

**Special Publication No. SP2014-03**

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**Subsistence Wildlife Harvests in Kotzebue, Alaska,  
2012–2013**

by

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and

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July 2014

Alaska Department of Fish and Game

Division of Subsistence



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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 <sup>3</sup> /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	two-letter abbreviations (e.g., AK, WA)

### Measures (fisheries)

fork length	FL
mid-eye-to-fork	MEF
mid-eye-to-tail-fork	METF
standard length	SL
total length	TL

### Mathematics, statistics

*all standard mathematical signs, symbols and abbreviations*

alternate hypothesis	H <sub>A</sub>
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, $\chi^2$ , 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 <sub>2</sub> , etc.
minute (angular)	'
not significant	NS
null hypothesis	H <sub>0</sub>
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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July 2014

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# TABLE OF CONTENTS

	Page
<b>List of Tables</b> .....	<b>ii</b>
<b>List of Figures</b> .....	<b>ii</b>
<b>List of Appendices</b> .....	<b>ii</b>
<b>Abstract</b> .....	<b>iii</b>
<b>1. Introduction</b> .....	<b>1</b>
<b>2. Methods</b> .....	<b>3</b>
Survey Design in 2013.....	3
Analysis.....	1
<b>3. Results</b> .....	<b>3</b>
Caribou.....	3
Moose and Other Big Game.....	6
Furbearers.....	6
Summary of Respondent Comments.....	6
Comparing the 2012–2013 Results with Previous Survey Data.....	7
<b>Acknowledgements</b> .....	<b>9</b>
<b>References Cited</b> .....	<b>10</b>

## **LIST OF TABLES**

Table 1.–Demographic characteristics of sampled households in Kotzebue, 2012–2013. ....	5
Table 2.–Estimated harvest and uses of caribou, Kotzebue, 2012–2013. ....	3
Table 3.–Estimated harvest and use of moose, Kotzebue, 2012–2013. ....	6

## **LIST OF FIGURES**

Figure 1.–Western Arctic caribou herd range and Kotzebue, Alaska. ....	2
Figure 2.–Estimated caribou harvest by month, Kotzebue, 2012–2013. ....	4
Figure 3.–Estimated caribou harvest by UCU, Kotzebue, June 2012–May 2013. ....	5
Figure 4.–Per person caribou harvests (edible pounds), Kotzebue and other Northwest Alaska communities, 1986–2012. ....	7

## **LIST OF APPENDICES**

Appendix A.–Western Arctic caribou herd subsistence survey, Kotzebue, 2012–2013. ....	11
Appendix B.–Harvests and uses of wild resources, Kotzebue, 2012–2013. ....	16
Appendix C.–Harvests of caribou by sex and month of harvest, Kotzebue, 2012–2013. ....	16
Appendix D.–Harvests of caribou by sex, month, and location of harvest, Kotzebue, 2012–2013. ....	17
Appendix E.–Local comments and concerns, Kotzebue, 2012–2013. ....	21
Appendix F.–Harvests of moose by sex, month, and location of harvest, Kotzebue, May 2011–April 2012. ....	24
Appendix G.–Comparison of 2012 estimates with previous survey results, Kotzebue. ....	26

## ABSTRACT

This report summarizes the results of big game subsistence harvest surveys conducted in Kotzebue in the spring of 2013. Since 1999, the Alaska Department of Fish and Game Division of Subsistence, with support from the Division of Wildlife Conservation, has conducted this limited scope harvest survey in communities within game management units (GMUs) 22 and 23 that harvest from the Western Arctic caribou herd. The survey asked heads of households in Kotzebue about their harvests of caribou, moose, black and brown bear, and 2 furbearers (wolf and wolverine) between June 1, 2012 and May 31, 2013. Researchers documented the number, sex, and harvest timing for these subsistence resources, as well as observations and comments from survey respondents. Reported results from the random sample of 217 households were expanded to account for 598 unsurveyed households. In the 2012–2013 study year, Kotzebue hunters harvested an estimated 1,804 caribou, approximately 80 edible pounds per person. Most (68%) of the caribou were hunted in the fall, and 61% were reported as male. About 44% of households attempted to harvest caribou; 39% actually did so, and 82% of households reported using caribou.

Key words: caribou, moose, brown bears, black bears, furbearers, wolf, wolverine, Kotzebue, WAH, Western Arctic caribou herd, subsistence hunting.

