

PSC Northern Fund Final Report

Project Number: NF-2014-I-8

Project Title: Genetic stock identification of Districts 106 and 108 sockeye, 2014

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Abstract:

The Stikine River in Southeast Alaska supports sockeye salmon runs important for various commercial and aboriginal fisheries in both Alaska and Canada. This project continues the use of mark- and age-enhanced genetic stock identification (GSI) of sockeye salmon harvested in the 2014 gillnet fishery in Districts 106 and 108 by screening 96 single nucleotide polymorphic genetic markers in 4,500 salmon. Advances in mixed stock analysis methodologies allowed the incorporation of hatchery-marked fish and age composition into genetic-based fishery estimates. The mixed stock analysis model indicated that the *Non-Stikine* reporting group was the largest contributor in the District 106 fisheries in 2014. In the District 108 fisheries, the *Stikine/Taku Mainstem* reporting group was the largest contributor, followed by the *Non-Stikine* reporting group. *Enhanced Tahltan*, *Enhanced Tuya*, and *Tahltan Wild* reporting groups were important contributors only early in the season for Subdistrict 106-41 and District 108. The most common ages over all fisheries was age-1.3, and this age group dominated all reporting groups except *Enhanced Tuya*.

Introduction:

The Stikine River in Southeast Alaska (SEAK) supports sockeye salmon runs important for various commercial and aboriginal fisheries in both the United States (U.S.) and Canada. Stikine River sockeye salmon are harvested in commercial gillnet fisheries in U.S. Districts 106 and 108, by U.S. subsistence fisheries in the lower river, by Canadian commercial gillnet in the lower and upper river, and by Canadian aboriginal fisheries in the upper river.

The gillnet fisheries in U.S. Districts 106 and 108 harvest wild stocks of sockeye salmon bound for Southeast Alaska (SEAK) island and mainland lakes, and for lakes and tributaries in the Stikine, Nass, and Skeena River drainages. Significant numbers of enhanced sockeye bound for release sites in the Stikine River are also caught in the fisheries. Catches of Stikine River sockeye salmon stocks in Districts 106 and 108 gillnet fisheries and the U.S. Stikine subsistence fishery are subject to a harvest sharing agreement under the Pacific Salmon Treaty (PST), in which the U.S. is allowed 50% of the Total Allowable Catch of Stikine River sockeye. Stock contribution estimates are used to document compliance with the harvest sharing agreements, reconstruct runs of wild stocks, estimate the return of enhanced fish, forecast upcoming returns, and support sustainable management.

In the past, matched-samples collected from the fishery were analyzed using scale pattern analysis (SPA) and otolith marks to estimate the catch of wild and enhanced stocks. Collecting and analyzing these matched samples was logistically complex, labor intensive, and expensive. In particular, SPA became increasingly difficult to complete in a timely fashion due to continual turnover in highly trained technicians and the need to establish an annual ‘escapement baseline’. In addition, outdated and unsupported software and outdated hardware required expensive upgrades in order to remain feasible.

Genetic stock identification can improve stock composition estimates for sustainable management of sockeye salmon in the Stikine River. The Alaska Department of Fish and Game (ADF&G) and Department of Fisheries and Ocean Canada (DFO) compared SPA and GSI in limited sample sets from Alaska’s District 101 gillnet fishery and found that although the two methods provide similar estimates, GSI analysis was more accurate and was able to discriminate stocks at a finer resolution than SPA (PSC NBTC 2005).

This project completed mark- and age-enhanced GSI analysis on sockeye salmon tissue samples collected from commercial gillnet fisheries in areas near the Stikine River in 2014. The analysis focused on tissue samples collected in Districts 106 and 108, and replaces SPA for stock estimates in this transboundary river. For Subdistrict 106-30, estimates are provided over the entire season for all age groups, for 10 time strata for all age groups, and over the entire season for 6 age groups. For Subdistrict 106-41, estimates are provided over the entire season for all age groups, for 8 time strata for all age groups, and over the entire season for 6 age groups. For District 108, estimates are provided over the entire season for all age groups, for 9 time strata for all age groups, and over the entire season for 6 age groups. Estimates are reported as proportions of 5 reporting groups consisting of 2 groups of Stikine wild fish (*Stikine/Taku Mainstem* and *Tahltan Wild*), 2 groups of Stikine hatchery-origin fish (*Enhanced Tahltan* and *Enhanced Tuya*), and one group that includes all other non-Stikine wild- and hatchery-origin fish in the baseline (*Non-Stikine*).

Original Objectives:

The objective of this project was to estimate the stock composition in Southeast Alaska sockeye fisheries near the Stikine River in 2014 using GSI. Identified tasks were to:

- Determine the stock composition of sockeye harvests from the District 106 drift gillnet fishery. For 2014, provide estimates for:
 - Subdistrict 106-30
 - All age groups, total season;
 - Subdistrict 106-41
 - All age groups, 5 time strata;
 - Age-1.2 only, total season.
- Determine the stock composition of sockeye harvests from the District 108 drift gillnet fishery. For 2014, provide estimates for:
 - Section 108A
 - All age groups, total season;
 - Age-1.2 only, total season;
 - Section 108B
 - All age groups, 5 time strata;

- Age-1.2 only, total season.

These analysis objectives were modified slightly post-season and additional goals were added to meet current needs of managers (see below).

Approach:

Fishery Sampling

Landings from drift gillnet fisheries in Subdistricts 106-30 and 106-41 (District 106) and in District 108 were sampled by ADF&G at fish processing facilities in Wrangell and Petersburg and by observers on tenders. Sampling protocols ensured that the fish sampled were as representative of catches as possible. Axillary processes were excised and placed into individually labeled vials and preserved in ethanol. Associated data for each sample including fishery and capture date were recorded, and the tissue sample for each fish was paired with age, sex, and length (ASL) information and with otolith samples.

Laboratory Analysis

A single nucleotide polymorphism (SNP) baseline for SEAK and British Columbia (BC) including 45 markers was first completed in 2007. The baseline included all major sockeye salmon-producing systems in SEAK and in BC north of and including the Skeena River and from representative sockeye salmon-producing systems in BC south of the Skeena River. A cooperative project between ADF&G and DFO in 2007-2009 added several collections to the baseline for transboundary rivers (Northern Fund project no. NF-2008-I-15A). In addition, these and existing collections have been analyzed at a total of 96 SNP markers in order to further enhance the baseline for fishery applications. The current genetic baseline includes 171 populations and 96 markers (Table 1; Rogers Olive et al. *in prep*).

