Fishery Data Series No. 20-21

Origins of Chinook Salmon in Yukon Area Fisheries, 2015

by

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

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

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ABSTRACT

The stock and age composition of Chinook salmon *Oncorhynchus tshawytscha* harvest within the Yukon Area was estimated for 2015. Limited sampling occurred in 2015 because of the anticipated low harvest. Stock composition was estimated by genetic mixed-stock analysis for 3 geographic stock groups termed Lower, Middle, and Upper. Stock composition estimates from sampled fish were applied to specific harvest groups across all age classes. Ages of sampled fish were determined from scales and age composition was estimated from the sample proportions in each age class. Age composition estimates were applied to specific harvest groups across all stock groups. Stock and age compositions from previous years or other harvest groups were used to estimate unsampled harvest groups. The total estimated Yukon Area harvest (which includes harvest from Coastal District communities and Canada) in 2015 was 8,791 Chinook salmon. Stock origin was estimated to be 13.5% Lower, 31.3% Middle, and 55.2% Upper groups. Overall, age-1.2 fish dominated the harvest with 3,478 fish, followed by 3,039 age-1.4 fish, 2,164 age-1.3 fish, and 110 fish from other age classes combined.

Key words: Chinook salmon, *Oncorhynchus tshawytscha*, stock composition, age composition, harvest, genetic mixed stock analysis, age-1.4, age-1.3, age-1.2, stock group, Yukon Area

INTRODUCTION

Yukon River Chinook salmon, *Oncorhynchus tshawytscha*, are harvested annually in various fisheries in both marine and freshwater. Except for a few fish taken in adjacent coastal waters near the mouth, only salmon of Yukon River origin are harvested in the Yukon Area. Within the Yukon River, returning adult salmon are harvested in subsistence and personal use fisheries in Alaska, Aboriginal and domestic fisheries in Canada, and commercial, test, and sport fisheries in Alaska and Canada. Sport fisheries are a minor component of overall harvest and occur primarily in lower river tributaries, Tanana River tributaries, and in Canada. The average annual harvest of Chinook salmon within the Yukon River drainage from 2005 through 2014 was 53,668 fish, and harvests within the Alaska portion of the drainage averaged 50,224 fish (JTC 2016). In 2015, the Yukon Area harvest was the second-lowest on record because of small run size and management actions that limited the harvest of Chinook salmon (Estensen et al. 2015). In Canada and Alaska, Aboriginal and subsistence fisheries were severely reduced, and commercial and sport fisheries with potential to encounter Canadian–origin Chinook salmon were closed (JTC 2016). Due to Chinook salmon fishing restrictions and the expected low run size, limited biological sampling of subsistence harvests occurred in 2015.

The U.S. and Canada have a long history of collaborative salmon management and biological data collection related to Yukon River Chinook salmon. Since 1985, both countries have been engaged in the cooperative management and conservation of Yukon River salmon stocks that spawn in Canada and are subject to harvest in both U.S. and Canadian fisheries (JTC 2016). In 2002, the *Yukon River Salmon Agreement* was signed as part of the *Pacific Salmon Treaty* (hereafter referred to as the Treaty). Through the Treaty, the U.S. and Canada agreed to, among other things, harvest sharing of Canadian-origin Chinook salmon that migrate through the Alaska portion of the Yukon River and spawn in the Yukon Territory and British Columbia. Stock composition estimates of harvests in Alaska provide valuable information for management and conservation of Chinook salmon throughout the Yukon River drainage and are required to determine if Treaty objectives were met. Stock and age compositions of harvests are also needed to construct stock-specific brood tables that are used for spawner-recruit analyses and to forecast future returns of Canadian-origin Chinook salmon.

Since 1981, stock and age composition of Chinook salmon harvested in each Yukon River fishing district in Alaska was estimated from 3 components. Stock and age class proportions were needed along with an estimate of harvest in numbers of fish. Sampling programs operated by the Alaska Department of Fish and Game (ADF&G) and cooperators were designed to collect stock and age data from each major component of the harvest (i.e., subsistence, commercial, test fisheries) or to serve as proxies for unmonitored portions of the harvest. Annual efforts to directly sample a specific portion of the harvest were determined based on the expected size of the harvest, staff capacity, and accessibility to harvested fish. The preferred sampling methods and analytical approaches used to represent the harvest within each district have been adaptive to the fishery and data availability.

Methods to estimate stock proportions have changed over time. Scale pattern analysis was used from 1981 to 2003 (e.g., DuBois 2005) to differentiate stock of origin of Chinook salmon harvested in the Yukon River. The analytical methods used historically in the stock identification program have been summarized in previous reports (e.g., Schneiderhan 1997). An improved method was developed in 1998 and then historical and subsequent data were processed using the new software program (Lingnau and Bromaghin 1999). Genetic analysis replaced scale pattern analysis in 2004. Based on surveys of genetic variation among Chinook salmon populations in the Yukon River drainage, a baseline of genetic information was completed and used for genetic stock identification using allozyme loci (Beacham et al. 1989; Wilmot et al. 1992; Templin et al. 2005). Subsequently, 2 types of genetic markers, single nucleotide polymorphisms (SNP) and microsatellites, were investigated as a replacement for the allozyme baseline. SNPs have been used since 2004 to evaluate the stock composition of Yukon River Chinook salmon, except in 2005, when microsatellite markers were used.

A total of 3 broad-scale stock (reporting) groups were used to apportion Chinook salmon harvest by Alaska fisheries within the Yukon River drainage. The Lower stock group included Chinook salmon originating in Yukon River tributary streams from the Andreafsky River to near the confluence with the Tanana River and the lower Koyukuk River drainage. The Middle stock group included Chinook salmon from Yukon River tributary streams upstream from the Tanana River confluence to the border with Canada, including the upper Koyukuk and Tanana river drainages. The Upper stock group consisted of Canadian-origin fish.

Chinook salmon scale and tissue samples were collected at numerous subsistence, commercial, and test fishery monitoring projects within the Yukon Area and were used to characterize the total harvest composition. Age, sex, length, and tissue sampling of subsistence harvests within select villages has occurred through a subsistence harvest sampling program (Drobny 2016). Participating subsistence fishermen were encouraged to sample their entire harvest and the samples were assumed to be representative of the total subsistence catch by the participating village. Chinook salmon harvested in commercial fisheries were sampled at the processor's docks after obtaining permission to sample from individual boat captains. Samples were collected in test fisheries operated in District Y-1 near Emmonak (Lower Yukon test fishery, LYTF), District Y-2 near the Pilot Station sonar test fishery (PSTF), and District Y-5 near the Eagle sonar test fishery (ETF). Fishing at the LYTF was performed at the Big Eddy and Middle Mouth test fishery sites. At each site, 8.5 in mesh set gillnets were used to catch Chinook salmon, and an additional 8.25 in mesh drift gillnet was used at the Big Eddy site. Daily sampling goals were 30 fish per day per site, and all harvested fish were distributed locally for subsistence uses. At the PSTF, Chinook salmon were caught using a suite of drift gillnets: 2.75 in, 4.0 in, 5.25 in, 6.5 in, 7.5 in, and 8.5 in stretched mesh. At the ETF, Chinook salmon were caught using drift gillnets of various mesh sizes: 5.25 in, 6.5 in, 7.5 in, and 8.5 in stretched mesh.

All Chinook salmon caught were sampled at the PSTF and ETF, live fish were returned to the river, and mortalities were distributed locally for subsistence uses.

