Sockeye Stock Composition Estimates for Fraser River First Nations Catches (1989 to 1995): A Comparison Between Run Reconstruction Models and Scale-based Discriminant Function Models

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Pacific Salmon Commission
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TABLE OF CONTENTS

ABSTRACT

In the past, the Pacific Salmon Commission has used run reconstruction models to assign stock of origin to sockeye salmon (*Oncorhynchus nerka)* catches in the Fraser River First Nations fishery. Sockeye salmon catches from this fishery have also been allocated to stock groups using linear discriminant function analysis of scale parameters. This latter method has been applied to fishery catches from which scale samples have been collected. In this report, comparisons are made of the stock proportions and catches derived using the two techniques.

The results indicated that the two estimation methods provided consistent assignments of stock specific sockeye catch in the First Nations fishery in the Fraser River watershed. The collection of scale samples from the First Nations fishery over the course of the study was intermittent so only partial comparisons of stock group catch by area were possible. For most of the stock groups analyzed, no significant differences were identified in the paired sample t-tests used to assess differences between the mean stock proportions derived from the two estimation procedures. There were exceptions to this, most notably in the estimation of the Chilko/Quesnel and Late Stuart/Stellako stock groups in the portion of the fishery taking place between Hope and Churn Creek. Additional work is required in future years to identify the possible reasons for the observed differences.

As the catch if the Fraser River First Nations fishery has increased in recent years, so to has the importance of accurately apportioning the catch into its' component stock groups. We recommend that stock specific catches from this fishery should be assigned in the future using scale analysis whenever adequate scale samples are available. Run reconstruction models should be used to estimate catch by stock in Fraser River First Nations fishery catches only when scale samples are not available.

INTRODUCTION

Sockeye salmon, *Oncorhynchus nerka*, comprise the largest component of the annual Fraser First Nations salmon catch (Macdonald, 1992). Fisheries and Oceans Canada (DFO) has the responsibility, in conjunction with Fraser First Nations, to estimate the weekly catch by species and area throughout the Fraser River drainage basin. The Pacific Salmon Commission (PSC) has the responsibility to estimate the stock composition of catch in all fisheries where Fraser River sockeye salmon are harvested, including the First Nations fishery in the Fraser River. In past years, the assessment of catch by stock in this fishery was accomplished through the use of run-reconstruction methodologies. Beginning in 1987, the PSC has annually requested that DFO provide scale samples from selected First Nations fishing sites along the Fraser River. Initially, scale samples were requested to corroborate the results of the run reconstruction analyses, and to test the hypothesis that the scale based DFA models and the run reconstruction models provide consistent catch by stock estimates; ultimately, the goal is to estimate the catch by stock directly in these important fisheries.

This report contains a brief overview of the run reconstruction models currently in use. It also documents the scale samples collected by DFO and First Nations samplers over the past years, and compares estimates of catch by stock in First Nations fisheries using run reconstruction and scale analyses. The analyses contained in the report focus on contrasting the results of run reconstruction models and linear discriminant function analysis (DFA) of scale samples for weeks and areas where scale data were available. The accuracy of the run reconstruction models is discussed, and recommendations are made concerning the need for continued scale sampling, including the potential for the expanded use of scale analyses in future years.

RACIAL COMPOSITION MODELS

RUN RECONSTRUCTION

The PSC has used run reconstruction models to apportion the weekly sockeye catch by First Nations in the Fraser River watershed into component stock groups. Two different reconstruction models are utilised:

i) Upstream model: This model uses daily estimates of Mission escapement by stock as initial data for apportioning sockeye catches by stock group. Catch estimates are derived in successive areas upstream of Mission through the use of daily stock proportions applied to area-specific catches. Estimates of the speed of upstream travel for individual stocks are used to construct the stock profiles in First Nations fishing areas above Mission. Stocks are dropped from the model in fishing areas above their natal spawning watersheds. This model is applied to estimates of sockeye caught in fisheries operating between Mission and Deadman Creek (located downstream of the confluence of the Fraser and Chilcotin Rivers) (Figure 1).

ii) Downstream model: This model incorporates spawning ground escapement abundance profiles as input data for the reconstruction of area-specific sockeye catches downstream of the spawning grounds. Similar to the upstream model, this model uses the estimated speed of migration for each stock in order to "work downstream" daily stock-specific spawning ground escapement profiles. The model is then used to calculate the abundance of fish by stock present in particular downstream fishing sites in prior weeks. The total catch in a region in a particular week is divided among stocks based on the relative numbers of each stock in the area. The model is applied to sockeye harvested in the Fraser River watershed upstream of Deadman Creek (Figure 1).

Both models make the following assumptions: a) that the daily escapement by stock at Mission or the spawning grounds, and the speed of travel inputs for sockeye stocks as they migrate between adjacent

areas are accurate; b) that individual stocks present in a particular stretch of the Fraser River are equally available and vulnerable to the fisheries. If these assumptions are violated, the run reconstruction models may generate biased estimates of catch by stock for particular areas. For example, the assumption of equal vulnerability of stocks may be violated if: i) gear selectivity varies among stocks, ii) migration routes vary among stocks (e.g., stocks may orient along the east or west banks of the river as they approach their natal watersheds, and therefore, may not be equally exposed to fishing gear), iii) average migration rates vary among stocks and/or catch areas. Because of the potential for bias in run reconstruction techniques, DFA analysis of scale samples collected from representative commercial fishery catches is the PSC's preferred method to estimate stock proportions in sockeye catches from non-First Nations fisheries.

SCALE ANALYSIS

Sockeye salmon from different stocks within the Fraser River watershed normally spend one year, at times two years, in the lakes adjacent to their natal streams. In some instances spawning occurs in the lake. Growth rates and total growth for individual fish vary between lakes and years and these differences are recorded in the form of variable numbers and spacing of circuli on the scales of juvenile sockeye. Observed differences in the scale circuli patterns from individual lakes are used to discriminate stock of origin in mixed-stock fishery samples taken from adult sockeye.

Annually, the PSC requests that DFO collect spawning ground scale samples from sockeye stocks throughout the Fraser River watershed. Counts of the number of freshwater circuli, and the distance measurements between circuli, are obtained from the portion of the scale corresponding to the first year of lake residence. These scale based counts and measurements from each of the "known stocks" become the DFA "baseline" standards. Subsequently, when scale samples are taken from fish of unknown origin in mixed-stock fishery catches, scale circuli counts and measurements are obtained from each scale. Stock proportions in the mixed-stock fishery sample are then estimated by comparing the individual scale data to the spawning ground standards. DFA is the statistical technique used to distinguish among the baseline standards, and to classify fishery samples to their probable stocks of origin (Gable and Cox-Rogers, 1993). Some important assumptions inherent in DFA analysis include: a) the baseline standards for each stock accurately represent the true distribution of scale variables for the stock, thereby allowing the fishery based stock proportions to be estimated without bias; b) the scale data from mixed-stock fishery samples are equivalent to data included in the baseline standards; c) the tendency of DFA analysis to overestimate the contribution rates of small stocks, and underestimate large stocks, is corrected through the use of Cook and Lord's (1978) bias correction procedure; d) the scale sample obtained from each fishery catch is random and unbiased.

To apportion commercial and test fishery catches into individual stock groups, the PSC develops its' DFA models on an age-specific basis. Separate baseline standards are constructed for age 4_2 and 5_2 fish, the two numerically dominant ages in Fraser River sockeye. When scale samples are obtained from marine area fishery catches, fish age can be determined directly from the scale. Due to the process of scale resorption which occurs during the period of upstream migration, however, it is not always possible to ascertain the age of a salmon from scales collected on the spawning ground. In order to develop age-specific baseline standards from spawning ground samples, matching otolith and scale samples are obtained. The age of the fish is determined from the otolith, while the pertinent freshwater scale variables are obtained from the scale.

Since 1987 the PSC has requested that DFO collect scale samples from sockeye caught in the Fraser River by First Nations fishers. Weekly scale samples from approximately 240 sockeye are requested from six locations along the main stem Fraser; these include areas adjacent to Chilliwack, Yale, Lytton (above the Fraser/Thompson confluence), Bridge River (above the Fraser/Seton confluence), a region between the Chilcotin and Quesnel Rivers, and Prince George (below the Fraser/Nechako

confluence) (Figure 1). The intent of these sample requests is to allow the PSC to estimate the stock contributions to these fisheries. Initially, the PSC requested matching scale and otolith samples to allow for accurate age determination in assessment of catches from upstream fisheries where scale resorption is a problem. This request was dropped, however, due to logistical problems in obtaining the matching scale and otolith data. The request was later modified to include matching scale and fin ray data, from selected areas only. Fin rays can also be used to determine fish age. To date only scale samples, without matching fin ray data, have been obtained.

Scale resorption in samples received from many First Nations fisheries made it impossible to age the scales accurately. Consequently, the baseline standards for DFA analysis have been constructed from pooled age classes, incorporating age 4_2 and 5_2 fish. While this does not in theory affect the accuracy of the models, it does tend to lower their precision. Therefore, it remains the objective of the PSC to obtain matching scale and otolith or fin ray samples.

The advantage of collecting and analysing scales from fishery catches is that a direct estimate is generated of the stock proportions present in the catch. Assumptions about speed of migration, or about the relative vulnerability and availability of individual sockeye stocks are not required. If all significant First Nations catch areas in the Fraser watershed were adequately sampled, stock specific catch estimates for individual fishing areas could be measured directly, eliminating the need for run reconstruction assessments.

Unfortunately, it has not been possible for DFO to obtain scale samples from enough areas, or from a broad enough time span each season, to allow direct estimation of catch by stock group throughout the watershed. It is possible, however, to compare the results of reconstruction analyses with the results of scale analyses for those weeks and areas where scales have been obtained. This allows for the testing of the key assumptions contained in the reconstruction models.

SAMPLE COLLECTIONS

Scale samples exist for sufficient week/area strata to allow comparisons to be made between stock specific catch estimates derived from scale samples and run reconstruction models (Table 1). In total, 95 samples and 10,970 scales were collected from 1989 to 1995, for an average of approximately 1,570 scales per year. Site coverage of the six target areas varied, from a low of one site being sampled in 1989 and 1990, to a high of four sites being sampled in 1991 and 1995. All six of the target areas were sampled in at least one year.

PSC sampling protocol was followed, with a single scale from the "preferred" area being removed from each fish sampled (Gable and Cox-Rogers, 1993). Scale samples from fish at each site were to be obtained from more than one fisher, and from multiple days of fishing when a fishery opening exceeded one day. First Nations catches of Fraser sockeye peak in July and August, and consequently, the majority of samples were obtained during these two months (Table 1). Significant catches also occur in June and September in some years.

Table 1 details both the number of scales obtained at each site and the number of days over which the sample was obtained. The goal of obtaining representative samples from multiple fishing days was achieved in many weeks, although sample sizes were often below desired levels. In many weeks and areas, however, scale samples were not obtained.

In 1989, scale samples were obtained from Lytton, one of the six target sites. In total, 728 scales were collected, encompassing six weeks of fishing (Table 1). Similarly, in 1990 scale samples were received from only one site, in this case the Agassiz (Chilliwack) area, with 876 scales being collected across eight weeks. In 1991, a more extensive area coverage was achieved. Four of the six target sites were sampled, including Chilliwack (751 scales), Yale (1093 scales), Bridge River (530 scales) and Prince George (237 scales). The coverage for the sites sampled ranged from five to nine weeks, and is detailed in Table 1. Three sites were sampled in both 1992 and 1993, but for a shorter duration than in 1991. These included: Chilliwack (513 scales sampled in 1992 and 410 scales sampled in 1993), Yale (346 scales sampled in 1992 and 417 scales sampled in 1993), and Bridge River (427 scales sampled in 1992 and 63 scales sampled in 1993). The number of weeks of fishing represented in the 1992 and 1993 scale sampling programs was three to four, with the exception of the Bridge River site in 1993 when only one week of fishing was sampled (Table 1). In 1994, three of the six target sites were again sampled, including Yale (61 scales), Lytton (510 scales) and Bridge River (160 scales). The sampling was short in duration, ranging from one to three weeks (Table 1). In 1995, four of the six target sites were sampled, including Yale (1,610 scales), Lytton (1,097 scales), Bridge River (534 scales) and Sheep Creek (507 scales). The Yale site was sampled in two sub-areas, one below Yale (lower canyon, 975 scales) and the other above Yale (upper canyon, 635 scales). The duration of sampling ranged from four weeks at Sheep Creek to ten weeks at Lytton (Table 1).

METHODOLOGY FOR COMPARING ESTIMATES

To assess the degree of similarity between stock composition estimates derived from run reconstruction methodologies and scale based DFA analyses, certain criteria were established. First, we used a "tailing" methodology (Gable and Cox-Rogers, 1993) to assign percentages to stocks that were present in mixed-stock samples in small proportions. This limits the tendency, common in DFA analyses, of overestimating stocks present in small proportions in mixture samples (overestimation bias). Stocks expected to be present in proportions of less than three percent (based on run reconstruction results), therefore, were not included in the DFA models used to analyse the scale samples.

Second, we addressed a problem encountered in all stock identification analyses; i.e., that the precision of individual stock estimates in a mixture sample declines as the size of the mixture sample is reduced. The PSC has established a minimum target of 120 scales when assessing stock contributions in mixed-stock test and commercial fishery catches. Often the weekly samples obtained from the First Nations fisheries were much lower than this target. By rejecting samples with fewer than 120 scales, the number of paired comparisons between run reconstruction and scale sample results would have been greatly reduced, making it difficult to draw conclusions about the relative performance of the models. As a compromise between improving the precision of the DFA analyses, and increasing the number of the paired scale sample and run reconstruction comparisons, First Nations scale samples which had fewer than 40 scales were rejected and not analysed. A complete list of scale samples, with estimates of stock group composition, and the decision on whether to include the sample in comparative analyses based on the above criteria, is provided in Appendix Table 1.

There were seven stock groups for which paired comparisons were made between model results from run reconstructions and DFA scale analyses: Early Stuart, Nadina/Gates, Fennell/Bowron, Scotch/Seymour, Chilko/Quesnel, Late Stuart/Stellako and Adams/Lower Shuswap. Using the decision criteria outlined above, the number of scale sample estimates accepted for comparative analyses included: 13 Early Stuart sample estimates, 38 Nadina/Gates sample estimates, 28 Fennell/Bowron sample estimates, 21 Scotch/Seymour sample estimates, 73 Chilko/Quesnel sample estimates, 69 Late Stuart/Stellako sample estimates and 10 Adams/Lower Shuswap sample estimates (Appendix Table 1).

In addition to the seven stock groups used for the paired comparisons listed above, the six potential sampling sites were grouped into three regions: Below Hope, Hope to Churn Creek and Above Churn Creek. For each stock group, and for each region, assessments were made on the racial proportions estimated from DFA models and run reconstruction models, as well as on the catch estimates for the stock group within the region. No attempt was made to assess the catch for areas or weeks for which data were unavailable. Consequently, the annual catch estimates reported by region and stock group are only partial estimates. Complete scale-based estimates of catch by stock are not available due to the incomplete data set.

Two methods were used to compare the scale sample and run reconstruction results from the First Nations fisheries between 1989 and 1995. The primary method was to test for significant differences between the mean stock proportions estimated from scale samples and run reconstruction models, using paired sample t-tests. The second method was to compare the relative catch estimates derived from the two methods for matching weeks and areas.

RESULTS

Data from DFA analyses of sockeye scale collections and corresponding run reconstruction estimates are summarized below by mean stock proportions and annual catch by stock assessments.

COMPARISON OF MEAN STOCK PROPORTIONS BY REGION

The comparisons of mean stock proportions were summarised individually for each of the seven stock groups for each of the following regions: "Below Hope", "Hope to Churn Creek", "Above Churn Creek", and "All Areas Combined". The seasonal and individual results that are presented were obtained from raw "untransformed" data. To test whether the observed differences between the scale and run reconstruction-based estimates were significant, the individual sample proportions were transformed using the arcsin of the square root of the raw proportions. The 2-tailed paired sample t-tests were conducted on the transformed data. The transformations were necessary in order to meet assumptions of normality, required when paired sample t-tests are used. The results of the t-tests are presented in Table 2. The null hypothesis was that the sample means for the two estimation procedures were not significantly different:

$$H_o: (\overline{X}_{s.s.} - \overline{X}_{r.r.}) = 0; \alpha = 0.05$$
$$H_a: (\overline{X}_{s.s.} - \overline{X}_{r.r.}) \neq 0; \alpha = 0.05$$

In the comparisons of mean differences across sites for each stock group, we ignored the variation associated with estimating the stock proportions from the mixed-stock sample. In fact, some of the differences observed between the run reconstruction and the scale based estimates were associated with the variance of the stock group proportion, due either to sample size constraints or to overlap between stocks in the baseline standards. Since this source of variation was not accounted for, the true variance in the paired sample t-test comparisons was underestimated and the null hypothesis (H_0) was likely rejected more often than it should have been (i.e., we assumed significant differences existed between the sample means when in fact the differences were not significant). This source of variation will need to be addressed in future years, when more complete scale based data sets are available.

Early Stuart Stock Group

Early Stuart sockeye were identified in 13 scale samples, all from sampling sites below Churn Creek. The average percent deviation for all sample areas, observed when comparing the DFA scale sampling results (62%) with the run reconstruction results (57%), was 5% (Appendix Table 2). The percent deviation was slightly larger for the region below Hope (7%), than for the region between Hope and Churn Creek (4%).

For the Early Stuart stock group, no significant differences were found between proportions estimated from scale samples versus the run reconstruction models. The null hypothesis was accepted for the region below Hope, for the region between Hope and Churn Creek, and for all areas combined (Table 2). The details of the paired two-sample t-tests for the Early Stuart stock are presented in Table 3. Given the relatively small sample sizes, the results from the combined area t-test are of most interest. The critical t-value was 2.179, while the t-statistic was 1.372, and the p-value was 0.195. Clearly, the stock proportions derived using the two methods were not significantly different.

While there were no significant differences in the Early Stuart stock proportions, the tendency was for the DFA analyses to estimate higher proportions of Early Stuart than the run reconstructions. The differences in the raw stock proportions for the two estimation methods are plotted in Figure 2. The plots show that the resulting difference, when subtracting the scale based estimate from the run reconstruction estimate, was most often in the -5% to +5% category. This is consistent with the finding of no significant difference between the two estimation techniques. The region 1 (below Hope) plot shows two observations in the -5% to -15% category (the scale samples identified fewer Early Stuart sockeye than the run reconstruction model) and one in the +35% to +45% category (the scale sample identified more Early Stuart sockeye than the run reconstruction model). In region 2 (Hope to Churn Creek), there were no observations below -5%, and two observations in the +15% to +25% category (the scale samples identified more Early Stuart sockeye than the run reconstruction model).

Nadina/Gates Stock Group

The Nadina/Gates stock group was identified in 38 scale samples, including samples from each of the three regions. The average percent deviation for all sample areas was 2%. The mean percentage was 14% for the DFA estimates, and 12% for the run reconstruction estimates (Appendix Table 2). The mean deviations between the two assessment techniques were identical (-2%) for sampling regions 1 and 2, which are below Churn Creek, while the mean deviation was zero for region 3 (Above Churn Creek).

The results of the paired two-sample t-tests for the Nadina/Gates stock group show that no significant differences existed between the two estimation procedures. This was true for each of the three regions individually as well as for all areas combined (Table 2). The details of the paired two-sample t-tests for the Nadina/Gates stock group are presented in Table 4. For the combined areas, the critical t-value was 2.026, while the t-statistic was 0.530, and the p-value was 0.599. Similar results were observed for the individual regions (Table 4).

As with the Early Stuart stock group, there was a tendency for the raw sample proportions from the scale based estimates of the Nadina/Gates stock group to be slightly higher than the run reconstruction proportions. This was noticeable in plots of the differences in the raw stock proportions for region 1 (below Hope), where there were more observations in the +5% to +15% category than in the -5% to -15% category (Figure 3). In contrast, the plots for regions 2 and 3 show distribution plots with observations evenly distributed about the -5% to +5% category.

Fennell/Bowron Stock Group

The Fennell/Bowron stock group was identified in 28 scale samples, including samples from each of the three regions. The average percent deviation for all sample areas was 3%. The mean percentage from the DFA analyses was 16%, and for the run reconstruction observations was 13% (Appendix Table 2). The mean deviations between the two assessment techniques varied depending on the sampling region. In region 1 (below Hope) the mean difference was -4%, with the mean DFA scale based proportion estimated at 15% versus 19% for the run reconstruction-based mean proportion. In region 2 (Hope to Churn Creek) the mean deviation was 5% (16% versus 11%), and in region 3 (above Churn Creek), where there were only three observations, the mean deviation was 11% (21% versus 10%).

The paired two-sample t-tests for the Fennell/Bowron stock group showed that no significant differences existed between the two estimation procedures for regions 1 and 2, or for all areas combined (Table 2). The exception was region 3 where a significant difference was observed in the paired two-sample t-tests, and the null hypothesis was rejected. The details of the paired two-sample t-tests for the Fennell/Bowron stock group are presented in Table 5. For regions 1 and 2 the null hypothesis was accepted, with p-values of 0.229 and 0.109, respectively. In region 3 there was a significant difference identified between the mean proportions estimated using the scale based estimate and the run reconstruction estimate. The critical t-value was 4.303, the t statistic was 7.532, and the p-value was 0.017 (Table 5). However, only three samples were obtained from this region, all in 1995. Additional data are required before any firm conclusions can be drawn about the accuracy of the reconstruction model for the Fennell/Bowron stock group in region 3. For the combined areas, the critical t-value was 2.052, while the t-statistic was 1.192, and the p-value was 0.244. The null hypothesis was accepted, with the conclusion that there was no significant difference between the sample means estimated by the two techniques.

Consistent differences in stock proportions were generated from the two estimation techniques in region 3 (Figure 4). All three scale samples indicated higher proportions of Fennell/Bowron sockeye than did the run reconstruction model. In regions 1 and 2, where no significant differences were found between the two estimation techniques, some differences are evident in the plots (Figure 4). In region 1 there were four occurrences of the run reconstruction model estimating more Fennell/Bowron sockeye than the scale samples. In region 2 the reverse was true; there were eleven occurrences where scale samples estimated more of this stock group than the run reconstruction model, and only four times when the scale samples estimated lower proportions of the Fennell/Bowron stock group.

Scotch/Seymour Stock Group

The Scotch/Seymour stock group was identified in 21 scale samples, all from sites downstream of the confluence of the Thompson River where this stock group leaves the Fraser River. The average percent deviation for all sample areas was 0%. When the data from the two regions were pooled, both the DFA scale results and the run reconstruction model results averaged 11%. A slight (1%) deviation was observed in region 1, while the deviation for region 2 was 0% (Appendix Table 2).

For the Scotch/Seymour stock group there was no significant difference identified between proportions estimated from scale samples versus run reconstructions. The null hypothesis was accepted for region 1 below Hope, for region 2 between Hope and the Thompson River, and for all areas combined (Table 2). The details of the paired two-sample t-tests for the Scotch/Seymour stock group are presented in Table 6. Given the relatively small sample sizes, the results for the combined area t-test are of most interest. The critical t-value was 2.086, while the t-statistic was -0.509, and the p-value was 0.616. There was no significant difference between the two estimates of stock proportions for the Scotch/Seymour stock group.

The differences in the raw stock proportions for the two estimation methods are plotted in Figure 5. The plots show that the resulting difference between the scale based estimate and the run reconstruction estimate was most often in the -5% to 5% category. Although it is difficult to draw firm conclusions because of the small sample sizes, the results are consistent with the finding of no significant difference between the two estimating techniques.

Chilko/Quesnel Stock Group

The Chilko/Quesnel stock group was identified in 73 scale samples, including samples from each of the three regions. The average percent deviation when all sample areas were pooled was 6%, with a mean percentage for all scale samples of 52%, and 58% for the run reconstructions (Appendix Table 2). The Chilko/Quesnel stock group was consistently estimated in lower proportions by the DFA scale estimates than by the run reconstruction model in regions 1 and 2. In region 1 the mean difference was relatively small at 3% (55% versus 58%), whereas in region 2 the mean difference was higher at 7% (53% versus 60%). In region 3, where only four scale samples were obtained, the mean proportion estimated by both methods was 26% (Appendix Table 2).

The paired two-sample t-tests for the Chilko/Quesnel stock group show that significant differences existed between the two estimation procedures. This was true for all areas combined, as well as for the Hope to Churn Creek area (region 2) (Table 2). In both cases the null hypothesis, that there was no significant difference between the proportions estimated using the two techniques, was rejected. The details of the paired two-sample t-tests for the Chilko/Quesnel stock group are presented in Table 7. For the combined areas, the critical t-value was 1.993, while the t-statistic was -3.036, and the p-value was 0.003. The differences were concentrated in region 2, in the Hope to Churn Creek region, where the critical t-value was 2.015, the t-statistic was -3.206, and the p-value was 0.003. In contrast, the p-values for comparisons between the two estimation procedures from regions 1 and 3, were 0.33 and 0.913, respectively (Table 7). In the latter two examples the null hypothesis was accepted.

The differences in the stock proportions between the DFA scale based estimates and the run reconstruction estimates are clearly shown in the histogram plot of region 2 (Figure 6). The largest mode for individual observations in the histogram plot was in the -5% to -15% category. There were also observations in the -35% to -45% category (where the scale based proportion was small relative to the run reconstruction-based proportion), while no observations were present above the +15% to +25% category (where the scale based proportion was higher). In total, there were 24 instances where the results of the scale analyses minus the reconstruction model were negative (fewer Chilko/Quesnel fish were identified by the scale based analyses), and only 11 instances where the differences were positive (where more Chilko/Quesnel fish were identified by the scale based analyses). The histogram plots from regions 1 and 3 show a more normal distribution, consistent with the results of the paired sample t-tests, that no significant differences existed between the two estimation procedures in these regions.

Late Stuart/Stellako Stock Group

The Late Stuart/Stellako stock group was identified in 67 scale samples, including samples from all three regions. The average percent deviation when the sample areas were pooled was 4%, with a mean percentage for all scale samples of 31%, and 27% for the run reconstructions (Appendix Table 2). The Late Stuart/Stellako stock group was consistently estimated in higher proportions by the DFA scale estimates than by the run reconstruction model in regions 1 and 2. In region 1 the mean difference was 3% (19% versus 16%), and in region 2 the mean difference was 6% (31% versus 25%). In region 3, where only six scale samples were obtained, the trend was reversed and the mean proportion estimated by run reconstruction model was higher by 4% (66% versus 62%) (Appendix Table 2).

The paired two-sample t-tests for the Late Stuart/Stellako stock group, show that significant differences existed between the two estimation procedures. As was the case with the Chilko/Quesnel stock group, the null hypothesis was rejected for all areas combined, as well as for the Hope to Churn Creek area (region 2) (Table 2). The details of the paired two-sample t-tests for the Late Stuart/Stellako stock group are presented in Table 8. For the combined areas, the critical t-value was 1.997, while the t-statistic was 2.703, and the p-value was 0.009. As with the Chilko/Quesnel stock group, the differences between the two estimation methods were concentrated in the sample comparisons from region 2, where the critical t-value was 2.014, the t-statistic was 3.233, and the p-value was 0.002. In both the "all area" result and the region 2 result, the null hypothesis was rejected. In contrast, the p-values for comparisons between the estimation procedures from regions 1 and 3 were 0.408 and 0.630, respectively (Table 8). In these two examples the null hypothesis was accepted.

The differences in the stock proportions between the DFA scale based estimates and the run reconstruction estimates are plotted in Figure 7. The histogram plot for region 2 shows relatively few observations below the -5% to +5% category; whereas many observations occurred above this category. This skewed distribution is consistent with the paired sample t-test result which rejected the null hypothesis for the region between Hope and Churn Creek. In total, there were only 10 instances where the results of the scale analyses minus the reconstruction model were negative (fewer Late Stuart/Stellako fish were identified by the scale based analyses), and 23 instances where the differences were positive (where more Late Stuart/Stellako fish were identified by the scale based analyses). The histogram plots from regions 1 and 3 had similar numbers of occurrences where the scale based estimates fell above and below the -5% to +5% category. This is consistent with the results of the paired sample t-tests, that there were no significant differences between the two estimation procedures in these regions.

Adams/Lower Shuswap Stock Group

The Adams/Lower Shuswap stock group was identified in 10 scale samples, all from sampling sites below the Thompson River where this stock group leaves the main stem of the Fraser River. The average percent deviation for all sample areas, observed when comparing the DFA scale sampling results (43%) with the run reconstruction results (50%), was 7%. A slight 1% deviation was observed in region 1, while the deviation for region 2 was 11% (Appendix Table 2). The sample sizes for this stock group were small. Therefore, the results from the paired sample t-tests should not be treated as highly certain.

