0.000	0.111
(7/10-7/16)	L. Trapper	0.822	0.212	0.005	0.795	0.000	0.582
	Mainstem	0.141	0.068	0.881	0.010	0.365	0.175
	L. Tatsamenie	0.000	0.404	0.114	0.104	0.635	0.132
30	Kuthai	0.004	0.005	0.000	0.003	0.000	0.003
(7/17-7/23)	L. Trapper	0.660	0.000	0.002	0.666	0.000	0.391
	Mainstem	0.128	0.603	0.912	0.024	0.413	0.359
	L. Tatsamenie	0.209	0.393	0.086	0.307	0.587	0.248
31	Kuthai	0.000	0.000	0.000	0.000	0.000	0.000
(7/24-7/30)	L. Trapper	0.530	0.394	0.002	0.799	0.000	0.360
	Mainstem	0.320	0.473	0.964	0.039	0.639	0.516
	L. Tatsamenie	0.151	0.133	0.034	0.162	0.361	0.125
32	Kuthai	0.007	0.000	0.000	0.004	0.000	0.002
(7/31-8/6)	L. Trapper	0.367	0.003	0.000	0.465	0.000	0.152
	Mainstem	0.613	0.365	0.950	0.060	0.547	0.606
	L. Tatsamenie	0.014	0.632	0.050	0.471	0.453	0.239
33	Kuthai	0.000	0.045	0.000	0.022	0.000	0.012
(8/7-8/13)	L. Trapper	0.496	0.033	0.001	0.615	0.000	0.184
	Mainstem	0.504	0.481	0.961	0.062	0.629	0.620
	L. Tatsamenie	0.000	0.441	0.038	0.301	0.371	0.185
34	Kuthai	0.000	0.000	0.000	0.000	0.000	0.009
(8/14-8/20)	L. Trapper	0.383	0.000	0.000	0.000	0.000	0.097
	Mainstem	0.617	0.822	0.990	0.000	0.854	0.822
	L. Tatsamenie	0.000	0.178	0.010	0.000	0.146	0.082
35	Kuthai	0.000	0.000	0.000	0.000	0.000	0.012
(8/21-9/18)	L. Trapper	0.383	0.000	0.000	0.577	0.000	0.087
	Mainstem	0.617	0.822	0.991	0.203	0.820	0.778
	L. Tatsamenie	0.000	0.178	0.009	0.220	0.180	0.135

Table 15. Estimated catches, escapements, total run sizes and exploitation rates of Snettisham and Taku River sockeye salmon, 1988. [a]

	District 111 Catch	Inriver Catches						District 111 Commercial Exploitation Rate	Total Commercial Exploitation Rate
Stock Group	Commercial	Commercial	Test	Food	Total Catch	Escapement	Total Run		
Crescent Lake	10,430	0	0	0	10,430	1,199	11,629	0.897	0.897
Speel Lake	2,765	0	0	0	2,765	969	3,734	0.740	0.740
Snettisham Total	13,195	0	0	0	13,195	2,168	15,363	0.859	0.859
L. Trapper Lake	6,192	5,005	269	102	11,568	10,629	22,197	0.279	0.521
L. Tatsamenie Lake	3,214	1,172	57	24	4,467	1,992	6,459	0.498	0.692
Kuthai Lake	4,627	1,715	148	35	6,525	n/d	n/d	n/d	n/d
Mainstem Taku River	11,940	4,122	240	84	16,386	n/d	n/d	n/d	n/d
Taku Total	25,973	12,014	714	245	38,946	74,055	113,001	0.230	0.336

[a] The stock composition of weekly test fishery catches was assumed to equal the commercial fishery stock composition estimates for the same week, while the stock composition of the food fishery was assumed to be equal to the stock composition of the total season's Canadian commercial harvest.

Table 16. Classification of 1988 Chilkoot and Chilkat age-1.3 scale samples using LDF functions created from Taku River and Port Snettisham age-1.3 standards.

