Fishery Data Series No. 15-22

Subsistence Salmon Harvests in the Kuskokwim Area, 2013

REVISED 10/09/2016

ADDENDUM

This addendum contains changes due to two errors. First are changes due to a mistake in tabulation of the 5- and 10- year average columns in Appendix A4, "Estimated number of coho salmon harvested in the Kuskokwim area, 2003-2013." These changes affected the display of data in Figure 11 but otherwise did not affect conclusions or the text of the report. The second change occurs on page 14, first paragraph, and refers to the number of survey respondents that gave reasons for not meeting their harvest needs for coho salmon in 2013. In the original, 635 respondents were cited; however, the actual number is 471 (853 minus 376 unknowns, 6 irrelevant comments, and 6 "other" comments). This correction appears only on page 14 and refers to Table 23. Data in Table 23 is unchanged from the original draft. This addendum has not otherwise changed the conclusions of this publication.

Annual Report for Study 10-352

USFWS Office of Subsistence Management

Fisheries Resource Monitoring Program

by

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July 2015

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

FISHERY DATA SERIES NO. 15-22

SUBSISTENCE SALMON HARVESTS IN THE KUSKOKWIM AREA, 2013

by
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July 2015

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ABSTRACT

The Alaska Department of Fish and Game (ADF&G) in partnership with Orutsararmiut Native Council (ONC) in Bethel and Kuskokwim Native Association (KNA) in Aniak conducted a voluntary survey program to estimate subsistence salmon harvest for the Kuskokwim Area in 2013. Harvest information was collected through postseason household interviews and harvest calendars. Simple random sampling, stratified random sampling, and 100% census techniques were used, based on community size and user group designations, to select households to be interviewed. For the communities of Bethel and Aniak, subsistence salmon harvest information was collected by ONC and KNA respectively. ADF&G surveyed the remaining communities in the Kuskokwim Area. Data from surveyed communities were applied to estimate the harvest of unsurveyed communities when historical data for the unsurveyed community existed, and updated estimates for unsurveyed and under-surveyed communities were applied to the full dataset (1990–2013). In 2013, Kuskokwim Area subsistence users were subject to light-to-moderate restrictions with respect to the harvest of Chinook salmon. Households were surveyed in 25 communities in the Kuskokwim Area, including most communities along the Kuskokwim River and all communities within south Kuskokwim Bay. Subsistence salmon harvest estimates for 2013 were 50,708 Chinook *Oncorhynchus tshawytscha*, 55,828 chum *O. keta*, 46,049 sockeye *O. nerka*, 27,841 coho *O. kisutch*, and 741 pink salmon *O. gorbuscha*.

Key words: Chinook *Oncorhynchus tshawytscha*, chum *Oncorhynchus keta*, coho *Oncorhynchus kisutch*, and pink *Oncorhynchus gorbuscha* salmon, subsistence, harvest, Bethel, Aniak, Kuskokwim River, Kuskokwim Bay, Kuskokwim Area.

INTRODUCTION

The purpose of this study was to quantitatively estimate the subsistence harvest of salmon, by species, in the Kuskokwim Management Area using postseason subsistence salmon harvest surveys. This study was a continuation of the *Kuskokwim Area subsistence salmon monitoring program* (Monitoring Program; Shelden et al. 2014). Data were collected about the number and species of salmon harvested by area residents and analyzed to provide an estimate of the number of salmon harvested for subsistence purposes in the Kuskokwim Area. This report describes the outcome of surveys for the 2013 fishing season in the Kuskokwim Area.

The Kuskokwim Area (Figure 1) subsistence salmon fishery is one of the largest in the state in terms of the number of residents who participate and the number of salmon harvested (Fall et al. 2013). Residents harvest all 5 locally-occurring species of Pacific salmon for subsistence purposes: Chinook *Oncorhynchus tshawytscha*, chum *O. keta*, coho *O. kisutch*, sockeye *O. nerka*, and pink *O. gorbuscha* salmon. The Division of Subsistence conducted comprehensive subsistence harvest and use surveys from 2010 to 2013 in 18 Kuskokwim River communities. The results indicate that on average salmon contributes 42% of the total wild resource harvest (in edible pounds) in the Lower Kuskokwim communities, 65% in the Central Kuskokwim communities, and 25% in the Upper Kuskokwim communities (Brown et al. 2012, 2013; Ikuta et al. 2014). Primary gear types used for harvesting salmon include drift gillnets, set gillnets, and rod and reel.

Subsistence salmon harvest practices represent a complicated dynamic among culture, tradition, salmon biology, and local economy (Ikuta et al. 2013; Simon et al. 2007; Patton and Carroll 2011). Salmon harvest typically occurs June through October and is often accompanied by the movement of families from permanent winter residences to summer fish camps situated along tributaries, sloughs, and along main river channels. During these months, daily activities of many Kuskokwim Area households revolve around subsistence fishing.

There are 38 communities in the Kuskokwim Area. Annual surveys were attempted in 26 villages, based on logistics and voluntary involvement in the study (Table 1; Figure 1). On average from 2003 to 2012, 77% of the Kuskokwim Area subsistence salmon harvest (all species

combined) occurred in the Lower Kuskokwim River villages from Eek to Tuluksak (Figure 2; Appendices A1–A4). The Middle Kuskokwim River villages from Lower Kalskag up through Chuathbaluk harvested an average of 9% of the total subsistence salmon between 2003 and 2012. The Upper Kuskokwim River communities harvested about 6% of the total, South Kuskokwim Bay communities harvested 5% of the total, and North Kuskokwim Bay communities harvested an average of 3% of the total, between 2003 and 2012 (Figure 2; Appendices A1–A4). This harvest distribution is similar to the human population distribution along the Kuskokwim River. In 2012, the population percentages calculated were Lower (76%), Middle (9%), and Upper (7%) Kuskokwim River communities, South Kuskokwim Bay communities (6%), and Kongiganak on north Kuskokwim Bay (2%) (Shelden et al. 2014).

The North Kuskokwim Bay communities of Kwigillingok, Kongiganak, and Kipnuk are not located on the Kuskokwim River, but some subsistence salmon fishing households from these communities travel to the Kuskokwim River to fish, in addition to fishing in areas closer to their communities (Fall et al. 2013). Of these North Kuskokwim Bay communities, only the community of Kongiganak (90 households in 2011; Shelden et al. 2014) has consistently participated in the voluntary Alaska Department of Fish and Game (ADF&G) harvest survey.

The communities of Quinhagak, Goodnews Bay, and Platinum, located in South Kuskokwim Bay, have been estimated to include 6% of the total Kuskokwim Area households (Shelden et al. 2014). Subsistence fishermen from these communities harvest salmon primarily from the Kanektok, Arolik, and Goodnews river drainages (Simon et al. 2007). South Kuskokwim Bay communities have consistently participated in Kuskokwim Area subsistence surveys (Appendices A1–A4).

Subsistence users from Bering Sea coastal communities have not chosen to participate in the ADF&G Monitoring Program for most years. These include the communities of Mekoryuk (on Nunivak Island), Newtok, Tununak, Toksook Bay, Nightmute, and Chefornak; and typically these communities harvest salmon from coastal waters as well as area rivers (Simon et al. 2007).

At the time of this study, subsistence fishermen in the Kuskokwim Area were not required to report their harvest to ADF&G or to any federal management agencies, and licenses and permits were not required to participate in the subsistence fishery. With a few exceptions for special management areas (e.g., Aniak River), the Kuskokwim Management Area is largely free of subsistence harvest limits. Legal subsistence fishing gear includes gillnets (which are most common), beach seine, rod and reel, fish wheel, and spear (5 AAC 01.270). The mesh size used for drift and set gillnets are not regulated, but length and depth of gillnets is restricted by regulation.

Annual documentation of the subsistence salmon harvest is necessary to determine whether salmon are returning in sufficient numbers to the Kuskokwim Area rivers to meet escapement and subsistence needs. Since 1960 the Monitoring Program has estimated salmon harvest primarily through household surveys and to a lesser extent harvest calendars and postcard surveys. This information has been used by ADF&G, U.S. Fish and Wildlife Service (USFWS), the Alaska Board of Fisheries (BOF), and the Federal Subsistence Board to manage and provide reasonable opportunity for continued customary and traditional uses of salmon throughout the region. In 2013, using the results from the postseason subsistence salmon survey, the BOF revised the recognized amounts of salmon reasonably necessary for subsistence (ANS) in the Kuskokwim River drainage based on ranges of recorded harvests of salmon in years of

unrestricted subsistence harvest. These revised ranges are 67,200 to 109,800 Chinook salmon; 41,200 to 116,400 chum salmon; 32,200 to 58,700 sockeye salmon; 27,400 to 57,600 coho salmon; and 500 to 2,000 pink salmon (5 AAC 01.286b). A species-specific ANS range provides an index of the extent to which reasonable opportunity was provided in each subsistence fishery.

The BOF also revisited the ANS findings for the remainder of the of the Kuskokwim area. For the south Kuskokwim Bay communities of Quinhagak, Goodnews Bay, and Platinum, the BOF found an ANS of 6,900 to 17,000 salmon (not broken down by species). For the remaining Kuskokwim Area communities, located along the Bering Sea coast, ANS are harder to determine, but available data document an annual use of 12,500 to 14,400 salmon (not broken down by species; Wolfe et al. 2012).

The goal of the survey is to provide a reliable annual estimate of subsistence salmon harvest in the Kuskokwim area, primarily as information for management. Questions are designed to determine total subsistence harvest of salmon regardless of eventual use. Estimates include fish harvested to feed dogs, fish discarded due to being unfit for human consumption, and fish given away as part of traditional sharing practices. The data collected during this survey serve fisheries managers by expanding their ability to assess annual run strength of various salmon species, forecast the strength and age composition of future runs, set preseason management plans, and develop long term management plans, including escapement goals. These data also help managers assess subsistence needs and identify whether harvestable surpluses will be available for subsistence, commercial, and sport fishing uses (Brazil et al. 2013).

OBJECTIVES

The objectives of this study were as follows:

1. Estimate the number of Chinook, chum, sockeye, coho, and pink salmon harvested for subsistence uses by subsistence fishermen in 28 communities within the Kuskokwim Area.
2. Document gear types used by Kuskokwim Area subsistence fishermen.
3. Estimate fishing households, community population size, and households receiving salmon.
4. Document the number of dogs within Kuskokwim Area communities and salmon fed to dogs.
5. Document household responses relating to meeting of subsistence salmon needs in surveyed communities.
6. Document reported harvest of non-salmon fish species among fishermen in the Kuskokwim Area.

METHODS

STUDY DESIGN

In 2013, household surveys were attempted in 26 of the 38 communities within the Kuskokwim Area, including most communities along the Kuskokwim River and all communities within South Kuskokwim Bay. The village of Kongiganak in the north Kuskokwim Bay declined a request by ADF&G staff to conduct surveys in 2013. With the exception of Bethel (simple random sample) and Aniak (census), the postseason subsistence harvest survey was designed

based on stratified random survey methodology (Scheaffer et al. 1999). In this survey design, each household was the primary sampling unit. A household generally consists of 1 or more people living together in a dwelling and sharing the same mailing address. Multiple generations living in 1 dwelling would be considered a single household. Each household was classified into 1 of 5 strata based on the household's recent harvest history. Because of the incidence of fishing restrictions in recent years, strata were determined using pre-restriction harvest patterns from 2009 and 2010. The 5 stratifications of participation in the subsistence fishery are as follows:

- high harvester: a household that has averaged a harvest of more than 200 salmon per year;
- medium harvester: a household that has averaged a harvest between 101 and 200 salmon per year;
- light harvesters: a household that has averaged a harvest between 1 and 100 salmon per year;
- usually does not fish: a household that did not participate in subsistence fishing activities;
- unknown: a household that has no harvest record within any of the past 5 years.

For this study, fishing household was defined as a household that participated in subsistence fishing activities, such as harvesting or processing salmon. The household stratification was updated prior to the survey and was not re-assigned during the survey year (i.e., no post-survey reclassification), with the exception of unknown fishing households. From each stratum, survey households were selected randomly in the following percentages:

- heavy harvester: 100%;
- medium harvester: 100%;
- light harvester: 30%;
- usually do not fish: 30%;
- unknown: 100%.

When the number of households in a stratum was less than 5 households, all households in the stratum were surveyed. Likewise, when the total number of households in a community was less than or equal to 40, all households in the community were surveyed and the survey method became a census (100% surveyed). In Aniak the survey method was also a census because the Kuskokwim Native Association (KNA) had the capacity to conduct a complete census, increasing the precision of the estimates from this larger community.

In Bethel, a 25% random survey was conducted based on simple random survey methodology where each dwelling (physical location instead of household) was the primary sampling unit. As a main hub city of western Alaska, the population of Bethel is highly fluid; a high proportion of the population moves in and out of Bethel on a regular basis (Krauthoefer 2005). In addition, people often change dwellings, making it difficult to maintain an accurate and complete household list. A dwelling list for Bethel has been maintained and updated annually. Dwelling maps are obtained annually from the Bethel city planner's office. Map and list are compared and updated both prior to the season and inseason based on surveyor notes. Based on the updated list, 25% of occupied dwellings were randomly selected for survey. Households randomly selected for survey in Bethel were pursued using rigorous protocols to prevent bias. For each selected dwelling, at least 3 separate attempts to contact the household were required. Attempts were made on separate days and different times of day with at least one visit made after 5:00 PM. Exceptions included an obviously abandoned or derelict dwelling or when contact was made and

the occupant declined to be surveyed. In these cases, the selected dwelling was dropped from the survey and replaced by another dwelling selected at random from those not previously selected. Therefore, the final number of selected households could have exceeded 25% of Bethel dwellings. However the final number of surveyed households was close to 25%.

Postseason subsistence harvest surveys were conducted in early autumn because the majority of salmon fishing was finished, yet fishermen could still recall their harvest numbers because the season had ended recently. In Aniak and Bethel, surveys were conducted by KNA and Orutsararmiut Native Council (ONC), respectively, and the other communities were surveyed by ADF&G.

Before conducting interviews, all surveyors (including KNA and ONC surveyors) were trained in surveying techniques, including direction of how to get the best information possible from people who are not accustomed to quantifying their fish harvest. Surveyors were trained in salmon species name identification, as local names for salmon vary throughout the drainage. The surveyors were also briefed on fishery issues or concerns from the recent subsistence and commercial salmon fishing season, to improve understanding of community members' reactions and comments during surveys.

The crew contacted community officials to notify them about the project before arriving in the community to conduct surveys. The household lists were annotated and corrected as the surveyors completed the survey process in the community. During interviews, both surveyors and surveyed individuals contributed to the quality of the estimate. Surveyors were responsible to attempt contact with each selected household, ask questions consistently and understandably, and foster a cooperative atmosphere. Surveyors attempted to interview a member of each selected household, preferably the primary harvester. Occasionally, interviews were conducted with households not pre-selected for the survey. Those households were either 1) new or previously unknown households found by surveyors, or 2) voluntarily provided surveyors with their harvest information.

All survey data were entered into the ADF&G subsistence harvest database, and harvest estimates were generated for the Kuskokwim Area. All subsistence harvest data were treated as confidential, such that individual harvest data were not shared and all analysis was aggregated and anonymous. The study was generally conducted in accordance with the Alaska Federation of Natives' "Guidelines for Research" (AFN 2014).

THE SURVEY INSTRUMENT

The survey instrument was adjusted in 2013, keeping the same questions in the same order. A few questions were enhanced and improved to be more consistent with training provided since 2008 on how to conduct surveys and ask questions. These improvements were designed to provide surveyors and project managers with a better overall product for ease of data recording and later interpretation (Appendix B1).

Most interview questions were designed to provide a quantitative assessment of each household's subsistence salmon harvest. A fishing household was identified by Question 3, which asked whether anyone in the household harvested salmon for subsistence use or kept fish for subsistence from the commercial fishery (Appendix B1). The surveyor was instructed to clarify that harvest includes any participation in the subsistence fishery, such as cutting fish. Household harvest included salmon that members of the household gave away, ate fresh, fed to

dogs, or lost to spoilage. To avoid double-counting among households, salmon received from other households (outside the fishing group) were not considered part of the household harvest because they were part of the harvest of the household that *gave* the fish.

Individual household harvests form the basis of salmon harvest estimates for this study; therefore, an effort was made to differentiate group harvest (several households fishing with, or helping, others) from individual household harvest to prevent bias. Households were asked about their harvest activities and whether they participated in group harvests or fished alone (Question 5 and 6, Appendix B1). If surveyors identified a group harvest, they followed up by asking what portion of the group harvest the individual household had kept for itself (Question 7, Appendix B1). This helped to prevent the possibility that a single large harvest might be reported by more than 1 member household of the fishing group defined in Question 5.

Households were also asked whether they had given salmon to other families (outside of the fishing group), or whether they had received salmon from other subsistence households (outside of the work group), from a commercial fisherman, or from a test fishery project. Households were also asked how many salmon were harvested for dog food.

Fishermen who did not know the actual number of fish harvested occasionally reporting harvest in alternative terms, such as the number of 5 gallon buckets, plastic bags, gunny sacks, or pounds. ADF&G devised a conversion sheet to estimate fish numbers in these circumstances (Appendix C1).

Assessment of whether a household's subsistence needs were met, for fishing and non-fishing households, was attempted as follows:

- Respondents were asked the *number* of fish, by species, the household would usually like to have or receive to meet their subsistence needs (Question 13, Appendix B1).
- For those who did not fish, respondents were asked the number of fish, by species, the household usually received or expected to receive at the beginning of the season to meet their subsistence needs.
- For fishing households, the number usually harvested was divided by actual household harvest of fish for fishing households (Question 7).
- For households receiving fish, the number usually received was divided by that actually received (Question 12).
- Results were binned by percentages of harvest goals met: 25%, 50%, 75% and 100%.

Responses were divided into 2 categories:

1) households that participated in harvesting salmon; and,
2) households that did not participate in harvesting salmon.

For the purposes of this analysis, responses from the second group were not included. These households would probably receive salmon later in the year, so an assessment of harvest needs and success would be premature at the time of the surveys.

After the households were interviewed, survey forms were reviewed. During this process, forms from fishing group members were compared to identify discrepancies. Follow-up calls were made to try to settle discrepancies. Occasionally, fishing group members simply did not agree on numbers for salmon harvest. In this event, ADF&G project staff made a judgment on how to best represent the fish harvest on the appropriate survey forms, and priority was always given to

ensuring the accuracy of the *household* harvest over the *group* harvest. Data from all surveys were checked and entered into the subsistence database. Each record was then rechecked by a different individual to assure accuracy.

HARVEST CALENDARS

In addition to household harvest survey, subsistence salmon harvest calendars were distributed by mass mailing to households identified as those who usually fish in late April or early May each year to ensure they were available to fishermen prior to the start of the salmon fishing season. The calendar has been instrumental for examination of subsistence harvest timing and assists fishermen in keeping track of their daily salmon harvest for reference during postseason surveys.

Calendar mailings were based on the most up-to-date household lists used in the harvest monitoring program. Extra calendars were kept at the Bethel ADF&G office for distribution as needed or upon request. In an effort to increase the use and return rate of subsistence calendars, public service announcements were broadcast on local radio stations inseason reminding fishermen to keep their calendars up to date and describing the importance of calendars for documenting subsistence use. Flyers describing the importance of subsistence calendars and the postseason subsistence survey project were also distributed to local communities for posting in public locations such as council offices, local stores, and post offices.

Data from the returned calendars were not normally used to directly generate Kuskokwim Area harvest estimates. Because harvest calendars may contain harvest information from 1 or multiple households, data from returned calendars were not normally used to compare or complete harvest surveys. However, on occasion a survey respondent would instruct surveyors to take harvest numbers directly from a calendar, either returned during the survey or mailed in prior to the survey. Calendars provide harvest timing data, which is important for making fishery management decisions.

DATA ANALYSIS

Harvest Estimation

Expanded Community Harvest

Subsistence salmon harvest reported by sampled households was expanded to estimate total community harvest, by species, using a stratified random sampling expansion technique (Scheaffer et al. 1999). The stratified expansion procedure was performed for a community only if a sufficient number of households were sampled.

For harvests of each stratum, if 10 or fewer households were surveyed, and the proportion of surveyed households was less than 0.25 (for non- and light harvesters) or 0.3 (for other strata), then harvest expansion was not conducted. For estimates of community harvest, if the total number of surveyed households in each stratum was less than 50 and the proportion of surveyed households was less than 0.3, total community harvest was not estimated using this method (see section *Harvest estimation of non-surveyed and under-surveyed communities*).

Denote that

N_{kj} = the number of households in the stratum (j =5: unknown, usually do not harvest, light harvest, medium harvest, and heavy harvest) of the community (k);

n_{kj} = the number of surveyed households in the stratum of the community (k); and

y_{kji} = response of surveyed household (i) (i = 1 … n_{kj}) in the stratum (j) of the community (k); e.g., the number of fish harvested by a household.

Mean household response in the stratum of the community ($\bar{y}_{kj}$) was calculated as

$$\bar{y}_{kj} = \frac{\sum_{i=1}^{n_{kj}} y_{kji}}{n_{kj}}. \tag{1}$$

Standard error of mean household response (SE_{kj}) was calculated as

$$SE_{kj} = \sqrt{\frac{s_{kj}^2}{n_{kj}}\left(\frac{N_{kj} - n_{kj}}{N_{kj}}\right)} \text{ where } s_{kj}^2 = \frac{\sum_{i=1}^{n_{kj}} \left(y_{kji} - \bar{y}_{kj}\right)^2}{n_{kj} - 1}. \tag{2}$$

The estimate of total harvest of the community ($\hat{T}_k$) was calculated as

$$\hat{T}_k = \sum_{j=1}^{5} N_{kj} \bar{y}_{kj}. \tag{3}$$

The 95% confidence interval of total community harvest (95% CI_k) was calculated as

$$95\%\text{CI}_k = t_{(0.025, df=n-1)} \cdot \sqrt{\hat{V}(T_k)} \text{ where } \hat{V}(T_k) = \sum_{j=1}^{5} N_{kj}^2 \left(\frac{N_{kj} - n_{kj}}{N_{kj}}\right)\left(\frac{s_{kj}^2}{n_{kj}}\right). \tag{4}$$

When a single stratum was not surveyed, total harvest of a community ($\hat{T}_k$) was calculated as

$$\hat{T}_k = \left(\frac{\sum_{j=1}^{5} N_{kj}}{\sum_{j=1}^{4} N_{kj}}\right) \sum_{j=1}^{4} N_{kj} \bar{y}_{kj}. \tag{5}$$

The 95% confidence interval of total community harvest when a single stratum was not surveyed (95% CI_k) was calculated as

$$95\%\text{CI}_k = t_{(0.025, df=n-1)} \cdot \sqrt{\hat{V}(T_k)} \text{ where } \hat{V}(T_k) = \left(\frac{\sum_{j=1}^{5} N_{kj}}{\sum_{j=1}^{4} N_{kj}}\right)^2 \sum_{j=1}^{4} N_{kj}^2 \left(\frac{N_{kj} - n_{kj}}{N_{kj}}\right)\left(\frac{s_{kj}^2}{n_{kj}}\right). \tag{6}$$

The above methods were used for estimation of salmon harvests (Question 7) and the number of people (Question 2). For the number of fish needed/usually harvested (Question 13), only harvests of those who subsistence fished were used.

For estimation of the number of subsistence fishing households in each community, the following expansion method was used.

Denote that

$n_{kj(s)}$ is the number of surveyed households that subsistence fish in the stratum (j) of the community (k); and,

n_{kj} is the number of surveyed households in the stratum (j) of the community (k).

Then, the proportion of households who subsistence fish in the stratum (j) of the community (k) ($\hat{p}_{kj(s)}$) was calculated as

$$\hat{p}_{kj(s)} = \frac{n_{kj(s)}}{n_{kj}} \quad . \tag{7}$$

Estimated number of households that subsistence fish in the community ($\hat{N}_{k(s)}$) was calculated as

$$\hat{N}_{k(s)} = \sum_{j=1}^{5} N_{kj} \hat{p}_{kj(s)} \quad . \tag{8}$$

The 95% confidence interval (95% CI_k) was calculated as

$$95\%\mathrm{CI}_k = t_{(0.025, df=n-1)} \cdot \sqrt{\hat{V}(\hat{N}_{k(s)})} \text{ where } \hat{V}(\hat{N}_{k(s)}) = \sum_{j=1}^{5} N_{kj}^2 \left(\frac{N_{kj} - n_{kj}}{N_{kj}} \right) \left(\frac{\hat{p}_{kj(s)}(1-\hat{p}_{kj(s)})}{n_{kj} - 1} \right) . \tag{9}$$

Harvest Estimation of Non-surveyed and Under-surveyed Communities

Harvests of several communities were not estimated every year because surveys were not conducted or survey data were insufficient. Harvests of those communities were estimated by employing a Bayesian hierarchical multiple imputation method (Honaker and King 2010; King et al. 2001). In this method, it was assumed that

1) events that cause missing harvest data follow a missing at random process (MAR); and,
2) harvest data possess multivariate normal distribution.

Under these conditions, harvests of communities in particular years can be estimated from harvest records of the communities in other years and surrounding communities. For instance, the 2008 harvest of the community of Tuntutuliak (un-surveyed in that year) was estimated using its known harvest during 1990–2007 and harvests of other Lower Kuskokwim communities. It should be noted that this estimation method is available and appropriate only for communities with several years of annual harvest estimates.