For the Adams/Lower Shuswap stock group no significant differences were observed between proportions estimated from scale samples versus run reconstructions for region 1 and for all areas combined. However, the null hypothesis was rejected for region 2, between Hope and the Thompson River, where significant differences were observed (Table 2). The details of the paired two-sample t-tests for the Adams/Lower Shuswap stock group are presented in Table 9. The results for the combined area t-test, where the null hypothesis was accepted, show that the critical t-value was 2.262, while the t-statistic was -1.827, and the p-value was 0.101. In region 1, where no significant differences were found, the critical t-value was 3.182, the t-statistic was -0.102, and the p-value was 0.925. In contrast, significant differences were found in region 2, where the critical t-value was 2.571, the t-statistic was -3.483, and the p-value was 0.018.

The differences in the raw stock proportions for the two estimation methods are plotted in Figure 8. It is difficult to draw conclusions from the histogram plots due to the small sample sizes. The plot from region 1 shows one occurrence where the scale sample estimated more Adams River fish than the run reconstruction model, and two occurrences where the scale sample estimates were lower. The plot from region 2 shows negative discrepancies, suggesting a tendency for the scale samples to estimate fewer Adams River fish than the run reconstruction model.

COMPARISON OF CATCH ESTIMATES BY STOCK GROUP AND REGION

Comparisons of catch estimates derived from scale based DFA analyses versus run reconstruction models are also of interest. However, as explained earlier, the catch estimates are incomplete and serve only as an indication of potential differences in stock group catch estimates that may result if scale samples were used in place of run reconstruction models to estimate catch in First Nations fisheries.

Early Stuart Stock Group

Early Stuart catch estimates derived from DFA analyses of scale samples are available for three years in region 1 and four years in region 2. In general, there was good correspondence between the catch estimates derived from scale samples and from run reconstruction models. The scale based catch estimates of Early Stuart sockeye were higher in both region 1 (48,962 versus 44,494) and region 2 (80,792 versus 74,306 (Table 10). When comparing the trend of annual catch estimates for the two methods, the results varied. For example, in region 1, the scale based estimate of Early Stuart sockeye was higher in 1991 and 1992, whereas the run reconstruction estimate was higher in 1990. In region 2, the scale based catch estimate was higher in 1991 and 1995, while the run reconstruction estimate was higher in 1989 and 1992 (Figure 9). These types of fluctuations are expected if each method is estimating the catch of Early Stuart sockeye in a relatively unbiased manner.

Nadina/Gates Stock Group

Scale based catch estimates for the Nadina/Gates stock group are available for three years in region 1, four years in region 2, and two years in region 3. As with the Early Stuart stock, there was good correspondence between the catch estimates derived from scale samples and from the run reconstruction models In regions 1 and 3 the scale based method estimated more of the Nadina/Gates stock group in the mixed-stock fishery samples than did the run reconstruction models (19,979 versus 16,896; and 711 versus 492), while in region 2 the run reconstruction model identified slightly more of the Nadina/Gates stock group (33,783 versus 33,309) (Table 11). When comparing the trend of annual catch estimates for the two methods, the results varied. In region 1 the scale based estimate of Nadina/Gates sockeye was higher in 1991 and 1992, while the estimates from the two methods were virtually identical in 1989. In region 2, the scale based catch estimate was higher in 1992 and 1995, while the run reconstruction estimate was higher in 1989 and 1991. In region 3, although the catch estimates were very small, each method had one year where it identified more of the stock group than the other (Figure 10). As with the Early Stuart example, these results are consistent with the two methods making relatively unbiased catch estimates of Nadina/Gates sockeye.

Fennell/Bowron Stock Group

Scale based catch estimates for the Fennell/Bowron stock group are available for three years in region 1, four years in region 2, and one year in region 3. In regions 2 and 3 the scale based method estimated more of the Fennell/Bowron stock group in the mixed-stock fishery samples than did the run reconstruction models (30,981 versus 23,114; and 816 versus 445), while in region 1 the run reconstruction model identified more of the stock group (10,489 versus 12,840) (Table 12). Notable examples of relatively large discrepancies in catch estimates between the two methods are: region 1 in 1991 when the scale based estimate was zero and the run reconstruction estimate was 1,209, and region 2 in 1995 when the scale estimate was 22,899 and the run reconstruction estimate was 13,068. In region 3 because there was only one year in which the Fennell/Bowron stock group was identified, it is difficult to speculate on potential differences between the two estimation methods. The fluctuations observed in the catch estimates of Fennell/Bowron sockeye using the two estimation techniques are not unexpected given the low proportions of this stock group in many of the mixed-stock fishery samples analysed. The annual patterns of catch estimates for the stock group for each of the two estimation techniques are displayed in Figure 11.

Scotch/Seymour Stock Group

The Scotch/Seymour stock group was identified in two years in region 1 and in three years in region 2. In region 1, the scale based estimate identified more of the Scotch/Seymour stock group than the run reconstruction model (20,849 versus 17,774). In region 2 the reverse was true, the DFA model identified fewer of the Scotch/Seymour stock group (25,327 versus 31,056) (Table 13). In general, the annual discrepancies between the two estimation methods were small and consistent with the finding that no significant differences existed between the two techniques in the estimation of the Scotch/Seymour stock group (Figure 12).

Chilko/Quesnel Stock Group

The Chilko/Quesnel stock group was identified in four years in region 1, six years in region 2, and one year in region 3. In regions 1 and 2 the scale based estimates identified fewer of the Chilko/Quesnel stock group than the run reconstruction model (194,478 versus 209,744; and 431,395 versus 473,281), while in region 3, where very little data was available, the scale based estimates identified more of the Chilko/Quesnel stock group (1,055 versus 884) (Table 14). Generally, the annual differences between the two estimation methods were not large. However, with the exceptions of 1992 in region 1, 1994 in region 2, and 1995 in region 3, the scale based estimates consistently identified fewer Chilko/Quesnel sockeye than did the run reconstruction model (Figure 13). The largest discrepancy occurred in region 2 in 1995 when there was a 35,579 fish difference between the two estimation methods (152,749 versus 188,328) (Table 14).

Late Stuart/Stellako Stock Group

The Late Stuart/Stellako stock group was identified in four years in region 1, six years in region 2, and two years in region 3. In regions 1 and 2 the scale based DFA model identified more of the Late Stuart /Stellako stock group than the run reconstruction model (69,490 versus 56,228 and 226,013 versus 171,428), while in region 3, the DFA model identified fewer of the Late Stuart/Stellako stock group (2,761 versus 3,182) (Table 15). Proportionally, the annual differences between the two estimation methods were somewhat larger than with previous examples discussed. The largest discrepancy was in 1995 in region 2, when a 35,968 fish difference between the two estimation methods resulted (106,190 versus 70,222) (Table 15). A plot of the annual catch estimates for the two estimation techniques is presented in Figure 14.

Adams/Lower Shuswap Stock Group

The Adams/Lower Shuswap stock group was identified in two years in both region 1 and region 2. In region 1, the scale based DFA model identified more of the Adams/Lower Shuswap stock group than the run reconstruction model (34,829 versus 32,743). In region 2 the reverse was true, the DFA model identified fewer of the Adams/Lower Shuswap stock group (22,983 versus 33,915) (Table 16). The annual differences between the two estimation methods were small, with the noticeable exception in 1995 in region 2, when a 9,947 fish difference occurred between the two methods. The annual catch estimates for each of the estimation techniques are plotted in Figure 15.

CONCLUSIONS

The results of analyses presented in this paper support the hypothesis that the scale based DFA models and the run reconstruction models provide consistent estimates of stock specific sockeye catch in the First Nations fisheries in the Fraser River watershed. For most of the stock groups analysed, no significant differences were identified in the paired sample t-tests used to assess differences between the mean stock proportions derived from the two estimation procedures. Exceptions to this were the Fennell/Bowron stock group (region 3), where only three scale samples were collected, the Chilko/Quesnel stock group (region 2), the Late Stuart/Stellako stock group (region 2), and the Adams/Lower Shuswap stock group (region 2).

The fact that a significant difference was found between the two estimation techniques in the identification of the abundant Chilko/Quesnel stock group in region 2 is of concern. When comparing the proportions of the two summer-run stock groups, it is apparent that if a directional bias exists in one of the two methods, the bias is between the summer-run groups. Additional work is required to determine if the differences in estimating the proportions of the Chilko/Quesnel and Late Stuart/Stellako stock groups in region 2 were the result of problems in the run reconstruction model, sampling bias related to the scale sampling site selection, stock ID bias, or some other cause. It will be important to monitor the results of future analyses carefully to determine whether these differences persist.

Assessments of catch differences between the two estimation methods show that they produce very similar estimates of catch by stock group. The main exception to this are the significant differences observed in the estimation of summer-run stock groups in region 2. Additional work will be required to determine the cause of the estimation discrepancies in the summer-run stock groups, assuming these discrepancies persist in future years.

The importance of accurate stock apportionment techniques for application to First Nations fisheries conducted throughout the Fraser River watershed has grown in recent years as the catch in this fishery has expanded. The data presented in this report suggest that Fraser River First Nations catches are being reasonably well apportioned into component stock groups using the current run reconstruction models. However, potential problem areas have been identified, most notably the estimation of summer-run stocks in the region between Hope and Churn Creek. These preliminary findings will require additional assessment work in future years. For example, how much of the identified variance is associated with estimating individual stock proportions from mixed-stock samples using DFA models? This source of variation was not accounted for in the current study.

RECOMMENDATIONS

Ideally, scale samples should be collected from an expanded suite of fishing sites and for an expanded time period in order to allow direct catch assessments to be made using scale based DFA models. This is the method currently employed by PSC staff in all other fisheries where significant catches of Fraser River sockeye stocks are harvested. Where possible, scale data obtained from each fishery designated for sampling should be obtained from landing sites where the catch from a large number of fishers can be accessed. Samples should be obtained from a sub-set of fishers to ensure that the scale sample is a random sub-set of the total catch. It is also desirable to begin collecting matching scale and otolith or fin ray data from all sites to enable age-specific DFA models to be employed. This will improve the precision of the scale based stock specific catch estimates. This is the recommended method for assessing catch by stock group in First Nations fisheries, assuming the program can be successfully implemented.

Until such a program is in place, two main approaches are possible for estimation of catch by stock group in First Nations fisheries in the Fraser River. One approach is to continue to use run reconstruction models, possibly with minor revisions in future years to account for potential stock identification biases, assuming these biases are shown to persist. This approach is not recommended as it does not make full use of the scale data which is available for use in the assessment of catch by stock.

The recommended interim strategy is to apportion the catches into component stock groups using both DFA models and reconstruction models in a hybrid approach. Where scale data of adequate sample sizes are available from an area, stock apportionment should be conducted using scale based DFA models. This determination would be made on a weekly basis. An adequate sample size should be close to the 120 fish minimum identified for commercial samples. When data gaps exist, for weeks within an area, and for areas where scale data have not been collected, then reconstruction models should be employed to generate estimates.

In summary, reconstruction models continue to be useful tools to assign sockeye catch in First Nations fisheries into component stock groupings. PSC staff conclude, however, that direct estimation of catch by stock in First Nations sockeye fisheries in the Fraser River using scale based DFA models will provide more accurate results. The degree to which the use of scale based DFA models will be possible in the future will depend on the success that DFO has, working in co-operation with First Nations, in obtaining the necessary samples.

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TABLES

Table 1. Scale Samples from First Nations fisheries (1989 - 1995).

First Nations Scale Samples - 1989

Area	Date	Sample Size
Lytton/Siska	7/26-27	136
Lytton/Siska	8/2-3	112
Lytton/Siska	8/9-10	99
Lytton/Siska	8/16-17	158
Lytton/Siska	8/23-24	132
Lytton/Siska	8/30-31	91
Annual Total		**728**

First Nations Scale Samples - 1990

Area	Date	Sample Size
Agassiz	7/20-22	40
Agassiz	7/26-29	81
Agassiz	8/3-5	120
Agassiz	8/9-12	204
Agassiz	8/17-18	65
Agassiz	8/24-25	160
Agassiz	8/31-9/1	62
Agassiz	9/13-16	144
Annual Total		**876**

First Nations Scale Samples - 1991

Area	Date	Sample Size
Chilliwack	7/18-20	101
Chilliwack	7/25-28	255
Chilliwack	8/8-11	92
Chilliwack	8/15-18	100
Chilliwack	8/22-25	103
Chilliwack	8/30-9/1	68
Chilliwack	9/6	32
Annual Total		**751**
Yale	7/19-21	105
Yale	7/25-28	108
Yale	8/1-4	111
Yale	8/11	106
Yale	8/15-18	169
Yale	8/24	110
Yale	9/6	107
Yale	9/13	108
Yale	9/28-29	169
Annual Total		**1093**
Bridge R	8/1	14
Bridge R	8/15	35
Bridge R	8/18-24	196
Bridge R	8/25-30	182
Bridge R	9/9-12	103
Annual Total		**530**
P. George	8/15-22	36
P. George	8/25-29	52
P. George	9/4	15
P. George	9/9-11	102
P. George	9/22	32
Annual Total		**237**

First Nations Scale Samples - 1992

Area	Date	Sample Size
Chilliwack	8/1-3	162
Chilliwack	8/6-10	165
Chilliwack	8/13-16	186
Annual Total		**513**
Yale	8/1-3	152
Yale	8/6	36
Yale	8/14-16	158
Aunual Total		**346**
Bridge R	8/10-11	145
Bridge R	8/17-19	125
Bridge R	8/20-21	101
Bridge R	9/1-9	56
Annual Total		**427**

First Nations Scale Samples - 1993

Area	Date	Sample Size
Chilliwack	8/14	101
Chilliwack	8/23	94
Chilliwack	9/5	109
Chilliwack	9/14	106
Aunual Total		**410**
Yale	8/14	108
Yale	8/23	98
Yale	9/6	106
Yale	9/13	105
Annual Total		**417**
Bridge R	9/6	63
Annual Total		**63**

First Nations Scale Samples - 1994

Area	Date	Sample Size
Yale	8/12,16-18	61
Annual Total		**61**
Lytton	8/10,13-15	200
Lytton	8/16-23	193
Lytton	8/24-29	117
Annual Total		**510**
Bridge R	8/9-11	160
Annual Total		**160**

First Nations Scale Samples - 1995

Area	Date	Sample Size
Yale (Lower Canyon)	7/21-22	184
Yale (Lower Canyon)	8/4-5	208
Yale (Lower Canyon)	8/6-9	204
Yale (Lower Canyon)	8/16-18	219
Yale (Lower Canyon)	8/25-26	33
Yale (Lower Canyon)	8/27-29	48
Yale (Lower Canyon)	9/3	79
Annual Total		**975**
Yale (Upper Canyon)	7/11	32
Yale (Upper Canyon)	7/21-24	212
Yale (Upper Canyon)	7/25-26	76
Yale (Upper Canyon)	7/28-8/1	96
Yale (Upper Canyon)	8/16-18	219
Annual Total		**635**
Lytton	7/17	27
Lytton	7/20-23	148
Lytton	7/24-25	102
Lytton	7/26-8/1	75
Lytton	8/4-6	217
Lytton	8/7-10	182
Lytton	8/16-17	154
Lytton	8/21-26	114
Lytton	9/13-19	37
Lytton	9/22-26	41
Annual Total		**1097**
Bridge R	7/27-31	85
Bridge R	8/2-4	99
Bridge R	8/10	47
Bridge R	8/16-19	99
Bridge R	8/20-22	204
Annual Total		**534**
Sheep Cr	7/28-8/6	190
Sheep Cr	8/7-11	136
Sheep Cr	8/12-16	139
Sheep Cr	8/23-24	42
Annual Total		**507**

Table 2. Test for significant differences between mean stock proportions in First Nations sockeye catches (reconstruction model results versus scale based DFA model results.

Stock	Area	DF	Value ($\alpha = 0.05$)	t Statistic ($\alpha = 0.05$)	$Ho: (\bar{Xs.s.} - \bar{Xr.r.}) = 0$ $Ha: (\bar{Xs.s.} - \bar{Xr.r.}) = 0$
Early Stuart	All Areas Combined	12	2.179	1.372	accept Ho
Early Stuart	Below Hope	3	3.182	0.623	accept Ho
Early Stuart	Hope - Churn Cr	8	2.306	1.723	accept Ho
Nadina/Gates	All Areas Combined	37	2.026	0.530	accept Ho
Nadina/Gates	Below Hope	8	2.306	0.350	accept Ho
Nadina/Gates	Hope - Churn Cr	24	2.064	0.400	accept Ho
Nadina/Gates	Above Churn Cr	3	3.182	0.059	accept Ho
Fennell/Bowron	All Areas Combined	27	2.052	1.192	accept Ho
Fennell/Bowron	Below Hope	5	2.571	-1.370	accept Ho
Fennell/Bowron	Hope - Churn Cr	18	2.101	1.686	accept Ho
Fennell/Bowron	Above Churn Cr	2	4.303	7.532	reject Ho
Seymour	All Areas Combined	20	2.086	-0.509	accept Ho
Seymour	Below Hope	7	2.365	0.231	accept Ho
Seymour	Hope - Churn Cr	12	2.179	-0.916	accept Ho
Horsefly/Chilko	All Areas Combined	72	1.993	-3.036	reject Ho
Horsefly/Chilko	Below Hope	23	2.069	-0.994	accept Ho
Horsefly/Chilko	Hope - Churn Cr	44	2.015	-3.206	reject Ho
Horsefly/Chilko	Above Churn Cr	3	3.182	0.118	accept Ho
Late Stuart/Stellako	All Areas Combined	66	1.997	2.703	reject Ho
Late Stuart/Stellako	Below Hope	14	2.145	0.853	accept Ho
Late Stuart/Stellako	Hope - Churn Cr	45	2.014	3.233	reject Ho
Late Stuart/Stellako	Above Churn Cr	5	2.571	-0.512	accept Ho
Adams	All Areas Combined	9	2.262	-1.827	accept Ho
Adams	Below Hope	3	3.182	-0.102	accept Ho
Adams	Hope - Churn Cr	5	2.571	-3.483	reject Ho

Table 3. Early Stuart t-test results with raw data transformed using the Arcsin of the square root of percentages.

t-test: paired two sample for means:	Early Stuart (all areas)	
	IFScales	Reconstruction
Mean	93.7%	85.4%
Variance	18.2%	12.4%
Observations	13	13
df	12	
t Stat	1.372	
P(T<=t) one-tail	9.8%	
t Critical one-tail	1.782	
P(T<=t) two-tail	19.5%	
t Critical two-tail	2.179	

t-test: paired two sample for means:	Early Stuart (Below Hope) - Region 1	
	IFScales	Reconstruction
Mean	101.1%	89.0%
Variance	24.0%	11.4%
Observations	4	4
df	3	
t Stat	0.623	
P(T<=t) one-tail	28.9%	
t Critical one-tail	2.353	
P(T<=t) two-tail	57.8%	
t Critical two-tail	3.182	

t-test: paired two sample for means:	Early Stuart (Hope - Churn Cr) - Region 2	
	IFScales	Reconstruction
Mean	90.4%	83.8%
Variance	17.9%	14.2%
Observations	9	9
df	8	
t Stat	1.723	
P(T<=t) one-tail	6.2%	
t Critical one-tail	1.860	
P(T<=t) two-tail	12.3%	
t Critical two-tail	2.306	

Table 4. Nadina/Gates t-test results with raw data transformed using the Arcsin of the square root of percentages.

t-test: paired two sample for means:	Nadina/Gates (all areas)	
	IFScales	Reconstruction
Mean	35.1%	33.5%
Variance	3.9%	1.9%
Observations	38	38
df	37	
t Stat	0.530	
P(T<=t) one-tail	30.0%	
t Critical one-tail	1.687	
P(T<=t) two-tail	59.9%	
t Critical two-tail	2.026	

t-test: paired two sample for means:	Nadina/Gates (Below Hope) - Region 1	
	IFScales	Reconstruction
Mean	39.0%	36.9%
Variance	4.8%	2.6%
Observations	9	9
df	8	
t Stat	0.350	
P(T<=t) one-tail	36.8%	
t Critical one-tail	1.860	
P(T<=t) two-tail	73.5%	
t Critical two-tail	2.306	

t-test: paired two sample for means:	Nadina/Gates (Hope-ChurnCr) - Region 2	
	IFScales	Reconstruction
Mean	33.2%	31.7%
Variance	3.8%	1.6%
Observations	25	25
df	24	
t Stat	0.400	
P(T<=t) one-tail	34.6%	
t Critical one-tail	1.711	
P(T<=t) two-tail	69.3%	
t Critical two-tail	2.064	

t-test: paired two sample for means:	Nadina/Gates (Above ChurnCr) - Region 3	
	IFScales	Reconstruction
Mean	37.8%	37.4%
Variance	3.4%	2.8%
Observations	4	4
df	3	
t Stat	0.059	
P(T<=t) one-tail	47.8%	
t Critical one-tail	2.353	
P(T<=t) two-tail	95.7%	
t Critical two-tail	3.182	

Table 5. Fennell/Bowron t-test results with raw data transformed using the Arcsin of the square root of percentages.

t-test: paired two sample for means:	Fennell/Bowron (all areas)	
	IFScales	Reconstruction
Mean	38.7%	34.8%
Variance	2.5%	1.5%
Observations	28	28
df	27	
t Stat	1.192	
P(T<=t) one-tail	12.2%	
t Critical one-tail	1.703	
P(T<=t) two-tail	24.4%	
t Critical two-tail	2.052	

t-test: paired two sample for means:	Fennell/Bowron (Below Hope) - Region 1	
	IFScales	Reconstruction
Mean	33.4%	43.1%
Variance	6.5%	3.1%
Observations	6	6
df	5	
t Stat	-1.370	
P(T<=t) one-tail	11.4%	
t Critical one-tail	2.015	
P(T<=t) two-tail	22.9%	
t Critical two-tail	2.571	

t-test: paired two sample for means:	Fennell/Bowron (Hope-ChurnCr) - Region 2	
	IFScales	Reconstruction
Mean	38.9%	32.5%
Variance	1.7%	1.1%
Observations	19	19
df	18	
t Stat	1.686	
P(T<=t) one-tail	5.5%	
t Critical one-tail	1.734	
P(T<=t) two-tail	10.9%	
t Critical two-tail	2.101	

t-test: paired two sample for means:	Fennell/Bowron (Above ChurnCr) - Region 3	
	IFScales	Reconstruction
Mean	47.3%	32.4%
Variance	0.0%	0.2%
Observations	3	3
df	2	
t Stat	7.532	
P(T<=t) one-tail	0.9%	
t Critical one-tail	2.920	
P(T<=t) two-tail	1.7%	
t Critical two-tail	4.303	

Table 6. Seymour t-test results with raw data transformed using the Arcsin of the square root of percentages.

t-test: paired two sample for means:	Seymour (all areas)	
	IFScales	Reconstruction
Mean	31.3%	32.8%
Variance	2.2%	0.8%
Observations	21	21
df	20	
t Stat	-0.509	
P(T<=t) one-tail	30.8%	
t Critical one-tail	1.725	
P(T<=t) two-tail	61.6%	
t Critical two-tail	2.086	

t-test: paired two sample for means:	Seymour (Below Hope) - Region 1	
	IFScales	Reconstruction
Mean	38.3%	37.0%
Variance	2.3%	0.9%
Observations	8	8
df	7	
t Stat	0.231	
P(T<=t) one-tail	41.2%	
t Critical one-tail	1.895	
P(T<=t) two-tail	82.4%	
t Critical two-tail	2.365	

t-test: paired two sample for means:	Seymour (Hope-ChurnCr) - Region 2	
	IFScales	Reconstruction
Mean	27.1%	30.2%
Variance	1.8%	0.6%
Observations	13	13
df	12	
t Stat	-0.916	
P(T<=t) one-tail	18.9%	
t Critical one-tail	1.782	
P(T<=t) two-tail	37.8%	
t Critical two-tail	2.179	

Table 7. Chilko/Quesnel t-test results with raw data transformed using the Arcsin of the square root of percentages.

t-test: paired two sample for means:	Chilko/Quesnel (all areas)	
	IFScales	Reconstruction
Mean	80.4%	86.2%
Variance	7.8%	6.0%
Observations	73	73
df	72	
t Stat	-3.036	
P(T<=t) one-tail	0.2%	
t Critical one-tail	1.666	
P(T<=t) two-tail	0.3%	
t Critical two-tail	1.993	

t-test: paired two sample for means:	Chilko/Quesnel (Below Hope) - Region 1	
	IFScales	Reconstruction
Mean	83.0%	86.3%
Variance	9.3%	7.6%
Observations	24	24
df	23	
t Stat	-0.994	
P(T<=t) one-tail	16.5%	
t Critical one-tail	1.714	
P(T<=t) two-tail	33.0%	
t Critical two-tail	2.069	

t-test: paired two sample for means:	Chilko/Quesnel (Hope-ChurnCr) - Region 2	
	IFScales	Reconstruction
Mean	81.5%	89.3%
Variance	6.9%	4.5%
Observations	45	45
df	44	
t Stat	-3.206	
P(T<=t) one-tail	0.1%	
t Critical one-tail	1.680	
P(T<=t) two-tail	0.3%	
t Critical two-tail	2.015	

t-test: paired two sample for means:	Chilko/Quesnel (Above ChurnCr) - Region 3	
	IFScales	Reconstruction
Mean	52.5%	51.4%
Variance	3.4%	3.9%
Observations	4	4
df	3	
t Stat	0.118	
P(T<=t) one-tail	45.7%	
t Critical one-tail	2.353	
P(T<=t) two-tail	91.3%	
t Critical two-tail	3.182	

Table 8. Late Stuart/Stellako t-test results with raw data transformed using the Arcsin of the square root of percentages.

t-test: paired two sample for means:	Late Stuart/Stellako (all areas)	
	IFScales	Reconstruction
Mean	58.1%	53.0%
Variance	5.8%	4.8%
Observations	67	67
df	66	
t Stat	2.703	
P(T<=t) one-tail	0.4%	
t Critical one-tail	1.668	
P(T<=t) two-tail	0.9%	
t Critical two-tail	1.997	

t-test: paired two sample for means:	Late Stuart/Stellako (Below Hope) - Region 1	
	IFScales	Reconstruction
Mean	43.9%	41.1%
Variance	2.1%	0.8%
Observations	15	15
df	14	
t Stat	0.853	
P(T<=t) one-tail	20.4%	
t Critical one-tail	1.761	
P(T<=t) two-tail	40.8%	
t Critical two-tail	2.145	

t-test: paired two sample for means:	Late Stuart/Stellako (Hope-ChurnCr) - Region 2	
	IFScales	Reconstruction
Mean	57.9%	50.7%
Variance	4.1%	2.4%
Observations	46	46
df	45	
t Stat	3.233	
P(T<=t) one-tail	0.1%	
t Critical one-tail	1.679	
P(T<=t) two-tail	0.2%	
t Critical two-tail	2.014	

t-test: paired two sample for means:	Late Stuart/Stellako (Above ChurnCr) - Region 3	
	IFScales	Reconstruction
Mean	95.1%	99.8%
Variance	12.1%	9.0%
Observations	6	6
df	5	
t Stat	-0.512	
P(T<=t) one-tail	31.5%	
t Critical one-tail	2.015	
P(T<=t) two-tail	63.0%	
t Critical two-tail	2.571	

Table 9. Adams t-test results with raw data transformed using the Arcsin of the square root of percentages.

t-test: paired two sample for means:	Adams (all areas)	
	IFScales	Reconstruction
Mean	71.6%	83.3%
Variance	11.9%	19.8%
Observations	10	10
df	9	
t Stat	-1.827	
P(T<=t) one-tail	5.0%	
t Critical one-tail	1.833	
P(T<=t) two-tail	10.1%	
t Critical two-tail	2.262	

t-test: paired two sample for means:	Adams (Below Hope) - Region 1	
	IFScales	Reconstruction
Mean	60.7%	62.1%
Variance	8.4%	12.3%
Observations	4	4
df	3	
t Stat	-0.102	
P(T<=t) one-tail	46.3%	
t Critical one-tail	2.353	
P(T<=t) two-tail	92.5%	
t Critical two-tail	3.182	

t-test: paired two sample for means:	Adams (Hope-ChurnCr) - Region 2	
	IFScales	Reconstruction
Mean	78.9%	97.4%
Variance	14.8%	22.3%
Observations	6	6
df	5	
t Stat	-3.483	
P(T<=t) one-tail	0.9%	
t Critical one-tail	2.015	
P(T<=t) two-tail	1.8%	
t Critical two-tail	2.571	

Table 10. Early Stuart catch estimates (Scales versus Reconstruction)