Samples were analyzed for 96 SNP loci. Genomic DNA was extracted using a DNeasy® 96 Tissue Kit by QIAGEN®, (Valencia, CA). All SNPs were detected using a TaqMAN SNP Genotyping Assay (Life Technologies). SNP assays were generally performed using the BioMark 96.96 Dynamic Array (Fluidigm). Re-analyses of failed assays was performed on the Applied Biosystems Prism 7900HT Sequence Detection System. Genotype data are stored in an *Oracle* database (*LOKI*) on a network drive maintained by ADF&G computer services. Quality control measures included reanalysis from DNA extraction forward of 8% of each collection for all markers to ensure that genotypes are reproducible and to identify laboratory errors and measure rates of inconsistencies during repeated analyses.

Mixture Analysis and Modified Objectives

For 2014 fisheries, original analysis goals were to provide estimates for 1) Subdistrict 106-30, all age groups, 400 samples over entire season, for a total of 400 samples; 2) Subdistrict 106-41, all age groups, 200 samples per week, 5 time strata, for a total of 1,000 samples; 3) Subdistrict 106-41, age-1.2, 400 samples over entire season, for a total of 400 samples; 4) Section 108A, all age groups, 400 samples over entire season, for a total of 400 samples; 5) Section 108A, age-1.2, 400 samples over entire season, for a total of 400 samples; 6) Section 108B, all age groups, 200 samples per week, 5 time strata, for a total of 1,000 samples; and 7) Section 108B, age-1.2, 400 samples over entire season, for a total of 400 samples.

Post-season conversations with fishery managers clarified management needs and project objectives were modified. First, managers indicated that it would not be useful to generate separate estimates for sections 108A and 108B. Thus, although samples were analyzed to provide separate estimates, they were weighted by harvest and combined to give total District 108 estimates. Second, managers felt that additional estimates would be useful: 1) Subdistrict 106-30, all age groups, at least 5 time strata; 2) Subdistrict 106-30, total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0.x, and other ages; 3) Subdistrict 106-41, total season, all age groups; 4) Subdistrict 106-41, total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0.x, and other ages; and 4) District 108, total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0.x, and other ages. A total of 33 separate estimates were made for the 2014 fisheries (15 were proposed).

In addition to changes in analysis goals, methods for mixture analysis have improved since the inception of this project. Mixture analyses can now include additional available data to help inform the genetic estimates; specifically, ages from matched scales and hatchery marks on matched otoliths. In this method (“mark- and age-enhanced GSI”), two sets of parameters are required: 1) a vector of stock compositions, summing to one, with a proportion for each of the wild and hatchery stocks weighted by harvest per stratum; and 2) a matrix of age composition, with a row for each of the wild and hatchery stocks (summing to one), and a column for each age class. This information is “completed” iteratively by stochastically assigning each wild fish to a population, then estimating the stock proportions based on summaries of assignments from each iteration. In this process, all available information is used to assign individuals to stock of origin based on age, genotype, and/or otolith information. For this method, only genotypes from wild fish are necessary to complete stock composition estimates; thus only wild fish were genotyped for 2014 fisheries.

To initialize the algorithm, all wild fish are given a stock assignment stochastically. The initialized algorithm then proceeds in the following steps:

- 1) Summarize all age data by assigned and observed stocks for both wild and hatchery individuals;
- 2) Estimate the stock proportions and age composition from previous summaries (accounting for sampling error);
- 3) Stochastically assign each wild fish with genotypes to a wild stock of origin based on the product of its genotypic frequency, age frequency, and stock proportion for each population;
- 4) Stochastically assign each wild fish without genotypes to a stock of origin based on the product of its age frequency and stock proportion for each population; and
- 5) Repeat steps 1-4 while updating and recording the estimates of the stock proportions and age compositions with each iteration.

This algorithm was run for 40,000 repetitions, discarding the first 20,000 repetitions to eliminate the effect of the initial state. The point estimates and credibility intervals for the stock proportions and age composition are simple summary statistics of the output.

Results are given for 5 reporting groups consisting of 2 groups of Stikine wild fish (*Stikine/Taku Mainstem* and *Tahltn Wild*), 2 groups of Stikine hatchery-origin fish (*Enhanced Tahltn* and

Enhanced Tuya), and one group that includes all other non-Stikine wild- and hatchery-origin fish in the baseline (*Non-Stikine*).

Results/Findings:

Fishery sampling

A total of 5,120 sockeye salmon were sampled in the gillnet fisheries in District 106 and 2,996 sockeye salmon were sampled in District 108 during 2014 (Table 2 and 3). In District 106, Subdistrict 30, 2,720 fish were sampled from statistical weeks 25 to 34 and in Subdistrict 41, 2,400 fish were sampled from statistical week 25 to 33 (Table 2). In District 108, 2,996 fish were sampled from statistical weeks 25 through 34 (Table 3).

Laboratory analyses

Of the samples collected in District 106, 2,720 samples were genotyped at 96 SNP genetic markers. During quality control procedures a total of 197 fish were reanalyzed at all 96 markers for a total of 18,912 comparisons. The average failure rate for District 106 was low at 1.6%. Few inconsistencies were found (0.51% across all comparisons).

Of the samples collected in District 108, 1,780 samples were genotyped at 96 SNP genetic markers. During quality control procedures a total of 147 fish were reanalyzed at all 96 markers for a total of 14,112 comparisons. The average failure rate for District 108 was low at 1.8%. Few inconsistencies were found (0.21% across all comparisons).

Mixture analysis

Mixtures of fish representing catches by statistical week, age group, and subdistrict from the Districts 106 and 108 gillnet fisheries were analyzed. Of the samples extracted and genotyped, genotypes from 4,500 wild fish (no otolith mark present) were used for the genetic analyses in the mark- and age-enhanced GSI method. Stock composition estimates can be found in Figures 1–10. Total season estimates were made for each subdistrict or district by age class and over all ages, and were weighted by harvest in each stratum. In addition, results are given for fish of all age classes over every time stratum sampled, regardless of sample size, to meet current needs of fishery managers. Estimates for some statistical weeks did not meet the minimum criteria for precision and accuracy accepted by the Pacific Salmon Commission (PSC) Transboundary Technical Committee (within 10% of the true mixture 90% of the time) and thus are not reported, including: statistical week 26 in Subdistrict 106-41, and statistical week 34 in District 108.

The largest component of the Subdistrict 106-30 fishery sample in 2014 was non-Stikine-origin fish, 98% over the entire season (Figure 1). This reporting group dominated catches in every statistical week (Figure 2). All other stocks were present at low proportions (<5%) over all statistical weeks. The most common age group in Subdistrict 106-30 was age-1.3 (47% of total), followed by age-1.2 (32%) and age-2.2 (13%; Figure 3). The *Tahltan Wild*, *Enhanced Tahltan*, *Non-Stikine*, and *Stikine/Taku Mainstem* reporting groups were primarily age-1.3 fish, while the *Enhanced Tuya* reporting group was comprised of larger percentages of ages-1.2, and -2.2 fish (Figure 4).