Let $D_{kj.obs}$ be observed data (e.g., average harvest per household) for k communities (1…k) with j years,

$$D_{kj.obs} \sim N(\mu_k, \Sigma_k) \quad , \tag{10}$$

where μ_k has a normal prior distribution with mean μ and variance σ^2, and Σ_k has a Wishhart distribution of $k \times k$ dimensions

$$\begin{aligned} \mu_k &\sim N(\mu, \sigma^2) \\ \Sigma_k &\sim W(I_k, k) \end{aligned} \quad . \tag{11}$$

Then, the posterior distributions for μ_k and Σ_k were derived as

$$\tilde{\mu}_k, \tilde{\Sigma}_k \sim P(\mu_k, \Sigma_k \mid D_{kj.obs}) \quad . \tag{12}$$

From this predicted value for missing data, $D_{kj.mis}$, were derived as

$$\tilde{D}_{kj.mis} \sim P(D_{kj.mis} \mid D_{kj.obs}, \tilde{\mu}_k, \tilde{\Sigma}_k) \quad . \tag{13}$$

For grouping of the k communities, geographic subareas of the Kuskokwim Management Area were used: 1) Lower Kuskokwim River and Kongiganak; 2) Middle Kuskokwim River; 3) Upper Kuskokwim River; and 4) South Kuskokwim Bay.

In applying the above method, log-transformed annual average number of fish harvested per household $D_k = \log(T_k/N_k+1)$ was used. This was based on the following assumptions: 1) fishing characteristics of communities (e.g., proportion of fishing households, fishing demands, fishing efforts, etc.) are constant over time, and 2) changes in average household harvests are primarily due to abundance of fish or fishing regulations affecting all communities.

For the Bayesian estimation, WinBUGS 1.4.3 (Lunn et al. 2000) with default initial values was used. A total of 55,000 imputations were generated (after discarding 5,000 initial burn-in iterations) and the mean value of these imputations was calculated. The resulting mean household harvest was back-transformed and multiplied by the number of households in the community that year to estimate the unknown total community harvest. Total community harvest was calculated as

$$\tilde{T}_{kj} = N_{kj} \exp(\tilde{D}_{kj.mis}) \quad , \tag{14}$$

and its 95% confidence interval was estimated as

$$95\%\text{CI} = N_{kj} \exp\left(1.96 \cdot \sqrt{V(\tilde{D}_{kj.mis})}\right) \quad , \tag{15}$$

where $V(\tilde{D}_{kj}^{mis})$ is the standard deviation of the Bayesian estimate.

Each year, a few villages may not be visited, or may be under surveyed, making it necessary to provide estimates by other means. In these instances, village harvest is estimated using Bayesian practices that draw upon the entire dataset. This method of estimation draws on all available data, and estimates become more accurate with each new year's data. As a result of the adjustment of the relationships among data by incorporating an additional year, the overall harvest estimates for each year within the dataset change slightly with each new year of project operation. In 2013, the Bayesian estimates within the entire reconstructed dataset (1990–present) were adjusted.

Total Kuskokwim Area Harvest

Total number of salmon harvested in the Kuskokwim Area ($\hat{T}$) was estimated by summing harvest estimates of all communities,

$$\hat{T} = \sum_{k=1} \hat{T}_k \,, \tag{16}$$

and its 95% confidence interval (95% CI) was calculated as

$$95\%\text{CI} = t_{(0.025, df=n-1)} \cdot \sqrt{\hat{V}(T)} \text{ where } \hat{V}(T) = \sum_{k=1} \hat{V}(T_k) \,. \tag{17}$$

RESULTS

HOUSEHOLD SELECTION AND SURVEY

The Kuskokwim Area results reported here include communities located along Kuskokwim River and the South Kuskokwim Bay communities. The Bering Sea Coast communities and north Kuskokwim Bay communities did not take part in the voluntary survey process and estimates of their harvests (with the exception of Kongiganak) were not otherwise possible; therefore, no data are reported for those communities.

Partners ONC and KNA were successful in their sampling efforts in 2013. Bethel subsistence surveys were conducted by ONC from October through November, and 538 dwellings were successfully surveyed, 25% of 2,126 occupied dwellings (Tables 2 and 3). Aniak subsistence surveys were conducted by KNA from October through December, and 173 (91%) of 191 households were surveyed, including both preselected and non-selected households (Tables 2 and 3).

In 2013, ADF&G surveys were conducted from mid-September through mid-November and were completed in 23 of 27 targeted communities: Eek, Tuntutuliak, Napakiak, Napaskiak, Oscarville, Nunapitchuk, Atmautluak, Kasigluk, Kwethluk, Akiachak, Akiak, Tuluksak, Lower Kalskag, Upper Kalskag, Chuathbaluk, Red Devil, Sleetmute, Stony River, McGrath, Nikolai, Quinhagak, Goodnews Bay, and Platinum. ADF&G was denied access to the village of Kongiganak and was unable to secure definitive permission to visit Crooked Creek. Lime Village and Takotna were ultimately not visited for logistical reasons. Overall, ADF&G contacted 1,121 (56%) of 1,997 households in targeted communities (Tables 2 and 3).

Of the 38 area communities, 35 were surveyed door-to-door in 2013 (Table 3). In total, 1,832 (43%) of the 4,314 households in the Kuskokwim Area were surveyed (Tables 2 and 3). Of the households selected for survey, 88% (or 1,591 households) were successfully contacted (Table 3). The additional 241 households surveyed were unknown or new households that were opportunistically encountered and surveyed (Table 3). Data entry of all surveys collected was initially completed near the end of December 2013, and additional error checking and data quality control extended the data entry period until mid-January 2014.

HARVEST ESTIMATES

For 2013, survey results were stratified and expanded for each community (Tables 4–8). The salmon harvest for Kongiganak, Crooked Creek, Lime Village, and Takotna (not surveyed in

2013) was estimated using Bayesian methods as described above (Table 2). The total expanded salmon harvest by species for the Kuskokwim Area (in communities for which estimates could be made) was 50,708 (95% CI +/-3,926) Chinook; 55,828 (95% CI +/-3,241) chum; 46,049 (95% CI +/-2,660) sockeye; 27,841 (95% CI +/-2,816) coho; and 741 (95% CI +/-230) pink salmon (Table 2). Overall, approximately 184,167 salmon were harvested in 2013 for subsistence use (Table 2).

Harvest estimates for households that participate in commercial fishing included salmon retained for subsistence use from that activity. Salmon retained from commercial fishing were most commonly reported in the areas within or adjacent to commercial fishing districts, such as north and south Kuskokwim Bay and the Lower Kuskokwim River (Table 9). In 2013, in the interest of conserving Chinook salmon, commercial fish buyers in the area chose not to purchase Chinook salmon in order to encourage retention for subsistence use and to discourage targeting of Chinook salmon by commercial fishermen. In 2013, the most commonly retained species from commercial harvests was Chinook salmon, followed by coho, sockeye, and few chum or pink salmon (Table 9).

PRIMARY FISHING GEAR

In 2013, the majority (82%) of responding households throughout the Kuskokwim Area reported that the primary gear type used for subsistence salmon fishing was drift gillnets (Table 10). Gear type estimates were not expanded.

ESTIMATED FISHING HOUSEHOLDS, COMMUNITY POPULATION SIZE, AND HOUSEHOLDS RECEIVING SALMON

We estimated that 2,407 households participated in the subsistence fishery for salmon in 2013 (Table 11). The total estimate of people living in surveyed communities of the Kuskokwim Area in 2013 was 15,550 (Table 12).

In Kuskokwim River subsistence activity, sharing of subsistence catch is a traditional practice. Sharing is here defined as the immediate distribution (giving or receiving) of salmon, upon harvest, to households outside of one's subsistence salmon harvest and processing work group. In 2013, a total of 1,675 households reported receiving 1,042 Chinook; 1,271 chum; 1,327 coho; 1,323 sockeye; and 13 pink salmon from subsistence fisherman, commercial fishermen, and the local Bethel test fishery (Table 13), with the majority (89%) of fish being received from subsistence fishermen.

SUBSISTENCE USE OF SALMON FOR DOG FOOD

In 2013, regarding the question about owning dogs, 1,736 households responded and 60% of respondents reported owning a combined total of 2,338 dogs. Of households reporting dogs, 2 was the average number per household. The number of households that reported feeding whole salmon to dogs was 71 (or 7% of dog owners), and among these households an average of 5 salmon per household were fed to dogs (Table 14).

LOST FISH

In 2013, from a total of 1,736 respondents, 1,964 salmon were reported as lost (i.e., not edible due to spoilage, animals, etc.; Table 15). Out of the 109 households that provided a reason for losing fish, 81% reported weather-related reasons (e.g., rain, moldy, flies, spoiled); 15% reported

animals (e.g., bears, birds, otters); 4% reported human theft; and 1% reported disease (fish) as having a negative effect (Table 15).

SUBSISTENCE SALMON NEEDS

Of 1,832 surveyed households, 1,281 (70%) responded to questions regarding needs met for the harvest of Chinook salmon (Table 16). Less than 1% of respondents reported that they did not have a need for that species (Table 17). Of those reporting a need for this species, an estimated 33% met 100% of their needs, 25% met 50%–75% of their needs, and 42% reported meeting only 25% of their needs (+/-1% for rounding error, Table 16). Of the 835 respondents who provided a reason for not meeting their needs, 72% indicated this was due to non-fishery related factors such as age, difficulties with equipment, the high price of fuel, work conflicts, or they had given away too many of the fish they harvested. Approximately 18% cited natural conditions including run dynamics (low abundance, timing of the run), river conditions (flooding, clarity, debris load), and inclement weather. Approximately 6% of respondents cited fisheries management decisions as the reason they did not meet their needs. Approximately 3% reported intentionally abstaining for conservation reasons. About 1% reported human theft as a contributing factor to not meeting their needs (Table 17).

Regarding needs met for chum salmon, 883 households (48%) responded and 33% of respondents stated that they do not generally fish for this species (Tables 18 and 19). Of those reporting a need for this species, an estimated 56% met 100% of their needs, 17% met 50%–75% of their needs, and 28% reported meeting only 25% of their needs (+/-1% for rounding error, Table 18). Of the 378 respondents that indicated that they had not met their needs for chum salmon, 82% cited non-fishery related reasons similar to those given for Chinook salmon and 12% cited natural conditions similar to those listed above. Approximately 4% of respondents cited fisheries management decisions as the reason they did not meet their needs. Approximately 2% reported intentionally abstaining for conservation reasons (Table 19).

Regarding needs met for sockeye salmon, 1,149 households (63%) responded and 20% of respondents stated that they do not generally fish for this species (Tables 20 and 21). Of those reporting a need for this species, an estimated 43% met 100% of their needs, 21% met 50%–75% of their needs, and 36% reported meeting only 25% of their needs (+/-1% for rounding error, Table 20). Of the 640 respondents that indicated that they had not met their needs for sockeye salmon, 83% cited non-fishery related reasons similar to those given for Chinook salmon and 11% cited natural conditions similar to those listed above. Approximately 4% of respondents cited fisheries management decisions as the reason they did not meet their needs. Approximately 2% reported intentionally abstaining for conservation reasons. And approximately 1% reported human theft as a contributing factor to not meeting their needs (Table 21).

Regarding needs met for coho salmon, 1,072 households (59%) responded and 23% of respondents stated that they do not generally fish for this species (Tables 22 and 23). Of those reporting a need for this species, an estimated 35% met 100% of their needs, 16% met 50%–75% of their needs, and 49% reported meeting only 25% of their needs (+/-1% for rounding error, Table 22). Of the 471 respondents who indicated that they had not met their needs for coho salmon, 86% cited non-fishery related reasons similar to those given for Chinook salmon and 12% cited natural conditions similar to those listed above. Approximately 1% of respondents cited fisheries management decisions as the reason they did not meet their needs. Approximately 1% reported intentionally abstaining for conservation reasons (Table 23).

REPORTED AND ESTIMATED HARVEST OF NON-SALMON SPECIES

In 2013, reported harvests of non-salmon species in the Kuskokwim Area included 12,835 humpback (*Coregonus pidschian*); 12,591 broad whitefish (*Coregonus nasus*); 8,100 cisco (*Coregonus* spp.); 2,158 sheefish (*Stenodus leucichthys*); 10,348 burbot (*Lota lota*); 188,433 blackfish (*Dallia pectoralis*); 111,104 smelt (*Osmerus mordax*); 20,059 northern pike (*Esox lucius*); 7,135 Pacific herring (*Clupea pallasii*); 1,467 grayling (*Thymallus arcticus*); 9,998 char (*Salvelinus alpinus* and *S. malma*); and 533 rainbow trout (*Oncorhynchus mykiss*; Table 24). Humpback and broad whitefish harvests were expanded to total harvest estimates for all communities surveyed in 2013. The estimated harvest of humpback whitefish was 23,239 fish, and the estimated harvest of broad whitefish was 22,804 fish (Table 25).

HARVEST CALENDARS

In 2013, households returned a total of 188 subsistence harvest calendars (approximately 11% of total issued). A total of 180 calendars (96% of those returned) documented salmon harvest information. The remaining households that returned harvest calendars in 2013 either indicated that they did not fish this season (<4%) or the calendars were returned blank (<1%). The timing and distribution of fishing effort among 7 Kuskokwim Area subareas by day is shown based on returned calendars (Figure 3).

DISCUSSION

HOUSEHOLD SELECTION AND SURVEY

In 2013, project surveyors visited and successfully surveyed 25 of 29 targeted communities (Tables 2 and 3, Appendix A). ADF&G surveyors were unable to visit 4 targeted villages, either because they were unable to gain permission from village councils or because of logistical concerns. The Kongiganak tribal council denied ADF&G permission to visit for the second season in a row, and reasons were not made clear. Officials in Crooked Creek were non-committal, and after multiple contacts, the project ran out of time. The villages of Lime Village and Takotna are very remote and expensive to visit. Harvest is typically relatively small, and periodic visits are sufficient to provide an estimate for these villages. Because both had been visited in 2012, staff concentrated efforts in other areas. ADF&G surveyors conducted 1,121 surveys with approximately 28 refusals.

The logistical difficulties of surveying the community of Bethel were addressed through an improved, stricter random sampling protocol. In 2011 and 2012, some lax sampling protocols had resulted in a large opportunistic sample that contained a degree of bias (Shelden et al. 2014). The bias was addressed in those years, and in 2013, much tighter control was applied to surveying, including multiple, documented visits to selected households. ONC surveyors successfully surveyed 25% of Bethel dwellings while adhering to stricter and more time-consuming random selection and sampling protocol (Table 2). Ultimately, 1,180 households (52%) were selected, with 251 (47%) unsuccessful (refusals or no-contact) and 538 successful surveys taken, constituting a 25% sample, which was sufficient for estimating Bethel's harvest (Table 2).

Aniak sampling, conducted by KNA, was also successful. The sample design selected for Aniak was a census. Aniak contains an estimated 191 households, of which 173 (91%) were surveyed

and 2 contacted households refused the survey. Harvest for the remaining households was estimated using standard procedures.

HARVEST ESTIMATES

Factors affecting subsistence salmon harvests include personal, cultural, socioeconomic, and environmental factors, and salmon run dynamics. From 2011 to 2013, Chinook salmon harvest in the Kuskokwim Area has been below the recent 5- (2008–2012) and 10-year (2003–2012) averages (Appendix A1). The 2013 subsistence harvest of Chinook salmon is estimated to have been the second lowest on record (Figures 4 and 5). Furthermore, in 2013 estimated Chinook salmon escapement on monitored tributaries was the lowest since 1990 (the earliest year in this subsistence harvest dataset), and escapement goals were not met for the mainstem Kuskokwim River or any monitored tributaries where goals have been established (Tiernan and Poetter 2015).

Initial reports of near normal harvest levels of Chinook salmon led managers and stakeholders to suspect that communities in the lower river area had met their Chinook salmon needs whereas middle and upper river communities had not (Bailey and Shelden 2014); however, post-season surveys revealed that Chinook salmon subsistence harvest in 2013 was the second lowest on record after 2012 in all areas of the Kuskokwim River (Appendix A1). Overall abundance of Chinook salmon was estimated as being lower in 2013 than in 2012, though harvests were estimated to have been higher (Tiernan and Poetter 2015; Shelden et al. 2014).

In 2013 the harvest of Chinook salmon in Kuskokwim River communities was below average (Figure 4; Appendix A1). Lower and Middle Kuskokwim River communities reported improved Chinook salmon harvests compared with 2012; however, harvests remained below all other previous years. Upper River communities recorded the lowest harvest of Chinook salmon in our dataset (1990 to present, Figure 5; Appendix A1). As expected, the majority of harvest of all species in the Kuskokwim River occurred in the Lower Kuskokwim River villages, followed by Middle and Upper Kuskokwim River communities (Figure 6).

Overall Kuskokwim Bay communities have shown a general decrease in Chinook salmon harvest over the last several years (Figure 7). In 2013, South Kuskokwim Bay communities showed a slight increase over previous years (Figure 7). These communities are small in size, and harvest may be strongly influenced by the success or failure of just a few households, which reinforces the need to census smaller villages for harvest information each year to reduce any estimation error that can occur due to small population size. The north Kuskokwim Bay community of Kongiganak was not visited in 2013 and estimates are based on historical relationships with its neighbors, limiting the utility of these data for understanding the effects of recent swings in Chinook salmon abundance on that community.

In 2013 the total harvest of chum salmon was down from the previous year and below the recent 5- (2008–2012) and 10-year averages (2003–2012) (Appendix A2). The shift in harvest observed in 2012 from Chinook to chum salmon did not continue in 2013, suggesting that communities may not voluntarily maintain such a shift without restriction (Figure 8; Shelden et al. 2014). Overall chum salmon abundances were considered to be good throughout the area from 2009 to 2013 (Brazil et al. 2013; Tiernan and Poetter 2015). This reinforces the suggestion that the lower harvest levels of chum salmon in 2009–2011 and 2013 are based on user preference, weather, and timing as opposed to abundance (Ikuta et al. 2013).

The total harvest of sockeye salmon in the Kuskokwim Area in 2013 was similar to the recent 5- and 10-year averages (Figure 9; Appendix A3). The reported harvest of sockeye salmon from Upper Kuskokwim River communities has been below the 5- (2008–2012) and 10-year averages (2003–2012) since 2010 but did not decrease in 2013 as it had each year since 2010 (Figure 10; Appendix A3). Middle Kuskokwim River communities continued to increase their harvest of sockeye salmon in 2013 whereas Lower River communities did not (Figure 10; Appendix A3).

In 2013, coho salmon subsistence harvests were below both the 5- (2008–2012) and 10-year averages (2003–2012) for the area (Figure 11; Appendix A4). The Lower Kuskokwim River communities have reported a reduced harvest in recent years (Figure 12; Appendix A4). In 2013, the harvest of coho salmon among Upper Kuskokwim River communities was much reduced from recent years, which may be attributable to unusually high water observed in the Upper Kuskokwim River during the late 2013 season. A Nikolai subsistence user reported observing flood conditions and coho being washed out of traditional fishing areas in late 2013 (Dan Esai, Nikolai subsistence user, personal communication). Escapements of coho salmon in 2013 were adequate, which suggest that changing harvest patterns are not strongly related to coho salmon abundance (Tiernan and Poetter 2015).

Following the 2013 season, the historical dataset for salmon harvest was adjusted. The 2013 iteration of this study represents the 5-year mark following the subsistence harvest reconstruction (1990–2007, Hamazaki 2011). Numbers reported here represent an updated dataset owing to updates in the Bayesian estimates for unsurveyed villages (Appendices A1–A4, Figures 4, 5, 7–12). For each species, the average annual change in the total harvest estimate for the area was less than 1%.

AMOUNTS NECESSARY FOR SUBSISTENCE

In 2013 the relative success of Kuskokwim River salmon harvests were mixed. Harvests of Chinook and coho salmon fell below the ANS range (5 AAC 01.286b). Despite being lower than recent averages, subsistence harvests of chum, sockeye, and pink salmon in the Kuskokwim River were within or exceeded the ANS ranges defined for the drainage.

The Kuskokwim Bay ANS determination is not broken down by species (5 AAC 01.286b). South Kuskokwim Bay harvest was determined to be within the range of ANS for that subarea (Table 2; Appendices A1–A4). ANS for the North Kuskokwim Bay and Bering Sea coastal communities within the Kuskokwim Area fall under the remainder of the Kuskokwim Area description. In 2013, with none of these communities directly participating in the survey, it was impossible to determine the status of ANS for this subarea.

ASSESSMENT OF SUBSISTENCE NEEDS MET

The survey results provide additional information in assessing how well subsistence needs were met, by species and community (Tables 16, 18, 20, 22). The total number of fish usually harvested or needed was calculated to estimate demands of subsistence harvests of the surveyed year. In this calculation, only answers (Question 13, Appendix B1) provided by households that fished were used to determine need, and it was assumed that the households who did not fish in the surveyed year do not usually fish, instead meeting their subsistence needs by receiving fish from other households. This may, to a small degree, undercount demands of households that usually fish but did not fish during the survey years.

In 2013, respondent households reported an improvement over 2012 (a year of heavy subsistence restriction; Shelden et al. 2014) in meeting their needs for Chinook salmon. In 2012, 87% of respondents indicated that they had not met 100% of their needs for Chinook salmon, compared with 66% in 2013 (Shelden et al. 2014; Table 16). In 2012 the majority of households reported management decisions as being the main barrier to meeting their needs; whereas in 2013, the majority listed mainly personal reasons or not fishing regarding why needs were unmet (Table 17).

Household needs can vary from year to year, and the perception of whether needs are met may, for some, have more to do with the volume of fish harvested than an exact number of fish of one species or another. For example, a household may prefer to harvest more Chinook salmon, but actual catches may include more chum or sockeye salmon than intended. The household may not attempt to continue fishing for Chinook salmon if overall harvest, though not ideally proportioned, is adequate to meet their needs. Harvest timing and processing can also play a part, in that a household may not have the capacity to process more salmon (space limited) or may need to begin focusing on other subsistence tasks, like berry picking (time limited). In situations like these, the household may choose not to continue fishing, even if more fish are desired or other species are preferred (Ikuta et al. 2013; Patton and Carroll 2011).

Though the qualitative data about whether or not people met their needs do not describe the experiences from individual households within and among subareas, they indicate that despite changes in levels of subsistence harvest, the majority of respondents were not able to meet their subsistence salmon needs in 2013. It is important to reiterate that in a given year, the number of salmon caught and the number of salmon needed may fluctuate naturally, and it is not possible to ascertain why these fluctuations occur within the scope of this study.

Not all households that identify a need for salmon are households that fish, which can pose problems for the assessment of household needs met category. Households that fall into this category include those that may use salmon, or would like to harvest salmon for subsistence use, but are not able to fish for themselves because of physical (elderly or disabled) or economic (no equipment or employment conflicts) restrictions. People who need fish but do not fish rely on receiving fish from family, friends, or others (Ikuta et al. 2014). Fish may be given to them throughout the winter as the need arises. At the time of survey, it may be difficult for non-fishers to assess whether their needs have or will be met because they may not have received fish yet or may not know whether what they have received will last them the winter. Conversely, fishing families who generally harvest fish to share with others may include the fish they plan to give away in their estimated need. In which case, if both those that give and that receive fish report their level of needs, it is possible to overestimate overall need and underestimate needs met. The pattern of sharing fish among households makes it difficult to separate and account for overestimated need. Also, fish are often transferred as processed food (canned, dried, smoked or salted), making it difficult to quantify the actual number of fish received (Jallen et al. 2012; Appendix C1).

The availability of salmon is lower as one travels further upriver due to fish turning off into respective tributaries and removal by harvest downstream. Harvester reports indicate that the probability of catching salmon decreases in the Middle Kuskokwim and Upper Kuskokwim River portions of the drainage due to lower overall density of salmon moving through those areas (Bailey and Shelden 2014). This is reflected in the fact that approximately 80% of the total

harvest comes from the lower portion of the river (Figure 2), where 78% of the households are situated (Figure 13).

Fishery managers have routinely maintained communications with fishermen to obtain information on fishing success in communities, particularly through the *Kuskokwim River Salmon Management Working Group* meetings. This process provides fishermen in the entire Kuskokwim River drainage the opportunity to discuss the salmon run and their harvests via teleconference (Bailey and Shelden 2014). During Working Group meetings, participants and the public discuss a range of salmon related topics, including, but not limited to, weekly success with salmon harvests (subsistence, commercial, and sport), observations of run dynamics such as timing and abundance, and the effect of weather on subsistence activities. Similarly, the *Lower Kuskokwim River inseason subsistence catch monitoring project* collects data on subsistence fishermen's assessment of relative salmon run timing and abundance, whether or not fishermen are achieving their harvest goals, and other factors affecting their harvests. Reports are given weekly during the fishing season at the Working Group meetings (Chavez and Shelden 2014; Bailey and Carroll 2012). These methods of assessing harvest success are valuable for salmon management inseason. However, they are entirely qualitative and do not provide harvest estimates, nor are all subareas of the Kuskokwim Area represented. For this reason, the postseason subsistence harvest survey program is invaluable to gaining a more complete picture of the salmon harvest for the whole Kuskokwim Area each year, though the data are not available until several months after the fishing season ends.

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TABLES AND FIGURES

Table 1.–Kuskokwim Area communities by geographic location.

North Kuskokwim Bay	Kipnuk[a]
	Kwigillingok[a]
	Kongiganak[b]
Lower Kuskokwim	Tuntutuliak
	Eek
	Kasigluk
	Nunapitchuk
	Atmautluak
	Napakiak
	Napaskiak
	Oscarville
	Bethel
	Kwethluk
	Akiachak
	Akiak
	Tuluksak
Middle Kuskokwim	Lower Kalskag
	Upper Kalskag
	Aniak
	Chuathbaluk
Upper Kuskokwim	Crooked Creek[c]
	Red Devil
	Sleetmute
	Stony River
	Lime Village[d]
	McGrath
	Takotna[d]
	Nikolai
	Telida
South Kuskokwim Bay	Quinhagak
	Goodnews Bay
	Platinum
Bering Sea Coast	Mekoryuk[a]
	Newtok[a]
	Nightmute[a]
	Toksook Bay[a]
	Tununak[a]
	Chefornak[a]

[a] The community was not surveyed because they chose to not participate in the study.