Region 1 : Below Hope

Early Stuart Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	8,888	9,421
1991	39,604	34,916
1992	470	157
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	n.e.	n.e.
All Years	48,962	44,494

Region 2 : Hope - Churn Creek

Early Stuart Catch Estimates

Year	Scale Based	Reconstruction
1989	3,523	3,710
1990	n.e.	n.e.
1991	46,374	45,473
1992	753	1,006
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	30,142	24,117
All Years	80,792	74,306

Notes:

i) n.e. - no estimate was made due to lack of scale data

ii) annual catch estimates listed are incomplete, they do not include catches for weeks (or years) when scale data were not available

Table 11. Nadina/Gates catch estimates (Scales versus Reconstruction)

Region 1 : Below Hope

Nadina / Gates Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	4,173	4,174
1991	7,382	5,537
1992	8,424	7,185
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	n.e.	n.e.
All Years	19,979	16,896

Region 2 : Hope - Churn Creek

Nadina / Gates Catch Estimates

Year	Scale Based	Reconstruction
1989	1,160	2,227
1990	n.e.	n.e.
1991	8,476	10,885
1992	11,586	10,773
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	12,087	9,898
All Years	33,309	33,783

Region 3 : Above Churn Creek

Nadina / Gates Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	n.e.	n.e.
1991	120	148
1992	n.e.	n.e.
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	591	344
All Years	711	492

Notes:

i) n.e. - no estimate was made due to lack of scale data

ii) annual catch estimates listed are incomplete, they do not include catches for weeks (or years) when scale data were not available

Table 12. Fennell/Bowron catch estimates (Scales versus Reconstruction)

Region 1 : Below Hope

Fennell/Bowron Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	7,443	6,867
1991	0	1,209
1992	3,046	4,764
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	n.e.	n.e.
All Years	10,489	12,840

Region 2 : Hope - Churn Creek

Fennell/Bowron Catch Estimates

Year	Scale Based	Reconstruction
1989	1,060	856
1990	n.e.	n.e.
1991	4,386	4,043
1992	2,636	5,147
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	22,899	13,068
All Years	30,981	23,114

Region 3 : Above Churn Creek

Fennell/Bowron Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	n.e.	n.e.
1991	n.e.	n.e.
1992	n.e.	n.e.
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	816	445
All Years	816	445

Notes:

i) n.e. - no estimate was made due to lack of scale data

ii) annual catch estimates listed are incomplete, they do not include catches for weeks (or years) when scale data were not available

Table 13. Seymour catch estimates (Scales versus Reconstruction)

Region 1 : Below Hope

Seymour Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	18,178	14,774
1991	2,671	3,000
1992	n.e.	n.e.
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	n.e.	n.e.
All Years	20,849	17,774

Region 2 : Hope - Churn Creek

Seymour Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	n.e.	n.e.
1991	6,190	7,017
1992	n.e.	n.e.
1993	n.e.	n.e.
1994	11,327	14,149
1995	7,810	9,890
All Years	25,327	31,056

Notes:

i) n.e. - no estimate was made due to lack of scale data

ii) annual catch estimates listed are incomplete, they do not include catches for weeks (or years) when scale data were not available

Table 14. Chilko/Quesnel catch estimates (Scales versus Reconstruction)

Region 1 : Below Hope

Chilko / Quesnel Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	79,633	90,916
1991	30,093	34,575
1992	19,158	18,636
1993	65,594	65,617
1994	n.e.	n.e.
1995	n.e.	n.e.
All Years	194,478	209,744

Region 2 : Hope - Churn Creek

Chilko / Quesnel Catch Estimates

Year	Scale Based	Reconstruction
1989	29,833	30,908
1990	n.e.	n.e.
1991	68,818	71,115
1992	23,704	24,965
1993	68,086	75,667
1994	88,205	82,298
1995	152,749	188,328
All Years	431,395	473,281

Region 3 : Above Churn Creek

Chilko/Quesnel Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	n.e.	n.e.
1991	n.e.	n.e.
1992	n.e.	n.e.
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	1,055	884
All Years	1,055	884

Notes:

i) n.e. - no estimate was made due to lack of scale data

ii) annual catch estimates listed are incomplete, they do not include catches for weeks (or years) when scale data were not available

Table 15. Late Stuart/Stellako catch estimates (Scales versus Reconstruction)

Region 1 : Below Hope

Late Stuart / Stellako Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	27,545	20,460
1991	7,801	6,160
1992	4,652	4,604
1993	29,492	25,004
1994	n.e.	n.e.
1995	n.e.	n.e.
All Years	69,490	56,228

Region 2 : Hope - Churn Creek

Late Stuart / Stellako Catch Estimates

Year	Scale Based	Reconstruction
1989	19,704	16,923
1990	n.e.	n.e.
1991	19,655	12,500
1992	10,084	5,901
1993	51,027	43,445
1994	19,353	22,437
1995	106,190	70,222
All Years	226,013	171,428

Region 3 : Above Churn Creek

Late Stuart / Stellako Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	n.e.	n.e.
1991	622	591
1992	n.e.	n.e.
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	2,139	2,591
All Years	2,761	3,182

Notes:

i) n.e. - no estimate was made due to lack of scale data

ii) annual catch estimates listed are incomplete, they do not include catches for weeks (or years) when scale data were not available

Table 16. Adams catch estimates (Scales versus Reconstruction)

Region 1 : Below Hope

Adams Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	31,461	28,469
1991	3,368	4,274
1992	n.e.	n.e.
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	n.e.	n.e.
All Years	34,829	32,743

Region 2 : Hope - Churn Creek

Adams Catch Estimates

Year	Scale Based	Reconstruction
1989	n.e.	n.e.
1990	n.e.	n.e.
1991	7,826	8,811
1992	n.e.	n.e.
1993	n.e.	n.e.
1994	n.e.	n.e.
1995	15,157	25,104
All Years	22,983	33,915

Notes:

i) n.e. - no estimate was made due to lack of scale data

ii) annual catch estimates listed are incomplete, they do not include catches for weeks (or years) when scale data were not available

FIGURES

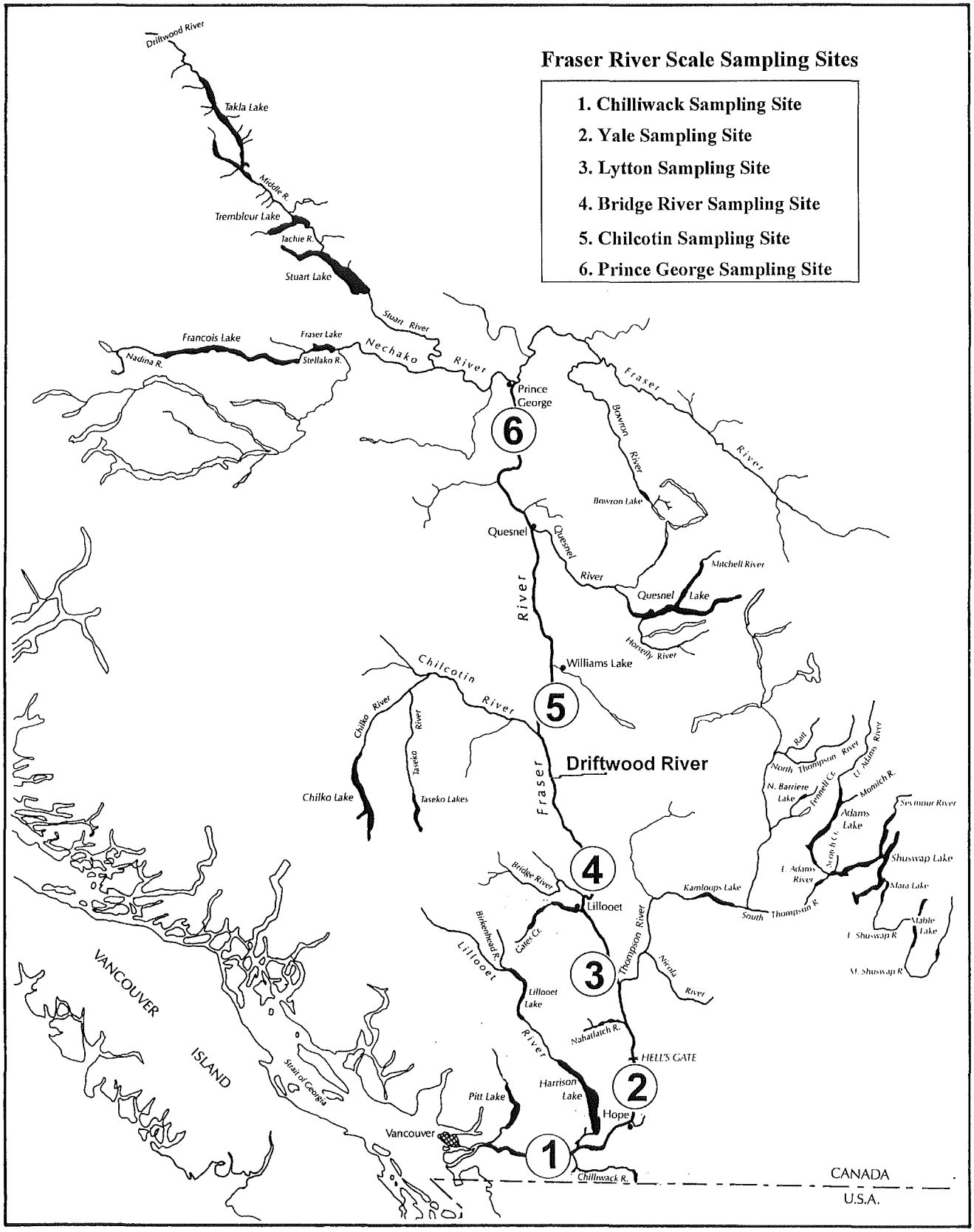
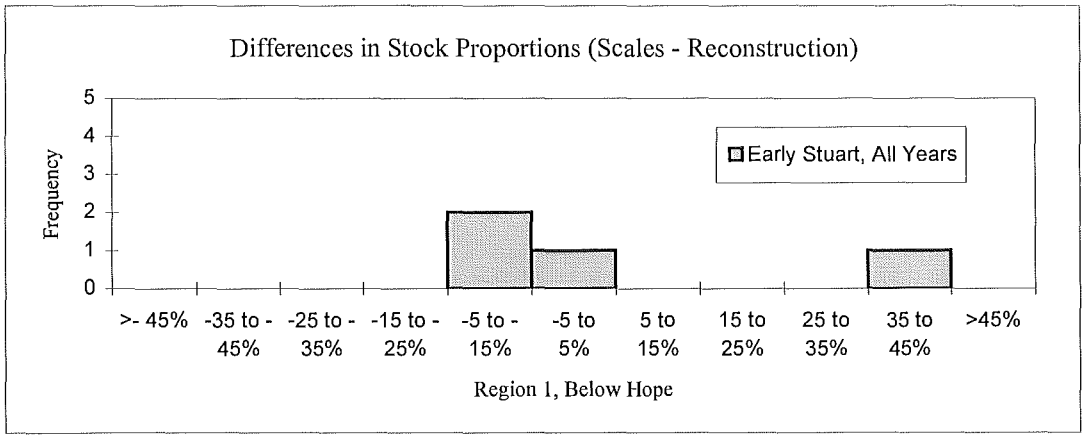


Figure 1. First Nations scale sampling sites in the Fraser River watershed.



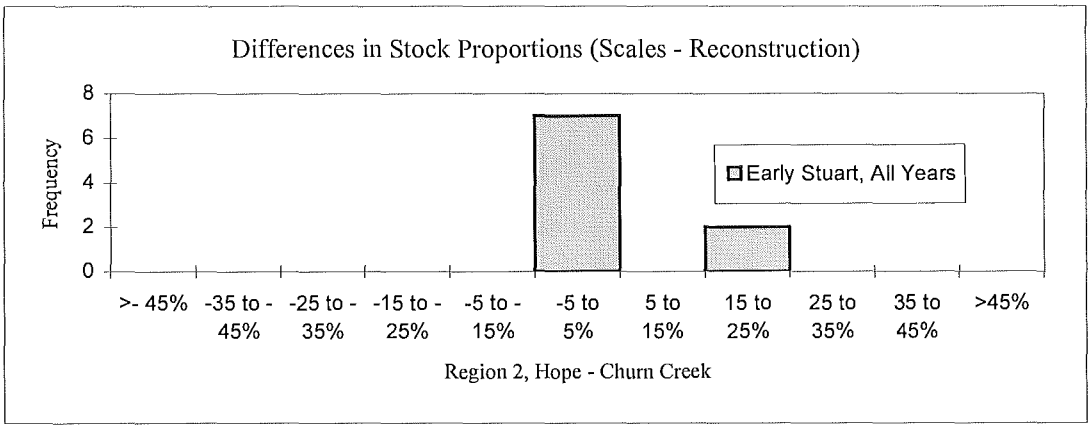
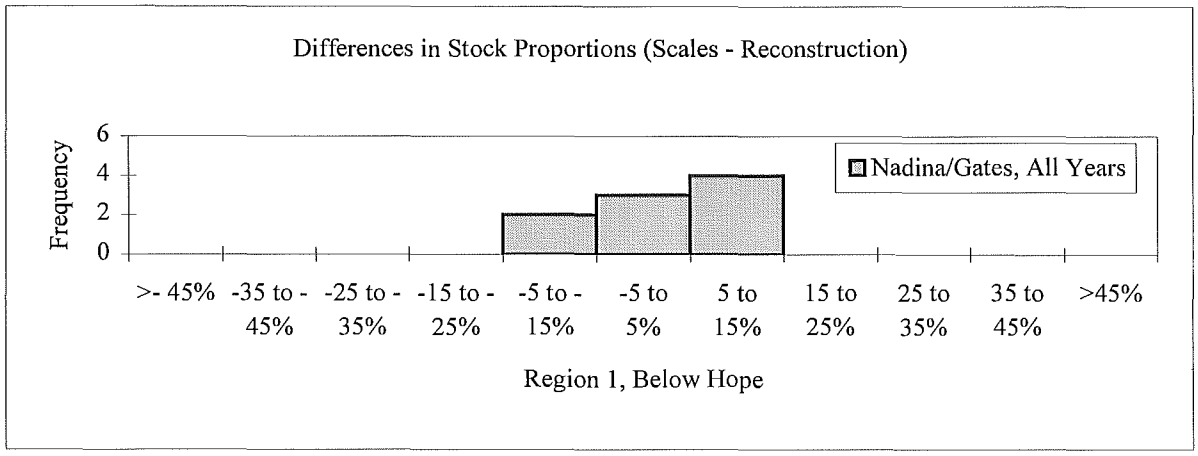
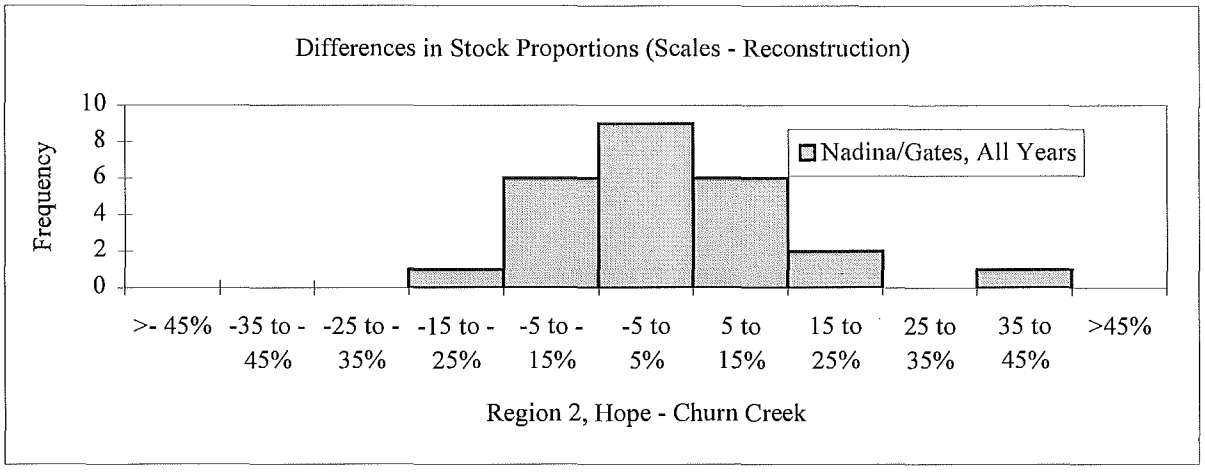


Figure 2. Differences in Early Stuart stock proportions (Scales minus Reconstructions)





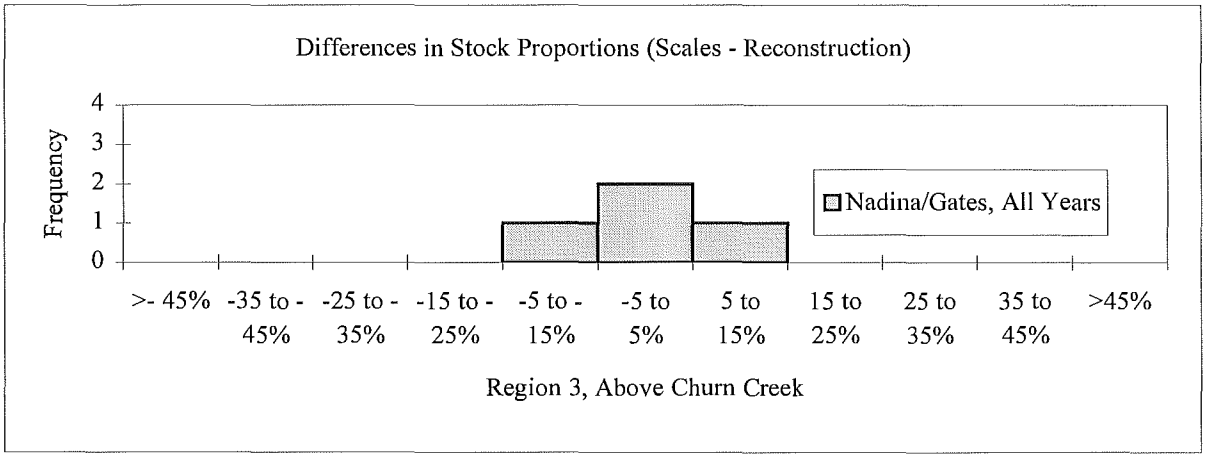
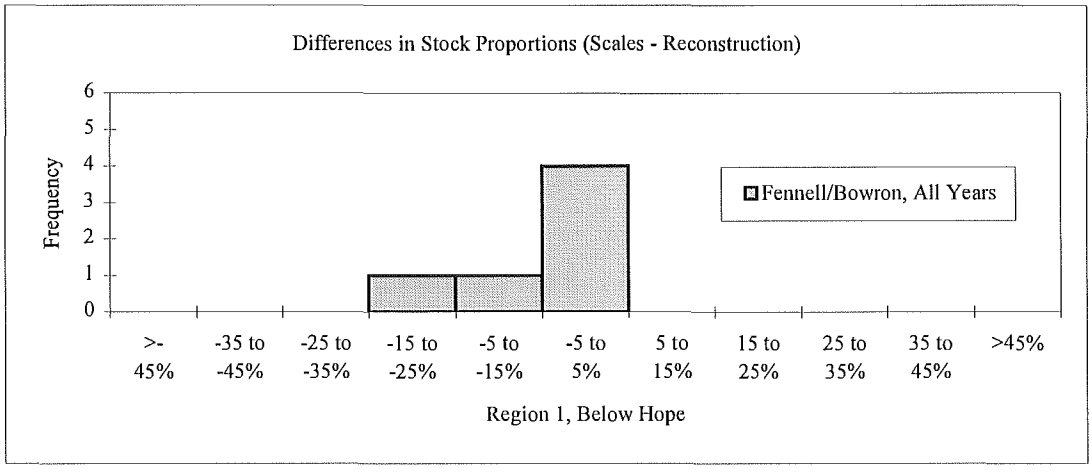
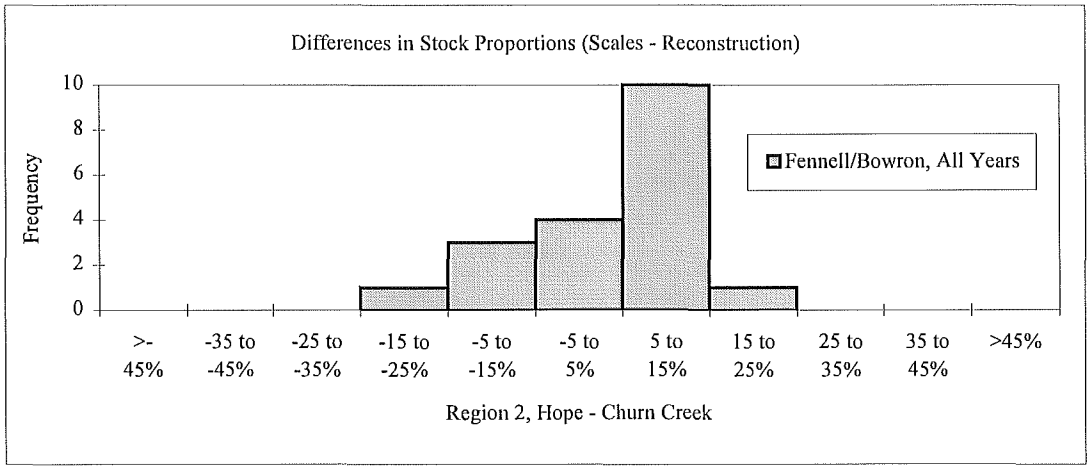


Figure 3. Differences in Nadina/Gates stock proportions (Scales minus Reconstructions)





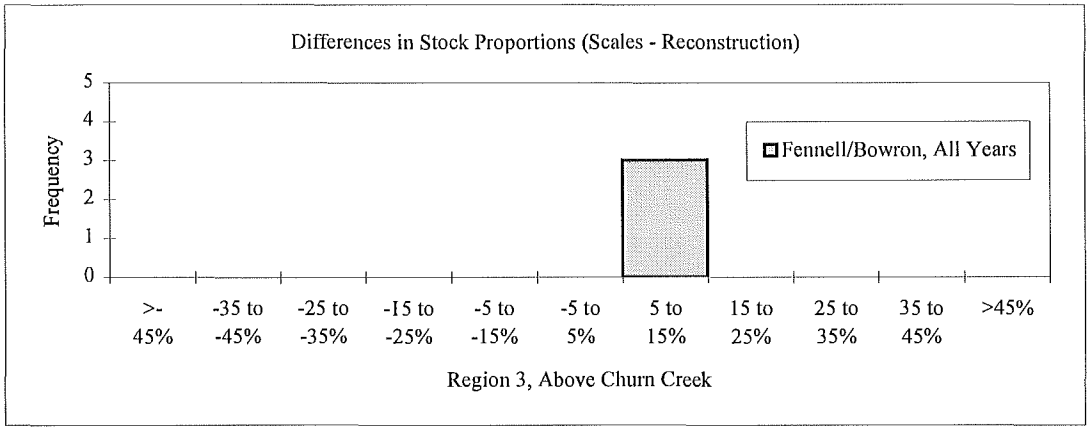
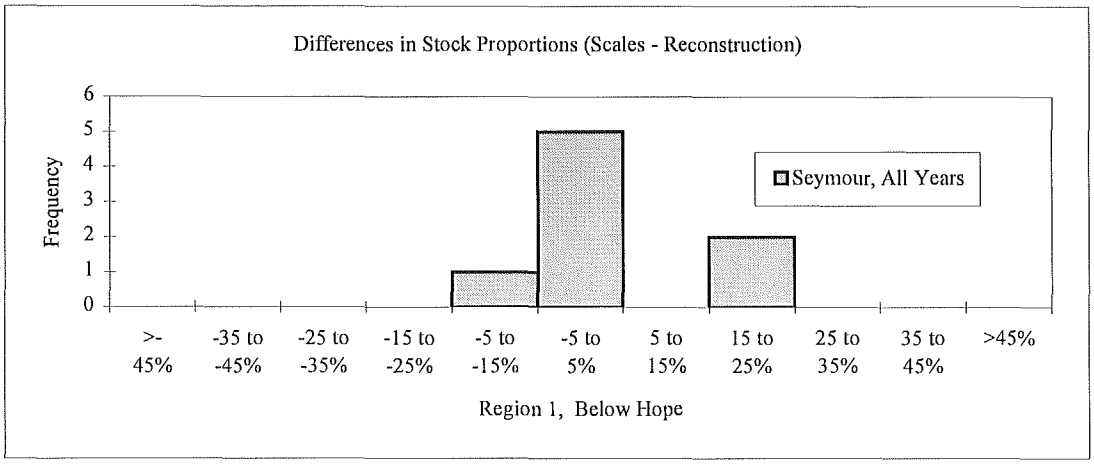


Figure 4. Differences in Fennell/Bowron stock porportions (Scale minus Recinstructions)



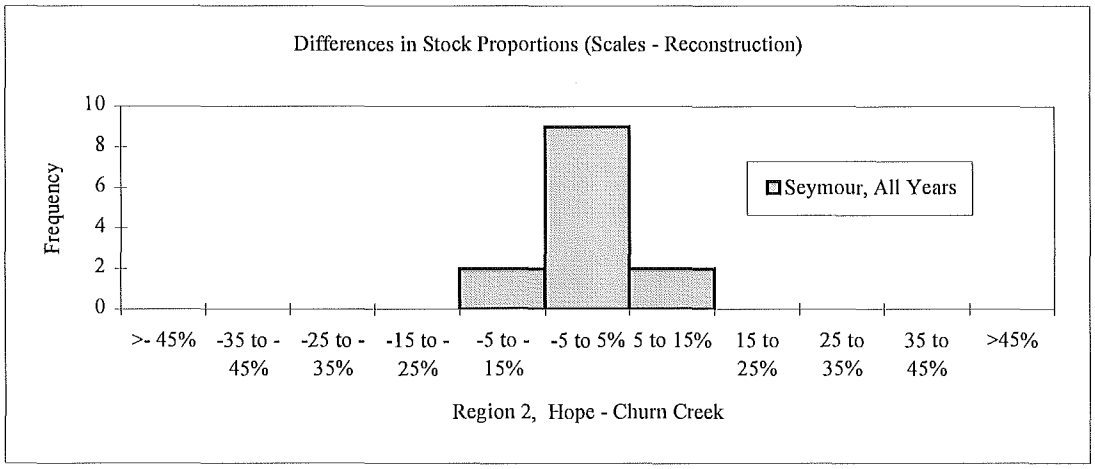
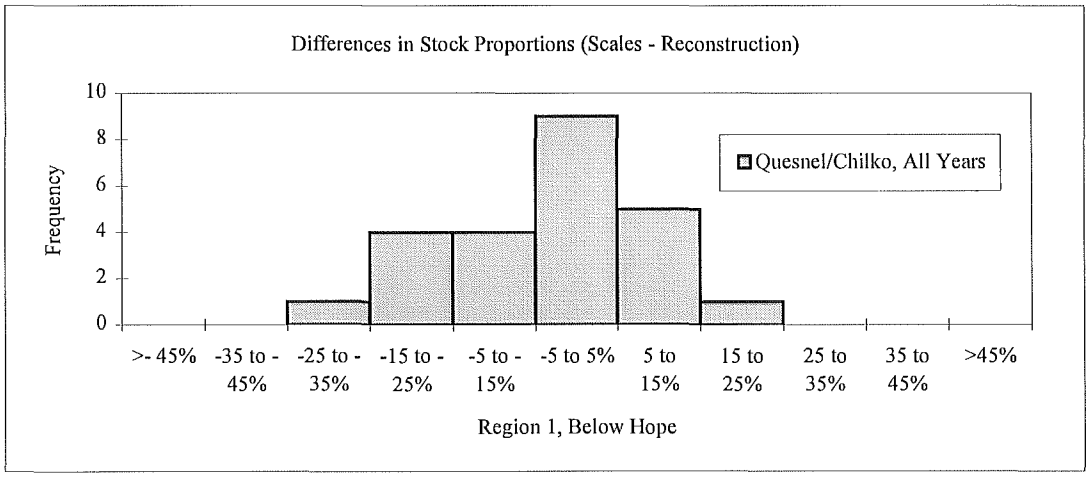
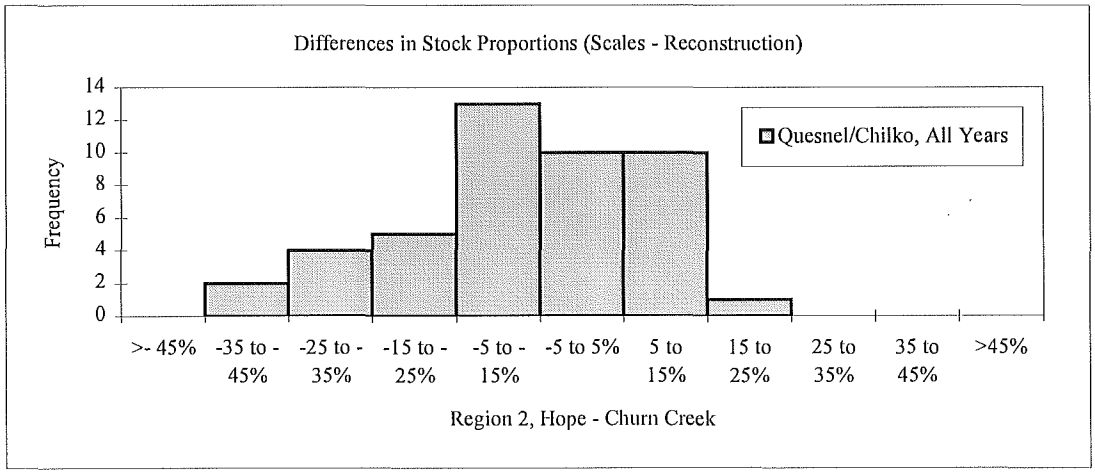