Actual Group of Origin	Sample Size	Classified Group of Origin					
		Kuthai	L. Trapper	Mainstem	L. Tatsamenie	Crescent	Speel
Chilkoot	100	0.000	0.000	0.000	0.000	1.000	0.000
Chilkat	100	0.199	0.000	0.000	0.801	0.000	0.000

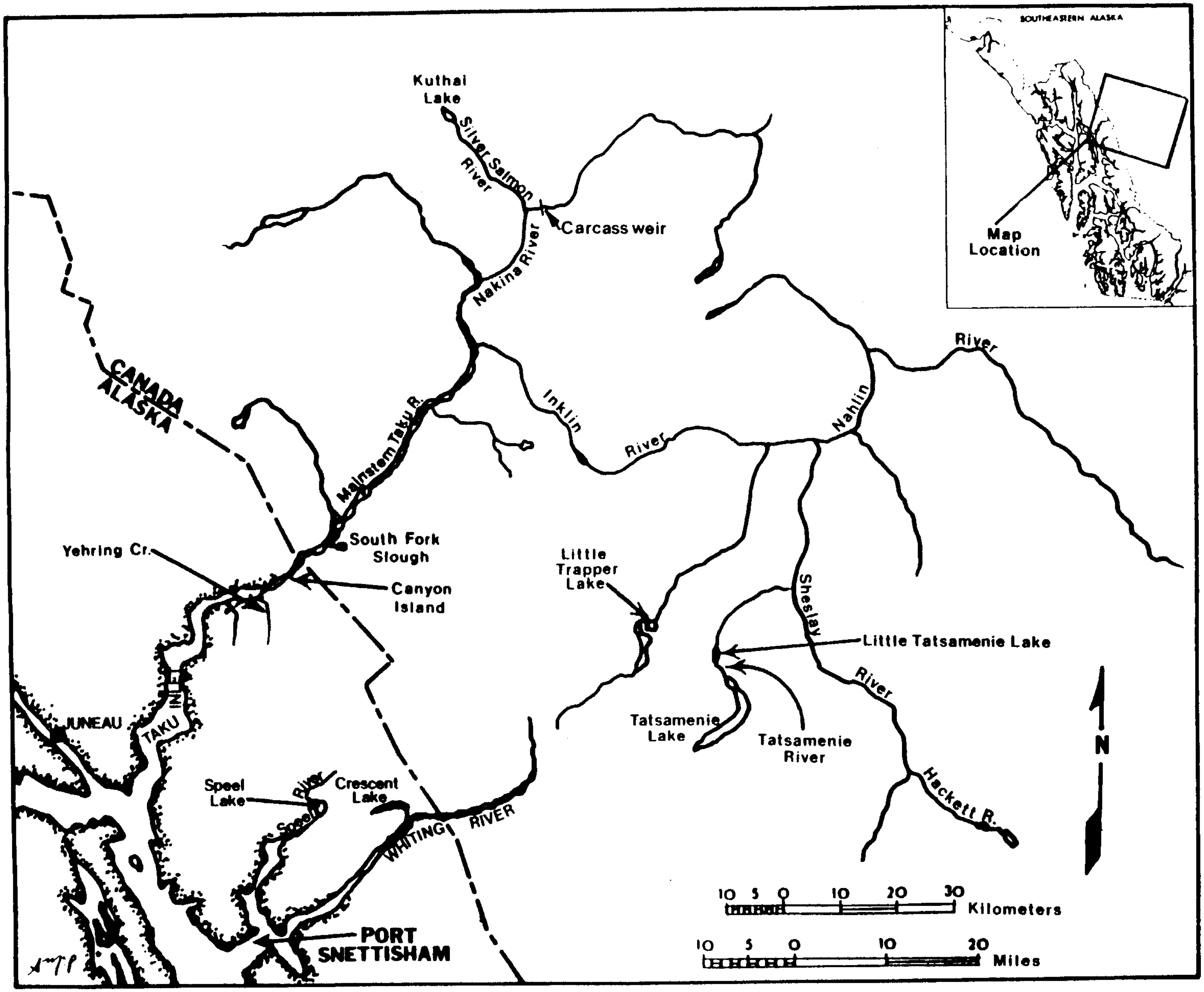

Figure 1. Taku River and Port Snettisham drainages.

