Fishery Data Series No. 11-15

Contribution of Alaskan, Canadian, and Transboundary Sockeye Salmon Stocks to Catches in Southeast Alaska Purse Seine and Gillnet Fisheries, Districts 101–108, Based on Analysis of Scale Patterns, 2003

by

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Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY DATA REPORT NO. 11-15

CONTRIBUTION OF ALASKAN, CANADIAN, AND TRANSBOUNDARY SOCKEYE SALMON STOCKS TO CATCHES IN SOUTHEAST ALASKA PURSE SEINE AND GILLNET FISHERIES, DISTRICTS 101–108, BASED ON ANALYSIS OF SCALE PATTERNS, 2003

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ABSTRACT

Sockeye salmon *(Oncorhynchuus nerka)* harvested in southern Southeast Alaska's 2003 gillnet and purse seine fisheries were classified to nation and/or stock group of origin using linear discriminant function analysis of scale patterns and age composition data. This year the method of measuring growth patterns was improved by using image processing techniques, whereas in previous year manual digitizing was used. A total of 731,704 sockeye salmon were harvested in purse seine and gillnet fisheries in 2003, the sixth lowest harvest since scale pattern analyses began in 1982. This catch was classified to nation of origin to estimate that 332,558 fish (45%) were of Alaska origin, 352,445 fish (48%) were of Canadian origin, and 46,671 fish (6%) were of Stikine River origin.

Key words: sockeye salmon, *Oncorhynchus nerka*, stock composition, linear discriminant function, scale pattern analysis, image processing, Southeast Alaska, Canada, Boundary Area

INTRODUCTION

Sockeye salmon (*Oncorhynchus nerka*) harvested in southern Southeast Alaskan commercial fisheries include drift gillnet fisheries that target primarily sockeye salmon in Alaska Districts 101, 106 and 108, as well as purse seine fisheries in Alaska Districts 101 through 104 that primarily target other species and harvest sockeye salmon only incidentally. These sockeye salmon stocks originate from numerous rivers in Southeast Alaska and British Columbia (Figure 1). The rivers can be entirely contained within Alaskan or Canadian boundaries, or if they cross an international border they are referred to as transboundary rivers (Rich and Morton 1930; Verhoeven 1952; Norenberg 1959; Logan 1967; Simpson 1968; Hoffman et al. 1983).

Sockeye salmon that spawn in rivers entirely within Alaskan borders originate primarily from numerous low to moderately productive systems in the immediate vicinity (Figure 2). Sockeye salmon from drainages entirely within Canadian borders originate principally from the Nass River, which flows into Portland Canal, and from the Skeena River, which flows into Chatham Sound, just south of the Alaska-Canada border (Figure 3). These harvests may also include a few sockeye salmon bound for northern Southeast Alaska, Prince William Sound, and Washington State, but their low numbers preclude estimates of stock of origin. In some years, migration patterns change for sockeye salmon from southern British Columbia, and increased numbers are caught in the Alaska District 104 purse seine fishery along the outer coast of Alaska and just north of the Alaska-Canada border. These fish are thought to originate primarily from the Fraser River. Several transboundary river systems contribute to sockeye salmon catches in Southeast Alaska, including the Taku, Stikine, and Alsek Rivers. In southern Southeast Alaska, the District 108 and 106 gillnet fisheries are the only ones that regularly harvest transboundary river sockeye stocks in quantifiable numbers, primarily stocks from the Stikine River drainage.

In 1982, the Alaska Department of Fish and Game began using scale pattern analysis (Marshall et al., 1984) to estimate the numbers of salmon bound for specific Canadian river systems. Scale pattern analysis is based on differences in patterns of arrangement of circuli on scales, which reflect average differences in fish growth history over broad geographic areas. Significant and persistent differences between sockeye salmon stock groups originating in Alaska and Canada have been documented in the patterns of scale growth during freshwater and early marine life history (Oliver et al. 1984; Oliver and Walls 1985; Oliver and Jensen 1986; Oliver et al. 1987; Oliver *Unpublished Report*; Oliver and Farrington 1989; Oliver et al. 1990; Farrington and Oliver 1994; Farrington et al. 1996a–c; Farrington et al. 1998a–b; Farrington et al. 1999a–b; Bloomquist et al. 2005 and 2010.).

The purpose of this study is to determine the national origin of major sockeye salmon stocks contributing to commercial gillnet and purse seine fishery catches in southern Southeast Alaska (Figure 1). Under the Pacific Salmon Treaty of 1985 and its later annexes, catches by fishermen of either country of their neighboring country's stocks are restricted in selected fisheries. In particular, the catch of Nass and Skeena sockeye salmon in Alaska District 101 gillnet and District 104 purse seine fisheries are limited, over a ten-year period, to a percentage of the total return of these stocks. Annual stock-specific run reconstructions (catch plus escapement) are required to accurately estimate relative contribution of each stock caught in these restricted fisheries. Estimates of national origin of contributing stocks from this study provide the most reliable information currently available to complete these run reconstructions, and are used to evaluate stock-specific productivity and to revise pre-season forecasts.

METHODS

COMMERCIAL HARVEST INFORMATION

The number of fish harvested by gear type, district, and week were obtained from an ADF&G statewide commercial harvest database of commercial salmon sales receipts dating back to 1960. Catches were summarized by statistical weeks (weeks), which began on Sunday at 12:01 a.m. and ended the following Saturday at midnight. These weeks were numbered sequentially starting from the beginning of the calendar year.

BIOLOGICAL DATA COLLECTION AND PROCESSING

ADF&G Division of Commercial Fisheries personnel collected biological information and scales of sockeye salmon from southern Southeast Alaska commercial gillnet and purse seine landings at fish processing facilities in Petersburg, Ketchikan, Craig, and Wrangell. A sample size of 520 fish per stratum was sufficient to describe the estimated sockeye salmon age composition with a precision of ± 5% and a probability of 0.10 (Thompson 1987). Technicians collected samples from multiple vessels and tenders for each district. Samples were collected throughout unloading, selecting no more than 40 fish from any single delivery. Deliveries containing catches mixed from more than one gear type or more than one district were not sampled.

Gender was determined visually from external physical characteristics and recorded for each fish sampled. Mid-eye to fork-of-tail length was recorded for 25% of the fish sampled, except for District 101 and District 104 where length was recorded for all fish sampled. Scales were taken from the preferred area above the lateral line on the left side of the fish on a diagonal downward from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963).

ADF&G Division of Commercial Fisheries personnel collected scales from a variety of major sockeye salmon escapement lake and stream systems in southern Southeast Alaska. In northern British Columbia, Canadian Department of Fisheries and Oceans (DFO) personnel collected scales from daily gillnet catches in test fisheries operating near or in the lower reaches of the Skeena River. LGL Ltd. personnel under contract to the Nisga'a First Nation in British Columbia, Canada, collected scales from daily fishwheel catches in test fishery in the lower Nass River. The Pacific Salmon Commission (PSC) provided scales from commercial net fishery catches in British Columbia and Washington State waters that were used to represent south migrating stocks.

Scales were mounted on gum cards and impressions made in cellulose acetate (Clutter and Whitesel 1956). Scales were examined under moderate (70x) magnification to determine age. Criteria used to assign ages were similar to those of Mosher (1968), and ages were reported in European notation (Koo 1962).

DIGITIZING OF SCALES

Counts and measurements were made on a selected radius along or near the longest axis of the scale (Figure 4) (Anas and Murai 1969). Measurements and counts were collected along this axis line from the scale focus to end of the first marine annular zone. Methods used in 2003 to measure fish growth characteristics from scale circuli differed from previous years, and were based on image analysis techniques. Prior methods projected scale impressions onto a digitizing tablet at 100x magnification to obtain measurements using equipment similar to that described by Ryan and Christie (1976).

Beginning in 2003, scale impressions were projected onto the screen of a ScreenScan® Model PC scanning microfiche reader at 42x magnification, similar to equipment described by Hagen (2001). The projected image was digitally rendered using ScreenScan® image capture software, and each scale image stored as a single Tagged Image File Format (TIFF) file. Image files representing scales from district and weekly strata, and from escapement locations, were stored in computer directories organized according to collection location and week.

Images files were processed using Optimate® 6.51 image analysis software running customized macros developed specifically for measuring salmon scales. Macros used to process sockeye salmon for these studies were written in the Optimas® proprietary programming language ALI, and were modified from routines originally developed by Hagen (2001). ALI code for the modified macros is documented in the detailed project operational plan for the Southeast Alaska regional scale lab in Douglas, Alaska.

The scale image processing macro permitted the scale reader to use a series of mouse clicks and key commands to extract circuli measurement data within growth pattern zones from each scale image file. Images were processed in the following sequence:

1) Open an image file.
2) Using successive mouse clicks, establish location of an axis line by setting a rubber band line start point in the visual center of the scale focus, and end point a few circuli beyond the first marine annulus.
3) Manually place a marker for each growth zone with a mouse click along the axis line, a short distance beyond the outside edge of the last circulus of each zone.
4) Invoke an edge detection algorithm to automatically identify and mark the intersection of the leading edge of each circulus with the transect line.
5) Manually adjust circulus markers placed incorrectly due to natural variations in scale circuli and poor image quality.
6) Calculate distance measurements between each adjacent circulus and append zone indicator codes and distance measurements to a specified comma delimited text file.

DATA ANALYSIS

Linear discriminant function (LDF) analysis (Fisher 1936) of scale patterns has been used to estimate stock contributions to southern Southeast Alaska mixed stock sockeye salmon fisheries based on observed differences between stocks since 1982 (Oliver et al. 1984; Oliver and Walls 1985; Oliver and Jensen 1986; Oliver et al. 1987; Oliver *Unpublished Report*; Oliver and Farrington 1989; Oliver et al. 1990; Farrington and Oliver 1994; Farrington et al. 1996a–c; Farrington et al. 1998a–b; Farrington et al. 1999a–b; Bloomquist et al. 2005 and 2010).

Age-specific LDF models for each gear type and District were assembled for the three distinct geographic areas (Appendices A–D) from 2003 escapement samples based on stock-specific migration patterns observed in tagging studies from the early 1980s (Hoffman et al. 1983, English et al. 1984). Construction of separate age-specific models from potential contributing stock groups within the Districts 106 and 108 gillnet fisheries also considered observed run timing differences (K. A. Jensen, Commercial Fishery Research Biologist, ADF&G, Douglas; personal communication).

Weekly commercial catches in each district were classified to potential contributing stocks using age-specific LDF models for four major age groups (1.2, 1.3, 2.2 and 2.3) that generally comprise more than 98% of commercial catches. Up to 100 scales per temporal stratum for each major age class in a district and fishery were analyzed to provide estimates of stock proportions with a precision of ± 10% with probability of 0.10. The stock apportionment of the other (minor) age classes not directly classified using LDF assumes that the proportion of the minor ages belonging to any given stock is equal to the combined proportion of all classified age classes. Age specific models were used in the analysis to 1) account for differences in age composition between stocks, 2) remove potential bias due to differences in migratory timing of different aged fish and 3) eliminate the effect of different environmental conditions on the scale patterns of different age fish. Stock contributions were estimated for each week to track temporal patterns. Stock contribution estimates for weekly district catches for which no scale samples were collected (primarily early and late in the season) were generally approximated using the age and stock composition results from the nearest temporal stratum for that district. Stock contribution estimates for catches from districts for which few samples were available for relatively small catches over a period of weeks, were approximated using stock composition results from an adjacent temporal stratum to estimate pooled catch contributions for the weekly catches.

Variances of weekly and seasonal stock composition estimates were approximated with the delta method (Seber 1982). Variance estimates were functions of the variances associated with the weekly: 1) estimated age composition of the catch, 2) age specific stock composition estimates, 3) sample size of the age composition, and 4) catch size. Use of a maximum likelihood procedure to constrain the stock proportion estimates did provide a variance estimate for stock(s) contributing zero fish.

RESULTS

NATIONAL ORIGIN OF SOUTHERN SOUTHEAST SOCKEYE SALMON CATCHES

The total sockeye salmon harvest in the southern Southeast Alaska (Districts 101–108) seine and gillnet fisheries was 731,704 fish in 2003. Catches from these net fisheries were classified by nation of origin (Table 1). The estimated U.S. contribution was 332,588 fish (45%), estimated Canadian contribution was 352,445 fish (49%), and estimated transboundary contribution was 46,671 fish (6%).

