PSC Northern Fund
Final Report

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Project Title: Estimating the sockeye salmon stock composition of Southeast Alaska District 106 & 108 fisheries, 2013

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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 2013 gillnet fishery in Districts 106 and 108 by screening 96 single nucleotide polymorphic genetic markers in 3,826 salmon. Recent advances in mixed stock analysis methodologies have 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 2013, followed by Stikine/Taku Mainstem reporting group. 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 were ages-1.3 and -2.3; the Non-Stikine reporting group was dominated by age-2.3 fish, while the Stikine/Taku Mainstem reporting group was dominated by age-1.3 fish.

Introduction:
The Stikine River in Southeast Alaska 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 2013 commercial gillnet fisheries in areas near the Stikine River in SEAK. 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 8 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 7 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 7 time strata for all age groups, and over the entire season for 6 age groups. Estimates are reported as proportions of five reporting groups consisting of two reporting groups of Stikine wild fish (Stikine/Taku Mainstem and Tahltan Wild), two reporting groups of Stikine hatchery-origin fish (Enhanced Tahltan and Enhanced Tuya), and one reporting group that includes all other non-Stikine wild- and hatchery-origin fish in the baseline (Non-Stikine).

Original Objectives:

The goal of this project was to estimate the stock composition in Southeast Alaska sockeye fisheries near the Stikine River in 2013 using GSI. Original objectives were to:

- Determine the stock composition of sockeye harvests from the District 106 drift gillnet fishery. For 2013, 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 2013, 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 most recent version of the baseline includes 128 populations and 96 markers (populations: Figure 1, Table 1; markers: see Dann et al. 2012). A baseline update is currently in progress and will include an additional 50 populations; this baseline is expected to be completed in January 2015.

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 2013 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, 5 time strata; 2) Subdistrict 106-30, total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0-checks, and other; 3) Subdistrict 106-41, total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0-checks, and other; and 4) District 108, total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0-checks, and other. A total of 28 separate estimates were made for the 2013 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 2013 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 five reporting groups consisting of two reporting groups of Stikine wild fish (Stikine/Taku Mainstem and Tahltan Wild), two reporting groups of Stikine hatchery-origin fish (Enhanced Tahltan and Enhanced Tuya), and one reporting group that includes all other non-Stikine wild- and hatchery-origin fish in the baseline (Non-Stikine).

Results/Findings:

Fishery sampling

A total of 3,933 sockeye salmon were sampled in the gillnet fisheries in District 106 and 2,582 sockeye salmon were sampled in District 108 during 2013 (Table 2 and 3). In District 106, Subdistrict 30, 2,230 fish were sampled from statistical weeks 25 to 33 and in Subdistrict 41, 1,703 fish were sampled from statistical week 26 to 33 (Table 2). In District 108, 2,582 fish were sampled from statistical weeks 25 through 33 (Table 3).

Laboratory analyses

Of the samples collected in District 106, 1,877 samples were genotyped at 96 SNP genetic markers. During quality control procedures a total of 160 fish were reanalyzed at all 96 markers for a total of 15,360 comparisons. The average failure rate for District 106 was 4.5%, due primarily to poor tissue quality in some samples. A few inconsistencies were found (0.89% across all comparisons); these were found primarily in samples that were of poor quality.

Of the samples collected in District 108, 1,949 samples were genotyped at 96 SNP genetic markers. During quality control procedures a total of 166 fish were reanalyzed at all 96 markers for a total of 15,936 comparisons. The average failure rate for District 108 was 1.5%. Few inconsistencies were found (0.40% 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 3,826 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 2–11. 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 25 in Subdistrict 106-30; statistical week 31 in Subdistrict 106-41; and statistical weeks 27 and 32 in District 108.

The largest component of the Subdistrict 106-30 fishery sample in 2013 was non-Stikine-origin fish, 94% over the entire season (Figure 2). This reporting group dominated catches in every statistical week (Figure 3). The Stikine/Taku Mainstem stock was most prevalent in statistical weeks 28–31 (range: 4–8%). All other stocks were present at low proportions (<5%) over all statistical weeks. The most common age group in Subdistrict 106-30 was age-2.3 (37% of total), followed by age-1.3 (23%) and age-1.2 (20%; Figure 4). The Enhanced Tahltan, Tahltan Wild, and Stikine/Taku Mainstem reporting groups were primarily age-1.3 (79%, 65%, and 64%),

while Enhanced Tuya and Non-Stikine reporting groups were comprised of larger percentages of ages-2.2, -2.3, and other (Figure 5).

Similar to Subdistrict 106-30, the harvests in Subdistrict 106-41 were dominated by the Non-Stikine reporting group (69% over the entire season; Figure 2). This reporting group was the largest contributor in each statistical week, though other stocks were important contributors especially early in the season (Figure 6). The Stikine/Taku Mainstem reporting group contributed throughout the season (range: 8–22%), with the highest proportion observed in statistical week 28. The Enhanced Tahltan, Enhanced Tuya, and Tahltan Wild reporting groups were important contributors in statistical week 26 (12%, 20%, and 14%, respectively), and then declined over the next two weeks to 0%. The most common age group in Subdistrict 106-41 was age-1.3 (36% of total), followed by age-2.3 (28%) and age-1.2 (17%; Figure 7). Similar to Subdistrict 106-30, 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 8).

Stock compositions in District 108 were quite different from District 106, with Stikine-origin reporting groups dominating until late in the season. The largest contributor over the entire season was the Stikine/Taku Mainstem reporting group (44%), followed by the Non-Stikine and Enhanced Tuya reporting groups (25% and 13%, respectively; Figure 2). The largest contributor in statistical weeks 25 and 26 was the Enhanced Tuya reporting group (34% and 30%, respectively), followed by the Tahltan Wild and Enhanced Tahltan reporting groups in statistical week 25 (23% and 20%, respectively) and the Enhanced Tahltan, Stikine/Taku Mainstem, and Tahltan Wild reporting groups in statistical week 26 (22%, 19%, and 19% respectively; Figure 9). In statistical weeks 28–30, the Stikine/Taku Mainstem reporting group was the largest contributor (range: 62–68%) followed by the Non-Stikine reporting group (range: 25–32%). In statistical week 31, these two reporting groups contributed equally (each 50%), and the Non-Stikine reporting group was the largest contributor in statistical week 33 (57%). The most common age group in District 108 was age-1.3 (57%), followed by age-2.3 and age-1.2 (each 12%; Figure 10). 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 11).