Similar to Subdistrict 106-30, the harvests in Subdistrict 106-41 were dominated by the *Non-Stikine* reporting group (79% over the entire season; Figure 1). This reporting group was the largest contributor in each statistical week, though other stocks were important contributors especially early in the season (Figure 5). The *Stikine/Taku Mainstem* reporting group contributed throughout primarily through statistical week 31 (range: 3–10%), with the highest proportion observed in statistical week 30. The *Tahltan Wild*, *Enhanced Tahltan*, and *Enhanced Tuya* reporting groups were important contributors in statistical week 25 (26%, 23%, and 18%, respectively), and then declined over the next two weeks to <5% each. The most common age group in Subdistrict 106-41 was age-1.3 (42% of total), followed by age-1.2 (34%) and age-2.2 (15%; Figure 6). Similar to Subdistrict 106-30, the *Enhanced Tahltan*, *Tahltan Wild*, and *Stikine/Taku Mainstem* reporting groups were primarily age-1.3 fish, while the *Enhanced Tuya* and *Non-Stikine* reporting groups were comprised of larger percentages of ages-1.2, and -2.2 fish (Figure 7).

Stock compositions in District 108 were quite different from District 106, with *Stikine*-origin reporting groups dominating throughout the season. The largest contributor over the entire season was the *Stikine/Taku Mainstem* reporting group (30%), followed by the *Non-Stikine*, *Enhanced Tahltan*, and *Tahltan Wild* reporting groups (20%, 19%, and 17%, respectively; Figure 1). The largest contributor in statistical weeks 25 and 26 was the *Tahltan Wild* reporting group (35% and 30%, respectively), followed by the *Enhanced Tahltan* and *Enhanced Tuya* reporting groups in statistical weeks 25 (33% and 15%, respectively) and 26 (29% and 25%, respectively; Figure 8). In statistical week 27, the *Enhanced Tahltan* and *Stikine/Taku Mainstem* reporting groups were the largest contributors (26% and 22%, respectively), followed by the *Tahltan Wild* and *Enhanced Tuya* groups (each 21%). In statistical weeks 28–33, the *Stikine/Taku Mainstem* reporting group was the largest contributor (range: 40–86%) followed by the *Non-Stikine* reporting group (range: 9–49%). The most common age group in District 108 was age-1.3 (51%), followed by age-1.2 (30%; Figure 9). Similar to District 106 fisheries, the *Enhanced Tahltan*, *Tahltan Wild*, and *Stikine/Taku Mainstem* reporting groups were primarily age-1.3 fish, while *Enhanced Tuya* and *Non-Stikine* reporting groups were comprised of larger percentages of ages-2.2, -2.3, and other (Figure 10).

Evaluation:

We accomplished the following:

- A total of 5,120 sockeye salmon were sampled from District 106 gillnet fisheries and 2,996 sockeye salmon were sampled from District 108 gillnet fisheries during the 2014 season.
- A total of 2,720 samples from District 106 and 1,780 samples of sockeye salmon from District 108 were assayed for genotypes for the 96 SNP loci in the sockeye salmon baseline, and quality control procedures revealed a low rate of inconsistencies.
- Mixture analyses estimated the contributions of 5 reporting groups including *Stikine* wild and enhanced sockeye salmon to 10 temporal strata in Subdistrict 106-30, 8 temporal strata in Subdistrict 106-41, and 9 temporal strata in District 108.
- Mixture analyses estimated the age compositions of harvests over the entire season in Subdistrict 106-30, Subdistrict 106-41, and District 108 for 5 reporting groups.
- Mixture analyses estimate the seasonal stock composition over all ages for Subdistrict 106-30, Subdistrict 106-41, and District 108 for 5 reporting groups.

- In total, 33 separate estimates are provided for Stikine area fisheries in 2014 (15 were proposed).
- The improved methodology (mark- and age-enhanced GSI) has allowed us to combine several sources of data when estimating stock composition in Districts 106 and 108 for Pacific Salmon Treaty (PST) purposes. In the past, GSI was conducted on only wild fish, and stock composition estimates for enhanced fish were conducted in a separate analysis using otolith and other data. This approach allows us to combine these analyses to provide the most accurate and efficient estimates possible for Stikine area fisheries. Work is currently underway to continue to improve this methodology to provide reliable estimates for statistical weeks where low sample sizes are an issue.
- Results will be incorporated into harvest estimates for PST purposes by the Transboundary Technical Committee (TTC *in prep*).

Project Products:

Results from this project have been presented both to ADF&G Commercial Fisheries management staff and to the bilateral PSC Transboundary Technical Committee. A report published in the ADF&G Fishery Data Series is expected in 2015.

Date Prepared: July 1, 2015

References:

Pacific Salmon Commission, Northern Boundary Technical Committee. 2005. Stock composition estimates and individual stock assignments based on genetic microsatellites and scale patterns for test mixtures of Alaskan and Canadian sockeye salmon. Report TCNB (05)-2, available online at www.psc.org/pubs/TCNB05-2.pdf.

Rogers Olive, S. D., S. E. Gilk-Baumer, E. K. C. Fox, and W. D. Templin. *In prep*. Genetic baseline of Southeast Alaska sockeye salmon for mixed stock analyses, 2014. Alaska Department of Fish and Game, Fishery Data Series No. YY-XX, Anchorage.

TTC (Transboundary Technical Committee). *In prep*. Estimates of Transboundary River salmon production, harvest and escapement, and a review of joint enhancement activities in 2014. Pacific Salmon Commission Report TCTR, Vancouver.