[b] The community typically participates but declined in 2014.

[c] The community was not surveyed in 2014 for logistical reasons.

[d] Project leaders were unable to coordinate a date for visit with village leaders. After multiple attempts, project leaders ran out of time.

Table 2.–Total estimated subsistence salmon harvest by species and community for the Kuskokwim Area, 2013.

	Households (HH)			Chinook			Chum			Sockeye			Coho			Pink		
Community	Total *N*	Total *n*	% survey	Avg harvest/ HH	Est. total harvest	CI (95%)	Avg harvest/ HH	Est. total harvest	CI (95%)	Avg harvest/ HH	Est. total harvest	CI (95%)	Avg harvest/ HH	Est. total harvest	CI (95%)	Avg harvest/ HH	Est. total harvest	CI (95%)
Kongiganak [a]	90	0	0%	7	641	200	16	1,397	180	11	1,031	184	5	412	186	–	–	–
N. Kuskokwim Bay	90	0	0%	7	641	200	16	1,397	180	11	1,031	184	5	412	186	0	0	0
Tuntutuliak	90	61	68%	27	2,448	398	24	2,180	335	18	1,582	267	5	450	114	0	3	0
Eek	88	53	60%	14	1,188	285	14	1,232	439	12	1,050	300	5	483	165	0	18	22
Kasigluk	104	54	52%	28	2,919	616	21	2,197	521	12	1,283	362	4	418	241	0	14	21
Nunapitchuk	118	77	65%	22	2,563	370	25	2,977	376	18	2,122	247	2	226	54	0	20	7
Atmautluak	63	38	60%	25	1,592	298	38	2,409	473	16	1,011	250	3	203	99	1	47	45
Napakiak	97	55	57%	16	1,588	642	12	1,185	280	12	1,167	243	7	634	227	0	3	2
Napaskiak	103	64	62%	29	2,939	710	25	2,589	699	19	1,966	527	7	772	249	0	0	0
Oscarville	15	13	87%	39	585	149	33	490	168	24	362	119	2	37	13	0	0	0
Bethel	2,126	538	25%	8	17,246	3,450	6	12,506	2,232	7	14,570	1,951	6	12,662	2,513	0	207	150
Kwethluk	166	98	59%	19	3,192	489	23	3,825	667	18	3,025	495	9	1,555	366	1	95	87
Akiachak	157	100	64%	23	3,585	610	22	3,417	518	19	3,057	461	7	1,106	216	0	51	31
Akiak	83	49	59%	17	1,449	396	27	2,212	858	23	1,945	597	5	454	199	1	110	117
Tuluksak	93	63	68%	8	732	142	33	3,062	686	20	1,877	688	5	473	174	0	10	7
Lower Kuskokwim	3,303	1,263	38%	13	42,026	3,804	12	40,281	2,905	11	35,017	2,421	6	19,473	2,606	0	578	219
Lower Kalskag	75	47	63%	10	744	258	16	1,214	329	13	977	648	7	529	263	0	9	8
Upper Kalskag	58	29	50%	23	1,317	407	26	1,534	533	11	662	141	11	636	297	0	0	0
Aniak	191	173	91%	8	1,440	200	15	2,880	556	8	1,466	186	16	3,102	787	0	22	10
Chuathbaluk	33	28	85%	5	155	47	28	935	261	15	480	172	10	319	81	0	0	0
Middle Kuskokwim	357	277	78%	10	3,656	524	18	6,563	877	10	3,585	710	13	4,586	885	0	31	13
Crooked Creek [a]	37	0	0%	4	145	82	49	1,803	190	14	514	60	7	255	135	-	–	–
Red Devil	15	11	73%	5	77	24	65	981	849	18	270	120	21	318	226	0	0	0
Sleetmute	39	33	85%	2	96	19	14	542	35	9	362	56	6	219	46	0	1	0
Stony River	15	11	73%	3	51	36	2	27	16	30	447	283	8	120	76	2	33	25
Lime Village [a]	14	0	0%	3	43	61	65	909	103	59	831	43	27	384	63	–	–	–
McGrath	129	64	50%	1	95	82	5	598	500	4	538	384	4	523	383	0	7	10
Takotna [a]	23	0	0%	0	0	102	0	12	101	0	2	120	0	0	74	-	–	–
Nikolai	35	32	91%	8	283	94	15	513	147	0	0	0	3	119	40	0	0	0
Telida	2	–	–	–	–	–	–	–	–	–	–	–	-	–	–	-	–	–
Upper Kuskokwim	309	151	49%	3	790	197	17	5,386	1025	10	2,964	515	6	1,938	485	0	41	27

-continued-

Table 2.–Page 2 of 2.

Community	Households (HH)			Chinook			Chum			Sockeye			Coho			Pink		
	Total *N*	Total *n*	% survey	Avg harvest/ HH	Est. Total harvest	CI (95%)	Avg harvest/ HH	Est. Total harvest	CI (95%)	Avg harvest/ HH	Est. Total harvest	CI (95%)	Avg harvest/ HH	Est. Total harvest	CI (95%)	Avg harvest/ HH	Est. Total harvest	CI (95%)
Kuskokwim River[b]	4,059	1,691	42%	12	47,113	3,851	13	53,627	3,208	10	42,597	2,581	7	26,409	2,801	0	650	221
Quinhagak	165	86	52%	19	3,143	743	12	1,958	454	13	2,158	456	7	1,087	232	0	73	66
Goodnews Bay	70	36	51%	6	413	193	2	153	51	16	1,113	446	4	295	176	0	13	7
Platinum	20	19	95%	2	39	11	5	90	29	9	181	62	3	50	18	0	5	3
S. Kuskokwim Bay	255	141	55%	14	3,595	768	9	2,201	458	14	3,452	641	6	1,432	292	0	91	66
Total	4,314	1,832	42%	12	50,708	3,926	13	55,828	3,241	11	46,049	2,660	6	27,841	2,816	0	741	230

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, CI (95)% = 95% confidence interval.

[a] Villages not surveyed. Estimated using historical average household harvest expanded by the number of households.

[b] Kuskokwim River Total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 3.–Households selected and surveyed by user group, 2013.

	Unknown					Does not usually fish					Light harvester					Medium harvester					High harvester					Combined use groups				
Community	*N*	S	ns	U	PS	*N*	S	ns	U	PS	*N*	S	ns	U	PS	*N*	S	ns	U	PS	*N*	S	ns	U	PS	*N*	S	ns	U	PS
Kongiganak	–	–	–	–	–	–	–	–	–	–	81	41	0	–	–	8	8	0	–	–	1	1	0	–	–	90	50	0	–	0
N. Kuskokwim Bay	–	–	–	–	–	–	–	–	–	–	81	41	0	–	0	8	8	0	–	0	1	1	0	–	0	90	50	0	–	0
Tuntutuliak	12	3	2	7	3.0	–	–	–	–	–	54	27	27	1	1.0	17	17	17	0	1.0	7	7	7	0	1.0	90	54	53	8	1.1
Eek	5	0	0	5	–	1	1	1	0	1.0	75	37	36	4	1.1	6	6	6	0	1.0	1	1	1	0	1.0	88	45	44	9	1.2
Kasigluk	5	0	0	5	–	–	–	–	–	–	89	42	37	3	1.0	7	7	6	0	0.9	3	3	3	0	1.0	104	52	46	8	1.0
Nunapitchuk	13	0	0	12	–	1	1	1	0	1.0	79	39	35	5	1.0	15	15	14	0	0.9	10	10	10	0	1.0	118	65	60	17	1.2
Atmautluak	3	0	0	3	–	–	–	–	–	–	47	24	22	2	1.0	9	9	7	0	0.8	4	4	4	0	1.0	63	37	33	5	1.0
Napakiak	11	5	5	5	2.0	3	3	3	0	1.0	70	34	29	0	0.9	12	12	12	0	1.0	1	1	1	0	1.0	97	55	50	5	1.0
Napaskiak	12	1	1	9	10.0	1	1	1	0	1.0	61	29	27	0	0.9	24	24	21	0	0.9	5	5	5	0	1.0	103	60	55	9	1.1
Oscarville	1	0	0	1	–	–	–	–	–	–	5	5	5	0	1.0	8	8	6	0	0.8	1	1	1	0	1.0	15	14	12	1	0.9
Bethel	–	–	–	–	–	–	–	–	–	–	2,126	529	529	9	1.0	–	–	–	–	–	–	–	–	–	–	2,126	1,108	529	9	1.0
Kwethluk	13	1	1	11	12.0	3	3	3	0	1.0	119	57	52	2	1.0	26	26	24	0	0.9	5	5	5	0	1.0	166	92	85	13	1.1
Akiachak	16	3	3	12	5.0	3	3	3	0	1.0	99	47	41	3	0.9	31	31	30	0	1.0	8	8	8	0	1.0	157	92	85	15	1.1
Akiak	8	0	0	5	–	–	–	–	–	–	49	24	20	2	0.9	17	17	13	0	0.8	9	9	9	0	1.0	83	50	42	7	1.0
Tuluksak	12	3	2	7	3.0	1	1	1	0	1.0	58	29	27	4	1.1	15	15	15	0	1.0	7	7	7	0	1.0	93	55	52	11	1.2
Lower Kuskokwim	111	16	14	82	6.0	13	13	13	0	1.0	2,931	923	887	35	1.0	187	187	171	0	0.9	61	61	61	0	1.0	3,303	1,200	1,146	117	1.1
Lower Kalskag	6	1	1	4	5.0	1	1	1	0	1.0	58	28	26	5	1.1	7	7	7	0	1.0	3	3	3	0	1.0	75	40	38	9	1.2
Upper Kalskag	–	–	–	–	–	1	1	1	0	1.0	50	23	20	1	0.9	4	4	4	0	1.0	3	3	3	0	1.0	58	31	28	1	0.9
Aniak	–	–	–	–	–	–	–	–	–	–	191	168	151	22	1.0	–	–	–	–	–	–	–	–	–	–	191	168	151	22	1.0
Chuathbaluk	7	2	2	3	2.5	2	2	2	0	1.0	19	10	9	7	1.6	5	5	5	0	1.0	–	–	–	–	–	33	19	18	10	1.5
Middle Kuskokwim	13	3	3	7	3.3	4	4	4	0	1.0	318	229	206	35	1.1	16	16	16	0	1.0	6	6	6	0	1.0	357	258	235	42	1.1
Crooked Creek	1	1	0	–	–	4	4	0	–	–	27	14	0	–	–	5	5	0	–	–	–	–	–	–	–	37	24	0	–	0.0
Red Devil	2	0	0	2	–	–	–	–	–	–	10	10	7	0	0.7	1	1	1	0	1.0	2	2	1	0	0.5	15	13	9	2	0.9
Sleetmute	2	0	0	1	–	1	1	0	–	–	32	17	14	14	1.7	2	2	2	0	1.0	2	2	2	0	1.0	39	22	18	15	1.5
Stony River	3	0	0	2	–	–	–	–	–	–	12	7	5	4	1.3	–	–	–	–	–	–	–	–	–	–	15	7	5	6	1.6
Lime Village	1	1	0	–	–	–	–	–	–	–	13	7	0	–	–	–	–	–	–	–	–	–	–	–	–	14	8	0	–	0.0
McGrath	12	4	3	7	2.5	2	2	2	0	1.0	113	55	45	5	0.9	1	1	1	0	1.0	1	1	1	0	1.0	129	63	52	12	1.0
Takotna	–	–	–	–	–	–	–	–	–	–	23	12	0	–	–	–	–	–	–	–	–	–	–	–	–	23	12	0	–	0.0
Nikolai	3	0	0	3	–	–	–	–	–	–	31	17	16	12	1.7	–	–	–	–	–	1	1	1	0	1.0	35	18	17	15	1.8
Telida	–	–	–	–	–	–	–	–	–	–	2	2	0	–	–	–	–	–	–	–	–	–	–	–	–	2	2	0	–	0.0
Upper Kuskokwim	24	6	3	15	3.0	7	7	2	0	0.3	263	141	87	35	0.9	9	9	4	0	0.4	6	6	5	0	0.8	309	169	101	50	0.9
Kuskokwim River[a]	148	25	20	104	5.0	24	24	19	0	0.8	3,593	1,334	1,180	105	1.0	220	220	191	0	0.9	74	74	72	0	1.0	4,059	1,677	1,482	209	1.0

-continued-

Table 3.–Page 2 of 2.

	Unknown					Does not usually fish					Light harvester					Medium harvester					High harvester					Combined use groups				
Community	*N*	S	ns	U	PS	*N*	S	ns	U	PS	*N*	S	ns	U	PS	*N*	S	ns	U	PS	*N*	S	ns	U	PS	*N*	S	ns	U	PS
Quinhagak	17	0	0	13	–	1	1	1	0	1.0	140	67	61	4	1.0	5	5	5	0	1.0	2	2	2	0	1.0	165	75	69	17	1.2
Goodnews Bay	4	0	0	4	–	1	1	1	0	1.0	63	33	28	1	0.9	2	2	2	0	1.0	–	–	–	–	–	70	36	31	5	1.0
Platinum	3	1	1	2	3.0	1	1	1	0	1.0	16	8	7	8	1.9	–	–	–	–	–	–	–	–	–	–	20	10	9	10	1.9
S. Kuskokwim Bay	24	1	1	19	20.0	3	3	3	0	1.0	219	108	96	13	1.0	7	7	7	0	1.0	2	2	2	0	1.0	255	121	109	32	1.2
Total	172	26	21	123	5.5	27	27	22	0	0.8	3,812	1,442	1,276	118	1.0	227	227	198	0	0.9	76	76	74	0	1.0	4,314	1,798	1,591	241	1.0

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, S = number selected for survey, ns = number selected and surveyed, U = number of unselected houses that were surveyed, PS = the proportion of selected households surveyed.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 4.–Expanded harvest of Chinook salmon for communities surveyed, Kuskokwim Area, 2013.

	Unknown				Not usually harvest				Light harvesters				Medium harvesters				High harvesters				Combined use groups			
Community	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	Total *N*	Total *n*	Est. total	CI (95%)
Kongiganak	–	–	–	–	–	–	–	–	81	0	–	–	8	0	–	–	1	0	–	–	90	0	–	–
Tuntutuliak	12	7	10	4	57	–	–	–	54	26	22	4	17	17	43	0	7	7	60	0	90	57	2,448	398
Eek	5	5	6	0	50	1	0	–	75	38	14	2	6	5	9	2	1	1	22	–	88	50	1,188	285
Kasigluk	5	5	13	0	49	–	–	–	89	37	28	3	7	4	31	8	3	3	45	0	104	49	2,919	616
Nunapitchuk	13	12	15	2	71	1	0	–	79	35	14	2	15	13	45	3	10	10	56	0	118	71	2,563	370
Atmautluak	3	3	37	0	37	–	–	–	47	23	18	3	9	7	40	5	4	4	64	0	63	37	1,592	298
Napakiak	11	10	6	1	51	3	3	0	70	25	16	5	12	12	30	0	1	1	58	–	97	51	1,588	642
Napaskiak	12	10	13	2	57	1	0	–	61	24	22	5	24	18	38	4	5	4	110	19	103	57	2,939	710
Oscarville	1	1	90	–	13	–	–	–	5	5	6	0	8	6	58	9	1	1	0	–	15	13	585	149
Bethel	–	–	–	–	519	–	–	–	2,126	519	8	1	–	–	–	–	–	–	–	–	2,126	519	17,246	3,450
Kwethluk	13	12	8	1	95	3	0	0	119	52	13	2	26	23	45	2	5	5	79	0	166	95	3,192	489
Akiachak	16	14	4	1	93	3	0	0	99	43	17	3	31	25	49	4	8	8	46	0	157	93	3,585	610
Akiak	8	5	20	12	46	–	–	–	49	21	15	3	17	12	23	3	9	8	17	3	83	46	1,449	396
Tuluksak	12	8	4	1	59	1	0	–	58	28	5	1	15	15	19	0	7	7	14	0	93	59	732	142
Lower Kalskag	6	5	2	1	47	1	0	–	58	31	10	2	7	7	17	0	3	3	11	0	75	47	744	258
Upper Kalskag	–	–	–	–	29	1	1	–	50	21	22	4	4	4	43	0	3	3	20	0	58	29	1,317	407
Aniak	–	–	–	–	170	–	–	–	191	170	8	1	–	–	–	–	–	–	–	–	191	170	1,440	200
Chuathbaluk	7	5	4	2	26	2	0	0	19	14	4	1	5	5	9	0	–	–	–	–	33	26	155	47
Crooked Creek	1	0	–	–	–	0	–	–	27	0	–	–	5	0	–	–	–	–	–	–	37	0	–	–
Red Devil	2	2	0	0	10	–	–	–	10	6	4	1	1	1	20	–	2	1	11	–	15	10	77	24
Sleetmute	2	1	0	–	32	0	–	–	32	27	2	0	2	2	2	0	2	2	16	0	39	32	96	19
Stony River	3	2	0	0	11	–	–	–	12	9	4	1	–	–	–	–	–	–	–	–	15	11	51	36
Lime Village	1	0	–	–	–	–	–	–	13	0	–	–	–	–	–	–	–	–	–	–	14	0	–	–
McGrath	12	10	0	0	63	2	0	0	113	50	1	0	1	1	0	–	1	0	–	–	129	63	95	82
Takotna	–	–	–	–	–	–	–	–	23	0	–	–	–	–	–	–	–	–	–	–	23	0	–	–
Nikolai	3	3	0	0	32	–	–	–	31	28	9	1	–	–	–	–	1	1	1	–	35	32	283	94
Telida	–	–	–	–	–	–	–	–	2	0	–	–	–	–	–	–	–	–	–	–	2	0	–	–
Quinhagak	17	13	11	2	86	1	0	–	140	65	18	3	5	5	40	0	2	2	96	0	165	86	3,143	743
Goodnews Bay	4	4	0	0	35	1	0	–	63	28	6	2	2	2	13	0	–	–	–	–	70	35	413	193
Platinum	3	3	0	0	17	1	0	–	16	13	2	0	–	–	–	–	–	–	–	–	20	17	39	11

Note: This table depicts only the expanded harvest estimates by village. It does not include Bayesian estimates for missed villages. Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, SE = standard error, CI (95)% = 95% confidence interval.

Table 5.–Expanded harvest of chum salmon for communities surveyed, Kuskokwim Area, 2013.

	Unknown				Not usually harvest				Light harvesters				Medium harvesters				High harvesters				Combined use groups			
Community	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	Total *N*	Total *n*	Est. total	CI (95%)
Kongiganak	–	–	–	–	–	–	–	–	81	0	–	–	8	0	–	–	1	0	–	–	90	0	–	–
Tuntutuliak	12	7	7	3	–	–	–	–	54	26	18	3	17	17	30	0	7	7	87	0	90	57	2,180	355
Eek	5	4	1	0	1	1	0	–	75	38	14	3	6	5	24	5	1	1	35	–	88	49	1,232	439
Kasigluk	5	5	9	0	–	–	–	–	89	37	20	3	7	4	47	14	3	3	27	0	104	49	2,197	521
Nunapitchuk	13	12	12	2	1	1	0	–	79	35	13	2	15	12	51	4	10	10	103	0	118	70	2,977	376
Atmautluak	3	3	46	0	–	–	–	–	47	22	25	5	9	7	57	9	4	4	145	0	63	36	2,409	473
Napakiak	11	9	9	2	3	3	20	0	70	23	8	2	12	12	34	0	1	1	71	–	97	48	1,185	280
Napaskiak	12	10	19	4	1	1	0	–	61	24	17	5	24	17	21	3	5	4	165	20	103	56	2,589	699
Oscarville	1	1	0	–	–	–	–	–	5	5	9	0	8	6	56	10	1	1	0	–	15	13	490	168
Bethel	–	–	–	–	–	–	–	–	2,126	518	6	1	–	–	–	–	–	–	–	–	2,126	518	12,506	2,232
Kwethluk	13	12	17	3	3	3	0	0	119	52	16	3	26	23	41	2	5	5	119	0	166	95	3,825	667
Akiachak	16	14	8	2	3	3	2	0	99	43	15	2	31	25	43	4	8	8	63	0	157	93	3,417	518
Akiak	8	5	0	0	–	–	–	–	49	21	18	8	17	12	23	4	9	8	103	19	83	46	2,212	858
Tuluksak	12	8	20	7	1	1	0	–	58	28	27	6	15	15	59	0	7	7	53	0	93	59	3,062	686
Lower Kalskag	6	5	1	0	1	1	0	–	58	31	11	3	7	7	49	0	3	3	83	0	75	47	1,214	329
Upper Kalskag	–	–	–	–	1	1	0	–	50	21	21	5	4	4	66	0	3	3	77	0	58	29	1,534	533
Aniak	–	–	–	–	–	–	–	–	191	169	15	1	–	–	–	–	–	–	–	–	191	169	2,880	556
Chuathbaluk	7	5	2	1	2	2	0	0	19	14	29	7	5	5	76	0	–	–	–	–	33	26	935	261
Crooked Creek	1	0	–	–	4	0	–	–	27	0	–	–	5	0	–	–	–	–	–	–	37	0	–	–
Red Devil	2	2	0	0	–	–	–	–	10	6	70	38	1	1	50	–	2	1	117	–	15	10	981	849
Sleetmute	2	1	0	–	1	0	–	–	32	26	2	1	2	2	35	0	2	2	205	0	39	31	542	35
Stony River	3	2	0	0	–	–	–	–	12	9	2	1	–	–	–	–	–	–	–	–	15	11	27	16
Lime Village	1	0	–	–	–	–	–	–	13	0	–	–	–	–	–	–	–	–	–	–	14	0	–	–
McGrath	12	10	1	0	2	2	0	0	113	50	5	2	1	1	0	–	1	0	–	–	129	63	598	500
Takotna	–	–	–	–	–	–	–	–	23	0	–	–	–	–	–	–	–	–	–	–	23	0	–	–
Nikolai	3	3	0	0	–	–	–	–	31	28	12	2	–	–	–	–	1	1	148	–	35	32	513	147
Telida	–	–	–	–	–	–	–	–	2	0	–	–	–	–	–	–	–	–	–	–	2	0	–	–
Quinhagak	17	13	6	1	1	1	0	–	140	65	11	2	5	5	43	0	2	2	47	0	165	86	1,958	454
Goodnews Bay	4	4	1	0	1	1	0	–	63	28	2	0	2	2	13	0	–	–	–	–	70	35	153	51
Platinum	3	3	0	0	1	1	0	–	16	13	6	1	–	–	–	–	–	–	–	–	20	17	90	29

Note: This table depicts only the expanded harvest estimates by village. It does not include Bayesian estimates for missed villages. Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, SE = standard error, CI (95)% = 95% confidence interval.

Table 6.–Expanded harvest of sockeye salmon for communities surveyed, Kuskokwim Area, 2013.

	Unknown				Not usually harvest				Light harvesters				Medium harvesters				High harvesters				Combined use groups			
Community	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	Total *N*	Total *n*	Est. total	CI (95%)
Kongiganak	–	–	–	–	–	–	–	–	81	0	–	–	8	0	–	–	1	0	–	–	90	0	–	–
Tuntutuliak	12	7	5	3	–	–	–	–	54	26	13	2	17	16	18	1	7	7	18	0	90	56	1,183	267
Eek	5	5	11	0	1	1	0	–	75	38	15	2	6	5	20	6	1	1	13	–	88	50	1,319	300
Kasigluk	5	5	5	0	–	–	–	–	89	37	13	2	7	4	29	7	3	3	23	0	104	49	1,470	362
Nunapitchuk	13	12	18	2	1	1	0	–	79	35	9	1	15	13	26	2	10	10	49	0	118	71	1,806	247
Atmautluak	3	3	27	0	–	–	–	–	47	23	13	2	9	7	39	4	4	4	69	0	63	37	1,316	250
Napakiak	11	10	8	1	3	3	4	0	70	24	9	2	12	12	23	0	1	1	82	–	97	50	1,105	243
Napaskiak	12	10	14	3	1	1	0	–	61	23	14	4	24	18	21	3	5	3	111	25	103	55	2,069	527
Oscarville	1	1	22	–	–	–	–	–	5	5	0	0	8	6	41	7	1	1	0	–	15	13	347	119
Bethel	–	–	–	–	–	–	–	–	2,126	516	6	0	–	–	–	–	–	–	–	–	2,126	516	12,616	1,951
Kwethluk	13	12	7	1	3	3	0	0	119	51	11	2	26	23	33	2	5	5	77	0	166	94	2,705	495
Akiachak	16	14	9	3	3	3	2	0	99	43	12	2	31	25	29	4	8	8	46	0	157	93	2,594	461
Akiak	8	5	4	2	–	–	–	–	49	20	20	6	17	12	28	4	9	8	31	3	83	45	1,731	597
Tuluksak	12	7	4	2	1	1	0	–	58	26	16	6	15	13	19	2	7	7	41	0	93	54	1,541	688
Lower Kalskag	6	5	1	1	1	1	0	–	58	31	14	6	7	7	13	0	3	3	27	0	75	47	977	648
Upper Kalskag	–	–	–	–	1	1	0	–	50	21	9	1	4	4	39	0	3	3	19	0	58	29	662	141
Aniak	–	–	–	–	–	–	–	–	191	170	8	0	–	–	–	–	–	–	–	–	191	170	1,466	186
Chuathbaluk	7	5	6	3	2	2	0	0	19	14	14	4	5	5	35	0	–	–	–	–	33	26	480	172
Crooked Creek	1	0	–	–	4	0	–	–	27	0	–	–	5	0	–	–	–	–	–	–	37	0	–	–
Red Devil	2	2	0	0	–	–	–	–	10	6	16	5	1	1	40	–	2	1	34	.	15	10	270	120
Sleetmute	2	1	0	–	1	0	–	–	32	27	4	1	2	2	30	0	2	2	75	0	39	32	362	56
Stony River	3	2	0	0	–	–	–	–	12	9	37	11	–	–	–	–	–	–	–	–	15	11	447	283
Lime Village	1	0	–	–	–	–	–	–	13	0	–	–	–	–	–	–	–	–	–	–	14	0	–	–
McGrath	12	10	3	1	2	2	0	0	113	50	4	2	1	1	100	.	1	0	–	–	129	63	538	384
Takotna	–	–	–	–	–	–	–	–	23	0	–	–	–	–	–	–	–	–	–	–	23	0	–	–
Nikolai	3	3	0	0	–	–	–	–	31	28	0	0	–	–	–	–	1	1	0	–	35	32	0	0
Telida	–	–	–	–	–	–	–	–	2	0	–	–	–	–	–	–	–	–	–	–	2	0	–	–
Quinhagak	17	13	9	2	1	1	0	–	140	65	12	2	5	5	49	0	2	2	35	0	165	86	2,158	456
Goodnews Bay	4	4	4	0	1	1	0	–	63	28	16	3	2	2	37	0	–	–	–	–	70	35	1,113	446
Platinum	3	3	0	0	1	1	0	–	16	13	11	2	–	–	–	–	–	–	–	–	20	17	181	62

Note: This table depicts only the expanded harvest estimates by village. It does not include Bayesian estimates for missed villages. Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, SE = standard error, CI (95)% = 95% confidence interval.

