PSC Northern Fund
Final Report

Project Number: NF-2017-I-6; COOP 18-004

Project Title: Mixed stock analysis of U.S. Districts 106, 108, and 111 sockeye salmon gillnet fisheries, 2017

Project Manager: Serena Rogers Olive and Sara Gilk-Baumer, Alaska Dept. of Fish and Game - Gene Conservation Laboratory, (907) 267-2162, serena.olive@alaska.gov

Duration of Project: Start date: July 7, 2017 End Date: December 31, 2018

Abstract:
The Stikine and Taku rivers 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 2017 gillnet fishery in Districts 106, 108, and 111 by screening 96 single nucleotide polymorphic genetic markers in 13,786 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 2017. In the District 108 fisheries, *Tahltan* and *Enhanced Tahltan* were the largest contributors in the early weeks, while the contribution of *Stikine/Taku Mainstem* dominated later in the season. The *Taku Lakes* reporting group was the largest contributor in District 111 early in the season, while the *Stikine/Taku Mainstem* and *Enhanced Snettisham* groups were the largest contributors in later weeks. The most common age group in all three districts was age-1.3.

Introduction:
The Stikine and Taku rivers 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 and Taku river sockeye salmon are harvested by commercial gillnet fisheries in U.S. Districts 106, 108 and 111, U.S. subsistence fisheries in the lower river, Canadian commercial gillnet in the lower and upper river, and Canadian aboriginal fisheries in the upper river.

The commercial 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, while fisheries in District 111 harvest wild stocks of sockeye salmon primarily bound for several systems in the Taku River or to Crescent and Speel lakes in Alaska. Significant numbers of enhanced sockeye salmon bound for release sites in the Stikine and Taku rivers or to Snettisham Hatchery are also caught in these fisheries. Catches of Stikine and Taku river sockeye salmon stocks in Districts 106, 108 and 111 gillnet fisheries and the U.S. Stikine subsistence fishery are subject to a harvest sharing agreement outlined in Annex IV of the Pacific Salmon Treaty (PST), in which the U.S. is allowed 50% of the Total Allowable Catch of Stikine River and a variable proportion of Taku River sockeye salmon depending on the return of enhanced fish. Stock contribution estimates are critical 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.

This project completed mark- and age-enhanced GSI analysis on sockeye salmon tissue samples collected from commercial gillnet fisheries in areas near the Stikine and Taku rivers in 2017. The analysis focused on tissue samples collected in U.S. Districts 106, 108, and 111.

Objectives:
The objective of this project is to estimate the stock composition of Southeast Alaska sockeye salmon fisheries near the Stikine and Taku rivers such that the estimates are within 10% of the true value 90% of the time. This will be accomplished through the following tasks:

- Determine the stock composition of sockeye salmon harvests from the District 106 drift gillnet fishery for 5 reporting groups including: 2 reporting groups of Stikine wild fish (*Stikine/Taku Mainstem* and *Tahltan Wild*), 2 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*). For 2017, provide estimates for:
    - Subdistrict 106-30
        - Total season, all age groups combined;
        - Total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0-checks, and other;
        - At least 5 time strata, all age groups combined;
    - Subdistrict 106-41
        - Total season, all age groups combined;
        - Total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0-checks, and other;
        - At least 5 time strata, all age groups combined.
- Determine the stock composition of sockeye salmon harvests from the District 108 drift gillnet fishery for the 5 reporting groups listed above. For 2017, provide estimates for:
    - District 108
        - Total season, all age groups combined;
        - Total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0-checks, and other;
        - At least 5 time strata, all age groups combined.
- Determine the stock composition of sockeye salmon harvests from the District 111 drift gillnet fishery for 10 reporting groups including: 4 reporting groups of Taku area wild fish (*Stikine/Taku Mainstem*, *Taku Lakes*, *Tatsamenie Wild*, and *Speel Wild*), 4 reporting groups of Taku area hatchery-origin fish (*Enhanced Tatsamenie*, *Enhanced Little Trapper*, *Enhanced King Salmon* and *Enhanced Snettisham*), one reporting group of Stikine hatchery-origin fish (*Enhanced Stikine*), and one reporting group that includes all other fish in the baseline (*Other*). For 2017, provide estimates for:
    - District 111
        - Total season, all age groups combined;
        - Total season, by age groups including ages-1.2, -1.3, -2.2, -2.3, 0-checks, and other;

- At least 5 time strata, all age groups combined.

Approach:

Fishery Sampling

Landings from drift gillnet fisheries were sampled by ADF&G at fish processing facilities in Petersburg, Wrangell, Ketchikan, and Juneau, 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 onto Whatman filter paper for dry preservation. 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 to further enhance the baseline for fishery applications. The current genetic baseline includes 238 populations and 96 markers (Table 1; Rogers Olive et al. 2018).

Samples were analyzed for 96 SNP loci. Genomic DNA was extracted using a NucleoSpin® 96 Tissue Kit by Macherey-Nagel (Düren, Germany). 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 QuantStudio™ 12K Flex Real-Time PCR System (Life Technologies). 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 from 8% of each collection for all markers to ensure genotype reproducibility and to identify laboratory errors and measure rates of inconsistencies during repeated analyses.

Mixture Analysis

Mixture analyses included 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 2017 fisheries.

This algorithm was run for 40,000 Markov chain Monte Carlo repetitions, discarding the first 20,000 repetitions to eliminate the effect of the initial state (burn-in). The point estimates and credibility intervals for the stock proportions and age composition are simple summary statistics of the output.

A total of 39 weekly stock composition estimates and 26 age group estimates were made for the 2017 fisheries.

Results/Findings:

Fishery sampling

A total of 13,786 sockeye salmon were sampled in districts 106, 108 and 111 gillnet fisheries. In District 106, Subdistrict 30, 2,123 fish were sampled and in Subdistrict 41, 3,054 fish were sampled for a total of 5,177 District 106 samples. In districts 108 and 111, 3,010 and 5,599 sockeye salmon were sampled respectively. Sockeye salmon were sampled from statistical weeks 25 through 35 for District 106, 26 through 35 for District 108, and 25 through 35 for District 111 (Tables 2 – 4).

Laboratory analyses

Of the samples collected in District 106, 2,272 samples were genotyped at 96 SNP genetic markers. During quality control procedures a total of 190 samples were reanalyzed at all 96 markers for a total of 18,240 comparisons. The average failure rate for District 106 was 1%. Few inconsistencies were found (< 1% across all comparisons).

Of the samples collected in District 108, 981 samples were genotyped at 96 SNP genetic markers. During quality control procedures a total of 82 samples were reanalyzed at all 96 markers for a total of 7,872 comparisons. The average failure rate for District 108 was low at 1%. Few inconsistencies were found (<1% across all comparisons).

Of the samples collected in District 111, 2,158 samples were genotyped at 96 SNP genetic markers. During quality control procedures a total of 180 samples were reanalyzed at all 96 markers for a total of 17,280 comparisons. The average failure rate for District 111 was low at 0.8%. Few inconsistencies were found (<1% across all comparisons).

Mixture analysis

Mixtures of fish representing catches by statistical week, age group, and subdistrict from U.S. Districts 106, 108 and 111 gillnet fisheries were analyzed. Stock and age composition estimates can be found in Figures 1–14. 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. Statistical weeks 34 and 35 for Subdistricts 106-30 and statistical week 33, 34 and 35 for District 108, were combined, respectively, so the estimates would 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).

The largest component of the Subdistrict 106-30 harvest in 2017 was non-Stikine-origin fish in all weeks (range 90–97%; 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 with the exception of *Stikine/Taku Mainstem* in statistical weeks 25, 30, and 33 (9%, 6%, and 6% respectively). The most common age group in Subdistrict 106-30 for the *Non-Stikine* group was age-1.3 (56% of total), followed by age-2.3 (24%; Figures 3 and 4).

Similar to Subdistrict 106-30, the harvests in Subdistrict 106-41 were dominated by the *Non-Stikine* reporting group (68% 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 (statistical weeks 25–28; Figure 5). The *Tahltan Wild* reporting group contributed between 14% and 34%, followed by the *Enhanced Tahltan* reporting group (range: 8–16%). The *Enhanced Tuya* group contributed <5% in all weeks except for statistical week 26. The greatest contribution by the *Stikine/Taku Mainstem* reporting group was 13% in statistical week 33. The most common age group in Subdistrict 106-41 was age-1.3 (42% of total), followed by age-2.3 (15% of total; Figures 6 and 7).