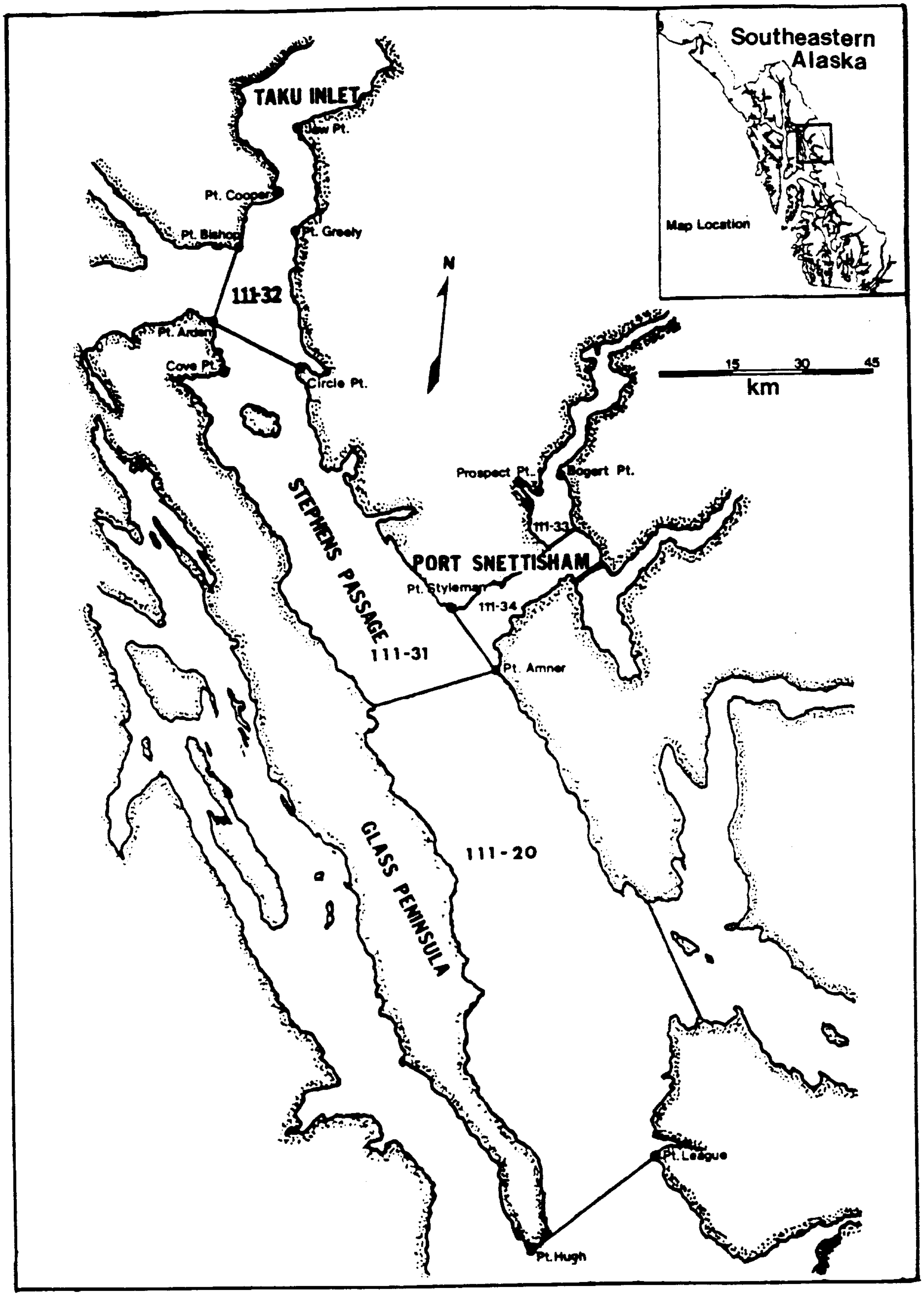

Figure 2. District 111 fishing area showing subdistricts.