The subsistence harvest of Chinook salmon has been estimated through an annual postseason survey program, which specifies harvest by village and district (e.g., Jallen et al. 2017). Harvest information was collected through postseason household interviews, follow-up telephone interviews, postal questionnaires, harvest calendars, and permits. Stratified random sampling techniques were used to select households to be surveyed.

In 2015, limited information was available to estimate the total Yukon Area Chinook salmon harvest by stock group and age class. Due to conservation concerns for Chinook salmon, management actions limited the harvest of Chinook salmon (Estensen et al. 2015). Within the commercial fishery, there was no directed Chinook salmon opportunity, and the sale of Chinook salmon harvested in the chum salmon (*Oncorhynchus keta*) commercial fishery was prohibited (Estensen et al. 2015). As such, Chinook salmon harvest was from subsistence, incidental commercial catch retained for subsistence, and test fishery sources. Test fishery harvest was monitored at LYTF, PSTF, and ETF. Sampling of Chinook salmon caught incidentally in the summer chum fishery and retained for subsistence was conducted opportunistically in District Y-1. Given the expectation for a reduced subsistence harvest, ADF&G and Spearfish Research conducted subsistence harvest sampling within a limited geographic area of the Yukon River (Drobny 2016). Subsistence harvest samples were from 5 samplers who collected 24 samples from Galena (District Y-4), 31 from Ruby (District Y-4), and 479 samples from Fort Yukon (District Y-5). Postseason estimates of subsistence harvest were conducted, as in past years. In 2015, a total of 1,187 households were surveyed in 33 communities. Data from surveyed households were expanded to estimate the total harvest and included households that were not surveyed (Jallen et al. 2017).

This report presents stock and age class composition of the total Yukon Area Chinook salmon harvest by district in 2015. This report is different than previous project reports (1981–2013) because the Coastal District harvest is included. Beginning in 2014, the Coastal District was included to provide a more complete estimate of Yukon River Chinook salmon harvest by stock and to be consistent with information used by ADF&G to determine total run and harvest shares of the Canadian stock component.

OBJECTIVES

The project objectives were to estimate the total 2015 Yukon Area Chinook salmon harvest by stock group and age class.

STUDY AREA

The Yukon River drains an area of 321,500 mi^2; originates in British Columbia, Canada; and flows over 1,980 river miles (rm) to its terminus at the Bering Sea (Estensen et al. 2015; Figures 1 and 2). Chinook salmon spawn in major tributaries throughout the drainage from the Archuelinguk River (rm 80) to nearly 2,000 rm upstream in the headwaters in Canada. Except for a few fish taken in the adjacent coastal waters near the mouth, only salmon of Yukon River origin are harvested in the Yukon Area. Within the Alaska portion of the drainage, the Yukon Area is split into 7 fishing districts for management (Coastal District and Districts Y1–Y6; Figure 1). The inriver Districts Y1–Y5 are numbered sequentially, progressing from the river mouth to the Canadian border. District Y-6 represents the Tanana River. Because the stock composition of the harvest changes from downriver to upriver, the 2 largest districts are further divided into subdistricts. For example, District Y-4 includes Subdistricts Y-4A, Y-4B, and Y-4C. Similarly, District Y-5 includes Subdistricts Y-5A, Y-5B, Y-5C, and Y-5D.

METHODS

DATA SOURCES

In 2015, data from a variety of sources were utilized to estimate the stock and age composition of the Chinook salmon subsistence harvest. Canadian harvest estimates were obtained from a report by the Joint Technical Committee to the U.S./Canada Yukon River Panel (JTC 2016). Age composition estimates were obtained from Chinook salmon incidentally caught in the summer chum salmon commercial fishery in District Y-1, the LYTF, the PSFT, the ETF, and subsistence harvest (Table 1). Because some test fisheries use a suite of gillnet mesh sizes (Appendix A1), specific mesh sizes were excluded in some instances. Stock composition estimates were obtained from the 2015 PSTF and historical averages (Table 2). Tissue samples were collected from the subsistence harvest in Galena, Ruby, and Fort Yukon in 2015 but were not analyzed due to lack of funding.

HARVEST STRATIFICATION

Estimates of stock and age proportions were applied to harvest estimates from 16 harvest groups to produce the estimated harvest within each group by stock and age class (Appendix A2). Harvest groups represented different fisheries, districts, subdistricts, and major tributaries where harvest occurred in 2015. Harvest groups were determined such that the stock and age composition of the harvest in each area was expected to differ from other groups because of differences in harvest timing, gear usage, and the stock and age structure of the fish available for harvest. A total of 14 of 16 harvest groups were needed to stratify and represent subsistence harvest throughout the drainage. Subsistence harvests in each of the following areas were treated as a separate harvest group: Coastal District; Districts Y-1, Y-2, and Y-3; Subdistricts Y-4A, Y-4B, and Y-4C; District Y-4 (Koyukuk River); District Y-5 from the Tanana River to Birch Creek; District Y-5 from Beaver to Fort Yukon; District Y-5 upriver from Fort Yukon; District Y-5 (Chandalar and Black River); District Y-6 (Tanana River subsistence and sport harvest); and Canada. Only 2 harvest groups were needed to represent the incidental harvest of Chinook salmon in the District Y-1 and District Y-2 commercial fisheries, which were not sold and were required to be retained for subsistence uses. Each harvest group was assumed to have a similar stock composition across all age groups and a similar age composition across all stock groups. Estimates of harvest by stock and age class were summed across harvest groups within a district to obtain districtwide harvest by stock and age class.

STOCK AND AGE COMPOSITION

Harvest Groups with Direct Sampling

Only a small component of the harvest was directly sampled in 2015 (Tables 3 and 4). Harvest group 2 (District Y-1 Chinook salmon retained from the summer chum salmon commercial fishery) was directly sampled for age composition. Harvest group 3 (District Y-1 subsistence) was directly sampled for age through the LYTF. All Chinook salmon harvested in the LYTF were donated for subsistence use and counted as part of the District Y-1 subsistence harvest. Fish donated from the LYTF made up most of the District Y-1 subsistence harvest in 2015 that were not retained from the commercial fishery. Harvest group 5 (District Y-2 subsistence) was directly sampled for age and stock composition through the PSTF. Like LYTF, Chinook salmon mortalities from the PSTF were donated to subsistence users, and those donations made up most of the 2015 subsistence harvest in District Y-2 that were not retained from the commercial fishery. Harvest group 5 was the only group that was directly sampled for stock composition (Table 4). Harvest groups 8 and 9 (Galena and Ruby subsistence harvests) were both directly sampled for age through the subsistence harvest sampling program. However, sample sizes were small, so samples were pooled and the combined samples were used to represent each harvest group. Harvest group 12 (District Y-5 subsistence from Beaver to Fort Yukon) was directly sampled for age through the subsistence harvest sampling program.

Harvest Groups with Proxies

Proxies were used to represent the harvest in areas that were not directly sampled. Proxies were used to represent the age composition in harvest groups 1, 4, 6–7, 10–11, and 13–16 (Table 3). Proxies were used to represent the stock composition in harvest groups 1–4 and 6–16 (Table 4). It was assumed that the age or stock composition of the proxy was like the actual age or stock composition of the harvest group it was chosen to represent in 2015 (Tables 3 and 4).