Stock compositions in District 108 were quite different from District 106, with no single stock dominating every week. The *Tahltan Wild* reporting group was the largest contributor is weeks 26 and 27 (41% contribution in both weeks), while the *Stikine/Taku Mainstem* reporting group became the dominant contributor starting in week 28 through the rest of the season (range 31–54%; Figure 8). The greatest contribution of the *Non-Stikine* reporting group was in the combined weeks (33/34/35) at 40%, while the smallest contribution was in statistical week 31 (10%; Figure 8). The contribution of the *Enhanced Tahltan* reporting group steadily decreased from 34% in statistical week 26 to 4% by the end of the season. The *Enhanced Tuya* reporting group was the smallest overall contributor over the course of the whole season (5%; Figure 1). The greatest component of the total District 108 harvest was the *Stikine/Taku Mainstem* reporting group (33%), followed by the *Tahltan Wild* reporting group (29%; Figure 1). The most common age group in District 108 was age-1.3 (75%), followed by age-2.3 (12%; Figures 9 and 10). All other ages were present at 5% or less.

The greatest contributor to the overall harvest in District 111 in 2017 was the *Enhanced Snettisham* reporting group (29%), followed by the *Tatsamenie Wild* and *Stikine/Taku Mainstem* reporting groups (27 and 25% respectively; Figure 11). Samples were unavailable from Subdistrict 111-31 for statistical weeks 25, 26, and 35; therefore, these weekly stock composition estimates were based solely on samples collected from Subdistrict 111-32. The largest contributions from the *Taku Lakes* reporting group was in weeks 25 through 29 (range 63–17%; Figure 12), with contributions in the rest of the weeks at 5% or less, while the *Stikine/Taku Mainstem* group was an important contributor throughout the season (range:11–46%) with the greatest contribution in statistical week 25 (Figure 12). The *Enhanced Snettisham* reporting group did not show up in the harvest until statistical week 27, with contributions ranging from 17% to 45%. The *Other* group contributed 5% or less in all weeks except weeks 27 and 32 (15% and 6% respectively). All other reporting groups were present at ≤ 5% in all weeks with the exception of *Enhanced King Salmon* (6%; statistical week 26) and *Enhanced Tatsamenie* (statistical weeks 32 through 35). The most common age group in District 111 was age-1.3 (70%) followed by age-1.2 (14%; Figures 13 and 14).

Evaluation:

We accomplished the following:

- A total of 5,177 samples from District 106, 3,010 samples from District 108 and 5,599 samples from District 111 were collected from sockeye salmon gillnet fisheries during the 2017 season.
- A total of 2,272 samples from District 106, 981 samples from District 108 and 2,158 samples of sockeye salmon from District 111 were assayed for genotypes for the 96 SNP loci and quality control procedures revealed a low rate of inconsistencies. The genotypes for 2,229, 964 samples and 2,132 samples were used in analysis for districts 106, 108, and 111 respectively.
- Mixture analyses estimated the contributions of 5 reporting groups including Stikine wild and enhanced sockeye salmon to 10 temporal strata in Subdistrict 106-30, 11 temporal strata in 106-41, and 8 temporal strata in District 108. Mixture analyses estimated the contributions of 9 reporting groups to 11 temporal strata in District 111.
- Mixture analyses estimated the age compositions of harvests over the entire season in Subdistrict 106-30, Subdistrict 106-41, District 108 over 6 ages and over 8 ages in District 111.
- Mixture analyses estimate the seasonal stock composition over all ages for Subdistrict 106-30, Subdistrict 106-41, and District 108 for 5 reporting groups and for District 111 for 9 reporting groups.
- The improved methodology (mark- and age-enhanced GSI) has allowed us to combine several sources of data when estimating stock composition 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 and Taku 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 2019).

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 multi-year report published in the ADF&G Fishery Data Series is expected in 2020.

Date Prepared: June 12, 2018; updated October 9, 2019

References:

Rogers Olive, S. D., E. K. C. Fox, and S. E. Gilk-Baumer. 2018. Genetic baseline for mixed stock analyses of sockeye salmon harvested in Southeast Alaska for Pacific Salmon Treaty applications, 2018. Alaska Department of Fish and Game, Fishery Manuscript No. 18-03, Anchorage.

TTC (Transboundary Technical Committee). 2019. Final estimates of Transboundary River salmon production, harvest and escapement and a review of joint enhancement activities in 2017. Pacific Salmon Commission Report TCTR (19)-2, Vancouver.

Table 1. Reporting groups and collection locations defined for use in genetic stock identification of sockeye salmon caught in gillnet fisheries in Districts 106, 108, and 111 in 2017. Wild collections are ordered north to south and followed by enhanced collections.

		Reporting Groups					
	Source	***Dist 106, 108***	***Dist 111***	Region	Populations	Year(s) Collected	N
1	Wild	***Non-Stikine***	***Other***	Prince William Sound	Bainbridge Lake	2010	95
2					Coghill Lake	1991, 1992, 2010	378
3					Eshamy Lake	1991, 2008	185
4					Main Bay	1991	96
5					Miners Lake	1991, 2009	191
6				Copper	Eyak Lk. - Middle Arm	2007	95
7					Eyak Lk. - Beaches	2007	87
8					Eyak Lk. - Hatchery Cr.	2010	95
9					Mendeltna Creek	2008, 2009	188
10					Swede Lake	2008	95
11					Gulkana R. – Fish Cr	2008	95
12					Gulkana River – E. Fork	2008	75
13					Paxson Lake	2009	75
14					Mentasta Lake	2008	95
15					Tanada Creek	2005	94
16					Tanada Lake - lower	2009	95
17					Tanada Lake - shore	2009	93
18					Klutina River	2008	95
19					Klutina Lake	2008, 2009	95
20					Bear Hole - Klutina	2008	94
21					Banana Lake - Klutina	2008	80
22					St. Anne Creek	2005, 2008	186
23					Mahlo River	2008	94
24					Tonsina Lake	2009	94
25					Long Lake	2005	95
26					Tebay River	2008	93
27					Bremner - Steamboat	2008	95
28					Bremner – Salmon Cr.	2008	93
29					Clear Creek	2007	87
30					McKinley Lake	2007	95
31					McKinley Lake	2008	95
32					McKinley Lake	1991	95
33					Salmon Creek	2007	93
34					Martin Lake	2007, 2008	187
35					Martin River Slough	2008	95

	Reporting Groups					
Source	*Dist 106, 108*	*Dist 111*	Region	Populations	Year(s) Collected	N
36				Tokun Lake	2008, 2009	189
37				Bering Lake	1991	95
38				Kushtaka Lake	2007, 2008	189
39			Yakutat	Mountain Stream	2007	159
40				Situk Lake	2013	190
41				Old Situk River	2007	163
42				Lost/Tahwah Rivers	2003	93
43				Ahrnklin River	2007	90
44				Dangerous River	2009	95
45				Akwe River	2009	95
46				East Alsek River	2003	94
47			Alsek	Datlasaka Creek	2012	95
48				Goat Creek	2007, 2012	56
49				Border Slough	2007, 2008	71
50				Border Slough	2009, 2011	70
51				Tweedsmuir	2007	48
52				Tweedsmuir	20099	46
53				Vern Ritchie	2009, 2010	114
54				Neskataheen Lake	2007	195
55				Klukshu River	2006	95
56				Klukshu River	2007	94
57				Kudwat Creek	2009, 2010, 2011	100
58				Tatshenshini – Bridge	2011, 2012	105
59				Tatshenshini - Stinky	2011	40
60				Upper Tatshenshini	2003	95
61				Little Tatshenshini Lk.	2001, 2003	65
62				Kwatini River	2011	65
63				Blanchard River	2007	89
64				Blanchard River	2009	62
65			N. Southeast	Chilkat - Bear Flats	2007	190
66				Chilkat - Mule Meadows	2003, 2007	189
67				Chilkat - Mosquito	2007	159
68				Chilkat Lake	2007	233
69				Chilkat Lake	2013	251
70				Chilkoot River	2003	159
71				Chilkoot Lk. - Bear Cr.	2007	233
72				Chilkoot Lk. - beaches	2007	251
73				Vivid Lake	1993	48
74				Seclusion Lake	2014	117