# 1. INTRODUCTION

Caribou *Rangifer tarandus* are an important subsistence resource for communities in the Northwest, Arctic, and Interior regions of Alaska, as well as other areas of the state. In northern Alaska, people from more than 40 villages, from Wainwright in the north to Kotlik in the south, as well as from the regional centers of Barrow, Kotzebue, and Nome, are known to harvest caribou from the Western Arctic caribou herd (WAH; Figure 1). This herd, which roams throughout an area of 140,000 square miles, is in decline but still the largest caribou herd in Alaska (Alaska Department of Fish and Game 2012). At its peak in 2003, the herd numbered 490,000 caribou. It declined at a rate of 4–6% annually between that census and 2011, when the herd numbered 325,000. The July 2013 census counted 235,000 animals, a decrease of about 27% since 2011. In May of 2014, Alaska Department of Fish and Game reported

[It] appears that summer and winter weather combined with predators has affected survival during recent years... Disease does not appear to be a factor, caribou have generally been in good body condition throughout this decline, and we don't think harvests initiated it. But, if harvests remain stable, they will increasingly affect the population trend as herd size goes down. (Alaska Department of Fish and Game, Division of Wildlife Conservation 2014)

The role of caribou in the nutritional, cultural, and economic health of northwestern Alaska residents varies both between communities and through time. In some communities, caribou meat is a large portion of the total subsistence harvest each year. In communities where other resources are more abundant, caribou may represent a smaller portion of the total subsistence harvest. Because of a village's location, residents may have only occasional access to the WAH. In villages located along key migration routes, residents might take caribou during several months of the year. A variety of other factors may also influence caribou harvests each year, including gasoline prices, user conflicts, weather, the success (or lack thereof) in harvesting other subsistence resources, migration timing, and so forth. Subsistence harvesters adapt to local conditions. Therefore, inter-annual variation in harvest numbers and characteristics is common, even within a single community or household.

It is the statutory responsibility of the Alaska Department of Fish and Game (ADF&G) Division of Subsistence to provide information to the public, agencies, the Board of Fisheries, and the Board of Game about the role of subsistence hunting and fishing in the lives of Alaska residents (AS 16.05.094). The division studies and reports on the seasonality, methods, sharing and trading, use areas, cultural and economic values, and trends of subsistence harvests and uses. This information is increasingly necessary as development projects are proposed throughout rural areas of Alaska. Documenting and understanding subsistence harvests is also necessary in order to evaluate reasonable opportunities for customary and traditional uses of wild resources. Other duties of the division set forth in statute include:

- quantifying the amount, nutritional value, and extent of dependency on foods acquired through subsistence hunting and fishing;
- evaluating the impacts of state and federal laws and regulations on subsistence hunting and fishing, and when corrective action is indicated, making recommendations to the department; and
- making recommendations to the Board of Game and the Board of Fisheries regarding adoption, amendment, and repeal of regulations affecting subsistence hunting and fishing.

Subsistence harvest surveys of varying scope have been conducted in over 200 Alaska communities since the division was formed in 1978. This research helps ADF&G estimate subsistence harvests and understand the role of subsistence in local economies. Each year since 1999, ADF&G, often in cooperation with the Maniilaq Association and Kawerak, Inc., has gathered big game harvest information in selected Kotzebue and Norton Sound area communities. In addition to the big game survey in

Kotzebue in 2013, comprehensive harvest surveys were conducted in 6 other communities within the range of the WAH—Ambler, Golovin, Kobuk, Noorvik, Shungnak, and Pt. Lay.<sup>1,2</sup>