Surrogate stock and age compositions were selected to represent the subsistence harvest within each harvest group. Selections were based on knowledge of harvest demographics spatially, temporally, and through gear selectivity from prior assessments of subsistence harvests. Run timing in the Yukon River has indicated that the Upper stock group arrives earlier in the run, and Middle and Lower stock groups arrive later in the run (DeCovich and Howard 2011). Gear type has been shown to influence stock and age composition of the catch (Howard and Evenson 2010). Consequently, decisions were made to select proxy data from similar locations, of similar run timing, and using similar harvest gear to those harvest groups being estimated. Additionally, terminal tributary harvests were assumed to include only those fish of that terminal stock group and no other stocks. Lower and Middle stocks were presumed to be unavailable to mainstem harvesters upstream of their spawning locations. The stock and age composition of subsistence harvests were probably influenced by management actions and limitations placed on allowable gear. Since 2013, subsistence gillnets were restricted almost entirely to 6.0-inch or smaller mesh and fish wheels and dipnets were required to release Chinook salmon for most of the season. Each year, the first pulses of Chinook salmon were protected by closing subsistence fishing as the pulses migrated upriver.

The age compositions of harvest in the Coastal District and Districts Y1–Y4 (harvest groups 1–9) were estimated from samples collected in 2015 from the District Y-1 incidental commercial harvest, the PSTF, the LYTF, and the combined subsistence harvests in Galena and Ruby (Table 3; Table 4; Appendix A2). The stock compositions of harvests in the Coastal District and Districts Y1–Y4 (harvest groups 1–9) were estimated from samples collected from the PSTF in 2015, the LYTF (2010–2011 average), harvest in Galena (2009–2011 average), and harvest in Ruby (2009–2011 average) (Table 3; Table 4; Appendix A2).

Harvests in the Koyukuk and Tanana rivers were assigned to the Middle stock group, based upon the geographic location of those rivers. The age composition of the harvest in the Koyukuk River (harvest group 10) was estimated from samples collected from the PSTF (Table 3; Appendix A2). In the Tanana River (harvest group 15), age composition estimates were based on samples collected from Galena and Ruby in 2015 (Table 3; Appendix A2).

In District Y-5, age composition estimates were based on samples collected from Fort Yukon in 2015 (harvest groups 11–14, Table 3; Appendix A2). Fort Yukon age samples were chosen to represent all subsistence harvests in District Y-5 because harvest timing and gear types were presumed similar across communities. Stock composition of harvest in District Y-5 was based on average stock composition from the Tanana and Fort Yukon harvests (Table 4; Appendix A2). Subsistence harvests among Tanana and Fort Yukon residents were sampled for genetic analysis from 2007 to 2014 (e.g., DeCovich and Howard 2011). Because the stock composition of harvests from the mainstem Yukon River between Tanana and Fort Yukon changes as the fish travel upriver, genetic samples from Tanana subsistence (2010–2012 average) were used to represent subsistence harvests from Tanana upstream to Birch Creek (harvest group 11, Table 4; Appendix A2). This average was chosen because these were the most recent 3 years available. Genetic samples from Fort Yukon subsistence (2009–2014 average) were used to represent subsistence harvests from Beaver to Fort Yukon (harvest group 12, Table 4; Appendix A2), and were selected because they were the most recent estimates available. Harvests upstream of Fort Yukon to the Canadian border (harvest group 13) were assigned to the Upper stock group based on location and the assumption that most of these fish were bound for Canada. Harvests from Chandalar and Black rivers were assigned to the Middle stock group based on location (harvest group 14).

The age composition from the ETF in 2015 was used to represent all harvests occurring in Canada (harvest group 14, Table 3; Table 4; Appendix A2). The harvest was assigned to the Upper stock group based on location. Canadian harvest was not directly sampled in 2015. The ETF age samples were chosen because they were from the closest monitored location to the Canada border and fish sampled at that location represented the composition of Chinook salmon available for harvest in Canada.

STOCK AND AGE ASSIGNMENT

Samples by specific mesh sizes, gear types, and locations were pooled within harvest groups. For each harvest group, the number of fish by stock and age class was estimated as follows.

Denote that $n_{k,h}$ is the number of age samples from fishery or project (k), representing harvest group (h); and $n_{j,k,h}$ is the number of samples at age (j) from fishery or project (k), representing harvest group (h). Summing across projects or fisheries within harvest group (h), the proportion $Pa_{j,h}$ of fish at age (j) representing harvest group (h) was estimated as:

$$\hat{P}a_{j,h} = \frac{\sum_k n_{j,k,h}}{\sum_k n_{k,h}}. \quad (1)$$

Let $Ps_{, i,h}$ be the proportion of stock (i), representing harvest group (h); and let N_h be the number of fish harvested in harvest group (h). Then the number of fish of stock (i) and age (j) in harvest group (h) was estimated as:

$$\hat{N}_{h,i,j} = N_h \cdot \hat{P}s_{i,h} \cdot \hat{P}a_{j,h}. \quad (2)$$

The number of fish of stock (i) and age (j), harvested in each district (d) was then estimated as the sum of harvests of that stock and age from all harvest groups within that district.

The total number of fish of stock (i) harvested within the Yukon drainage (N_i) was estimated as:

$$\hat{N}_{d,i} = \sum_{h}\sum_{j}\hat{N}_{d,i,j,h}. \tag{3}$$

RESULTS

Harvest by stock and age class was estimated for the Chinook salmon subsistence harvest in 2015. The Lower stock group contributed 1,183 fish (13.5%), Middle stock group 2,755 fish (31.3%), and Upper stock group 4,853 fish (55.2%; Tables 5 and 6). The Canadian harvest was 1,204 fish or 13.7% of the total harvest. Age-1.2 fish contributed 3,478 fish to the total harvest, followed by 3,039 age-1.4 fish and 2,164 age-1.3 fish (Table 5). The Lower, Middle, and Upper stock group harvests in 2015 were nearly one-quarter that of the 2010–2014 averages (Tables 7 and 8).

DISCUSSION

Harvest, stock, and age proportions were considered as specific point estimates, and uncertainty of the results was not quantified. There were confidence intervals around the harvest, age, and stock composition estimates used in this analysis, and those uncertainties were not propagated through to the estimates of harvest composition presented in this report. Furthermore, additional uncertainty exists because other stock and age composition estimates were used as proxies for the harvest groups not sampled in 2015. For example, mixed stock composition estimates were predominately reliant on results from the 380 fish analyzed from PSTF during 2015. Stock compositions from these fish were applied to 3,972 Chinook salmon in mixed stock harvests (harvest groups 1, 2, 4–7; Appendix A2), approximately two-thirds of the total mixed-stock harvest. Furthermore, the use of recent-year average stock compositions to represent the 2015 harvest in unmonitored groups was tenuous. There are often annual differences in the natural stock and age composition of the run that influence harvest composition. Similarly, harvest timing and gear usage influenced harvest composition, and annual variation in fishing opportunity or behavior was not considered when selecting proxies. As such, it is unknown if the recent year average harvest stock compositions used were representative of the 2015 harvest.

Overall, there was a lack of direct sampling in 2015 to inform the estimates of stock and age composition of the harvest. The estimates provided in this report should be used with caution. Although the uncertainty in these estimates was probably large, the effect on subsequent management evaluations and stock assessment was probably small because of the near-record low harvest. When taken in context with escapement, even large errors in the apportionment of a small harvest has a relatively negligible influence on estimates of stock-specific total run, exploitation, and brood table development.