	Reporting Groups					
Source	***Dist 106, 108***	***Dist 111***	Region	Populations	Year(s) Collected	N
75				North Berg Bay Inlet	1991	53
76				North Berg Bay Inlet	1992	100
77				Bartlett River	2013	69
78				Neva Lake	2008	94
79				Neva Lake	2009, 2013	255
80				Hoktaheen - inlet	2004	47
81				Hoktaheen - outlet	2004	49
82				Hoktaheen - marine	2014	47
83				Klag Bay Stream	2009	200
84				Ford Arm Lake	2004	207
85				Ford Arm Creek	2013	199
86				Redoubt Lake	2013	200
87				Salmon Lake	2007, 2008	185
88				Benzeman Lake	1991, 1993	95
89				Falls Lake	2003, 2010	190
90				Redfish Lake	1993	94
91				Kutlaku	2003	95
92				Kutlaku	2012	78
93				Kutlaku	2013	50
94				Lace River	2013	63
95				Berners Bay	2003, 2013	165
96				Antler-Gilkey River	2013	53
97				Windfall Lake	2003, 2007	142
98				Steep Creek	2003	91
99				Lake Cr. (Auke Cr. Weir)	2013, 2014	318
100				Crescent Lake	2003	194
101		***Speel Wild***		Speel Lake	2003	95
102				Snettisham Hatchery	2006, 2007	190
103				Snettisham Hatchery	2013	146
104		***Other (cont.)***		Pavlof River	2012, 2013	174
105				Kook Lake Late	2007, 2010, 2012	194
106				Kook Lake early	2012, 2013	148
107				Sitkoh Lake	2003, 2011, 2012	351
108				Lake Eva	2012	115
109				Hasselborg Lake	2012, 2013	209
110				Kanalku Lake	2007, 2010, 2013	319
111		***Taku Lakes***	Taku	Kuthai Lake	2006	171
112				King Salmon Lake	2010, 2011	214
113				Little Trapper Lake	1990, 2006	237
114				Little Tatsamenie	2011	59

Source	Reporting Groups: *Dist 106, 108*	*Dist 111*	Region	Populations	Year(s) Collected	N
115		***Tatsamenie Wild***		Tatsamenie Lake	2005, 2006	288
116	***Stikine/Taku***	***Stikine/Taku***		Hackett River	2008	52
117	***Mainstem***	***Mainstem***		Nahlin River	2003, 2007, 2012	179
118				Taku River	2007	95
119				Takwahoni/Sinwa	2009	67
120				Shustahini Slough	2008, 2009	185
121				Tuskwa/Chunk Slough	2008, 2009	356
122				Yellow Bluff Slough	2008, 2010, 2011	81
123				Tulsequah River	2007, 2008, 2009	156
124				Fish Creek	2009, 2010	160
125				Yehring Creek	2007, 2009	171
126			Stikine	Chutine River	2008	94
127				Chutine Lake	2009, 2011	224
128				Andy Smith slough	2007, 2008, 2009	54
129				Porcupine	2007, 2011	74
130				Devil's Elbow	2007, 2008	148
131				Devil's Elbow	2009	53
132				Scud River	2007, 2008, 2009	192
133				Iskut River	1985-86, 2002, 2006, 2008-09	153
134				Iskut - Craigson Slough	2007	42
135				Craig River-CAN	2006 - 2008	38
136				Bronson Slough	2008, 2009	78
137				Shakes Slough	2006, 2007, 2009	67
138				Christina Lake	2011, 2012	70
139	***Tahltan Wild***	***Other (cont.)***		Little Tahltan	1990	95
140				Tahltan Lake06	2006	196
141	***Non-Stikine***	***Other (cont.)***	S. Southeast	Petersburg Lake	2004	95
142				Kah Sheets Lake	2003	96
143				Mill Creek Weir Early	2007	94
144				Mill Creek Weir Late	2007	95
145				Kunk Lake	2003	96
146				Thoms Lake	2004, 2014	93
147				Red Bay Lake	2004	95
148				Salmon Bay Lake	2004, 2007	170
149				Shipley Lake	2003	94
150				Sarkar Lakes	2000, 2005	91
151				Hatchery Creek	2003, 2007	142
152				Luck Lake	2004	94

	Reporting Groups					
Source	*Dist 106, 108*	*Dist 111*	Region	Populations	Year(s) Collected	N
153				Big Lake	2010, 2014	161
154				McDonald Lake	1992, 2003, 2007, 2013	369
155				Karta River	1992, 2003, 2004, 2016	472
156				Unuk River07	2007	95
157				Unuk River08	2008	69
158				Helm Lake	2005	94
159				Heckman Lake	2004, 2007	189
160				Mahoney Creek	2003, 2007	154
161				Kegan Lake	2004	95
162				Fillmore Lake	2005	52
163				Klawock - Three Mile	2004, 2010	181
164				Klawock - Inlet Creek	2003, 2008	212
165				Hetta Lake	2003, 2008, 2009	281
166				Hetta Creek - middle	2009	95
167				Hetta Creek - early	2010	95
168				Eek Creek	2004, 2007	50
169				Klakas Lake	2004	95
170				Essowah Lake	2004	95
171				Hugh Smith	1992, 2013	155
172				HS - Buschmann	2004	151
173				HS - Cobb Creek	2007	99
174			Nass	Kwinageese	2001, 2012	76
175				Bowser Lake	2001	94
176				Bonney Creek	2001, 2012	164
177				Damdochax Creek	2001	93
178				Meziadin Lake	2001, 2006	186
179				Hanna Creek	2006	93
180				Tintina Creek	2006	94
181				Gingit Creek	1997	94
182			Skeena	Alastair Lake	1987, 2006	118
183				Lakelelse Lake	2006	93
184				Sustut River	2001	79
185				Salix Bear	1987, 1988	94
186				Motase Lake	1987	47
187				Slamgeesh River	2006	95
188				Babine River	2006	95
189				Four Mile Creek	2006	85
190				Pinkut Creek	1994	187
191				Grizzly Creek	1987	76

	Reporting Groups					
Source	***Dist 106, 108***	***Dist 111***	Region	Populations	Year(s) Collected	N
192				Pierre Creek	2006	95
193				Fulton River	2006	95
194				Morrison	2007	92
195				Lower Tahlo River	1994	78
196				Tahlo Creek	2007	95
197				McDonell Lake	2002, 2006	131
198				Kitsumkalum Lake	2006	56
199				Kitsumkalum Lake	2012	94
200				Kitwanga River	2012	92
201				Stephens Creek	2001	95
202				Nangeese River	2006	40
203				Kispiox River	2002	53
204				Swan Lake	2006	93
205				Nanika River	1988, 2007	114
206			Fraser	Trembleur - Kynock	1997	94
207				Tachie River	2001	94
208				Stellako River	2007	94
209				Fraser Lake	1996	85
210				Horsefly River	2001, 2007	274
211				Nahatlatch River	2002	92
212				Cultus Lake	2002	91
213				Chilliwack Lake	2004	90
214				Chilko Lake	2001	87
215				Raft River	2001	84
216				Adams River	2002, 2007	187
217				Middle Shuswap River	2002	91
218				Scotch River	2000	91
219				Gates Creek	2009	90
220				Birkenhead River	2007	90
221				Weaver Creek	2001	89
222				Harrison River	2007	95
223				North Thompson	2005	95
224			BC/Washington	Naden River	1995	95
225				QCI - Yakoun Lake	1993	70
226				Kitimat River	2010	93
227				Bloomfield Lake	2005	94
228				Tankeeah River03	2003	47
229				Tankeeah River05	2005	47
230				Amback Creek	2004	91
231				Kitlope Lake	2006	95
232				Great Central Lake	2002	95
233				Quatse River	2003	95

	Source	*Reporting Groups* *Dist 106, 108*	*Dist 111*	Region	Populations	Year(s) Collected	N
234					Mitchell River	2001	94
235					Okanagan River	2002	95
236					Lake Pleasant	1997	89
237					Issaquah Creek	1996	82
238					Lake Wenatchee	1998	95
239	Enhanced			S. Southeast	Burnett Enhanced	NA	NA
240				PWS	Main Bay Enhanced	NA	NA
241			***Enh. Snettisham***	N. Southeast	Speel Arm Enhanced	NA	NA
242					Sweetheart Lk. Enhanced	NA	NA
243		***Enh. Tahltan***	***Enhanced Stikine***	Stikine	Tahltan Enhanced	NA	NA
245		***Enh. Tuya***			Tuya Enhanced	NA	NA
246		***Non-Stikine (cont)***	***Enh. King Salmon***	Taku	King Salmon Enhanced	NA	NA
247			***Enh. Little Trapper***		Little Trapper Enhanced	NA	NA
244			***Enh. Tatsamenie***		Tatsamenie Enhanced	NA	NA

Table 2. Number of sockeye salmon sampled from Subdistricts 106-30 and 106-41 gillnet harvests during each statistical week in 2017, total genotyped samples used in analysis, and otolith-marked or aged samples not genotyped (or failed genotyping).