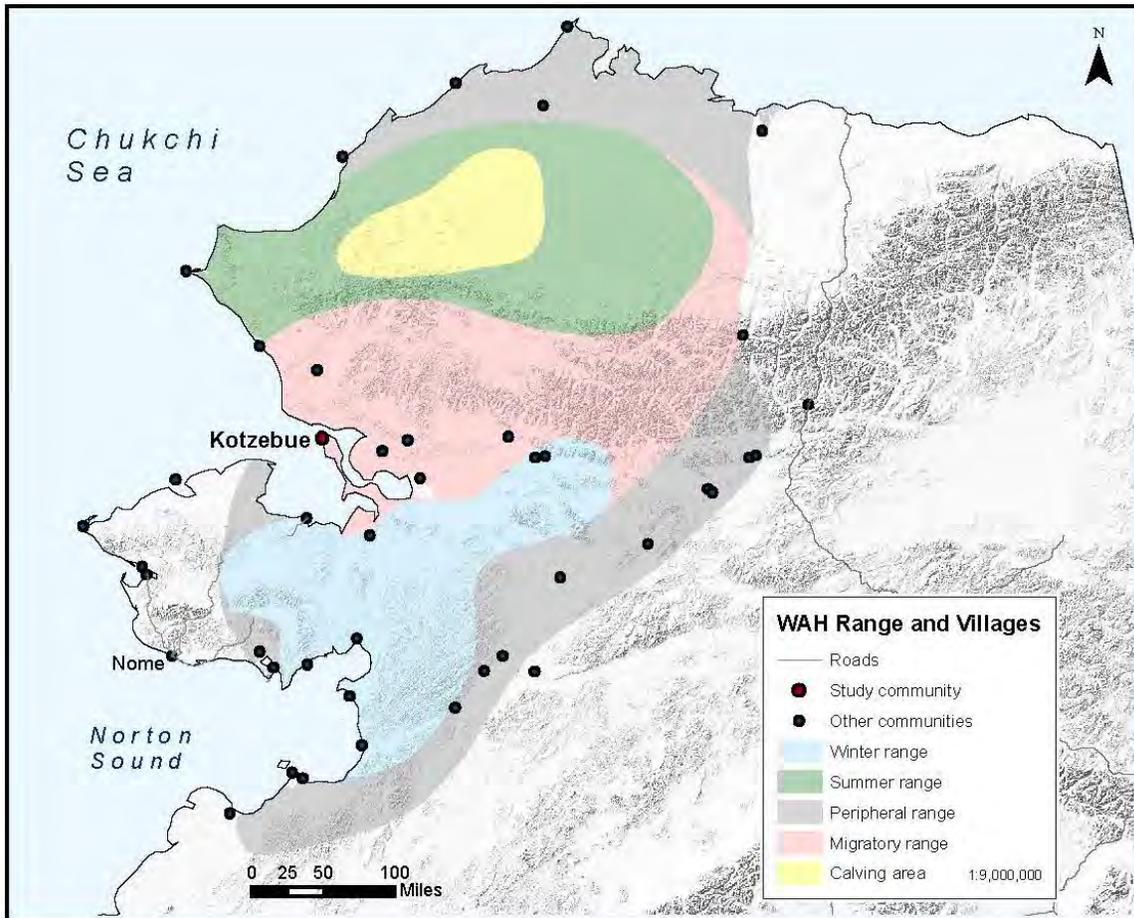


Figure 1.—Western Arctic caribou herd range and Kotzebue, Alaska.

1. Braem, Nicole M., D.S. Koster, M. Kostick, A. Brenner, A. Godduhn, and B. Retherford. In prep. Chukchi Sea and Norton Sound Observation Network: Golovin, Noorvik, and Point Lay, 2012. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 403, Fairbanks.
2. Braem, Nicole M., D.S. Koster, M. Kostick, E. Mikow, and S. Wilson. In prep. Wild food harvests in 3 upper Kobuk River communities: Ambler, Kobuk, and Shungnak, 2012. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 402, Fairbanks.

## 2. METHODS

In 2013, division staff collected subsistence harvest information in Kotzebue with the survey instrument found in Appendix A. All data were processed and analyzed by the division. Survey data from participating households were expanded to account for unsurveyed households in our estimates.

The division's policy is to seek community approval before conducting local research. Community approval from the Native Village of Kotzebue was obtained by the Division of Subsistence. Survey timing was designed to coincide with the end of a major harvest period. In late May and June of 2013, Division of Subsistence staff traveled to Kotzebue, where they hired and trained local surveyors and helped conduct surveys. Kotzebue households were asked about their harvest of caribou, other large game, and furbearers between June 1, 2012 and May 31, 2013. Funding for the big game survey came from ADF&G Divisions of Wildlife Conservation and Subsistence.

### SURVEY DESIGN IN 2013

The Division of Subsistence standard method for collecting harvest information in smaller communities is to attempt to survey every household, usually by talking to the head or heads of each household. Before starting the project, survey workers compile an updated list of every household present in the community during the study period. In larger communities such as Kotzebue, the division uses a random sampling approach. Because of Kotzebue's size, division staff created a database of occupied housing units and used the random sampling design. Confidentiality is protected by using randomly assigned household numbers instead of names on the survey form. Participation in surveys is voluntary—people may refuse to answer any or all questions. Surveyors try to contact each selected household on 3 separate occasions on different days. If no contact is made, then that household is recorded as “no contact.” There are a variety of reasons that a household may be marked “no contact:” they may be out of town during the survey effort; they may have moved to another community; or the household members may have passed away during or after the study year. Surveyors often go door to door but make appointments for surveys when necessary.