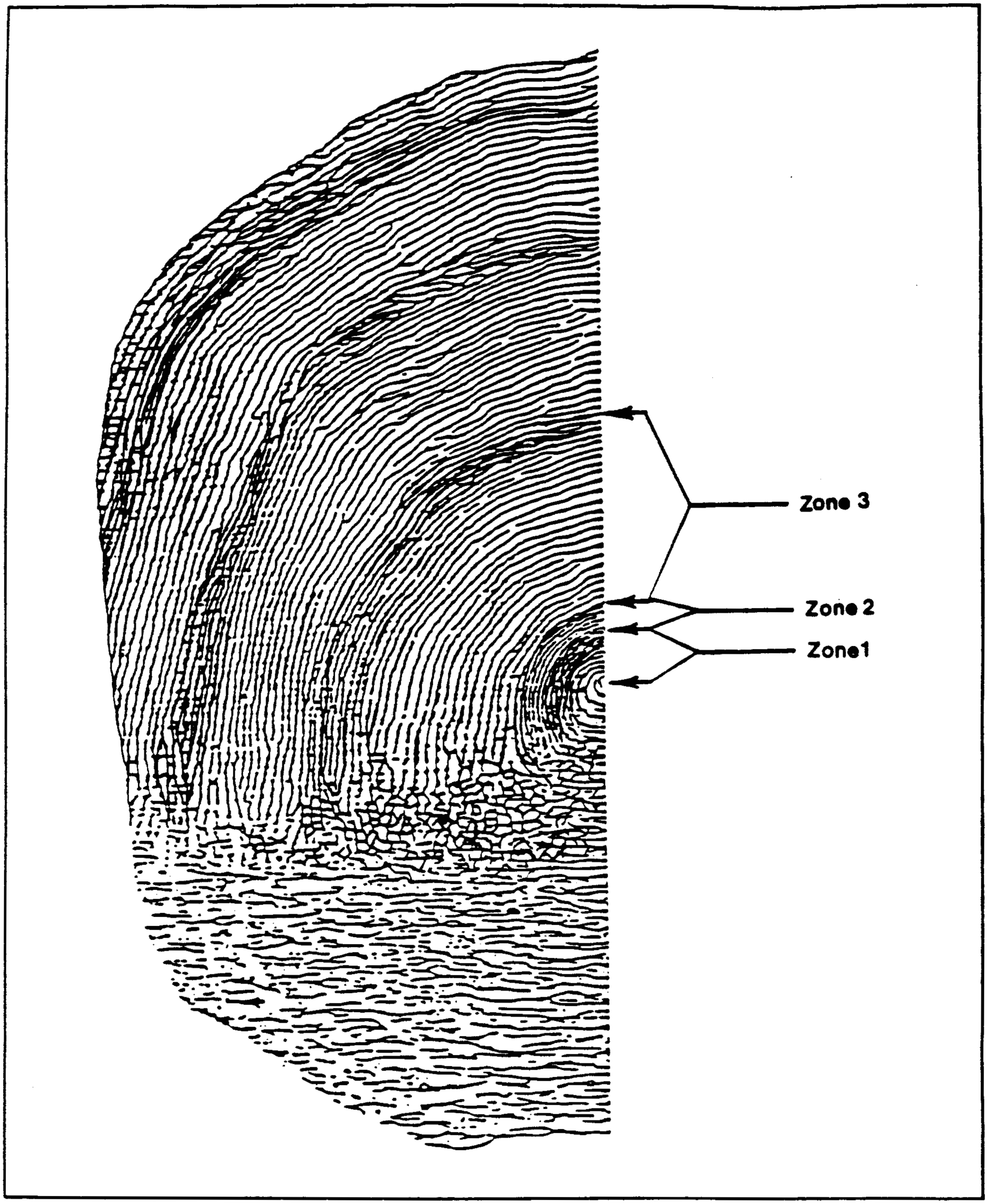

Figure 3. Typical age-1. sockeye salmon scale showing the zones used to measure scale patterns.