The limited subsistence sampling combined with age data from the PSTF indicated there may have been a high percentage of young fish caught in the subsistence fishery in 2015. Specifically, the percentage of the harvest that was age-1.2 fish was high (22.4% in the PSTF and greater than 50% in the subsistence samples) compared to past years (Eaton 2016). This was probably due to the age composition of the 2015 run and management actions to conserve Chinook salmon. For example, the percentage of age-1.2 Chinook salmon from the PSTF was nearly double the 2010–2014 average. Fishermen were limited to gillnet stretch mesh sizes of 6.0 inches or smaller. This relatively small mesh gear probably targeted smaller and younger fish compared to 7.5-inch stretch mesh gillnets that may be used when gear restrictions are not in place.

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TABLES AND FIGURES

Table 1.–Age class composition of Chinook salmon sampled in the Yukon River mainstem, by district and data source, 2015.

District	Data source	Sample size	Percentage by age class 1.1	1.2	1.3	2.2	1.4	2.3	1.5	2.4
Y-1	Incidental commercial	67	0.0	49.3	17.9	0.0	32.8	0.0	0.0	0.0
Y-1	Lower Yukon test fishery	596	0.0	9.8	16.9	0.2	72.0	0.0	0.5	0.7
Y-2	Pilot Station test fishery (all mesh)	512	0.0	22.4	33.7	0.2	42.2	1.0	0.2	0.2
Y-2	Pilot Station test fishery (≤6.5 inch mesh)	201	0.0	35.3	31.3	0.5	31.8	1.0	0.0	0.0
Y-3	Pilot Station test fishery (≤6.5 inch mesh)	201	0.0	35.3	31.3	0.5	31.8	1.0	0.0	0.0
Y-4	Subsistence (Galena / Ruby)	49	0.0	57.1	24.5	0.0	18.4	0.0	0.0	0.0
Y-5	Subsistence (Fort Yukon)	373	0.3	54.4	24.1	0.3	20.4	0.0	0.3	0.3
Y-5	Eagle test fishery	927	0.3	10.8	34.4	0.0	50.3	2.0	1.2	1.0

Table 2.–Genetic stock composition estimates used to apportion the Yukon River Chinook salmon harvest, by district including data and year sampled, 2015.

District	Data source	Year sampled	Stock group	Sample size	Estimate	90% CI
Y-1	Lower Yukon test fishery	2010–2011 average	Lower		0.19	
			Middle		0.26	[a]
			Upper		0.55	
Y-2, Y-3,	Pilot Station	2015	Lower	380	0.25	0.201–0.300
Y-4A	Test fishery		Middle		0.32	0.265–0.384
			Upper		0.43	0.373–0.480
Y-4B	Galena subsistence	Galena 2009–2011	Lower		0.06	
		average	Middle		0.59	[a]
			Upper		0.35	
Y-4C	Ruby subsistence	Ruby 2009–2011	Lower		0.09	
		average	Middle		0.76	[a]
			Upper		0.14	
Y-5	Tanana to Birch Creek	Tanana 2010–2012	Lower		0.02	
	subsistence	average	Middle		0.28	[a]
			Upper		0.70	
Y-5	Beaver to Fort Yukon	Fort Yukon 2009–2014	Lower		0.00	
	subsistence	average	Middle		0.08	[a]
			Upper		0.92	

[a] Stock composition estimates were averaged across years; 90% CI not available.

Table 3.–Description and rationale used to select proxies to represent the age composition of 16 harvest groups, 2015.

Harvest group	Fishery	Sampled in 2015	Number of fish sampled	Proxy data source	Rationale for proxy selection
1	Coastal District subsistence	No	–	2015 Y-1 incidental commercial	Coastal District is near Y-1. Subsistence gillnets were restricted to ≤6-inch mesh in the Coastal District, consistent with gear and mesh size used in the Y-1 commercial fishery.
2	Y-1 incidental commercial	Yes	69	–	–
3	Y-1 subsistence [a]	Yes	803	–	–
4	Y-2 incidental commercial	No	–	2015 Y-1 incidental commercial & PSTF ≤6.5 inch	Proxy data sources were averaged. Y-2 is near Y-1 and the commercial fishery within both districts were managed similarly with respect to timing and gear. PSTF is in Y-2 and commercial gillnets were limited to ≤6-inch mesh.
5	Y-2 subsistence [a]	Yes	380	–	–
6	Y-3 subsistence	No	–	2015 PSTF ≤6.5 inch	PSTF is located downriver from Y-3. Subsistence gillnets in Y-3 were limited to ≤6-inch mesh.
7	Y-4A subsistence mainstem villages Anvik to Koyukuk	No	–	2015 PSTF ≤6.5 inch	PSTF is located downriver from Y-4. Subsistence gillnets in Y-4 were limited to ≤6-inch mesh.
8 & 9	Y-4B & Y-4C subsistence Galena & Ruby	Yes	49	–	–
10	Y-4 subsistence Koyukuk River villages	No	–	2015 PSTF ≤6.5 inch	PSTF is located downriver from Koyukuk River. Subsistence gillnets in the Koyukuk River were limited to ≤6-inch mesh.
11	Y-5 subsistence Tanana to Birch Creek	No	–	2015 Fort Yukon subsistence	Fort Yukon is in Y-5. Harvest timing, gear usage, and fish available for harvest from Tanana to Birch Creek are relatively similar to the upriver village of Fort Yukon.
12	Y-5 subsistence Beaver to Fort Yukon	Yes	373	–	–

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Table 3.–Page 2 of 2.

Harvest group	Fishery	Sampled in 2015	Number of fish sampled	Proxy data source	Rationale for proxy selection
13	Y-5 subsistence villages above Fort Yukon	No	–	2015 Fort Yukon subsistence	Fort Yukon is in Y-5. Harvest timing, gear usage, and fish available for harvest from villages above Fort Yukon are relatively similar to the village of Fort Yukon.
14	Y-5 subsistence Chandalar & Black river villages	No	–	2015 Fort Yukon subsistence	Fort Yukon is near the Chandalar and Black Rivers and was the closest sampled village.
15	Y-6 subsistence and sport	No	–	2015 Galena and Ruby subsistence	Harvest samples from Ruby and Galena were pooled. Ruby and Galena were the closest sampled villages downstream of Y-6.
16	Canada all harvest	No	–	2015 ETF	ETF is located near the Alaska/Canada border and age composition measured at ETF represents fish available for harvests in Canada.

[a] Includes mortalities from test fisheries donated to subsistence users.

Table 4.–Description and rationale used to select proxies used to represent the stock composition of 16 harvest groups, 2015.