Table 7.–Expanded harvest of coho salmon for surveyed communities, Kuskokwim Area, 2013.

	Unknown				Not usually harvest				Light harvesters				Medium harvesters				High harvesters				Combined use groups			
Community	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	Total *N*	Total *n*	Est. total	CI (95%)
Kongiganak	–	–	–	–	–	–	–	–	81	0	–	–	8	0	–	–	1	0	–	–	90	0	–	–
Tuntutuliak	12	7	1	1	–	–	–	–	54	26	5	1	17	17	7	0	7	7	8	0	90	57	450	114
Eek	5	4	2	1	1	1	0	–	75	38	6	1	6	5	7	1	1	1	0	–	88	49	483	165
Kasigluk	5	4	3	1	–	–	–	–	89	38	4	1	7	4	6	4	3	3	11	0	104	49	418	241
Nunapitchuk	13	12	0	0	1	1	0	–	79	35	1	0	15	13	7	1	10	10	7	0	118	71	226	54
Atmautluak	3	3	1	0	–	–	–	–	47	22	0	0	9	7	11	5	4	4	21	0	63	36	203	99
Napakiak	11	10	8	1	3	3	4	0	70	25	4	2	12	12	19	0	1	1	0	–	97	51	634	227
Napaskiak	12	10	1	0	1	1	0	–	61	23	6	2	24	19	12	2	5	4	15	4	103	57	772	249
Oscarville	1	1	10	–	–	–	–	–	5	5	0	0	8	6	3	1	1	1	0	–	15	13	37	13
Bethel	–	–	–	–	–	–	–	–	2,126	520	6	1	–	–	–	–	–	–	–	–	2,126	520	12,662	2,513
Kwethluk	13	12	18	5	3	3	0	0	119	52	7	1	26	22	17	3	5	5	12	0	166	94	1,555	366
Akiachak	16	14	10	3	3	3	2	0	99	43	3	1	31	25	17	2	8	8	13	0	157	93	1,106	216
Akiak	8	5	3	1	–	–	–	–	49	21	5	2	17	11	6	1	9	8	6	1	83	45	454	199
Tuluksak	12	8	2	1	1	1	0	–	58	28	6	1	15	13	3	1	7	7	10	0	93	57	473	174
Lower Kalskag	6	5	4	2	1	1	0	–	58	31	6	2	7	7	11	0	3	3	23	0	75	47	529	263
Upper Kalskag	–	–	–	–	1	1	22	–	50	21	7	3	4	4	13	0	3	3	67	0	58	29	636	297
Aniak	–	–	–	–	–	–	–	–	191	171	16	2	–	–	–	–	–	–	–	–	191	171	3,102	787
Chuathbaluk	7	5	3	1	2	2	8	0	19	14	10	2	5	5	19	0	–	–	–	–	33	26	319	81
Crooked Creek	1	0	–	–	4	0	–	–	27	0	–	–	5	0	–	–	–	–	–	–	37	0	–	–
Red Devil	2	2	0	0	–	–	–	–	10	6	21	10	1	1	10	–	2	1	50	–	15	10	318	226
Sleetmute	2	1	0	–	1	0	–	–	32	27	3	1	2	2	0	0	2	2	58	0	39	32	219	46
Stony River	3	2	0	0	–	–	–	–	12	9	10	3	–	–	–	–	–	–	–	–	15	11	120	76
Lime Village	1	0	–	–	–	–	–	–	13	0	–	–	–	–	–	–	–	–	–	–	14	0	–	–
McGrath	12	10	1	0	2	2	0	0	113	50	4	2	1	1	0	–	1	0	–	–	129	63	523	383
Takotna	–	–	–	–	–	–	–	–	23	0	–	–	–	–	–	–	–	–	–	–	23	0	–	–
Nikolai	3	3	0	0	–	–	–	–	31	28	3	1	–	–	–	–	1	1	18	–	35	32	119	40
Telida	–	–	–	–	–	–	–	–	2	0	–	–	–	–	–	–	–	–	–	–	2	0	–	–
Quinhagak	17	13	8	2	1	1	0	–	140	65	6	1	5	5	10	0	2	2	3	0	165	86	1,087	232
Goodnews Bay	4	4	1	0	1	1	0	–	63	28	4	1	2	2	11	0	–	–	–	–	70	35	295	176
Platinum	3	3	0	0	1	1	0	–	16	13	3	1	–	–	–	–	–	–	–	–	20	17	50	18

Note: This table depicts only the expanded harvest estimates by village. It does not include Bayesian estimates for missed villages. Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, SE = standard error, CI (95)% = 95% confidence interval.

Table 8.–Expanded harvest of pink salmon for communities surveyed, Kuskokwim Area, 2013.

	Unknown				Not usually harvest				Light harvesters				Medium harvesters				High harvesters				Combined use groups			
Community	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	Total *N*	Total *n*	Est. total	CI (95%)
Kongiganak	–	–	–	–	–	–	–	–	81	0	–	–	8	0	–	–	1	0	–	–	90	0	–	–
Tuntutuliak	12	7	0	0	–	–	–	–	54	26	0	0	17	17	0	0	7	7	0	0	90	57	3	0
Eek	5	5	0	0	1	1	0	–	75	38	0	0	6	5	0	0	1	1	2	–	88	50	18	22
Kasigluk	5	4	0	0	–	–	–	–	89	38	0	0	7	4	0	0	3	3	0	0	104	49	14	21
Nunapitchuk	13	12	1	0	1	1	0	–	79	35	0	0	15	13	1	0	10	10	0	0	118	71	20	7
Atmautluak	3	3	0	0	–	–	–	–	47	23	1	0	9	7	0	0	4	4	3	0	63	37	47	45
Napakiak	11	10	0	0	3	3	0	0	70	26	0	0	12	12	0	0	1	1	0	–	97	52	3	2
Napaskiak	12	9	0	0	1	1	0	–	61	24	0	0	24	20	0	0	5	4	0	0	103	58	0	0
Oscarville	1	1	0	–	–	–	–	–	5	5	0	0	8	6	0	0	1	1	0	–	15	13	0	0
Bethel	–	–	–	–	–	–	–	–	2,126	524	0	0	–	–	–	–	–	–	–	–	2,126	524	207	150
Kwethluk	13	12	0	0	3	3	0	0	119	52	1	0	26	23	1	0	5	5	0	0	166	95	95	87
Akiachak	16	14	0	0	3	3	0	0	99	43	0	0	31	25	1	0	8	8	0	0	157	93	51	31
Akiak	8	5	0	0	–	–	–	–	49	21	2	1	17	11	0	0	9	8	0	0	83	45	110	117
Tuluksak	12	8	0	0	1	1	0	–	58	27	0	0	15	15	0	0	7	7	0	0	93	58	10	7
Lower Kalskag	6	5	0	0	1	1	0	–	58	31	0	0	7	7	0	0	3	3	0	0	75	47	9	8
Upper Kalskag	–	–	–	–	1	1	0	–	50	21	0	0	4	4	0	0	3	3	0	0	58	29	0	0
Aniak	–	–	–	–	–	–	–	–	191	170	0	0	–	–	–	–	–	–	–	–	191	170	22	10
Chuathbaluk	7	5	0	0	2	2	0	0	19	14	0	0	5	5	0	0	–	–	–	–	33	26	0	0
Crooked Creek	1	0	–	–	4	0	–	–	27	0	–	–	5	0	–	–	–	–	–	–	37	0	–	–
Red Devil	2	2	0	0	–	–	–	–	10	6	0	0	1	1	0	–	2	1	0	.	15	10	0	0
Sleetmute	2	1	0	–	1	0	–	–	32	27	0	0	2	2	0	0	2	2	1	0	39	32	1	0
Stony River	3	2	0	0	–	–	–	–	12	9	3	1	–	–	–	–	–	–	–	–	15	11	33	25
Lime Village	1	0	–	–	–	–	–	–	13	0	–	–	–	–	–	–	–	–	–	–	14	0	–	–
McGrath	12	10	0	0	2	2	0	0	113	50	0	0	1	1	0	–	1	0	–	–	129	63	7	10
Takotna	–	–	–	–	–	–	–	–	23	0	–	–	–	–	–	–	–	–	–	–	23	0	–	–
Nikolai	3	3	0	0	–	–	–	–	31	28	0	0	–	–	–	–	1	1	0	–	35	32	0	0
Telida	–	–	–	–	–	–	–	–	2	0	–	–	–	–	–	–	–	–	–	–	2	0	–	–
Quinhagak	17	13	0	0	1	1	0	–	140	65	1	0	5	5	0	0	2	2	0	0	165	86	73	66
Goodnews Bay	4	4	0	0	1	1	0	–	63	28	0	0	2	2	4	0	–	–	–	–	70	35	13	7
Platinum	3	3	0	0	1	1	0	–	16	13	0	0	–	–	–	–	–	–	–	–	20	17	5	3

Note: This table depicts only the expanded harvest estimates by village. Bayesian estimates are not performed for pink salmon for missed villages. Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, SE = standard error, CI (95)% = 95% confidence interval.

Table 9.–Reported number of salmon retained from commercial fishing for subsistence use, Kuskokwim Area, 2013.

Community	*N*	*n*	Chinook	Chum	Coho	Sockeye	Pink
Kongiganak	90	0	–	–	–	–	–
N. Kuskokwim Bay	92	0	–	–	–	–	–
Tuntutuliak	90	23	1	0	0	0	0
Eek	88	21	30	5	42	16	0
Kasigluk	104	7	0	0	39	0	6
Nunapitchuk	118	17	2	0	8	0	0
Atmautluak	63	5	20	0	0	0	10
Napakiak	97	15	9	17	10	18	3
Napaskiak	103	11	3	0	0	0	0
Oscarville	15	2	1	0	8	0	0
Bethel	2,126	27	18	0	43	2	3
Kwethluk	166	16	5	6	7	0	7
Akiachak	157	37	16	2	15	2	12
Akiak	83	7	0	0	7	0	0
Tuluksak	93	6	0	0	10	0	0
Lower Kuskokwim	3,303	194	105	30	189	38	41
Lower Kalskag	75	0	0	0	0	0	0
Upper Kalskag	58	0	0	0	0	0	0
Aniak	191	0	0	0	0	0	0
Chuathbaluk	33	0	0	0	0	0	0
Middle Kuskokwim	357	0	0	0	0	0	0
Crooked Creek	37	0	–	–	–	–	–
Red Devil	15	0	0	0	0	0	0
Sleetmute	39	0	0	0	0	0	0
Stony River	15	0	0	0	0	0	0
Lime Village	14	0	–	–	–	–	–
McGrath	129	0	0	0	0	0	0
Takotna	23	0	–	–	–	–	–
Nikolai	35	0	0	0	0	0	0
Telida	2	0	–	–	–	–	–
Upper Kuskokwim	309	0	0	0	0	0	0
Kuskokwim River[a]	4,061	194	105	30	189	38	41
Quinhagak	165	37	112	0	10	5	4
Goodnews Bay	70	20	1	5	0	35	0
Platinum	20	4	5	0	0	10	4
S. Kuskokwim Bay	255	61	118	5	10	50	8
Survey total	4,316	255	223	35	199	88	49

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 10.–Fishing gear reported as the primary type used by subsistence fishermen, Kuskokwim Area, 2013.

Community	*N*	*n*	Set net	Drift net	Fish wheel	Hook & Line
Kongiganak	90	0	–	–	–	–
N. Kuskokwim Bay	92	0	–	–	–	–
Tuntutuliak	85	48	1	47	–	–
Eek	87	34	4	29	–	1
Kasigluk	108	43	–	43	–	–
Nunapitchuk	118	53	–	52	–	1
Atmautluak	60	28	2	26	–	–
Napakiak	93	35	5	30	–	–
Napaskiak	99	43	7	36	–	–
Oscarville	16	8	4	4	–	–
Bethel	2,087	231	13	210	1	7
Kwethluk	165	71	3	64	–	4
Akiachak	152	76	3	72	–	1
Akiak	80	34	6	28	–	–
Tuluksak	86	47	6	39	–	2
Lower Kuskokwim	3,236	751	54	680	1	16
Lower Kalskag	79	29	2	27	–	–
Upper Kalskag	67	25	1	24	–	–
Aniak	182	104	7	69	2	26
Chuathbaluk	31	19	1	15	–	3
Middle Kuskokwim	359	177	11	135	2	29
Crooked Creek	38	0	–	–	–	–
Red Devil	13	6	3	2	–	1
Sleetmute	37	15	5	6	–	4
Stony River	16	5	3	–	2	–
Lime Village	15	0	–	–	–	–
McGrath	136	17	12	2	2	1
Takotna	23	0	–	–	–	–
Nikolai	33	16	7	–	4	5
Telida	2	0	–	–	–	–
Upper Kuskokwim	313	59	30	10	8	11
Kuskokwim River[a]	4,000	987	95	825	11	56
Quinhagak	155	68	7	52	–	9
Goodnews Bay	71	25	10	14	–	1
Platinum	17	13	6	3	–	4
S. Kuskokwim Bay	243	106	23	69	–	14
Total	4,243	1,093	118	894	11	70

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 11.–Estimated number of households that subsistence fished in communities surveyed, Kuskokwim Area, 2013.

	Unknown				Not usually harvest				Light harvesters				Medium harvesters				High harvesters				Combined use groups			
Community	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	Total *N*	Total *n*	Est. total	CI (95%)
Kongiganak	–	–	–	–	–	–	–	–	81	0	–	–	–	0	–	–	1	0	–	–	90	0	–	–
N. Kuskokwim Bay	–	–	–	–	–	–	–	–	81	0	–	–	8	0	–	–	1	0	–	–	90	0	–	–
Tuntutuliak	12	8	1	0	–	–	–	–	54	26	1	0	17	17	1	0	7	7	1	0	90	58	74	7
Eek	5	5	1	0	1	1	0	–	75	40	1	0	6	6	1	0	1	1	1	–	88	53	73	6
Kasigluk	5	5	1	0	.	–	–	–	89	40	1	0	7	5	1	0	3	3	1	0	104	53	86	8
Nunapitchuk	13	12	1	0	1	1	0	–	79	37	1	0	15	13	1	0	10	10	1	0	118	73	87	9
Atmautluak	3	3	1	0	–	–	–	–	47	23	1	0	9	7	1	0	4	4	1	0	63	37	46	7
Napakiak	11	10	1	0	3	3	0	0	70	29	1	0	12	12	1	0	1	1	1	–	97	55	68	9
Napaskiak	12	10	1	0	1	1	0	–	61	25	1	0	24	20	1	0	5	4	1	0	103	60	80	9
Oscarville	1	1	1	–	–	–	–	–	5	5	0	0	8	6	1	0	1	1	0	–	15	13	10	0
Bethel	–	–	–	–	–	–	–	–	2,126	538	0	0	–	–	–	–	–	–	–	–	2,126	538	968	78
Kwethluk	13	12	1	0	3	3	0	0	119	52	1	0	26	24	1	0	5	5	1	0	166	96	123	11
Akiachak	16	15	1	0	3	3	0	0	99	44	1	0	31	28	1	0	8	8	1	0	157	98	127	9
Akiak	8	5	0	0	–	–	–	–	49	21	1	0	17	12	1	0	9	8	1	0	83	46	64	7
Tuluksak	12	8	1	0	1	1	0	–	58	31	1	0	15	15	1	0	7	7	1	0	93	62	70	7
Lower Kuskokwim	111	94	1	0	13	13	0	0	2,931	911	1	0	187	165	1	0	61	59	1	0	3,303	1,242	1,876	82
Lower Kalskag	6	5	1	0	1	1	1	–	58	31	1	0	7	7	1	0	3	3	1	0	75	47	45	7
Upper Kalskag	–	–	–	–	1	1	1	–	50	21	1	0	4	4	1	0	3	3	1	0	58	29	48	7
Aniak	–	–	–	–	–	–	–	–	191	171	1	0	–	–	–	–	–	–	–	–	191	171	117	5
Chuathbaluk	7	5	1	0	2	2	1	0	19	14	1	0	5	5	1	0	–	–	–	–	33	26	24	3
Middle Kuskokwim	13	10	1	0	4	4	1	0	318	237	1	0	16	16	1	0	6	6	1	0	357	273	234	11
Crooked Creek	1	0	–	–	4	0	–	–	27	0	–	–	5	0	–	–	–	–	–	–	37	0	–	–
Red Devil	2	2	1	0	–	–	–	–	10	6	1	0	1	1	1	–	2	1	1	–	15	10	9	3
Sleetmute	2	1	0	–	1	0	–	–	32	27	0	0	2	2	1	0	2	2	1	0	39	32	19	3
Stony River	3	2	0	0	–	–	–	–	12	9	1	0	–	–	–	–	–	–	–	–	15	11	7	2
Lime Village	1	0	–	–	–	–	–	–	13	0	–	–	–	–	–	–	–	–	–	–	14	0	–	–
McGrath	12	10	0	0	2	2	0	0	113	50	0	0	1	1	1	–	1	0	–	–	129	63	34	11
Takotna	–	–	–	–	–	–	–	–	23	0	–	–	–	–	–	–	–	–	–	–	23	0	–	–
Nikolai	3	3	1	0	–	–	–	–	31	28	0	0	–	–	–	–	1	1	1	–	35	32	17	2
Telida	–	–	–	–	–	–	–	–	2	0	–	–	–	–	–	–	–	–	–	–	2	0	–	–
Upper Kuskokwim	24	18	0	0	7	2	0	0	263	120	0	0	9	4	1	0	6	4	1	0	309	148	86	12
Kuskokwim River[a]	148	122	1	0	24	19	0	0	3,593	1,268	1	0	220	185	1	0	74	69	1	0	4,059	1,663	2,197	83

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Table 11.–Page 2 of 2.

	Unknown				Does not usually harvest				Light harvesters				Medium harvesters				High harvesters				Combined use groups			
Community	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	Total *N*	Total *n*	Est. total	CI (95%)
Quinhagak	17	13	1	0	1	1	0	–	140	65	1	0	5	5	1	0	2	2	1	0	165	86	134	10
Goodnews Bay	4	4	1	0	1	1	1	–	63	28	1	0	2	2	1	0	–	–	–	–	70	35	60	6
Platinum	3	3	1	0	1	1	0	–	16	13	1	0	–	–	–	–	–	–	–	–	20	17	17	1
S. Kuskokwim Bay	24	20	1	0	3	3	0	–	219	106	1	0	7	7	1	0	2	2	1	0	255	138	211	12
Total	172	142	1	0	27	22	0	0	3,812	1,374	1	0	227	192	1	0	76	71	1	0	4,314	1,801	2,407	84

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, SE = standard error, Est. Total = estimated total number of households from all use groups that subsistence fished, expressed as a proportion of households from each group that fished, based on the number of households surveyed, and their responses to the question: "Did you subsistence fish?", CI (95)% = 95% confidence interval.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 12.–Estimated number of people living in communities surveyed, Kuskokwim Area, 2013.

	Unknown				Not usually harvest				Light harvesters				Medium harvesters				High harvesters				Combined use groups			
Community	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	Total *N*	Total *n*	Est. total	CI (95%)
Kongiganak	–	–	–	–	–	–	–	–	81	0	–	–	8	0	–	–	1	0	–	–	90	0	–	–
N. Kuskokwim Bay	–	–	–	–	–	–	–	–	81	0	–	–	8	0	–	–	1	0	–	–	90	0	–	–
Tuntutuliak	12	8	4	0	–	–	–	–	54	26	4	0	17	17	5	0	7	7	4	0	90	58	398	32
Eek	5	5	4	0	1	1	2	–	75	40	4	0	6	6	4	0	1	1	5	–	88	53	362	39
Kasigluk	5	5	5	0	–	–	–	–	89	37	6	0	7	5	6	0	3	3	7	0	104	50	623	62
Nunapitchuk	13	11	4	0	1	1	6	–	79	36	5	0	15	13	7	0	10	10	5	0	118	71	583	50
Atmautluak	3	3	4	0	–	–	–	–	47	22	5	0	9	7	6	1	4	4	6	0	63	36	321	33
Napakiak	11	10	3	0	3	3	3	0	70	27	3	0	12	12	4	0	1	1	3	–	97	53	330	53
Napaskiak	12	10	5	0	1	1	5	–	61	25	5	0	24	20	5	0	5	4	5	0	103	60	486	46
Oscarville	1	1	6	–	–	–	–	–	5	5	4	0	8	6	5	1	1	1	7	–	15	13	68	10
Bethel	–	–	–	–	–	–	–	–	2,126	520	3	0	–	–	–	–	–	–	–	–	2,126	520	7,216	298
Kwethluk	13	12	4	0	3	3	3	0	119	52	5	0	26	24	6	0	5	5	9	0	166	96	796	65
Akiachak	16	15	3	0	3	3	3	0	99	43	4	0	31	27	5	0	8	8	5	0	157	96	678	48
Akiak	8	5	3	1	–	–	–	–	49	21	5	0	17	11	4	0	9	8	6	0	83	45	410	51
Tuluksak	12	6	3	0	1	1	2	–	58	31	5	0	15	15	6	0	7	7	5	0	93	60	419	33
Lower Kuskokwim	111	91	4	0	13	13	3	0	2,931	885	4	0	187	163	5	0	61	59	6	0	3,303	1,211	12,691	336
Lower Kalskag	6	5	4	1	1	1	4	–	58	31	4	0	7	6	5	1	3	3	3	0	75	46	280	34
Upper Kalskag	–	–	–	–	1	1	3	–	50	21	4	0	4	4	6	0	3	3	3	0	58	29	243	40
Aniak	–	–	–	–	–	–	–	–	191	165	3	0	–	–	–	–	–	–	–	–	191	165	586	19
Chuathbaluk	7	5	2	0	2	2	3	0	19	14	4	0	5	5	5	0	–	–	–	–	33	26	115	12
Middle Kuskokwim	13	10	3	0	4	4	3	0	318	231	3	0	16	15	5	0	6	6	3	0	357	266	1,224	55
Crooked Creek	1	0	–	–	4	0	–	–	27	0	–	–	5	0	–	–	–	–	–	–	37	0	–	–
Red Devil	2	2	2	0	–	–	–	–	10	6	2	0	1	1	4	–	2	1	1	–	15	10	29	9
Sleetmute	2	1	2	–	1	0	–	–	32	27	2	0	2	2	7	0	2	2	2	0	39	32	100	8
Stony River	3	2	3	1	–	–	–	–	12	9	3	0	–	–	–	–	–	–	–	–	15	11	48	10
Lime Village	1	0	–	–	–	–	–	–	13	0	–	–	–	–	–	–	–	–	–	–	14	0	–	–
McGrath	12	10	2	0	2	2	3	0	113	50	3	0	1	1	2	–	1	0	–	–	129	63	319	30
Takotna	–	–	–	–	–	–	–	–	23	0	–	–	–	–	–	–	–	–	–	–	23	0	–	–
Nikolai	3	3	2	0	–	–	–	–	31	28	3	0	–	–	–	–	1	1	1	–	35	32	90	6
Telida	–	–	–	–	–	–	–	–	2	0	.	.	–	–	–	–	–	–	–	–	2	0	–	–
Upper Kuskokwim	24	18	2	0	7	2	3	0	263	120	3	0	9	4	5	0	6	4	1	0	309	148	586	33
Kuskokwim River[a]	148	119	3	0	24	19	3	0	3,593	1,236	4	0	220	182	5	0	74	69	5	0	4,059	1,625	14,500	342

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Table 12.–Page 2 of 2.

	Unknown				Does not usually harvest				Light harvesters				Medium harvesters				High harvesters				Combined use groups			
Community	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	*N*	*n*	Mean	SE	Total *N*	Total *n*	Est. total	CI (95%)
Quinhagak	17	13	4	0	1	1	1	–	140	64	5	0	5	5	6	0	2	2	4	0	165	85	756	69
Goodnews Bay	4	4	3	0	1	1	5	–	63	28	3	0	2	2	3	0	–	–	–	–	70	35	222	41
Platinum	3	3	2	0	1	1	1	–	16	13	4	0	–	–	–	–	–	–	–	–	20	17	72	10
S. Kuskokwim Bay	24	20	3	0	3	3	2	–	219	105	4	0	7	7	5	0	2	2	4	0	255	137	1,050	80
Survey total	172	139	3	0	27	22	3	0	3,812	1,341	4	0	227	189	5	0	76	71	5	0	4,314	1,762	15,550	351

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, SE = standard error, Est. Total = estimated total number of households from all use groups that subsistence fished, expressed as a proportion of households from each group that fished, based on the number of households surveyed, and their responses to the question: "Did you subsistence fish?", CI (95)% = 95% confidence interval.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 13.–Number of fish reported as received from subsistence, commercial, and test fisheries, Kuskokwim Area, 2013.