STOCK COMPOSITION OF SOUTHERN SOUTHEAST SOCKEYE SALMON CATCHES

The total number of sockeye salmon classified to stock group of origin was 731,704 fish (Table 2). Of these, it was estimated that: 332,588 fish (45%) were of Alaska origin; 148,860 fish (20%) were Nass River origin; 143,674 (20%) were Skeena River origin; 59,911 (8%) were south-migrating stock origin (primarily Fraser River); 14,938 (2%) were transboundary Tahltan Lake origin; 22,609 (3%) were transboundary Stikine River origin; and 9,123 (1%) were transboundary Tuya Lake origin.

District 101 Gillnet Stock Composition

Weekly stock composition estimates comprised Alaska, Nass, and Skeena stock groupings. Of the season catch of 105,263 sockeye salmon, the estimated stock contributions were: 14,723 fish from the Alaska stock grouping for 14% of the total; 72,884 Nass River fish (69%); and 17,655 Skeena River fish (17%) (Table 3). Nass was the largest stock component in all weekly strata until very late in the season after week 35. The estimated Alaskan contribution was the eighth lowest to this fishery since analyses began in 1982.

District 101 Purse Seine Stock Composition

Weekly and stock composition estimates comprised Alaska, Nass, and Skeena stock groupings. Early and late weekly strata were combined due to low sample sizes. The season catch total was 74,650 sockeye. The estimated stock contributions were 57,046 fish from the Alaska stock grouping (76%), 10,295 Nass River fish (14%), and 7,309 Skeena River fish (10%) (Table 4). Alaska was the largest stock component in all weekly time strata.

District 102 Purse Seine Stock Composition

Where possible, weekly stock composition estimates were made for Alaska, Nass, and Skeena stock groupings. Of the catch of 38,357 sockeye salmon through week 39, the estimated stock contributions was: 35,098 fish from the Alaska stock grouping for (92%); 1,368 Nass River fish (4%); and 1,891 Skeena River fish (5%) (Table 5). Early and late weekly strata were either or pooled or estimated from adjacent temporal strata due to low sample sizes. The stock composition for several weeks in the middle of the season was also estimated using results from adjacent strata when all landings available to samplers were mixed with catches from other districts.

District 103 Purse Seine Stock Composition

Sockeye salmon harvested in the District 103 purse seine fishery totaled 24,654 fish. The estimates for contributions by stock group were: 18,929 (77%) from Alaska, 4,475 (18%) from Nass, and 1,250 (5%) from Skeena (Table 6).

District 104 Purse Seine Stock Composition

Weekly stock compositions comprised Alaska, Nass, Skeena, and south-migrating groupings. Of the season total of 329,719 sockeye salmon caught, the estimated stock contributions were: 111,492 fish from the Alaska stock grouping (34%); 48,358 Nass River fish (15%); 109,957 Skeena River fish (33%); and 59,911 (18%) fish from the south-migrating stock grouping (Table 7). Alaska stocks were the dominant component in the fishery during the peak of the season during weeks 31–33. Skeena was the largest contributing stock in all earlier and later weeks.

District 106 and 108 Gillnet Stock Composition

A total of 116,904 sockeye salmon were caught in the District 106 gillnet fishery, and 42,158 sockeye salmon in the District 108 gillnet fishery. Alaska stocks contributed 86,626 sockeye (74%) to the District 106 gillnet fishery and 8,675 sockeye (21%) to the District 108 gillnet fishery. Canadian stocks contributed 12,527 (11%) fish to the District 106 gillnet fishery and 4,563 (11%) fish to District 108 gillnet. Transboundary stocks contributed 17,751 (15%) fish to 106 gillnet and 28,920 (69%) fish to the District 108 gillnet fishery.

DISCUSSION

The total sockeye salmon harvest in the southern Southeast Alaska (Districts 101–108) seine and gillnet fisheries in 2003 (731,704) was the sixth lowest harvest for these fisheries since scale pattern analyses began in 1982, and was well below the 1982–2002 average harvest of 1.1 million sockeye (Table 1). Catches in 2003 were below average in all purse seine and gillnet fisheries, except the District 104 purse seine and District 108 gillnet fisheries, which were each approximately 2,000 fish above the 1982–2002 average. However, the 2003 harvest was still a substantial increase over the record low sockeye salmon catch in the boundary area net fisheries in 2002.

In 2003, harvests in the District 101 gillnet and District 104 purse seine fisheries (fisheries directly regulated through harvest sharing provisions of the Pacific Salmon Treaty) were well below the 1982–2002 averages (31% below for 101 gillnet, and 43% below for 104 purse seine). These lower harvest levels were reflected in contribution estimates for Canadian stocks that were 29% below average for District 101 gillnet, and 53% below average for District 104 purse seine.

Similar to most districts in 2003, the District 106 harvest was below the 1982–2002 average of 158,693 sockeye, but substantially greater than the low harvests of the previous year. The estimated contribution of Canadian stocks (12,527 sockeye) in this fishery, which is mostly transboundary stocks from the Stikine River drainage, were the fifth lowest since 1982, and were 74% below the 1982–2002 average contribution estimate. Estimated contribution of transboundary stocks was only 13% below the 1982–2002 average.

The District 108 harvest in 2003 was slightly above the 1982–2002 average of 39,897 sockeye. This district experienced several years of low abundance and non-harvests in the mid 1980s, as well as low abundance and very low harvests in 2001 and 2002. Estimated contribution of

transboundary stocks (28,920 sockeye) in 2003 for this gillnet fishery, which also targets largely transboundary stocks, was 3% above the 1982–2002 average contribution.

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REFERENCES CITED

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

Bloomquist, R., A.M Reynolds, and I.S. Frank. 2005. Contribution Of Alaskan, Canadian, and transboundary sockeye salmon stocks to catches in southeast Alaska purse seine and gillnet fisheries, Districts 101–108, based on analysis of scale patterns, 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J02-40, Juneau.

Bloomquist, R., A.M Reynolds, and I.S. Frank. 2010. Contribution Of Alaskan, Canadian, and transboundary sockeye salmon stocks to catches in southeast Alaska purse seine and gillnet fisheries, Districts 101–108, based on analysis of scale patterns, 2002. Alaska Department of Fish and Game, Fishery Data Series No. 10-27, Anchorage.

Clutter R. and L. Whitesel. 1956. Collection and interpretation of sockeye salmon scales. Bulletin International Pacific Salmon Fisheries Commission, No. 9.

English, K.K., W.J. Gazey, and J.A. Taylor. 1984. Part C. The 1983 North Coast tagging study. [*In*] Gazey, W.J., and D.A. Birdsall (*editors*), Design and execution of a stock interception study. Draft of Unpublished Report by LGL Limited and ESSA Environmental Social Systems Analysts Ltd., for Fisheries and Oceans Canada, 115p., LGL Limited, No. 333, 2453 Beacon Ave., Sidney, B.C., Canada.

Farrington, C. W. and G. T. Oliver, 1994. Contribution of Alaskan, Canadian, and transboundary sockeye stocks to 1990 catches in Southeast Alaska purse seine and gillnet fisheries, Districts 101–108, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J94-03, Juneau.

Farrington, C. W., G. T. Oliver, and R. A. Bloomquist. 1996a. Contribution of Alaskan, Canadian, and transboundary sockeye stocks to catches in Southeast Alaska purse seine and gillnet fisheries, Districts 101–108, 1992, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J96-10, Juneau.

Farrington, C. W., G. T. Oliver, and R. A. Bloomquist. 1996b. Contribution of Alaskan, Canadian, and transboundary sockeye stocks to catches in Southeast Alaska purse seine and gillnet fisheries, Districts 101–108, 1993, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J96-11, Juneau.

Farrington, C. W., G. T. Oliver, and R. A. Bloomquist. 1996c. Contribution of Alaskan, Canadian, and transboundary sockeye stocks to 1993 catches in Southeast Alaska purse seine and gillnet fisheries, Districts 101–108, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J96-12, Juneau.

Farrington, C. W., G. T. Oliver, and R. A. Bloomquist. 1998a. Contribution of Alaskan, Canadian, and transboundary sockeye stocks to catches in Southeast Alaska purse seine and gillnet fisheries, Districts 101–108, 1994, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J98-15, Juneau.

Farrington, C. W., G. T. Oliver, and R. A. Bloomquist. 1998b. Contribution of Alaskan, Canadian, and transboundary sockeye stocks to catches in Southeast Alaska purse seine and gillnet fisheries, Districts 101–108, 1995, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J98-16, Juneau.

Farrington, C. W., G. T. Oliver, and R. A. Bloomquist. 1999a. Contribution of Alaskan, Canadian, and transboundary sockeye stocks to catches in Southeast Alaska purse seine and gillnet fisheries, Districts 101–108, 1996, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J99-43, Juneau.

REFERENCES CITED (continued)

Farrington, C. W., G. T. Oliver, and R. A. Bloomquist. 1999b. Contribution of Alaskan, Canadian, and transboundary sockeye stocks to catches in Southeast Alaska purse seine and gillnet fisheries, Districts 101–108, 1997, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J99-46, Juneau.

Fisher, R. 1936. The use of multiple measurements in taxonomic problems. Ann. Eugenic 7:179–188.

Hagen, Peter T. 2001. Workshop on salmonid otolith marking: Seattle, Washington, USA, March 21, 2001. Vancouver, BC: North Pacific Anadromous Fish Commission, 2001.

Hoffman, S. H., L. Talley and M. C. Seibel. 1984. U.S./Canada cooperative pink and sockeye salmon tagging, interception rates, migration patterns, run timing, and stock intermingling in southern Southeastern Alaska and northern British Columbia, 1982. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report No. 110, Juneau.

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

Koo, T. S. Y. 1962. Age designation in salmon. Pages 37–48 in T. S. Y. Koo, editor, Studies of Alaska red salmon. University of Washington Press, Seattle, Washington.

Logan, R. 1967. The Noyes Island salmon fishing conflict. British Columbia Geographic Series, Occasional Paper 8:18–26.

Marshall, S. L., G. T. Oliver, D. R. Bernard, and S. A. McPherson. 1984. Accuracy of scale pattern analysis in separating major stocks of sockeye salmon (*Oncorhynchus nerka*) from southern Southeastern Alaska and northern British Columbia. Alaska Department of Fish and Game, Informational Leaflet 230, Juneau.

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

Norenberg, W. 1959. Salmon migrations in Southeastern Alaska. U.S. Fish and Wildlife Service, Circular No. 59.

Oliver, G. T. *Unpublished*. Contribution of Alaskan, Canadian, and Transboundary sockeye stocks to catches in Southeast Alaska Purse Seine and gillnet fisheries, Districts 101–108, 1987, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

Oliver, G., S. Marshall, D. Bernard, S. McPherson, and S. Walls. 1984. Estimated contribution from Alaska and Canada stocks to the catches of sockeye salmon in southern Southeast Alaska, 1982 and 1983 based on scale pattern analysis. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 137, Juneau.

Oliver, G. and S. Walls. 1985. Estimated contribution from Alaska and Canada stocks to the catches of sockeye salmon in southern Southeast Alaska, 1984, based on the analysis of scale patterns. Section report in 1985 salmon research conducted in southeast Alaska by the Alaska Department of Fish and Game in Conjunction with the National Marine Fisheries Service Auke Bay Laboratory for Joint U.S./Canada interception studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, Contract Report WASC 84 00179.

Oliver, G. T. and K. A. Jensen. 1986. Estimated contribution of Alaskan, Canadian, and Transboundary stocks to the catches of sockeye salmon in southern Southeast Alaska, 1985, based on analysis of scale patterns. Section report in 1985 salmon research conducted in southeast Alaska by the Alaska Department of Fish and Game in Conjunction with the National Marine Fisheries Service Auke Bay Laboratory for Joint U.S./Canada interception studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, Contract Report 85 ABC 00142.

Oliver, G. T., K. Jensen, I. Frank, and N. Sands. 1987. Contribution of Alaskan, Canadian, and transboundary sockeye stocks to catches from Southeast Alaska Districts 101–108, 1986, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J87-07, Juneau.