Harvest group	Fishery	Direct sampling	Number of fish sampled	Proxy data source	Rationale for proxy selection
1	Coastal District subsistence	No	–	2015 PSTF	PSTF is in Y-2 and was the closest assessment program to the Coastal District that produced stock composition estimates. Stock groups passing through the Coastal District are assumed to be predominately Yukon River origin.
2	Y-1 incidental commercial	No	–	2015 PSTF	PSTF is in Y-2 and was the closest assessment program to Y-1 that produced stock composition estimates. All stock groups (and components) susceptible to harvest in Y-1 pass the PSTF, except Andreafsky River.
3	Y-1 subsistence [a]	No	–	2010–2011 average LYTF	LYTF is in Y-1 and all fish were donated for subsistence purposes. Donated fish made up most of the 2015 subsistence harvest in Y-1 that was not retained from the commercial fishery. LYTF stock composition is known to differ from PSTF due to exclusive use of large mesh gillnets. PSTF was not a suitable proxy. 2010-2011 were the most recent years with data from LYTF.
4	Y-2 incidental commercial	No	–	2015 PSTF	PSTF is in Y-2 and represented the stock composition of fish available for harvest.
5	Y-2 subsistence [a]	Yes	380	–	–
6	Y-3 subsistence	No	–	2015 PSTF	PSTF is in Y-2 and was the closest assessment program to Y-3 that produced stock composition estimates. All stock groups (and components) represented by PSTF, were susceptible to harvest in Y-3.
7	Y-4A subsistence mainstem villages Anvik to Koyukuk	No	–	2015 PSTF	PSTF is in Y-2 and was the closest assessment program to Y-4A that produced stock composition estimates. All stock groups (and components) represented by PSTF, were susceptible to harvest in Y-4A.
8	Y-4B subsistence Galena	No	–	2009–2011 average Galena	2015 genetic samples were not analyzed. 2009-2011 are the most recent 3-years of data. Historically, Galena has had a different stock composition than Y-4A so PSTF was not a suitable proxy.

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Table 4.–Page 2 of 2.

Harvest group	Fishery	Direct sampling	Number of fish sampled	Proxy data source	Rationale for proxy selection
9	Y-4C subsistence Ruby	No	–	2009–2011 average Ruby	2015 genetic samples were not analyzed. 2009-2011 are the most recent 3 years of data. Historically, Ruby has had a different stock composition than Y-4A or Galena so neither of these was a suitable proxy.
10	Y-4 subsistence Koyukuk River villages	No	–	Assigned – middle stock	The Koyukuk River is a component of the Middle stock group. Harvest within the Koyokuk is probably of Middle stock origin based on geographic location.
11	Y-5 subsistence Tanana to Birch Creek	No	–	2010–2012 average Tanana	Tanana is one of the largest harvesters in Y-5, and historically the stock composition of Tanana harvest has been different from downstream (Ruby/Galena) and upstream locations (Fort Yukon). 2010-2012 were the most recent years 3 years of data.
12	Y-5 subsistence Beaver to Fort Yukon	No	–	2009–2014 average Fort Yukon	Fort Yukon is a large harvester in Y-5, and stock composition of the harvest is known to be different than other locations (e.g., Tanana). 2015 genetic samples were not analyzed. 2009–2014 represent all available data from this location.
13	Y-5 subsistence villages above Fort Yukon	No	–	Assigned – upper stock	The Porcupine River is the only major Alaska spawning tributary between Fort Yukon and Canadian border. Harvest upriver from Fort Yukon is probably Canadian-origin based on geographic location.
14	Y-5 subsistence Chandalar & Black river villages	No	–	Assigned – middle stock	The Chandalar and Black Rivers are components of the Middle stock group. Harvest within these rivers is probably of Middle stock origin based on geographic location.
15	Y-6 subsistence and sport	No	–	Assigned – middle stock	The Tanana River is a component of the Middle stock group. Harvest within the Tanana River is probably of Middle stock origin based on geographic location.
16	Canada all harvest	No	–	Assigned – upper stock	All harvest within Canada is made up of Canadian-origin (Upper) stock.

[a] Includes mortalities from test fisheries donated to subsistence users.

Table 5.–Estimated harvest of Chinook salmon in the Yukon Area apportioned by age class, district, fishery, and stock group, 2015.

			Age class								
District	Fishery	Stock group	1.1	1.2	1.3	2.2	1.4	2.3	1.5	2.4	Total
Coastal	Subsistence	Lower	0	119	43	0	79	0	0	0	242
		Middle	0	154	56	0	103	0	0	0	312
		Alaska	0	273	99	0	182	0	0	0	554
		Upper	0	203	74	0	135	0	0	0	412
		Total	0	476	173	0	317	0	0	0	966
Y-1	Subsistence [a]	Lower	0	152	75	0	199	0	1	1	429
		Middle	0	199	100	0	271	0	1	1	573
		Alaska	0	351	176	1	471	0	2	2	1,002
		Upper	0	278	160	1	474	0	2	3	917
		Total	0	629	335	1	944	0	4	5	1,919
Y-2	Subsistence [a]	Lower	0	114	84	1	96	2	0	0	297
		Middle	0	147	108	1	124	3	0	0	383
		Alaska	0	260	191	3	220	5	0	0	680
		Upper	0	193	142	2	164	4	0	0	505
		Total	0	454	334	4	384	9	0	0	1,185
Y-3	Subsistence	Lower	0	40	35	1	36	1	0	0	112
		Middle	0	51	45	1	46	1	0	0	145
		Alaska	0	91	80	1	82	3	0	0	256
		Upper	0	67	60	1	61	2	0	0	191
		Total	0	158	140	2	142	4	0	0	447
Y-4	Subsistence	Lower	0	39	27	0	26	1	0	0	93
		Middle	0	210	115	1	100	2	0	0	427
		Alaska	0	249	142	1	125	2	0	0	520
		Upper	0	120	69	1	61	1	0	0	251
		Total	0	368	212	2	186	3	0	0	771
Y-5	Subsistence	Lower	0	6	3	0	2	0	0	0	12
		Middle	1	253	112	1	95	0	1	1	465
		Alaska	1	259	115	1	97	0	1	1	476
		Upper	4	747	331	4	280	0	4	4	1,373
		Total	5	1,006	446	5	377	0	5	5	1,849
Y-6	Subsistence	Middle	0	250	107	0	80	0	0	0	437
	Sport	Middle	0	7	3	0	2	0	0	0	13
Canada		Upper	4	130	414	0	605	25	14	12	1,204
Total		Lower	0	470	267	2	438	4	1	1	1,183
harvest		Middle	1	1,270	647	5	821	6	2	3	2,755
		Alaska	1	1,740	914	7	1,259	10	3	4	3,938
		Upper	8	1,738	1,250	8	1,779	31	20	18	4,853
		Total	9	3,478	2,164	15	3,039	41	23	22	8,791

[a] Includes mortalities from test fisheries donated to subsistence users and salmon caught during the summer chum salmon commercial fishery and retained for subsistence.

Table 6.–Estimated harvest percentage of Chinook salmon in the Yukon Area apportioned by age class, district, fishery, and stock group, 2015.