Received from:			Subsistence fishermen					Commercial fishermen					Bethel test fishery					All fisheries combined				
Community	*N*	*n*	Chinook	Chum	Sockeye	Coho	Pink	Chinook	Chum	Coho	Sockeye	Pink	Chinook	Chum	Coho	Sockeye	Pink	Chinook	Chum	Coho	Sockeye	Pink
Kongiganak	90	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
N. Kuskokwim Bay	92	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuntutuliak	90	55	17	1	11	18	0	0	0	0	0	0	0	0	0	0	0	17	1	11	18	0
Eek	88	48	9	3	11	14	0	0	0	0	4	0	0	0	0	0	0	9	3	11	18	0
Kasigluk	104	47	52	29	4	6	0	0	0	0	0	0	0	0	0	0	0	52	29	4	6	0
Nunapitchuk	118	71	28	42	50	10	0	0	0	0	0	0	0	0	0	0	0	28	42	50	10	0
Atmautluak	63	34	43	171	34	15	0	0	0	0	0	0	0	0	0	0	0	43	171	34	15	0
Napakiak	97	51	11	60	55	31	1	0	0	0	0	0	0	0	0	0	0	11	60	55	31	1
Napaskiak	103	53	23	7	9	19	0	0	0	0	0	0	0	0	0	0	0	23	7	9	19	0
Oscarville	15	12	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0	3	0	0	4	0
Bethel	2,126	497	371	335	370	451	6	0	0	0	0	0	63	130	145	154	0	434	465	515	605	6
Kwethluk	166	87	22	47	24	65	0	0	0	0	0	0	0	0	0	0	0	22	47	24	65	0
Akiachak	157	91	27	52	51	8	1	0	0	0	0	0	0	0	0	0	0	27	52	51	8	1
Akiak	83	39	44	8	31	23	0	0	0	0	0	0	0	0	0	0	0	44	8	31	23	0
Tuluksak	93	58	25	216	141	75	0	0	0	0	0	0	0	0	0	0	0	25	216	141	75	0
Lower Kuskokwim	3,303	1,143	675	971	791	739	8	0	0	0	4	0	63	130	145	154	0	738	1,101	936	897	8
Lower Kalskag	75	41	13	15	3	28	0	0	0	0	0	0	0	0	0	0	0	13	15	3	28	0
Upper Kalskag	58	27	26	0	57	5	0	0	0	0	0	0	0	0	0	0	0	26	0	57	5	0
Aniak	191	169	101	70	68	208	0	0	0	0	0	0	0	0	0	0	0	101	70	68	208	0
Chuathbaluk	33	25	7	0	26	9	0	0	0	0	0	0	0	0	0	14	0	7	0	26	23	0
Middle Kuskokwim	357	262	147	85	154	250	0	0	0	0	0	0	0	0	0	14	0	147	85	154	264	0
Crooked Creek	37	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Red Devil	15	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sleetmute	39	30	10	7	37	45	0	0	0	0	0	0	0	0	0	0	0	10	7	37	45	0
Stony River	15	8	1	0	40	1	0	0	0	0	0	0	0	0	0	0	0	1	0	40	1	0
Lime Village	14	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
McGrath	129	59	38	2	41	34	0	0	0	0	0	0	0	0	0	0	0	38	2	41	34	0
Takotna	23	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nikolai	35	31	28	35	0	4	0	0	0	0	0	0	0	0	0	0	0	28	35	0	4	0
Telida	2	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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Received from:			Subsistence fishermen					Commercial fishermen					Bethel test fishery					All fisheries combined				
Community	*N*	*n*	Chinook	Chum	Sockeye	Coho	Pink	Chinook	Chum	Coho	Sockeye	Pink	Chinook	Chum	Coho	Sockeye	Pink	Chinook	Chum	Coho	Sockeye	Pink
Upper Kuskokwim	309	135	77	44	118	84	0	0	0	0	0	0	0	0	0	0	0	77	44	118	84	0
Kuskokwim River[a]	4,061	1,540	899	1,100	1,063	1,073	8	0	0	0	4	0	63	130	145	168	0	962	1,230	1,208	1,245	8
Quinhagak	165	84	64	21	73	40	1	0	0	0	0	3	0	0	0	0	0	64	21	73	40	4
Goodnews Bay	70	34	14	7	40	17	0	0	0	0	0	0	0	0	0	0	0	14	7	40	17	0
Platinum	20	17	2	1	6	13	1	0	0	0	0	0	0	12	0	8	0	2	13	6	21	1
S. Kuskokwim Bay	255	135	80	29	119	70	2	0	0	0	0	3	0	12	0	8	0	80	41	119	78	5
Survey total	4,316	1,675	979	1,129	1,182	1,143	10	0	0	0	4	3	63	142	145	176	0	1,042	1,271	1,327	1,323	13

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 14.–Number of people that own dogs, number reporting harvesting salmon for dogs, and number of salmon harvested for dogs, by species, Kuskokwim Area, 2013.

Community	*N*	*n*	# own dog	Feed salmon	# dogs	Chinook	Chum	Sockeye	Coho	Pink
Kongiganak	90	0	–	–	–	–	–	–	–	–
N. Kuskokwim Bay	92	0	–	–	–	–	–	–	–	–
Tuntutuliak	90	55	44	0	92	0	0	0	0	0
Eek	88	49	31	1	51	0	3	0	0	0
Kasigluk	104	48	34	1	65	0	0	0	0	6
Nunapitchuk	118	68	48	2	92	0	30	0	0	0
Atmautluak	63	37	32	1	114	0	25	0	0	0
Napakiak	97	54	31	0	43	0	0	0	0	0
Napaskiak	103	57	40	2	120	0	160	60	0	0
Oscarville	15	13	9	1	16	0	90	0	0	0
Bethel	2,126	514	217	4	313	0	37	4	105	0
Kwethluk	166	95	80	6	164	0	15	0	101	34
Akiachak	157	93	58	7	197	2	195	50	115	0
Akiak	83	46	34	3	161	0	574	0	0	0
Tuluksak	93	60	43	3	118	0	10	10	0	2
Lower Kuskokwim	3,303	1,189	701	31	1,546	2	1,139	124	321	42
Lower Kalskag	75	44	31	3	76	0	439	0	129	0
Upper Kalskag	58	29	20	6	70	0	295	0	80	0
Aniak	191	169	101	17	280	0	692	0	876	0
Chuathbaluk	33	26	20	0	40	0	0	0	0	0
Middle Kuskokwim	357	268	172	26	466	0	1,426	0	1,085	0
Crooked Creek	37	0	–	–	–	–	–	–	–	–
Red Devil	15	8	5	2	9	0	160	0	0	0
Sleetmute	39	30	13	0	18	0	0	0	0	0
Stony River	15	11	3	0	4	0	0	0	0	0
Lime Village	14	0	–	–	–	–	–	–	–	–
McGrath	129	62	34	3	65	0	150	0	10	0
Takotna	23	0	.	.	.	–	–	–	–	–
Nikolai	35	32	23	4	59	0	222	0	46	0
Telida	2	0	–	–	–	–	–	–	–	–

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Community	*N*	*n*	# own dog	Feed salmon	# dogs	Chinook	Chum	Sockeye	Coho	Pink
Upper Kuskokwim	309	143	78	9	155	0	532	0	56	0
Kuskokwim River[a]	4,061	1,600	951	66	2,167	2	3,097	124	1,462	42
Quinhagak	165	85	59	4	108	0	51	0	0	0
Goodnews Bay	70	35	23	0	42	0	0	0	0	0
Platinum	20	16	10	1	21	0	3	3	0	0
S. Kuskokwim Bay	255	136	92	5	171	0	54	3	0	0
Survey total	4,316	1,736	1,043	71	2,338	2	3,151	127	1,462	42

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, # own dog = number of people who own dogs, feed salmon = salmon fed to dogs, # dog = number of dogs reported / owned by the respondent.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 15.–Number of salmon, by species reported as lost due to spoilage, animals, etc., Kuskokwim Area, 2013.

Community	*N*	*n*	Households reporting lost fish	Chinook	Chum	Coho	Sockeye	Reason given for loss			
								Animal	Disease	Human	Weather
Kongiganak	90	0	–	–	–	–	–	–	–	–	–
N. Kuskokwim Bay	92	0	–	–	–	–	–	–	–	–	–
Tuntutuliak	90	53	7	34	180	0	35	–	–	–	6
Eek	88	46	3	8	20	0	16	–	–	–	2
Kasigluk	104	51	4	7	30	0	4	–	–	–	4
Nunapitchuk	118	67	9	7	78	0	32	–	–	–	8
Atmautluak	63	36	4	5	69	4	28	–	–	–	2
Napakiak	97	50	3	0	45	0	57	–	–	–	3
Napaskiak	103	58	5	15	10	0	5	–	–	–	4
Oscarville	15	13	3	2	33	0	35	1	–	–	2
Bethel	2,126	531	17	40	33	0	46	1	–	–	13
Kwethluk	166	95	9	50	125	10	60	7	–	–	2
Akiachak	157	91	9	53	77	38	78	1	–	–	8
Akiak	83	45	4	5	90	0	5	–	–	–	4
Tuluksak	93	59	6	7	75	7	21	1	–	–	5
Lower Kuskokwim	3,303	1,195	83	233	865	59	422	11	–	–	63
Lower Kalskag	75	43	3	0	22	0	0	–	–	–	2
Upper Kalskag	58	29	1	0	15	0	0	–	–	–	–
Aniak	191	168	11	25	115	10	0	1	–	2	6
Chuathbaluk	33	23	4	0	8	0	0	1	–	–	3
Middle Kuskokwim	357	263	19	25	160	10	0	2	0	2	11
Crooked Creek	37	0	–	–	–	–	–	–	–	–	–
Red Devil	15	9	1	0	0	0	0	–	–	–	–
Sleetmute	39	29	3	4	0	0	17	–	–	–	3
Stony River	15	11	–	0	0	0	0	–	–	–	–
Lime Village	14	0	–	–	–	–	–	–	–	–	–
McGrath	129	63	1	4	0	0	0	–	–	–	–
Takotna	23	0		–	–	–	–	–	–	–	–
Nikolai	35	31	2	6	55	0	0	–	–	–	2
Telida	2	0	–	–	–	–	–	–	–	–	–

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Community	*N*	*n*	Households reporting lost fish	Chinook	Chum	Coho	Sockeye	Reason given for loss			
								Animal	Disease	Human	Weather
Upper Kuskokwim	309	143	7	14	55	0	17	–	–	–	5
Kuskokwim River[a]	4,061	1,601	109	272	1,080	69	439	13	0	2	79
Quinhagak	165	84	12	29	20	5	34	3	–	2	7
Goodnews Bay	70	34	2	0	0	4	3	–	1	–	1
Platinum	20	17	1	0	5	0	4	–	–	–	1
S. Kuskokwim Bay	255	135	15	29	25	9	41	3	1	2	9
Survey total	4,316	1,736	124	301	1,105	78	480	16	1	4	88

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 16.–Percentage of estimated Chinook salmon subsistence needs met for households that subsistence fished, Kuskokwim Area, 2013.

Community	*N*	*n*	25% needs met	50% needs met	75% needs met	100% needs met
Kongiganak	90	–	–	–	–	–
N. Kuskokwim Bay	90	–	–	–	–	–
Tuntutuliak	90	43	21%	9%	12%	58%
Eek	88	35	34%	11%	3%	51%
Kasigluk	104	44	23%	20%	11%	45%
Nunapitchuk	118	60	23%	13%	10%	53%
Atmautluak	63	33	21%	9%	6%	64%
Napakiak	97	40	43%	15%	10%	33%
Napaskiak	103	47	21%	9%	19%	51%
Oscarville	15	13	31%	8%	23%	38%
Bethel	2,126	346	57%	12%	7%	24%
Kwethluk	166	67	33%	19%	9%	39%
Akiachak	157	64	19%	14%	25%	42%
Akiak	83	30	27%	30%	7%	37%
Tuluksak	93	42	48%	19%	7%	26%
Lower Kuskokwim	3,303	864	40%	14%	10%	37%
Lower Kalskag	75	28	25%	18%	14%	43%
Upper Kalskag	58	27	15%	33%	11%	41%
Aniak	191	125	56%	18%	11%	15%
Chuathbaluk	33	20	60%	20%	0%	20%
Middle Kuskokwim	357	200	47%	20%	11%	23%
Crooked Creek	37	–	–	–	–	–
Red Devil	15	5	40%	0%	40%	20%
Sleetmute	39	23	57%	13%	0%	30%
Stony River	15	4	25%	50%	0%	25%
Lime Village	14	–	–	–	–	–
McGrath	129	43	67%	9%	5%	19%
Takotna	23	–	–	–	–	–
Nikolai	35	26	73%	8%	8%	12%
Telida	2	–	–	–	–	–
Upper Kuskokwim	309	101	63%	11%	6%	20%
Kuskokwim River[a]	4,059	1,165	43%	15%	10%	33%
Quinhagak	165	76	22%	22%	8%	47%
Goodnews Bay	70	25	48%	12%	12%	28%
Platinum	20	15	60%	20%	0%	20%
S. Kuskokwim Bay	255	116	33%	20%	8%	40%
Survey total	4,314	1,281	42%	15%	10%	33%

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed. The percentage is estimated by dividing the total number of fish harvested by the total responders said were needed.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 17.–Comments provided by survey participants regarding the meeting of subsistence needs for Chinook salmon.

						Reasons given for reporting needs not met												Unknown
						Non-fishery related factors					Natural conditions							
	N	*n*	Needs met	No need	Total not met	Did not fish	Personal	Equipment	Expenses	Management	Run dynamics	River conditions	Weather	Voluntary conservation	Human theft	Other	Irrelevant	Unknown
Kongiganak	90	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
N. Kuskokwim Bay	90	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuntutuliak	90	61	26	3	14	2	4	3	–	2	–	–	3	–	–	–	–	18
Eek	88	53	22	6	16	5	9	2	–	–	–	–	–	–	–	1	–	0
Kasigluk	104	54	23		30	5	15	1	4	2	1	–	2	–	–	–	1	0
Nunapitchuk	118	77	33	3	29	2	12	4	6	2	2	–	1	–	–	–	–	4
Atmautluak	63	38	20		15	2	5	3	3	2	–	–	–	–	–	–	–	1
Napakiak	97	55	19	3	26	3	10	7	–	2	3	–	1	–	–	–	1	1
Napaskiak	103	64	28	–	22	6	6	1	–	4	4	–	–	1	–	–	–	4
Oscarville	15	13	5	–	7	1	2	–	1	–	2	–	1	–	–	–	–	0
Bethel	2,126	538	101	122	248	52	82	61	3	6	17	–	7	19	1	1	2	0
Kwethluk	166	98	27	11	41	4	19	9	5	1	3	–	–	–	–	–	–	2
Akiachak	157	100	33	11	35	1	12	5	1	5	8	–	2	–	1	1	–	5
Akiak	83	49	15	4	20	1	3	5	–	5	5	–	–	1	–	–	–	3
Tuluksak	93	63	15	6	33	1	6	8	4	3	9	–	1	–	1	–	–	4
Lower Kuskokwim	3,303	1,263	367	169	536	85	185	109	27	34	54	0	18	21	3	3	4	31
Lower Kalskag	75	47	13	10	17	2	3	1	–	1	8	–	–	–	2		–	1
Upper Kalskag	58	29	12		16	2	5	–	–	1	6	–	–	2	–	–	–	0
Aniak	191	173	12	36	103	12	33	11	1	8	30	3	–	3	2	2	–	11
Chuathbaluk	33	28	6	3	13	4	2	–	–	–	7	–	–	–			–	2
Middle Kuskokwim	357	277	43	49	149	20	43	12	1	10	51	3	0	5	4	2	0	14
Crooked Creek	37	0			0				–	–	–	–	–	–	–	–	–	0
Red Devil	15	11	1	2	5	1	1	1	–	–	2	–	–	–	–	–	–	2
Sleetmute	39	33	7	5	18	4	6	7	–	1	–	–	–	–	–	–	–	2
Stony River	15	11	2	4	4	1	–	–	–	–	2	1	–	–	–	–	–	1
Lime Village	14	0	–	–	0	–	–	–	–	–	–	–	–	–	–	–	–	0
McGrath	129	64	8	19	36	3	16	6	–	–	11	–	–	–	–	–	–	1
Takotna	23	0	–	–	0	–	–	–	–	–	–	–	–	–	–	–	–	0
Nikolai	35	32	2	5	23	2	15	2	2	–	2	–	–	–	–	–	–	0
Telida	2	–	–	–	0	–	–	–	–	–	–	–	–	–	–	–	–	-

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						Reasons given for reporting needs not met												Unknown
						Non-fishery related factors					Natural conditions							
	N	*n*	Needs met	No need	Total not met	Did not fish	Personal	Equipment	Expenses	Management	Run dynamics	River conditions	Weather	Voluntary conservation	Human theft	Other	Irrelevant	Unknown
Upper Kuskokwim	309	151	20	35	86	11	38	16	2	1	17	1	0	0	0	0	0	6
Kuskokwim River[a]	4,059	1,691	430	253	771	116	266	137	30	45	122	4	18	26	7	5	4	51
Quinhagak	165	86	36	5	36	6	19	9	1	–	–	–	–	1	–	–	–	0
Goodnews Bay	70	36	10	4	16	2	8	1	–	1	3	–	–	1	–	–	–	1
Platinum	20	19	3	1	12	2	3	3	–	–	3	–	1	–	–	1	–	2
S. Kuskokwim Bay	255	141	49	10	64	10	30	13	1	1	6	0	1	2	0	1	0	3
Survey total	4,314	1,832	479	263	835	126	296	150	31	46	128	4	19	28	7	6	4	54

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed.

Table 18.–Percentage of estimated chum salmon subsistence needs met for households that subsistence fished, Kuskokwim Area, 2013.

Community	*N*	*n*	25% needs met	50% needs met	75% needs met	100% needs met
Kongiganak	90	–	–	–	–	–
N. Kuskokwim Bay	90	–	–	–	–	–
Tuntutuliak	90	37	19%	11%	5%	65%
Eek	88	30	13%	10%	3%	73%
Kasigluk	104	37	19%	14%	8%	59%
Nunapitchuk	118	55	25%	15%	9%	51%
Atmautluak	63	28	7%	14%	4%	75%
Napakiak	97	30	33%	7%	7%	53%
Napaskiak	103	39	21%	0%	15%	64%
Oscarville	15	9	33%	0%	11%	56%
Bethel	2,126	199	45%	10%	6%	39%
Kwethluk	166	64	22%	13%	13%	53%
Akiachak	157	60	17%	12%	3%	68%
Akiak	83	26	23%	15%	4%	58%
Tuluksak	93	38	16%	0%	21%	63%
Lower Kuskokwim	3,303	652	28%	10%	8%	54%
Lower Kalskag	75	23	13%	0%	4%	83%
Upper Kalskag	58	20	10%	5%	0%	85%
Aniak	191	51	33%	16%	6%	45%
Chuathbaluk	33	14	7%	0%	7%	86%
Middle Kuskokwim	357	108	21%	8%	5%	66%
Crooked Creek	37	–	–	–	–	–
Red Devil	15	4	0%	0%	0%	100%
Sleetmute	39	9	56%	11%	0%	33%
Stony River	15	3	33%	0%	0%	67%
Lime Village	14	–	–	–	–	–
McGrath	129	11	45%	18%	0%	36%
Takotna	23	–	–	–	–	–
Nikolai	35	21	48%	10%	0%	43%
Telida	2	–	–	–	–	–
Upper Kuskokwim	309	48	44%	10%	0%	46%
Kuskokwim River[a]	4,059	808	28%	10%	7%	55%
Quinhagak	165	57	21%	11%	7%	61%
Goodnews Bay	70	14	36%	0%	7%	57%
Platinum	20	4	25%	0%	25%	50%
S. Kuskokwim Bay	255	75	24%	8%	8%	60%
Survey total	4,314	883	28%	10%	7%	56%

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed. The percentage is estimated by dividing the total number of fish harvested

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 19.–Comments provided by survey participants regarding the meeting of subsistence needs for chum salmon.

						Reporting needs not met											Unknown
						Non-fishery related factors					Natural conditions						
	N	*n*	Needs met	No need	Total not met	Did not fish	Personal	Equipment	Expenses	Management	Run dynamics	River Conditions	Weather	Voluntary conservation	Other	Irrelevant	Unknown
Kongiganak	90	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
N. Kuskokwim Bay	90	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuntutuliak	90	61	24	8	29	2	7	–	–	–	2	–	5	–	–	–	13
Eek	88	53	26	16	11	2	3	1	–	–	–	–	–	–	–	–	5
Kasigluk	104	54	25	1	28	3	5	3	7	–	–	–	2	–	–	–	8
Nunapitchuk	118	77	31	7	39	2	13	2	2	1	2	–	1	–	1	1	14
Atmautluak	63	38	22	1	15	2	3	2	3	1	–	–	1	–	–	–	3
Napakiak	97	55	19	11	25	2	7	4	–	1	–	–	1	–	–	1	9
Napaskiak	103	64	31	5	28	4	3	2	–	2	–	–	2	1	–	–	14
Oscarville	15	13	6	4	3	–	–	1	–	–	–	–	1	–	–	–	1
Bethel	2,126	538	113	263	162	28	41	26	1	1	2	–	3	2	1	–	57
Kwethluk	166	98	34	12	52	3	17	8	5	1	–	–	1	–	–	–	17
Akiachak	157	100	47	14	39	–	9	2	2	1	5	–	2	–	–	1	17
Akiak	83	49	20	8	21	3	2	2	1	2	1	–	–	1	–	–	9
Tuluksak	93	63	28	7	28		7	3	2	2	3	–	1	–	–	–	10
Lower Kuskokwim	3,303	1,263	426	357	480	51	117	56	23	12	15	0	20	4	2	3	177
Lower Kalskag	75	47	23	13	11	2	1	1	–	–	–	–	–	–		–	7
Upper Kalskag	58	29	19	8	2	–	1	–	–	–	–	–	–	1		–	0
Aniak	191	173	29	106	38	3	13	1	2	2	2	–	–	2	–	–	13
Chuathbaluk	33	28	14	8	6	1	–	–	–	–	–	–	–	–		–	5
Middle Kuskokwim	357	277	85	135	57	6	15	2	2	2	2	0	0	3	0	0	25
Crooked Creek	37	0	–	–	0	–	–	–	–	–	–	–	–	–	–	–	0
Red Devil	15	11	–	–	11	–	–	–	–	–	–	–	–	–	–	–	11
Sleetmute	39	33	6	14	13	1	2	5	–	1	–	–	–	–	–	–	4
Stony River	15	11	3	6	2	–	–	–	–	–	–	1	–	–	–	–	1
Lime Village	14	0	–	–	0	–	–	–	–	–	–	–	–	–	–	–	0
McGrath	129	64	4	46	14	–	5	–	–	–	–	1	–	1	–	–	7
Takotna	23	0	–	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Nikolai	35	32	10	9	13	–	3	1	2	–	1	–	–	–	–	–	6
Telida	2	–	–	–	0	–	–	–	–	–	–	–	–	–	–	–	–

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						Reporting needs not met										Unknown	
						Non-fishery related factors				Natural conditions							
	N	*n*	Needs met	No need	Total not met	Did not fish	Personal	Equipment	Expenses	Management	Run dynamics	River conditions	Weather	Voluntary conservation	Other	Irrelevant	Unknown
Upper Kuskokwim	309	151	23	75	53	1	10	6	2	1	1	2	0	1	0	0	29
Kuskokwim River[a]	4,059	1,691	534	567	590	58	142	64	27	15	18	2	20	8	2	3	231
Quinhagak	165	86	39	21	26	–	10	5	–	–	1	–	1	–	–	–	9
Goodnews Bay	70	36	11	14	11	–	2	–	–	1	3	–	–	–	–	–	5
Platinum	20	19	2	9	8	–	–	1	–	–	–	–	–	–	–	–	7
S. Kuskokwim Bay	255	141	52	44	45	0	12	6	0	1	4	0	1	0	0	0	21
Survey total	4,314	1,832	586	611	635	58	154	70	27	16	22	2	21	8	2	3	252

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed.

Table 20.–Percentage of estimated sockeye salmon subsistence needs met for households that subsistence fished, Kuskokwim Area, 2013.