REFERENCES CITED (continued)

Oliver, G. T. and C. W. Farrington. 1989. Contribution of Alaskan, Canadian, and Transboundary sockeye stocks to catches in Southeast Alaska Purse Seine and gillnet fisheries, Districts 101–108, 1988, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J89-45, Juneau.

Oliver, G. T., C. W. Farrington and B. V. Alen. 1990. Contribution of Alaskan and Canadian sockeye salmon stocks to catches in Southeast Alaska purse seine and gill net fisheries, Districts 101-108, 1989, based on analysis of scale patterns. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J90-29 Juneau.

Rich, W. and F. Morton. 1930. Salmon-tagging experiments in Alaska, 1927–1928. U. S. Bureau of Fisheries Bulletin 45:1–23.

Ryan, P. and M. Christie. 1976. Scale reading equipment. Fisheries and Marine Service, Canada Technical Report no. PAC/T 758.

Simpson, L. 1968. Sockeye salmon migratory behavior and biological statistics collection, Southeastern Alaska. Annual Progress Report, 1 July, 1967 to 30 June, 1968. Anadromous Fish Act (P. L. 89–304), Project No. AFC-2–2.

Thompson, S. K. 1987. Sample size for estimating multinomial proportions. The American Statistician 41:1:62–46.

Verhoven, L. 1952. A report to the salmon fishing industry of Alaska on the results of the 1947 tagging experiments. Unpublished manuscript. Fisheries Research Institute, University of Washington, Seattle.

TABLES AND FIGURES

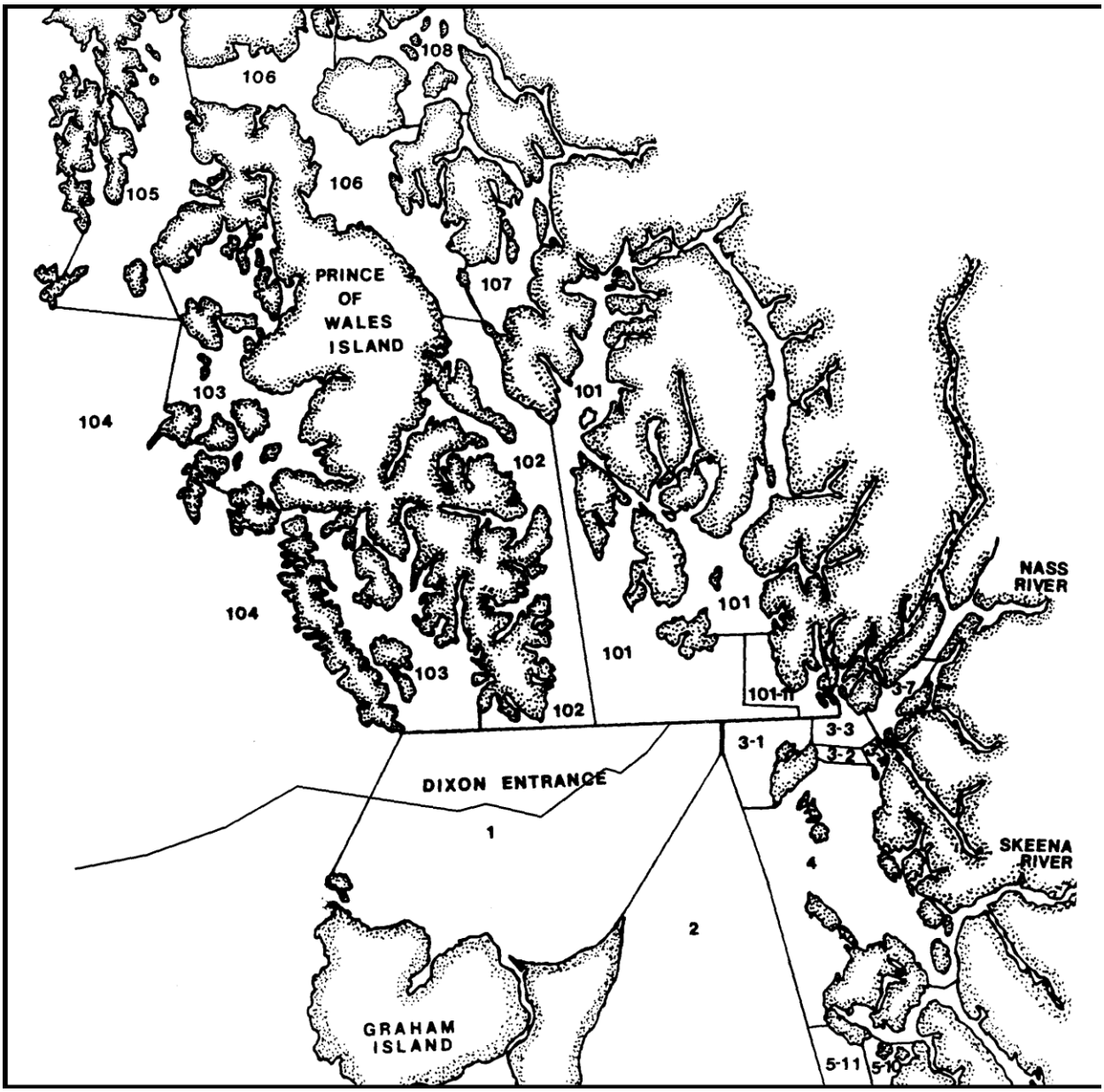

Figure 1.–Fishery management districts in southern Southeast Alaska and northern British Columbia waters.

Figure 2.–Major sockeye salmon systems of Southeast Alaska sampled for scales used in scale pattern analysis stock discrimination studies, 2003.

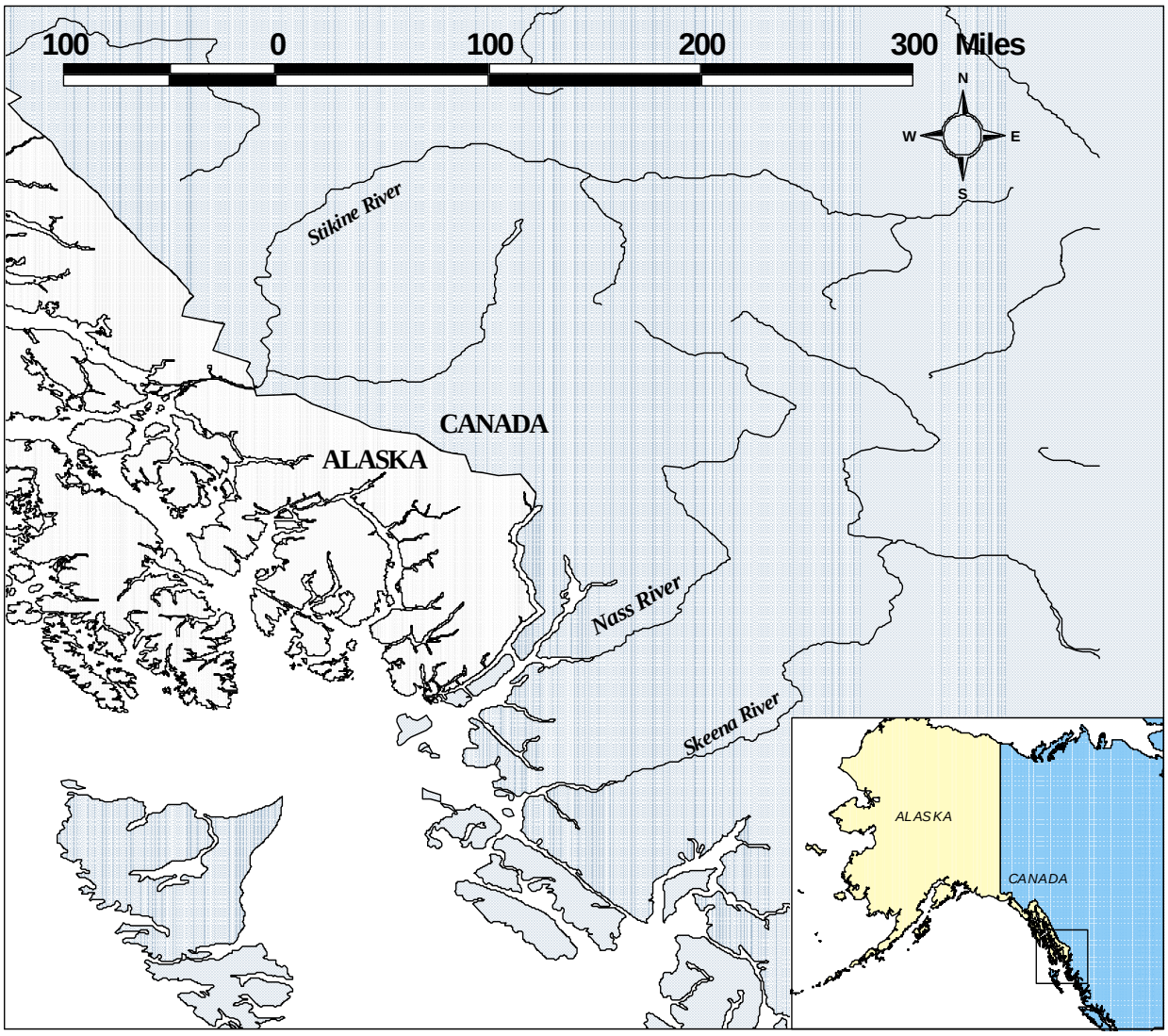

Figure 3.–The Canadian Nass and Skeena Rivers and the transboundary Stikine River.

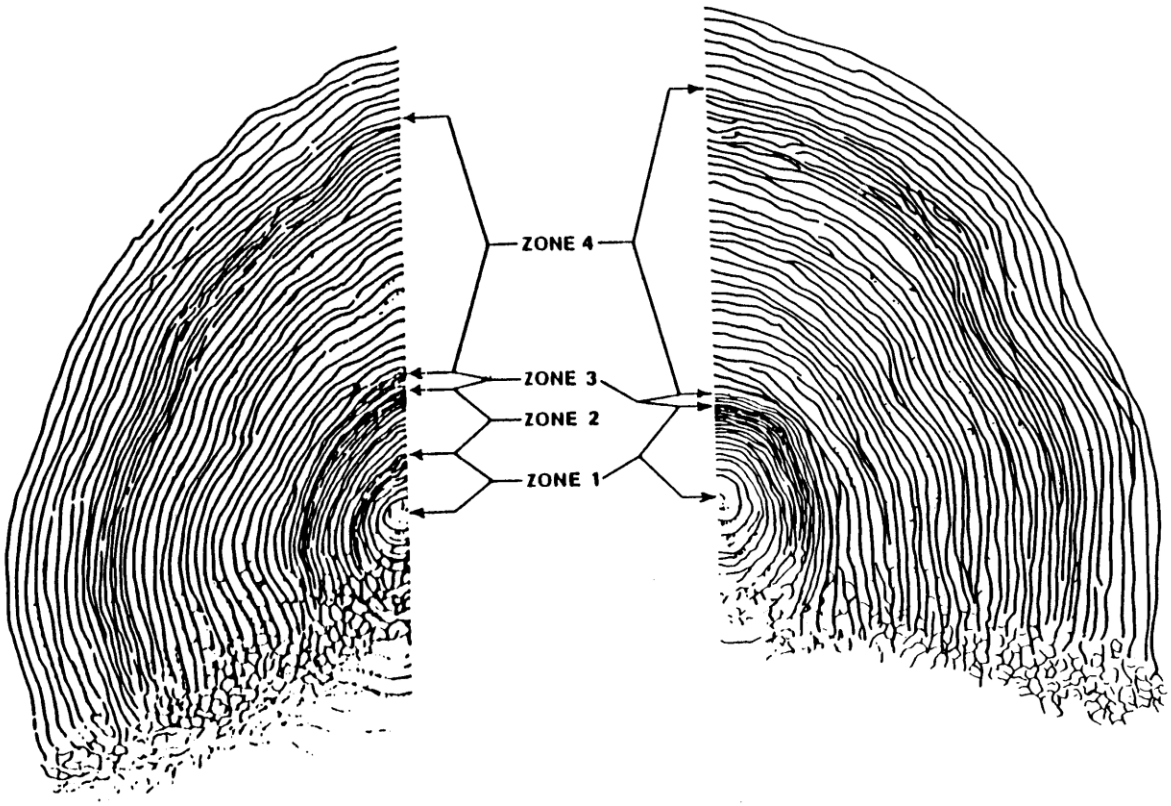

Figure 4.–Typical scales with two and one freshwater growth zones showing the zones used for scale pattern analysis.