Evaluation:

We accomplished the following:

- A total of 3,933 sockeye salmon were sampled from District 106 gillnet fisheries and 2,582 sockeye salmon were sampled from District 108 gillnet fisheries during the 2013 season.
- A total of 1,877 samples from District 106 and 1,949 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 8 temporal strata in Subdistrict 106-30, 7 temporal strata in Subdistrict 106-41, and 7 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, 28 separate estimates are provided for Stikine area fisheries in 2013 (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 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 will be presented to ADF&G Commercial Fisheries management staff and will be presented to the PSC Transboundary Technical Committee. A multi-year (2011-2013) report published in the ADF&G Fishery Data Series is expected in 2015.

Date Prepared: July 23, 2014

References:
Dann, T. H., C. Habicht, J. R. Jasper, E. K. C. Fox, H. A. Hoyt, H. L. Liller, E. S. Lardizabal, P. A. Kuriscak, Z. D. Grauvogel, and W. D. Templin. 2012. Sockeye salmon baseline for the Western Alaska Salmon Stock Identification Project. Alaska Department of Fish and Game, Special Publication No. 12-12, Anchorage.

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.

TTC (Transboundary Technical Committee). *In prep*. Estimates of Transboundary River salmon production, harvest and escapement, and a review of joint enhancement activities in 2013. Pacific Salmon Commission Report TCTR, Vancouver.

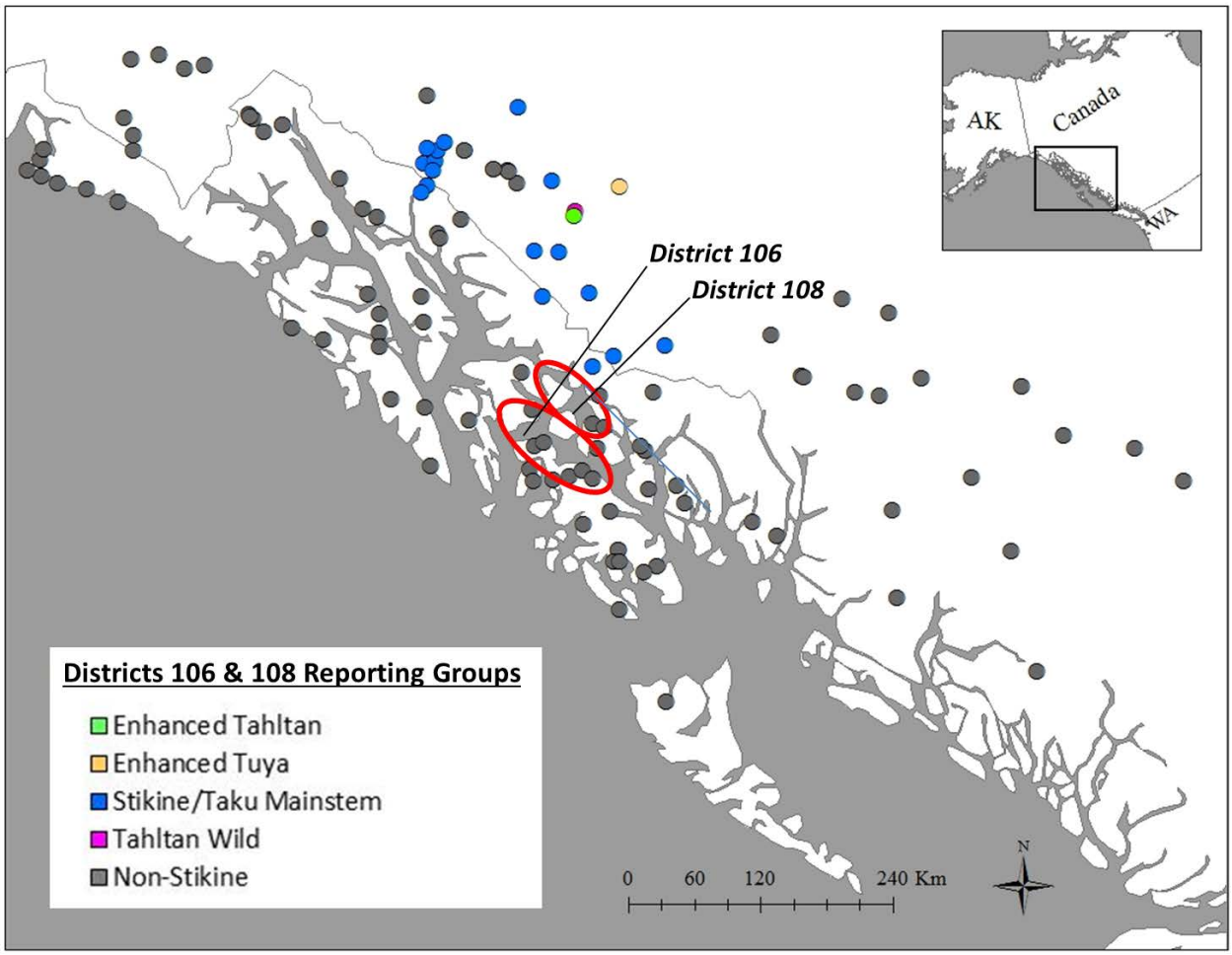

Figure 1. Map of Southeast Alaska sockeye salmon baseline collections used for the 2013 genetic stock identification analysis of harvests in Districts 106 and 108, and fishery locations.