APPENDICES

Appendix A.1. Scale pattern variables screened for linear discriminant function of age-1.3 and age-1.2 sockeye salmon, 1988.

Variable No.	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)
	Freshwater Plus Growth (PG)
61	Number of circuli in the zone
62	Distance across the zone
	Combined Freshwater Zones
65	Total number of circuli in the combined zones
66	Total distance across the combined zones
67	Relative Distance: (Variable #2)/(Variable #66)

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Variable No.	Description
	First Freshwater (FW) 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
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	Average distance between circuli: (Variable #71)/(Variable #70)
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 function analyses of age-1.3 sockeye salmon scales used postseason to estimate the stock composition of District 111 catches.

Actual Group of Origin	Sample Size	Classified Group of Origin: Kuthai	L. Trapper	Mainstem	L. Tatsamenie	Crescent	Speel
Kuthai	168	0.946	0.006	0.000	0.048	0.000	0.000
L. Trapper	200	0.005	0.605	0.095	0.130	0.030	0.135
Mainstem	226	0.018	0.115	0.509	0.133	0.084	0.142
L. Tatsamenie	200	0.010	0.150	0.210	0.530	0.010	0.090
Crescent	119	0.000	0.059	0.059	0.000	0.672	0.210
Speel	200	0.000	0.160	0.120	0.065	0.075	0.580

Mean proportion correctly classified: 0.640

Actual Group of Origin	Sample Size	Classified Group of Origin: Kuthai	L.Trapper	L. Tatsamenie	Crescent	Speel
Kuthai	168	0.970	0.000	0.030	0.000	0.000
L.Trapper	200	0.000	0.665	0.130	0.040	0.165
L. Tatsamenie	200	0.025	0.220	0.535	0.020	0.200
Crescent	119	0.000	0.092	0.008	0.689	0.210
Speel	200	0.000	0.205	0.050	0.100	0.645

Mean proportion correctly classified: 0.701

Actual Group of Origin	Sample Size	Classified Group of Origin: Kuthai	L.Trapper	Mainstem	L. Tatsamenie	Crescent
Kuthai	168	0.964	0.000	0.000	0.036	0.000
L.Trapper	200	0.005	0.725	0.110	0.125	0.035
Mainstem	226	0.013	0.159	0.597	0.146	0.084
L. Tatsamenie	200	0.005	0.245	0.240	0.505	0.005
Crescent	119	0.000	0.202	0.101	0.000	0.697

Mean proportion correctly classified: 0.698

Actual Group of Origin	Sample Size	Classified Group of Origin: Kuthai	Mainstem	L.Tatsamenie	Crescent	Speel
Kuthai	168	0.976	0.000	0.024	0.000	0.000
Mainstem	226	0.013	0.558	0.204	0.053	0.173
L. Tatsamenie	200	0.020	0.285	0.510	0.000	0.185
Crescent	119	0.000	0.050	0.025	0.647	0.277
Speel	200	0.000	0.160	0.055	0.070	0.715

Mean proportion correctly classified: 0.681

Actual Group of Origin	Sample Size	Classified Group of Origin: Kuthai	L. Trapper	L. Tatsamenie	Crescent
Kuthai	168	0.976	0.000	0.024	0.000
L. Trapper	200	0.000	0.750	0.215	0.035
L. Tatsamenie	200	0.025	0.285	0.655	0.035
Crescent	119	0.000	0.218	0.025	0.756

Mean proportion correctly classified: 0.784

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Appendix B.1. (page 2 of 2).