Table 1.–Estimated sockeye salmon contributions by nation of origin to southern Southeast Alaska Districts 101–108 net fisheries, 1982–2003.

District	Type	Stock Group	1982	(%)	1983	(%)	1984	(%)	1985	(%)	1986	(%)	1987	(%)	1988	(%)	1989	(%)	1990	(%)
101	**Gillnet**	**US**	69,483	36	48,905	36	34,843	39	30,946	18	12,738	9	25,073	23	14,796	13	31,406	22	13,862	16
		Canada	121,325	64	86,998	64	53,588	61	142,154	82	132,961	91	82,430	77	101,319	87	113,530	78	71,829	84
		Total	190,808		135,903		88,431		173,100		145,699		107,503		116,115		144,936		85,691	
101[a]	**Purse Seine**	**US**	39,518	56	20,376	43	49,348	60	82,311	69	50,313	67	30,071	69	12,799	41	37,236	32	29,498	51
		Canada	30,941	44	27,263	57	32,537	40	37,159	31	24,510	33	13,233	31	18,340	59	80,622	68	27,809	49
		Total	70,459		47,639		81,885		119,470		74,823		43,304		31,139		117,858		57,307	
102	**Purse Seine**	**US**	18,672	80	6,482	59	17,857	82	28,417	78	24,030	73	16,211	94	10,347	70	35,807	62	38,384	75
		Canada	4,542	20	4,498	41	3,808	18	7,887	22	8,681	27	1,064	6	4,455	30	21,834	38	12,838	25
		Total	23,214		10,980		21,665		36,304		32,711		17,275		14,802		57,641		51,222	
103	**Purse Seine**	**US**			7,098	68			19,560	74	9,883	72	1,401	98	790	33	20,551	96	14,226	74
		Canada			3,357	32			6,703	26	3,806	28	34	2	1,587	67	936	4	5,124	26
		Total			10,455				26,263		13,689		1,435		2,377		21,487		19,350	
104	**Purse Seine**	**US**	106,786	38	155,967	24	78,954	27	94,005	22	101,121	23	68,647	40	104,042	18	73,026	14	123,420	15
		Canada	176,572	62	487,301	76	215,208	73	337,648	78	343,550	77	102,332	60	487,243	82	443,575	86	673,378	85
		Total	283,358		643,268		294,162		431,653		444,671		170,979		591,285		516,601		796,798	
106	**Gillnet**	**US**	94,320	49	32,583	67	60,597	66	126,914	48	100,268	69	112,893	83	80,868	87	126,603	66	112,983	61
		Canada	62,063	32	10,582	22	24,755	27	111,017	42	42,756	29	21,190	15	9,784	11	59,959	31	68,921	37
		Transboundary	37,418	19	5,580	11	6,787	7	27,056	10	2,685	2	2,344	2	1,877	2	6,172	3	3,901	2
		Total	193,801		48,842		92,139		264,987		145,709		136,427		92,529		192,734		185,805	
108	**Gillnet**	**US**	1,784	25							930	22			265	21	1,180	12	4,576	40
		Canada	4,139	58							73	2			48	4	545	5	1,479	13
		Transboundary	1,213	17							3,184	76			933	75	8,358	83	5,519	48
		Total	7,136								4,185				1,246		10,083		11,574	
Total		**US**	330,562	43	271,411	30	241,599	42	382,152	36	299,284	35	254,296	53	223,907	27	325,809	31	336,949	28
		Canada	399,583	52	619,998	69	329,896	57	642,569	61	556,336	64	220,283	46	622,776	73	721,001	68	861,378	71
		Transboundary	38,631	5	5,580	1	6,787	1	27,056	3	5,869	1	2,344	1	2,810	0	14,530	1	9,420	1
		Total	768,776		896,989		578,282		1,051,777		861,489		476,923		849,493		1,061,340		1,207,747	

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Table 1.–Page 2 of 3.

District	Type	Stock Group	1991	(%)	1992	(%)	1993	(%)	1994	(%)	1995	(%)	1996	(%)	1997	(%)	1998	(%)	1999	(%)
101	**Gillnet**	**US**	13,599	10	49,771	20	42,337	11	14,008	14	13,056	8	29,745	14	32,028	19	15,884	10	15,030	9
		Canada	117,893	90	194,878	80	351,761	89	86,369	86	151,238	92	182,658	86	137,446	81	144,622	90	144,998	91
		Total	131,492		244,649		394,098		100,377		164,294		212,403		169,474		160,506		160,028	
101[a]	**Purse Seine**	**US**	34,193	57	83,065	74	246,662	75	18,991	33	63,279	29	396,178	89	84,519	80	47,485	67	77,174	88
		Canada	26,227	43	28,954	26	83,820	25	39,100	67	154,699	71	47,653	11	21,691	20	22,916	33	10,420	12
		Total	60,420		112,019		330,482		58,091		217,978		443,831		106,210		70,401		87,594	
102	**Purse Seine**	**US**	32,413	75	30,075	90	115,916	94	18,521	65	56,518	77	60,026	90	45,908	84	23,111	79	35,518	91
		Canada	10,841	25	3,377	10	7,991	6	10,158	35	16,907	23	6,767	10	8,503	16	6,303	21	3,591	9
		Total	43,254		33,452		123,907		28,679		73,425		66,793		54,411		29,414		39,109	
103	**Purse Seine**	**US**	13,867	74	3,277	74	37,251	74	11,242	74	7,532	74	24,009	99	24,666	82	14,873	85	7,925	100
		Canada	4,995	26	1,180	26	13,419	26	4,050	26	2,713	26	178	1	5,306	18	2,582	15	31	0
		Total	18,862		4,457		50,670		15,292		10,245		24,187		29,972		17,455		7,956	
104	**Purse Seine**	**US**	166,794	20	198,080	18	205,108	22	212,854	19	68,952	14	209,567	24	210,524	17	65,348	13	63,013	38
		Canada	683,037	80	873,959	82	740,177	78	923,284	81	428,193	86	650,872	76	1,034,156	83	421,882	87	101,844	62
		Total	849,831		1,072,039		945,285		1,136,138		497,145		860,439		1,244,680		487,230		164,857	
106	**Gillnet**	**US**	78,577	55	120,977	60	82,301	40	122,118	58	65,544	32	165,221	53	97,101	58	67,890	60	70,334	67
		Canada	47,695	33	47,207	23	69,616	34	53,683	25	116,075	56	83,271	27	45,665	27	34,811	31	9,692	9
		Transboundary	17,832	12	34,971	17	54,038	26	35,247	17	25,679	12	62,608	20	25,752	15	10,734	9	24,809	24
		Total	144,104		203,155		205,955		211,048		207,298		311,100		168,518		113,435		104,835	
108	**Gillnet**	**US**	3,116	17	8,604	16	17,758	23	31,715	33	10,374	14	15,755	10	5,381	6	2,541	12	5,263	14
		Canada	2,117	12	2,696	5	8,742	11	20,250	21	15,641	20	12,618	8	12,152	13	2,376	11	1,314	4
		Transboundary	12,754	71	41,417	79	50,374	66	45,259	47	50,741	66	125,777	82	75,506	81	17,114	78	30,024	82
		Total	17,987		52,717		76,874		97,224		76,756		154,150		93,039		22,031		36,601	
Total		**US**	342,560	27	493,849	29	747,333	35	429,450	26	285,255	23	900,501	43	500,127	27	237,132	26	274,257	46
		Canada	892,804	71	1,152,251	67	1,275,526	60	1,136,893	69	885,466	71	984,017	48	1,264,919	68	635,492	71	271,890	45
		Transboundary	30,585	2	76,388	4	104,412	5	80,506	5	76,420	6	188,385	9	101,258	5	27,848	3	54,833	9
		Total	1,265,950		1,722,488		2,127,271		1,646,849		1,247,141		2,072,903		1,866,304		900,472		600,980	

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Table 1.–Page 3 of 3.

District	Type	Group	2000	(%)	2001	(%)	2002	(%)	2003	(%)
101	**Gillnet**	**US**	16,727	18	10,915	14	14,462	12	14,723	14
		Canada	77,924	82	69,126	86	105,891	88	90,540	86
		Total	94,651		80,041		120,353		105,263	
101[a]	**Purse**	**US**	71,168	56	96,511	61	16,567	64	57,046	76
		Canada	55,942	44	61,172	39	9,122	36	17,604	24
		Total	127,110		157,683		25,689		74,650	
102[b]	**Purse**	**US**	26,265	78	36,987	68	23,759	80	35,098	92
		Canada	7,305	22	17,045	32	5,908	20	3,259	8
		Total	33,570		54,032		29,667		38,357	
103[c]	**Purse**	**US**	14,240	86	11,393	42	4,670	82	18,929	77
		Canada	2,384	14	15,566	58	1,055	18	5,725	23
		Total	16,624		26,959		5,725		24,654	
104	**Purse**	**US**	78,727	35	82,358	15	10,169	30	111,492	34
		Canada	148,312	65	454,276	85	24,018	70	218,226	66
		Total	227,039		536,634		34,187		329,719	
106	**Gillnet**	**US**	57,923	64	86,078	52	42,573	76	86,626	74
		Canada	21,007	23	54,512	33	5,487	10	12,527	11
		Transboundary[d]	11,146	12	23,423	14	8,075	14	17,751	15
		Total	90,076		164,013		56,135		116,904	
108	**Gillnet**	**US**	3,319	21	473	78	182	88	8,675	21
		Canada	2,025	13	60	10	25	12	4,563	11
		Transboundary	10,489	66	77	13	1	0	28,920	69
		Total	15,833		610		208		42,158	
Total		**US**	268,369	44	324,715	32	112,382	41	332,558	45
		Canada	314,899	52	671,757	66	151,506	56	352,445	48
		Transboundary	21,635	4	23,500	2	8,076	3	46,671	6
		Total	604,903		1,019,972		271,964		731,704	

[a] Includes catches from Yes Bay (West Behm Canal) terminal area fisheries.

[b] District 102 includes fish taken in terminal area fisheries after week 35.

[c] District 103 estimates are average of the preceding years, except the direct estimates of 1996 and 2003.

[d] Includes Stikine, Tahltan, and Tuya River spawning stock groups.

Table 2.–Estimated contribution by stock group of origin of sockeye salmon harvested in commercial net fisheries in Alaska Districts 101–108, 2003.

District	Gear Type	Stock Group	Number	Percent	SE	90% CI Lower	90% CI Upper
101	**Gillnet**	**Alaska**	14,723	14.0	337	14,168	15,278
		Nass	72,884	69.2	592	71,910	73,859
		Skeena	17,655	16.8	504	16,826	18,485
		Total	105,263				
101	**Purse seine**	**Alaska**	57,046	76.4	384	56,414	57,677
		Nass	10,295	13.8	325	9,761	10,829
		Skeena	7,309	9.8	298	6,819	7,800
		Total	74,650				
102	**Purse seine**	**Alaska**	35,098	91.5	304	34,597	35,598
		Nass	1,368	3.6	176	1,079	1,658
		Skeena	1,891	4.9	177	1,599	2,183
		Total	38,357				
103	**Purse Seine**	**Alaska**	18,929	76.8	240	18,534	19,323
		Nass	4,475	18.2	265	4,040	4,911
		Skeena	1,250	5.1	137	1,025	1,475
		Total	24,654				
104	**Purse seine**	**Alaska**	111,492	33.8	2621	107,180	115,805
		Nass	48,358	14.7	3254	43,005	53,710
		Skeena	109,957	33.3	3252	104,608	115,307
		South	59,911	18.2	2886	55,164	64,659
		Total	329,719				
106	**Gillnet**	**Alaska I**	62,226	53.2	600	61,239	63,214
		Alaska II	24,400	20.9	443	23,671	25,129
		Nass	7,335	6.3	381	6,709	7,962
		Skeena	5,192	4.4	482	4,399	5,984
		Tahltan	8,489	7.3	304	7,989	8,988
		Stikine	3,192	2.7	256	2,771	3,614
		Tuya	6,070	5.2	318	5,547	6,593
		Total	116,904				
108	**Gillnet**	**Alaska I**	7,711	18.3	315	7,193	8,228
		Alaska II	964	2.3	115	775	1,154
		Nass	4,144	9.8	275	3,691	4,597
		Skeena	420	1.0	261	-10	849
		Tahltan	6,450	15.3	273	6,001	6,899
		Stikine	19,417	46.1	400	18,759	20,076
		Tuya	3,053	7.2	229	2,676	3,430
		Total	42,158				
Season Total		**Alaska**	332,588	45.5	2820	327,950	337,227
		Nass	148,860	20.3	3371	143,314	154,406
		Skeena	143,674	19.6	3357	138,152	149,196
		South Migrating	59,911	8.2	2886	55,164	64,658
		Tahltan	14,938	2.0	408	14,267	15,610
		Stikine	22,609	3.1	475	21,828	23,391
		Tuya	9,123	1.2	392	8,478	9,768
		Total	731,704				

Table 3.–Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska District 101 (Tree Point) drift gillnet fishery, 2003.