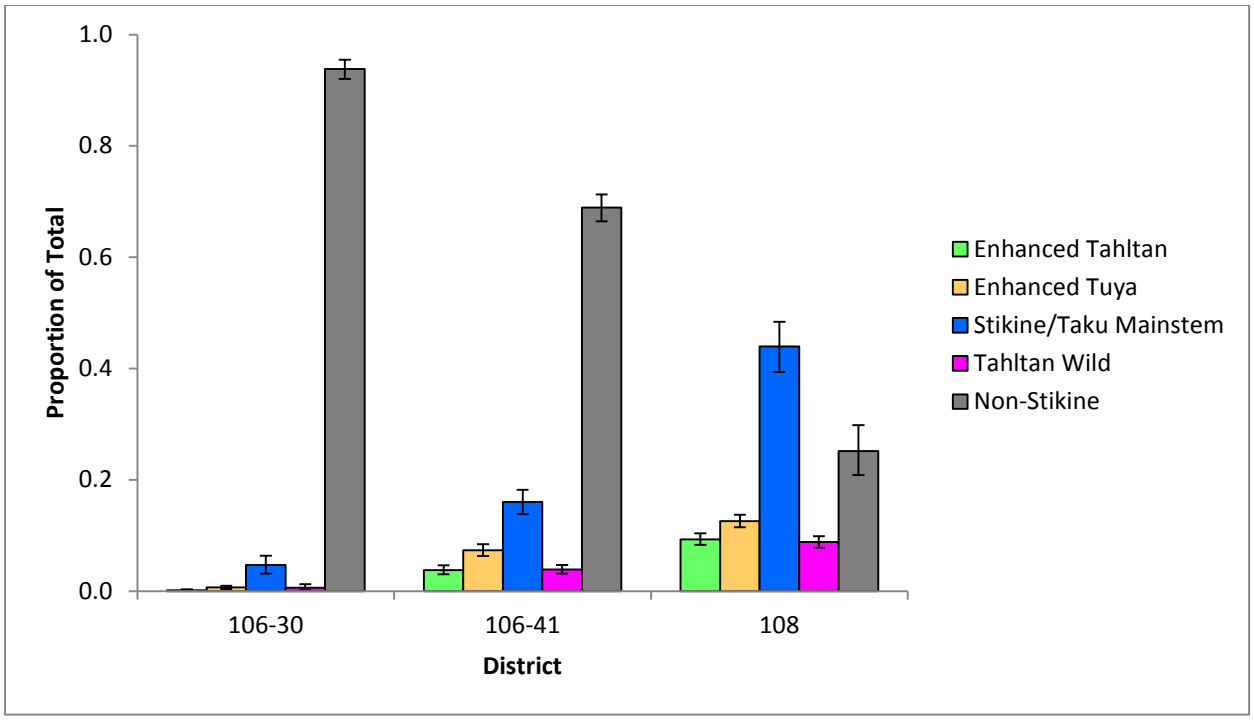

Figure 2. Total season stock composition estimates for Stikine River area fisheries. Estimates were weighted by harvest per strata.

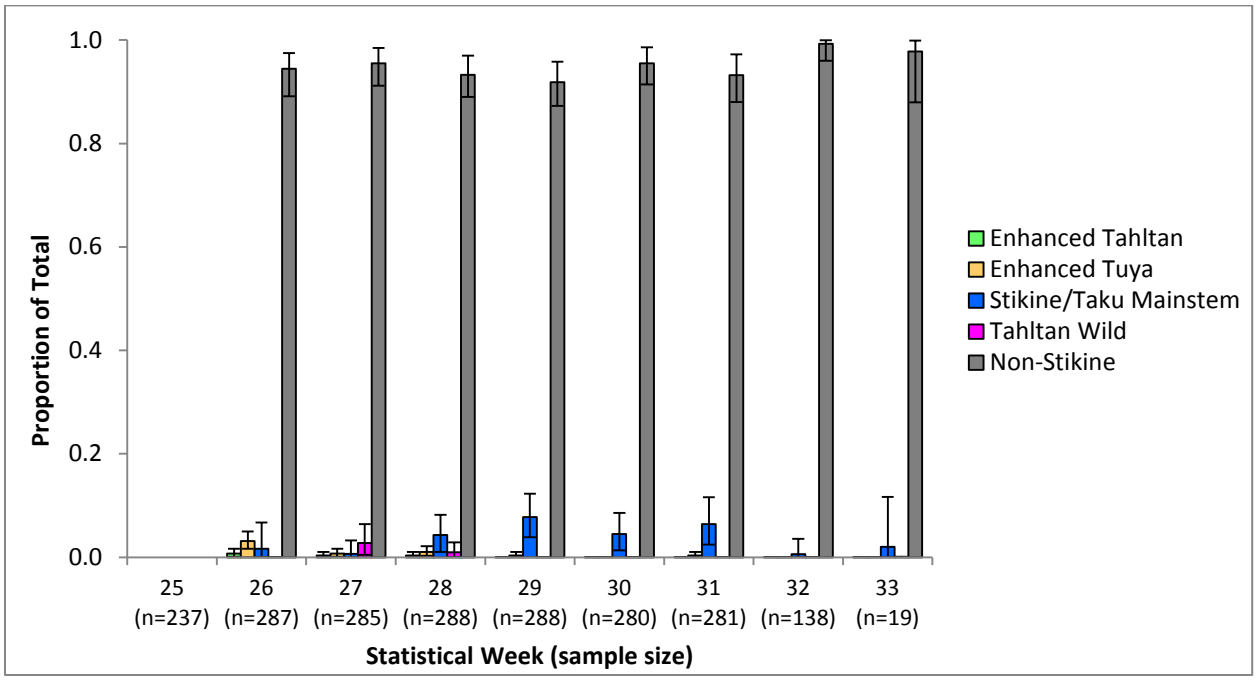

Figure 3. Stock composition estimates of sockeye salmon caught in the District 106-30 gillnet fishery in 2013. Sample size (n) includes genotyped, aged, and otolith-marked fish. Estimates in week 25 did not meet precision and accuracy goals identified by the TTC and thus are not reported.