In Kotzebue, 274 out of 815 existing (2012–2013) households were contacted, and 217 households were successfully surveyed for a 26.6% sample. Of those who were contacted but not surveyed, 49 refused and 8 did not meet the 3 month minimum residency requirement. The big game survey used in 2013 gathered demographic information for each household member: their age, sex, and relationship to the head(s) of household, and whether they were Alaska Native (Table 1).

The survey (Appendix A) included questions about harvests and uses of caribou, moose *Alces alces*, brown bear *Ursus arctos*, black bear *Ursus americanus*, wolf *Canis lupus*, and wolverine *Gulo gulo* (wolves and wolverines are classified as both big game and as furbearers). In the interest of brevity, other big game species were left off the survey. Researchers also asked about sharing (i.e., if a household gave away a resource to other households or if the household received it). Harvest location was recorded by ADF&G Division of Wildlife Conservation Uniform Coding Unit (UCU). These units are geographical areas that can vary in size from just a few square miles to several thousand square miles. Respondents were asked about the locations of harvests, the sexes of harvested animals, and the months in which harvests occurred. In recent years, in cases that the month of harvest is unknown, the season of harvest has been recorded and included in the analysis. Respondents were also asked if they had any questions, comments, or concerns. The 2013 survey in Kotzebue was conducted in conjunction with the Alaska Migratory Bird Co-Management Council (AMBCC) migratory bird survey, the findings of which will be reported elsewhere.<sup>3</sup> The surveys typically took less than 5 minutes each to administer, but sometimes took longer with heavy harvesters.

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3. Naves, L.C. and N.M. Braem. *In prep.* Alaska subsistence harvest of birds and eggs, 2012. Anchorage. Alaska Migratory Bird Co-Management Council. Alaska Department of Fish and Game Division of Subsistence.

The estimated population of Kotzebue (Table 1) was 3,076 individuals, of whom 52% were male and 48% female. The mean household size was 3.8 people, with a minimum of 1 and a maximum of 17 people. The mean age of the surveyed population in years was 30.7 with a minimum of 0 (infant(s) less than 1) and a maximum of 83. Approximately 81% of the surveyed population was Alaska Native, and about 77% of households had at least one Alaska Native head of household.

Table 1.—Demographic characteristics of sampled households in Kotzebue, 2012–2013.

Characteristics	Community
	Kotzebue
<b>Sample achievement</b>	
Sampled households	217
Eligible households	815
Percentage sampled	26.6%
<b>Household size</b>	
Mean	3.8
Minimum	1
Maximum	17
<b>Age</b>	
Mean	30.7
Minimum <sup>a</sup>	0
Maximum	83
Median	27
<b>Sex</b>	
Estimated male	
Number	1,601.2
Percentage	52.1%
Estimated female	
Number	1,474.8
Percentage	47.9%
<b>Alaska Native</b>	
Estimated households <sup>b</sup>	
Number	628.4
Percentage	77.1%
Estimated population	
Number	2,503.69
Percentage	81.4%

Source ADF&G Division of Subsistence household surveys, 2013.

a. A minimum age of 0 (zero) is used for infants that are less than 1 year of age.

b. The estimated number of households in which at least one head of household is Alaska Native.

## ANALYSIS

Since its establishment in 1978, the Division of Subsistence Information Management (IM) team has adopted standards based on observations and findings to analyze subsistence harvest resource data. The base unit for the majority of surveys is the household. IM generates harvest estimates and participation rates at the community level. The statistical program SPSS<sup>4</sup> is used to analyze data and prepare tables.

Results from surveyed households were entered into the division's data repository in MS SQL Server. Each survey was entered 2 times by different staff. As the first step in data validation, the 2 versions were compared and corrected according to the actual values recorded on paper surveys. Once entered and validated, data were then extracted using SPSS v19.0 and analyzed using standard division methods. Harvest amounts and demographic information were extrapolated to un-surveyed households to derive total harvest and human population estimates for the community. Fractional estimates are the direct result of this expansion procedure and are rounded to the nearest tenth in accompanying report tables and usually to whole numbers for discussion in the text. Participation levels, presented in percentages, are derived directly from the sampled data, which are assumed to be representative of participation levels for the entire community.