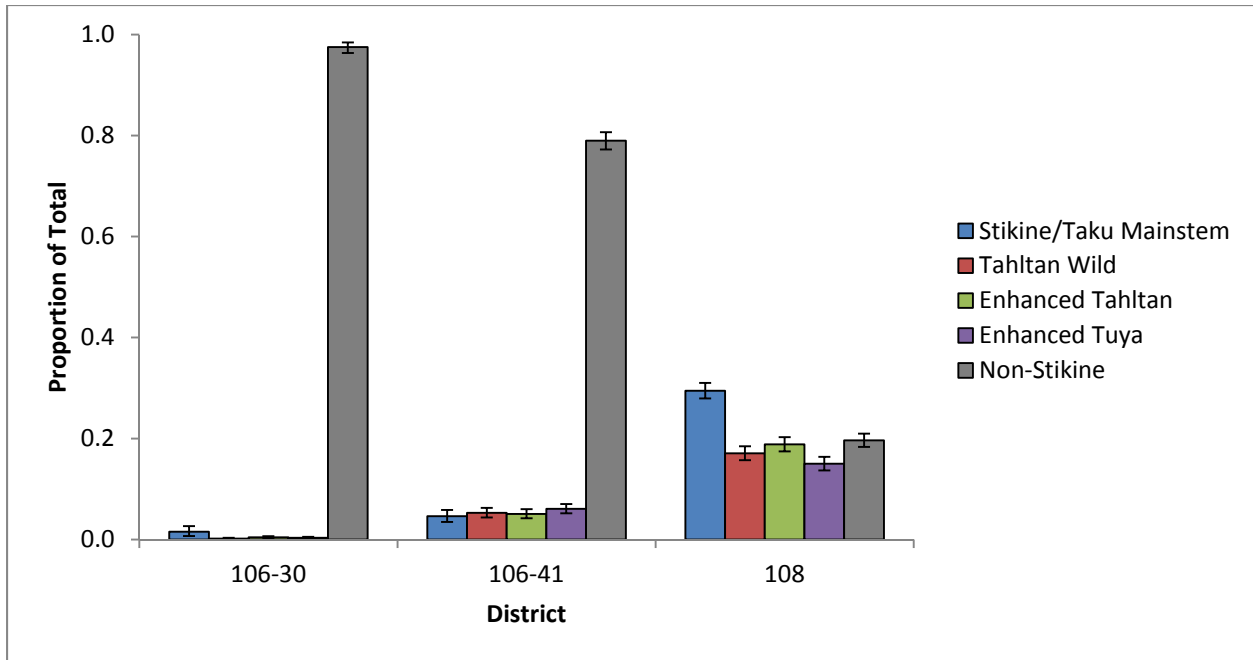


Figure 1. Total season stock composition estimates for Stikine River area fisheries. Estimates were weighted by harvest per stratum.

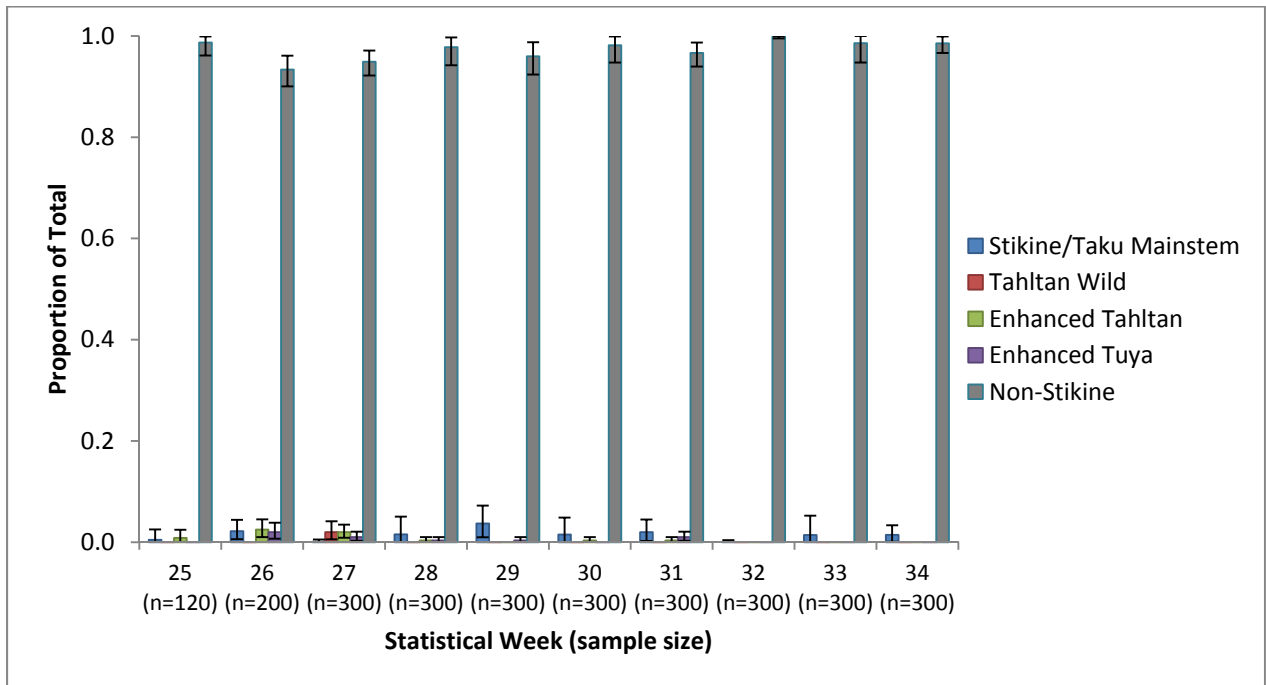


Figure 2. Stock composition estimates of sockeye salmon caught in the District 106-30 gillnet fishery in 2014. Sample size (n) includes genotyped, aged, and otolith-marked fish.

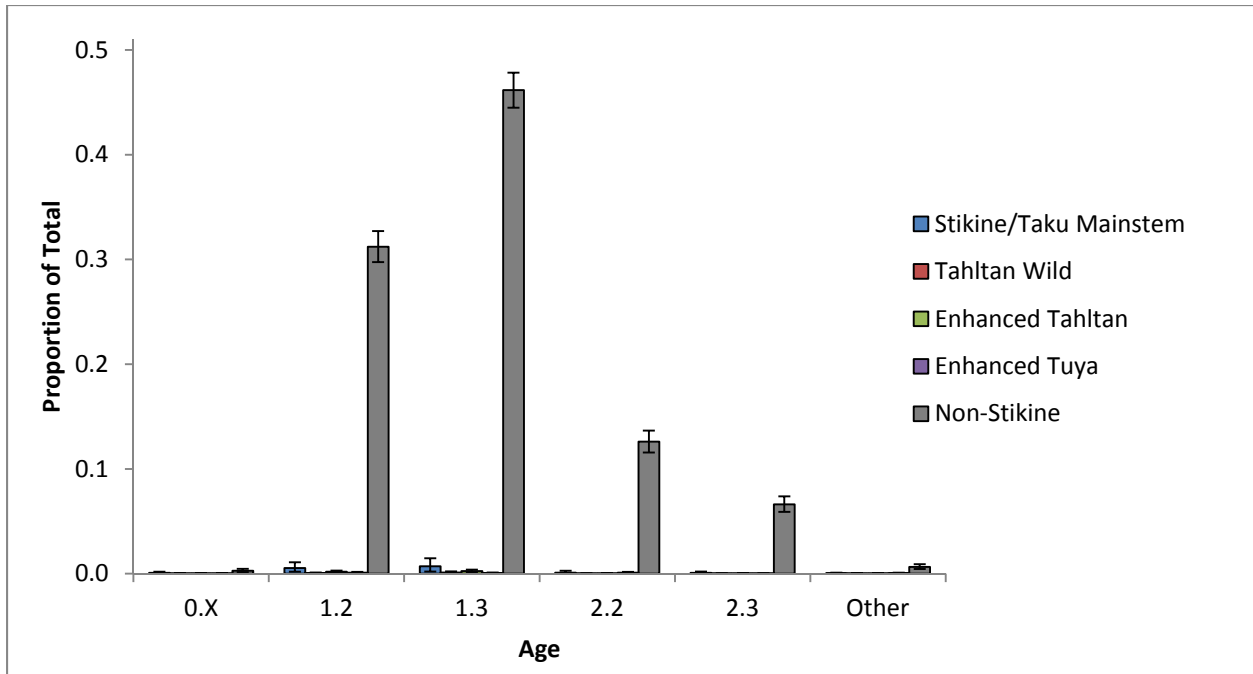


Figure 3. Age composition of sockeye salmon caught in the District 106-30 gillnet fishery in 2014 over the entire season.