District	Subdistrict	Statistical Week(s)	Total Samples Collected	Genotypes Used in Analysis	Not Genotyped (otolith-marked or aged or both)
106	30	25	51	48	3
		26	264	105	159
		27	216	110	106
		28	300	102	198
		29	300	99	201
		30	226	109	117
		31	73	69	4
		32	300	110	190
		33	268	97	171
		34/35	125	60	65
	41	25	300	105	195
		26	300	160	140
		27	320	171	149
		28	300	163	137
		29	300	144	156
		30	120	100	20
		31	300	107	193
		32	300	110	190
		33	300	108	192
		34	300	107	193
		35	214	45	169
Totals			5,177	2,229	2,948

Table 3. Number of sockeye salmon sampled from gillnet harvests in the sockeye salmon fisheries in District 108 during 2017 by statistical week, total genotyped samples used in analysis, and otolith-marked or aged samples not genotyped (or failed genotyping).

District	Statistical Week	Total Samples Collected	Genotypes Used in Analysis	Not Genotyped (otolith-marked or aged or both)
108	26	370	89	281
	27	376	221	155
	28	520	178	342
	29	520	137	383
	30	422	110	312
	31	250	92	158
	32	278	69	209
	33/34/35	274	68	206
Totals		3,010	964	2,046

Table 4. Number of sockeye salmon sampled from gillnet harvests in the sockeye salmon fisheries in District 111 during 2017 by statistical week, total genotyped samples used in analysis, and otolith-marked or aged samples not genotyped (or failed genotyping).

District	Statistical Week	Total Samples Collected	Genotypes Used in Analysis	Not Genotyped (otolith-marked or aged or both)
111	25*	200	94	106
	26*	397	93	304
	27	414	124	290
	28	606	168	438
	29	800	252	548
	30	732	297	435
	31	600	328	272
	32	600	256	344
	33	450	188	262
	34	600	215	385
	35*	200	117	83
Totals		5,599	2,132	3,467

*Samples only collected from Subdistrict 111-32.

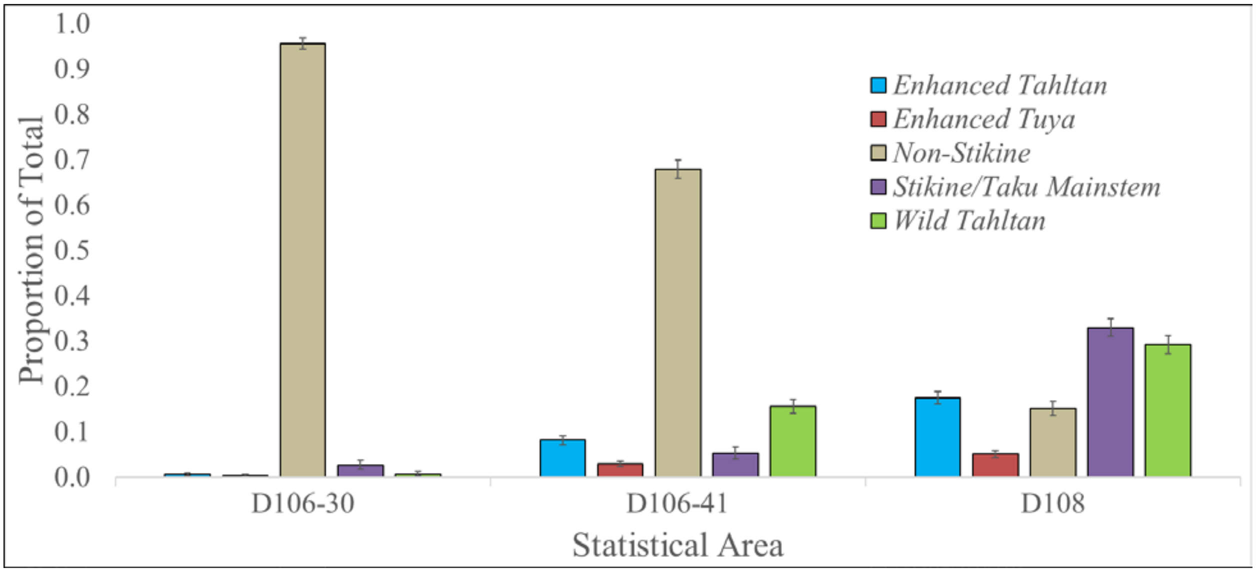

Figure 1. Total season stock composition estimates for Stikine River area fisheries 2017. Estimates were weighted by harvest per stratum. Error bars are upper and lower bounds of 90% credibility intervals.

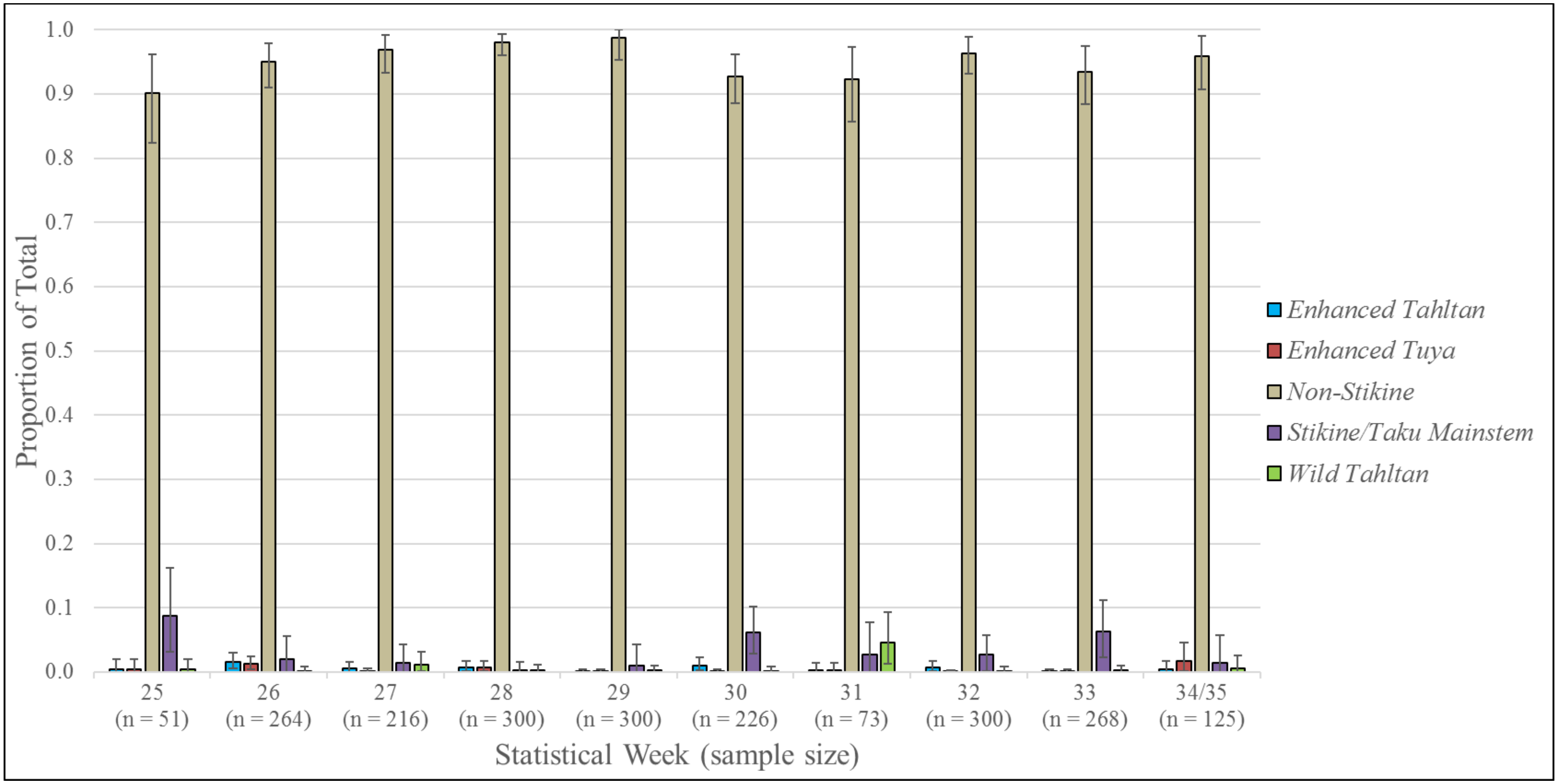

Figure 2. Stock composition estimates of sockeye salmon caught in the District 106-30 gillnet fishery in 2017. Sample size (n) includes genotyped, aged, and otolith-marked fish. Error bars are upper and lower bounds of 90% credibility intervals.