Date	Group	Catch By Age Class 1.2	1.3	2.2	2.3	Other	Total	Percent	SE	90% CI Lower	Upper
Week 25	**Alaska**	67	579	0	120	51	816	11.3	61.8	715	918
(6/15–6/21)	**Nass**	350	3,716	315	406	321	5,109	70.4	99.9	4,945	5,273
	Skeena	40	1,079	126	1	84	1,331	18.3	85.3	1,190	1,471
	Total	456	5,374	442	527	456	7,256				
Week 26	**Alaska**	0	655	0	427	14	1,096	3.2	238.9	703	1,489
(6/22–6/28)	**Nass**	2,982	18,138	1,953	2,186	338	25,597	75.6	487.8	24,795	26,400
	Skeena	0	6,628	358	71	95	7,152	21.1	435.7	6,435	7,868
	Total	2,982	25,421	2,311	2,684	447	33,845				
Week 27	**Alaska**	0	872	52	0	14	938	5.9	115.5	748	1,128
(6/29–7/5)	**Nass**	2,863	8,648	1,658	1,203	220	14,591	91.3	134.8	14,370	14,813
	Skeena	162	0	283	0	7	451	2.8	93.4	298	605
	Total	3,024	9,520	1,993	1,203	241	15,981				
Week 28	**Alaska**	121	1,625	9	165	15	1,935	19.0	103.9	1,764	2,106
(7/6–7/12)	**Nass**	1,964	3,422	813	1,027	57	7,281	71.5	129.2	7,069	7,494
	Skeena	0	593	370	0	8	970	9.5	94.2	815	1,125
	Total	2,085	5,639	1,191	1,191	79	10,186				
Week 29	**Alaska**	182	1,263	74	65	25	1,610	35.9	53.5	1,522	1,698
(7/13–7/19)	**Nass**	869	1,140	174	285	38	2,507	56.0	64.8	2,400	2,613
	Skeena	0	298	56	3	6	363	8.1	38.9	299	427
	Total	1,051	2,701	304	354	69	4,479				
Week 30	**Alaska**	118	1,415	223	127	12	1,894	15.2	110.6	1,712	2,076
(7/20–7/26)	**Nass**	2,452	3,648	572	1,165	50	7,888	63.2	193.2	7,570	8,205
	Skeena	0	2,620	0	59	17	2,696	21.6	158.3	2,436	2,956
	Total	2,570	7,683	795	1,351	79	12,478				
Week 31	**Alaska**	94	1,625	14	142	0	1,875	32.7	75.9	1,750	2,000
(7/27–8/2)	**Nass**	1,050	1,155	424	295	0	2,924	50.9	93.7	2,770	3,078
	Skeena	135	646	74	87	0	942	16.4	59.6	844	1,040
	Total	1,279	3,427	511	524	0	5,741				
Week 32	**Alaska**	24	1,224	151	159	17	1,575	28.0	61.8	1,473	1,676
(8/3–8/9)	**Nass**	944	955	213	485	29	2,626	46.6	91.6	2,475	2,776
	Skeena	113	1,259	42	0	16	1,429	25.4	69.2	1,315	1,543
	Total	1,080	3,438	405	644	62	5,629				
Week 33	**Alaska**	127	804	150	10	5	1,095	26.9	45.5	1,020	1,170
(8/10–8/16)	**Nass**	727	568	311	485	9	2,100	51.5	69.0	1,987	2,214
	Skeena	112	687	52	26	4	881	21.6	49.3	800	962
	Total	966	2,059	513	521	17	4,076				
Week 34	**Alaska**	37	617	155	11	2	0	822	29.9	34.6	765
(8/17–8/23)	**Nass**	568	305	93	264	3	1,232	44.8	53.2	1,145	1,320
	Skeena	0	685	8	0	2	694	25.3	37.6	632	756
	Total	605	1,607	257	275	6	2,749				
Week 35	**Alaska**	17	498	99	3	0	617	35.1	25.0	576	658
(8/24–8/30)	**Nass**	315	82	92	177	0	666	37.9	35.0	608	723
	Skeena	50	379	23	22	0	474	27.0	22.5	437	511
	Total	383	959	213	201	0	1,757				
Week 36–39[a]	**Alaska**	0	297	94	55	3	450	41.4	16.9	422	478
(8/31–9/27)	**Nass**	92	104	102	64	2	363	33.4	22.8	326	401
	Skeena	18	225	24	4	2	273	25.1	16.7	246	301
	Total	110	625	220	124	7	1,086				
Season Total	**Alaska**	787	11,474	1,020	1,284	158	14,723	14.0	337	14,168	15,278
	Nass	15,174	41,881	6,720	8,042	1,068	72,884	69.2	592	71,910	73,859
	Skeena	629	15,098	1,416	274	238	17,655	16.8	504	16,826	18,485
	Total	16,590	68,453	9,156	9,600	1,464	105,263				

[a] Only 158 samples collected during week 36. The 428 sockeye caught in weeks 37–39 added to the week 36 catch.

Table 4.–Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska District 101 purse seine fishery, 2003.

		Catch By Age Class								90% CI	
Date	Group	1.2	1.3	2.2	2.3	Other	Total	Percent	SE	Lower	Upper
Week 27[a]	**Alaska**	25	96	12	19	7	160	51.6	4.8	152	167
(6/29–7/05)	**Nass**	49	62	27	3	7	147	47.7	4.9	139	155
	Skeena	1	0	1	0	0	2	0.7	1.7	-1	5
	Total	75	158	40	22	14	309				
Week 28	**Alaska**	243	938	117	188	72	1,559	51.6	46.7	1,482	1,636
(7/06–7/12)	**Nass**	475	602	265	30	67	1,439	47.7	47.7	1,360	1,517
	Skeena	13	0	7	0	1	21	0.7	16.7	-6	49
	Total	731	1,541	389	218	140	3,019				
Week 29	**Alaska**	1,493	3,377	352	461	157	5,840	75.0	85.5	5,699	5,980
(7/13–7/19)	**Nass**	338	428	0	1	21	789	10.1	84.3	650	927
	Skeena	99	791	236	0	31	1,158	14.9	78.4	1,029	1,287
	Total	1,931	4,596	588	462	210	7,786				
Week 30	**Alaska**	1,931	5,927	296	352	285	8,791	62.6	185.8	8,485	9,096
(7/20–7/26)	**Nass**	1,700	880	192	104	96	2,972	21.2	184.6	2,668	3,275
	Skeena	835	879	485	0	74	2,273	16.2	147.1	2,031	2,515
	Total	4,466	7,686	972	456	456	14,035				
Week 31	**Alaska**	1,206	8,378	295	684	640	11,203	93.6	211.2	10,856	11,551
(7/27–8/02)	**Nass**	333	0	0	0	20	353	2.9	108.7	174	532
	Skeena	0	0	389	0	24	413	3.4	191.8	97	728
	Total	1,539	8,378	684	684	684	11,969				
Week 32	**Alaska**	1,255	14,355	378	1,934	0	17,922	97.8	93.6	17,768	18,076
(8/03–8/09)	**Nass**	65	0	0	0	0	65	0.4	38.5	1	128
	Skeena	286	0	0	50	0	335	1.8	79.5	204	466
	Total	1,606	14,355	378	1,983	0	18,322				
Week 33	**Alaska**	731	5,428	283	374	703	7,519	62.7	195.6	7,197	7,840
(8/10–8/16)	**Nass**	1,622	181	494	237	261	2,796	23.3	182.0	2,496	3,095
	Skeena	450	642	428	6	157	1,683	14.0	113.6	1,496	1,870
	Total	2,803	6,251	1,205	617	1,121	11,997				
Week 34	**Alaska**	170	2,563	390	256	356	3,735	56.2	107.5	3,558	3,912
(8/17–8/23)	**Nass**	1,116	0	169	162	152	1,599	24.1	124.4	1,395	1,804
	Skeena	170	1,003	11	4	125	1,313	19.8	70.3	1,197	1,428
	Total	1,456	3,566	570	422	633	6,647				
Week 35[b]	**Alaska**	13	203	31	20	28	296	56.2	8.5	282	310
(8/24–8/30)	**Nass**	88	0	13	13	12	127	24.1	9.9	111	143
	Skeena	14	80	1	0	10	104	19.8	5.6	95	113
	Total	115	283	45	33	50	527				
Week 36[b]	**Alaska**	1	15	2	2	2	22	56.2	0.6	21	23
(8/31–9/06)	**Nass**	7	0	1	1	1	9	24.1	0.7	8	11
	Skeena	1	6	0	0	1	8	19.8	0.4	7	8
	Total	9	21	3	2	4	39				
Season Total	**Alaska**	7,068	41,282	2,155	4,289	2,251	57,046	76.4	384	56,414	57,677
	Nass	5,792	2,152	1,161	551	638	10,295	13.8	325	9,761	10,829
	Skeena	1,870	3,400	1,557	60	423	7,309	9.8	298	6,819	7,800
	Total	14,730	46,834	4,874	4,899	3,312	74,650				

[a] Age and stock composition for week 27 estimated using 194 samples collected during week 28.

[b] Age and stock composition for week 35 and 36 estimated using 315 samples collected during week 34.

Table 5.–Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska District 102 purse seine fishery, 2003.

Date	Group	Catch By Age Class 1.2	1.3	2.2	2.3	Other	Total	Percent	SE	90% CI Lower	Upper
Week 26	**Alaska**	61	262	0	8	10	341	93.1	8.7	327	355
(6/22–6/28[a])	**Nass**	0	0	11	3	0	14	3.8	4.6	7	22
	Skeena	0	0	11	0	0	11	3.0	4.3	4	18
	Total	61	262	22	11	11	366				
Week 27	**Alaska**	251	1,079	0	32	41	1,403	93.1	35.6	1,345	1,462
(6/29–7/05[a])	**Nass**	0	0	44	12	2	58	3.8	18.8	27	89
	Skeena	0	0	44	0	1	46	3.0	17.8	16	75
	Total	251	1,079	89	44	44	1,507				
Week 28	**Alaska**	702	3,012	0	91	115	3,920	93.1	99.5	3,756	4,084
(7/06–7/12[a])	**Nass**	0	0	124	33	5	162	3.8	52.5	75	248
	Skeena	0	0	124	0	4	127	3.0	49.7	46	209
	Total	702	3,012	248	124	124	4,209				
Week 29	**Alaska**	148	635	0	19	24	826	93.1	21.0	792	861
(7/13–7/19)	**Nass**	0	0	26	7	1	34	3.8	11.1	16	52
	Skeena	0	0	26	0	1	27	3.0	10.5	10	44
	Total	148	635	52	26	26	887				
Week 30	**Alaska**	168	721	0	22	28	939	93.1	23.8	900	978
(7/20–7/26[a])	**Nass**	0	0	30	8	1	39	3.8	12.6	18	59
	Skeena	0	0	30	0	1	31	3.0	11.9	11	50
	Total	168	721	59	30	30	1,008				
Week 31	**Alaska**	1,612	6,924	0	209	265	9,009	93.1	228.6	8,633	9,386
(7/27–8/02[a])	**Nass**	0	0	285	76	11	372	3.8	120.6	173	570
	Skeena	0	0	284	0	9	293	3.0	114.1	105	481
	Total	1,612	6,924	569	285	285	9,674				
Week 32	**Alaska**	1,824	5,288	411	503	486	8,513	88.7	142.5	8,279	8,748
(8/03–8/09[b])	**Nass**	172	0	0	183	22	377	3.9	100.5	212	542
	Skeena	472	198	0	0	41	711	7.4	105.0	538	884
	Total	2,469	5,486	411	686	549	9,601				
Week 33	**Alaska**	876	2,541	198	242	234	4,090	88.7	68.5	3,978	4,203
(8/10–8/16)	**Nass**	83	0	0	88	10	181	3.9	48.3	102	261
	Skeena	227	95	0	0	20	342	7.4	50.4	259	425
	Total	1,186	2,636	198	330	264	4,613				
Week 34	**Alaska**	281	2,800	106	275	49	3,511	93.6	31.9	3,459	3,564
(8/17–8/23)	**Nass**	56	0	0	13	1	69	1.8	16.1	43	96
	Skeena	126	0	0	43	2	171	4.5	23.8	131	210
	Total	462	2,800	106	330	53	3,751				
Week 35–39	**Alaska**	423	1,848	95	178	0	2,545	92.8	45.4	2,470	2,619
(8/24–9/27[c])	**Nass**	0	0	8	54	0	63	2.3	18.6	32	93
	Skeena	5	8	68	53	0	133	4.9	34.7	76	190
	Total	428	1,856	171	286	0	2,741				
Season Total	**Alaska**	6,347	25,109	810	1,578	1,253	35,098	91.5	304	34,597	35,598
	Nass	311	0	528	476	53	1,368	3.6	176	1,079	1,658
	Skeena	830	301	586	95	78	1,891	4.9	177	1,599	2,183
	Total	7,487	25,411	1,924	2,150	1,384	38,357				

[a] Age and stock composition for weeks 26–28 and 30–31 estimated using 102 samples collected during week 29.