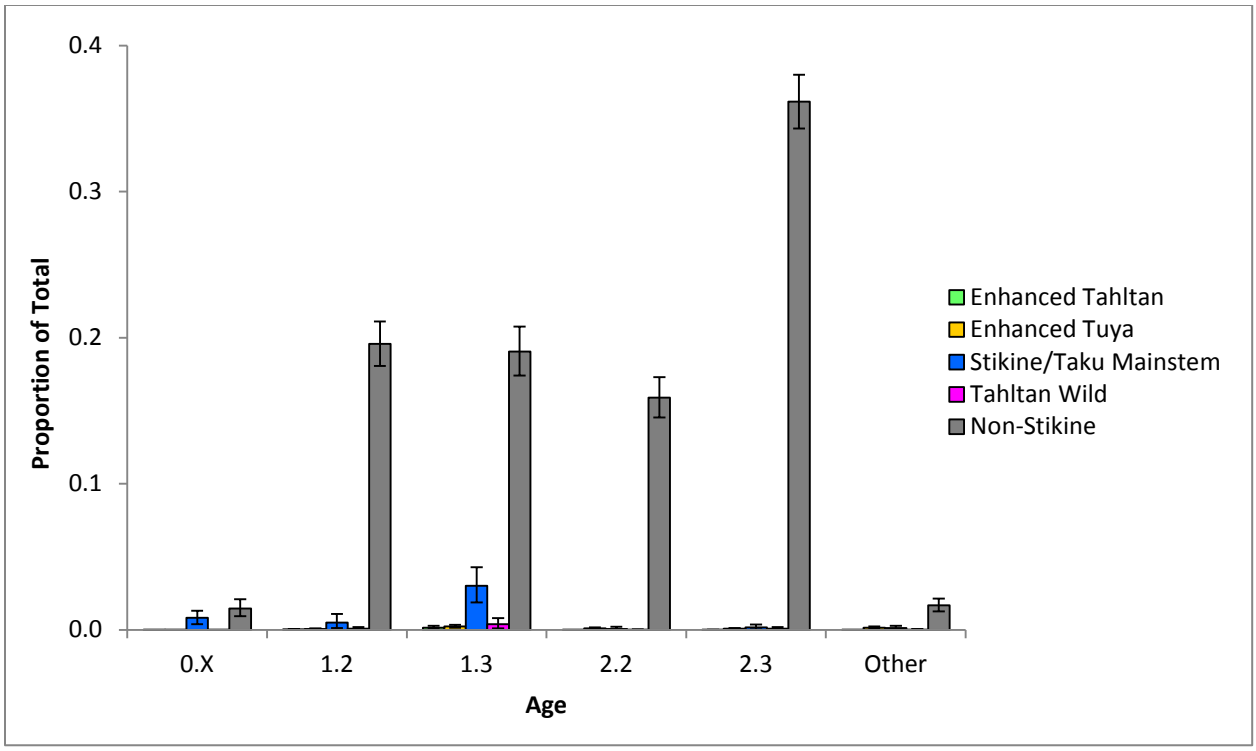

Figure 4. Age composition of sockeye salmon caught in the District 106-30 gillnet fishery in 2013 over the entire season.

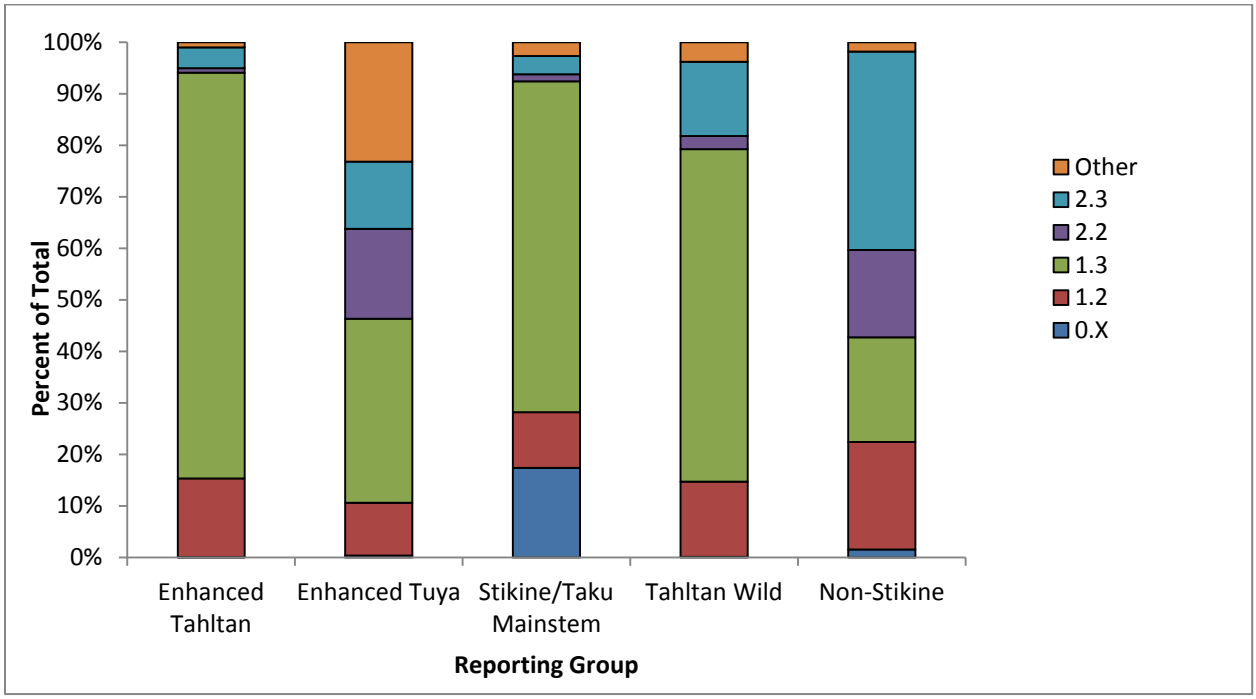

Figure 5. Age composition by reporting group of sockeye caught in the District 106-30 gillnet fishery in 2013.