Figure 5. Differences in Scotch/Seymour stock proportions (Scales minus Reconstructions)





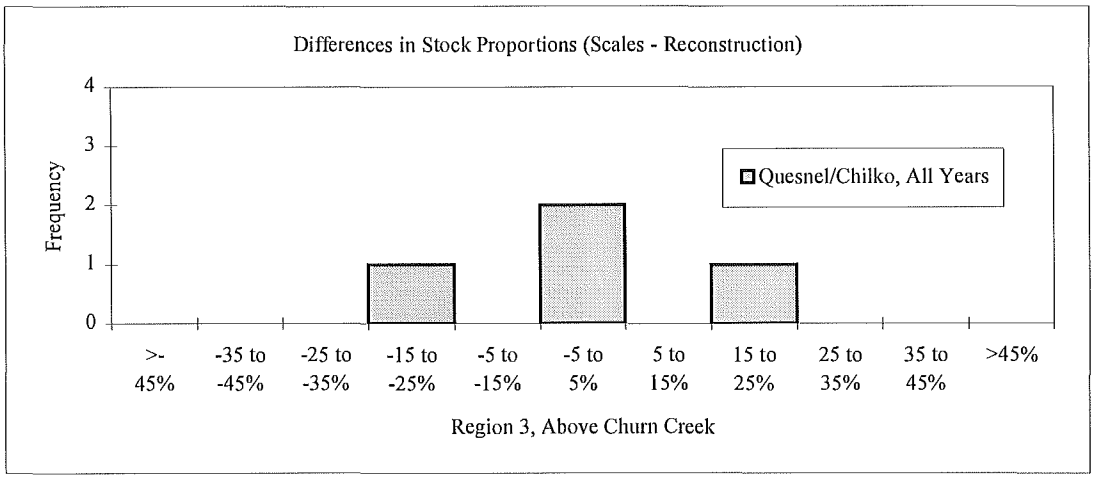
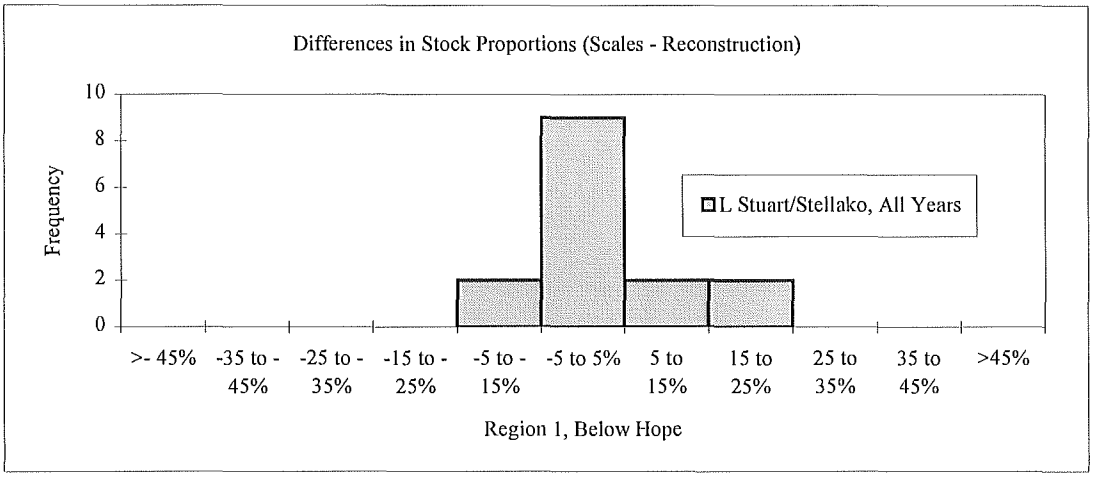
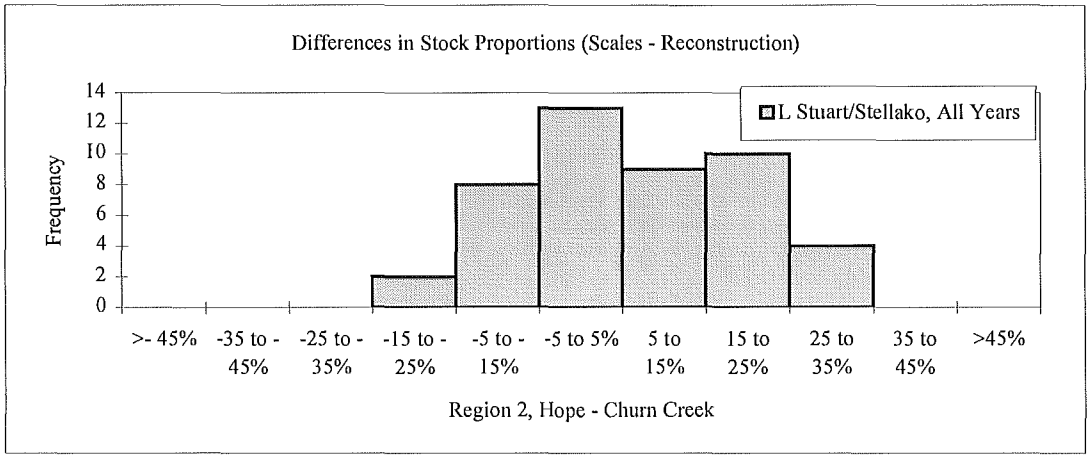


Figure 6. Differences in Chilko/Quesnel stock proportions (Scales minus Reconstructions)





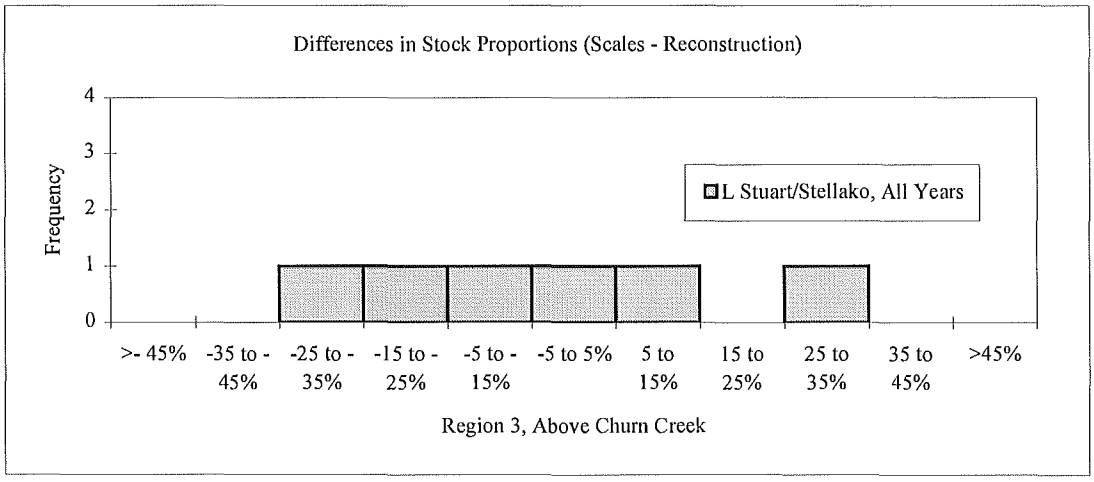
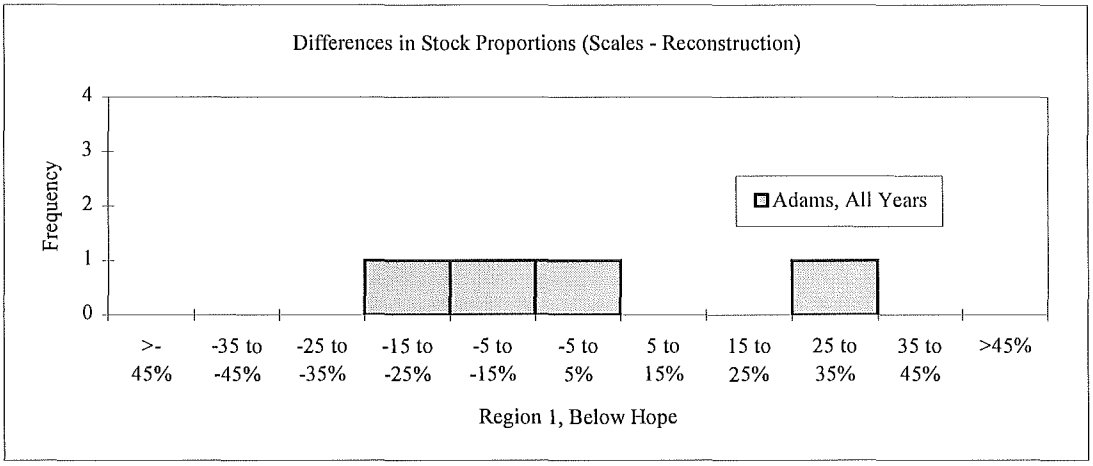


Figure 7. Differences in Late Stuart/Stellako stock proportions (Scales minus Reconstructions)



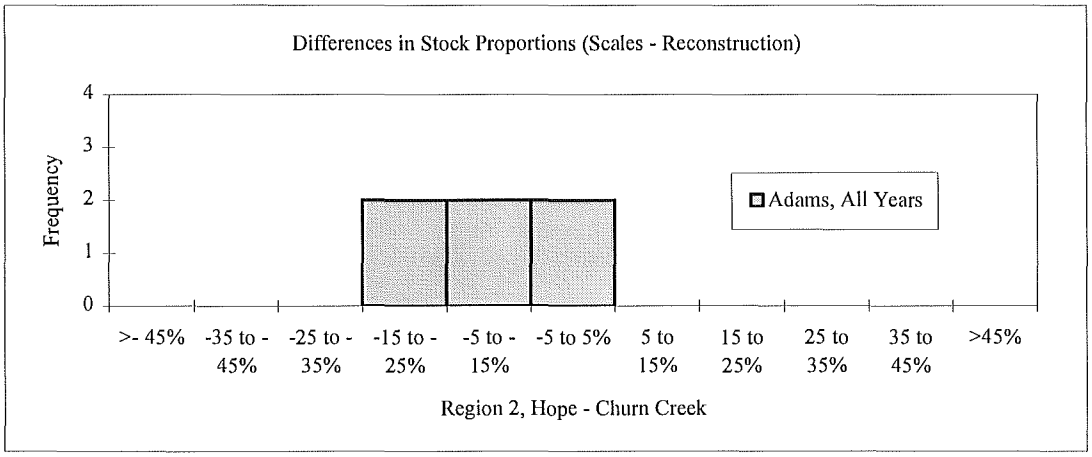
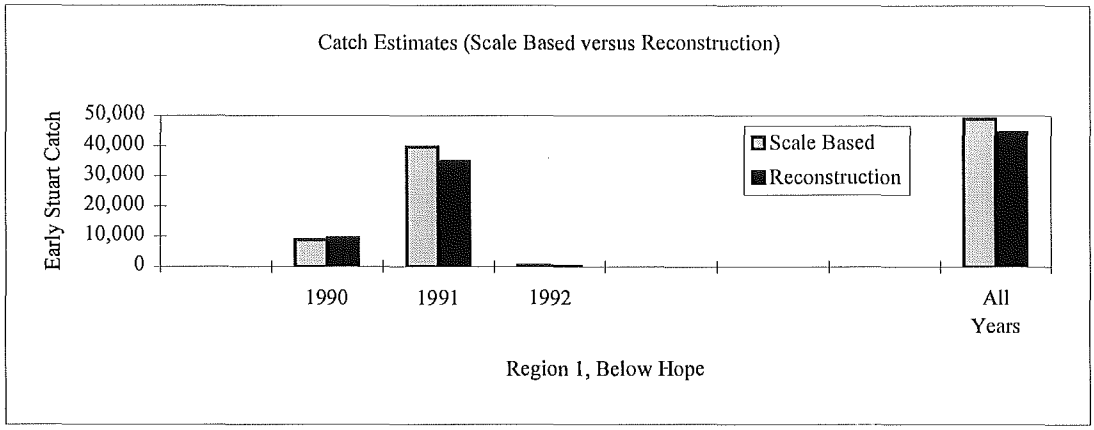


Figure 8. Differences in Adams/Lower Shuswap stock proportions (Scales minus Reconstructions)



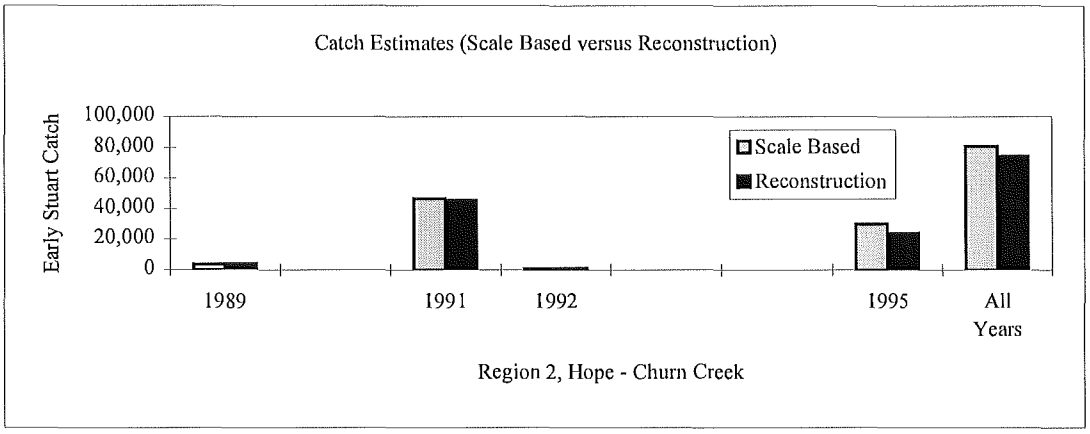
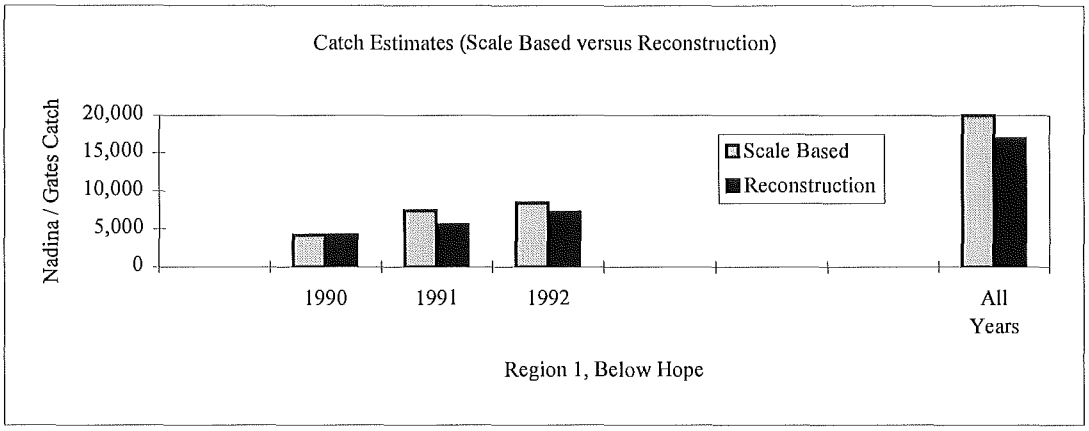
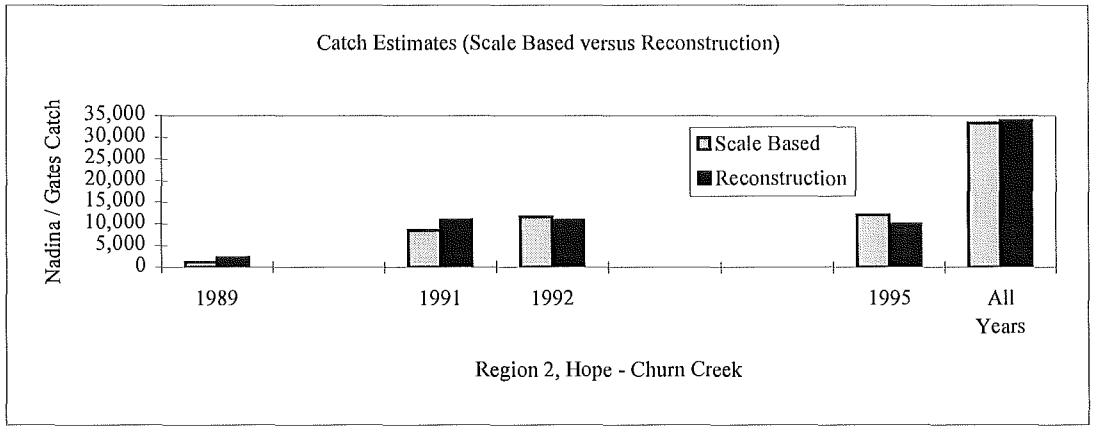


Figure 9. Comparisons of Early Stuart catch estimates (Scale Based versus Reconstructions)





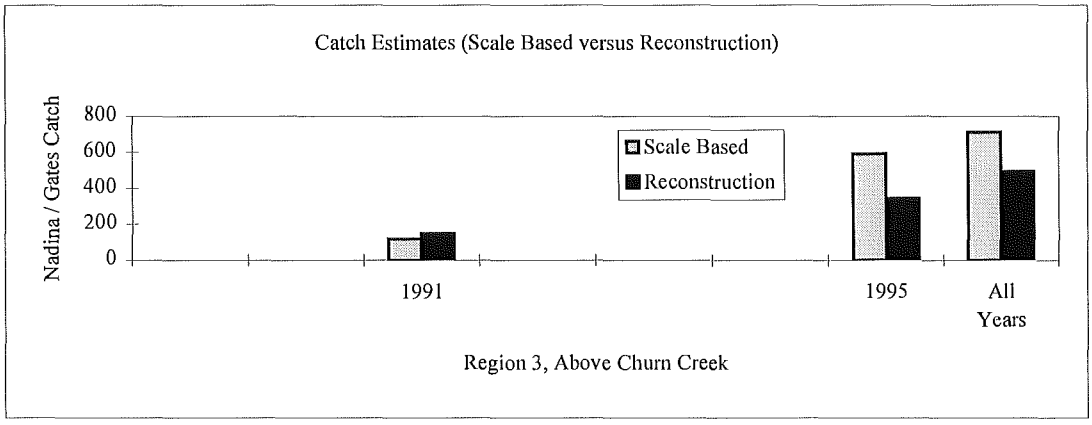
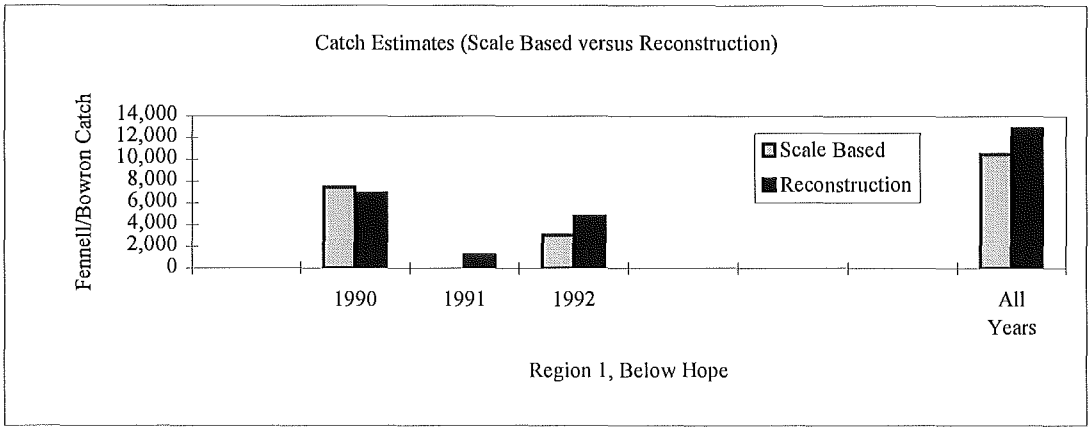
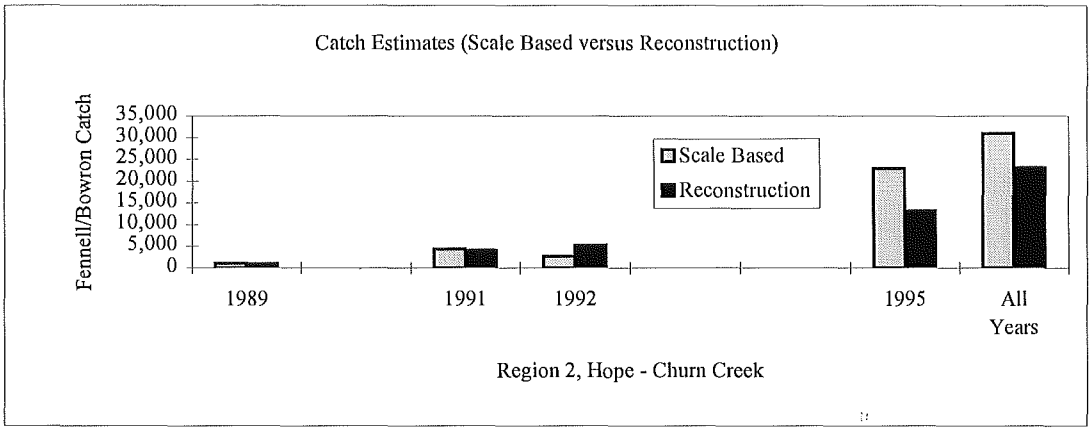


Figure 10. Comparisons of Nadina/Gates catch estimates (Scale Based versus Reconstructions)





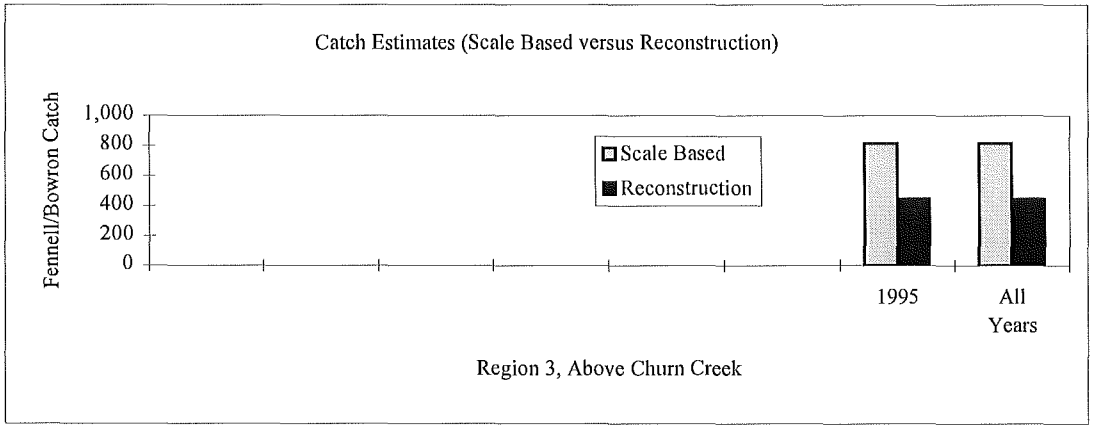
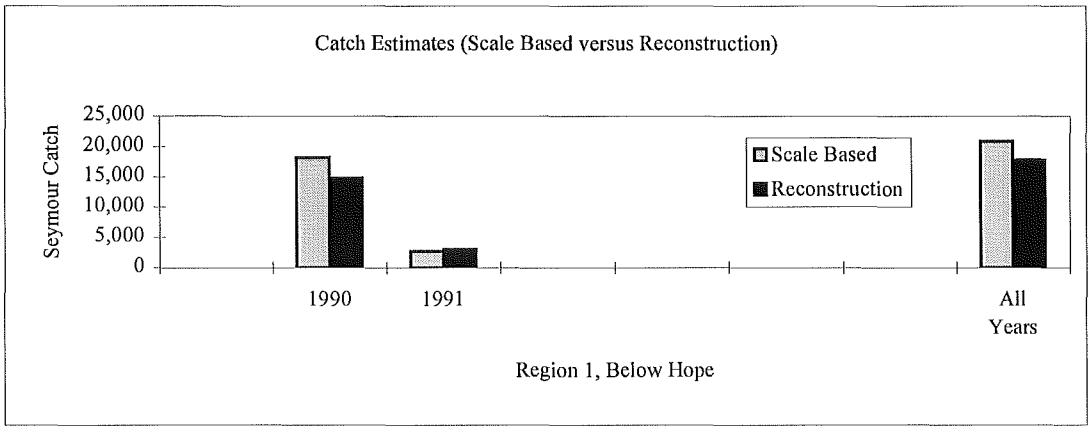


Figure 11. Comparisons of Fennell/Bowron catch estimates (Scale Based versus Reconstructions)



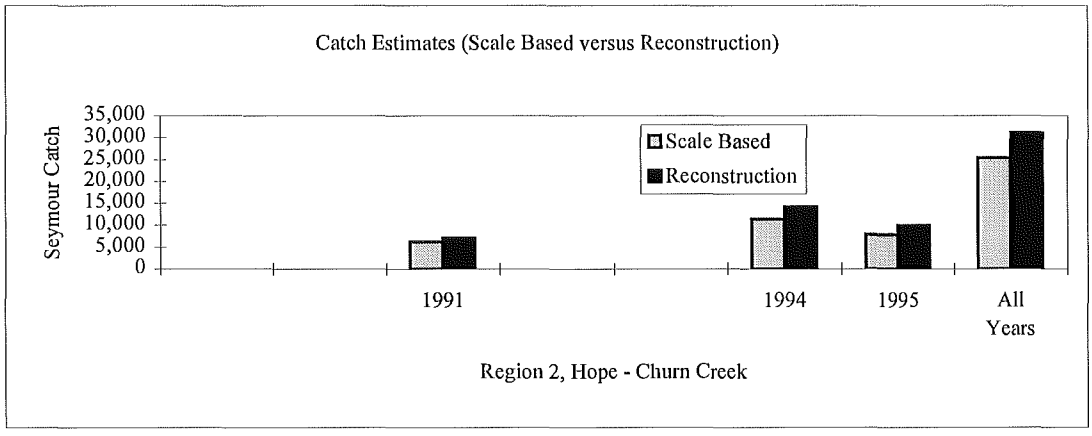
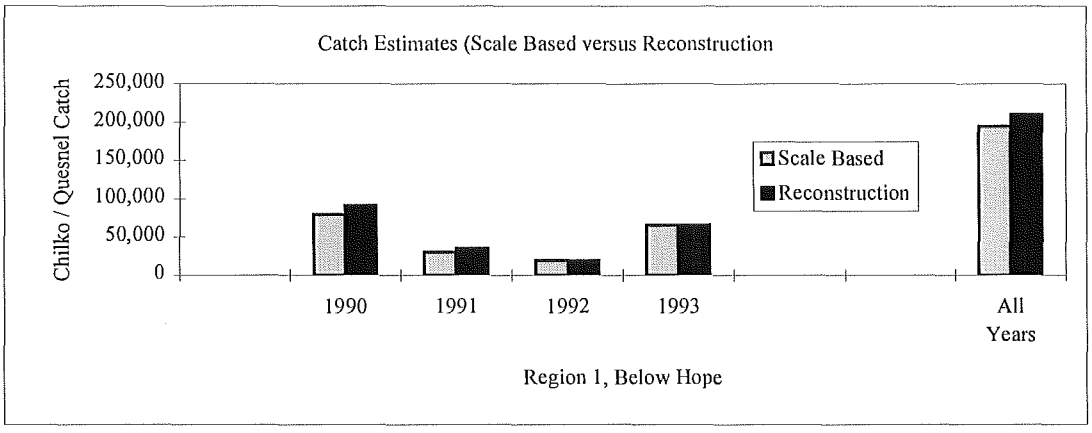
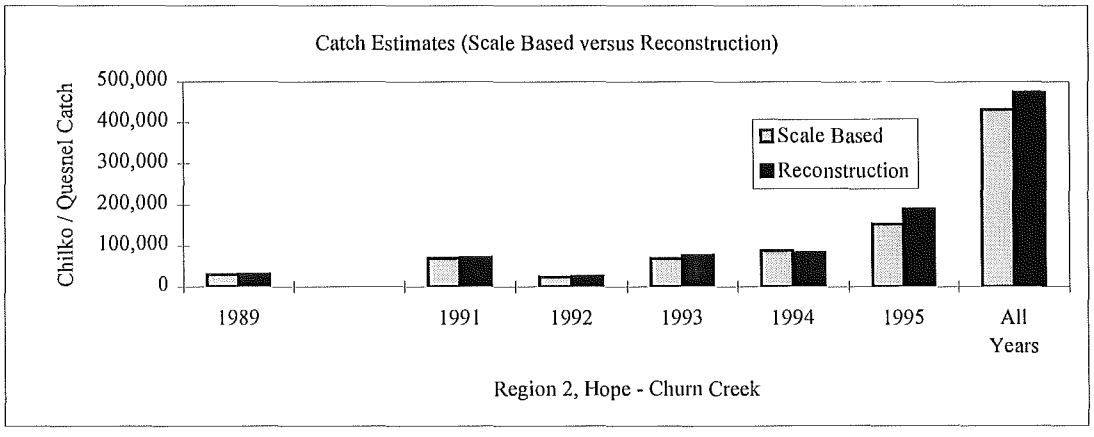