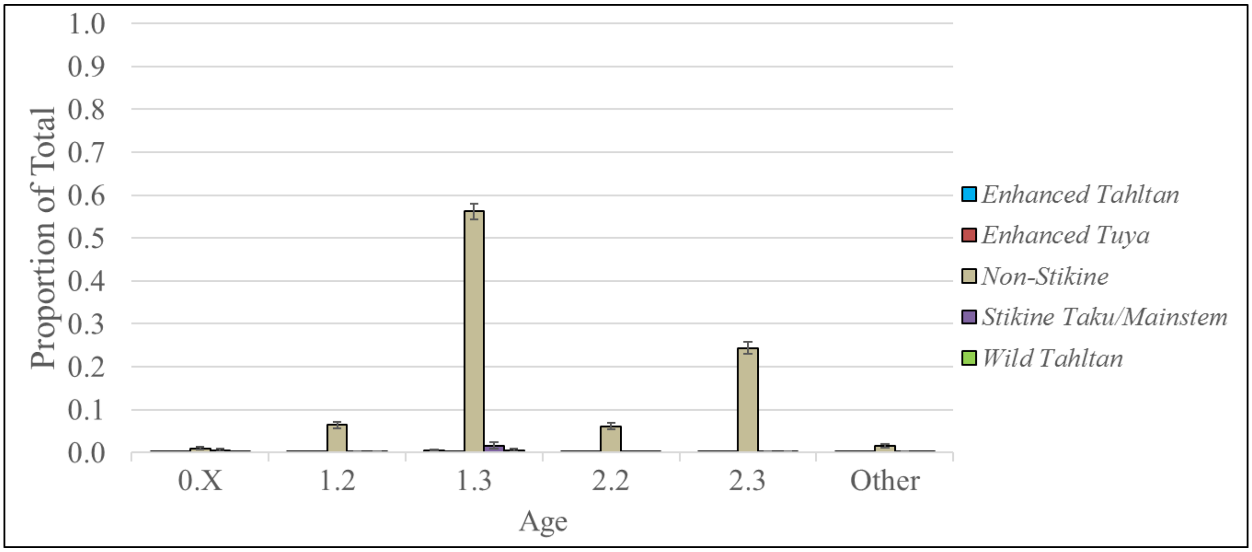

Figure 3. Age composition of sockeye salmon caught in the District 106-30 gillnet fishery in 2017 over the entire season. Error bars are upper and lower bounds of 90% credibility intervals.

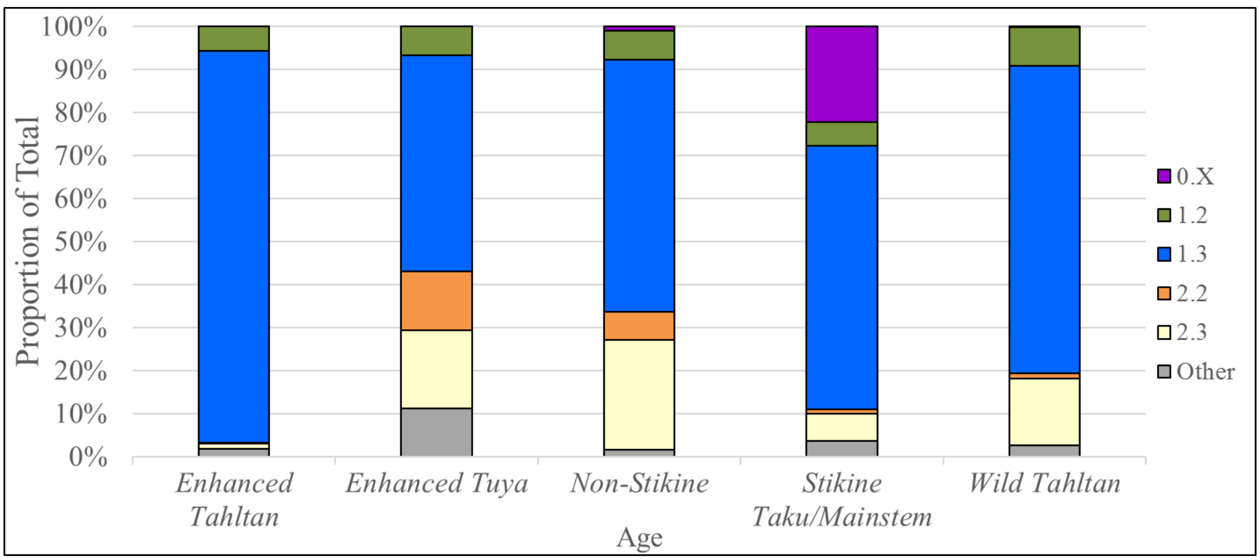

Figure 4. Age composition by reporting group of sockeye salmon caught in the District 106-30 gillnet fishery in 2017.

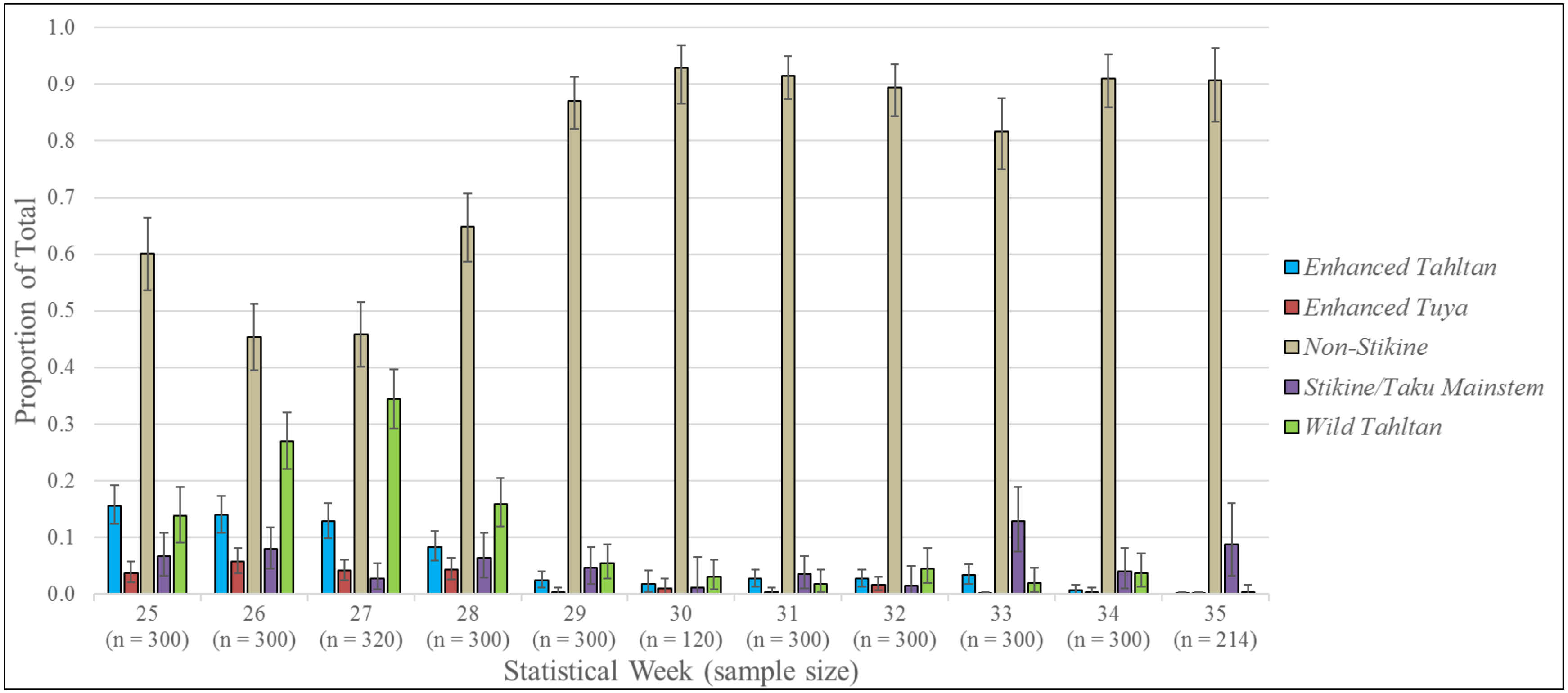

Figure 5. Stock composition estimates of sockeye salmon caught in the District 106-41 gillnet fishery in 2017. Sample size (n) includes genotyped, aged, and otolith-marked fish. Estimates in week 28 did not meet precision and accuracy goals identified by the TTC and thus are not reported. Error bars are upper and lower bounds of 90% credibility intervals.