[b] Age and stock composition for week 32 estimated using 70 samples collected during week 33.

[c] Only 96 samples collected during week 35. The 216 sockeye caught in weeks 36–39 added to week 35 catch.

Table 6.–Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska District 103 purse seine fishery, 2003.

Date	Group	Catch By Age Class 1.2	1.3	2.2	2.3	Other	Total	Percent	SE	90% CI Lower	Upper
Week 30	**Alaska**	185	410	94	11	0	700	91.5	10.6	683	717
(7/20–7/26[a])	**Nass**	48	0	0	0	0	48	6.3	9.9	32	64
	Skeena	0	0	17	0	0	17	2.2	6.1	7	27
	Total	233	410	111	11	0	765				
Week 31	**Alaska**	864	1,917	438	52	0	3,271	91.5	49.4	3,190	3,353
(7/27–8/02)	**Nass**	224	0	0	0	0	224	6.3	46.4	148	300
	Skeena	0	0	80	0	0	80	2.2	28.5	33	127
	Total	1,088	1,917	518	52	0	3,575				
Week 32	**Alaska**	2,511	3,030	396	103	0	6,041	80.0	146.0	5,801	6,281
(8/03–8/09)	**Nass**	663	4	0	226	0	893	11.8	163.4	624	1,161
	Skeena	0	360	261	0	0	620	8.2	109.4	440	800
	Total	3,175	3,394	657	328	0	7,554				
Week 33	**Alaska**	2,221	2,136	679	79	86	5,200	68.2	165.9	4,927	5,473
(8/10–8/16)	**Nass**	1,874	0	0	173	34	2,081	27.3	183.8	1,779	2,384
	Skeena	0	69	266	0	6	341	4.5	73.2	220	461
	Total	4,094	2,205	945	252	126	7,622				
Week 34	**Alaska**	855	1,537	385	68	77	2,922	72.3	75.5	2,797	3,046
(8/17–8/23)	**Nass**	898	43	0	0	26	967	23.9	82.8	830	1,103
	Skeena	0	129	0	18	4	151	3.7	22.4	114	188
	Total	1,752	1,710	385	85	107	4,039				
Week 35	**Alaska**	233	418	105	18	21	795	72.3	20.5	761	829
(8/24–8/30[b])	**Nass**	244	12	0	0	7	263	23.9	22.5	226	300
	Skeena	0	35	0	5	1	41	3.7	6.1	31	51
	Total	477	465	105	23	29	1,099				
Season Total	**Alaska**	6,868	9,449	2,097	331	184	18,929	76.8	240	18,534	19,323
	Nass	3,951	59	0	399	67	4,475	18.2	265	4,040	4,911
	Skeena	0	593	623	22	11	1,250	5.1	137	1,025	1,475
	Total	10,819	10,101	2,720	752	262	24,654				

[a] Age and stock composition for week 30 estimated using 69 samples collected during week 31.

[b] Age and stock composition for week 35 estimated using 189 samples collected during week 34.

Table 7.–Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska District 104 purse seine fishery, 2003.

		Catch By Age Class							SE	90% CI	
Date	**Group**	**1.2**	**1.3**	**2.2**	**2.3**	**Other**	**Total**	**Percent**	**Error**	**Lower**	**Upper**
Week 28	**Alaska**	65	263	25	16	9	379	37.0	18.4	349	409
(7/06–7/12[a])	**Nass**	61	103	12	21	5	201	19.7	23.2	163	240
	Skeena	35	320	13	24	9	401	39.2	22.7	363	438
	South	30	11	0	0	1	42	4.1	11.0	24	60
	Total	191	697	50	62	24	1,023				
Week 29	**Alaska**	1,692	6,815	658	421	231	9,818	37.0	477.6	9,033	10,604
(7/13–7/19)	**Nass**	1,584	2,663	298	552	123	5,220	19.7	602.5	4,229	6,211
	Skeena	900	8,284	331	623	245	10,382	39.2	587.4	9,416	11,349
	South	766	298	11	0	15	1,091	4.1	285.8	621	1,561
	Total	4,942	18,059	1,299	1,596	615	26,511				
Week 30	**Alaska**	2,636	16,754	1,265	414	277	21,346	37.3	1,087.2	19,558	23,135
(7/20–7/26)	**Nass**	707	3,197	400	731	66	5,101	8.9	1,270.4	3,012	7,191
	Skeena	2,346	19,280	577	689	301	23,192	40.5	1,324.0	21,014	25,370
	South	5,316	2,066	79	2	106	7,569	13.2	870.1	6,138	9,000
	Total	11,005	41,297	2,321	1,836	749	57,208				
Week 31	**Alaska**	2,573	22,011	2,525	2,820	551	30,480	33.8	1,642.0	27,779	33,181
(7/27–/02)	**Nass**	3,916	4,200	3,038	2,991	260	14,406	16.0	2,023.7	11,076	17,735
	Skeena	765	25,329	1,910	374	522	28,901	32.0	2,083.7	25,473	32,328
	South	11,558	4,492	173	3	230	16,457	18.2	1,827.0	13,451	19,462
	Total	18,812	56,032	7,646	6,188	1,564	90,243				
Week 32	**Alaska**	3,809	18,590	948	1,841	164	25,352	33.9	1,338.1	23,151	27,553
(8/03–8/09)	**Nass**	4,438	4,423	2,637	2,283	90	13,871	18.5	1,734.0	11,018	16,723
	Skeena	882	21,998	901	671	159	24,611	32.9	1,693.9	21,825	27,398
	South	7,731	3,004	116	2	154	11,007	14.7	1,311.7	8,849	13,164
	Total	16,860	48,015	4,601	4,797	568	74,840				
Week 33	**Alaska**	1,242	8,148	687	833	298	11,209	46.7	429.9	10,502	11,916
(8/10–8/16)	**Nass**	39	0	309	1,460	49	1,858	7.7	331.4	1,313	2,403
	Skeena	844	6,819	302	118	221	8,305	34.6	452.4	7,560	9,049
	South	1,834	713	27	1	37	2,611	10.9	334.0	2,061	3,160
	Total	3,958	15,680	1,326	2,413	605	23,982				
Week 34	**Alaska**	1,248	7,383	1,528	176	92	10,427	22.8	866.2	9,002	11,852
(8/17–8/23)	**Nass**	1,981	2,588	621	618	52	5,861	12.8	1,154.0	3,963	7,760
	Skeena	0	9,872	533	457	97	10,959	23.9	999.7	9,314	12,603
	South	13,039	5,067	195	4	260	18,564	40.5	1,496.5	16,102	21,026
	Total	16,268	24,910	2,876	1,255	501	45,811				
Week 35	**Alaska**	43	1,843	429	140	27	2,482	24.6	199.6	2,153	2,810
(8/24–8/30)	**Nass**	1,109	662	7	42	20	1,840	18.2	256.7	1,418	2,262
	Skeena	328	2,625	134	86	34	3,208	31.8	246.6	2,802	3,613
	South	1,807	702	27	1	36	2,572	25.5	285.1	2,103	3,041
	Total	3,286	5,832	597	269	117	10,101				
Season Total	**Alaska**	13,308	81,808	8,065	6,662	1,649	111,49	33.8	2,621	107,180	115,805
	Nass	13,835	17,836	7,323	8,699	665	48,358	14.7	3,254	43,005	53,710
	Skeena	6,100	94,527	4,700	3,042	1,589	109,95	33.3	3,252	104,608	115,307
	South	42,079	16,353	629	12	839	59,911	18.2	2,886	55,164	64,659
	Total	75,322	210,52	20,717	18,415	4,742	329,71				

[a] Age and stock composition from week 28 estimated from 509 samples collected during week 29.

Table 8.–Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska District 106 drift gillnet fishery, 2003.

Date	Group	Catch By Age Class 1.2	1.3	2.2	2.3	Other	Total	Percent	SE	90% CI Lower	Upper
Week 25	**Alaska I**	56	495	41	51	13	655	57.1	13.9	632	678
(6/15–6/21)	**Alaska II**	0	0	0	0	0	0	0.0	0.0	0	0
	Nass	1	7	0	5	0	13	1.1	2.6	9	17
	Skeena	4	225	0	0	5	234	20.4	15.9	208	260
	Tahltan	2	147	0	0	3	152	13.3	13.7	130	175
	Stikine	0	0	0	6	0	6	0.5	2.6	2	10
	Tuya	12	0	41	32	2	87	7.6	11.0	69	106
	Total	75	874	83	94	23	1,148				
Week 26	**Alaska I**	87	1,730	319	358	76	2,569	34.4	95.2	2,413	2,726
(6/22–6/28)	**Alaska II**	0	0	0	0	0	0	0.0	0.0	0	0
	Nass	292	50	40	40	13	435	5.8	62.0	333	537
	Skeena	0	1,136	0	35	41	1,212	16.2	142.3	978	1,446
	Tahltan	176	1,908	0	65	75	2,224	29.7	107.0	2,048	2,400
	Stikine	13	178	0	0	7	198	2.7	56.5	105	291
	Tuya	134	5	593	78	28	839	11.2	116.2	648	1,030
	Total	703	5,007	952	575	239	7,477				
Week 27	**Alaska I**	302	2,624	157	252	180	3,514	41.0	135.7	3,291	3,738
(6/29–7/05)	**Alaska II**	0	15	0	0	1	15	0.2	43.4	-56	87
	Nass	226	71	41	80	22	441	5.1	107.1	265	617
	Skeena	107	517	0	42	35	701	8.2	214.8	348	1,054
	Tahltan	0	1,589	150	72	95	1,906	22.2	114.2	1,718	2,094
	Stikine	0	18	0	0	1	19	0.2	64.6	-88	125
	Tuya	321	750	719	94	98	1,983	23.1	156.0	1,726	2,239
	Total	956	5,584	1,067	540	432	8,579				
Week 28	**Alaska I**	708	5,020	678	649	28	7,084	54.4	159.2	6,822	7,346
(7/06–7/12)	**Alaska II**	0	959	0	0	3	962	7.4	87.1	819	1,105
	Nass	292	1,056	72	0	8	1,428	11.0	134.6	1,206	1,649
	Skeena	0	289	0	0	2	291	2.2	226.9	-83	664
	Tahltan	54	1,618	87	154	12	1,925	14.8	124.7	1,720	2,130
	Stikine	7	0	0	0	0	7	0.1	28.1	-40	53
	Tuya	94	583	546	93	8	1,324	10.2	156.1	1,067	1,580
	Total	1,155	9,524	1,383	896	60	13,019				
Week 29	**Alaska I**	957	8,150	1,014	1,153	221	11,494	64.9	230.2	11,115	11,873
(7/13–7/19)	**Alaska II**	0	1,660	0	0	34	1,695	9.6	122.0	1,494	1,895
	Nass	303	704	111	0	27	1,146	6.5	161.9	880	1,413
	Skeena	0	65	0	0	2	67	0.4	240.4	-329	462
	Tahltan	245	722	0	69	27	1,064	6.0	126.6	856	1,272
	Stikine	64	873	0	0	24	961	5.4	150.2	714	1,208
	Tuya	125	735	346	49	32	1,287	7.3	169.4	1,008	1,565
	Total	1,694	12,910	1,471	1,271	367	17,714				
Week 30	**Alaska I**	468	7,922	724	625	97	9,836	55.6	288.3	9,362	10,310
(7/20–7/26)	**Alaska II**	0	5,305	0	0	29	5,334	30.2	262.1	4,903	5,765
	Nass	377	0	83	87	2	549	3.1	146.4	308	790
	Skeena	0	0	0	0	0	0	0.0	0.4	0	1
	Tahltan	0	36	58	30	1	125	0.7	85.1	-15	265
	Stikine	105	1,375	0	13	10	1,503	8.5	171.1	1,222	1,785
	Tuya	110	149	72	0	4	334	1.9	85.0	195	474
	Total	1,059	14,788	936	755	144	17,682				
Week 31	**Alaska I**	374	11,935	308	670	94	13,381	54.7	354.4	12,798	13,964
(7/27–8/02)	**Alaska II**	0	7,743	0	0	60	7,802	31.9	268.0	7,361	8,243
	Nass	226	592	89	135	8	1,050	4.3	211.5	702	1,398
	Skeena	9	813	0	1	5	829	3.4	205.9	490	1,167
	Tahltan	0	1,082	0	0	10	1,092	4.5	169.6	813	1,371
	Stikine	70	0	0	32	1	103	0.4	41.0	35	170
	Tuya	214	0	0	0	2	216	0.9	52.6	130	302
	Total	893	22,165	397	838	180	24,473				