Figure 12. Comparisons of Scotch/Seymour catch estimates (Scale Based versus Reconstructions)





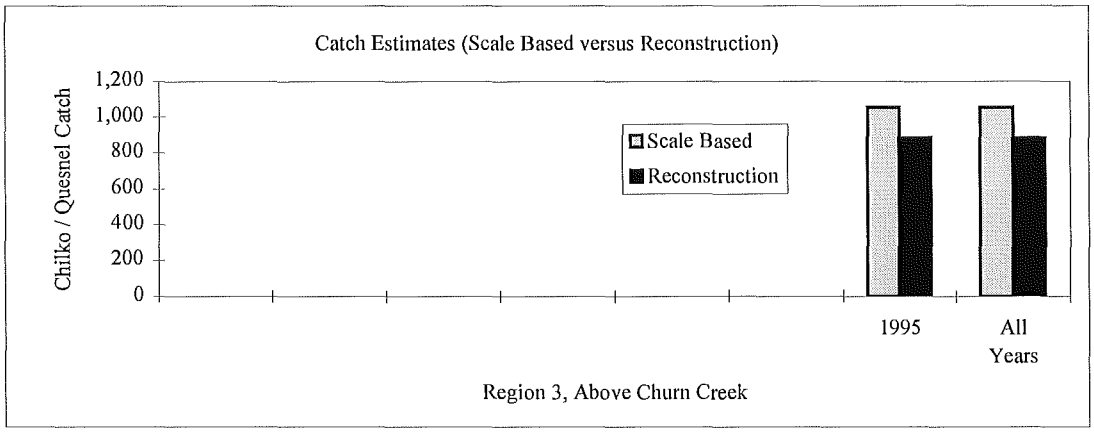
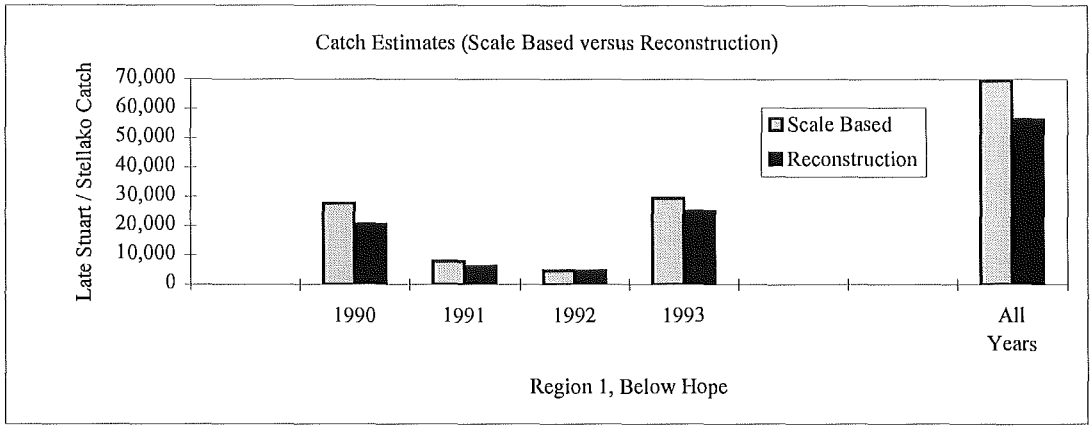
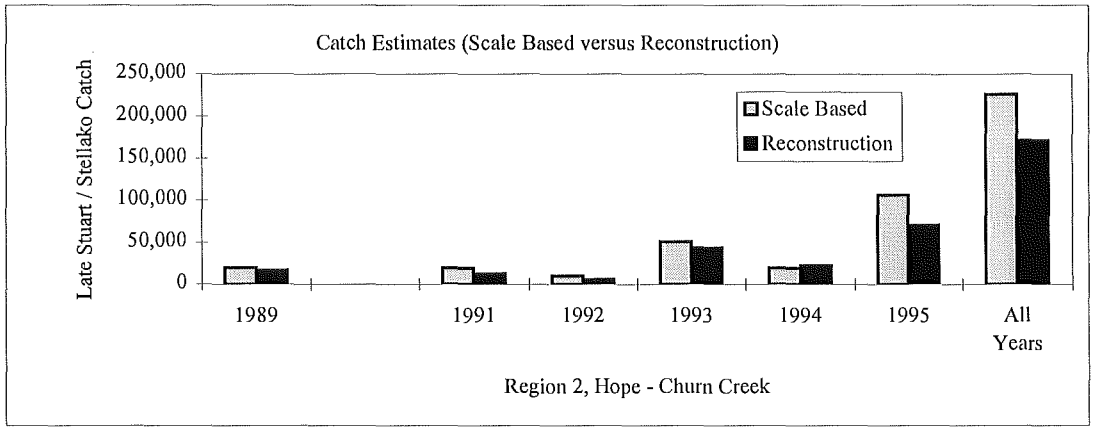


Figure 13. Comparisons of Chilko/Quesnel catch estimates (Scale Based versus Reconstructions)





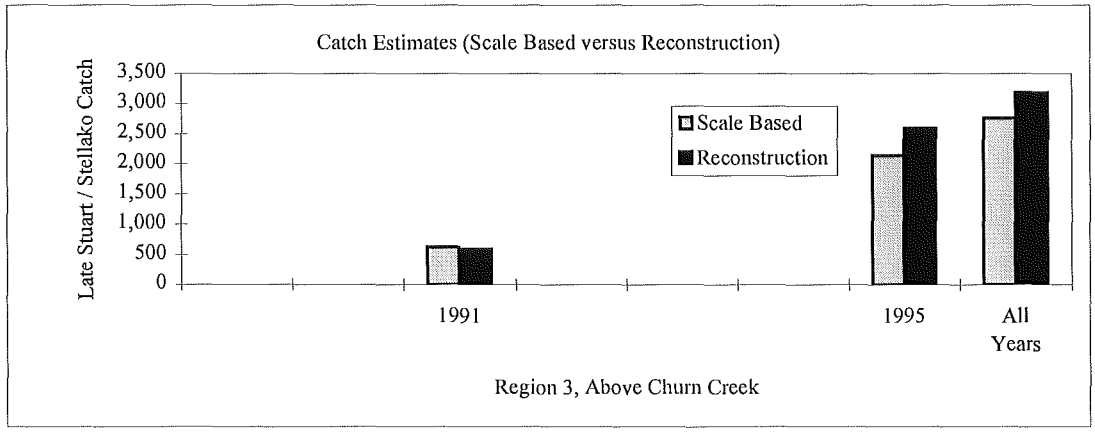
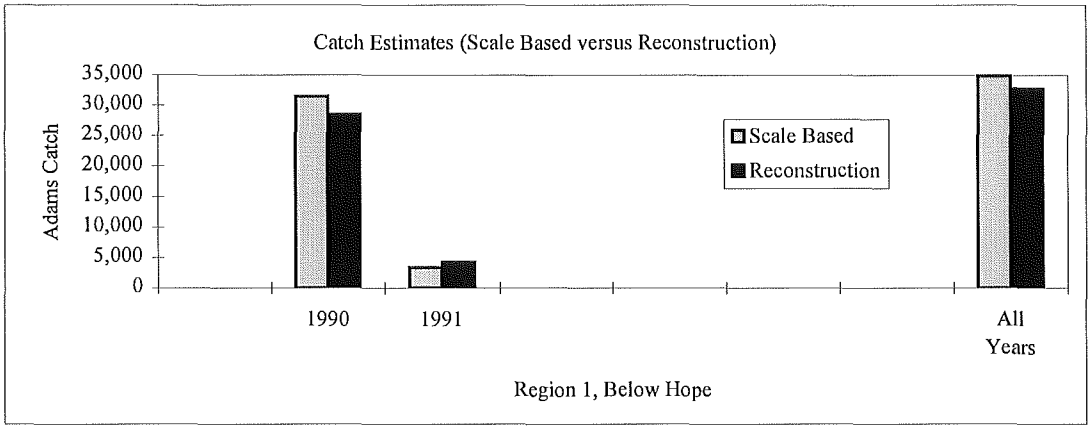


Figure 14. Comparisons of L Stuart/Stellako catch estimates (Scale Based versus Reconstructions)



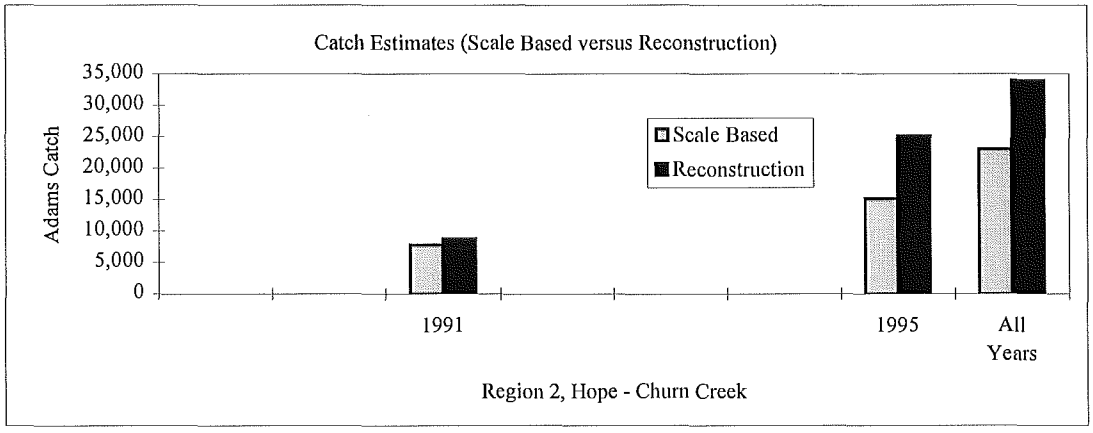


Figure 15. Comparisons of Adams/L.Shuswap catch estimates(Scale Based versus Reconstructions)

APPENDIX TABLES

Appendix Table 1. Complete list of Early Stuart samples

Area	Date	Sample Size	Model	Scale Sample Results: Early Stuart	Reconstruction Analyses Results: Early Stuart	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1989						
Lytton/Siska	7/26-27	136	$4_{2's}$ & $5_{2's}$	67%	69%	Yes
Lytton/Siska	8/2-3	112	$4_{2's}$ & $5_{2's}$	n.e.	1%	No
Lytton/Siska	8/9-10	99	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1990						
Agassiz	7/20-22	40	$4_{2's}$ & $5_{2's}$	63%	62%	Yes
Agassiz	7/26-29	81	$4_{2's}$ & $5_{2's}$	15%	21%	Yes
Agassiz	8/3-5	120	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1991						
Chilliwack	7/18-20	101	$4_{2's}$ & $5_{2's}$	84%	93%	Yes
Chilliwack	7/25-28	255	$4_{2's}$ & $5_{2's}$	100%	59%	Yes
Chilliwack	8/8-11	92	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1991						
Yale	7/19-21	105	$4_{2's}$ & $5_{2's}$	100%	97%	Yes
Yale	7/25-28	108	$4_{2's}$ & $5_{2's}$	71%	71%	Yes
Yale	8/1-4	111	$4_{2's}$ & $5_{2's}$	8%	8%	Yes
Yale	8/11	106	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1991						
Bridge R	8/1	14	$4_{2's}$ & $5_{2's}$	23%	72%	No
Bridge R	8/15	35	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1991						
P. George	8/15-22	36	$4_{2's}$ & $5_{2's}$	n.e.	8%	No
P. George	8/25-29	52	$4_{2's}$ & $5_{2's}$	n.e.	0%	No

Appendix Table 1 (continued). Complete list of Early Stuart samples

Area	Date	Sample Size	Model	Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1992						
		Sample		Early	Early	Include
Area	Date	Size	Model	Stuart	Stuart	Sample ?
Chilliwack	8/1-3	162	$4_{2's}$ & $5_{2's}$	6%	2%	No
Chilliwack	8/6-10	165	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1992						
		Sample		Early	Early	Include
Area	Date	Size	Model	Stuart	Stuart	Sample ?
Yale	8/1-3	152	$4_{2's}$ & $5_{2's}$	4%	4%	Yes
Yale	8/6	36	$4_{2's}$ & $5_{2's}$	n.e.	1%	No
Yale	8/14-16	158	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1992						
		Sample		Early	Early	Include
Area	Date	Size	Model	Stuart	Stuart	Sample ?
Bridge R	8/10-11	145	$4_{2's}$ & $5_{2's}$	n.e.	2%	No
Bridge R	8/17-19	125	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1993						
		Sample		Early	Early	Include
Area	Date	Size	Model	Stuart	Stuart	Sample ?
Chilliwack	8/14	101	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1993						
		Sample		Early	Early	Include
Area	Date	Size	Model	Stuart	Stuart	Sample ?
Yale	8/14	108	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1993						
		Sample		Early	Early	Include
Area	Date	Size	Model	Stuart	Stuart	Sample ?
Bridge R	9/6	63	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1994						
		Sample		Early	Early	Include
Area	Date	Size	Model	Stuart	Stuart	Sample ?
Yale	8/12,16-18	61	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1994						
		Sample		Early	Early	Include
Area	Date	Size	Model	Stuart	Stuart	Sample ?
Lytton	8/10,13-15	200	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1994						
		Sample		Early	Early	Include
Area	Date	Size	Model	Stuart	Stuart	Sample ?
Bridge R	8/9-11	160	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No

Appendix Table 1 (continued). Complete list of Early Stuart samples

Area	Date	Sample Size	Model	Scale Sample Results: Early Stuart	Reconstruction Analyses Results: Early Stuart	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1995						
Yale	7/21-22	184	$4_{2's}$ & $5_{2's}$	86%	64%	Yes
Yale	8/4-5	208	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1995						
Yale	7/11	32	$4_{2's}$ & $5_{2's}$	100%	100%	No
Yale	7/21-24	212	$4_{2's}$ & $5_{2's}$	65%	63%	Yes
Yale	7/25-26	76	$4_{2's}$ & $5_{2's}$	69%	49%	Yes
Yale	7/28-8/1	96	$4_{2's}$ & $5_{2's}$	1%	0%	No
Indian Fishery Scale Samples - 1995						
Lytton	7/17	27	$4_{2's}$ & $5_{2's}$	100%	98%	No
Lytton	7/20-23	148	$4_{2's}$ & $5_{2's}$	72%	76%	Yes
Lytton	7/24-25	102	$4_{2's}$ & $5_{2's}$	4%	2%	No
Lytton	7/26-8/1	75	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1995						
Bridge R	7/27-31	85	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1995						
Sheep Cr	7/28-8/6	190	$4_{2's}$ & $5_{2's}$	n.e.	0%	No

Decision Rules for statistical analyses:

(1) do not use scale sample results if the sample size is less than 40.

(2) do not include the scale sample results if the estimated percentage of the run reconstruction results is less than 3 percent, or if the stock was not estimated in the scale sample.

Note: n.e. indicates that no estimate was made for the stock group.

Appendix Table 1 (continued). Complete list of Nadina/Gates samples

Area	Date	Sample Size	Model	Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1989						
		Sample		Nadina/	Nadina/	Include
Area	Date	Size	Model	Gates	Gates	Sample ?
Lytton/Siska	7/26-27	136	$4_{2's}$ & $5_{2's}$	0%	6%	Yes
Lytton/Siska	8/2-3	112	$4_{2's}$ & $5_{2's}$	18%	11%	Yes
Lytton/Siska	8/9-10	99	$4_{2's}$ & $5_{2's}$	2%	14%	Yes
Lytton/Siska	8/16-17	158	$4_{2's}$ & $5_{2's}$	n.e.	2%	No
Indian Fishery Scale Samples - 1990						
		Sample		Nadina/	Nadina/	Include
Area	Date	Size	Model	Gates	Gates	Sample ?
Agassiz	7/20-22	40	$4_{2's}$ & $5_{2's}$	0%	2%	No
Agassiz	7/26-29	81	$4_{2's}$ & $5_{2's}$	6%	13%	Yes
Agassiz	8/3-5	120	$4_{2's}$ & $5_{2's}$	14%	11%	Yes
Agassiz	8/9-12	204	$4_{2's}$ & $5_{2's}$	n.e.	1%	No
Indian Fishery Scale Samples - 1991						
		Sample		Nadina/	Nadina/	Include
Area	Date	Size	Model	Gates	Gates	Sample ?
Chilliwack	7/18-20	101	$4_{2's}$ & $5_{2's}$	11%	3%	Yes
Chilliwack	7/25-28	255	$4_{2's}$ & $5_{2's}$	0%	13%	Yes
Chilliwack	8/8-11	92	$4_{2's}$ & $5_{2's}$	27%	19%	Yes
Chilliwack	8/15-18	100	$4_{2's}$ & $5_{2's}$	14%	3%	Yes
Chilliwack	8/22-25	103	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1991						
		Sample		Nadina/	Nadina/	Include
Area	Date	Size	Model	Gates	Gates	Sample ?
Yale	7/19-21	105	$4_{2's}$ & $5_{2's}$	0%	2%	No
Yale	7/25-28	108	$4_{2's}$ & $5_{2's}$	2%	8%	Yes
Yale	8/1-4	111	$4_{2's}$ & $5_{2's}$	32%	20%	Yes
Yale	8/11	106	$4_{2's}$ & $5_{2's}$	9%	27%	Yes
Yale	8/15-18	169	$4_{2's}$ & $5_{2's}$	6%	4%	Yes
Yale	8/24	110	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1991						
		Sample				Include
Area	Date	Size	Model	Nadina	Nadina	Sample ?
Bridge R	8/1	14	$4_{2's}$ & $5_{2's}$	14%	11%	No
Bridge R	8/15	35	$4_{2's}$ & $5_{2's}$	13%	26%	No
Bridge R	8/18-24	196	$4_{2's}$ & $5_{2's}$	10%	4%	Yes
Bridge R	8/25-30	182	$4_{2's}$ & $5_{2's}$	n.e.	0%	No

Appendix Table 1 (continued). Complete list of Nadina/Gates samples

Area	Date	Sample Size	Model	Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1991						
		Sample				Include
Area	Date	Size	Model	Nadina	Nadina	Sample ?
P. George	8/15-22	36	$4_{2's}$ & $5_{2's}$	33%	65%	No
P. George	8/25-29	52	$4_{2's}$ & $5_{2's}$	28%	34%	Yes
P. George	9/4	15	$4_{2's}$ & $5_{2's}$	7%	4%	No
P. George	9/9-11	102	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1992						
		Sample		Nadina/	Nadina/	Include
Area	Date	Size	Model	Gates	Gates	Sample ?
Chilliwack	8/1-3	162	$4_{2's}$ & $5_{2's}$	53%	42%	Yes
Chilliwack	8/6-10	165	$4_{2's}$ & $5_{2's}$	18%	18%	Yes
Chilliwack	8/13-16	186	$4_{2's}$ & $5_{2's}$	12%	9%	Yes
Indian Fishery Scale Samples - 1992						
		Sample		Nadina/	Nadina/	Include
Area	Date	Size	Model	Gates	Gates	Sample ?
Yale	8/1-3	152	$4_{2's}$ & $5_{2's}$	54%	43%	Yes
Yale	8/6	36	$4_{2's}$ & $5_{2's}$	40%	44%	No
Yale	8/14-16	158	$4_{2's}$ & $5_{2's}$	5%	9%	Yes
Indian Fishery Scale Samples - 1992						
		Sample				Include
Area	Date	Size	Model	Nadina	Nadina	Sample ?
Bridge R	8/10-11	145	$4_{2's}$ & $5_{2's}$	6%	17%	Yes
Bridge R	8/17-19	125	$4_{2's}$ & $5_{2's}$	0%	1%	No
Bridge R	8/20-21	101	$4_{2's}$ & $5_{2's}$	n.e.	1%	No
Indian Fishery Scale Samples - 1993						
		Sample		Nadina/	Nadina/	Include
Area	Date	Size	Model	Gates	Gates	Sample ?
Chilliwack	8/14	101	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1993						
		Sample		Nadina/	Nadina/	Include
Area	Date	Size	Model	Gates	Gates	Sample ?
Yale	8/14	108	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1993						
		Sample		Nadina/	Nadina/	Include
Area	Date	Size	Model	Gates	Gates	Sample ?
Bridge R	9/6	63	$4_{2's}$ & $5_{2's}$	n.e.	0%	No

Appendix Table 1 (continued). Complete list of Nadina/Gates samples

Area	Date	Sample Size	Model	Scale Sample Results: Nadina/ Gates	Reconstruction Analyses Results: Nadina/ Gates	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1994						
Yale	12,16-18	61	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1994						
Lytton	10,13-15	200	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1994						
Bridge R	8/9-11	160	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1995						
Yale	7/21-22	184	$4_{2's}$ & $5_{2's}$	1%	9%	Yes
Yale	8/4-5	208	$4_{2's}$ & $5_{2's}$	8%	9%	Yes
Yale	8/6-9	204	$4_{2's}$ & $5_{2's}$	4%	3%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	n.e.	2%	No
Indian Fishery Scale Samples - 1995						
Yale	7/11	32	$4_{2's}$ & $5_{2's}$	n.e	0%	No
Yale	7/21-24	212	$4_{2's}$ & $5_{2's}$	15%	11%	Yes
Yale	7/25-26	76	$4_{2's}$ & $5_{2's}$	2%	9%	Yes
Yale	7/28-8/1	96	$4_{2's}$ & $5_{2's}$	21%	4%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	n.e	2%	No
Indian Fishery Scale Samples - 1995						
Lytton	7/17	27	$4_{2's}$ & $5_{2's}$	n.e	0%	No
Lytton	7/20-23	148	$4_{2's}$ & $5_{2's}$	14%	18%	Yes
Lytton	7/24-25	102	$4_{2's}$ & $5_{2's}$	10%	9%	Yes
Lytton	7/26-8/1	75	$4_{2's}$ & $5_{2's}$	2%	7%	Yes
Lytton	8/4-6	217	$4_{2's}$ & $5_{2's}$	16%	4%	Yes
Lytton	8/7-10	182	$4_{2's}$ & $5_{2's}$	6%	6%	Yes
Lytton	8/16-17	154	$4_{2's}$ & $5_{2's}$	n.e	4%	No

Appendix Table 1 (continued). Complete list of Nadina/Gates samples

Area	Date	Sample Size	Model	Scale Sample Results: Nadina/ Gates	Reconstruction Analyses Results: Nadina/ Gates	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1995						
Bridge R	7/27-31	85	$4_{2's}$ & $5_{2's}$	19%	8%	Yes
Bridge R	8/2-4	99	$4_{2's}$ & $5_{2's}$	42%	3%	Yes
Bridge R	8/10	47	$4_{2's}$ & $5_{2's}$	27%	7%	Yes
Bridge R	8/16-19	99	$4_{2's}$ & $5_{2's}$	n.e	4%	No
Indian Fishery Scale Samples - 1995						
Sheep Cr	7/28-8/6	190	$4_{2's}$ & $5_{2's}$	24%	10%	Yes
Sheep Cr	8/7-11	136	$4_{2's}$ & $5_{2's}$	4%	6%	Yes
Sheep Cr	8/12-16	139	$4_{2's}$ & $5_{2's}$	6%	9%	Yes
Sheep Cr	8/23-24	42	$4_{2's}$ & $5_{2's}$	n.e	8%	No

Decision Rules for statistical analyses:

(1) do not use scale sample results if the sample size is less than 40.

(2) do not include the scale sample results if the estimated percentage of the run reconstruction results is less than 3 percent, or if the stock was not estimated in the scale sample.

Note: n.e. indicates that no estimate was made for the stock group.