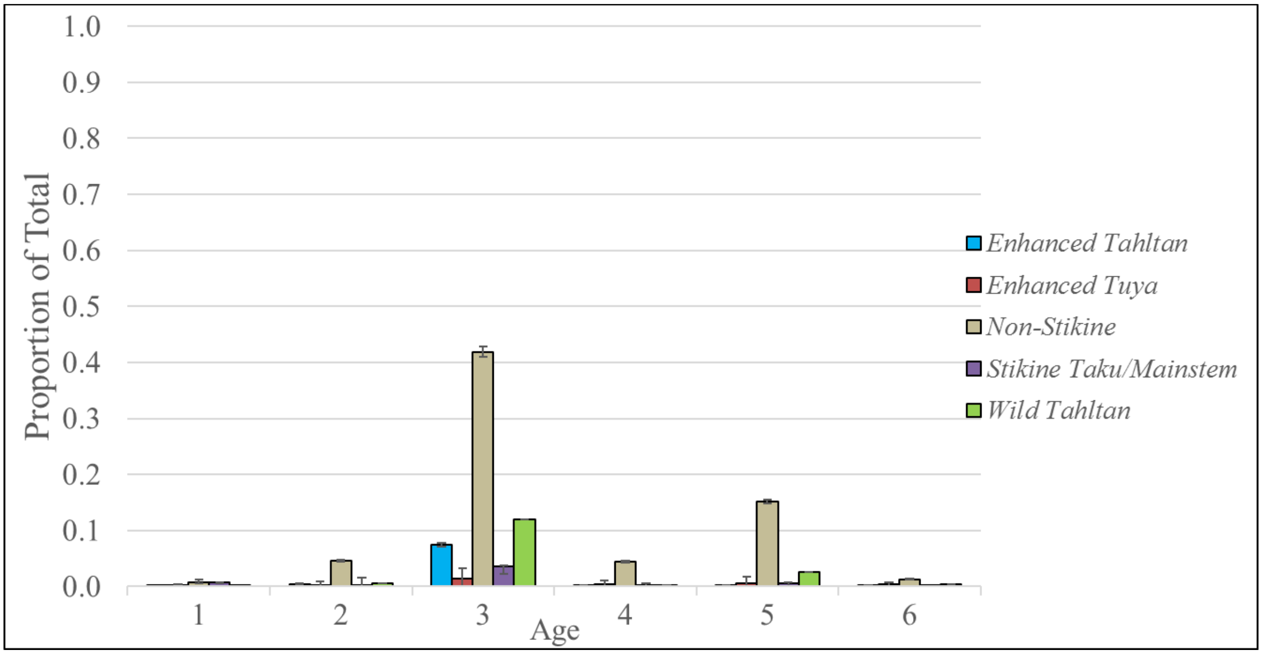

Figure 6. Total age composition of sockeye salmon caught in the District 106-41 gillnet fishery in 2017 over the entire season. Error bars are upper and lower bounds of 90% credibility intervals.

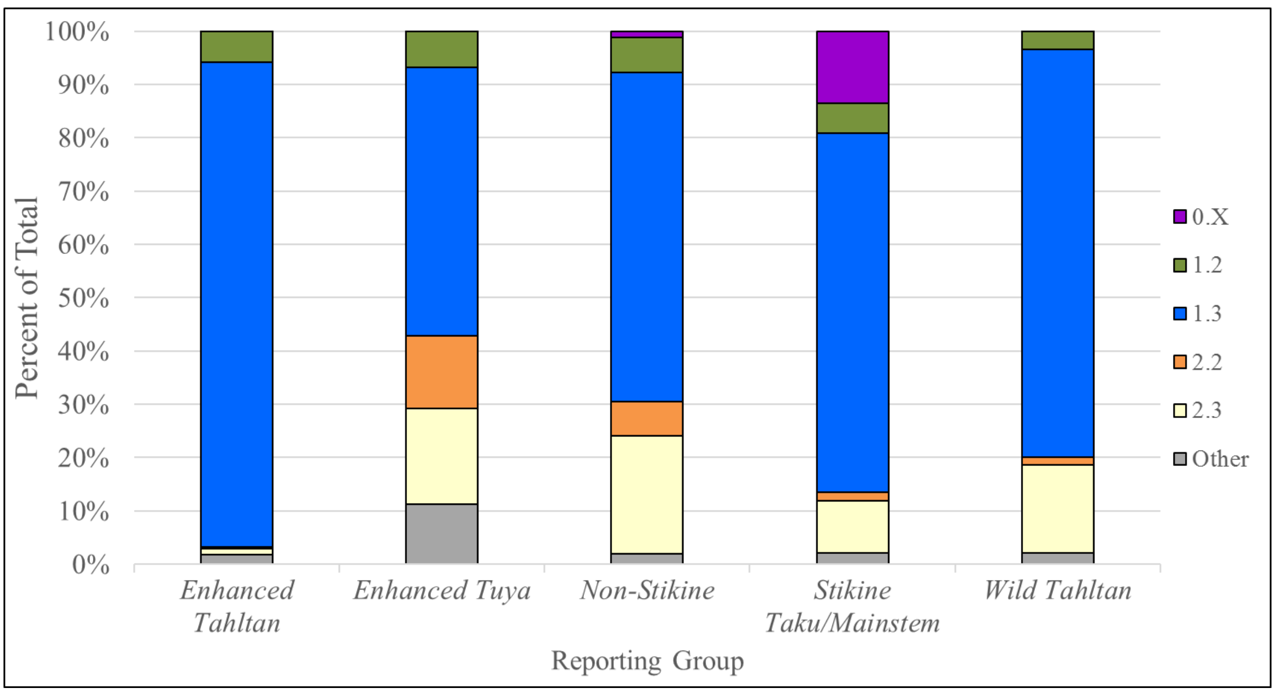

Figure 7. Age composition by reporting group of sockeye salmon caught in the District 106-41 gillnet fishery in 2017.

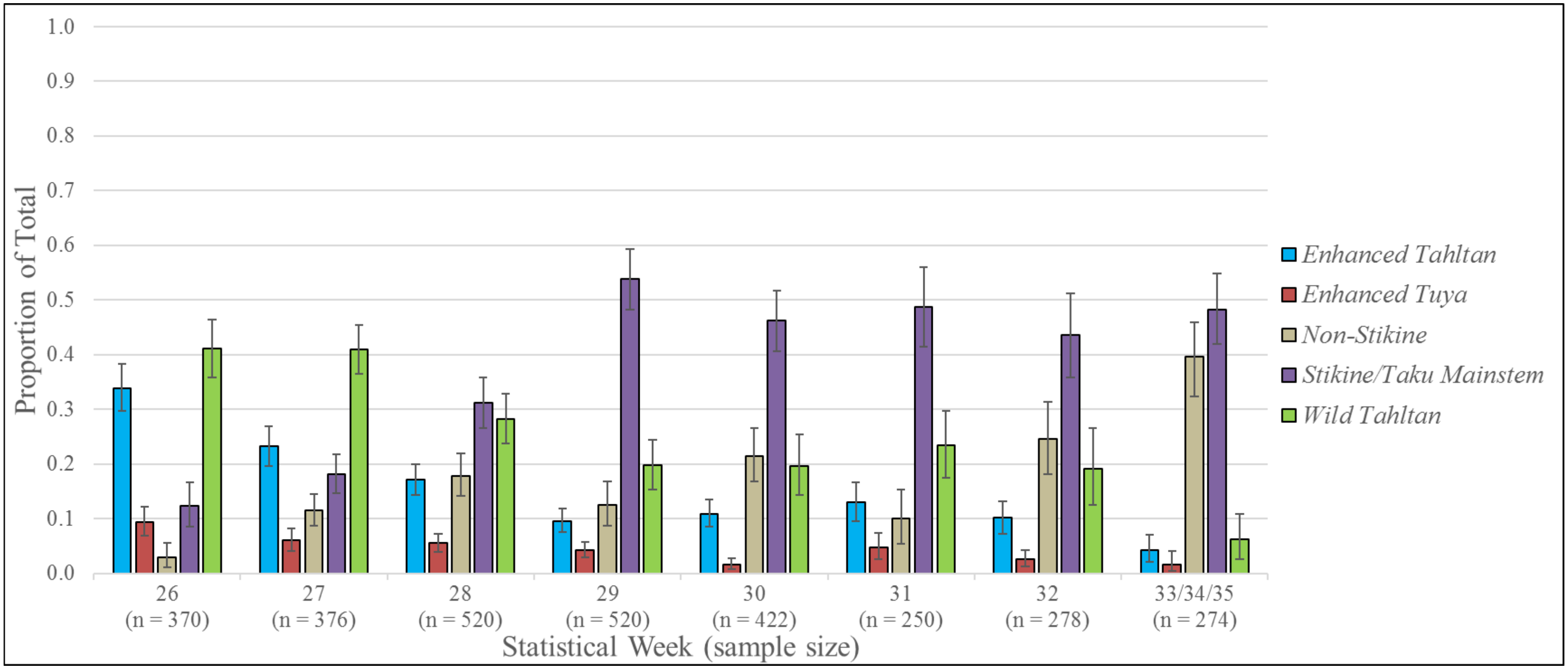

Figure 8. Stock composition estimates of sockeye salmon caught in the District 108 gillnet fishery in 2017. Sample size (n) includes genotyped, aged, and otolith-marked fish. Estimates in week 34 did not meet precision and accuracy goals identified by the TTC and thus are not reported. Error bars are upper and lower bounds of 90% credibility intervals.