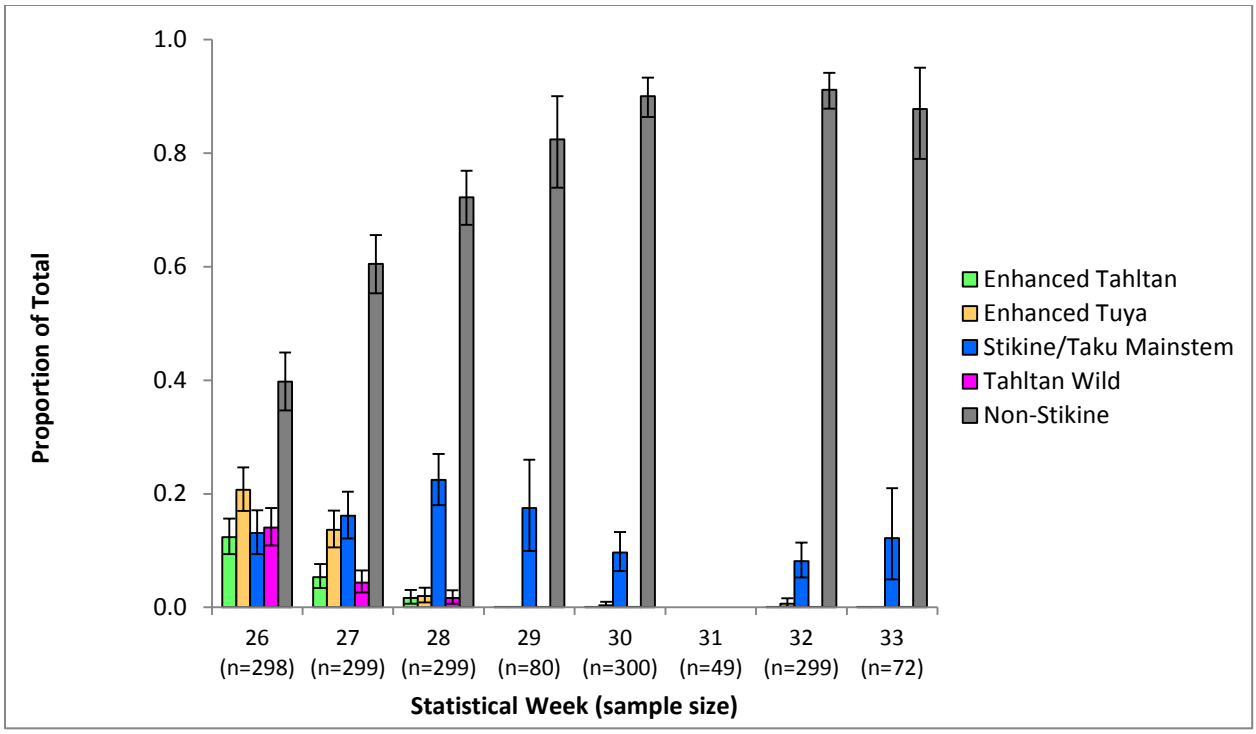

Figure 6. Stock composition estimates of sockeye salmon caught in the District 106-41 gillnet fishery in 2013. Sample size (n) includes genotyped, aged, and otolith-marked fish. Estimates in week 31 did not meet precision and accuracy goals identified by the TTC and thus are not reported.

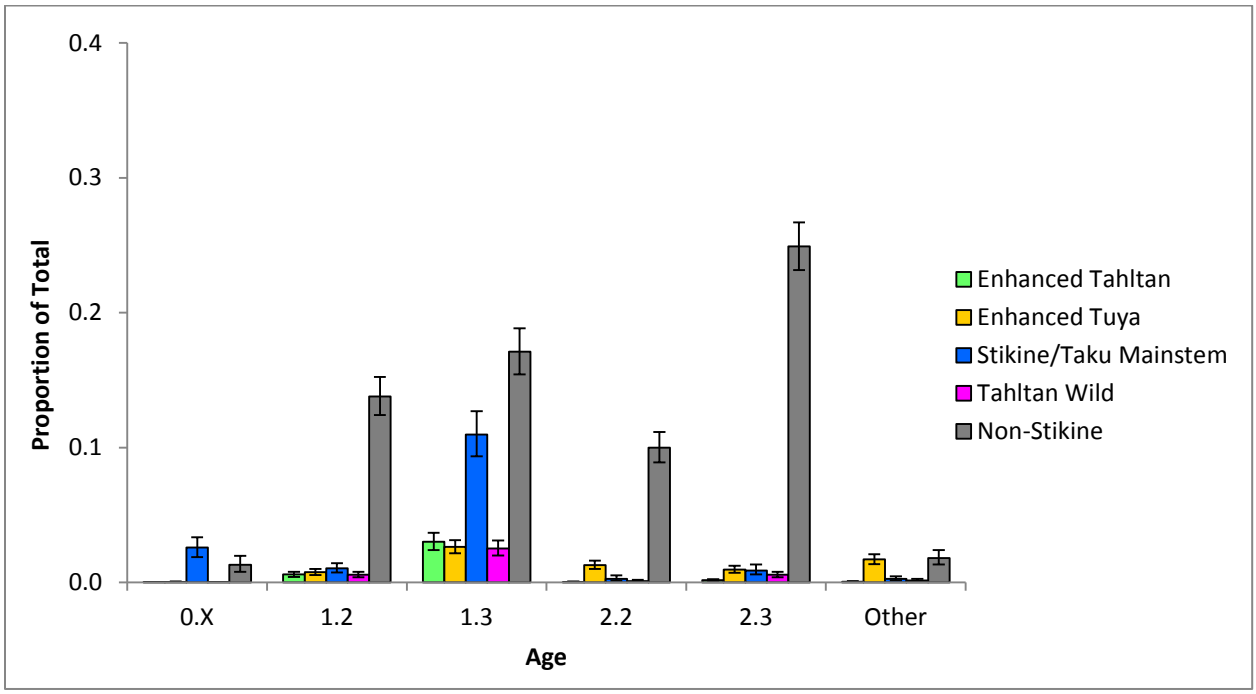

Figure 7. Total age composition of sockeye salmon caught in the District 106-41 gillnet fishery in 2013 over the entire season.