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Table 8.–Page 2 of 2.

		Catch By Age Class								90% CI	
Date	**Group**	**1.2**	**1.3**	**2.2**	**2.3**	**Other**	**Total**	**Percent**	**SE**	**Lower**	**Upper**
Week 32	**Alaska I**	506	6,140	353	966	45	8,010	50.1	189.9	7,698	8,323
(8/03–8/09)	**Alaska II**	0	5,101	0	0	29	5,130	32.1	157.7	4,870	5,389
	Nass	606	589	70	255	12	1,532	9.6	127.8	1,322	1,742
	Skeena	0	1,136	0	2	10	1,147	7.2	105.8	973	1,321
	Tahltan	0	0	0	0	0	0	0.0	0.0	0	0
	Stikine	90	0	0	65	1	156	1.0	37.6	94	217
	Tuya	0	0	0	0	0	0	0.0	0.0	0	0
	Total	1,202	12,965	423	1,288	97	15,975				
Week 33	**Alaska I**	183	2,867	148	353	15	3,565	49.6	93.8	3,411	3,719
(8/10–8/16)	**Alaska II**	0	2,567	0	0	14	2,581	35.9	76.9	2,454	2,707
	Nass	189	0	19	96	2	306	4.3	39.4	242	371
	Skeena	0	508	0	0	1	509	7.1	50.5	426	592
	Tahltan	0	0	0	0	0	0	0.0	0.0	0	0
	Stikine	0	218	0	1	0	220	3.1	50.1	137	302
	Tuya	0	0	0	0	0	0	0.0	0.0	0	0
	Total	372	6,160	168	450	32	7,181				
Week 34	**Alaska I**	87	1,281	38	58	8	1,472	67.1	24.2	1,432	1,512
(8/17–8/23)	**Alaska II**	0	500	0	0	3	503	22.9	22.6	466	540
	Nass	138	0	5	64	1	209	9.5	25.6	167	251
	Skeena	0	7	0	0	0	7	0.3	9.8	-9	23
	Tahltan	0	0	0	0	0	0	0.0	0.0	0	0
	Stikine	0	0	0	4	0	4	0.2	2.4	0	8
	Tuya	0	0	0	0	0	0	0.0	0.0	0	0
	Total	226	1,788	43	126	12	2,195				
Week 35	**Alaska I**	30	320	21	47	0	418	44.0	12.4	398	438
(8/24–8/30	**Alaska II**	0	265	0	0	0	265	27.9	17.3	236	293
	Nass	49	45	4	52	0	150	15.8	23.4	111	188
	Skeena	0	114	0	0	0	114	12.0	10.4	97	131
	Tahltan	0	0	0	0	0	0	0.0	0.0	0	0
	Stikine	0	0	0	4	0	4	0.4	2.1	0	7
	Tuya	0	0	0	0	0	0	0.0	0.0	0	0
	Total	79	744	25	102	0	950				
Week 36–40	**Alaska I**	13	148	17	42	9	228	44.6	8.8	213	242
(8/31–9/04)	**Alaska II**	0	109	0	0	4	114	22.3	13.8	91	136
	Nass	20	4	1	48	3	76	14.8	3.6	70	81
	Skeena	0	78	0	0	3	81	15.9	1.5	79	84
	Tahltan	0	0	0	0	0	0	0.0	0.0	0	0
	Stikine	0	8	0	4	0	12	2.4	0.0	12	12
	Tuya	0	0	0	0	0	0	0.0	0.0	0	0
	Total	32	347	18	94	20	511				
Season Total	**Alaska I**	3,771	48,631	3,817	5,222	785	62,226	53.2	600.3	61,239	63,214
	Alaska II	0	24,223	0	0	177	24,400	20.9	443.4	23,671	25,129
	Nass	2,719	3,119	535	863	99	7,335	6.3	380.9	6,709	7,962
	Skeena	120	4,888	0	81	103	5,192	4.4	481.9	4,399	5,984
	Tahltan	477	7,103	294	391	223	8,489	7.3	303.7	7,989	8,988
	Stikine	349	2,670	0	128	45	3,192	2.7	256.2	2,771	3,614
	Tuya	1,011	2,223	2,318	345	173	6,070	5.2	317.8	5,547	6,593
	Total	8,447	92,857	6,964	7,030	1,606	116,904				

Table 9.–Estimated contribution of sockeye salmon stocks originating in Alaska and Canada to Alaska District 108 drift gillnet fishery, 2003.

		Catch By Age Class									90% CI	
Date	Group	1.2	1.3	2.2	2.3	0	Other	Total	Percent	SE	Lower	Upper
Week 28	**Alaska I**	254	769	562	14	22	0	1,621	14.4	151.3	1,372	1,870
(7/06–7/12)	**Alaska II**	0	0	0	0	0	0	0	0.0	0.0	0	0
	Nass	0	1,329	0	52	19	0	1,400	12.5	136.8	1,175	1,625
	Skeena	0	250	0	25	4	0	278	2.5	245.9	-126	683
	Tahltan	730	2,218	23	127	42	0	3,140	28.0	181.7	2,841	3,439
	Stikine	504	1,712	0	43	31	684	2,973	26.5	181.9	2,674	3,272
	Tuva	242	1,024	521	0	24	0	1,811	16.1	185.7	1,506	2,117
	Total	1,730	7,302	1,106	261	141	684	11,224				
Week 29	**Alaska I**	166	2,012	138	260	7	0	2,582	24.4	167.9	2,306	2,859
(7/13–7/19)	**Alaska II**	0	0	0	0	0	0	0	0.0	0.0	0	0
	Nass	113	876	0	24	3	0	1,016	9.6	141.0	784	1,247
	Skeena	10	0	0	0	0	0	10	0.1	52.1	-76	96
	Tahltan	159	1,425	6	65	4	0	1,660	15.7	133.7	1,440	1,880
	Stikine	588	3,072	0	21	9	962	4,652	44.0	195.5	4,331	4,974
	Tuva	123	409	128	0	2	0	661	6.2	95.6	504	818
	Total	1,159	7,794	271	370	25	962	10,581				
Week 30	**Alaska I**	161	1,411	346	155	15	0	2,088	14.4	207.8	1,746	2,430
(7/20–7/26)	**Alaska II**	0	300	0	0	2	0	302	2.1	107.1	126	478
	Nass	147	801	0	137	8	0	1,093	7.5	185.0	789	1,397
	Skeena	0	0	0	61	0	0	61	0.4	67.7	-50	173
	Tahltan	138	1,376	14	49	11	0	1,588	10.9	151.4	1,339	1,837
	Stikine	980	6,819	0	0	55	1,207	9,061	62.3	284.3	8,594	9,529
	Tuva	28	0	321	0	2	0	352	2.4	88.0	207	496
	Total	1,455	10,708	681	402	93	1,207	14,545				
Week 31	**Alaska I**	40	563	114	70	0	0	787	19.4	61.8	685	889
(7/27–8/02)	**Alaska II**	0	407	0	0	0	0	407	10.1	38.5	344	470
	Nass	37	402	0	62	0	0	501	12.4	52.9	414	588
	Skeena	0	0	0	28	0	0	28	0.7	18.7	-3	58
	Tahltan	35	0	5	22	0	0	61	1.5	25.1	20	103
	Stikine	245	1,510	0	0	0	280	2,036	50.3	84.0	1,897	2,174
	Tuva	7	116	106	0	0	0	229	5.7	35.0	171	287
	Total	364	2,998	224	182	0	280	4,048				
Week 32	**Alaska I**	0	286	85	48	2	0	422	34.2	24.0	382	461
(8/03–8/09)	**Alaska II**	0	122	0	0	1	0	123	10.0	11.2	104	141
	Nass	9	52	8	39	1	0	109	8.8	14.6	85	133
	Skeena	2	0	0	0	0	0	2	0.2	0.7	1	3
	Tahltan	0	0	0	0	0	0	0	0.0	0.0	0	0
	Stikine	51	429	0	0	3	93	576	46.8	27.1	531	621
	Tuva	0	0	0	0	0	0	0	0.0	0.0	0	0
	Total	62	889	93	87	6	93	1,231				
Week 33–38	**Alaska I**	0	94	101	17	0	0	211	39.9	21.7	176	247
(8/10–9/20)[a]	**Alaska II**	0	133	0	0	0	0	133	25.1	14.0	110	156
	Nass	3	0	9	13	0	0	26	4.8	8.2	12	39
	Skeena	1	40	0	0	0	0	40	7.6	5.3	32	49
	Tahltan	0	0	0	0	0	0	0	0.0	0.0	0	0
	Stikine	16	83	0	0	0	20	119	22.5	17.1	91	147
	Tuva	0	0	0	0	0	0	0	0.0	0.0	0	0
	Total	20	349	110	30	0	20	529				
Season Total	**Alaska I**	621	5,134	1,346	564	45	0	7,711	18.3	315	7,193	8,228
	Alaska II	0	961	0	0	3	0	964	2.3	115	775	1,154
	Nass	308	3,461	17	328	30	0	4,144	9.8	275	3,691	4,597
	Skeena	13	289	0	113	4	0	420	1.0	261	-10	849
	Tahltan	1,062	5,020	47	264	57	0	6,450	15.3	273	6,001	6,899
	Stikine	2,386	13,625	0	63	97	3,246	19,417	46.1	400	18,759	20,076
	Tuva	400	1,549	1,076	0	28	0	3,053	7.2	229	2,676	3,430
	Total	4,790	30,039	2,486	1,333	265	3,246	42,158				

[a] Only 53 samples collected during week 33. The 245 sockeye caught in weeks 34–38 added to the week 33 catch.

APPENDICES

Appendix A.–Scale measurement and count characters calculated from intercirculus distances and evaluated for use in linear discriminant function analysis.