Appendix Table 1 (continued). Complete list of Fennell/Bowron samples

Area	Date	Sample Size	Model	Scale Sample Results: Fennell/ Bowron	Reconstruction Analyses Results: Fennell/ Bowron	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1989						
Lytton/Siska	7/26-27	136	$4_{2's}$ & $5_{2's}$	20%	8%	Yes
Lytton/Siska	8/2-3	112	$4_{2's}$ & $5_{2's}$	0%	8%	Yes
Lytton/Siska	8/9-10	99	$4_{2's}$ & $5_{2's}$	n.e.	1%	No
Indian Fishery Scale Samples - 1990						
Agassiz	7/20-22	40	$4_{2's}$ & $5_{2's}$	28%	23%	Yes
Agassiz	7/26-29	81	$4_{2's}$ & $5_{2's}$	39%	40%	Yes
Agassiz	8/3-5	120	$4_{2's}$ & $5_{2's}$	n.e.	4%	No
Indian Fishery Scale Samples - 1991						
Chilliwack	7/18-20	101	$4_{2's}$ & $5_{2's}$	0%	1%	No
Chilliwack	7/25-28	255	$4_{2's}$ & $5_{2's}$	0%	7%	Yes
Chilliwack	8/8-11	92	$4_{2's}$ & $5_{2's}$	n.e.	1%	No
Indian Fishery Scale Samples - 1991						
Yale	7/19-21	105	$4_{2's}$ & $5_{2's}$	0%	0%	No
Yale	7/25-28	108	$4_{2's}$ & $5_{2's}$	8%	6%	Yes
Yale	8/1-4	111	$4_{2's}$ & $5_{2's}$	19%	20%	Yes
Yale	8/11	106	$4_{2's}$ & $5_{2's}$	0%	1%	No
Indian Fishery Scale Samples - 1991						
Bridge R	8/1	14	$4_{2's}$ & $5_{2's}$	18%	1%	No
Bridge R	8/15	35	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1991						
P. George	8/15-22	36	$4_{2's}$ & $5_{2's}$	n.e.	8%	No
P. George	8/25-29	52	$4_{2's}$ & $5_{2's}$	n.e.	0%	No

Appendix Table 1 (continued). Complete list of Fennell/Bowron samples

Area	Date	Sample Size	Model	Scale Sample Results: Fennell/ Bowron	Reconstruction Analyses Results: Fennell/ Bowron	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1992						
Chilliwack	8/1-3	162	$4_{2's}$ & $5_{2's}$	3%	25%	Yes
Chilliwack	8/6-10	165	$4_{2's}$ & $5_{2's}$	15%	15%	Yes
Chilliwack	8/13-16	186	$4_{2's}$ & $5_{2's}$	4%	4%	Yes
Indian Fishery Scale Samples - 1992						
Yale	8/1-3	152	$4_{2's}$ & $5_{2's}$	14%	27%	Yes
Yale	8/6	36	$4_{2's}$ & $5_{2's}$	2%	27%	no
Yale	8/14-16	158	$4_{2's}$ & $5_{2's}$	n.e.	4%	no
Indian Fishery Scale Samples - 1992						
Bridge R	8/10-11	145	$4_{2's}$ & $5_{2's}$	n.e.	13%	no
Bridge R	8/17-19	125	$4_{2's}$ & $5_{2's}$	n.e.	0%	no
Indian Fishery Scale Samples - 1993						
Chilliwack	8/14	101	$4_{2's}$ & $5_{2's}$	n.e	0%	no
Chilliwack	8/23	94	$4_{2's}$ & $5_{2's}$	n.e	0%	no
Indian Fishery Scale Samples - 1993						
Yale	8/14	108	$4_{2's}$ & $5_{2's}$	n.e	0%	no
Yale	8/23	98	$4_{2's}$ & $5_{2's}$	n.e	0%	no
Indian Fishery Scale Samples - 1993						
Bridge R	9/6	63	$4_{2's}$ & $5_{2's}$	n.e	0%	no
Indian Fishery Scale Samples - 1994						
Yale	8/12,16-18	61	$4_{2's}$ & $5_{2's}$	n.e	0%	no

Appendix Table 1 (continued). Complete list of Fennell/Bowron samples

				Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1994						
Area	Date	Sample Size	Model	Fennell/ Bowron	Fennell/ Bowron	Include Sample ?
Lytton	8/10,13-15	200	$4_{2's}$ & $5_{2's}$	n.e	0%	no
Lytton	8/16-23	193	$4_{2's}$ & $5_{2's}$	n.e	100%	no
Indian Fishery Scale Samples - 1994						
Area	Date	Sample Size	Model	Fennell/ Bowron	Fennell/ Bowron	Include Sample ?
Bridge R	8/9-11	160	$4_{2's}$ & $5_{2's}$	n.e	0%	no
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	Fennell/ Bowron	Fennell/ Bowron	Include Sample ?
Yale	7/21-22	184	$4_{2's}$ & $5_{2's}$	12%	22%	Yes
Yale	8/4-5	208	$4_{2's}$ & $5_{2's}$	15%	7%	Yes
Yale	8/6-9	204	$4_{2's}$ & $5_{2's}$	15%	3%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	n.e.	1%	no
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	Fennell/ Bowron	Fennell/ Bowron	Include Sample ?
Yale	7/11	32	$4_{2's}$ & $5_{2's}$	n.e.	0%	no
Yale	7/21-24	212	$4_{2's}$ & $5_{2's}$	20%	16%	Yes
Yale	7/25-26	76	$4_{2's}$ & $5_{2's}$	29%	12%	Yes
Yale	7/28-8/1	96	$4_{2's}$ & $5_{2's}$	21%	11%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	n.e.	2%	no
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	Fennell/ Bowron	Fennell/ Bowron	Include Sample ?
Lytton	7/17	27	$4_{2's}$ & $5_{2's}$	n.e.	2%	no
Lytton	7/20-23	148	$4_{2's}$ & $5_{2's}$	14%	6%	Yes
Lytton	7/24-25	102	$4_{2's}$ & $5_{2's}$	3%	21%	Yes
Lytton	7/26-8/1	75	$4_{2's}$ & $5_{2's}$	19%	9%	Yes
Lytton	8/4-6	217	$4_{2's}$ & $5_{2's}$	20%	7%	Yes
Lytton	8/7-10	182	$4_{2's}$ & $5_{2's}$	13%	5%	Yes
Lytton	8/16-17	154	$4_{2's}$ & $5_{2's}$	n.e.	2%	no

Appendix Table 1 (continued). Complete list of Fennell/Bowron samples

Area	Date	Sample Size	Model	Scale Sample Results Fennell/ Bowron	Reconstruction Analyses Results Fennell/ Bowron	Decision On Whether To Use Sample In Comparative Analyses Include Sample ?
Indian Fishery Scale Samples - 1995						
Bridge R	7/27-31	85	$4_{2's}$ & $5_{2's}$	25%	10%	Yes
Bridge R	8/2-4	99	$4_{2's}$ & $5_{2's}$	20%	8%	Yes
Bridge R	8/10	47	$4_{2's}$ & $5_{2's}$	10%	5%	Yes
Bridge R	8/16-19	99	$4_{2's}$ & $5_{2's}$	n.e.	3%	no
Indian Fishery Scale Samples - 1995						
Sheep Cr	7/28-8/6	190	$4_{2's}$ & $5_{2's}$	19%	11%	Yes
Sheep Cr	8/7-11	136	$4_{2's}$ & $5_{2's}$	23%	13%	Yes
Sheep Cr	8/12-16	139	$4_{2's}$ & $5_{2's}$	20%	8%	Yes
Sheep Cr	8/23-24	42	$4_{2's}$ & $5_{2's}$	n.e.	3%	no

Decision Rules for statistical analyses:

(1) do not use scale sample results if the sample size is less than 40.

(2) do not include the scale sample results if the estimated percentage of the run reconstruction results is less than 3 percent, or if the stock was not estimated in the scale sample.

Note: n.e. indicates that no estimate was made for the stock group.

Appendix Table 1 (continued). Complete list of Scotch/Seymour samples

Area	Date	Sample Size	Model	Scale Sample Results Seymour	Reconstruction Analyses Results Seymour	Decision On Whether To Use Sample In Comparative Analyses Include Sample ?
Indian Fishery Scale Samples - 1989						
Lytton/Siska	7/26-27	136	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1990						
Agassiz	7/20-22	40	$4_{2's}$ & $5_{2's}$	9%	12%	Yes
Agassiz	7/26-29	81	$4_{2's}$ & $5_{2's}$	40%	21%	Yes
Agassiz	8/3-5	120	$4_{2's}$ & $5_{2's}$	19%	23%	Yes
Agassiz	8/9-12	204	$4_{2's}$ & $5_{2's}$	7%	22%	Yes
Agassiz	8/17-18	65	$4_{2's}$ & $5_{2's}$	24%	7%	Yes
Agassiz	8/24-25	160	$4_{2's}$ & $5_{2's}$	4%	0%	No
Indian Fishery Scale Samples - 1991						
Chilliwack	7/18-20	101	$4_{2's}$ & $5_{2's}$	1%	0%	No
Chilliwack	7/25-28	255	$4_{2's}$ & $5_{2's}$	0%	2%	No
Chilliwack	8/8-11	92	$4_{2's}$ & $5_{2's}$	7%	7%	Yes
Chilliwack	8/15-18	100	$4_{2's}$ & $5_{2's}$	8%	9%	Yes
Chilliwack	8/22-25	103	$4_{2's}$ & $5_{2's}$	8%	10%	Yes
Chilliwack	8/30-9/1	68	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1991						
Yale	7/19-21	105	$4_{2's}$ & $5_{2's}$	0%	0%	No
Yale	7/25-28	108	$4_{2's}$ & $5_{2's}$	2%	2%	No
Yale	8/1-4	111	$4_{2's}$ & $5_{2's}$	3%	5%	Yes
Yale	8/11	106	$4_{2's}$ & $5_{2's}$	8%	6%	Yes
Yale	8/15-18	169	$4_{2's}$ & $5_{2's}$	6%	9%	Yes
Yale	8/24	110	$4_{2's}$ & $5_{2's}$	10%	10%	Yes
Yale	9/6	107	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1991						
Bridge R	8/1	14	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No

Appendix Table 1 (continued). Complete list of Scotch/Seymour samples

Area	Date	Sample Size	Model	Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1991						
P. George	8/15-22	36	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1992						
Chilliwack	8/1-3	162	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1992						
Yale	8/1-3	152	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1992						
Bridge R	8/10-11	145	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1993						
Chilliwack	8/14	101	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1993						
Yale	8/14	108	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1993						
Bridge R	9/6	63	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1994						
Yale	8/12,16-18	61	$4_{2's}$ & $5_{2's}$	1%	16%	Yes

Appendix Table 1 (continued). Complete list of Scotch/Seymour samples

Area	Date	Sample Size	Model	Scale Sample Results Seymour	Reconstruction Analyses Results Seymour	Decision On Whether To Use Sample In Comparative Analyses Include Sample ?
Indian Fishery Scale Samples - 1994						
Lytton	8/10,13-15	200	$4_{2's}$ & $5_{2's}$	20%	14%	Yes
Lytton	8/16-23	193	$4_{2's}$ & $5_{2's}$	24%	14%	Yes
Lytton	8/24-29	117	$4_{2's}$ & $5_{2's}$	13%	16%	Yes
Indian Fishery Scale Samples - 1994						
Bridge R	8/9-11	160	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1995						
Yale	7/21-22	184	$4_{2's}$ & $5_{2's}$	0%	0%	No
Yale	8/4-5	208	$4_{2's}$ & $5_{2's}$	6%	12%	Yes
Yale	8/6-9	204	$4_{2's}$ & $5_{2's}$	0%	4%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	7%	7%	Yes
Yale	8/25-26	33	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Indian Fishery Scale Samples - 1995						
Yale	7/25-26	76	$4_{2's}$ & $5_{2's}$	0%	0%	No
Yale	7/28-8/1	96	$4_{2's}$ & $5_{2's}$	8%	5%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	7%	5%	Yes
Indian Fishery Scale Samples - 1995						
Lytton	7/17	27	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1995						
Bridge R	7/27-31	85	$4_{2's}$ & $5_{2's}$	0%	0%	No

Appendix Table 1 (continued). Complete list of Scotch/Seymour samples

Area	Date	Sample Size	Model	Scale Sample Results Seymour	Reconstruction Analyses Results Seymour	Decision On Whether To Use Sample In Comparative Analyses Include Sample ?
Indian Fishery Scale Samples - 1995						
Sheep Cr	7/28-8/6	190	$4_{2's}$ & $5_{2's}$	0%	0%	No

Decision Rules for statistical analyses:

(1) do not use scale sample results if the sample size is less than 40.

(2) do not include the scale sample results if the estimated percentage of the run reconstruction results is less than 3 percent, or if the stock was not estimated in the scale sample.

Note: n.e. indicates that no estimate was made for the stock group.

Appendix Table 1 (continued). Complete list of Chilko/Quesnel samples

Area	Date	Sample Size	Model	Scale Sample Results: Quesnel/ Chilko	Reconstruction Analyses Results: Quesnel/ Chilko	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1989						
Lytton/Siska	7/26-27	136	$4_{2's}$ & $5_{2's}$	n.e.	3%	No
Lytton/Siska	8/2-3	112	$4_{2's}$ & $5_{2's}$	37%	26%	Yes
Lytton/Siska	8/9-10	99	$4_{2's}$ & $5_{2's}$	23%	40%	Yes
Lytton/Siska	8/16-17	158	$4_{2's}$ & $5_{2's}$	72%	69%	Yes
Lytton/Siska	8/23-24	132	$4_{2's}$ & $5_{2's}$	73%	75%	Yes
Lytton/Siska	8/30-31	91	$4_{2's}$ & $5_{2's}$	77%	87%	Yes
Indian Fishery Scale Samples - 1990						
Agassiz	7/26-29	81	$4_{2's}$ & $5_{2's}$	n.e.	3%	No
Agassiz	8/3-5	120	$4_{2's}$ & $5_{2's}$	51%	48%	Yes
Agassiz	8/9-12	204	$4_{2's}$ & $5_{2's}$	68%	58%	Yes
Agassiz	8/17-18	65	$4_{2's}$ & $5_{2's}$	49%	80%	Yes
Agassiz	8/24-25	160	$4_{2's}$ & $5_{2's}$	64%	86%	Yes
Agassiz	8/31-9/1	62	$4_{2's}$ & $5_{2's}$	55%	68%	Yes
Agassiz	9/13-16	144	$4_{2's}$ & $5_{2's}$	30%	16%	Yes
Indian Fishery Scale Samples - 1991						
Chilliwack	7/18-20	101	$4_{2's}$ & $5_{2's}$	4%	3%	Yes
Chilliwack	7/25-28	255	$4_{2's}$ & $5_{2's}$	0%	18%	Yes
Chilliwack	8/8-11	92	$4_{2's}$ & $5_{2's}$	55%	58%	Yes
Chilliwack	8/15-18	100	$4_{2's}$ & $5_{2's}$	67%	73%	Yes
Chilliwack	8/22-25	103	$4_{2's}$ & $5_{2's}$	66%	74%	Yes
Chilliwack	8/30-9/1	68	$4_{2's}$ & $5_{2's}$	61%	61%	Yes
Chilliwack	9/6	32	$4_{2's}$ & $5_{2's}$	70%	47%	No

Appendix Table 1 (continued). Complete list of Chilko/Quesnel samples

				Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1991						
Area	Date	Sample Size	Model	Quesnel/ Chilko	Quesnel/ Chilko	Include Sample ?
Yale	7/19-21	105	$4_{2's}$ & $5_{2's}$	0%	1%	No
Yale	7/25-28	108	$4_{2's}$ & $5_{2's}$	17%	12%	Yes
Yale	8/1-4	111	$4_{2's}$ & $5_{2's}$	27%	37%	Yes
Yale	8/11	106	$4_{2's}$ & $5_{2's}$	66%	52%	Yes
Yale	8/15-18	169	$4_{2's}$ & $5_{2's}$	57%	71%	Yes
Yale	8/24	110	$4_{2's}$ & $5_{2's}$	74%	78%	Yes
Yale	9/6	107	$4_{2's}$ & $5_{2's}$	64%	56%	Yes
Yale	9/13	108	$4_{2's}$ & $5_{2's}$	58%	52%	Yes
Yale	9/28-29	169	$4_{2's}$ & $5_{2's}$	0%	0%	No
Indian Fishery Scale Samples - 1991						
Area	Date	Sample Size	Model	Quesnel/ Chilko	Quesnel/ Chilko	Include Sample ?
Bridge R	8/1	14	$4_{2's}$ & $5_{2's}$	45%	16%	No
Bridge R	8/15	35	$4_{2's}$ & $5_{2's}$	86%	59%	No
Bridge R	8/18-24	196	$4_{2's}$ & $5_{2's}$	73%	79%	Yes
Bridge R	8/25-30	182	$4_{2's}$ & $5_{2's}$	76%	86%	Yes
Bridge R	9/9-12	103	$4_{2's}$ & $5_{2's}$	74%	87%	Yes
Indian Fishery Scale Samples - 1991						
Area	Date	Sample Size	Model	Quesnel/ Chilko	Quesnel/ Chilko	Include Sample ?
P. George	8/15-22	36	$4_{2's}$ & $5_{2's}$	n.e.	n.e	No
Indian Fishery Scale Samples - 1992						
Area	Date	Sample Size	Model	Quesnel/ Chilko	Quesnel/ Chilko	Include Sample ?
Chilliwack	8/1-3	162	$4_{2's}$ & $5_{2's}$	32%	26%	Yes
Chilliwack	8/6-10	165	$4_{2's}$ & $5_{2's}$	51%	50%	Yes
Chilliwack	8/13-16	186	$4_{2's}$ & $5_{2's}$	71%	70%	Yes
Indian Fishery Scale Samples - 1992						
Area	Date	Sample Size	Model	Quesnel/ Chilko	Quesnel/ Chilko	Include Sample ?
Yale	8/1-3	152	$4_{2's}$ & $5_{2's}$	24%	22%	Yes
Yale	8/6	36	$4_{2's}$ & $5_{2's}$	49%	24%	No
Yale	8/14-16	158	$4_{2's}$ & $5_{2's}$	64%	69%	Yes

Appendix Table 1 (continued). Complete list of Chilko/Quesnel samples

Area	Date	Sample Size	Model	Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1992						
				Quesnel/	Quesnel/	Include
Area	Date	Size	Model	Chilko	Chilko	Sample ?
Bridge R	8/10-11	145	$4_{2's}$ & $5_{2's}$	66%	57%	Yes
Bridge R	8/17-19	125	$4_{2's}$ & $5_{2's}$	82%	77%	Yes
Bridge R	8/20-21	101	$4_{2's}$ & $5_{2's}$	54%	80%	Yes
Bridge R	9/1-9	56	$4_{2's}$ & $5_{2's}$	80%	73%	Yes
Indian Fishery Scale Samples - 1993						
				Quesnel/	Quesnel/	Include
Area	Date	Size	Model	Chilko	Chilko	Sample ?
Chilliwack	8/14	101	$4_{2's}$ & $5_{2's}$	50%	67%	Yes
Chilliwack	8/23	94	$4_{2's}$ & $5_{2's}$	77%	65%	Yes
Chilliwack	9/5	109	$4_{2's}$ & $5_{2's}$	94%	75%	Yes
Chilliwack	9/14	106	$4_{2's}$ & $5_{2's}$	95%	91%	Yes
Indian Fishery Scale Samples - 1993						
				Quesnel/	Quesnel/	Include
Area	Date	Size	Model	Chilko	Chilko	Sample ?
Yale	8/14	108	$4_{2's}$ & $5_{2's}$	31%	62%	Yes
Yale	8/23	98	$4_{2's}$ & $5_{2's}$	78%	58%	Yes
Yale	9/6	106	$4_{2's}$ & $5_{2's}$	57%	81%	Yes
Yale	9/13	105	$4_{2's}$ & $5_{2's}$	90%	90%	Yes
Indian Fishery Scale Samples - 1993						
				Quesnel/	Quesnel/	Include
Area	Date	Size	Model	Chilko	Chilko	Sample ?
Bridge R	9/6	63	$4_{2's}$ & $5_{2's}$	66%	79%	Yes
Indian Fishery Scale Samples - 1994						
				Chilko/	Quesnel/	Include
Area	Date	Size	Model	Quesnel	Chilko	Sample ?
Yale	8/12,16-18	61	$4_{2's}$ & $5_{2's}$	72%	66%	Yes
Indian Fishery Scale Samples - 1994						
				Chilko/	Quesnel/	Include
Area	Date	Size	Model	Quesnel	Chilko	Sample ?
Lytton	8/10,13-15	200	$4_{2's}$ & $5_{2's}$	69%	64%	Yes
Lytton	8/16-23	193	$4_{2's}$ & $5_{2's}$	60%	71%	Yes
Lytton	8/24-29	117	$4_{2's}$ & $5_{2's}$	79%	70%	Yes

Appendix Table 1 (continued). Complete list of Chilko/Quesnel samples

Area	Date	Sample Size	Model	Scale Sample Results: Chilko/ Quesnel	Reconstruction Analyses Results: Quesnel/ Chilko	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1994						
Bridge R	8/9-11	160	$4_{2's}$ & $5_{2's}$	92%	78%	Yes
Indian Fishery Scale Samples - 1995						
Yale	7/21-22	184	$4_{2's}$ & $5_{2's}$		6%	No
Yale	8/4-5	208	$4_{2's}$ & $5_{2's}$	26%	40%	Yes
Yale	8/6-9	204	$4_{2's}$ & $5_{2's}$	45%	57%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	51%	66%	Yes
Yale	8/25-26	33	$4_{2's}$ & $5_{2's}$	75%	61%	Yes
Yale	8/27-29	48	$4_{2's}$ & $5_{2's}$	74%	64%	Yes
Yale	9/3	79	$4_{2's}$ & $5_{2's}$	21%	48%	Yes
Indian Fishery Scale Samples - 1995						
Yale	7/21-24	212	$4_{2's}$ & $5_{2's}$	n.e.	10%	No
Yale	7/25-26	76	$4_{2's}$ & $5_{2's}$	0%	30%	No
Yale	7/28-8/1	96	$4_{2's}$ & $5_{2's}$	10%	47%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	51%	71%	Yes
Indian Fishery Scale Samples - 1995						
Lytton	7/20-23	148	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Lytton	7/24-25	102	$4_{2's}$ & $5_{2's}$	5%	6%	Yes
Lytton	7/26-8/1	75	$4_{2's}$ & $5_{2's}$	22%	40%	Yes
Lytton	8/4-6	217	$4_{2's}$ & $5_{2's}$	22%	44%	Yes
Lytton	8/7-10	182	$4_{2's}$ & $5_{2's}$	28%	54%	Yes
Lytton	8/16-17	154	$4_{2's}$ & $5_{2's}$	66%	70%	Yes
Lytton	8/21-26	114	$4_{2's}$ & $5_{2's}$	52%	63%	Yes
Lytton	9/13-19	37	$4_{2's}$ & $5_{2's}$	43%	18%	No
Lytton	9/22-26	41	$4_{2's}$ & $5_{2's}$	16%	0%	No

Appendix Table 1 (continued). Complete list of Chilko/Quesnel samples

Area	Date	Sample Size	Model	Scale Sample Results: Chilko/ Quesnel	Reconstruction Analyses Results: Quesnel/ Chilko	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1995						
Bridge R	7/27-31	85	$4_{2's}$ & $5_{2's}$	22%	27%	Yes
Bridge R	8/2-4	99	$4_{2's}$ & $5_{2's}$	11%	55%	Yes
Bridge R	8/10	47	$4_{2's}$ & $5_{2's}$	37%	48%	Yes
Bridge R	8/16-19	99	$4_{2's}$ & $5_{2's}$	63%	73%	Yes
Bridge R	8/20-22	204	$4_{2's}$ & $5_{2's}$	60%	75%	Yes
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	Quesnel	Quesnel/ Chilko	Include Sample ?
Sheep Cr	7/28-8/6	190	$4_{2's}$ & $5_{2's}$	8%	8%	Yes
Sheep Cr	8/7-11	136	$4_{2's}$ & $5_{2's}$	46%	22%	Yes
Sheep Cr	8/12-16	139	$4_{2's}$ & $5_{2's}$	23%	24%	Yes
Sheep Cr	8/23-24	42	$4_{2's}$ & $5_{2's}$	29%	48%	Yes

Decision Rules for statistical analyses:

(1) do not use scale sample results if the sample size is less than 40.

(2) do not include the scale sample results if the estimated percentage of the run reconstruction results is less than 3 percent, or if the stock was not estimated in the scale sample.

Note: n.e. indicates that no estimate was made for the stock group.

Appendix Table 1 (continued). Complete list of Late Stuart/Stellako samples

Area	Date	Sample Size	Model	Scale Sample Results: Stellako/ LStuart	Reconstruction Analyses Results: Stellako/ LStuart	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Indian Fishery Scale Samples - 1989						
Lytton/Siska	7/26-27	136	$4_{2's}$ & $5_{2's}$	13%	14%	Yes
Lytton/Siska	8/2-3	112	$4_{2's}$ & $5_{2's}$	45%	54%	Yes
Lytton/Siska	8/9-10	99	$4_{2's}$ & $5_{2's}$	75%	45%	Yes
Lytton/Siska	8/16-17	158	$4_{2's}$ & $5_{2's}$	28%	29%	Yes
Lytton/Siska	8/23-24	132	$4_{2's}$ & $5_{2's}$	27%	25%	Yes
Lytton/Siska	8/30-31	91	$4_{2's}$ & $5_{2's}$	23%	13%	Yes
Indian Fishery Scale Samples - 1990						
Area	Date	Sample Size	Model	LStuart Stellako	LStuart Stellako	Include Sample ?
Agassiz	7/26-29	81	$4_{2's}$ & $5_{2's}$	n.e	3%	No
Agassiz	8/3-5	120	$4_{2's}$ & $5_{2's}$	16%	14%	Yes
Agassiz	8/9-12	204	$4_{2's}$ & $5_{2's}$	25%	20%	Yes
Agassiz	8/17-18	65	$4_{2's}$ & $5_{2's}$	27%	13%	Yes
Agassiz	8/24-25	160	$4_{2's}$ & $5_{2's}$	32%	14%	Yes
Agassiz	8/31-9/1	62	$4_{2's}$ & $5_{2's}$	10%	24%	Yes
Agassiz	9/13-16	144	$4_{2's}$ & $5_{2's}$	n.e	3%	No
Indian Fishery Scale Samples - 1991						
Area	Date	Sample Size	Model	LStuart Stellako	LStuart Stellako	Include Sample ?
Chilliwack	7/25-28	255	$4_{2's}$ & $5_{2's}$	0%	1%	No
Chilliwack	8/8-11	92	$4_{2's}$ & $5_{2's}$	11%	13%	Yes
Chilliwack	8/15-18	100	$4_{2's}$ & $5_{2's}$	11%	13%	Yes
Chilliwack	8/22-25	103	$4_{2's}$ & $5_{2's}$	26%	13%	Yes
Chilliwack	8/30-9/1	68	$4_{2's}$ & $5_{2's}$	16%	12%	Yes
Chilliwack	9/6	32	$4_{2's}$ & $5_{2's}$	21%	5%	No
Indian Fishery Scale Samples - 1991						
Area	Date	Sample Size	Model	LStuart Stellako	LStuart Stellako	Include Sample ?
Yale	7/25-28	108	$4_{2's}$ & $5_{2's}$	0%	0%	No
Yale	8/1-4	111	$4_{2's}$ & $5_{2's}$	11%	9%	Yes
Yale	8/11	106	$4_{2's}$ & $5_{2's}$	17%	12%	Yes
Yale	8/15-18	169	$4_{2's}$ & $5_{2's}$	31%	15%	Yes
Yale	8/24	110	$4_{2's}$ & $5_{2's}$	16%	12%	Yes
Yale	9/6	107	$4_{2's}$ & $5_{2's}$	4%	10%	Yes
Yale	9/13	108	$4_{2's}$ & $5_{2's}$	7%	2%	No
Yale	9/28-29	169	$4_{2's}$ & $5_{2's}$	0%	0%	No

Appendix Table 1 (continued). Complete list of Late Stuart/Stellako samples

Indian Fishery Scale Samples - 1991

Area	Date	Sample Size	Model	Scale Sample Results: LStuart Stellako	Reconstruction Analyses Results: LStuart Stellako	Decision On Whether To Use Sample In Comparative Analyses: Include Sample ?
Bridge R	8/15	35	$4_{2's}$ & $5_{2's}$	1%	13%	No
Bridge R	8/18-24	196	$4_{2's}$ & $5_{2's}$	17%	16%	Yes
Bridge R	8/25-30	182	$4_{2's}$ & $5_{2's}$	24%	14%	Yes
Bridge R	9/9-12	103	$4_{2's}$ & $5_{2's}$	26%	13%	Yes

Indian Fishery Scale Samples - 1991

Area	Date	Sample Size	Model	LStuart Stellako	LStuart Stellako	Include Sample ?
P. George	8/15-22	36	$4_{2's}$ & $5_{2's}$	67%	19%	No
P. George	8/25-29	52	$4_{2's}$ & $5_{2's}$	72%	66%	Yes
P. George	9/4	15	$4_{2's}$ & $5_{2's}$	93%	96%	No
P. George	9/9-11	102	$4_{2's}$ & $5_{2's}$	100%	100%	Yes
P. George	9/22	32	$4_{2's}$ & $5_{2's}$	100%	100%	No

Indian Fishery Scale Samples - 1992

Area	Date	Sample Size	Model	LStuart Stellako	LStuart Stellako	Include Sample ?
Chilliwack	8/1-3	162	$4_{2's}$ & $5_{2's}$	6%	5%	Yes
Chilliwack	8/6-10	165	$4_{2's}$ & $5_{2's}$	16%	15%	Yes
Chilliwack	8/13-16	186	$4_{2's}$ & $5_{2's}$	13%	15%	Yes

Indian Fishery Scale Samples - 1992

Area	Date	Sample Size	Model	LStuart Stellako	LStuart Stellako	Include Sample ?
Yale	8/1-3	152	$4_{2's}$ & $5_{2's}$	4%	4%	Yes
Yale	8/6	36	$4_{2's}$ & $5_{2's}$	9%	4%	No
Yale	8/14-16	158	$4_{2's}$ & $5_{2's}$	31%	17%	Yes

Indian Fishery Scale Samples - 1992

Area	Date	Sample Size	Model	LStuart Stellako	LStuart Stellako	Include Sample ?
Bridge R	8/10-11	145	$4_{2's}$ & $5_{2's}$	28%	12%	Yes
Bridge R	8/17-19	125	$4_{2's}$ & $5_{2's}$	18%	22%	Yes
Bridge R	8/20-21	101	$4_{2's}$ & $5_{2's}$	46%	17%	Yes
Bridge R	9/1-9	56	$4_{2's}$ & $5_{2's}$	20%	27%	Yes

Appendix Table 1 (continued). Complete list of Late Stuart/Stellako samples

Area	Date	Sample Size	Model	Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1993						
		Sample		LStuart	LStuart	Include
Area	Date	Size	Model	Stellako	Stellako	Sample ?
Chilliwack	8/14	101	$4_{2's}$ & $5_{2's}$	50%	31%	Yes
Chilliwack	8/23	94	$4_{2's}$ & $5_{2's}$	23%	28%	Yes
Chilliwack	9/5	109	$4_{2's}$ & $5_{2's}$	6%	18%	Yes
Chilliwack	9/14	106	$4_{2's}$ & $5_{2's}$	5%	0%	No
Indian Fishery Scale Samples - 1993						
		Sample		LStuart	LStuart	Include
Area	Date	Size	Model	Stellako	Stellako	Sample ?
Yale	8/14	108	$4_{2's}$ & $5_{2's}$	69%	38%	Yes
Yale	8/23	98	$4_{2's}$ & $5_{2's}$	22%	42%	Yes
Yale	9/6	106	$4_{2's}$ & $5_{2's}$	43%	19%	Yes
Yale	9/13	105	$4_{2's}$ & $5_{2's}$	10%	10%	Yes
Indian Fishery Scale Samples - 1993						
		Sample		LStuart	LStuart	Include
Area	Date	Size	Model	Stellako	Stellako	Sample ?
Bridge R	9/6	63	$4_{2's}$ & $5_{2's}$	34%	21%	Yes
Indian Fishery Scale Samples - 1994						
		Sample		L.Stuart/	LStuart	Include
Area	Date	Size	Model	Stellako	Stellako	Sample ?
Yale	8/12,16-18	61	$4_{2's}$ & $5_{2's}$	27%	18%	Yes
Indian Fishery Scale Samples - 1994						
		Sample		L.Stuart/	LStuart	Include
Area	Date	Size	Model	Stellako	Stellako	Sample ?
Lytton	8/10,13-15	200	$4_{2's}$ & $5_{2's}$	11%	23%	Yes
Lytton	8/16-23	193	$4_{2's}$ & $5_{2's}$	16%	16%	Yes
Lytton	8/24-29	117	$4_{2's}$ & $5_{2's}$	8%	15%	Yes
Indian Fishery Scale Samples - 1994						
		Sample		L.Stuart/	LStuart	Include
Area	Date	Size	Model	Stellako	Stellako	Sample ?
Bridge R	8/9-11	160	$4_{2's}$ & $5_{2's}$	8%	22%	Yes