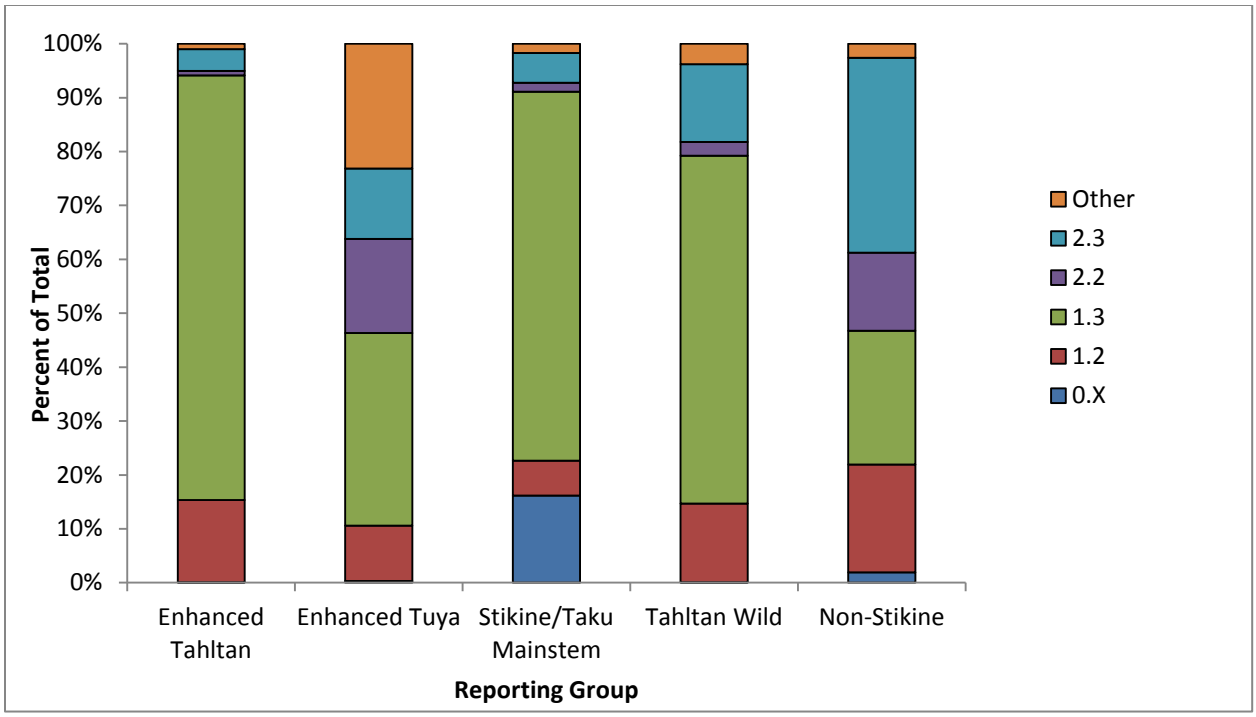

Figure 8. Age composition by reporting group of sockeye salmon caught in the District 106-41 gillnet fishery in 2013.

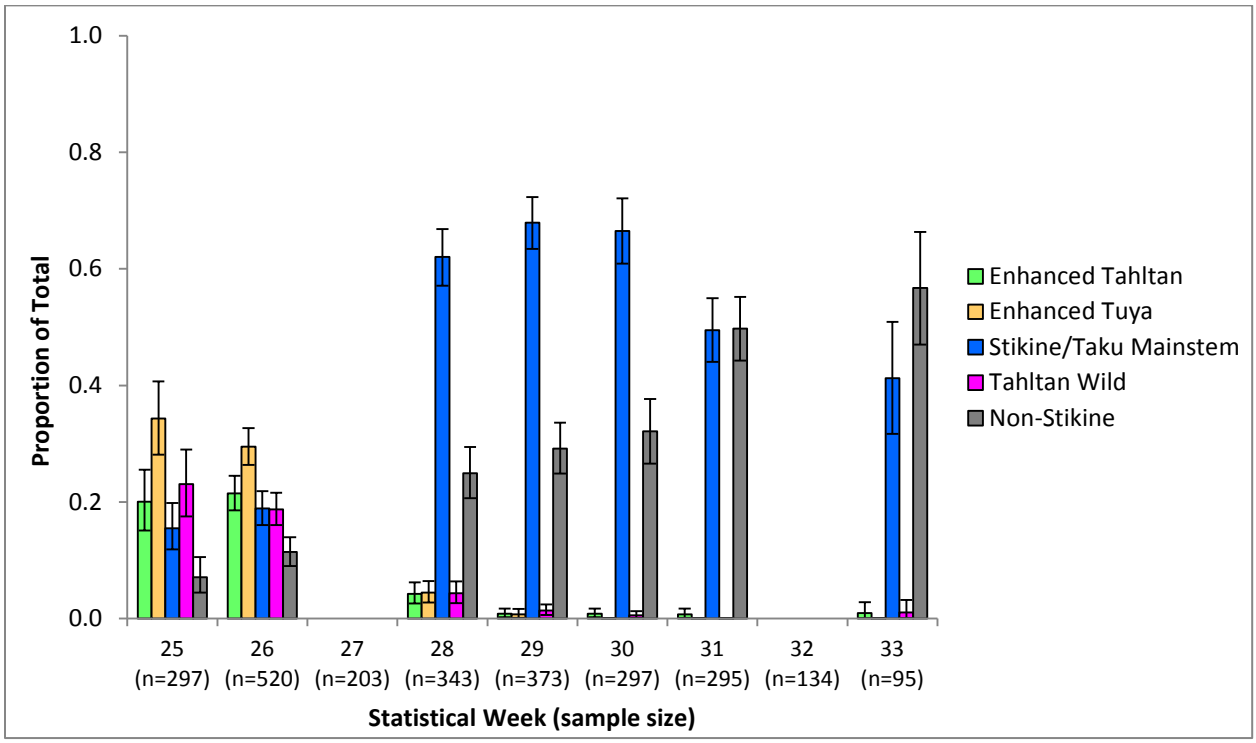

Figure 9. Stock composition estimates of sockeye salmon caught in the District 108 gillnet fishery in 2013. Sample size (n) includes genotyped, aged, and otolith-marked fish. Estimates in weeks 27 and 32 did not meet precision and accuracy goals identified by the TTC and thus are not reported.