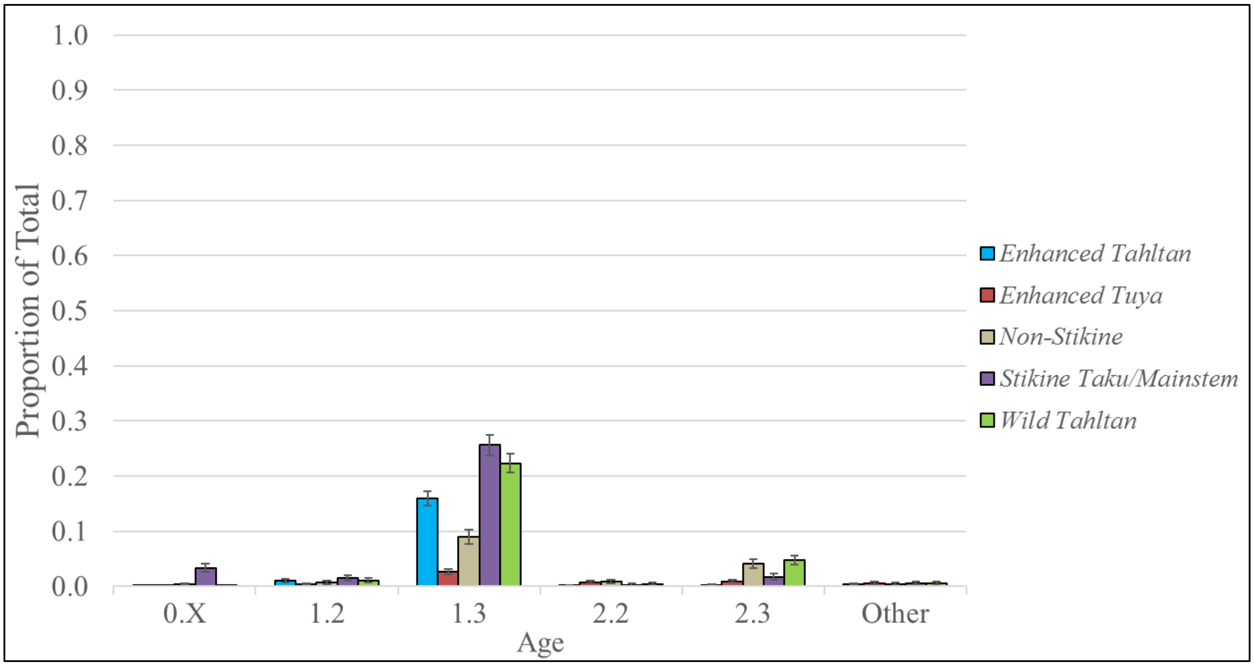

Figure 9. Total age composition of sockeye salmon caught in the District 108 gillnet fishery in 2017 over the entire season. Error bars are upper and lower bounds of 90% credibility intervals.

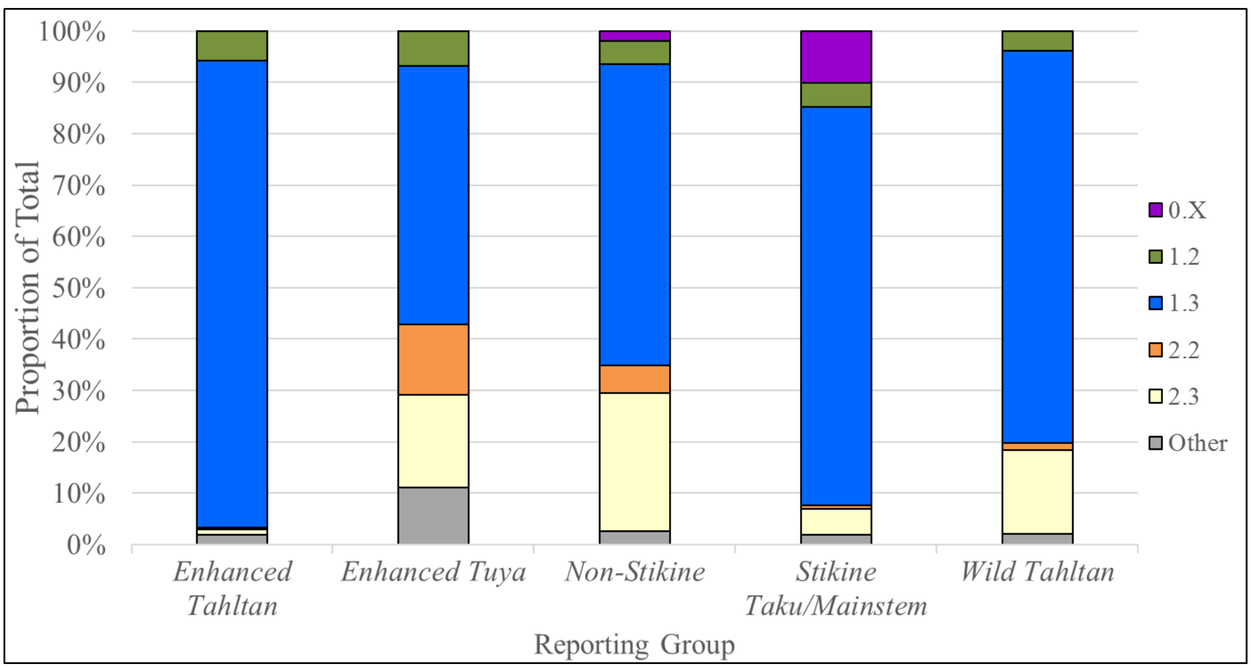

Figure 10. Age composition by reporting group of sockeye salmon caught in the District 108 gillnet fishery in 2017.

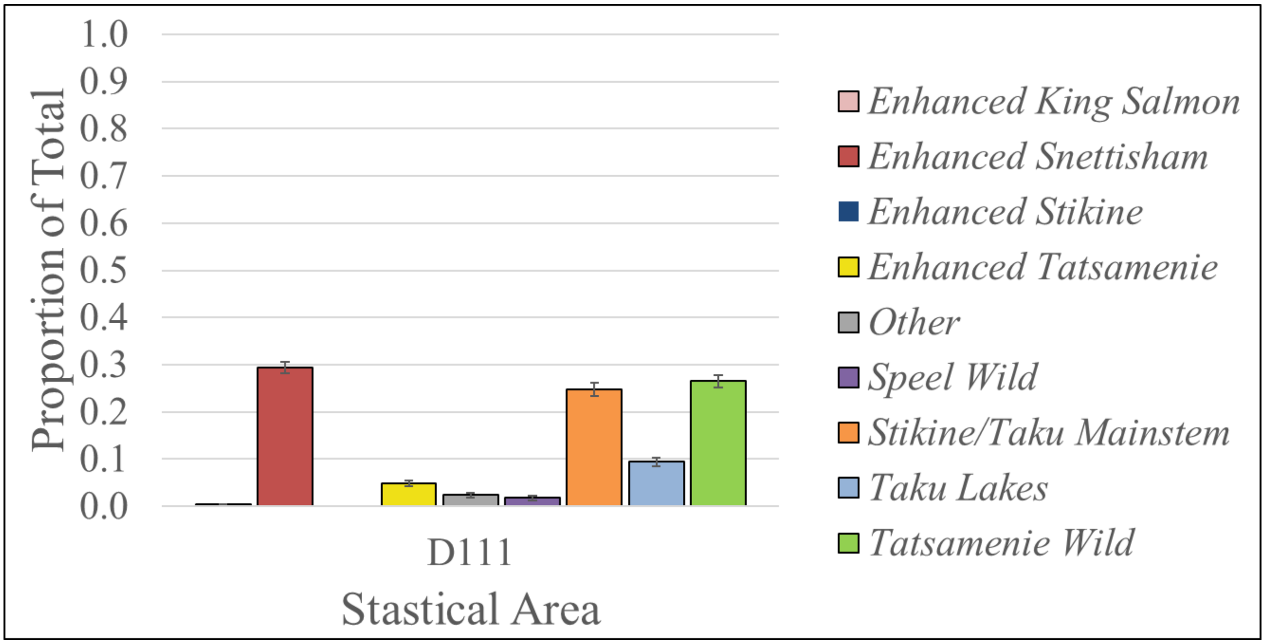

Figure 11. Total season stock composition estimates for Taku River area fisheries 2017. Estimates were weighted by harvest per stratum. Error bars are upper and lower bounds of 90% credibility intervals.