Community	*N*	*n*	25% needs met	50% needs met	75% needs met	100% needs met
Kongiganak	90	–	–	–	–	–
N. Kuskokwim Bay	90	–	–	–	–	–
Tuntutuliak	90	38	26%	8%	5%	61%
Eek	88	31	32%	0%	3%	65%
Kasigluk	104	37	32%	14%	5%	49%
Nunapitchuk	118	59	19%	15%	10%	56%
Atmautluak	63	31	23%	16%	13%	48%
Napakiak	97	38	32%	8%	5%	55%
Napaskiak	103	41	20%	22%	7%	51%
Oscarville	15	11	45%	0%	27%	27%
Bethel	2,126	325	48%	13%	9%	30%
Kwethluk	166	66	21%	20%	9%	50%
Akiachak	157	63	22%	14%	8%	56%
Akiak	83	27	15%	15%	7%	63%
Tuluksak	93	36	22%	25%	11%	42%
Lower Kuskokwim	3,303	803	34%	14%	9%	44%
Lower Kalskag	75	25	12%	12%	8%	68%
Upper Kalskag	58	26	15%	12%	8%	65%
Aniak	191	105	52%	12%	6%	30%
Chuathbaluk	33	19	26%	11%	16%	47%
Middle Kuskokwim	357	175	38%	12%	7%	42%
Crooked Creek	37	–	–	–	–	–
Red Devil	15	5	20%	0%	0%	80%
Sleetmute	39	17	65%	6%	6%	24%
Stony River	15	3	0%	0%	33%	67%
Lime Village	14	–	–	–	–	–
McGrath	129	28	68%	7%	11%	14%
Takotna	23	–	–	–	–	–
Nikolai	35	2	100%	0%	0%	0%
Telida	2	–	–	–	–	–
Upper Kuskokwim	309	55	60%	5%	9%	25%
Kuskokwim River[a]	4,059	1,033	36%	13%	9%	42%
Quinhagak	165	76	34%	13%	5%	47%
Goodnews Bay	70	27	30%	11%	7%	52%
Platinum	20	13	54%	0%	8%	38%
S. Kuskokwim Bay	255	116	35%	11%	6%	47%
Survey total	4,314	1,149	36%	13%	8%	43%

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed. The percentage is estimated by dividing the total number of fish harvested by the total responders said were needed.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 21.–Comments provided by survey participants regarding the meeting of subsistence needs for sockeye salmon.

						Reporting needs not met												Unknown
						Non-fishery related factors					Natural conditions							
	N	*n*	Needs met	No need	Total not met	Did not fish	Personal	Equipment	Expenses	Management	Run dynamics	River conditions	Weather	Voluntary conservation	Human	Other	Irrelevant	Unknown
Kongiganak	90	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
N. Kuskokwim Bay	90	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuntutuliak	90	61	71	27	30	2	5	2	–	–	4	–	1	–	–	–	–	16
Eek	88	53	54	22	19	3	7	2	–	–	1	–		–	–	–	–	6
Kasigluk	104	54	72	21	31	5	5	3	4	–	2	–	1	–	–	–	–	11
Nunapitchuk	118	77	101	34	39	2	15	3	3	1	3	–	1	–	–	–	–	11
Atmautluak	63	38	53	16	21	3	4	3	4	1	1	–		–	–	–	–	5
Napakiak	97	55	70	24	25	4	7	7	–	1	–	–	1	–	–	–	1	4
Napaskiak	103	64	84	26	35	4	6	3	–	5	3	–	2	–	–	–	–	12
Oscarville	15	13	15	4	7	1	–	–	–	–	2	–	1	–	–	–	–	3
Bethel	2,126	538	596	125	266	44	93	48	5	2	4	–	3	4	1	1	–	61
Kwethluk	166	98	124	34	53	3	18	10	3	2	1	–		–	–	–	–	16
Akiachak	157	100	114	40	46	1	11	3	3	2	5	–	2	–	1	–	–	18
Akiak	83	49	57	22	22	1	1	2	–	4	4	–		1	–	–	–	9
Tuluksak	93	63	81	21	36	–	9	5	3	2	4	–	1	–	–	–	–	12
Lower Kuskokwim	3,303	1,263	1,492	416	630	73	181	91	25	20	34	0	13	5	2	1	1	184
Lower Kalskag	75	47	43	21	15	2	1	1	–	–	1	–	–	–	2	–	–	8
Upper Kalskag	58	29	33	21	6	–	3	1	–	–	1	–	–	1	–	–	–	0
Aniak	191	173	187	32	84	14	33	10	1	2	8	–	–	2	1	–	–	13
Chuathbaluk	33	28	33	10	14	2	2	–	–	–	5	–	–	–	–	–	–	5
Middle Kuskokwim	357	277	296	84	119	18	39	12	1	2	15	0	0	3	3	0	0	27
Crooked Creek	37	0	0		0	–	–	–	–	–	–	–	–	–	–	–	–	0
Red Devil	15	11	12	4	5	1	1	–	–	–	1	–	–	–	–	–	–	2
Sleetmute	39	33	45	8	20	4	5	8	–	–	–	–	–	–	–	–	–	3
Stony River	15	11	9	4	3	–	–	–	–	–	–	2	–	–	–	–	–	1
Lime Village	14	0	0	–	0	–	–	–	–	–	–	–	–	–	–	–	–	0
McGrath	129	64	55	4	27	4	12	3	1	–	3	–	–	–	–	–	1	3
Takotna	23	0	0	–	0	–	–	–	–	–	–	–	–	–	–	–	–	–
Nikolai	35	32	14	–	12	–	–	1	–	–	1	–	–	–	–	–	–	10
Telida	2	–	–	–	0	–	–	–	–	–	–	–	–	–	–	–	–	–

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						Reporting needs not met												Unknown
						Non-fishery related factors					Natural conditions							
	N	*n*	Needs met	No need	Total not met	Did not fish	Personal	Equipment	Expenses	Management	Run dynamics	River conditions	Weather	Voluntary conservation	Human	Other	Irrelevant	Unknown
Upper Kuskokwim	309	151	135	20	67	9	18	12	1	0	5	2	0	0	0	0	1	19
Kuskokwim River[a]	4,059	1,691	1,923	520	816	100	238	115	27	22	54	2	13	8	5	1	2	230
Quinhagak	165	86	116	38	43	5	19	11	–	–	–	–	–	–	–	–	–	8
Goodnews Bay	70	36	43	14	18	1	7	–	–	–	1	–	1	1	–	–	–	7
Platinum	20	19	27	4	13	2	4	2	–	–	1	–	1	–	–	–	–	3
S. Kuskokwim Bay	255	141	186	56	74	8	30	13	0	0	2	0	2	1	0	0	0	18
Survey total	4,314	1,832	2,109	576	890	108	268	128	27	22	56	2	15	9	5	1	2	248

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed.

Table 22.–Percentage of estimated coho salmon subsistence needs met for households that subsistence fished, Kuskokwim Area, 2013.

Community	*N*	*n*	25% needs met	50% needs met	75% needs met	100% needs met
Kongiganak	90	–	–	–	–	–
N. Kuskokwim Bay	90	–	–	–	–	–
Tuntutuliak	90	32	34%	6%	3%	56%
Eek	88	35	31%	3%	11%	54%
Kasigluk	104	33	64%	0%	3%	33%
Nunapitchuk	118	46	76%	2%	2%	20%
Atmautluak	63	21	67%	0%	0%	33%
Napakiak	97	32	56%	6%	6%	31%
Napaskiak	103	33	33%	6%	3%	58%
Oscarville	15	9	56%	0%	22%	22%
Bethel	2,126	281	58%	10%	6%	26%
Kwethluk	166	60	37%	15%	7%	42%
Akiachak	157	55	47%	9%	5%	38%
Akiak	83	31	45%	13%	6%	35%
Tuluksak	93	31	48%	10%	0%	42%
Lower Kuskokwim	3,303	699	52%	8%	5%	34%
Lower Kalskag	75	25	28%	8%	0%	64%
Upper Kalskag	58	18	33%	6%	0%	61%
Aniak	191	108	31%	23%	8%	38%
Chuathbaluk	33	20	40%	0%	0%	60%
Middle Kuskokwim	357	171	32%	16%	5%	47%
Crooked Creek	37	–	–	–	–	–
Red Devil	15	–	–	–	–	–
Sleetmute	39	14	50%	7%	0%	43%
Stony River	15	4	0%	25%	25%	50%
Lime Village	14	–	–	–	–	–
McGrath	129	41	63%	12%	7%	17%
Takotna	23	–	–	–	–	–
Nikolai	35	22	68%	5%	0%	27%
Telida	2	–	–	–	–	–
Upper Kuskokwim	309	87	57%	9%	5%	29%
Kuskokwim River[a]	4,059	957	49%	10%	5%	36%
Quinhagak	165	76	43%	17%	4%	36%
Goodnews Bay	70	25	48%	12%	4%	36%
Platinum	20	14	64%	7%	21%	7%
S. Kuskokwim Bay	255	115	47%	15%	6%	32%
Survey total	4,314	1,072	49%	10%	5%	35%

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed. The percentage is estimated by dividing the total number of fish

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 23.–Comments provided by survey participants regarding the meeting of subsistence needs for coho salmon.

						Reporting needs not met										Unknown	
							Non-fishery related factors				Natural conditions						
	N	*n*	Needs met	No need	Total not met	Did not fish	Personal	Equipment	Expenses	Management	Run dynamics	River conditions	Weather	Voluntary conservation	Other	Irrelevant	Unknown
Kongiganak	90	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
N. Kuskokwim Bay	90	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tuntutuliak	90	61	19	13	29	3	7	1	–	–	1	–	3	–	–	–	14
Eek	88	53	22	8	23	6	7	1	–	–	1	–	1	–	–	–	7
Kasigluk	104	54	12	10	32	11	4	3	3	–	–	–	1	–	–	–	10
Nunapitchuk	118	77	9	21	47	12	12	2	5	–	3	–	2	–	–	–	11
Atmautluak	63	38	8	12	18	4	2	3	4	–	–	–	–	–	–	–	5
Napakiak	97	55	14	12	29	4	10	4	–	–	–	–	4	–	–	1	6
Napaskiak	103	64	24	12	28	4	4	2	–	–	2	–	1	–	–	–	15
Oscarville	15	13	2	4	7	3	1	1	–	–	–	–	–	–	–	–	2
Bethel	2,126	538	110	176	252	39	82	43	2	2	4	–	10	2	3	–	65
Kwethluk	166	98	28	20	50	5	19	6	2	–	1	–	–	–	–	–	17
Akiachak	157	100	29	22	49	7	10	3	2	2	2	–	4	–	–	–	19
Akiak	83	49	17	5	27	6	3	2	–	1	1	–	–	–	–	2	12
Tuluksak	93	63	19	14	30	3	5	5	2	1	2	–	1	–	–	–	11
Lower Kuskokwim	3,303	1,263	313	329	621	107	166	76	20	6	17	0	27	2	3	3	194
Lower Kalskag	75	47	18	13	16	4	1	1	–	–	1	–	–	–	–	–	9
Upper Kalskag	58	29	–	–	29	–	–	–	–	–	–	–	–	–	–	–	29
Aniak	191	173	42	52	79	6	33	11	3	2	7	–	2	–	–	–	15
Chuathbaluk	33	28	11	5	12	3	3	–	–	–	2	–	–	–	–	–	4
Middle Kuskokwim	357	277	71	70	136	13	37	12	3	2	10	0	2	0	0	0	57
Crooked Creek	37	0	–	–	0	–	–	–	–	–	–	–	–	–	–	–	0
Red Devil	15	11	4	2	5	1	1	–	–	–	1	–	–	–	–	–	2
Sleetmute	39	33	7	10	16	3	4	6	–	–	–	–	–	–	–	–	3
Stony River	15	11	2	5	4	2		–	–	–	–	1	–	–	–	–	1
Lime Village	14	0	–	–	0	–	–	–	–	–	–	–	–	–	–	–	0
McGrath	129	64	6	18	40	9	16	3	1	–	3	1	–	–	–	–	7
Takotna	23	0	–	–	0	–	–	–	–	–	–	–	–	–	–	–	–
Nikolai	35	32	5	9	18	3	8	2	2	–	1	–	–	–	–	–	2
Telida	2	–	–	–	0	–	–	–	–	–	–	–	–	–	–	–	–

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						Reporting needs not met										Unknown	
						Non-fishery related factors				Natural conditions							
	N	*n*	Needs met	No need	Total not met	Did not fish	Personal	Equipment	Expenses	Management	Run dynamics	River conditions	Weather	Voluntary conservation	Other	Irrelevant	Unknown
Upper Kuskokwim	309	151	14	8	8	3	1	11	3	0	5	2	0	0	0	0	104
Kuskokwim River[a]	4,059	1,691	398	407	765	123	204	99	26	8	32	2	29	2	3	3	355
Quinhagak	165	86	31	3	52	5	22	9	–	–	1	1	2	1	–	–	11
Goodnews Bay	70	36	9	6	21	1	8	–	–	–	1	–	1	3	–	–	7
Platinum	20	19	3	1	15	3	3	2	–	–	3	–	1	–	–	–	3
S. Kuskokwim Bay	255	141	43	10	88	9	33	11	0	0	5	1	4	4	0	0	21
Survey total	4,314	1,832	441	417	853	132	237	110	26	8	37	3	33	6	3	3	376

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed.

Table 24.–Number of non-salmon fish reported as harvested (unexpanded), including those caught in the winter prior to the survey season, Kuskokwim Area, 2013.

Community	*N*	*n*	Humpback white fish	Broad whitefish	Cisco	Sheefish	Burbot	Blackfish	Smelt	Pike	Herring	Grayling	Char	Rainbow
Kongiganak	90	0	–	–	–	–	–	–	–	–	–	–	–	–
N. Kuskokwim Bay	92	0	–	–	–	–	–	–	–	–	–	–	–	–
Tuntutuliak	90	52	697	1,100	190	66	623	8,015	1,425	907	21	5	0	40
Eek	88	50	163	160	423	11	410	6,310	1,525	505	230	6	218	21
Kasigluk	104	50	1,124	1,533	80	30	86	17,080	1,750	1,544	13	0	0	0
Nunapitchuk	118	72	1,524	1,717	55	76	361	56,310	4,500	2,277	0	0	15	1
Atmautluak	63	37	546	1,846	200	16	471	8,135	2,800	1,554	0	0	0	1
Napakiak	97	55	614	386	1	74	290	3,875	3,200	3,886	0	0	14	31
Napaskiak	103	58	959	102	58	81	642	1,845	8,868	1,565	39	0	0	0
Oscarville	15	13	365	141	65	20	164	1,162	1,425	381	0	0	0	0
Bethel	2,126	531	745	824	594	265	829	11,221	31,219	2,057	3,722	69	22	151
Kwethluk	166	93	1,196	442	61	53	617	8,500	6,300	1,367	65	58	4,118	46
Akiachak	157	92	2,173	1,821	798	271	1,603	31,145	17,850	1,514	390	32	59	15
Akiak	83	45	175	351	290	86	3,291	2,225	6,740	489	0	15	41	25
Tuluksak	93	59	491	379	126	129	349	17,387	7,950	696	0	2	6	3
Lower Kuskokwim	3,303	1,207	10,772	10,802	2,941	1,178	9,736	173,210	95,552	18,742	4,480	187	4,493	334
Lower Kalskag	75	45	203	237	41	92	288	3,010	1,275	147	0	0	0	3
Upper Kalskag	58	28	179	406	54	120	185	2,455	2,950	222	0	2	2	14
Aniak	191	170	682	589	3,684	273	70	6	650	287	0	172	118	90
Chuathbaluk	33	25	92	48	84	68	2	0	175	34	0	115	2	5
Middle Kuskokwim	357	268	1,156	1,280	3,863	553	545	5,471	5,050	690	0	289	122	112
Crooked Creek	37	0	–	–	–	–	–	–	–	–	–	–	–	–
Red Devil	15	9	258	93	0	26	1	0	0	12	0	13	0	0
Sleetmute	39	29	7	95	0	30	3	0	0	4	0	163	0	0
Stony River	15	10	60	20	0	45	0	0	0	4	0	10	0	0
Lime Village	14	0	–	–	–	–	–	–	–	–	–	–	–	–
McGrath	129	63	110	146	75	210	20	30	0	213	0	629	30	0
Takotna	23	0	–	–	–	–	–	–	–	–	–	–	–	–
Nikolai	35	32	272	127	488	113	5	0	0	166	0	43	8	0
Telida	2	0	–	–	–	–	–	–	–	–	–	–	–	–

-continued-

Table 24.–Page 2 of 2.

Community	*N*	*n*	Humpback white fish	Broad whitefish	Cisco	Sheefish	Burbot	Blackfish	Smelt	Pike	Herring	Grayling	Char	Rainbow
Upper Kuskokwim	309	143	707	481	563	424	29	30	0	399	0	858	38	0
Kuskokwim River[a]	4,061	1,618	12,635	12,563	7,367	2,155	10,310	178,711	100,602	19,831	4,480	1,334	4,653	446
Quinhagak	165	85	200	27	376	2	38	9,705	10,268	136	2,188	80	2,786	75
Goodnews Bay	70	35	0	0	239	0	0	2	149	0	304	30	1,183	11
Platinum	20	17	0	1	118	1	0	15	85	92	163	23	1,376	1
S. Kuskokwim Bay	255	137	200	28	733	3	38	9,722	10,502	228	2,655	133	5,345	87
Survey total	4,316	1,755	12,835	12,591	8,100	2,158	10,348	188,433	111,104	20,059	7,135	1,467	9,998	533

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Table 25.–Estimated (expanded) harvest of humpback and broad whitefish, including those caught in previous winter, Kuskokwim Area, 2013.

			Humpback whitefish		Broad whitefish	
Community	*N*	*n*	Total	CI (95%)	Total	CI (95%)
Kongiganak	90	0	–	–	–	–
N. Kuskokwim Bay	90	0	–	–	–	–
Tuntutuliak	90	47	1,239	877	1,607	403
Eek	88	48	308	168	251	93
Kasigluk	104	44	2,827	1,130	3,488	1,248
Nunapitchuk	118	66	2,814	1,592	2,556	600
Atmautluak	63	36	800	254	2,960	1,537
Napakiak	97	49	971	404	655	347
Napaskiak	103	56	1,833	1,083	230	146
Oscarville	15	13	469	429	184	84
Bethel	2,126	524	3,023	869	3,343	1,063
Kwethluk	166	86	1,811	593	773	277
Akiachak	157	91	2,942	999	2,472	803
Akiak	83	39	453	380	849	651
Tuluksak	93	54	793	260	567	207
Lower Kuskokwim	3,303	1,153	20,280	2,860	19,934	2,572
Lower Kalskag	75	42	321	146	408	158
Upper Kalskag	58	25	404	154	882	408
Aniak	191	169	771	239	666	131
Chuathbaluk	33	24	125	82	66	47
Middle Kuskokwim	357	260	1,621	324	2,022	443
Crooked Creek	37	0	–	–	–	–
Red Devil	15	9	433	596	179	251
Sleetmute	39	26	7	0	98	3
Stony River	15	10	90	56	30	39
Lime Village	14	0	–	–	–	–
McGrath	129	62	249	158	339	299
Takotna	23	0	–	–	–	–
Nikolai	35	32	297	105	141	63
Telida	2	0	–	–	–	–
Upper Kuskokwim	309	139	1,076	556	787	372
Kuskokwim River[a]	4,059	1,552	22,977	2,930	22,744	2,635
Quinhagak	165	85	262	252	59	80
Goodnews Bay	70	35	0	0	0	0
Platinum	20	17	0	0	1	1
S. Kuskokwim Bay	255	137	262	251	60	80
Survey total	4,314	1,689	23,239	2,940	22,804	2,636

Note: Dashes indicate data are unavailable. Headings defined as: *N* = the total number of households, *n* = the number of households surveyed, CI (95%) is 95% confidence interval.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Figure 1.–Kuskokwim Management Area showing communities.

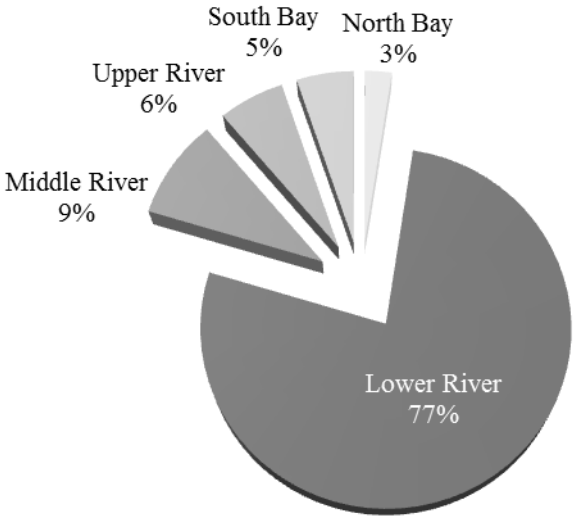

Figure 2.–The percentage of the average subsistence salmon harvest in the Kuskokwim River by subarea, 2003–2012.

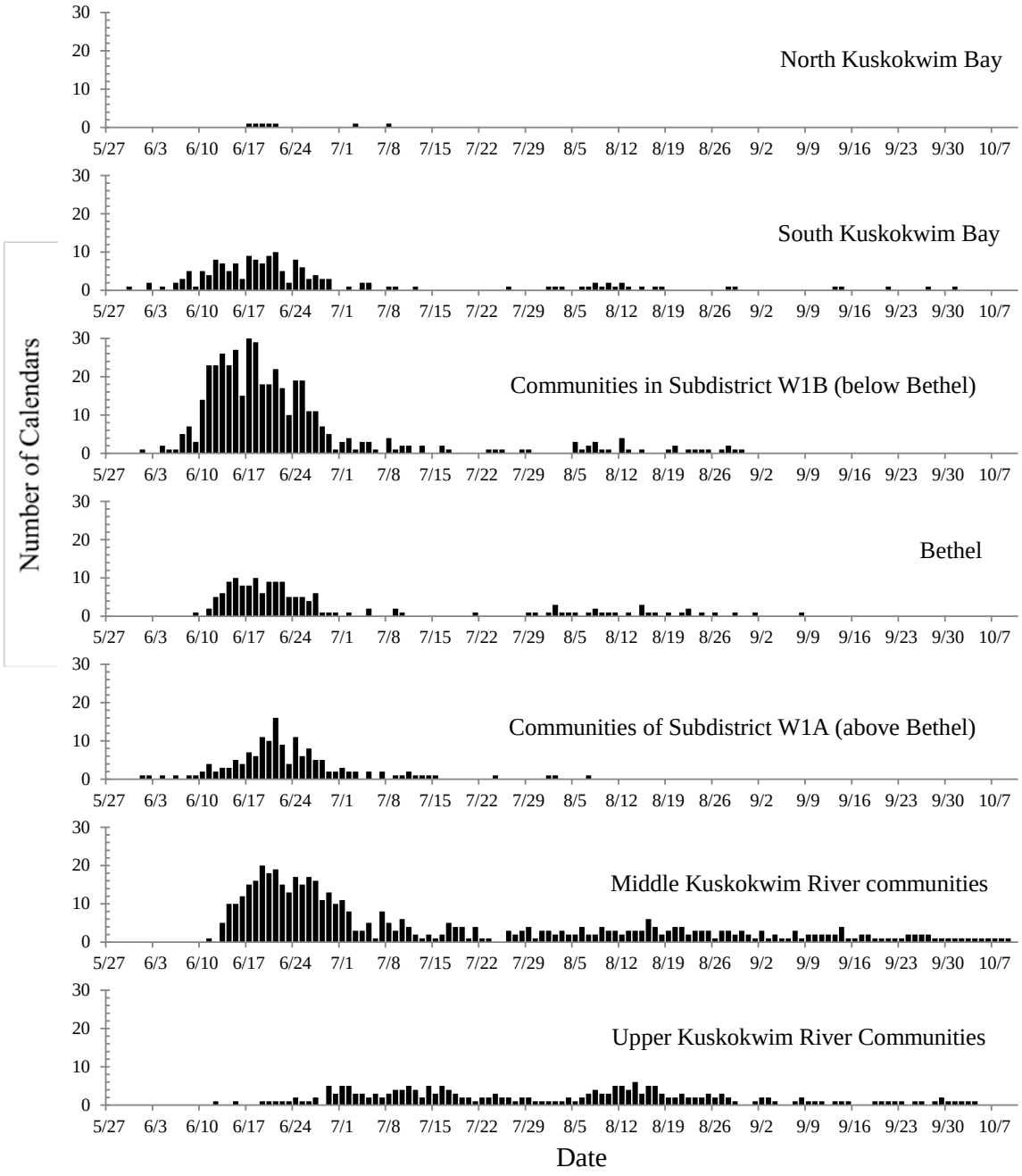

Figure 3.–Number of households reporting fishing effort by day and by subarea, 2013.

Note: Salmon fishing effort by day as recorded on harvest calendars in each of the 7 subareas within the Kuskokwim Area:
North Kuskokwim Bay (Kongiganak);
South Kuskokwim Bay (Quinhagak, Goodnews Bay, and Platinum); Communities of commercial fishing subdistrict W1B (Eek, Tuntatuliak, Atmuatluk, Kasigluk, Nunapitchuk, Napaskiak, Napakiak, Oscarville);
Bethel; Communities of commercial fishing sub district W1A (Kwethluk, Akiak, Akiachak, Tuluksak);
Middle Kuskokwim River Communities (Lower Kalskag, Upper Kalskag, Aniak, Chuathbaluk); and
Upper Kuskokwim River Communities (Crooked Creek, Red Devil, Sleetmute, Lime Village, McGrath, Nikolai).

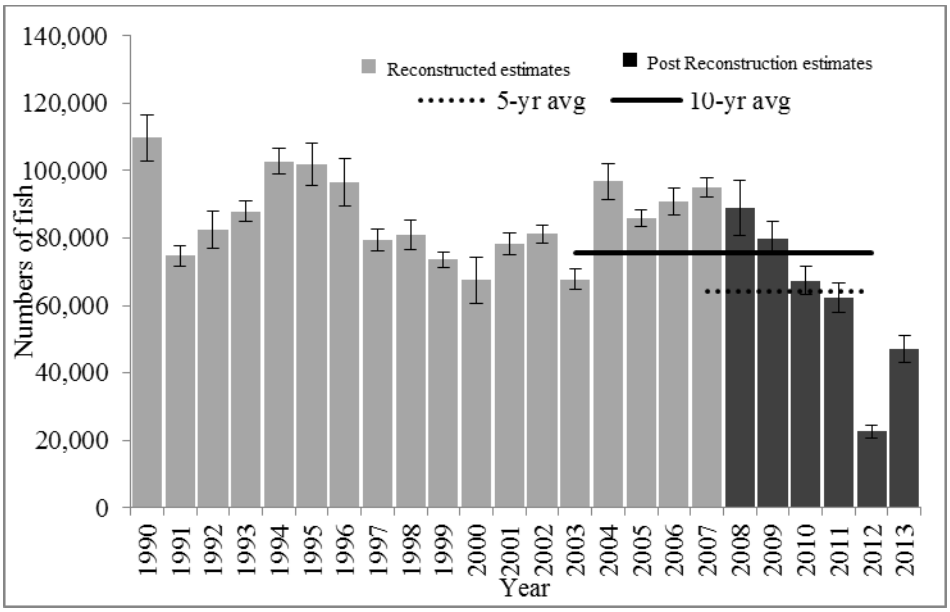

Figure 4.–Historical subsistence harvest estimates of Chinook salmon in the Kuskokwim River.