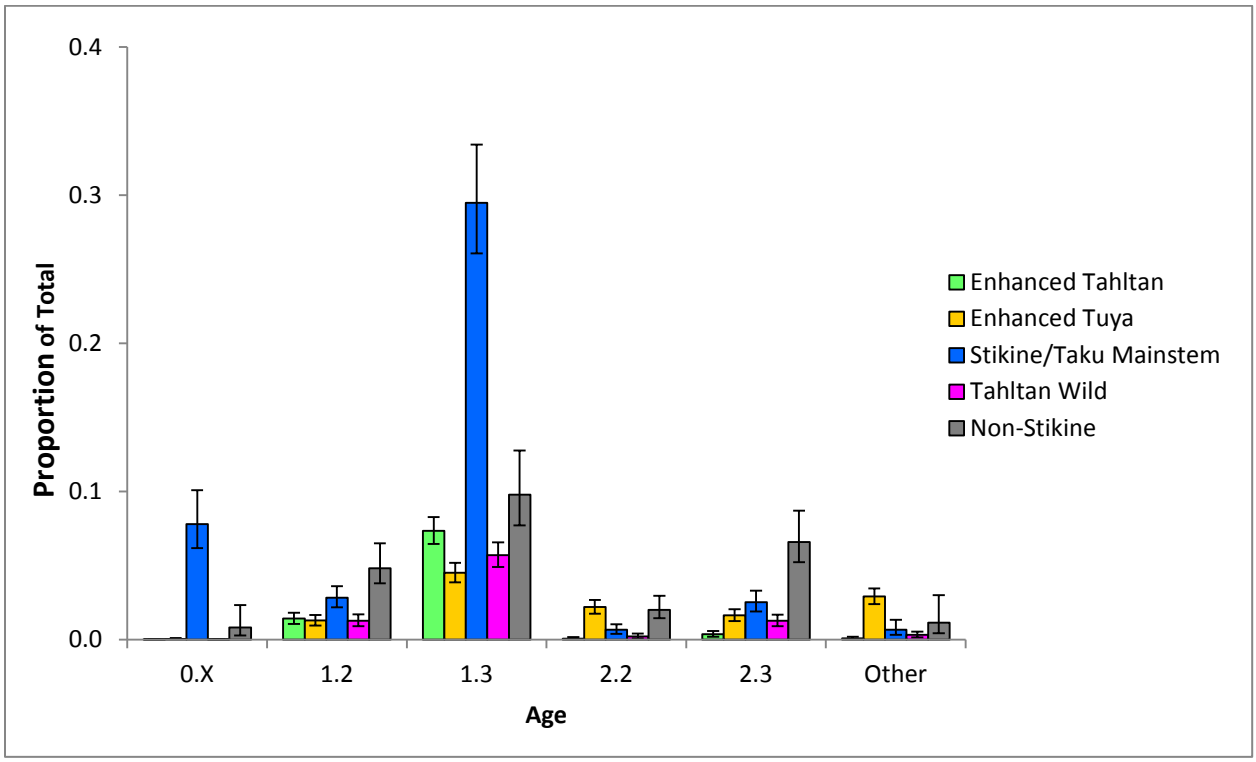

Figure 10. Total age composition of sockeye salmon caught in the District 108 gillnet fishery in 2013 over the entire season.

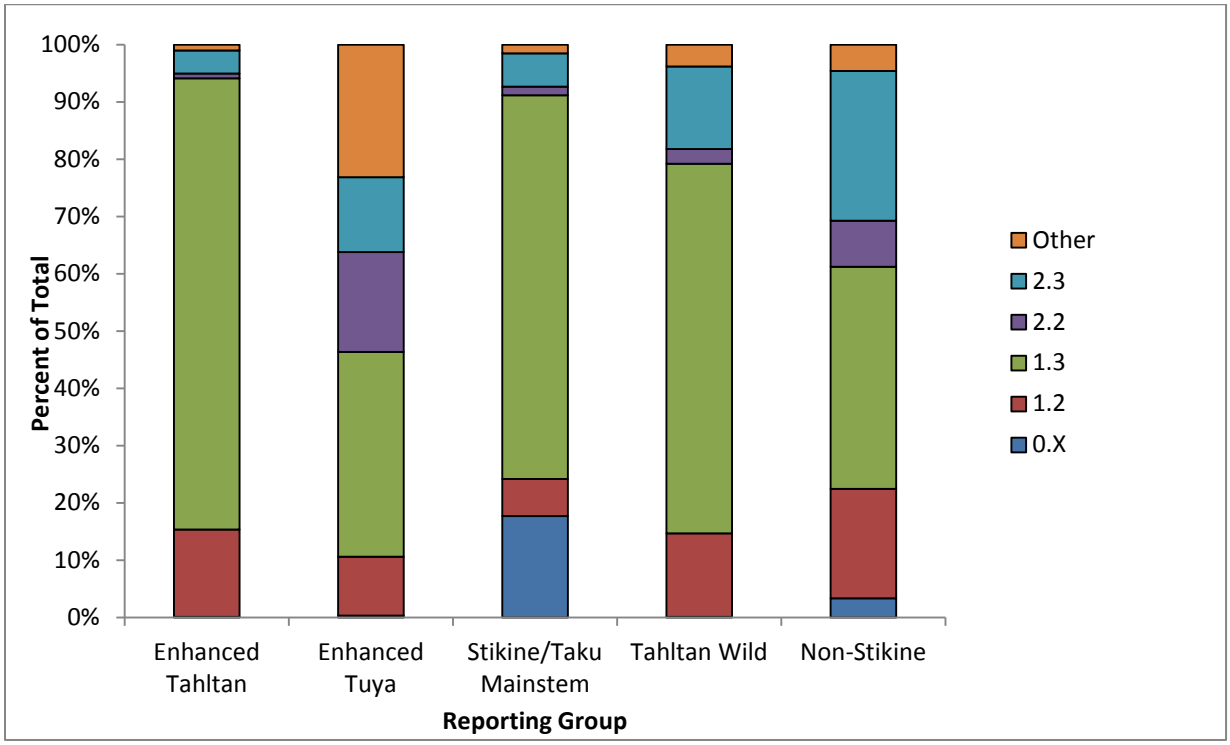

Figure 11. Age composition by reporting group of sockeye salmon caught in the District 108 gillnet fishery in 2013.