District	Fishery	Stock group	Age class 1.1	1.2	1.3	2.2	1.4	2.3	1.5	2.4	Total
Coastal	Subsistence	Lower	0.0	12.3	4.5	0.0	8.2	0.0	0.0	0.0	25.0
		Middle	0.0	15.9	5.8	0.0	10.6	0.0	0.0	0.0	32.3
		Alaska	0.0	28.3	10.3	0.0	18.8	0.0	0.0	0.0	57.4
		Upper	0.0	21.0	7.6	0.0	14.0	0.0	0.0	0.0	42.6
		Total	0.0	49.3	17.9	0.0	32.8	0.0	0.0	0.0	100.0
Y-1	Subsistence [a]	Lower	0.0	7.9	3.9	0.0	10.4	0.0	0.0	0.1	22.3
		Middle	0.0	10.4	5.2	0.0	14.1	0.0	0.1	0.1	29.9
		Alaska	0.0	18.3	9.2	0.0	24.5	0.0	0.1	0.1	52.2
		Upper	0.0	14.5	8.3	0.0	24.7	0.0	0.1	0.2	47.8
		Total	0.0	32.8	17.5	0.1	49.2	0.0	0.2	0.3	100.0
Y-2	Subsistence [a]	Lower	0.0	9.6	7.0	0.1	8.1	0.2	0.0	0.0	25.0
		Middle	0.0	12.4	9.1	0.1	10.5	0.2	0.0	0.0	32.3
		Alaska	0.0	22.0	16.2	0.2	18.6	0.4	0.0	0.0	57.4
		Upper	0.0	16.3	12.0	0.2	13.8	0.3	0.0	0.0	42.6
		Total	0.0	38.3	28.2	0.4	32.4	0.8	0.0	0.0	100.0
Y-3	Subsistence	Lower	0.0	8.8	7.8	0.1	8.0	0.2	0.0	0.0	25.0
		Middle	0.0	11.4	10.1	0.2	10.3	0.3	0.0	0.0	32.3
		Alaska	0.0	20.3	18.0	0.3	18.3	0.6	0.0	0.0	57.4
		Upper	0.0	15.1	13.4	0.2	13.6	0.4	0.0	0.0	42.6
		Total	0.0	35.3	31.3	0.5	31.8	1.0	0.0	0.0	100.0
Y-4	Subsistence	Lower	0.0	5.1	3.5	0.0	3.3	0.1	0.0	0.0	12.0
		Middle	0.0	27.2	15.0	0.1	12.9	0.2	0.0	0.0	55.4
		Alaska	0.0	32.3	18.5	0.1	16.2	0.3	0.0	0.0	67.4
		Upper	0.0	15.5	9.0	0.1	7.9	0.1	0.0	0.0	32.6
		Total	0.0	47.8	27.4	0.2	24.2	0.4	0.0	0.0	100.0
Y-5	Subsistence	Lower	0.0	0.3	0.2	0.0	0.1	0.0	0.0	0.0	0.6
		Middle	0.1	13.7	6.1	0.1	5.1	0.0	0.1	0.1	25.1
		Alaska	0.1	14.0	6.2	0.1	5.2	0.0	0.1	0.1	25.8
		Upper	0.2	40.4	17.9	0.2	15.1	0.0	0.2	0.2	74.2
		Total	0.3	54.4	24.1	0.3	20.4	0.0	0.3	0.3	100.0
Y-6	Subsistence	Middle	0.0	57.1	24.5	0.0	18.4	0.0	0.0	0.0	100.0
	Sport	Middle	0.0	57.1	24.5	0.0	18.4	0.0	0.0	0.0	100.0
Canada		Upper	0.3	10.8	34.4	0.0	50.3	2.0	1.2	1.0	100.0
Total harvest		Lower	0.0	5.3	3.0	0.0	5.0	0.0	0.0	0.0	13.5
		Middle	0.0	14.5	7.4	0.1	9.3	0.1	0.0	0.0	31.3
		Alaska	0.0	19.8	10.4	0.1	14.3	0.1	0.0	0.0	44.8
		Upper	0.1	19.8	14.2	0.1	20.2	0.4	0.2	0.2	55.2
		Total	0.1	39.6	24.6	0.2	34.6	0.5	0.3	0.3	100.0

[a] Includes mortalities from test fisheries donated to subsistence users and salmon caught during the summer chum salmon commercial fishery and retained for subsistence.

Table 7.–Estimated harvest of Chinook salmon in the Yukon Area by stock group, 1981–2015.

			Upper			
Year [a]	Lower	Middle	U.S.	Canada	Total Upper	Total
1981	11,164	112,669	64,644	18,109	82,753	206,586
1982	23,601	41,967	87,241	17,208	104,449	170,017
1983	28,081	73,361	96,994	18,952	115,946	217,388
1984	45,210	71,656	44,735	16,795	61,530	178,396
1985	57,770	46,753	85,773	19,301	105,074	209,597
1986	32,517	15,894	97,593	20,364	117,957	166,368
1987	32,847	40,281	115,258	17,614	132,872	206,000
1988	36,967	26,805	84,649	21,427	106,076	169,848
1989	42,872	27,936	86,798	17,944	104,742	175,550
1990	34,007	42,430	72,996	19,227	92,223	168,660
1991	49,113	44,328	61,210	20,607	81,817	175,258
1992	30,330	40,600	97,261	17,903	115,164	186,094
1993	38,592	45,671	78,815	16,611	95,426	179,689
1994	35,161	41,488	95,666	21,218	116,884	193,533
1995	35,518	44,404	97,741	20,887	118,628	198,550
1996	33,278	16,386	88,958	19,612	108,570	158,234
1997	50,420	32,043	92,162	16,528	108,690	191,153
1998	34,759	18,509	46,947	5,937	52,884	106,152
1999	54,788	8,619	60,908	12,468	73,376	136,783
2000	16,989	6,176	22,143	4,879	27,022	50,187
2001	20,115	10,190	23,325	10,139	33,421	63,726
2002	14,895	22,395	30,058	9,257	39,387	76,677
2003	7,394	31,232	59,940	9,619	69,559	108,185
2004	18,965	35,553	57,831	11,238	69,069	123,587
2005	19,893	20,607	44,650	11,074	55,724	96,223
2006	18,301	28,756	48,097	9,072	57,169	104,225
2007	12,311	28,924	48,320	5,094	53,414	94,649
2008	8,903	14,636	25,329	3,426	28,755	52,294
2009	4,332	12,229	17,646	4,758	22,404	38,964
2010	10,046	18,465	25,271	2,647	27,918	56,429
2011	6,356	13,591	20,824	4,884	25,708	45,656
2012	4,123	10,763	13,842	2,200	16,042	30,927
2013	1,793	2,802	6,604	2,146	8,750	13,345
2014 [b]	979	853	1,455	103	1,558	3,390
2015 [b]	1,183	2,755	3,649	1,204	4,853	8,791
Average						
1981–2014	25,659	30,852	58,873	12,625	71,499	128,009
2010–2014	4,080	8,205	11,941	2,197	14,138	26,423

[a] The years 1981–2013 do not include the subsistence harvest from the Coastal District communities of Hooper Bay and Scammon Bay.

[b] Includes the subsistence harvest from Hooper Bay and Scammon Bay.

Table 8.–Estimated harvest percentage of Chinook salmon in the Yukon Area by stock group, 1981–2015.

Year [a]	Lower	Middle	Upper U.S.	Upper Canada	Total
1981	5.4	54.5	31.3	8.8	40.1
1982	13.9	24.7	51.3	10.1	61.4
1983	12.9	33.7	44.6	8.7	53.3
1984	25.3	40.2	25.1	9.4	34.5
1985	27.6	22.3	40.9	9.2	50.1
1986	19.5	9.6	58.7	12.2	70.9
1987	15.9	19.6	56.0	8.6	64.5
1988	21.8	15.8	49.8	12.6	62.5
1989	24.4	15.9	49.4	10.2	59.7
1990	20.2	25.2	43.3	11.4	54.7
1991	28.0	25.3	34.9	11.8	46.7
1992	16.3	21.8	52.3	9.6	61.9
1993	21.5	25.4	43.9	9.2	53.1
1994	18.2	21.4	49.4	11.0	60.4
1995	17.9	22.4	49.2	10.5	59.7
1996	21.0	10.4	56.2	12.4	68.6
1997	26.4	16.8	48.2	8.6	56.9
1998	32.7	17.4	44.2	5.6	49.8
1999	40.1	6.3	44.5	9.1	53.6
2000	33.9	12.3	44.1	9.7	53.8
2001	31.6	16.0	36.5	15.9	52.4
2002	19.4	29.2	39.3	12.1	51.4
2003	6.8	28.9	55.4	8.9	64.3
2004	15.3	28.8	46.8	9.1	55.9
2005	20.7	21.4	46.4	11.5	57.9
2006	17.6	27.6	46.1	8.7	54.9
2007	13.0	30.6	51.1	5.4	56.4
2008	17.0	28.0	48.4	6.6	55.0
2009	11.1	31.4	45.3	12.2	57.5
2010	17.8	32.7	44.8	4.7	49.5
2011	13.9	29.8	45.6	10.7	56.3
2012	13.3	34.8	44.8	7.1	51.9
2013	13.4	21.0	49.5	16.1	65.6
2014 [b]	28.9	25.2	42.9	3.0	45.9
2015 [b]	13.5	31.3	41.5	13.7	55.2
Average					
1981–2014	20.0	24.4	45.9	9.7	55.6
2010–2014	16.8	29.2	45.6	8.4	54.0