Actual Group of Origin	Sample Size	Classified Group of Origin			
		Kuthai	L. Trapper	Mainstem	Crescent
Kuthai	168	0.988	0.006	0.006	0.000
L. Trapper	200	0.000	0.780	0.180	0.040
Mainstem	226	0.022	0.212	0.677	0.088
Crescent	119	0.000	0.176	0.092	0.731

Mean proportion correctly classified: 0.794

Actual Group of Origin	Sample Size	Classified Group of Origin		
		Mainstem	L. Tatsamenie	Crescent
Mainstem	226	0.712	.217	.071
L. Tatsamenie	200	0.335	.645	.020
Crescent	119	0.160	.092	.748

Mean proportion correctly classified: 0.702

Actual Group of Origin	Sample Size	Classified Group of Origin		
		L. Trapper	Mainstem	Crescent
L. Trapper	200	0.780	.195	.025
Mainstem	226	0.208	.712	.080
Crescent	119	0.168	.101	.731

Mean proportion correctly classified: 0.741

Appendix B.2. Classification matrices from discriminant function analyses of age-1.3 sockeye salmon scales used postseason to estimate the stock composition of Canadian Taku River and Canyon Island catches.

Actual Group of Origin	Sample Size	Classified Group of Origin			
		Kuthai	L. Trapper	Mainstem	L. Tatsamenie
Kuthai	168	0.970	0.000	0.000	0.030
L.Trapper	200	0.005	0.755	0.125	0.115
Mainstem	200	0.013	0.159	0.668	0.159
L.Tatsamenie	226	0.005	0.200	0.250	0.545

Mean proportion correctly classified: 0.735

Actual Group of Origin	Sample Size	Classified Group of Origin		
		Kuthai	L.Trapper	Mainstem
Kuthai	168	0.988	0.012	0.000
L.Trapper	200	0.000	0.815	0.185
Mainstem	226	0.022	0.212	0.765

Mean proportion correctly classified: 0.856

Actual Group of Origin	Sample Size	Classified Group of Origin		
		L. Trapper	Mainstem	L.Tatsamenie
L. Trapper	200	0.765	0.145	0.090
Mainstem	226	0.164	0.708	0.128
L.Tatsamenie	200	0.200	0.255	0.545

Mean proportion correctly classified: 0.673

Actual Group of Origin	Sample Size	Classified Group of Origin	
		L. Trapper	Mainstem
L. Trapper	200	0.805	0.195
Mainstem	226	0.230	0.770

Mean proportion correctly classified: 0.787

Appendix B.3. Classification matrices from discriminant function analyses of age-1.2 sockeye salmon scales used postseason to estimate the stock composition of District 111 catches.

Actual Group of Origin	Sample Size	Classified Group of Origin					
		Kuthai	L. Trapper	Mainstem	L. Tatsamenie	Crescent	Speel
Kuthai	100	0.970	0.000	0.000	0.030	0.000	0.000
L. Trapper	73	0.000	0.534	0.178	0.096	0.041	0.151
Mainstem	99	0.030	0.141	0.535	0.111	0.071	0.111
L. Tatsamenie	100	0.040	0.140	0.180	0.530	0.040	0.070
Crescent	87	0.000	0.011	0.241	0.046	0.609	0.092
Speel	100	0.000	0.060	0.070	0.060	0.040	0.770

Mean proportion correctly classified: 0.658

Actual Group of Origin	Sample Size	Classified Group of Origin				
		Kuthai	L.Trapper	L. Tatsamenie	Crescent	Speel
Kuthai	100	0.980	0.000	0.020	0.000	0.000
L.Trapper	73	0.000	0.630	0.123	0.068	0.178
L. Tatsamenie	100	0.040	0.280	0.530	0.040	0.110
Crescent	87	0.000	0.126	0.023	0.655	0.195
Speel	100	0.000	0.110	0.050	0.040	0.800

Mean proportion correctly classified: 0.719

Actual Group of Origin	Sample Size	Classified Group of Origin				
		L. Trapper	Mainstem	L. Tatsamenie	Crescent	Speel
L. Trapper	73	0.589	0.151	0.082	0.027	0.151
Mainstem	99	0.152	0.556	0.121	0.061	0.111
L. Tatsamenie	100	0.180	0.210	0.500	0.020	0.090
Crescent	87	0.023	0.195	0.034	0.609	0.138
Speel	100	0.050	0.070	0.020	0.050	0.810