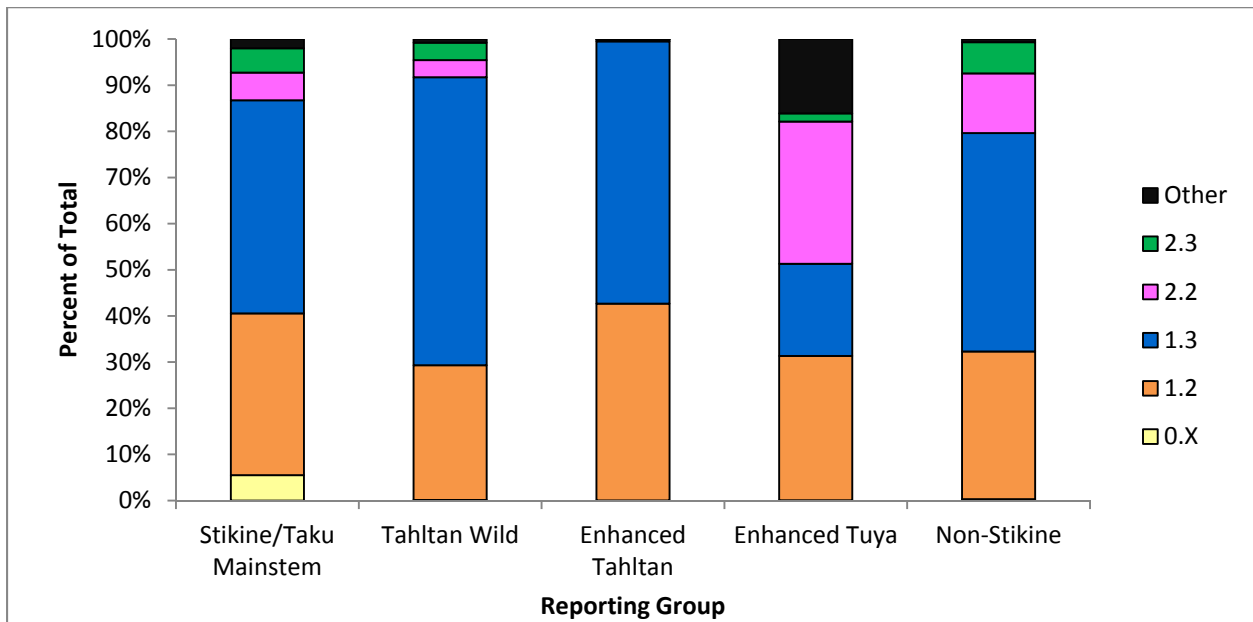


Figure 4. Age composition by reporting group of sockeye salmon caught in the District 106-30 gillnet fishery in 2014.

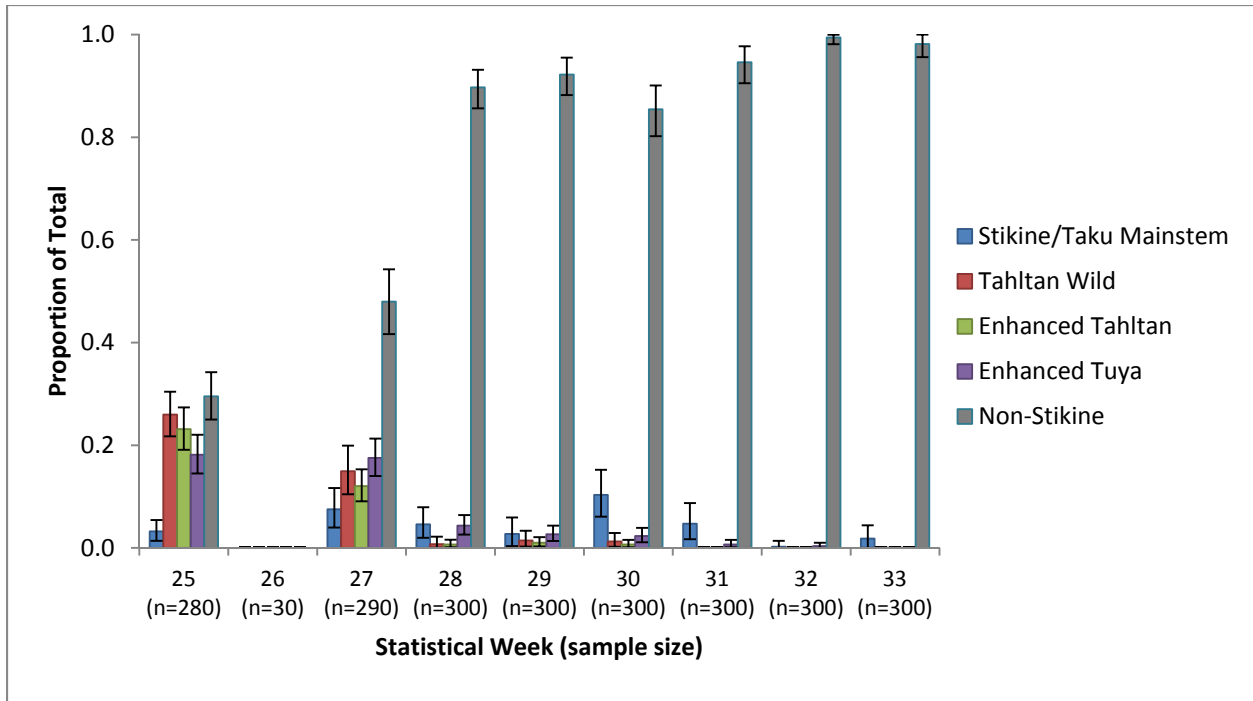


Figure 5. Stock composition estimates of sockeye salmon caught in the District 106-41 gillnet fishery in 2014. Sample size (n) includes genotyped, aged, and otolith-marked fish. Estimates in week 26 did not meet precision and accuracy goals identified by the TTC and thus are not reported.