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 2013. Wild collections are ordered north to south and followed by enhanced collections ordered alphabetically.

Reporting Group	Collection Location
Non-Stikine	Ahrnklin River
	Akwe River
	Dangerous River
	East Alsek River
	Lost/Tahwah Rivers
	Old Situk
	Situk Lake
	Blanchard River
	Border Slough
	Klukshu River
	Kudwat Creek
	Tatshenshi/Kwatini
	Neskataheen Lake
	Tweedsmuir
	Vern Ritchie
	Chilkat Lake - early and late run
	Chilkat Mainstem - Mosquito Lk
	Chilkat Mainstem - Bear Flats
	Chilkat Mainstem - Mule Mead.
	Chilkoot Lake - beaches
	Chilkoot Lake - Bear Creek
	Berners Bay
	Falls Lake - East Baranof Island
	Neva Lake weir
	Sitkoh Lake
	Lake Eva
	Steep Creek
	Windfall Lake
	Ford Arm Lake weir
	Klag Bay Stream outlet
	Kook Lake
	Pavlof Lake
	Hasselborg Lake
	Redfish Lake beaches
	Salmon Lake weir
	Crescent Lake
	Snettisham
	King Salmon Lake weir
	Little Tatsamenie
	Tatsamenie Lake
	Little Trapper
	Kuthai Lake
Stikine/Taku Mainstem	Fish Creek
	Yehring Creek
	Tulsequah
	Yellow Bluff
	Shustahine
	Taku River
	Takwahoni/Sinwa
	Betw Tuskwa and Chunk
	Hackett River
	Nahlin River
	Shakes Slough Creek
	Iskut River
	Verrett River
	Scud River
Stikine/Taku Mainstem (cont.)	Scud River
	Chutine Lake
	Chutine River
	Christina Lake
Tahltan Wild	Tahltan Lake, Little Tahltan
Non-Stikine	Hugh Smith Lake
	McDonald - Hatchery Ck
	Hatchery Ck - Sweetwater
	Heckman Lake
	Helm Lake
	Kanalku Lake
	Kutlaku Lake
	Kah Sheets Lake
	Karta R, McGilvery Ck
	Kegan Lake
	Kunk Lake - Etolin Island
	P.O.W. Island - Luck Lake
	P.O.W. Island - Big Lake
	Mahoney Creek
	Mill Ck early - Virginia Lk
	Petersburg Lake
	Red Bay Lake
	Salmon Bay Lake
	Unuk River - Gene's Lake
	Bar Creek - Essowah Lake
	Fillmore Lk - Hoffman Ck
	Hetta Creek - late run
	Hetta Creek - middle run
	Hetta Creek - early run
	Klakas Lake
	Klawock - Half Mile Creek
	Sarkar - Five Finger Creek
	Shipley Lake
	Salmon Bay Lake
	Unuk River - Gene's Lake
	Bar Creek - Essowah Lake
	Fillmore Lk - Hoffman Ck
	Hetta Creek - late run
	Hetta Creek - middle run
	Hetta Creek - early run
	Klakas Lake
	Klawock - Half Mile Creek
	Sarkar - Five Finger Creek
	Shipley Lake
	Eek Creek
	Thoms Lake
	Bowser Lake
	Damdochax Creek
	Meziadin Beach
	Tintina Creek
	Alastair Lake
	Four Mile Creek
	Fulton River
	Kitsumkalum Lake
	Lower Tahlo River
	McDonell - Zymoetz River

-continued-

Table 1 (con't). 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 2013. Wild collections are ordered north to south and followed by enhanced collections ordered alphabetically.

Reporting Group	Collection Location
Non-Stikine (cont.)	Nangeese River
	Nanika River
	Slamgeesh River
	Sustut - Johanson Lake
	Swan Lake
	Upper Babine River
	QCI - Naden River
	Central - Kitlope Lake
	Adams River - Shuswap late
	Birkenhead
	Chilko Lake
	Gates Creek
	Harrison River
	Horsefly River
	Raft River
	Stellako River
	Weaver Creek
	Baker Lake
	Issaquah Creek - Puget Sound
	Enhanced - Burnett Inlet
	Enhanced - Main Bay
	Enhanced - McDonald
	Enhanced - Sweetheart
	Enhanced - Speel Arm
	Enhanced - Tatsamenie
	Enhanced - Trapper
Enhanced Tahltan	Enhanced - Tahltan
Enhanced Tuya	Enhanced - Tuya

Table 2. Number of sockeye salmon sampled from Subdistricts 106-30 and 106-41 sockeye gillnet harvests during each statistical week in 2013, samples genotyped, and otolith-marked or aged samples not genotyped for each statistical week. Samples were weighted by harvest for total season estimates.

District	Subdistrict	Statistical Week	Total Samples Collected	Genotypes Used in Analysis	Not Genotyped (otolith-marked or aged or both)
106	30	25	250	6	231
		26	300	25	262
		27	300	65	220
		28	300	58	230
		29	300	116	219
		30	300	67	215
		31	300	42	241
		32	160	15	125
		33	20	6	14
	41	26	300	197	101
		27	300	234	66
		28	300	277	22
		29	80	74	6
		30	300	286	14
		31	50	45	4
		32	300	292	8
		33	73	72	0
Totals			3,933	1,877	1,978

Table 3. Number of sockeye salmon sampled from gillnet harvests in the sockeye salmon fisheries in District 108 during 2013 divided by statistical week, samples genotyped, and otolith-marked or aged samples not genotyped. Samples were weighted by harvest for total season estimates.

District	Statistical Week	Total Samples Collected	Genotypes Used in Analysis	Not Genotyped (otolith-marked or aged or both)
108	25	300	158	139
	26	524	250	270
	27	203	150	53
	28	348	299	44
	29	379	343	32
	30	299	280	18
	31	299	264	33
	32	134	120	14
	33	96	85	10
Totals		2,582	1,949	613