[a] The years 1981–2013 do not include the subsistence harvest from the Coastal District communities of Hooper Bay and Scammon Bay.

[b] Includes the subsistence harvest from Hooper Bay and Scammon Bay.

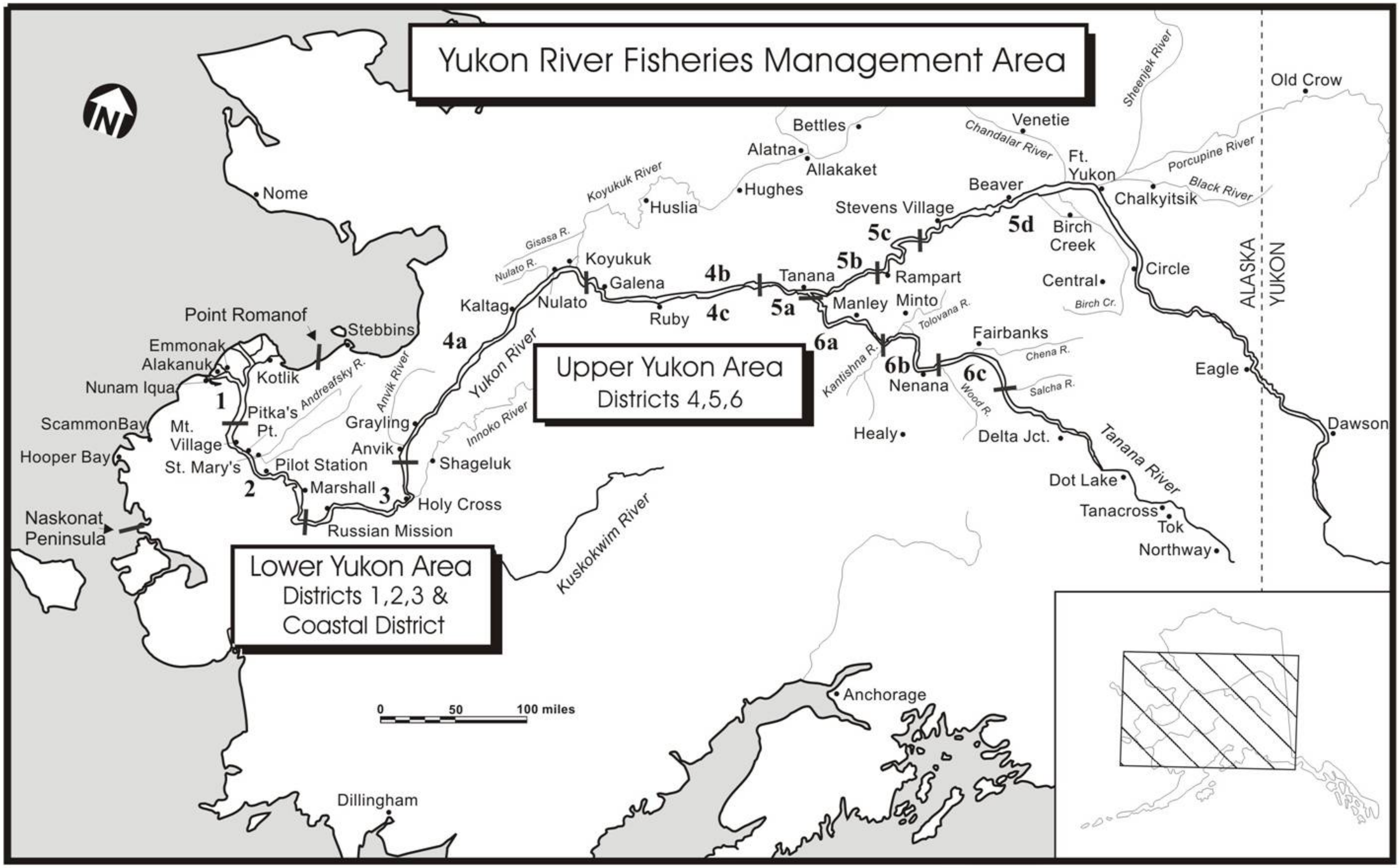

Figure 1.–Alaska portion of the Yukon River drainage district boundaries and major spawning tributaries.