Variable Code	Growth Zone	Scale Character
Z1	1st Freshwater Annular	Number of circuli (NC1FW)
Z2		Width of zone (S1FW)
Z3		Distance from scale focus (C0) to circulus 2 (C2)
Z4		Distance from scale focus to circulus 4 (C0 - C4)
Z5		Distance from scale focus to circulus 6 (C0 - C6)
Z6		Distance from scale focus to circulus 8 (C0 - C8)
Z12		Distance from fourth-to-last circulus to end of zone, C(NC1FW-4) - EOZ
Z13		Distance from second-to-last circulus to end of zone, C(NC1FW-2) - EOZ
Z28		Number of circuli in first 3/4 of zone
Z30		Relative width, (variable 29)/S1FW
Z31	2nd Freshwater Annular	Number of circuli (NC2FW)
Z32		Width of zone (S2FW)
Z33		Distance from end of first annular zone (E1FW) to circulus 2 (C2)
Z34		Distance from end of first annular zone to circulus 4 (E1FW - C4)
Z35		Distance from end of first annular zone to circulus 6 (E1FW - C6)
Z36		Distance from end of first annular zone to circulus 8 (E1FW - C8)
Z42		Distance from fourth-to-last circulus to end of zone, C(NC2FW-4) - EOZ
Z43		Distance from second-to-last circulus to end of zone, C(NC2FW-2) - EOZ
Z57		Average interval between circuli (S2FW/NC2FW)
Z58		Number of circuli in first 3/4 of zone
Z61	Freshwater Plus Growth	Number of circuli (NCPGZ)
Z62		Width of zone (SPGZ)
Z63	All Freshwater	Total number of annular circuli (NC1FW + NC2FW)
Z64		Total width of annular zones (S1FW + S2FW)
Z65		Total number of freshwater circuli (NC1FW + NC2FW + NCPGZ)
Z66		Total width of freshwater zones (S1FW + S2FW + SPGZ)
Z70	1st Marine Annular	Number of circuli (NC1OZ)
Z71		Width of zone (S1OZ)
Z72		Distance from end of freshwater growth (EFW) to circulus 3 (C3)
Z73		Distance from end of freshwater growth to circulus 6 (EFW - C6)
Z74		Distance from end of freshwater growth to circulus 9 (EFW - C9)
Z75		Distance from end of freshwater growth to circulus 12 (EFW - C12)
Z76		Distance from end of freshwater growth to circulus 15 (EFW - C15)
Z85		Distance from sixth-to-last circulus to end of zone, C(NC1OZ-6) - EOZ
Z86		Distance from third-to-last circulus to end of zone, C(NC1OZ-3) - EOZ
Z87		Distance from circulus 3 to end of zone (C3 - EOZ)
Z88		Distance from circulus 9 to end of zone (C9 - EOZ)
Z89		Distance from circulus 15 to end of zone (C15 - EOZ)
Z105		Average interval between circuli (S1OZ/NC1OZ)
Z106		Number of circuli in first 1/2 of zone

Appendix B.–Scale variables with associated entry F-statistics, and classification matrices for age-specific linear discriminant models used to classify sockeye salmon commercial catches in the District 101 gillnet fishery, and Districts 101–103 purse seine fisheries, 2003.

Age-Specific Model Constructed		Stepwise Variable Selection		Misclassification Matrix				
				True Stock	Classified As (number and percent)			
Age Class	Run	Variable	F-Statistic		Alaska	Nass	Skeena	Total
12	Season Total	z4	238.73	Alaska	150	35	13	
		z71	83.91		75.76%	17.68%	6.57%	198
		z86	24.64	Nass	23	119	41	
		z13	16.67		12.57%	65.03%	22.4%	183
				Skeena	3	40	157	
					1.5%	20%	78.5%	200
				Total	176	194	211	581
13	Season Total	z4	308.3	Alaska	153	29	17	
		z71	77.46		76.88%	14.57%	8.54%	199
		z76	25.12	Nass	13	141	51	
		z1	26.39		6.34%	68.78%	24.88%	205
		z70	10.8	Skeena	11	58	136	
					5.37%	28.29%	66.34%	205
				Total	177	228	204	609
22	Season Total	z5	172.82	Alaska	96	16	21	
		z34	16.1		72.18%	12.03%	15.79%	133
		z71	11.13	Nass	15	138	44	
		z3	7.94		7.61%	70.05%	22.34%	197
		z2	6.88	Skeena	5	7	15	
					18.52%	25.93%	55.56%	27
				Total	116	161	80	357
23	Season Total	z4	119.5	Alaska	92	11	13	
		z35	54.76		79.31%	9.48%	11.21%	116
		z76	40.12	Nass	23	89	38	
		z65	10.43		15.33%	59.33%	25.33%	150
		z72	3.91	Skeena	4	8	36	
					8.33%	16.67%	75%	48
				Total	119	108	87	314

Appendix C.–Scale variables with associated entry F-statistics, and classification matrices for age-specific linear discriminant models used to classify sockeye salmon commercial catches in the District 104 purse seine fishery, 2003.

Age-Specific Model Constructed		Stepwise Variable Selection		Misclassification Matrix					
					Classified As (number and percent)				Total
Age Class	Timing	Variable	F-Statistic	True Stock	Fraser	Alaska	Nass	Skeena	
12	**Season Total**	z4	149.64	**Fraser**	54	10	29	36	
		z71	74.13		41.86%	7.75%	22.48%	27.91%	129
		z86	24.25	**Alaska**	17	141	30	10	
		z28	17.91		8.59%	71.21%	15.15%	5.05%	198
		z2	14.41	**Nass**	48	23	83	29	
		z76	11.19		26.23%	12.57%	45.36%	15.85%	183
		z13	10.6	**Skeena**	40	2	23	135	
		z1	4.48		20%	1%	11.5%	67.5%	200
				Total	159	176	165	210	710
13	**Season Total**	z4	271.18	**Alaska**		149	35	16	
		z71	82.2			74.5%	17.5%	8%	200
		z76	25.13	**Nass**		16	138	51	
		z65	27.92			7.8%	67.32%	24.88%	205
				Skeena		12	57	136	
						5.85%	27.8%	66.34%	205
				Total		177	230	203	610
22	**Season Total**	z5	164.74	**Alaska**		97	14	20	
		z66	77.34			74.05%	10.69%	15.27%	131
		z88	13.01	**Nass**		17	134	46	
		z1	9.19			8.63%	68.02%	23.35%	197
		z3	8.86	**Skeena**		5	7	15	
						18.52%	25.93%	55.56%	27
				Total		119	155	81	355
23	**Season Total**	z4	127.69	**Alaska**		95	14	13	
		z32	55.62			77.87%	11.48%	10.66%	122
		z65	41.53	**Nass**		21	92	37	
		z76	23.22			14%	61.33%	24.67%	150
		z106	24.99	**Skeena**		4	9	35	
		z58	8.71			8.33%	18.75%	72.92%	48
				Total		120	115	85	320

Appendix D.–Scale variables with associated entry F-statistics, and classification matrices for age-specific linear discriminant models used to classify sockeye salmon commercial catches in the Districts 106 and 108 drift gillnet fisheries, 2003.

Age-Specific Model Constructed		Stepwise Variable Selection		Misclassification Matrix								
				True Stock	Classified As (number and percent)							
Age Class	Timing	Variable	F-Statistic		McDonald	Alaska	Nass	Skeena	Stikine	Tahltan	Tuya	Total
12	**Early**	z5	142.71	**Alaska**		134	10	2	33	19	2	
		z71	61.59			67%	5%	1%	16.5%	9.5%	1%	200
		z1	24.44	**Nass**		15	65	15	42	30	16	
		z74	22.12			8.2%	35.52%	8.2%	22.95%	16.39%	8.74%	183
		z76	10.13	**Skeena**		2	19	80	5	51	43	
						1%	9.5%	40%	2.5%	25.5%	21.5%	200
				Stikine		17	14	3	14	5	6	
						28.81%	23.73%	5.08%	23.73%	8.47%	10.17%	59
				Tahltan		9	24	44	6	90	26	
						4.52%	12.06%	22.11%	3.02%	45.23%	13.07%	199
				Tuya		0	2	6	0	3	5	
						0%	12.5%	37.5%	0%	18.75%	31.25%	16
				Total		177	134	150	100	198	98	857
12	**Late**	z5	191.74	**Alaska**		141	13	11	35			
		z71	62.04			70.5%	6.5%	5.5%	17.5%			200
		z28	29.01	**Nass**		17	77	41	48			
		z76	17.58			9.29%	42.08%	22.4%	26.23%			183
		z13	7.96	**Skeena**		3	31	158	8			
		z66	7.92			1.5%	15.5%	79%	4%			200
		z86	6.05	**Stikine**		18	20	6	15			
						30.51%	33.9%	10.17%	25.42%			59
				Total		179	141	216	106			642
13	**Early**	z2	447.42	**McDonald**	128	16	0	0	1	1	0	146
		z5	134.92		87.67%	10.96%	0%	0%	0.68%	0.68%	0%	
		z71	75.97	**Alaska**	53	67	18	2	34	16	9	199
		z1	43.11		26.63%	33.67%	9.05%	1.01%	17.09%	8.04%	4.52%	
		z76	30.94	**Nass**	1	6	115	29	27	15	12	205
					0.49%	2.93%	56.1%	14.15%	13.17%	7.32%	5.85%	
				Skeena	1	4	39	77	18	23	43	205
					0.49%	1.95%	19.02%	37.56%	8.78%	11.22%	20.98%	
				Stikine	12	58	50	10	45	18	12	205
					5.85%	28.29%	24.39%	4.88%	21.95%	8.78%	5.85%	
				Tahltan	1	10	21	24	18	88	42	204
					0.49%	4.9%	10.29%	11.76%	8.82%	43.14%	20.59%	
				Tuya	1	3	9	30	7	38	117	205
					0.49%	1.46%	4.39%	14.63%	3.41%	18.54%	57.07%	
				Total	197	164	252	172	150	199	235	1369
13	**Late**	z5	304.35	**McDonald**	127	16	0	1	2			146
		z1	141.58		86.99%	10.96%	0%	0.68%	1.37%			
		z76	42.93	**Alaska**	53	76	18	14	38			199
		z73	30.66		26.63%	38.19%	9.05%	7.04%	19.1%			
		z106	23.24	**Nass**	1	7	117	48	32			205
		z6	9.49		0.49%	3.41%	57.07%	23.41%	15.61%			
				Skeena	1	8	43	132	21			205
					0.49%	3.9%	20.98%	64.39%	10.24%			
				Stikine	11	63	50	30	51			205
					5.37%	30.73%	24.39%	14.63%	24.88%			
				Total	193	170	228	225	144			960

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Age-Specific Model Constructed		Stepwise Variable Selection		Misclassification Matrix								
					Classified As (number and percent)							
Age	**Class Timing**	**Variable**	**F-Statistic**	**True Stock**	**McDonald**	**Alaska**	**Nass**	**Skeena**	**Stikine**	**Tahltan**	**Tuya**	**Total**
22	Season	z65	396.48	**Alaska**		125	41			24	5	195
	Total	z71	147.81			64.1%	21.03%			12.31%	2.56%	
		z5	122.38	**Nass**		24	147			16	10	197
		z35	29.95			12.18%	74.62%			8.12%	5.08%	
				Tahltan		7	1			38	15	61
						11.48%	1.64%			62.3%	24.59%	
				Tuya		1	9			35	125	170
						0.59%	5.29%			20.59%	73.53%	
				Total		157	198			113	155	623
23	**Early**	z71	56.02	**Alaska**		85	36	15	26	7	6	175
		z32	42.35			48.57%	20.57%	8.57%	14.86%	4%	3.43%	
		z65	50.28	**Nass**		24	84	19	17	4	2	150
		z2	21.68			16%	56%	12.67%	11.33%	2.67%	1.33%	
		z4	14.72	**Skeena**		3	8	14	4	7	12	48
		z1	8.74			6.25%	16.67%	29.17%	8.33%	14.58%	25%	
				Stikine		3	1	1	11	6	1	23
						13.04%	4.35%	4.35%	47.83%	26.09%	4.35%	
				Tahltan		2	1	16	8	18	9	54
						3.7%	1.85%	29.63%	14.81%	33.33%	16.67%	
				Tuya		0	1	3	1	1	18	24
						0%	4.17%	12.5%	4.17%	4.17%	75%	
				Total		117	131	68	67	43	48	474
23	**Late**	z35	61.48	**Alaska**		85	36	23	31			175
		z32	31.29			48.57%	20.57%	13.14%	17.71%			
		z28	32.99	**Nass**		21	88	21	20			150
		z71	27.11			14%	58.67%	14%	13.33%			
		z4	12.18	**Skeena**		3	8	32	5			48
		z66	16.16			6.25%	16.67%	66.67%	10.42%			
		z43	5.84	**Stikine**		2	2	3	16			23
						8.7%	8.7%	13.04%	69.57%			
				Total		111	134	79	72			396