Appendix Table 1 (continued). Complete list of Late Stuart/Stellako samples

				Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	L.Stuart/ Stellako	LStuart Stellako	Include Sample ?
Yale	7/21-22	184	$4_{2's}$ & $5_{2's}$	n.e	0%	No
Yale	8/4-5	208	$4_{2's}$ & $5_{2's}$	45%	33%	Yes
Yale	8/6-9	204	$4_{2's}$ & $5_{2's}$	37%	32%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	43%	24%	Yes
Yale	8/25-26	33	$4_{2's}$ & $5_{2's}$	17%	20%	Yes
Yale	8/27-29	48	$4_{2's}$ & $5_{2's}$	13%	11%	Yes
Yale	9/3	79	$4_{2's}$ & $5_{2's}$	45%	0%	No
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	L.Stuart/ Stellako	LStuart Stellako	Include Sample ?
Yale	7/25-26	76	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Yale	7/28-8/1	96	$4_{2's}$ & $5_{2's}$	39%	33%	Yes
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	43%	21%	Yes
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	L.Stuart/ Stellako	LStuart Stellako	Include Sample ?
Lytton	7/20-23	148	$4_{2's}$ & $5_{2's}$	n.e.	0%	No
Lytton	7/24-25	102	$4_{2's}$ & $5_{2's}$	78%	63%	Yes
Lytton	7/26-8/1	75	$4_{2's}$ & $5_{2's}$	58%	43%	Yes
Lytton	8/4-6	217	$4_{2's}$ & $5_{2's}$	43%	44%	Yes
Lytton	8/7-10	182	$4_{2's}$ & $5_{2's}$	53%	28%	Yes
Lytton	8/16-17	154	$4_{2's}$ & $5_{2's}$	34%	18%	Yes
Lytton	8/21-26	114	$4_{2's}$ & $5_{2's}$	49%	21%	Yes
Lytton	9/13-19	37	$4_{2's}$ & $5_{2's}$	11%	0%	No
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	L.Stuart/ Stellako	LStuart Stellako	Include Sample ?
Bridge R	7/27-31	85	$4_{2's}$ & $5_{2's}$	35%	56%	Yes
Bridge R	8/2-4	99	$4_{2's}$ & $5_{2's}$	27%	34%	Yes
Bridge R	8/10	47	$4_{2's}$ & $5_{2's}$	26%	40%	Yes
Bridge R	8/16-19	99	$4_{2's}$ & $5_{2's}$	37%	21%	Yes
Bridge R	8/20-22	204	$4_{2's}$ & $5_{2's}$	40%	22%	Yes

Appendix Table 1 (continued). Complete list of Late Stuart/Stellako samples

Area	Date	Sample Size	Model	Scale Sample Results L.Stuart/ Stellako	Reconstruction Analyses Results LStuart Stellako	Decision On Whether To Use Sample In Comparative Analyses Include Sample ?
Indian Fishery Scale Samples - 1995						
Sheep Cr	7/28-8/6	190	$4_{2's}$ & $5_{2's}$	48%	72%	Yes
Sheep Cr	8/7-11	136	$4_{2's}$ & $5_{2's}$	28%	59%	Yes
Sheep Cr	8/12-16	139	$4_{2's}$ & $5_{2's}$	50%	59%	Yes
Sheep Cr	8/23-24	42	$4_{2's}$ & $5_{2's}$	72%	42%	Yes

Decision Rules for statistical analyses:

(1) do not use scale sample results if the sample size is less than 40.

(2) do not include the scale sample results if the estimated percentage of the run reconstruction results is less than 3 percent, or if the stock was not estimated in the scale sample.

Note: n.e. indicates that no estimate was made for the stock group.

Appendix Table 1 (continued). Complete list of Adams/Lower Shuswap samples

Area	Date	Sample Size	Model	Scale Sample Results Adams	Reconstruction Analyses Results Adams	Decision On Whether To Use Sample In Comparative Analyses Include Sample ?
Indian Fishery Scale Samples - 1989						
Lytton/Siska	8/30-31	91	$4_{2's}$ & $5_{2's}$	n.e.	n.e.	No
Indian Fishery Scale Samples - 1990						
Agassiz	8/24-25	160	$4_{2's}$ & $5_{2's}$	n.e	0%	No
Agassiz	8/31-9/1	62	$4_{2's}$ & $5_{2's}$	35%	9%	Yes
Agassiz	9/13-16	144	$4_{2's}$ & $5_{2's}$	70%	81%	Yes
Indian Fishery Scale Samples - 1991						
Chilliwack	8/22-25	103	$4_{2's}$ & $5_{2's}$	n.e	0%	No
Chilliwack	8/30-9/1	68	$4_{2's}$ & $5_{2's}$	23%	20%	Yes
Chilliwack	9/6	32	$4_{2's}$ & $5_{2's}$	9%	32%	Yes
Indian Fishery Scale Samples - 1991						
Yale	8/24	110	$4_{2's}$ & $5_{2's}$	n.e	0%	No
Yale	9/6	107	$4_{2's}$ & $5_{2's}$	32%	34%	Yes
Yale	9/13	108	$4_{2's}$ & $5_{2's}$	34%	46%	Yes
Yale	9/28-29	169	$4_{2's}$ & $5_{2's}$	96%	100%	Yes
Indian Fishery Scale Samples - 1991						
Bridge R	9/9-12	103	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1991						
P. George	9/9-11	102	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1992						
Chilliwack	8/13-16	186	$4_{2's}$ & $5_{2's}$	n.e	n.e	No

Appendix Table 1 (continued). Complete list of Adams/Lower Shuswap samples

Area	Date	Sample Size	Model	Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1992						
Yale	8/14-16	158	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1992						
Bridge R	9/1-9	56	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1993						
Chilliwack	9/14	106	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1993						
Yale	9/13	105	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1993						
Bridge R	9/6	63	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1994						
Yale	8/12,16-18	61	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1994						
Lytton	8/24-29	117	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1994						
Bridge R	8/9-11	160	$4_{2's}$ & $5_{2's}$	n.e	n.e	No

Appendix Table 1 (continued). Complete list of Adams/Lower Shuswap samples

				Scale Sample Results	Reconstruction Analyses Results	Decision On Whether To Use Sample In Comparative Analyses
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	Adams	Adams	Include Sample ?
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	n.e	0%	No
Yale	8/25-26	33	$4_{2's}$ & $5_{2's}$	8%	19%	No
Yale	8/27-29	48	$4_{2's}$ & $5_{2's}$	13%	26%	Yes
Yale	9/3	79	$4_{2's}$ & $5_{2's}$	33%	52%	Yes
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	Adams	Adams	Include Sample ?
Yale	8/16-18	219	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	Adams	Adams	Include Sample ?
Lytton	8/21-26	114	$4_{2's}$ & $5_{2's}$	n.e	3%	No
Lytton	9/13-19	37	$4_{2's}$ & $5_{2's}$	46%	82%	No
Lytton	9/22-26	41	$4_{2's}$ & $5_{2's}$	84%	100%	Yes
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	Adams	Adams	Include Sample ?
Bridge R	8/20-22	204	$4_{2's}$ & $5_{2's}$	n.e	n.e	No
Indian Fishery Scale Samples - 1995						
Area	Date	Sample Size	Model	Adams	Adams	Include Sample ?
Sheep Cr	8/23-24	42	$4_{2's}$ & $5_{2's}$	n.e	n.e	No

Decision Rules for statistical analyses:

(1) do not use scale sample results if the sample size is less than 40.

(2) do not include the scale sample results if the estimated percentage of the run reconstruction results is less than 3 percent, or if the stock was not estimated in the scale sample.

Note: n.e. indicates that no estimate was made for the stock group.

Appendix Table 2. Comparison of untransformed and transformed stock group percentages

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Early	Early	Early	Early
	Area		Date	Size	Stuart	Stuart	Stuart	Stuart
All Areas	Lytton	1989	7/26-27	136	67%	69%	96%	98%
All Areas	Agassiz	1990	7/20-22	40	63%	62%	92%	91%
All Areas	Agassiz	1990	7/26-29	81	15%	21%	40%	48%
All Areas	Chilliwack	1991	7/18-20	101	84%	93%	116%	130%
All Areas	Chilliwack	1991	7/25-28	255	100%	59%	157%	88%
All Areas	Yale	1991	7/19-21	105	100%	97%	157%	140%
All Areas	Yale	1991	7/25-28	108	71%	71%	100%	100%
All Areas	Yale	1991	8/1-4	111	8%	8%	29%	29%
All Areas	Yale	1992	8/1-3	152	4%	4%	20%	20%
All Areas	Yale	1995	7/21-22	184	86%	64%	119%	93%
All Areas	Yale	1995	7/21-24	212	65%	63%	93%	92%
All Areas	Yale	1995	7/25-26	76	69%	49%	98%	78%
All Areas	Lytton	1995	7/20-23	148	72%	76%	101%	106%
					62%	57%	94%	85%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Early	Early	Early	Early
	Area		Date	Size	Stuart	Stuart	Stuart	Stuart
Below Hope	Agassiz	1990	7/20-22	40	63%	62%	92%	91%
Below Hope	Agassiz	1990	7/26-29	81	15%	21%	40%	48%
Below Hope	Chilliwack	1991	7/18-20	101	84%	93%	116%	130%
Below Hope	Chilliwack	1991	7/25-28	255	100%	59%	157%	88%
					66%	59%	101%	89%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Early	Early	Early	Early
	Area		Date	Size	Stuart	Stuart	Stuart	Stuart
Hope-Churn Cr	Lytton	1989	7/26-27	136	67%	69%	96%	98%
Hope-Churn Cr	Yale	1991	7/19-21	105	100%	97%	157%	140%
Hope-Churn Cr	Yale	1991	7/25-28	108	71%	71%	100%	100%
Hope-Churn Cr	Yale	1991	8/1-4	111	8%	8%	29%	29%
Hope-Churn Cr	Yale	1992	8/1-3	152	4%	4%	20%	20%
Hope-Churn Cr	Yale	1995	7/21-22	184	86%	64%	119%	93%
Hope-Churn Cr	Yale	1995	7/21-24	212	65%	63%	93%	92%
Hope-Churn Cr	Yale	1995	7/25-26	76	69%	49%	98%	78%
Hope-Churn Cr	Lytton	1995	7/20-23	148	72%	76%	101%	106%
					60%	56%	90%	84%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

	Area	Date	Sample Size	Raw Percentages Scales Nadina /Gates	Raw Percentages Reconstruction Nadina /Gates	ARCSIN of sqrt of %'s Scales Nadina /Gates	ARCSIN of sqrt of %'s Reconstruction Nadina /Gates
All Areas	Lytton 1989	7/26-27	136	0%	6%	0%	25%
All Areas	Lytton 1989	8/2-3	112	18%	11%	44%	34%
All Areas	Lytton 1989	8/9-10	99	2%	14%	14%	38%
All Areas	Agassiz 1990	7/26-29	81	6%	13%	25%	37%
All Areas	Agassiz 1990	8/3-5	120	14%	11%	38%	34%
All Areas	Chilliwack 1991	7/18-20	101	11%	3%	34%	17%
All Areas	Chilliwack 1991	7/25-28	255	0%	13%	0%	37%
All Areas	Chilliwack 1991	8/8-11	92	27%	19%	55%	45%
All Areas	Chilliwack 1991	8/15-18	100	14%	3%	38%	17%
All Areas	Yale 1991	7/25-28	108	2%	8%	14%	29%
All Areas	Yale 1991	8/1-4	111	32%	20%	60%	46%
All Areas	Yale 1991	8/11	106	9%	27%	30%	55%
All Areas	Yale 1991	8/15-18	169	6%	4%	25%	20%
All Areas	Bridge R 1991	8/18-24	196	10%	4%	32%	20%
All Areas	P. George 1991	8/25-29	52	28%	34%	56%	62%
All Areas	Chilliwack 1992	8/1-3	162	53%	42%	82%	71%
All Areas	Chilliwack 1992	8/6-10	165	18%	18%	44%	44%
All Areas	Chilliwack 1992	8/13-16	186	12%	9%	35%	30%
All Areas	Yale 1992	8/1-3	152	54%	43%	83%	72%
All Areas	Yale 1992	8/14-16	158	5%	9%	23%	30%
All Areas	Bridge R 1992	8/10-11	145	6%	17%	25%	42%
All Areas	Yale 1995	7/21-22	184	1%	9%	12%	30%
All Areas	Yale 1995	8/4-5	208	8%	9%	29%	30%
All Areas	Yale 1995	8/6-9	204	4%	3%	20%	17%
All Areas	Yale 1995	7/21-24	212	15%	11%	40%	34%
All Areas	Yale 1995	7/25-26	76	2%	9%	16%	30%
All Areas	Yale 1995	7/28-8/1	96	21%	4%	48%	20%
All Areas	Lytton 1995	7/20-23	148	14%	18%	38%	44%
All Areas	Lytton 1995	7/24-25	102	10%	9%	32%	30%
All Areas	Lytton 1995	7/26-8/1	75	2%	7%	13%	27%
All Areas	Lytton 1995	8/4-6	217	16%	4%	41%	20%
All Areas	Lytton 1995	8/7-10	182	6%	6%	24%	25%
All Areas	Bridge R 1995	7/27-31	85	19%	8%	45%	29%
All Areas	Bridge R 1995	8/2-4	99	42%	3%	70%	17%
All Areas	Bridge R 1995	8/10	47	27%	7%	54%	27%
All Areas	Sheep Cr 1995	7/28-8/6	190	24%	10%	52%	32%
All Areas	Sheep Cr 1995	8/7-11	136	4%	6%	19%	25%
All Areas	Sheep Cr 1995	8/12-16	139	6%	9%	25%	30%
				14%	12%	35%	34%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Nadina/	Nadina/	Nadina/	Nadina/
	Area		Date	Size	Gates	Gates	Gates	Gates
Below Hope	Agassiz	1990	7/26-29	81	6%	13%	25%	37%
Below Hope	Agassiz	1990	8/3-5	120	14%	11%	38%	34%
Below Hope	Chilliwack	1991	7/18-20	101	11%	3%	34%	17%
Below Hope	Chilliwack	1991	7/25-28	255	0%	13%	0%	37%
Below Hope	Chilliwack	1991	8/8-11	92	27%	19%	55%	45%
Below Hope	Chilliwack	1991	8/15-18	100	14%	3%	38%	17%
Below Hope	Chilliwack	1992	8/1-3	162	53%	42%	82%	71%
Below Hope	Chilliwack	1992	8/6-10	165	18%	18%	44%	44%
Below Hope	Chilliwack	1992	8/13-16	186	12%	9%	35%	30%
					17%	15%	39%	37%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Nadina/	Nadina/	Nadina/	Nadina/
	Area		Date	Size	Gates	Gates	Gates	Gates
Hope-ChurnCr	Lytton	1989	7/26-27	136	0%	6%	0%	25%
Hope-ChurnCr	Lytton	1989	8/2-3	112	18%	11%	44%	34%
Hope-ChurnCr	Lytton	1989	8/9-10	99	2%	14%	14%	38%
Hope-ChurnCr	Yale	1991	7/25-28	108	2%	8%	14%	29%
Hope-ChurnCr	Yale	1991	8/1-4	111	32%	20%	60%	46%
Hope-ChurnCr	Yale	1991	8/11	106	9%	27%	30%	55%
Hope-ChurnCr	Yale	1991	8/15-18	169	6%	4%	25%	20%
Hope-ChurnCr	Bridge R	1991	8/18-24	196	10%	4%	32%	20%
Hope-ChurnCr	Yale	1992	8/1-3	152	54%	43%	83%	72%
Hope-ChurnCr	Yale	1992	8/14-16	158	5%	9%	23%	30%
Hope-ChurnCr	Bridge R	1992	8/10-11	145	6%	17%	25%	42%
Hope-ChurnCr	Yale	1995	7/21-22	184	1%	9%	12%	30%
Hope-ChurnCr	Yale	1995	8/4-5	208	8%	9%	29%	30%
Hope-ChurnCr	Yale	1995	8/6-9	204	4%	3%	20%	17%
Hope-ChurnCr	Yale	1995	7/21-24	212	15%	11%	40%	34%
Hope-ChurnCr	Yale	1995	7/25-26	76	2%	9%	16%	30%
Hope-ChurnCr	Yale	1995	7/28-8/1	96	21%	4%	48%	20%
Hope-ChurnCr	Lytton	1995	7/20-23	148	14%	18%	38%	44%
Hope-ChurnCr	Lytton	1995	7/24-25	102	10%	9%	32%	30%
Hope-ChurnCr	Lytton	1995	7/26-8/1	75	2%	7%	13%	27%
Hope-ChurnCr	Lytton	1995	8/4-6	217	16%	4%	41%	20%
Hope-ChurnCr	Lytton	1995	8/7-10	182	6%	6%	24%	25%
Hope-ChurnCr	Bridge R	1995	7/27-31	85	19%	8%	45%	29%
Hope-ChurnCr	Bridge R	1995	8/2-4	99	42%	3%	70%	17%
Hope-ChurnCr	Bridge R	1995	8/10	47	27%	7%	54%	27%
					13%	11%	33%	32%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

	Area	Date	Sample Size	Raw Percentages: Scales Nadina/ Gates	Raw Percentages: Reconstruction Nadina/ Gates	ARCSIN of sqrt of %'s: Scales Nadina/ Gates	ARCSIN of sqrt of %'s: Reconstruction Nadina/ Gates
Above Churn	P. George 1991	8/25-29	52	28%	34%	56%	62%
Above Churn	Sheep Cr 1995	7/28-8/6	190	24%	10%	52%	32%
Above Churn	Sheep Cr 1995	8/7-11	136	4%	6%	19%	25%
Above Churn	Sheep Cr 1995	8/12-16	139	6%	9%	25%	30%
				15%	15%	38%	37%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

	Area		Date	Sample Size	Raw Percentages: Scales Fennell/ Bowron	Raw Percentages: Reconstruction Fennell/ Bowron	ARCSIN of sqrt of %'s: Scales Fennell/ Bowron	ARCSIN of sqrt of %'s: Reconstruction Fennell/ Bowron
All Areas	Lytton	1989	7/26-27	136	20%	8%	46%	29%
All Areas	Lytton	1989	8/2-3	112	0%	8%	0%	29%
All Areas	Agassiz	1990	7/20-22	40	28%	23%	56%	50%
All Areas	Agassiz	1990	7/26-29	81	39%	40%	67%	68%
All Areas	Chilliwack	1991	7/25-28	255	0%	7%	0%	27%
All Areas	Yale	1991	7/25-28	108	8%	6%	29%	25%
All Areas	Yale	1991	8/1-4	111	19%	20%	45%	46%
All Areas	Chilliwack	1992	8/1-3	162	3%	25%	17%	53%
All Areas	Chilliwack	1992	8/6-10	165	15%	15%	40%	40%
All Areas	Chilliwack	1992	8/13-16	186	4%	4%	20%	20%
All Areas	Yale	1992	8/1-3	152	14%	27%	38%	55%
All Areas	Yale	1995	7/21-22	184	12%	22%	36%	48%
All Areas	Yale	1995	8/4-5	208	15%	7%	40%	26%
All Areas	Yale	1995	8/6-9	204	15%	3%	39%	18%
All Areas	Yale	1995	7/21-24	212	20%	16%	47%	41%
All Areas	Yale	1995	7/25-26	76	29%	12%	56%	35%
All Areas	Yale	1995	7/28-8/1	96	21%	11%	47%	33%
All Areas	Lytton	1995	7/20-23	148	14%	6%	39%	25%
All Areas	Lytton	1995	7/24-25	102	3%	21%	17%	47%
All Areas	Lytton	1995	7/26-8/1	75	19%	9%	45%	30%
All Areas	Lytton	1995	8/4-6	217	20%	7%	46%	26%
All Areas	Lytton	1995	8/7-10	182	13%	5%	37%	22%
All Areas	Bridge R	1995	7/27-31	85	25%	10%	52%	32%
All Areas	Bridge R	1995	8/2-4	99	20%	8%	47%	28%
All Areas	Bridge R	1995	8/10	47	10%	5%	33%	23%
All Areas	Sheep Cr	1995	7/28-8/6	190	19%	11%	45%	33%
All Areas	Sheep Cr	1995	8/7-11	136	23%	13%	50%	36%
All Areas	Sheep Cr	1995	8/12-16	139	20%	8%	47%	28%
					16%	13%	39%	35%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Fennell/	Fennell/	Fennell/	Fennell/
	Area		Date	Size	Bowron	Bowron	Bowron	Bowron
Below Hope	Agassiz	1990	7/20-22	40	28%	23%	56%	50%
Below Hope	Agassiz	1990	7/26-29	81	39%	40%	67%	68%
Below Hope	Chilliwack	1991	7/25-28	255	0%	7%	0%	27%
Below Hope	Chilliwack	1992	8/1-3	162	3%	25%	17%	53%
Below Hope	Chilliwack	1992	8/6-10	165	15%	15%	40%	40%
Below Hope	Chilliwack	1992	8/13-16	186	4%	4%	20%	20%
					15%	19%	33%	43%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Fennell/	Fennell/	Fennell/	Fennell/
	Area		Date	Size	Bowron	Bowron	Bowron	Bowron
Hope-ChurnCr	Lytton	1989	7/26-27	136	20%	8%	46%	29%
Hope-ChurnCr	Lytton	1989	8/2-3	112	0%	8%	0%	29%
Hope-ChurnCr	Yale	1991	7/25-28	108	8%	6%	29%	25%
Hope-ChurnCr	Yale	1991	8/1-4	111	19%	20%	45%	46%
Hope-ChurnCr	Yale	1992	8/1-3	152	14%	27%	38%	55%
Hope-ChurnCr	Yale	1995	7/21-22	184	12%	22%	36%	48%
Hope-ChurnCr	Yale	1995	8/4-5	208	15%	7%	40%	26%
Hope-ChurnCr	Yale	1995	8/6-9	204	15%	3%	39%	18%
Hope-ChurnCr	Yale	1995	7/21-24	212	20%	16%	47%	41%
Hope-ChurnCr	Yale	1995	7/25-26	76	29%	12%	56%	35%
Hope-ChurnCr	Yale	1995	7/28-8/1	96	21%	11%	47%	33%
Hope-ChurnCr	Lytton	1995	7/20-23	148	14%	6%	39%	25%
Hope-ChurnCr	Lytton	1995	7/24-25	102	3%	21%	17%	47%
Hope-ChurnCr	Lytton	1995	7/26-8/1	75	19%	9%	45%	30%
Hope-ChurnCr	Lytton	1995	8/4-6	217	20%	7%	46%	26%
Hope-ChurnCr	Lytton	1995	8/7-10	182	13%	5%	37%	22%
Hope-ChurnCr	Bridge R	1995	7/27-31	85	25%	10%	52%	32%
Hope-ChurnCr	Bridge R	1995	8/2-4	99	20%	8%	47%	28%
Hope-ChurnCr	Bridge R	1995	8/10	47	10%	5%	33%	23%
					16%	11%	39%	33%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Fennell/	Fennell/	Fennell/	Fennell/
	Area		Date	Size	Bowron	Bowron	Bowron	Bowron
Above Churn	Sheep Cr	1995	7/28-8/6	190	19%	11%	45%	33%
Above Churn	Sheep Cr	1995	8/7-11	136	23%	13%	50%	36%
Above Churn	Sheep Cr	1995	8/12-16	139	20%	8%	47%	28%
					21%	10%	47%	32%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Scotch/	Scotch/	Scotch/	Scotch/
	Area		Date	Size	Seymour	Seymour	Seymour	Seymour
All Areas	Agassiz	1990	7/20-22	40	9%	12%	30%	35%
All Areas	Agassiz	1990	7/26-29	81	40%	21%	68%	47%
All Areas	Agassiz	1990	8/3-5	120	19%	23%	45%	50%
All Areas	Agassiz	1990	8/9-12	204	7%	22%	27%	48%
All Areas	Agassiz	1990	8/17-18	65	24%	7%	51%	27%
All Areas	Chilliwack	1991	8/8-11	92	7%	7%	27%	27%
All Areas	Chilliwack	1991	8/15-18	100	8%	9%	29%	30%
All Areas	Chilliwack	1991	8/22-25	103	8%	10%	29%	32%
All Areas	Yale	1991	8/1-4	111	3%	5%	17%	23%
All Areas	Yale	1991	8/11	106	8%	6%	29%	25%
All Areas	Yale	1991	8/15-18	169	6%	9%	25%	30%
All Areas	Yale	1991	8/24	110	10%	10%	32%	32%
All Areas	Yale	1994	8/12,16-18	61	1%	16%	10%	41%
All Areas	Lytton	1994	8/10,13-15	200	20%	14%	46%	38%
All Areas	Lytton	1994	8/16-23	193	24%	14%	51%	38%
All Areas	Lytton	1994	8/24-29	117	13%	16%	37%	40%
All Areas	Yale	1995	8/4-5	208	6%	12%	24%	35%
All Areas	Yale	1995	8/6-9	204	0%	4%	0%	20%
All Areas	Yale	1995	8/16-18	219	7%	7%	26%	26%
All Areas	Yale	1995	7/28-8/1	96	8%	5%	28%	22%
All Areas	Yale	1995	8/16-18	219	7%	5%	26%	22%
					11%	11%	31%	33%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Scotch/	Scotch/	Scotch/	Scotch/
	Area		Date	Size	Seymour	Seymour	Seymour	Seymour
Below Hope	Agassiz	1990	7/20-22	40	9%	12%	30%	35%
Below Hope	Agassiz	1990	7/26-29	81	40%	21%	68%	47%
Below Hope	Agassiz	1990	8/3-5	120	19%	23%	45%	50%
Below Hope	Agassiz	1990	8/9-12	204	7%	22%	27%	48%
Below Hope	Agassiz	1990	8/17-18	65	24%	7%	51%	27%
Below Hope	Chilliwack	1991	8/8-11	92	7%	7%	27%	27%
Below Hope	Chilliwack	1991	8/15-18	100	8%	9%	29%	30%
Below Hope	Chilliwack	1991	8/22-25	103	8%	10%	29%	32%
					15%	14%	38%	37%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

				Raw Percentages		ARCSIN of sqrt of %'s	
				Scales	Reconstruction	Scales	Reconstruction
			Sample	Scotch/	Scotch/	Scotch/	Scotch/
	Area	Date	Size	Seymour	Seymour	Seymour	Seymour
Hope-ChurnCr	Yale 1991	8/1-4	111	3%	5%	17%	23%
Hope-ChurnCr	Yale 1991	8/11	106	8%	6%	29%	25%
Hope-ChurnCr	Yale 1991	8/15-18	169	6%	9%	25%	30%
Hope-ChurnCr	Yale 1991	8/24	110	10%	10%	32%	32%
Hope-ChurnCr	Yale 1994	8/12,16-18	61	1%	16%	10%	41%
Hope-ChurnCr	Lytton 1994	8/10,13-15	200	20%	14%	46%	38%
Hope-ChurnCr	Lytton 1994	8/16-23	193	24%	14%	51%	38%
Hope-ChurnCr	Lytton 1994	8/24-29	117	13%	16%	37%	40%
Hope-ChurnCr	Yale 1995	8/4-5	208	6%	12%	24%	35%
Hope-ChurnCr	Yale 1995	8/6-9	204	0%	4%	0%	20%
Hope-ChurnCr	Yale 1995	8/16-18	219	7%	7%	26%	26%
Hope-ChurnCr	Yale 1995	7/28-8/1	96	8%	5%	28%	22%
Hope-ChurnCr	Yale 1995	8/16-18	219	7%	5%	26%	22%
				9%	9%	27%	30%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