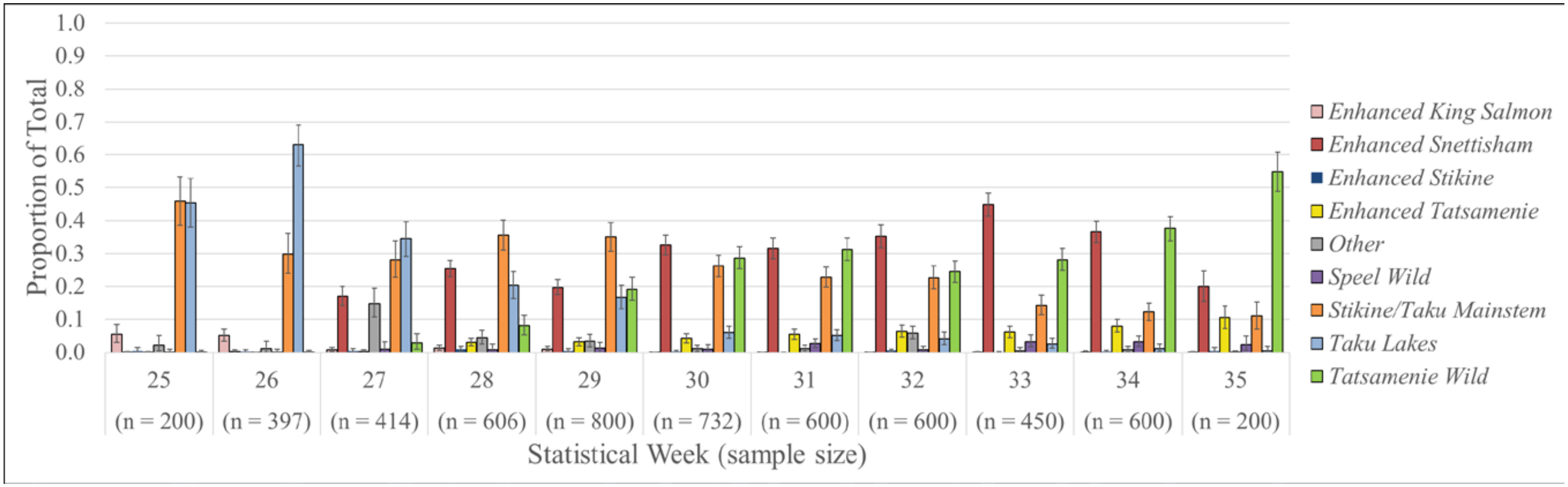

Figure 12. Stock composition estimates of sockeye salmon caught in the District 111 gillnet fishery in 2017. Sample size (n) includes genotyped, aged, and otolith-marked fish. Only samples from Subdistrict 111-32 were used in weeks 25, 26, and 35. Estimates in week 35 did not meet precision and accuracy goals identified by the TTC and thus are not reported. Error bars are upper and lower bounds of 90% credibility intervals.

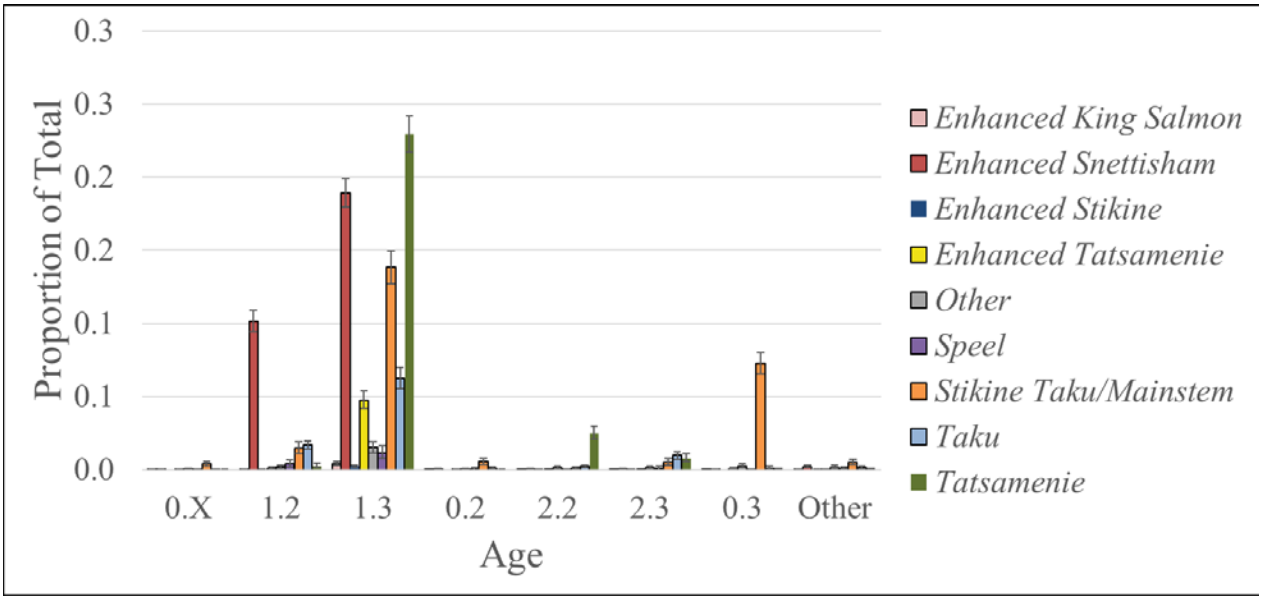

Figure 13. Total age composition of sockeye salmon caught in the District 111 gillnet fishery in 2017 over the entire season. Error bars are upper and lower bounds of 90% credibility intervals.

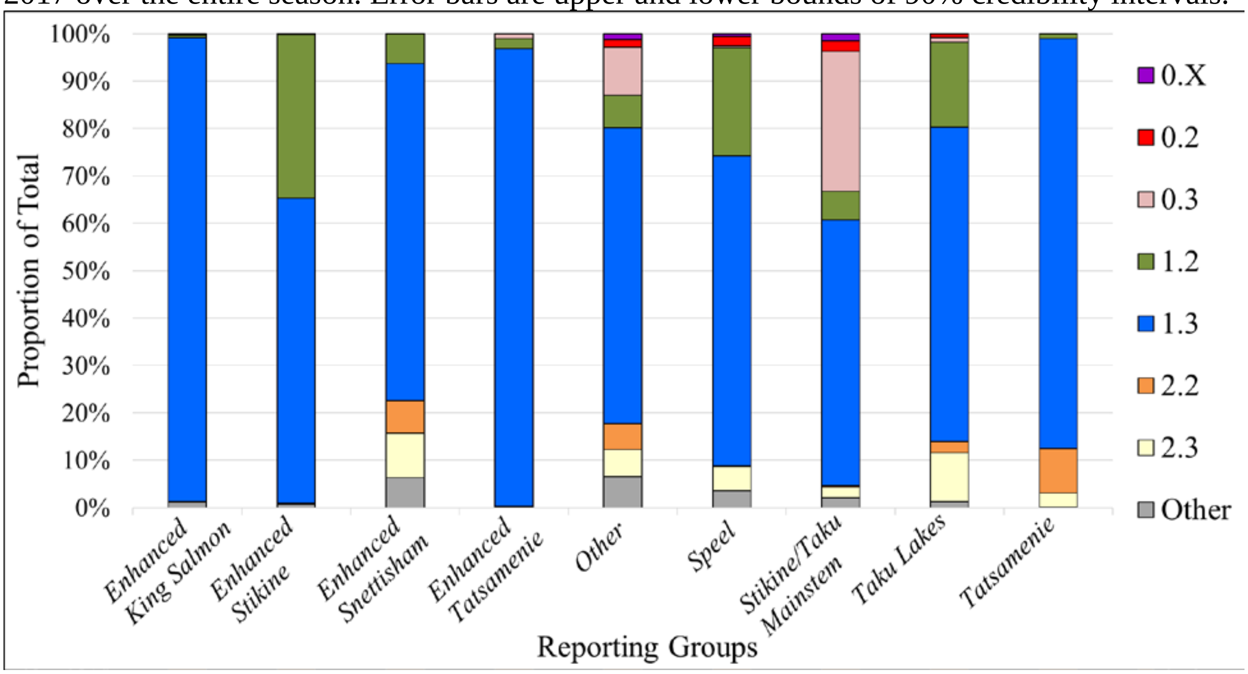

Figure 14. Age composition by reporting group of sockeye salmon caught in the District 111 gillnet fishery in 2017.