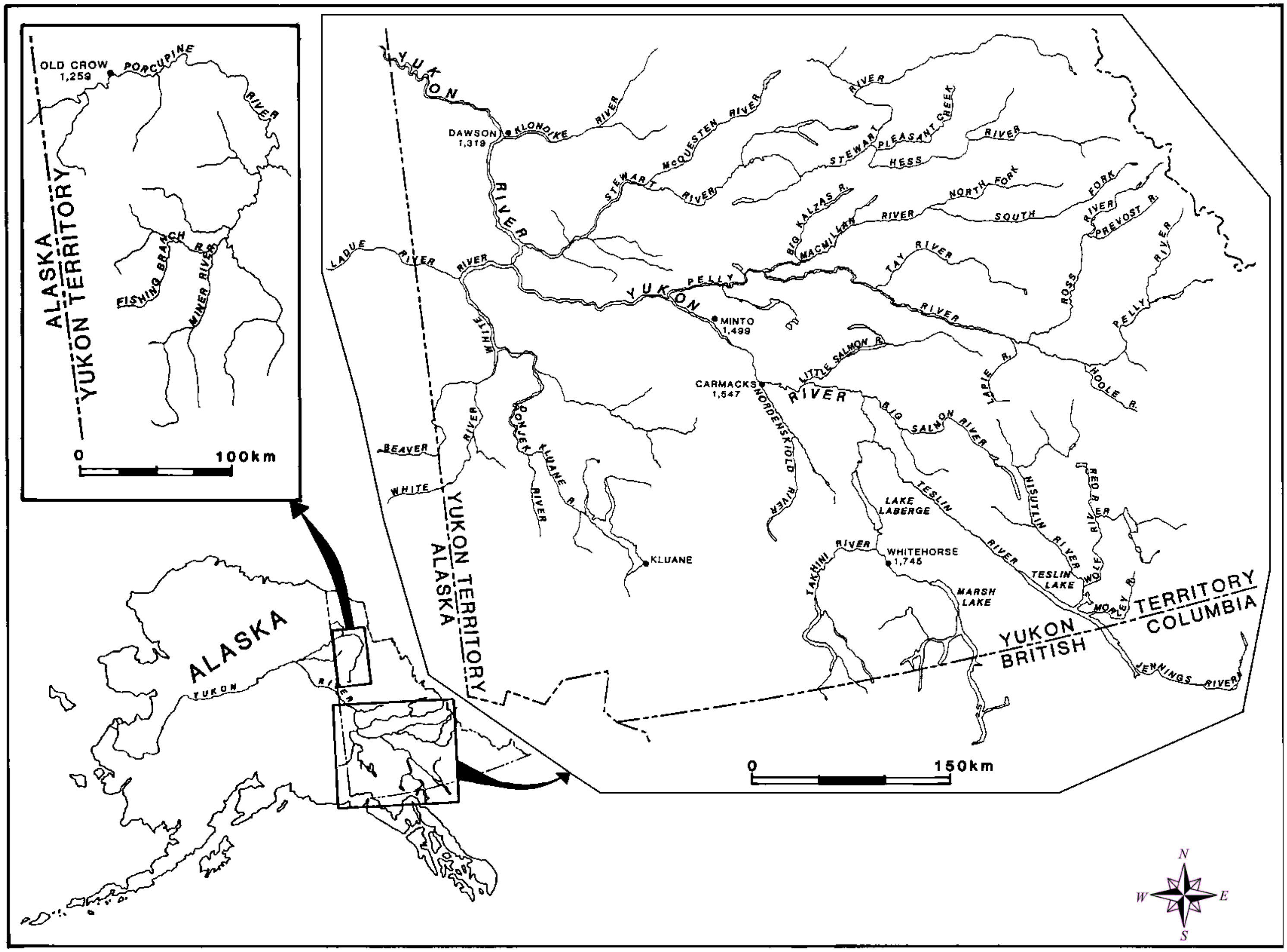

Figure 2.–Canadian portion of the Yukon River drainage and major spawning tributaries.

APPENDIX A

Appendix A1.–Gear used to harvest Chinook salmon, 2015.

Project / fishery	Gear and mesh size
Lower Yukon test fishery	Set gillnet 8.5 inch
Pilot Station test fishery	Drift gillnet 2.75, 4, 5, 5.25, 5.75, 6.5, 7.5, 8.5 inch
Eagle test fishery	Drift gillnet 5.25, 6.5, 7.5, 8.5 inch
Fort Yukon subsistence harvest	Set gillnet 6 inch
Legal gear in subsistence harvest	Set and drift gillnet ≤6 inch

Appendix A2.–Estimated Chinook salmon stock and age class proportions by harvest group, 2015.

						Age class proportion										Data sources	
District	Fishery	Harvest group	Harvest apportioned	Stock group	Stock prop.	1.1	1.2	1.3	2.2	1.4	2.3	1.5	2.4	1.6	2.5	Stock composition	Age composition
Coastal	Subsistence	1	966	Lower	0.25	0.00	0.49	0.18	0.00	0.33	0.00	0.00	0.00	0.00	0.00	2015	2015
				Middle	0.32											PSTF	Y-1 Incidental
				Upper	0.43												Commercial
Y-1	Incidental	2	1,116	Lower	0.25	0.00	0.49	0.18	0.00	0.33	0.00	0.00	0.00	0.00	0.00	2015	2015
	commercial			Middle	0.32											PSTF	Y-1 Incidental
				Upper	0.43												Commercial
Y-1	Subsistence	3	803	Lower	0.19	0.00	0.10	0.17	0.00	0.72	0.00	0.01	0.01	0.00	0.00	2010–2011 Average	2015 Lower Yukon
				Middle	0.26											LYTF	Test fishery
				Upper	0.55												
Y-2	Incidental	4	1,147	Lower	0.25	0.00	0.39	0.28	0.00	0.32	0.01	0.00	0.00	0.00	0.00	2015	2015
	commercial			Middle	0.32											PSTF	Y-1 Incidental Commercial
				Upper	0.43												and PSTF ≤6.5"
Y-2	Subsistence	5	38	Lower	0.25	0.00	0.22	0.34	0.00	0.42	0.01	0.00	0.00	0.00	0.00	2015	2015
				Middle	0.32											PSTF	PSTF
				Upper	0.43												all mesh
Y-3	Subsistence	6	447	Lower	0.25	0.00	0.35	0.31	0.00	0.32	0.01	0.00	0.00	0.00	0.00	2015	2015
				Middle	0.32											PSTF	PSTF ≤6.5"
				Upper	0.43												

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District	Fishery	Harvest group	Harvest apportioned	Stock group	Stock prop.	Age class proportion 1.1	1.2	1.3	2.2	1.4	2.3	1.5	2.4	1.6	2.5	Data source: Stock composition	Age composition
Y-4A	Subsistence	7	258	Lower	0.25	0.00	0.35	0.31	0.00	0.32	0.01	0.00	0.00	0.00	0.00	2015	2015
	Mainstem villages			Middle	0.32											PSTF	PSTF ≤6.5"
	Anvik to Koyukuk			Upper	0.43												
Y-4B	Subsistence	8	372	Lower	0.06	0.00	0.57	0.24	0.00	0.18	0.00	0.00	0.00	0.00	0.00	Galena	2015
	Mainstem villages			Middle	0.59											2009–2011 Average	Galena Ruby
	Galena			Upper	0.35												
Y-4C	Subsistence	9	68	Lower	0.09	0.00	0.57	0.24	0.00	0.18	0.00	0.00	0.00	0.00	0.00	Ruby	2015
	Mainstem villages			Middle	0.76											2009–2011 Average	Galena Ruby
	Ruby			Upper	0.14												
Y-4	Subsistence	10	73	Middle	1.00	0.00	0.35	0.31	0.00	0.32	0.01	0.00	0.00	0.00	0.00	Assigned	2015
	Koyukuk River villages																PSTF ≤6.5"
Y-5	Subsistence	11	405	Lower	0.02	0.00	0.54	0.24	0.00	0.20	0.00	0.00	0.00	0.00	0.00	2010–2012 Average	2015 Fort Yukon
	Tanana to			Middle	0.28											Tanana	Subsistence
	Birch Creek			Upper	0.70												
Y-5	Subsistence	12	549	Lower	0.00	0.00	0.54	0.24	0.00	0.20	0.00	0.00	0.00	0.00	0.00	2009–2014	2015 Fort Yukon
	Beaver to			Middle	0.08											Fort Yukon	Subsistence
	Fort Yukon			Upper	0.92											Average	
Y-5	Subsistence	13	587	Upper	1.00	0.00	0.54	0.24	0.00	0.20	0.00	0.00	0.00	0.00	0.00	Assigned	2015 Fort Yukon
	Villages above Fort Yukon																Subsistence
Y-5	Subsistence	14	308	Middle	1.00	0.00	0.54	0.24	0.00	0.20	0.00	0.00	0.00	0.00	0.00	Assigned	2015 Fort Yukon
	Chandalar and Black River villages																Subsistence
Y-6	Subsistence	15	437	Middle	1.00	0.00	0.57	0.24	0.00	0.18	0.00	0.00	0.00	0.00	0.00	Assigned	2015
	Sport		13	Middle	1.00												Galena Ruby
Canada	All	16	1,204	Upper	1.00	0.00	0.11	0.34	0.00	0.50	0.02	0.01	0.01	0.00	0.00	Assigned	2015 ETF

Note: LYTF is Lower Yukon test fishery project and PSTF is Pilot Station test fishery project.