				Raw Percentages		ARCSIN of sqrt of %'s	
				Scales	Reconstruction	Scales	Reconstruction
			Sample	Chilko/	Chilko/	Chilko/	Chilko/
	Area	Date	Size	Quesnel	Quesnel	Quesnel	Quesnel
All Areas	Lytton 1989	8/2-3	112	37%	26%	65%	54%
All Areas	Lytton 1989	8/9-10	99	23%	40%	50%	68%
All Areas	Lytton 1989	8/16-17	158	72%	69%	101%	98%
All Areas	Lytton 1989	8/23-24	132	73%	75%	102%	105%
All Areas	Lytton 1989	8/30-31	91	77%	87%	107%	120%
All Areas	Agassiz 1990	8/3-5	120	51%	48%	80%	77%
All Areas	Agassiz 1990	8/9-12	204	68%	58%	97%	87%
All Areas	Agassiz 1990	8/17-18	65	49%	80%	78%	111%
All Areas	Agassiz 1990	8/24-25	160	64%	86%	93%	119%
All Areas	Agassiz 1990	8/31-9/1	62	55%	68%	84%	96%
All Areas	Agassiz 1990	9/13-16	144	30%	16%	58%	41%
All Areas	Chilliwack 1991	7/18-20	101	4%	3%	20%	17%
All Areas	Chilliwack 1991	7/25-28	255	0%	18%	0%	44%
All Areas	Chilliwack 1991	8/8-11	92	55%	58%	84%	87%
All Areas	Chilliwack 1991	8/15-18	100	67%	73%	96%	102%
All Areas	Chilliwack 1991	8/22-25	103	66%	74%	95%	104%
All Areas	Chilliwack 1991	8/30-9/1	68	61%	61%	90%	90%
All Areas	Yale 1991	7/25-28	108	17%	12%	42%	35%
All Areas	Yale 1991	8/1-4	111	27%	37%	55%	65%
All Areas	Yale 1991	8/11	106	66%	52%	95%	81%
All Areas	Yale 1991	8/15-18	169	57%	71%	86%	100%
All Areas	Yale 1991	8/24	110	74%	78%	104%	108%
All Areas	Yale 1991	9/6	107	64%	56%	93%	85%
All Areas	Yale 1991	9/13	108	58%	52%	87%	81%
All Areas	Bridge R 1991	8/18-24	196	73%	79%	102%	109%
All Areas	Bridge R 1991	8/25-30	182	76%	86%	106%	119%
All Areas	Bridge R 1991	9/9-12	103	74%	87%	104%	120%
All Areas	Chilliwack 1992	8/1-3	162	32%	26%	60%	54%
All Areas	Chilliwack 1992	8/6-10	165	51%	50%	80%	79%
All Areas	Chilliwack 1992	8/13-16	186	71%	70%	100%	99%
All Areas	Yale 1992	8/1-3	152	24%	22%	51%	49%
All Areas	Yale 1992	8/14-16	158	64%	69%	93%	98%
All Areas	Bridge R 1992	8/10-11	145	66%	57%	95%	86%
All Areas	Bridge R 1992	8/17-19	125	82%	77%	113%	107%
All Areas	Bridge R 1992	8/20-21	101	54%	80%	83%	111%
All Areas	Bridge R 1992	9/1-9	56	80%	73%	111%	102%
All Areas	Chilliwack 1993	8/14	101	50%	67%	79%	96%
All Areas	Chilliwack 1993	8/23	94	77%	65%	107%	94%
All Areas	Chilliwack 1993	9/5	109	94%	75%	133%	105%
All Areas	Chilliwack 1993	9/14	106	95%	91%	135%	127%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

				Raw Percentages		ARCSIN of sqrt of %'s	
				Scales	Reconstruction	Scales	Reconstruction
			Sample	Chilko/	Chilko/	Chilko/	Chilko/
	Area	Date	Size	Quesnel	Quesnel	Quesnel	Quesnel
All Areas	Yale 1993	8/14	108	31%	62%	59%	91%
All Areas	Yale 1993	8/23	98	78%	58%	108%	87%
All Areas	Yale 1993	9/6	106	57%	81%	85%	112%
All Areas	Yale 1993	9/13	105	90%	90%	125%	125%
All Areas	Bridge R 1993	9/6	63	66%	79%	95%	109%
All Areas	Yale 1994	8/12,16-18	61	72%	66%	101%	95%
All Areas	Lytton 1994	8/10,13-15	200	69%	64%	98%	92%
All Areas	Lytton 1994	8/16-23	193	60%	71%	89%	100%
All Areas	Lytton 1994	8/24-29	117	79%	70%	109%	99%
All Areas	Bridge R 1994	8/9-11	160	92%	78%	128%	108%
All Areas	Yale 1995	8/4-5	208	26%	40%	53%	68%
All Areas	Yale 1995	8/6-9	204	45%	57%	73%	86%
All Areas	Yale 1995	8/16-18	219	51%	66%	79%	95%
All Areas	Yale 1995	8/25-26	33	75%	61%	105%	89%
All Areas	Yale 1995	8/27-29	48	74%	64%	104%	92%
All Areas	Yale 1995	9/3	79	21%	48%	48%	77%
All Areas	Yale 1995	7/28-8/1	96	10%	47%	32%	76%
All Areas	Yale 1995	8/16-18	219	51%	71%	79%	101%
All Areas	Lytton 1995	7/24-25	102	5%	6%	22%	25%
All Areas	Lytton 1995	7/26-8/1	75	22%	40%	48%	69%
All Areas	Lytton 1995	8/4-6	217	22%	44%	49%	72%
All Areas	Lytton 1995	8/7-10	182	28%	54%	56%	83%
All Areas	Lytton 1995	8/16-17	154	66%	70%	95%	99%
All Areas	Lytton 1995	8/21-26	114	52%	63%	80%	92%
All Areas	Bridge R 1995	7/27-31	85	22%	27%	48%	55%
All Areas	Bridge R 1995	8/2-4	99	11%	55%	34%	84%
All Areas	Bridge R 1995	8/10	47	37%	48%	65%	77%
All Areas	Bridge R 1995	8/16-19	99	63%	73%	92%	102%
All Areas	Bridge R 1995	8/20-22	204	60%	75%	88%	105%
All Areas	Sheep Cr 1995	7/28-8/6	190	8%	8%	29%	28%
All Areas	Sheep Cr 1995	8/7-11	136	46%	22%	74%	49%
All Areas	Sheep Cr 1995	8/12-16	139	23%	24%	50%	51%
All Areas	Sheep Cr 1995	8/23-24	42	29%	48%	56%	77%
				52%	58%	80%	86%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Chilko/	Chilko/	Chilko/	Chilko/
	Area		Date	Size	Quesnel	Quesnel	Quesnel	Quesnel
Below Hope	Lytton	1989	8/2-3	112	37%	26%	65%	54%
Below Hope	Lytton	1989	8/9-10	99	23%	40%	50%	68%
Below Hope	Lytton	1989	8/16-17	158	72%	69%	101%	98%
Below Hope	Lytton	1989	8/23-24	132	73%	75%	102%	105%
Below Hope	Lytton	1989	8/30-31	91	77%	87%	107%	120%
Below Hope	Agassiz	1990	8/3-5	120	51%	48%	80%	77%
Below Hope	Agassiz	1990	8/9-12	204	68%	58%	97%	87%
Below Hope	Agassiz	1990	8/17-18	65	49%	80%	78%	111%
Below Hope	Agassiz	1990	8/24-25	160	64%	86%	93%	119%
Below Hope	Agassiz	1990	8/31-9/1	62	55%	68%	84%	96%
Below Hope	Agassiz	1990	9/13-16	144	30%	16%	58%	41%
Below Hope	Chilliwack	1991	7/18-20	101	4%	3%	20%	17%
Below Hope	Chilliwack	1991	7/25-28	255	0%	18%	0%	44%
Below Hope	Chilliwack	1991	8/8-11	92	55%	58%	84%	87%
Below Hope	Chilliwack	1991	8/15-18	100	67%	73%	96%	102%
Below Hope	Chilliwack	1991	8/22-25	103	66%	74%	95%	104%
Below Hope	Chilliwack	1991	8/30-9/1	68	61%	61%	90%	90%
Below Hope	Chilliwack	1992	8/1-3	162	32%	26%	60%	54%
Below Hope	Chilliwack	1992	8/6-10	165	51%	50%	80%	79%
Below Hope	Chilliwack	1992	8/13-16	186	71%	70%	100%	99%
Below Hope	Chilliwack	1993	8/14	101	50%	67%	79%	96%
Below Hope	Chilliwack	1993	8/23	94	77%	65%	107%	94%
Below Hope	Chilliwack	1993	9/5	109	94%	75%	133%	105%
Below Hope	Chilliwack	1993	9/14	106	95%	91%	135%	127%
					55%	58%	83%	86%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Chilko/	Chilko/	Chilko/	Chilko/
	Area		Date	Size	Quesnel	Quesnel	Quesnel	Quesnel
Hope - Churn	Yale	1991	7/25-28	108	17%	12%	42%	35%
Hope - Churn	Yale	1991	8/1-4	111	27%	37%	55%	65%
Hope - Churn	Yale	1991	8/11	106	66%	52%	95%	81%
Hope - Churn	Yale	1991	8/15-18	169	57%	71%	86%	100%
Hope - Churn	Yale	1991	8/24	110	74%	78%	104%	108%
Hope - Churn	Yale	1991	9/6	107	64%	56%	93%	85%
Hope - Churn	Yale	1991	9/13	108	58%	52%	87%	81%
Hope - Churn	Bridge R	1991	8/18-24	196	73%	79%	102%	109%
Hope - Churn	Bridge R	1991	8/25-30	182	76%	86%	106%	119%
Hope - Churn	Bridge R	1991	9/9-12	103	74%	87%	104%	120%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Chilko/	Chilko/	Chilko/	Chilko/
	Area	Date		Size	Quesnel	Quesnel	Quesnel	Quesnel
Hope - Churn	Yale 1992	8/1-3		152	24%	22%	51%	49%
Hope - Churn	Yale 1992	8/14-16		158	64%	69%	93%	98%
Hope - Churn	Bridge R 1992	8/10-11		145	66%	57%	95%	86%
Hope - Churn	Bridge R 1992	8/17-19		125	82%	77%	113%	107%
Hope - Churn	Bridge R 1992	8/20-21		101	54%	80%	83%	111%
Hope - Churn	Bridge R 1992	9/1-9		56	80%	73%	111%	102%
Hope - Churn	Yale 1993	8/14		108	31%	62%	59%	91%
Hope - Churn	Yale 1993	8/23		98	78%	58%	108%	87%
Hope - Churn	Yale 1993	9/6		106	57%	81%	85%	112%
Hope - Churn	Yale 1993	9/13		105	90%	90%	125%	125%
Hope - Churn	Bridge R 1993	9/6		63	66%	79%	95%	109%
Hope - Churn	Yale 1994	8/12,16-18		61	72%	66%	101%	95%
Hope - Churn	Lytton 1994	8/10,13-15		200	69%	64%	98%	92%
Hope - Churn	Lytton 1994	8/16-23		193	60%	71%	89%	100%
Hope - Churn	Lytton 1994	8/24-29		117	79%	70%	109%	99%
Hope - Churn	Bridge R 1994	8/9-11		160	92%	78%	128%	108%
Hope - Churn	Yale 1995	8/4-5		208	26%	40%	53%	68%
Hope - Churn	Yale 1995	8/6-9		204	45%	57%	73%	86%
Hope - Churn	Yale 1995	8/16-18		219	51%	66%	79%	95%
Hope - Churn	Yale 1995	8/25-26		33	75%	61%	105%	89%
Hope - Churn	Yale 1995	8/27-29		48	74%	64%	104%	92%
Hope - Churn	Yale 1995	9/3		79	21%	48%	48%	77%
Hope - Churn	Yale 1995	7/28-8/1		96	10%	47%	32%	76%
Hope - Churn	Yale 1995	8/16-18		219	51%	71%	79%	101%
Hope - Churn	Lytton 1995	7/24-25		102	5%	6%	22%	25%
Hope - Churn	Lytton 1995	7/26-8/1		75	22%	40%	48%	69%
Hope - Churn	Lytton 1995	8/4-6		217	22%	44%	49%	72%
Hope - Churn	Lytton 1995	8/7-10		182	28%	54%	56%	83%
Hope - Churn	Lytton 1995	8/16-17		154	66%	70%	95%	99%
Hope - Churn	Lytton 1995	8/21-26		114	52%	63%	80%	92%
Hope - Churn	Bridge R 1995	7/27-31		85	22%	27%	48%	55%
Hope - Churn	Bridge R 1995	8/2-4		99	11%	55%	34%	84%
Hope - Churn	Bridge R 1995	8/10		47	37%	48%	65%	77%
Hope - Churn	Bridge R 1995	8/16-19		99	63%	73%	92%	102%
Hope - Churn	Bridge R 1995	8/20-22		204	60%	75%	88%	105%
					53%	60%	82%	89%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

	Area	Date	Sample Size	Raw Percentages: Scales Chilko/ Quesnel	Raw Percentages: Reconstruction Chilko/ Quesnel	ARCSIN of sqrt of %'s: Scales Chilko/ Quesnel	ARCSIN of sqrt of %'s: Reconstruction Chilko/ Quesnel
Above Churn	Sheep Cr 1995	7/28-8/6	190	8%	8%	29%	28%
Above Churn	Sheep Cr 1995	8/7-11	136	46%	22%	74%	49%
Above Churn	Sheep Cr 1995	8/12-16	139	23%	24%	50%	51%
Above Churn	Sheep Cr 1995	8/23-24	42	29%	48%	56%	77%
				26%	26%	53%	51%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

				Raw Percentages		ARCSIN of sqrt of %'s	
				Scales	Reconstruction	Scales	Reconstruction
			Sample	L.Stuart	L.Stuart	L.Stuart	L.Stuart
	Area	Date	Size	/Stellako	/Stellako	/Stellako	/Stellako
All Areas	Lytton 1989	7/26-27	136	13%	14%	38%	38%
All Areas	Lytton 1989	8/2-3	112	45%	54%	74%	83%
All Areas	Lytton 1989	8/9-10	99	75%	45%	105%	74%
All Areas	Lytton 1989	8/16-17	158	28%	29%	56%	57%
All Areas	Lytton 1989	8/23-24	132	27%	25%	55%	52%
All Areas	Lytton 1989	8/30-31	91	23%	13%	50%	37%
All Areas	Agassiz 1990	8/3-5	120	16%	14%	41%	39%
All Areas	Agassiz 1990	8/9-12	204	25%	20%	52%	46%
All Areas	Agassiz 1990	8/17-18	65	27%	13%	55%	37%
All Areas	Agassiz 1990	8/24-25	160	32%	14%	60%	38%
All Areas	Agassiz 1990	8/31-9/1	62	10%	24%	32%	51%
All Areas	Chilliwack 1991	8/8-11	92	11%	13%	34%	37%
All Areas	Chilliwack 1991	8/15-18	100	11%	13%	34%	37%
All Areas	Chilliwack 1991	8/22-25	103	26%	13%	54%	37%
All Areas	Chilliwack 1991	8/30-9/1	68	16%	12%	41%	35%
All Areas	Yale 1991	8/11	106	17%	12%	42%	35%
All Areas	Yale 1991	8/15-18	169	31%	15%	59%	40%
All Areas	Yale 1991	8/24	110	16%	12%	41%	35%
All Areas	Yale 1991	9/6	107	4%	10%	20%	32%
All Areas	Bridge R 1991	8/18-24	196	17%	16%	42%	41%
All Areas	Bridge R 1991	8/25-30	182	24%	14%	51%	38%
All Areas	Bridge R 1991	9/9-12	103	26%	13%	54%	37%
All Areas	P. George 1991	8/25-29	52	72%	66%	101%	95%
All Areas	P. George 1991	9/9-11	102	100%	100%	157%	157%
All Areas	Chilliwack 1992	8/1-3	162	6%	5%	25%	23%
All Areas	Chilliwack 1992	8/6-10	165	16%	15%	41%	40%
All Areas	Chilliwack 1992	8/13-16	186	13%	15%	37%	40%
All Areas	Yale 1992	8/1-3	152	4%	4%	20%	20%
All Areas	Yale 1992	8/14-16	158	31%	17%	59%	42%
All Areas	Bridge R 1992	8/10-11	145	28%	12%	56%	35%
All Areas	Bridge R 1992	8/17-19	125	18%	22%	44%	49%
All Areas	Bridge R 1992	8/20-21	101	46%	17%	75%	42%
All Areas	Bridge R 1992	9/1-9	56	20%	27%	46%	55%
All Areas	Chilliwack 1993	8/14	101	50%	31%	78%	59%
All Areas	Chilliwack 1993	8/23	94	23%	28%	50%	56%
All Areas	Chilliwack 1993	9/5	109	6%	18%	24%	44%
All Areas	Yale 1993	8/14	108	69%	38%	98%	66%
All Areas	Yale 1993	8/23	98	22%	42%	49%	71%
All Areas	Yale 1993	9/6	106	43%	19%	72%	45%
All Areas	Yale 1993	9/13	105	10%	10%	33%	32%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	L.Stuart	L.Stuart	L.Stuart	L.Stuart
	Area		Date	Size	/Stellako	/Stellako	/Stellako	/Stellako
All Areas	Bridge R	1993	9/6	63	34%	21%	62%	48%
All Areas	Yale	1994	8/12,16-18	61	27%	18%	55%	44%
All Areas	Lytton	1994	8/10,13-15	200	11%	23%	34%	50%
All Areas	Lytton	1994	8/16-23	193	16%	16%	41%	41%
All Areas	Lytton	1994	8/24-29	117	8%	15%	29%	39%
All Areas	Bridge R	1994	8/9-11	160	8%	22%	29%	49%
All Areas	Yale	1995	8/4-5	208	45%	33%	73%	61%
All Areas	Yale	1995	8/6-9	204	37%	32%	65%	60%
All Areas	Yale	1995	8/16-18	219	43%	24%	71%	51%
All Areas	Yale	1995	8/27-29	48	13%	11%	37%	33%
All Areas	Yale	1995	7/28-8/1	96	39%	33%	68%	61%
All Areas	Yale	1995	8/16-18	219	43%	21%	71%	48%
All Areas	Lytton	1995	7/24-25	102	78%	63%	109%	91%
All Areas	Lytton	1995	7/26-8/1	75	58%	43%	86%	71%
All Areas	Lytton	1995	8/4-6	217	43%	44%	71%	73%
All Areas	Lytton	1995	8/7-10	182	53%	28%	81%	55%
All Areas	Lytton	1995	8/16-17	154	34%	18%	63%	43%
All Areas	Lytton	1995	8/21-26	114	49%	21%	77%	47%
All Areas	Bridge R	1995	7/27-31	85	35%	56%	63%	84%
All Areas	Bridge R	1995	8/2-4	99	27%	34%	54%	62%
All Areas	Bridge R	1995	8/10	47	26%	40%	54%	68%
All Areas	Bridge R	1995	8/16-19	99	37%	21%	65%	47%
All Areas	Bridge R	1995	8/20-22	204	40%	22%	69%	49%
All Areas	Sheep Cr	1995	7/28-8/6	190	48%	72%	77%	101%
All Areas	Sheep Cr	1995	8/7-11	136	28%	59%	56%	88%
All Areas	Sheep Cr	1995	8/12-16	139	50%	59%	79%	88%
All Areas	Sheep Cr	1995	8/23-24	42	72%	42%	101%	70%
					31%	27%	58%	53%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	L.Stuart	L.Stuart	L.Stuart	L.Stuart
	Area		Date	Size	/Stellako	/Stellako	/Stellako	/Stellako
Below Hope	Agassiz	1990	8/3-5	120	16%	14%	41%	39%
Below Hope	Agassiz	1990	8/9-12	204	25%	20%	52%	46%
Below Hope	Agassiz	1990	8/17-18	65	27%	13%	55%	37%
Below Hope	Agassiz	1990	8/24-25	160	32%	14%	60%	38%
Below Hope	Agassiz	1990	8/31-9/1	62	10%	24%	32%	51%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

				Raw Percentages		ARCSIN of sqrt of %'s	
				Scales	Reconstruction	Scales	Reconstruction
			Sample	L.Stuart	L.Stuart	L.Stuart	L.Stuart
Area		Date	Size	/Stellako	/Stellako	/Stellako	/Stellako
Below Hope Chilliwack	1991	8/8-11	92	11%	13%	34%	37%
Below Hope Chilliwack	1991	8/15-18	100	11%	13%	34%	37%
Below Hope Chilliwack	1991	8/22-25	103	26%	13%	54%	37%
Below Hope Chilliwack	1991	8/30-9/1	68	16%	12%	41%	35%
Below Hope Chilliwack	1992	8/1-3	162	6%	5%	25%	23%
Below Hope Chilliwack	1992	8/6-10	165	16%	15%	41%	40%
Below Hope Chilliwack	1992	8/13-16	186	13%	15%	37%	40%
Below Hope Chilliwack	1993	8/14	101	50%	31%	78%	59%
Below Hope Chilliwack	1993	8/23	94	23%	28%	50%	56%
Below Hope Chilliwack	1993	9/5	109	6%	18%	24%	44%
				19%	16%	44%	41%

				Raw Percentages		ARCSIN of sqrt of %'s	
				Scales	Reconstruction	Scales	Reconstruction
			Sample	L.Stuart	L.Stuart	L.Stuart	L.Stuart
Area		Date	Size	/Stellako	/Stellako	/Stellako	/Stellako
Hope - Churn	Lytton 1989	7/26-27	136	13%	14%	38%	38%
Hope - Churn	Lytton 1989	8/2-3	112	45%	54%	74%	83%
Hope - Churn	Lytton 1989	8/9-10	99	75%	45%	105%	74%
Hope - Churn	Lytton 1989	8/16-17	158	28%	29%	56%	57%
Hope - Churn	Lytton 1989	8/23-24	132	27%	25%	55%	52%
Hope - Churn	Lytton 1989	8/30-31	91	23%	13%	50%	37%
Hope - Churn	Yale 1991	8/11	106	17%	12%	42%	35%
Hope - Churn	Yale 1991	8/15-18	169	31%	15%	59%	40%
Hope - Churn	Yale 1991	8/24	110	16%	12%	41%	35%
Hope - Churn	Yale 1991	9/6	107	4%	10%	20%	32%
Hope - Churn	Bridge R 1991	8/18-24	196	17%	16%	42%	41%
Hope - Churn	Bridge R 1991	8/25-30	182	24%	14%	51%	38%
Hope - Churn	Bridge R 1991	9/9-12	103	26%	13%	54%	37%
Hope - Churn	Yale 1992	8/1-3	152	4%	4%	20%	20%
Hope - Churn	Yale 1992	8/14-16	158	31%	17%	59%	42%
Hope - Churn	Bridge R 1992	8/10-11	145	28%	12%	56%	35%
Hope - Churn	Bridge R 1992	8/17-19	125	18%	22%	44%	49%
Hope - Churn	Bridge R 1992	8/20-21	101	46%	17%	75%	42%
Hope - Churn	Bridge R 1992	9/1-9	56	20%	27%	46%	55%
Hope - Churn	Yale 1993	8/14	108	69%	38%	98%	66%
Hope - Churn	Yale 1993	8/23	98	22%	42%	49%	71%
Hope - Churn	Yale 1993	9/6	106	43%	19%	72%	45%
Hope - Churn	Yale 1993	9/13	105	10%	10%	33%	32%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	L.Stuart	L.Stuart	L.Stuart	L.Stuart
	Area		Date	Size	/Stellako	/Stellako	/Stellako	/Stellako
Hope - Churn	Bridge R	1993	9/6	63	34%	21%	62%	48%
Hope - Churn	Yale	1994	8/12,16-18	61	27%	18%	55%	44%
Hope - Churn	Lytton	1994	8/10,13-15	200	11%	23%	34%	50%
Hope - Churn	Lytton	1994	8/16-23	193	16%	16%	41%	41%
Hope - Churn	Lytton	1994	8/24-29	117	8%	15%	29%	39%
Hope - Churn	Bridge R	1994	8/9-11	160	8%	22%	29%	49%
Hope - Churn	Yale	1995	8/4-5	208	45%	33%	73%	61%
Hope - Churn	Yale	1995	8/6-9	204	37%	32%	65%	60%
Hope - Churn	Yale	1995	8/16-18	219	43%	24%	71%	51%
Hope - Churn	Yale	1995	8/27-29	48	13%	11%	37%	33%
Hope - Churn	Yale	1995	7/28-8/1	96	39%	33%	68%	61%
Hope - Churn	Yale	1995	8/16-18	219	43%	21%	71%	48%
Hope - Churn	Lytton	1995	7/24-25	102	78%	63%	109%	91%
Hope - Churn	Lytton	1995	7/26-8/1	75	58%	43%	86%	71%
Hope - Churn	Lytton	1995	8/4-6	217	43%	44%	71%	73%
Hope - Churn	Lytton	1995	8/7-10	182	53%	28%	81%	55%
Hope - Churn	Lytton	1995	8/16-17	154	34%	18%	63%	43%
Hope - Churn	Lytton	1995	8/21-26	114	49%	21%	77%	47%
Hope - Churn	Bridge R	1995	7/27-31	85	35%	56%	63%	84%
Hope - Churn	Bridge R	1995	8/2-4	99	27%	34%	54%	62%
Hope - Churn	Bridge R	1995	8/10	47	26%	40%	54%	68%
Hope - Churn	Bridge R	1995	8/16-19	99	37%	21%	65%	47%
Hope - Churn	Bridge R	1995	8/20-22	204	40%	22%	69%	49%
					31%	25%	58%	51%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	L.Stuart	L.Stuart	L.Stuart	L.Stuart
	Area		Date	Size	/Stellako	/Stellako	/Stellako	/Stellako
Above Churn	P. George	1991	8/25-29	52	72%	66%	101%	95%
Above Churn	P. George	1991	9/9-11	102	100%	100%	157%	157%
Above Churn	Sheep Cr	1995	7/28-8/6	190	48%	72%	77%	101%
Above Churn	Sheep Cr	1995	8/7-11	136	28%	59%	56%	88%
Above Churn	Sheep Cr	1995	8/12-16	139	50%	59%	79%	88%
Above Churn	Sheep Cr	1995	8/23-24	42	72%	42%	101%	70%
					62%	66%	95%	100%

Appendix Table 2 (continued). Comparison of untransformed and transformed stock group percentages

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Adams/	Adams/	Adams/	Adams/
	Area		Date	Size	L.Shus	L.Shus	L.Shus	L.Shus
All Areas	Agassiz	1990	8/31-9/1	62	35%	9%	63%	30%
All Areas	Agassiz	1990	9/13-16	144	70%	81%	99%	111%
All Areas	Chilliwack	1991	8/30-9/1	68	23%	20%	50%	46%
All Areas	Chilliwack	1991	9/6	32	9%	32%	30%	60%
All Areas	Yale	1991	9/6	107	32%	34%	60%	62%
All Areas	Yale	1991	9/13	108	34%	46%	62%	75%
All Areas	Yale	1991	9/28-29	169	96%	100%	137%	157%
All Areas	Yale	1995	8/27-29	48	13%	26%	37%	53%
All Areas	Yale	1995	9/3	79	33%	52%	62%	81%
All Areas	Lytton	1995	9/22-26	41	84%	100%	115%	157%
					43%	50%	72%	83%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Adams/	Adams/	Adams/	Adams/
	Area		Date	Size	L.Shus	L.Shus	L.Shus	L.Shus
Below Hope	Agassiz	1990	8/31-9/1	62	35%	9%	63%	30%
Below Hope	Agassiz	1990	9/13-16	144	70%	81%	99%	111%
Below Hope	Chilliwack	1991	8/30-9/1	68	23%	20%	50%	46%
Below Hope	Chilliwack	1991	9/6	32	9%	32%	30%	60%
					34%	35%	61%	62%

					Raw Percentages		ARCSIN of sqrt of %'s	
					Scales	Reconstruction	Scales	Reconstruction
				Sample	Adams/	Adams/	Adams/	Adams/
	Area		Date	Size	L.Shus	L.Shus	L.Shus	L.Shus
Hope - Churn	Yale	1991	9/6	107	32%	34%	60%	62%
Hope - Churn	Yale	1991	9/13	108	34%	46%	62%	75%
Hope - Churn	Yale	1991	9/28-29	169	96%	100%	137%	157%
Hope - Churn	Yale	1995	8/27-29	48	13%	26%	37%	53%
Hope - Churn	Yale	1995	9/3	79	33%	52%	62%	81%
Hope - Churn	Lytton	1995	9/22-26	41	84%	100%	115%	157%
					49%	60%	79%	97%