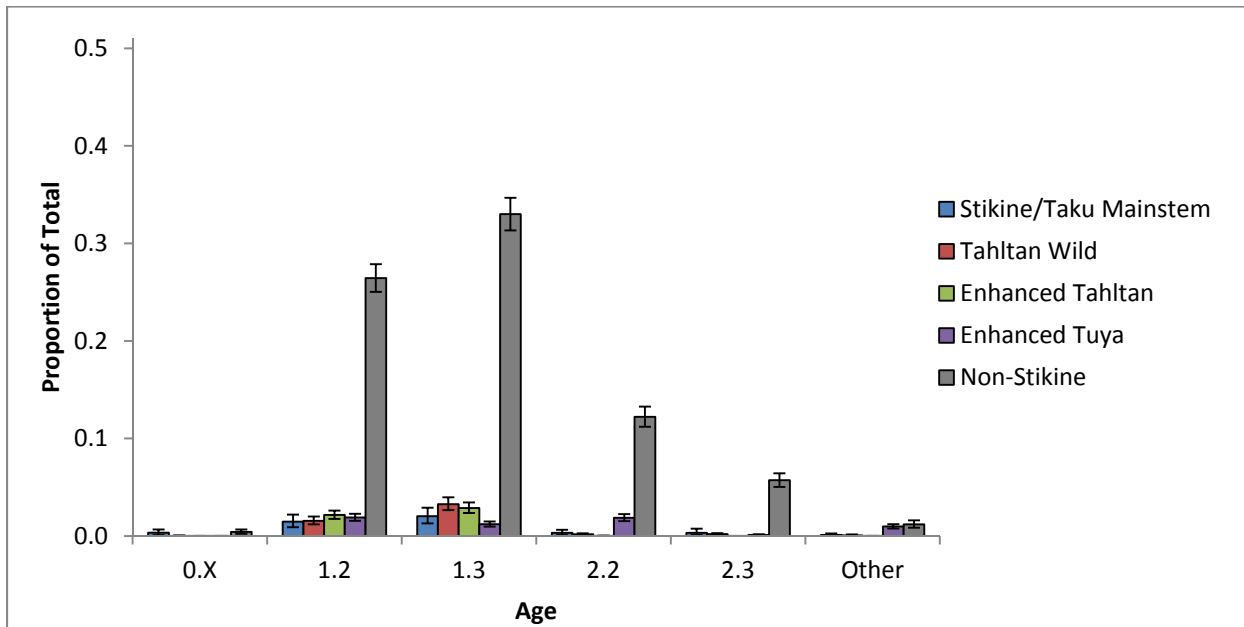


Figure 6. Total age composition of sockeye salmon caught in the District 106-41 gillnet fishery in 2014 over the entire season.

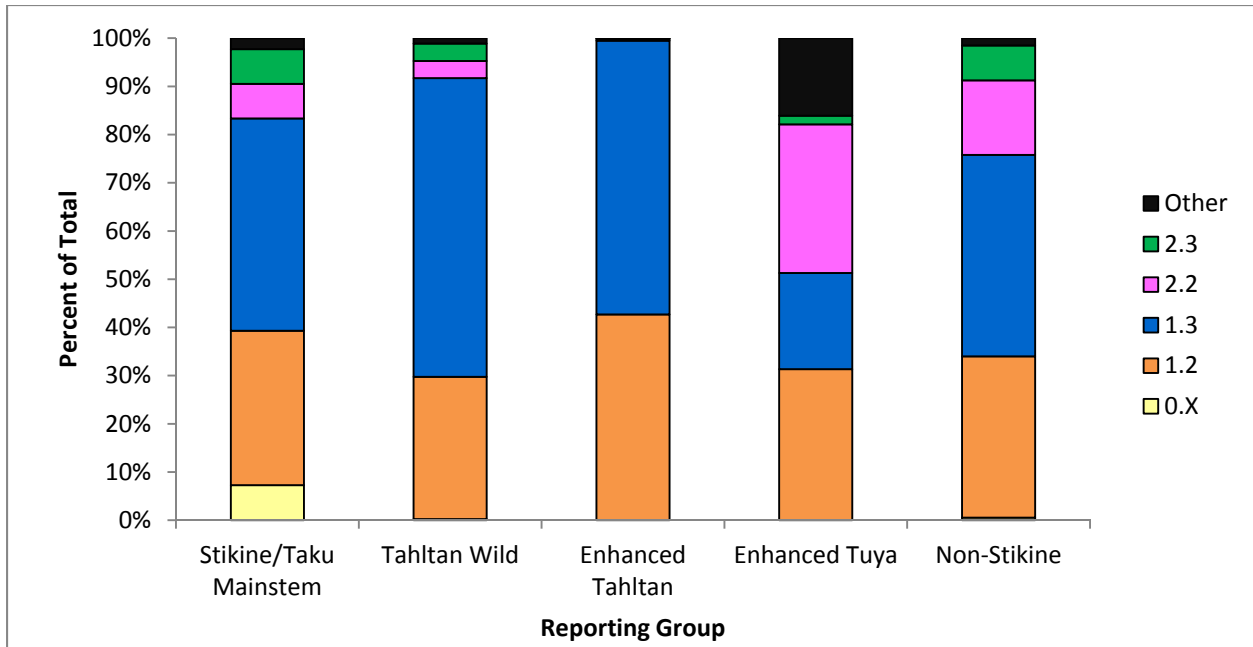


Figure 7. Age composition by reporting group of sockeye salmon caught in the District 106-41 gillnet fishery in 2014.