Mean proportion correctly classified: 0.613

Actual Group of Origin	Sample Size	Classified Group of Origin			
		Mainstem	L. Tatsamenie	Crescent	Speel
Mainstem	99	0.576	0.242	0.091	0.091
L. Tatsamenie	100	0.230	0.650	0.040	0.080
Crescent	87	0.207	0.011	0.632	0.149
Speel	100	0.080	0.070	0.080	0.770

Mean proportion correctly classified: 0.657

Actual Group of Origin	Sample Size	Classified Group of Origin			
		Kuthai	L. Tatsamenie	Crescent	Speel
Kuthai	100	0.980	0.020	0.000	0.000
L. Tatsamenie	100	0.030	0.800	0.060	0.110
Crescent	87	0.000	0.069	0.724	0.207
Speel	100	0.000	0.100	0.070	0.830

Mean proportion correctly classified: 0.834

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Appendix B.3. (page 2 of 2).

Actual Group of Origin	Sample Size	Classified Group of Origin			
		L. Trapper	Mainstem	Crescent	Speel
L. Trapper	73	0.644	0.164	0.041	0.151
Mainstem	99	0.182	0.626	0.091	0.101
Crescent	87	0.023	0.207	0.609	0.161
Speel	100	0.070	0.060	0.060	0.810

Mean proportion correctly classified: 0.672

Actual Group of Origin	Sample Size	Classified Group of Origin		
		Kuthai	L. Trapper	Speel
Kuthai	100	1.000	.000	.000
L. Trapper	200	0.000	.836	.164
Speel	119	0.000	.120	.880

Mean proportion correctly classified: 0.905

Actual Group of Origin	Sample Size	Classified Group of Origin		
		Kuthai	L. Tatsamenie	Speel
Kuthai	100	1.000	.000	.000
L. Tatsamenie	100	0.030	.840	.130
Speel	100	0.000	.120	.880

Mean proportion correctly classified: 0.907

Appendix B.4. Classification matrices from discriminant function analyses of age-1.2 sockeye salmon scales used postseason to estimate the stock composition of Canadian Taku River and Canyon Island catches.

Actual Group of Origin	Sample Size	Classified Group of Origin			
		Kuthai	L. Trapper	Mainstem	L. Tatsamenie
Kuthai	100	1.000	0.000	0.000	0.000
L.Trapper	73	0.000	0.712	0.219	0.068
Mainstem	99	0.040	0.172	0.626	0.162
L.Tatsamenie	100	0.040	0.220	0.220	0.520

Mean proportion correctly classified: 0.715

Actual Group of Origin	Sample Size	Classified Group of Origin		
		L. Trapper	Mainstem	L. Tatsamenie
L. Trapper	73	0.753	0.178	0.068
Mainstem	99	0.172	0.677	0.152
L. Tatsamenie	100	0.240	0.270	0.490

Mean proportion correctly classified: 0.640

Actual Group of Origin	Sample Size	Classified Group of Origin		
		Kuthai	Mainstem	L.Tatsamenie
Kuthai	100	0.980	0.000	0.020
Mainstem	99	0.030	0.737	0.232
L.Tatsamenie	100	0.020	0.240	0.740

Mean proportion correctly classified: 0.819

Actual Group of Origin	Sample Size	Classified Group of Origin		
		Kuthai	L. Trapper	L.Tatsamenie
Kuthai	100	1.000	0.000	0.000
L. Trapper	73	0.000	0.863	0.137
L.Tatsamenie	100	0.050	0.280	0.670

Mean proportion correctly classified: 0.844

Actual Group of Origin	Sample Size	Classified Group of Origin	
		Mainstem	L. Tatsamenie
Mainstem	99	0.768	0.232
L. Tatsamenie	100	0.240	0.760

Mean proportion correctly classified: 0.764