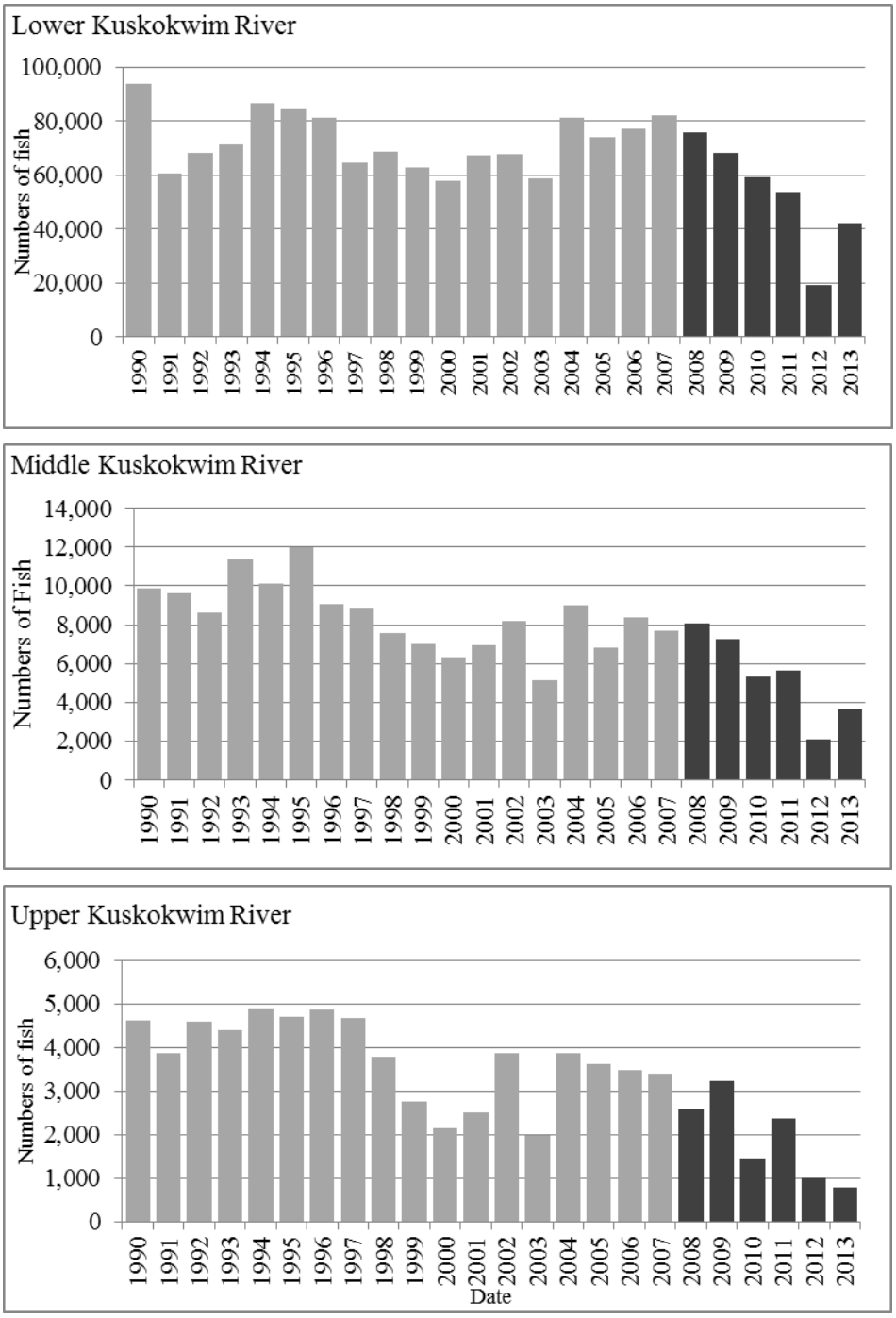

Figure 5.–Historical subsistence harvest estimates of Chinook salmon in the Kuskokwim River by subarea.

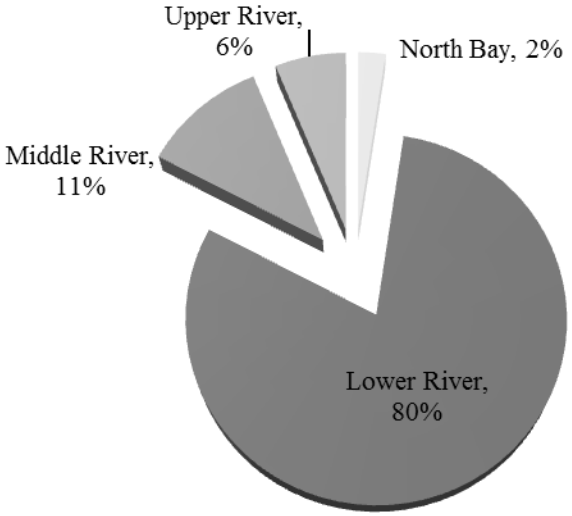

Figure 6.–Percentage of total 2013 salmon harvest (all species) from 4 subareas of the Kuskokwim River.

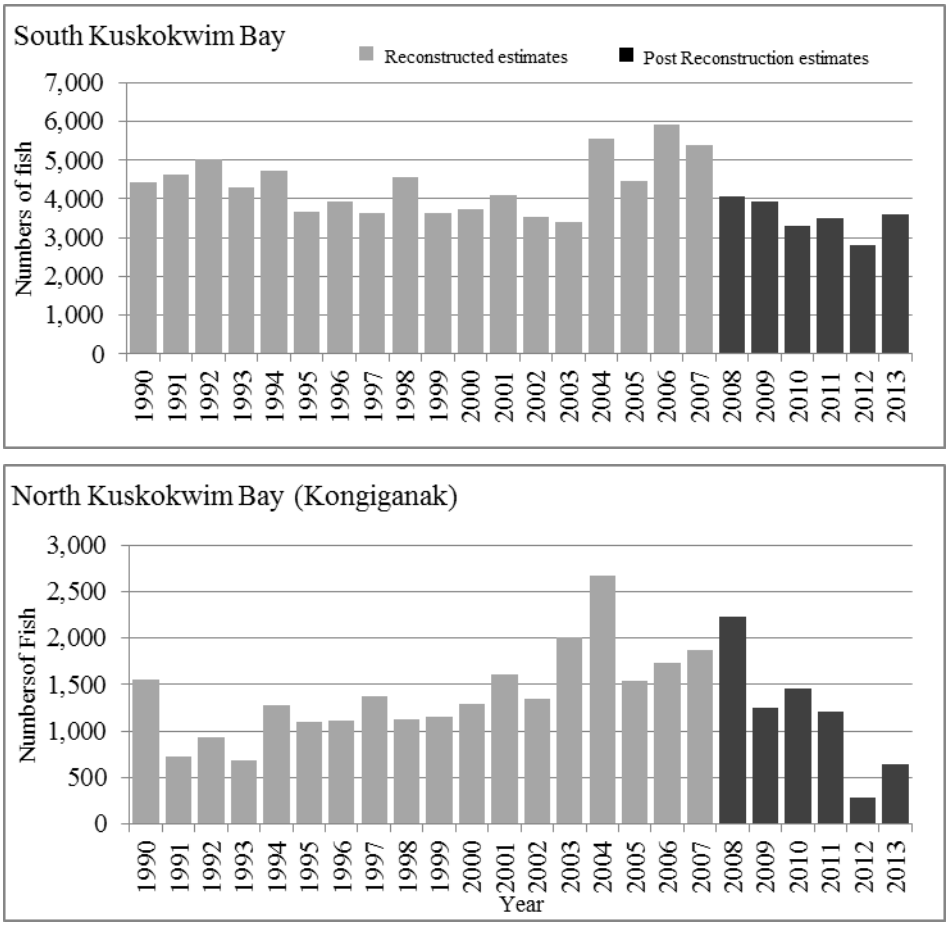

Figure 7.–Historical subsistence harvest estimates of Chinook salmon in the Kuskokwim Bay by subarea.

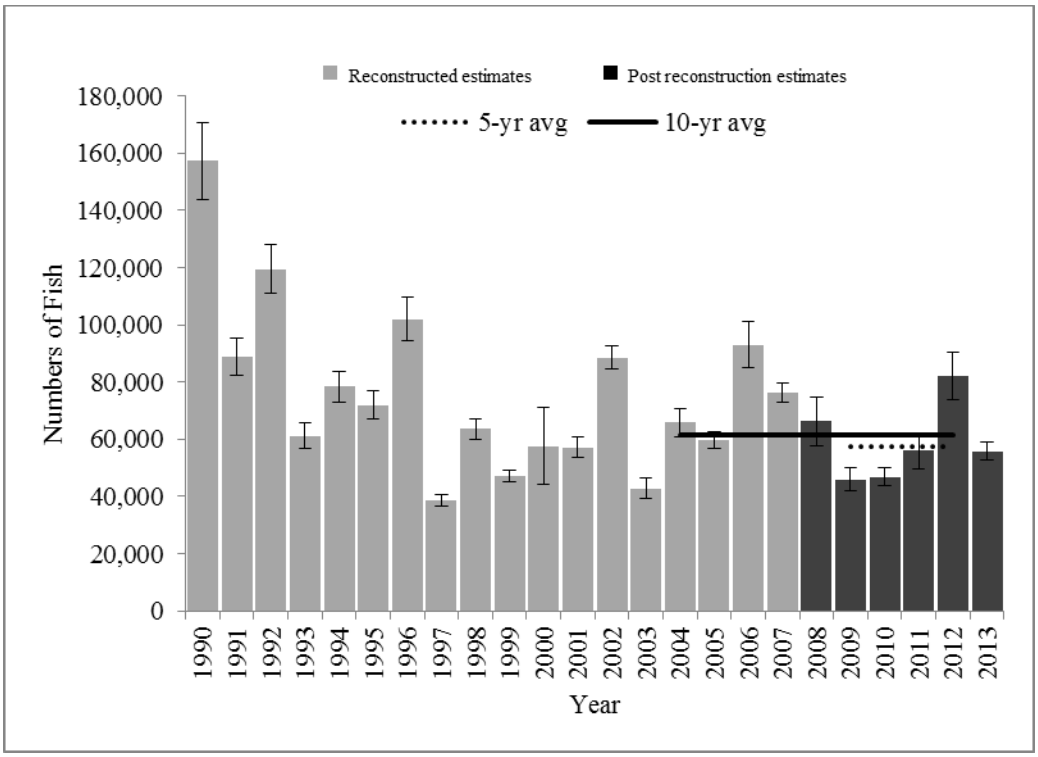

Figure 8.–Historical subsistence harvest estimates of chum salmon in the Kuskokwim Area (Kuskokwim River and Bay).

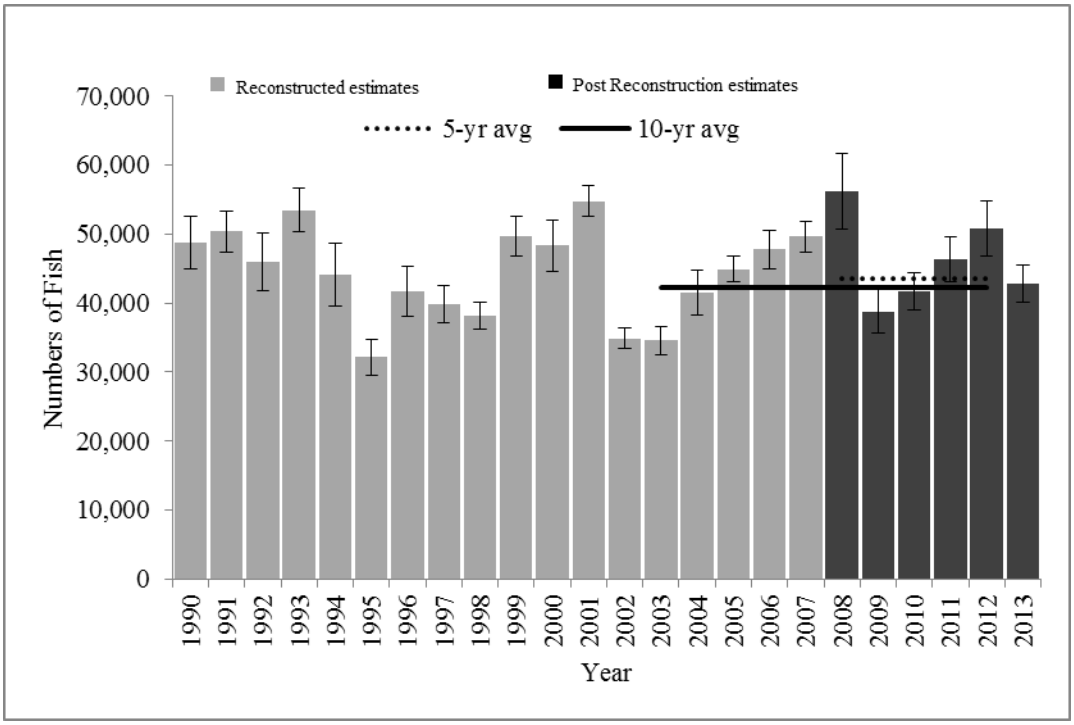

Figure 9.–Historical subsistence harvest estimates of sockeye salmon in the Kuskokwim Area.

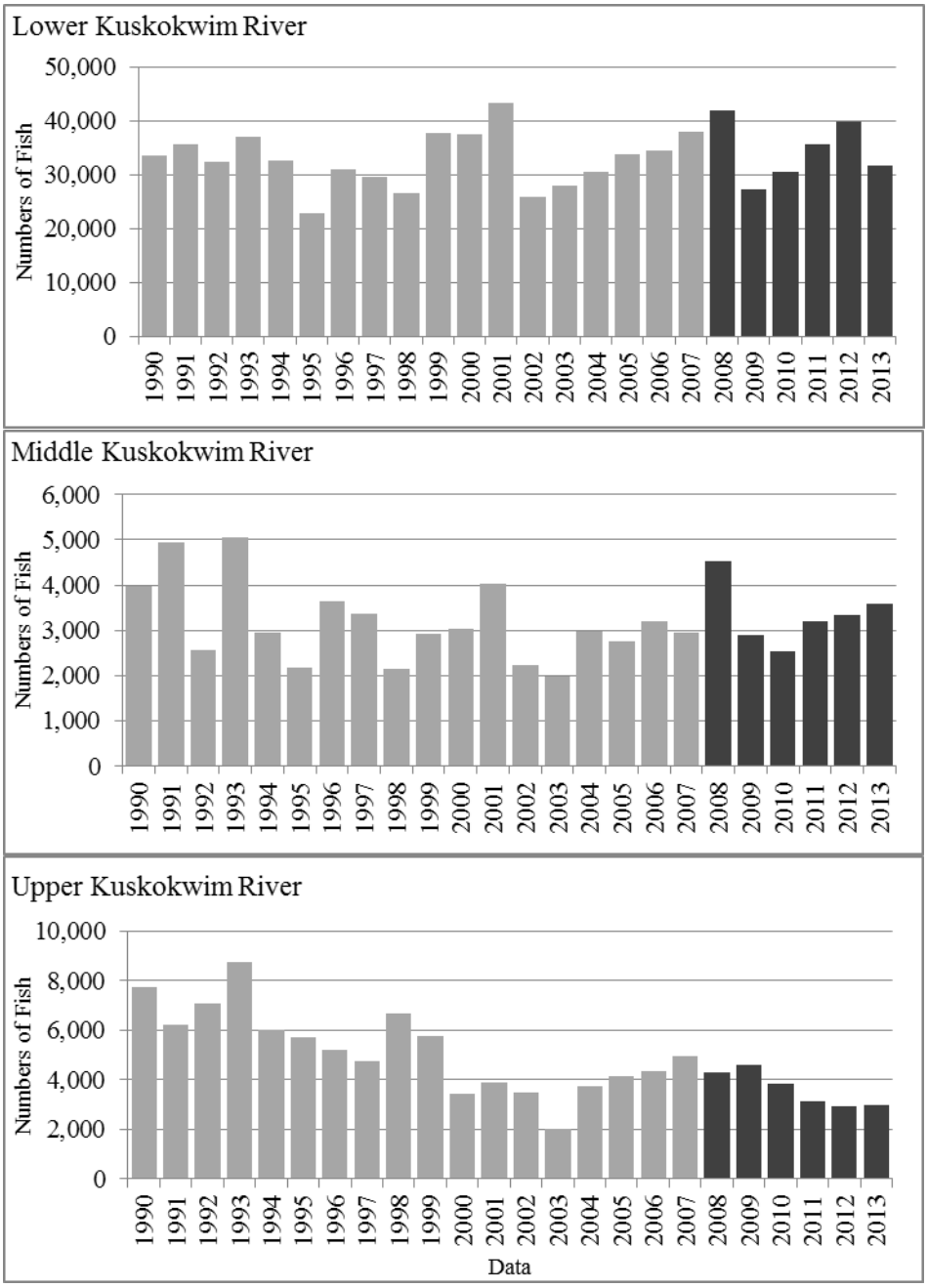

Figure 10.–Historical subsistence harvest estimates of sockeye salmon in the Kuskokwim River by subarea.

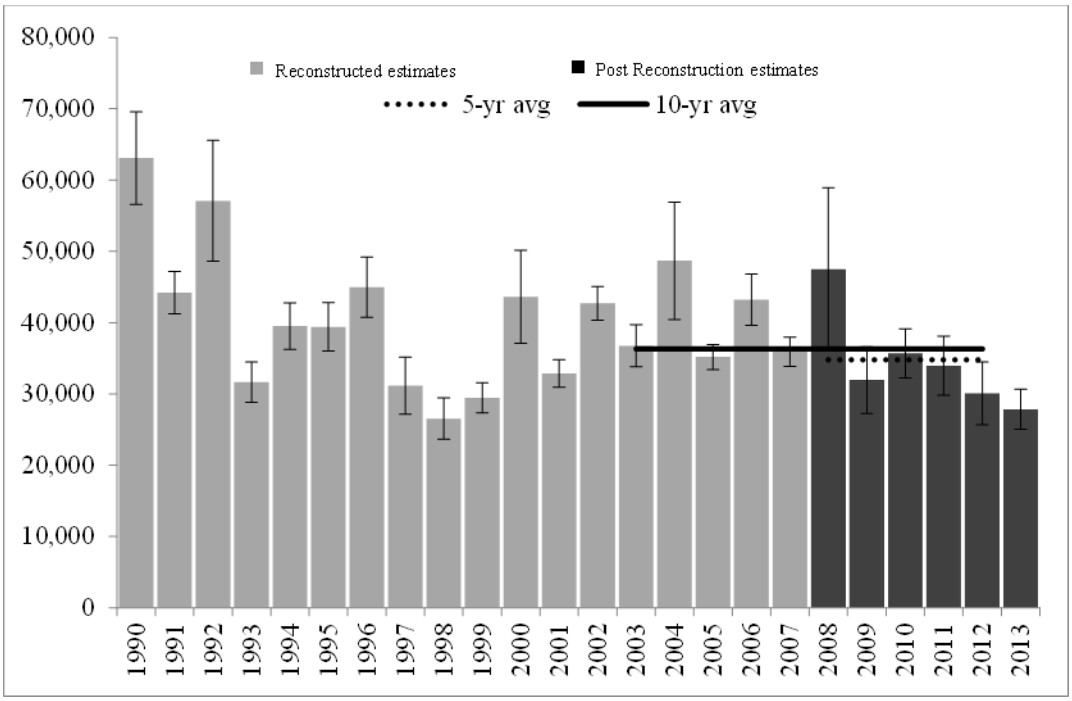

Figure 11.–Historical subsistence harvest estimates of coho salmon in the Kuskokwim Area.

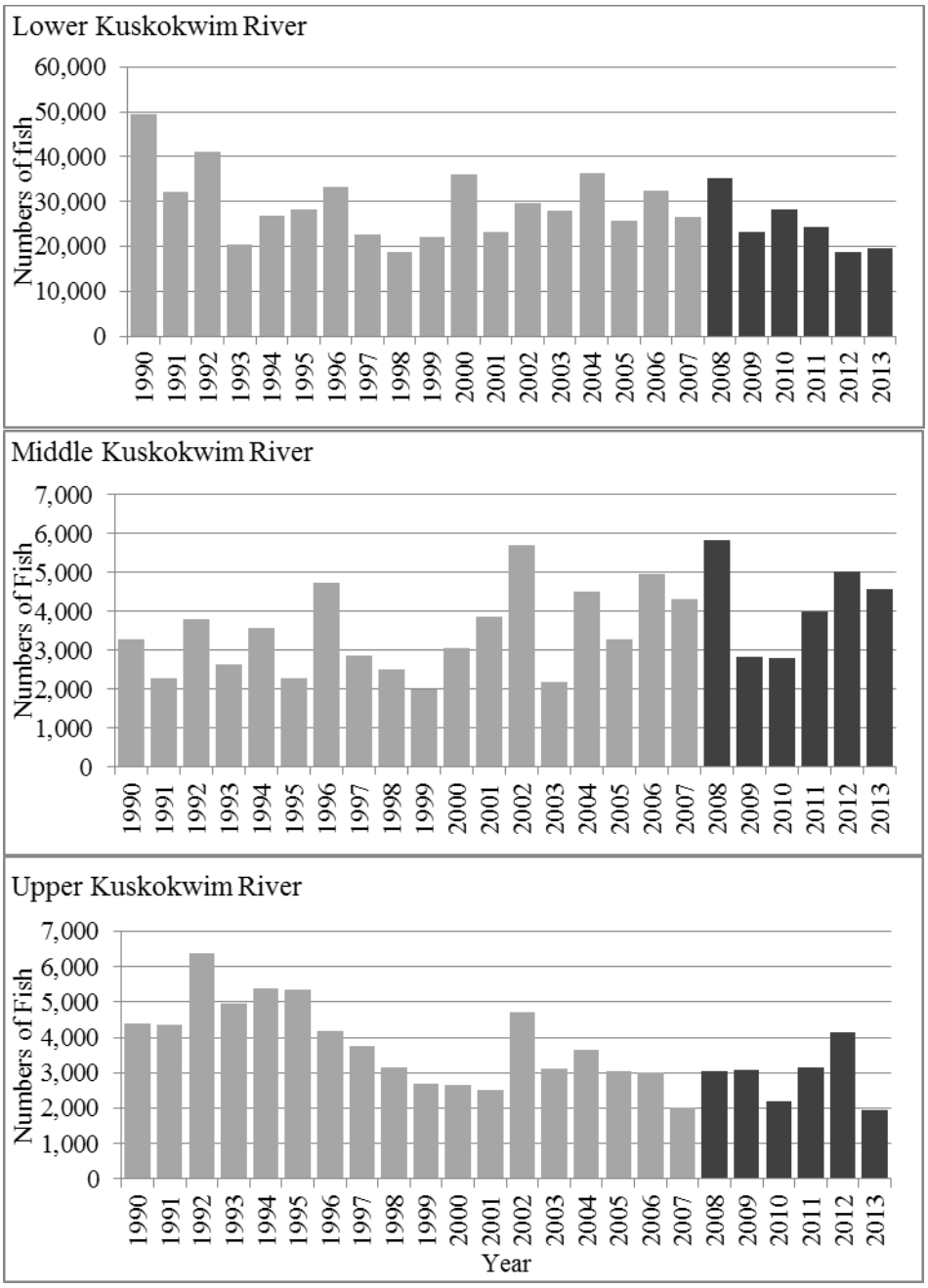

Figure 12.–Historical subsistence harvest estimates of coho salmon in the Kuskokwim River by subarea.

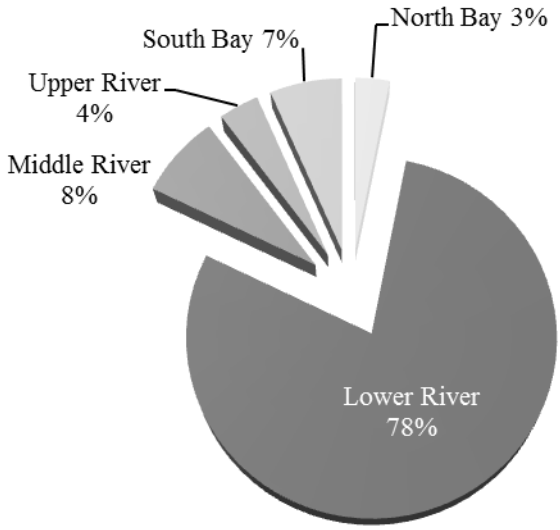

Figure 13.–Percentage of the surveyed portion of Kuskokwim Area population residing in each subarea.

APPENDIX A: HISTORICAL SALMON HARVEST ESTIMATES 2003–2013

Appendix A1.–Estimated number of Chinook salmon harvested in the Kuskokwim area, 2003–2013.

Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr Avg	10-yr Avg
Kongiganak	2,003	2,663	1,536	**1,729**	1,865	2,233	1,243	1,456	1,208	**287**	**641**	1,285	1,622
North Kuskokwim Bay	2,003	2,663	1,536	1,729	1,865	2,233	1,243	1,456	1,208	287	641	1,285	1,622
Tuntutuliak	2,657	3,912	4,545	4,469	**4,614**	4,266	3,067	3,261	3,032	1,123	2,448	2,950	3,495
Eek	2,075	2,954	**3,133**	**2,501**	**2,512**	2,966	1,982	1,761	1,378	1,004	1,188	1,818	2,227
Kasigluk	4,711	**7,859**	**5,242**	**4,905**	**5,167**	2,471	2,464	3,014	2,823	552	2,919	2,265	3,921
Nunapitchuk	3,179	4,921	4,103	4,121	**4,661**	4,234	3,468	2,548	3,559	845	2,563	2,931	3,564
Atmautluak	547	2,153	**1,927**	1,758	**1,890**	1,298	1,567	1,088	1,236	234	1,592	1,085	1,370
Napakiak	2,438	2,839	3,060	5,125	3,245	1,903	2,387	1,674	1,963	457	1,588	1,677	2,509
Napaskiak	3,390	4,058	4,485	5,877	6,392	4,555	5,372	4,333	3,360	1,108	2,939	3,746	4,293
Oscarville	1,153	1,325	1,069	1,052	1,360	1,351	754	618	694	51	585	694	943
Bethel	24,584	29,443	28,293	27,805	30,422	27,800	26,170	26,157	25,093	7,321	17,246	22,508	25,309
Kwethluk	4,206	7,157	6,089	7,258	6,466	8,451	7,130	4,440	2,467	1,709	3,192	4,839	5,537
Akiachak	2,493	7,131	5,411	5,561	7,621	9,719	7,361	4,470	3,852	2,862	3,585	5,653	5,648
Akiak	3,905	3,775	3,860	4,423	4,297	4,090	3,247	3,625	2,455	**1,218**	1,449	2,927	3,489
Tuluksak	3,286	3,766	2,655	**2,372**	3,266	2,937	3,212	2,057	1,230	651	732	2,017	2,543
Lower Kuskokwim	58,624	81,293	73,872	77,228	81,914	76,040	68,181	59,046	53,142	19,135	42,026	55,109	64,847
Lower Kalskag	1,556	1,991	1,417	3,494	1,937	1,748	2,525	1,030	1,260	459	744	1,404	1,742
Upper Kalskag	1,328	2,498	2,533	1,569	1,383	2,435	1,696	1,496	1,772	562	1,317	1,592	1,727
Aniak	1,837	3,022	1,977	2,412	3,417	3,100	2,130	2,262	2,214	993	1,440	2,140	2,336
Chuathbaluk	405	1,460	913	**887**	973	772	877	551	409	103	155	542	735
Middle Kuskokwim	5,126	8,971	6,840	8,362	7,710	8,055	7,228	5,339	5,655	2,117	3,656	5,679	6,540
Crooked Creek	582	946	948	**736**	647	488	608	240	402	124	**145**	372	572
Red Devil	31	156	181	232	301	148	258	33	186	225	77	170	175
Sleetmute	600	906	522	750	861	933	693	272	242	132	96	454	591
Stony River	118	**688**	**311**	**288**	530	514	704	189	134	**151**	51	338	363
Lime Village	34	**69**	**171**	**103**	**95**	**29**	**75**	**47**	**118**	29	**43**	60	77
McGrath	395	**587**	910	689	495	288	600	262	829	68	95	409	512
Takotna	0	**16**	8	**0**	**10**	**0**	**8**	0	0	**0**	**0**	2	4
Nikolai	224	493	564	696	471	184	298	402	450	276	283	322	406
Telida	–	–	–	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim	1,984	3,861	3,615	3,494	3,409	2,584	3,244	1,445	2,361	1,005	790	2,128	2,700
Kuskokwim River[a]	67,737	96,788	85,863	90,812	94,898	88,912	79,896	67,286	62,366	22,544	47,113	64,201	75,710
Quinhagak	2,563	4,563	3,505	5,163	4,686	3,125	3,312	2,793	2,588	2,396	3,143	2,843	3,469
Goodnews Bay	807	863	869	**713**	647	898	569	480	834	389	413	634	707
Platinum	45	122	74	**45**	66	42	61	17	62	24	39	41	56
South Kuskokwim Bay	3,415	5,548	4,448	5,921	5,399	4,065	3,942	3,290	3,484	2,809	3,595	3,518	4,232
Total estimated harvest	71,152	102,336	90,311	96,733	100,297	92,977	83,838	70,576	65,850	25,353	50,708	67,719	79,942

Note: Dashes indicate harvest was not estimated, Bold indicates Bayesian estimates. The 5-year average is from 2008 to 2012 and the 10-year average is from 2003 to 2012.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Appendix A2.–Estimated number of chum salmon harvested in the Kuskokwim area, 2003–2013.

Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr Avg	10-yr Avg
Kongiganak	897	2,958	1,960	2,420	**2,353**	1,755	1,420	2,522	2,809	**1,638**	**1,397**	2,029	2,073
North Kuskokwim Bay	897	2,958	1,960	2,420	2,353	1,755	1,420	2,522	2,809	1,638	1,397	2,029	2,073
Tuntutuliak	1,288	2,546	3,568	4,024	3,350	**3,375**	3,330	2,439	1,865	2,614	2,180	2,725	2,840
Eek	578	688	**877**	**1,075**	**783**	**788**	782	721	486	1,552	1,232	866	833
Kasigluk	**3,581**	5,064	**4,194**	**5,461**	**4,309**	**1,502**	1,857	2,338	2,029	3,261	2,197	2,197	3,360
Nunapitchuk	2,865	5,053	4,167	5,150	**6,619**	**4,705**	3,468	3,223	4,257	5,312	2,977	4,193	4,482
Atmautluak	849	2,271	1,940	**2,337**	2,193	2,177	1,665	1,386	1,864	2,701	2,409	1,959	1,938
Napakiak	1,560	2,328	3,238	8,143	3,628	1,313	1,638	1,759	1,546	1,711	1,185	1,593	2,686
Napaskiak	2,061	2,705	2,205	4,323	3,032	2,400	1,451	3,110	1,783	3,216	2,589	2,392	2,629
Oscarville	804	828	686	1,151	932	847	534	352	402	599	490	547	714
Bethel	11,452	13,448	14,273	20,953	16,540	15,853	10,055	9,575	15,324	26,872	12,506	15,536	15,435
Kwethluk	2,294	4,288	4,328	6,328	6,291	5,729	4,111	3,112	3,484	3,849	3,825	4,057	4,381
Akiachak	2,650	3,880	2,428	4,333	4,782	6,856	2,872	2,856	3,205	4,150	3,417	3,988	3,801
Akiak	2,928	3,499	3,528	3,095	4,141	3,522	1,350	1,163	2,421	**2,925**	2,212	2,276	2,857
Tuluksak	894	2,433	2,183	3,094	**3,202**	2,920	1,570	3,180	2,697	2,585	3,062	2,590	2,476
Lower Kuskokwim	33,804	49,031	47,615	69,466	59,803	51,988	34,683	35,214	41,363	61,347	40,281	44,919	48,431
Lower Kalskag	1,087	1,316	997	4,703	1,997	1,004	930	691	1,643	3,284	1,214	1,510	1,765
Upper Kalskag	516	1,656	1,201	2,469	294	2,432	329	391	1,599	1,930	1,534	1,336	1,282
Aniak	820	2,535	2,952	3,722	4,108	2,830	2,602	2,515	2,391	5,667	2,880	3,201	3,014
Chuathbaluk	2,502	2,352	530	1,451	**1,541**	593	937	535	686	796	935	709	1,192
Middle Kuskokwim River	4,925	7,859	5,680	12,345	7,940	6,859	4,798	4,132	6,319	11,677	6,563	6,757	7,253
Crooked Creek	750	1,583	1,064	1,513	**813**	352	519	539	862	610	**1,803**	576	861
Red Devil	63	135	214	41	186	188	244	122	434	516	981	301	214
Sleetmute	468	1,054	422	1,475	818	373	367	524	689	1,004	542	591	719
Stony River	361	754	**324**	**790**	**540**	1,247	771	338	516	**491**	**27**	673	613
Lime Village	110	199	**573**	**316**	**419**	**297**	**405**	**314**	**499**	419	909	387	355
McGrath	513	290	**470**	999	464	676	825	944	476	885	598	761	654
Takotna	**0**	0	4	0	**0**	**0**	**0**	**0**	0	**0**	**12**	0	0
Nikolai	191	277	230	308	223	54	292	440	349	1,044	513	436	341
Telida	–	–	–	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	2,456	4,292	3,301	5,442	3,464	3,187	3,423	3,221	3,825	4,970	5,386	3,725	3,758
Kuskokwim River[a]	42,082	64,140	58,555	89,674	73,560	63,789	44,324	45,089	54,316	79,631	53,627	57,430	61,516
Quinhagak	559	1,383	994	2,754	2,249	1,794	1,557	1,347	1,255	2,001	1,958	1,591	1,589
Goodnews Bay	200	240	192	555	395	586	138	324	349	322	153	344	330
Platinum	19	42	21	108	77	106	28	37	70	76	90	63	58
South Kuskokwim Bay	778	1,665	1,207	3,417	2,720	2,486	1,723	1,708	1,674	2,399	2,201	1,998	1,978
Total estimated harvest	42,860	65,805	59,762	93,091	76,281	66,275	46,047	46,797	55,990	82,030	55,828	59,428	63,494

Note: Dashes indicate harvest was not estimated, Bold indicates Bayesian estimates. The 5-year average is from 2008 to 2012 and the 10-year average is from 2003 to 2012.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Appendix A3.–Estimated number of sockeye salmon harvested in the Kuskokwim area, 2003–2013.

Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr Avg	10-yr Avg
Kongiganak	929	1,809	1,103	1,464	**960**	1,502	1,018	1,869	1,266	**1,307**	**1,031**	1,392	1,323
North Kuskokwim Bay	929	1,809	1,103	1,464	960	1,502	1,018	1,869	1,266	1,307	1,031	1,392	1,323
Tuntutuliak	1,148	1,620	2,145	1,834	1,763	**2,120**	932	2,068	1,274	1,516	1,183	1,582	1,642
Eek	586	567	1,033	**684**	**558**	**834**	1,019	1,241	664	1,490	1,319	1,050	868
Kasigluk	**2,429**	1,668	**1,634**	**2,248**	**1,786**	**1,041**	1,215	1,441	1,269	1,451	1,470	1,283	1,618
Nunapitchuk	1,714	1,659	1,821	1,871	2,147	**2,549**	1,538	1,902	2,223	2,396	1,806	2,122	1,982
Atmautluak	679	1,103	1,444	**1,012**	1,041	**1,250**	624	731	827	1,623	1,316	1,011	1,033
Napakiak	1,453	1,351	2,122	1,845	1,962	1,244	917	1,183	1,351	1,141	1,105	1,167	1,457
Napaskiak	1,643	1,148	1,344	1,784	1,738	2,620	1,579	1,979	1,587	2,065	2,069	1,966	1,749
Oscarville	806	436	278	778	712	677	332	250	228	323	347	362	482
Bethel	12,198	11,679	14,297	12,816	13,902	15,247	11,272	11,103	16,946	18,282	12,616	14,570	13,774
Kwethluk	1,903	3,302	2,457	2,770	3,536	4,920	2,432	2,534	2,357	2,884	2,705	3,025	2,910
Akiachak	1,607	3,109	2,372	2,661	3,269	4,354	2,407	2,433	2,647	3,443	2,594	3,057	2,830
Akiak	995	1,258	1,920	2,000	3,695	2,881	1,290	1,161	2,576	**1,818**	1,731	1,945	1,959
Tuluksak	875	1,670	987	2,247	**1,845**	2,133	1,691	2,483	1,699	1,380	1,541	1,877	1,701
Lower Kuskokwim	28,036	30,570	33,854	34,550	37,955	41,869	27,248	30,509	35,648	39,812	31,802	35,017	34,005
Lower Kalskag	515	775	439	1,434	780	1,583	1,044	507	802	891	977	965	877
Upper Kalskag	431	686	945	563	417	1,000	369	460	938	770	662	707	658
Aniak	756	996	1,015	692	1,261	1,585	923	1,165	1,168	1,375	1,466	1,243	1,094
Chuathbaluk	274	526	369	508	**484**	363	564	403	300	297	480	385	409
Middle Kuskokwim	1,976	2,983	2,768	3,197	2,942	4,531	2,900	2,535	3,208	3,333	3,585	3,301	3,037
Crooked Creek	571	732	693	544	**523**	220	329	302	243	234	**514**	266	439
Red Devil	309	88	272	510	318	359	477	475	502	511	270	465	382
Sleetmute	504	980	673	1,181	1,303	1,164	684	1,024	693	715	362	856	892
Stony River	158	896	**688**	**746**	**1,019**	1,476	977	372	303	**469**	447	719	710
Lime Village	374	874	**1,368**	**1,216**	**1,406**	**659**	**1,080**	**932**	**739**	780	**831**	838	943
McGrath	112	194	**454**	149	375	417	965	650	630	233	538	579	418
Takotna	**1**	0	**1**	0	**1**	**3**	**3**	**2**	0	**2**	**2**	2	1
Nikolai	2	1	10	20	14	13	66	65	13	0	0	31	20
Telida	–	–	–	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim	2,031	3,765	4,160	4,365	4,960	4,310	4,581	3,822	3,123	2,945	2,964	3,756	3,806
Kuskokwim River[a]	32,973	39,127	41,885	43,577	46,817	52,213	35,747	38,735	43,245	47,396	39,382	43,467	42,171
Quinhagak	805	1,375	1,745	3,128	1,755	2,097	1,960	1,719	1,582	2,015	2,158	1,875	1,818
Goodnews Bay	705	873	1,213	995	**920**	1,739	902	1,093	1,328	1,197	1,113	1,252	1,096
Platinum	64	183	90	63	**121**	156	186	175	135	173	181	165	135
South Kuskokwim Bay	1,574	2,431	3,048	4,186	2,796	3,992	3,048	2,987	3,045	3,385	3,452	3,291	3,049
Total estimated harvest	34,547	41,558	44,933	47,763	49,613	56,205	38,795	41,722	46,290	50,781	42,834	46,759	45,221

Note: Dashes indicate harvest was not estimated, Bold indicates Bayesian estimates. The 5-year average is from 2008 to 2012 and the 10-year average is from 2003 to 2012.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Appendix A4.–Estimated number of coho salmon harvested in the Kuskokwim area, 2003–2013.

Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2008-2012	Average 2003-2012
Kongiganak	236	937	740	657	883	**557**	561	483	613	**356**	**412**	619	630
North Kuskokwim Bay	236	937	740	657	883	557	561	483	613	356	412	619	630
Tuntutuliak	2,092	1,189	1,074	948	703	1,620	**359**	698	250	565	450	726	993
Eek	747	1,018	378	773	**459**	**661**	**176**	315	280	612	483	378	534
Kasigluk	**1,762**	**5,034**	1,304	**3,070**	**1,753**	**867**	**629**	1,043	430	303	418	944	1,766
Nunapitchuk	627	555	807	692	1,752	508	**286**	195	407	319	226	630	648
Atmautluak	283	744	530	254	**424**	262	**67**	36	263	383	203	210	318
Napakiak	992	1,648	742	2,363	1,244	1,006	420	877	927	402	634	895	1,135
Napaskiak	983	655	602	1,640	639	903	786	1,029	471	269	772	766	856
Oscarville	19	304	60	175	180	62	67	12	43	38	37	73	102
Bethel	15,062	17,040	12,994	18,810	12,972	15,839	12,895	20,426	18,141	13,280	12,662	16,055	16,020
Kwethluk	1,787	3,430	3,048	1,245	1,624	7,262	4,333	1,495	1,097	1,013	1,555	3,162	2,813
Akiachak	1,627	2,397	1,817	1,714	2,355	4,311	1,790	1,181	1,440	714	1,106	2,215	2,070
Akiak	1,094	1,342	1,847	379	1,325	1,358	661	475	505	**455**	454	865	998
Tuluksak	921	1,007	484	498	1,131	**635**	857	330	163	341	473	623	670
Lower Kuskokwim River	27,996	36,363	25,687	32,561	26,561	35,293	23,326	28,112	24,417	18,694	19,473	27,542	28,924
Lower Kalskag	314	368	319	1,415	515	76	318	96	684	1,107	529	338	456
Upper Kalskag	462	1,500	594	1,799	381	2,350	181	92	998	360	636	800	929
Aniak	1,164	2,355	2,032	1,018	3,003	2,883	2,223	2,533	2,215	3,365	3,102	2,571	2,158
Chuathbaluk	259	284	346	727	419	**525**	96	76	109	179	319	245	316
Middle Kuskokwim River	2,199	4,507	3,291	4,959	4,318	5,834	2,818	2,797	4,006	5,011	4,586	3,955	3,859
Crooked Creek	375	713	312	401	289	**952**	283	87	297	149	**255**	382	412
Red Devil	351	65	331	171	193	307	126	88	130	238	318	169	196
Sleetmute	731	505	581	671	360	228	403	458	426	784	219	375	485
Stony River	214	679	468	**322**	**336**	**552**	634	201	333	**358**	120	411	415
Lime Village	**46**	231	372	**132**	**443**	**695**	**210**	**146**	**596**	117	**384**	418	319
McGrath	997	1,228	799	**894**	279	247	1,175	1,053	1,331	2,257	523	817	889
Takotna	6	**51**	8	**0**	8	**6**	**28**	**20**	3	**22**	**0**	13	14
Nikolai	379	171	166	407	95	53	203	135	20	214	119	101	181
Telida	–	–	–	–	–	–	–	–	–	–	–		

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Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 2008-2012	Average 2003-2012
Upper Kuskokwim River	3,099	3,643	3,037	2,998	2,005	3,040	3,062	2,188	3,136	4,139	1,938	2,686	2,912
Kuskokwim River[a]	33,531	45,450	32,755	41,175	33,766	44,724	29,767	33,580	32,172	28,200	26,409	34,802	36,324
Quinhagak	1,868	1,435	1,558	1,315	1,550	1,869	1,824	1,599	1,369	1,380	1,087	1,642	1,599
Goodnews Bay	1,228	1,542	634	605	468	**769**	261	319	259	382	295	415	676
Platinum	144	266	223	116	106	**114**	81	197	143	124	50	128	154
South Kuskokwim Bay	3,240	3,243	2,415	2,036	2,124	2,752	2,166	2,115	1,771	1,886	1,432	2185.60269	2429.11261
Total estimated Harvest	36,771	48,693	35,170	43,211	35,890	47,476	31,933	35,695	33,943	30,086	27,841	36,987	38,753

Note: Dashes indicate harvest was not estimated, Bold indicates Bayesian estimates. The 5-year average is from 2008 to 2012 and the 10-year average is from 2003 to 2012.

[a] Kuskokwim River total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

APPENDIX B: SURVEY INSTRUMENT

Appendix B1.–Kuskokwim Area postseason subsistence salmon harvest survey form, 2013.

Date of Survey:_____ Time: _____

Person Interviewed:_____

Relation to HH: _____Interviewer: _____

HHID #	COMMUNITY:	Data Entry:	Error Check:

CONFIDENTAL INFORMATION

2013 Kuskokwim Area Postseason Subsistence Salmon Survey

1. Head of Household:_____ **Telephone** _____ **Address:** _____

2. How many people live in your household? _____ **Permanent Notes:** _____

3. Did anyone in your household subsistence or commercial fish for salmon? YES ☐ NO ☐
(Subsistence "harvest" includes catching or cutting salmon.) **YES →Part I. NO → Part II.**

☐ Adult household member declined to be interviewed.
Reason:_____

PART I: FISHING HOUSEHOLDS

4. Do you have a catch calendar to turn in: YES ☐ NO ☐ Already Sent In ☐ (Is calendar group or household harvest? Are all salmon recorded on calendar?)

5. Did you fish in a group or did you fish by yourself? Total households (including respondent): _____Names:_____

6. How many salmon did your fishing group harvest this year? Chinook _____ Sockeye _____ Chum _____ Coho _____ Pink _____

7. How many salmon did your household harvest/keep from the group harvest? Where did you go fishing? (See Map)

Area		Chinook			Sockeye			Chum			Coho			Pink			
Area		Chinook			Sockeye			Chum			Coho			Pink			

8. What is your household's main gear type? (1=primary, 2=secondary, etc.) Set Net ____ Drift Net ____ Fish Wheel ____Hook & Line ____ Dipnet ____ Other ____

a. Hook & Line? YES ☐ NO ☐ ; b. Included above (#7)? YES ☐ NO ☐ Chinook _____Sockeye _____Chum _____Coho _____Pink _____

9. Did anyone in your household commercial fish? YES ☐ NO ☐

a. If yes, did your household keep any of the commercial salmon for subsistence? Area____Chinook ____Sockeye ____Chum ____ Coho ____Pink ____

b. Are these fish already reported in the household harvest (#7)? YES ☐ NO ☐

10. Did anyone in your household lose any salmon (i.e. bears, weather, flies, etc.)? YES ☐ NO ☐

Chinook _____ Sockeye _____ Chum _____ Coho _____ Pink _____ Reason (s) for loss: _____

a. Are the "lost" fish already reported in the household harvest (#7)? YES ☐ NO ☐

b. Were any of the "lost" salmon fed to **your** dogs (whole fish only)? YES ☐ NO ☐; How many? Chinook ___ Sockeye ___ Chum ____ Coho _____ Pink ___

c. Were extra fish harvested to replace those that were lost? YES ☐ NO ☐; How many? Area___ Chinook ___Sockeye ___Chum ____Coho ___Pink ___

d. Are the "replacement" fish already reported in the household harvest (#7)? YES ☐ NO ☐

11. Did your household give away any salmon that you harvested (not including spoiled)? YES ☐ NO ☐ (shared outside of their fishing group)

Chinook _____ Sockeye _____ Chum _____ Coho _____ Pink _____; Names: _____

a. Are these fish already reported in the household harvest (#7)? YES ☐ NO ☐

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PART II: ALL HOUSEHOLDS

12. Did anyone give you salmon? YES ☐ NO ☐ **Code:** S = Subsistence; C = Commercial; T = Test Fish

Code:_____Chinook _____ Sockeye _____ Chum _____ Coho _____ Pink _____ Names: _____

Code:_____Chinook _____ Sockeye _____ Chum _____ Coho _____ Pink _____ Names: _____

a. Were any of the fish you received fed to your dogs (from question #12)? YES ☐ NO ☐ Chinook _____ Sockeye _____ Chum _____ Coho _____ Pink _____

13. How many salmon does your household like to have for subsistence?

Chinook _____ Sockeye _____ Chum _____ Coho _____ Pink _____

Why? _____ Why? _____ Why? _____ Why? _____ Why? _____

14. Did your household catch any other fish besides salmon? (From last Sept/October to now.) YES ☐ NO ☐

Humpback Whitefish_____ Broad Whitefish_____ Cisco _____ Sheefish_____ Lush_____ Pike_____ Blackfish_____

Grayling_____ Char_____ Rainbow Trout_____ Smelt_____ Herring_____

15. How many dogs does your household have? _____ (if zero go to question #18)

16. Do you feed whole salmon to your dogs? YES ☐ NO ☐ Only Scraps ☐

17. Not including spoiled fish or fish you received, how many whole salmon did your household put up for dogs this year? (Numbers should represent whole fish, not scraps)

Chinook _____ Sockeye _____ Chum _____ Coho _____ Pink _____

a. Are fish harvested for dogs already reported in the household harvest (from question #7)? YES ☐ NO ☐

18. Additional Comments: _____

_____

_____

_____

_____

Surveyor Comments:

Completed Survey ☐ **Partial Survey** ☐ **No Survey** ☐ **Survey Reviewed for completeness by Surveyor** ☐

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APPENDIX C: FISH MEASURES

Appendix C1.–Approximate measurements used to convert reported amounts of fish harvest, Kuskokwim Area, 2008–2012.

Amount	Description
Salmon	
1 Chinook salmon = 5–8 pound strips	Dried and smoked Chinook salmon
1 gallon Ziplock = 5pound strips	Dried and smoked Chinook salmon
1 quart Ziplock = 2 pound strips	Dried and smoked Chinook salmon
6 gallon bucket = 4 to 5 Chinook salmon	Dried Chinook salmon
5 gallon poke fish = 25 to 30 chum salmon	Dried chum salmon in seal oil
30 gallon barrel = 150 to 180 chum salmon	Dried chum salmon in seal oil
1 gallon Ziplock = 2 to 3 chum salmon	Dried chum salmon filets
5 gallon bucket = 25 chum salmon	Chum salmon filets, tightly packed
1 dried chum salmon = 2/3 pound	Summer chum salmon for dog food
1 bundle – 50 dried chum salmon	Summer chum salmon for dog food
300 dog salmon/dog/winter	Feeding summer chum salmon to a dog team
1 dried chum salmon = 1.25 to 1.33 pounds	Summer or fall chum salmon
1 pink salmon = 3 pounds	Pink salmon
Other fish	
1 small whitefish = 1 pound	Round whitefish, least, Bering, or arctic cisco, caught in whitefish net (4 inch or smaller mesh) or a fish wheel
1 large whitefish = 4 pounds	Broad or humpback whitefish caught in a chum salmon net (5 inch or larger mesh) or a fish wheel
125 smelt = 5 gallon bucket	
1 gunny sack = 50 to 100 pounds (ask fishermen)	tomcod, whitefish, herring
14 blackfish = 1 pound	Blackfish
350 blackfish = 5 gallon bucket = 25 pounds	
1 eel = 1/3 pound	Arctic lamprey