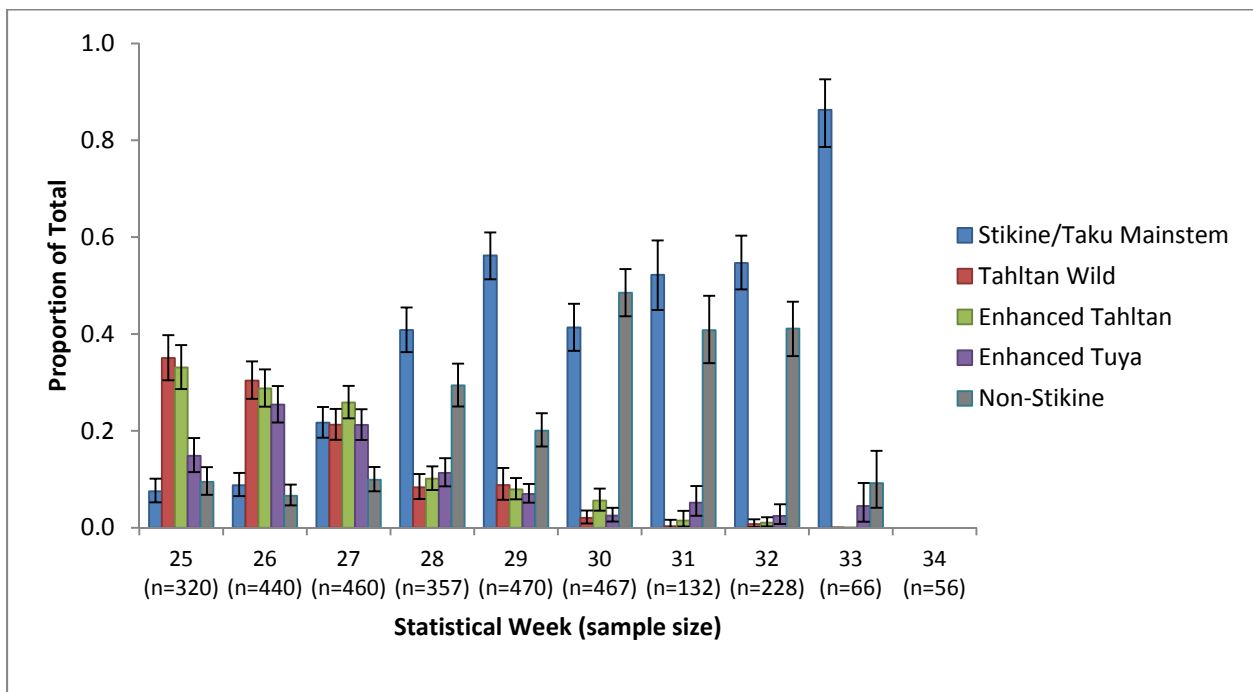


Figure 8. Stock composition estimates of sockeye salmon caught in the District 108 gillnet fishery in 2014. Sample size (n) includes genotyped, aged, and otolith-marked fish. Estimates in week 34 did not meet precision and accuracy goals identified by the TTC and thus are not reported.

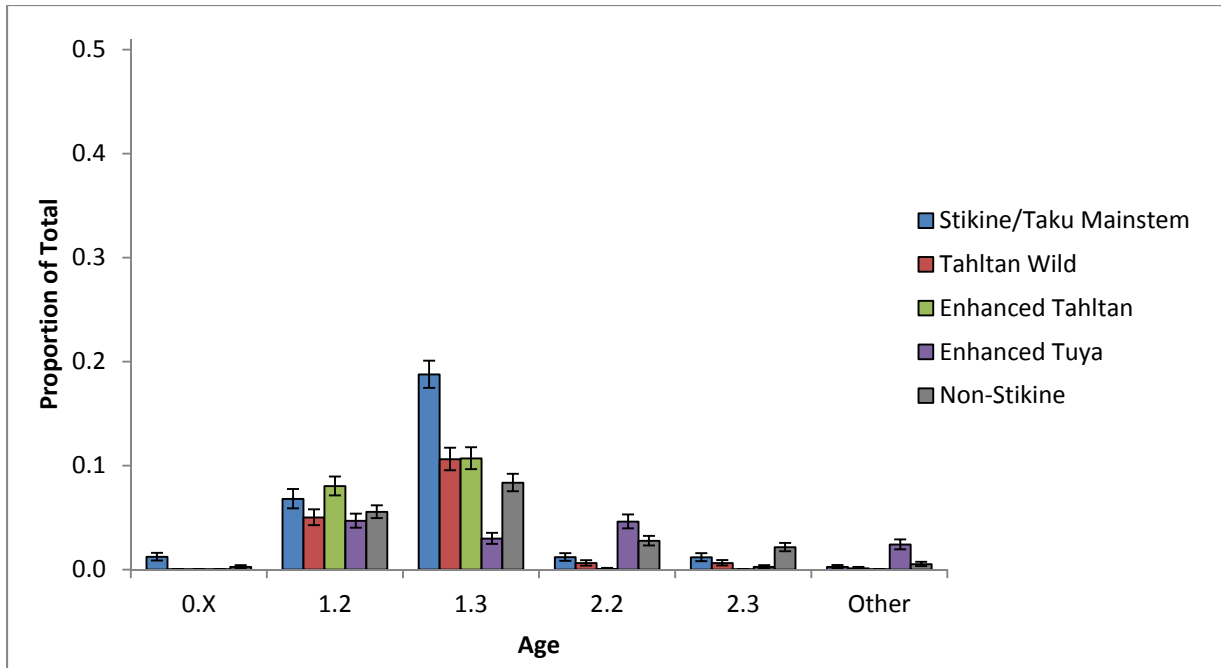


Figure 9. Total age composition of sockeye salmon caught in the District 108 gillnet fishery in 2014 over the entire season.

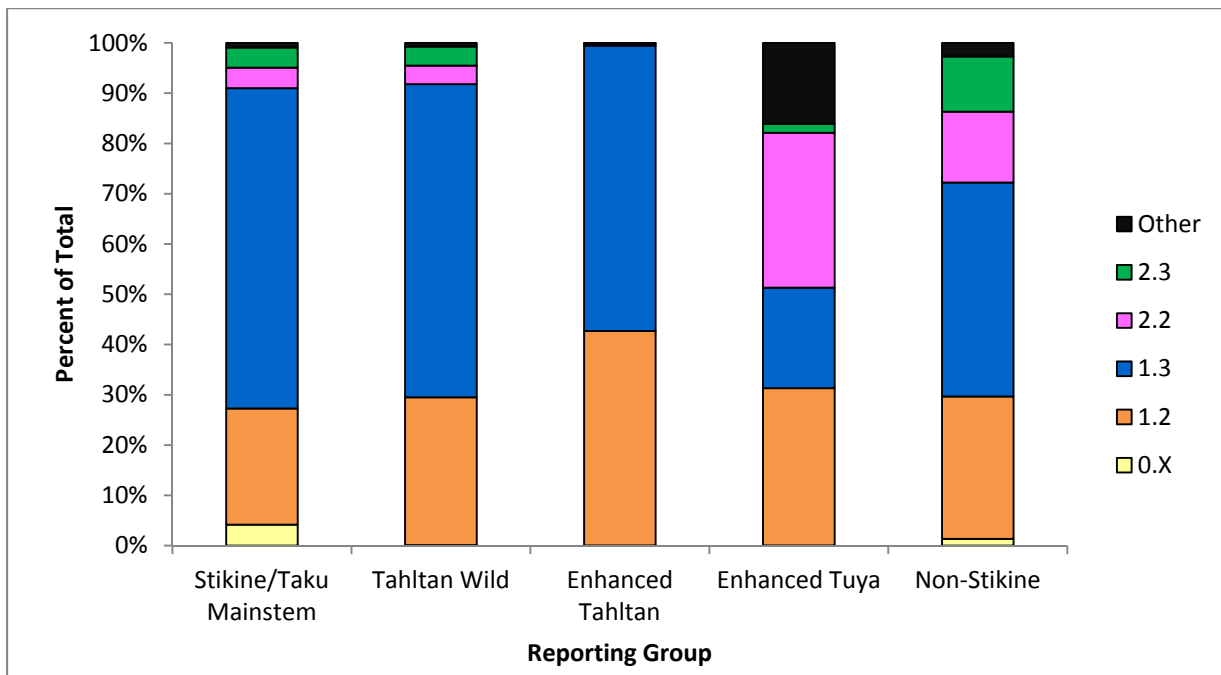


Figure 10. Age composition by reporting group of sockeye salmon caught in the District 108 gillnet fishery in 2014.

Table 1. Reporting groups and collection locations defined for use in genetic stock identification of sockeye salmon caught in gillnet fisheries in Districts 106 and 108 in 2014. Wild collections are ordered north to south and followed by enhanced collections.

Reporting Group	Collection Location	Reporting Group	Collection Location
<i>Non-Stikine</i>	Bainbridge Lake	<i>Non-Stikine (cont.)</i>	Chilkat River - Mule Meadows
	Coghill Lake		Chilkoot Lake - Beaches
	Eshamy Lake		Chilkoot Lake - Bear Creek
	Main Bay		Chilkoot River
	Miners Lake		Berners Bay
	Bering Lake		Lace River
	Clear Creek at 40 Mile		Steep Creek
	Eyak - Hatchery Creek		Windfall Lake
	Eyak - Middle Arm		Lake Creek - Auke Creek Weir
	Eyak - South beaches		Crescent Lake
	Gulkana - Fish Creek		Speel Lake
	Gulkana - East Fork		Snettisham
	Klutina Lake - inlet		Vivid Lake
	Klutina - Mainstem		Bartlett River - Creel survey
	Klutina - Banana Lake		North Berg Bay Inlet
	Klutina - Bear Hole		Hoktaheen Lake
	Kushtaka Lake		Neva Lake
	Long Lake weir		Sitkoh Lake
	Mahlo River		Lake Eva
	Martin Lake		Kook Lake
	Martin River Slough		Pavlof Lake
	McKinley Lake 2007		Hasselborg Lake
	McKinley Lake 2008		Kanalku Lake ¹
	McKinley Lake 1991		Kutlaku Lake
	Salmon Creek - Bremner		Falls Lake
	Mendeltna Creek		Ford Arm Creek
	Mentasta Lake		Klag Bay Stream outlet
	Paxson Lake - outlet		Redfish Lake Beaches
	St. Anne Creek		Salmon Lake weir
	Steamboat Lake - Bremner		Redoubt Lake - outlet
	Swede Lake		Benzeman Lake
	Tanada Creek weir		King Salmon Lake
	Tanada Lk - lower outlet		Little Tatsamenie
	Tanada Lk - shore		Little Trapper Lake
	Tebay River - Outlet		Kuthai Lake
	Tokun Lake		Tatsamenie Lake
	Tonsina Lake		Hackett River
	Ahrnklin River		Nahlin River
	Akwe River		Tulsequah River
	Dangerous River		Yellow Bluff Slough
	East Alsek River		Sustahine Slough
	Lost/Tahwah Rivers		Taku River
	Old Situk River		Takwahoni/Sinwa Creek
	Mountain Stream		Tuskwa/Chunk/Bear Slough
	Situk Lake		Fish Creek
	Blanchard River		Yehring Creek
Border Slough	Shakes Slough		
Klukshu River	Iskut River		
Upper Tatshenshini/Kudwat	Verrett River		
Tatshenshini - Kwatini River	Scud River		
Neskataheen Lake	Andy Smith/Porcupine/Fowler		
Tweedsmuir River	Devil's Elbow		
Vern Ritchie	Chutine River		
Chilkat Lake	Chutine Lake		
Chilkat River - Mosquito Lake	Christina Lake		
Chilkat River - Bear Flats	Little Tahltan River		
	<i>Tahltan Wild</i>		

-continued-

Table 1 (cont.)

Reporting Group	Collection Location	Reporting Group	Collection Location
<i>Tahltan Wild (cont.)</i>	Tahltan Lake	<i>Non-Stikine (cont.)</i>	Alastair Lake
<i>Non-Stikine (cont.)</i>	Hugh Smith Lake		Four Mile Creek/Pierre Creek
	McDonald Lake		Fulton River/Morrison Creek
	Hatchery Creek - Sweetwater		Kitsumkalum Lake
	Kah Sheets Lake		Lower Tahlo River
	Kunk Lake		McDonell Lake - Zymoetz R
	Luck Lake		Nangeese River
	Big Lake		Nanika River
	Mill Creek Weir		Slamgeesh River
	Petersburg Lake		Sustut River - Johanson Lake
	Red Bay Lake		Swan Lake
	Salmon Bay Lake		Upper Babine River
	Shipley Lake		Naden River
	Thoms Lake		Kitlope Lake
	Sarkar Lakes		Baker Lake
	Heckman Lake		Issaquah Creek
	Helm Lake		Cedar River
	Karta River/McGilvery Creek		Adams R - Shuswap Lake
	Kegan Lake		Birkenhead River
	Mahoney Creek		Chilko Lake
	Unuk River - Gene's Lake		Gates Creek
	Fillmore Lake - Hoffman Creek		Harrison River
	Klakas Lake		Horsefly River
	Bar Creek - Essowah Lake		Raft River
	Eek Creek		Stellako River
	Hetta Creek - Middle run		Enhanced - Burnett Inlet
	Hetta Creek - Early run		Enhanced - Main Bay
	Hetta Lake		Enhanced - McDonald
	Klawock River		Enhanced - Sweetheart
	Bowser Lake		Enhanced - Tatsamenie
	Damdochax Creek		Enhanced - Speel Arm
	Meziadin Lake	<i>Enhanced Tahltan</i>	Enhanced - Tahltan
	Tintina Creek	<i>Enhanced Tuya</i>	Enhanced - Tuya
	Weaver Creek		

Table 2. Number of sockeye salmon sampled from Subdistricts 106-30 and 106-41 gillnet harvests during each statistical week in 2014, samples genotyped, and otolith-marked or aged samples not genotyped for each statistical week.

District	Subdistrict	Statistical Week	Total Samples Collected	Genotypes Used in Analysis	Not Genotyped (otolith-marked or aged or both)
106	30	25	120	116	4
		26	200	180	20
		27	300	140	160
		28	300	142	158
		29	300	143	157
		30	300	141	159
		31	300	139	161
		32	300	148	152
		33	300	193	107
		34	300	204	96
	41	25	280	158	122
		26	30	18	12
		27	290	100	190
		28	300	140	160
		29	300	136	164
		30	300	141	159
		31	300	146	154
		32	300	147	153
		33	300	188	112
Totals			5,120	2,720	2,400

Table 3. Number of sockeye salmon sampled from gillnet harvests in the sockeye salmon fisheries in District 108 during 2014 divided by statistical week, samples genotyped, and otolith-marked or aged samples not genotyped.

District	Statistical Week	Total Samples Collected	Genotypes Used in Analysis	Not Genotyped (otolith-marked or aged or both)
108	25	320	164	156
	26	440	213	227
	27	460	232	228
	28	357	242	115
	29	470	264	206
	30	467	253	214
	31	132	109	23
	32	228	194	34
	33	66	61	5
	34	56	48	8
Totals		2,996	1,780	1,216