Harvest estimates and responses to all questions were calculated based upon the application of weighted means (Cochran 1977). These calculations are standard methods for extrapolating sampled data. The formula applied for this method is:

$$X_C = \frac{N}{n} \sum_{i=1}^n x_i$$

where:

- $x$  = household harvest
- $i$  = ith household in the community
- $n$  = number of sampled households in the community
- $N$  = number of households in the community
- $X_C$  = total estimated community harvest

In addition to harvest estimates, the division reports confidence intervals (CI) to provide some context to the quality and accuracy of the sample. This value represents the relative precision of the mean, or likelihood that an unknown value falls within a certain distance from the mean. In the accompanying tables, the CI is expressed as a percent and applies to both the mean household harvest and total community harvest. The division standard is to use a 95% confidence interval. The formula applied to produce this value is:

$$C.I.\%(\pm) = \frac{t_{\alpha/2} \times S_x}{\bar{x} \times \sqrt{n}} \times \sqrt{\frac{N-n}{N-1}}$$

where:

$t_{\alpha/2}$  = Student's t statistic for given alpha level ( $\alpha$ ) with n-1 degrees of freedom (95% CI with n-1 degrees of freedom). The commonly accepted standard is to use 1.96, however for very small populations, less than ~140, the appropriate value must be identified from a look-up table (not applicable to this analysis).

- $s$  = the sample standard deviation
- $\bar{x}$  = sample mean for the community
- $n$  = sample size for a community

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<sup>4</sup>. Product names are given because they are established standards for the State of Alaska or for scientific completeness; they do not constitute product endorsement.

$N$  = total households in a community

As an interim step, the standard deviation (SD), or variance (V; which is the SD squared), was also calculated with the raw, unexpanded data. The standard error (SE), or SD of the mean was also calculated for the community. This was used to estimate the relative precision of the mean, or the likelihood that an unknown value would fall within a certain distance from the mean. In this study, the relative precision of the mean is shown in the tables as a confidence limit (CL), expressed as a percentage. Once the standard error was calculated, the CL was determined by multiplying the SE by a constant that reflected the level of significance desired, based on a normal distribution. The constant for 95% confidence limits is 1.96. Though there are numerous ways to express the formula below, it contains the components of an SD, V, and SE.

Relative precision of the mean (CL%):

$$\%(\pm) = \frac{t_{\alpha/2} \frac{s}{\sqrt{n}} \sqrt{N}}{\bar{x}} \quad (2)$$

where:

$s$  = sample standard deviation,

$n$  = sample size,

$N$  = population size, and

$t_{\alpha/2}$  = Student's  $t$  statistic for alpha level ( $\alpha=.95$ ) with  $n-1$  degrees of freedom.

Small CL percentages indicate that an estimate is likely to be very close to the actual mean of the sample. Larger percentages mean that estimates could be further from the mean of the sample.

### 3. RESULTS

#### CARIBOU

The total estimated study-year caribou harvest was 1,804 animals,  $\pm$  22%, or about 2.2 caribou per household. This provided approximately 245,287 edible pounds to the community, or almost 80 lb per capita (Table 2). More than double the number of households used caribou (82%) than harvested it. This reflects traditional food distribution practices such as sharing, barter, and customary trade. More households gave away caribou than actually harvested them, indicating that some of those who received caribou, in turn, gave it away.

Table 2.—Estimated harvest and uses of caribou, Kotzebue, 2012–2013.

Community	Percentage of households reporting					Estimated harvest			
	Use	Attempt	Harvest	Give	Receive	Total amount	Mean household amount	Per capita pounds	95% CI harvest
Kotzebue	82.0%	43.8%	38.7%	48.8%	59.4%	1,803.6	2.2	79.7	22.4%

*Source* ADF&G Division of Subsistence household surveys, 2012.

Hunting success rates (roughly measured by dividing the number of households attempting to harvest by the percentage of households that did so) for caribou were relatively high: 88%. This rough measure of success does not, however, account for effort: the number of trips made, instances of trips made with no harvest, distance traveled, and the money spent on gasoline and other supplies. Caribou harvest in a given year is influenced by many factors including: location relative to varied herd range and migration routes, the availability and successful harvest of other resources (notably marine mammals), the availability and reliability of equipment, travel conditions, gas prices, food preferences, and others.

A majority of Kotzebue’s caribou harvest, 61%, was bulls, and 20% was cows. Respondents were unable to recall the sex of the remaining 19% of harvested animals. Kotzebue hunters reported harvesting caribou in all months of the study year except June and July. Most caribou (68%) were taken in fall (August through October; Figure 2) with a strong preference for bulls. Nearly half (45%) of the caribou were taken in September alone. Lesser harvests occurred throughout the winter and into the spring, with some preference for females beginning in December. Detailed information on the harvest and uses of caribou and other resources is available in Appendix B. For a complete breakdown of caribou harvest by sex and month, see Appendix C.

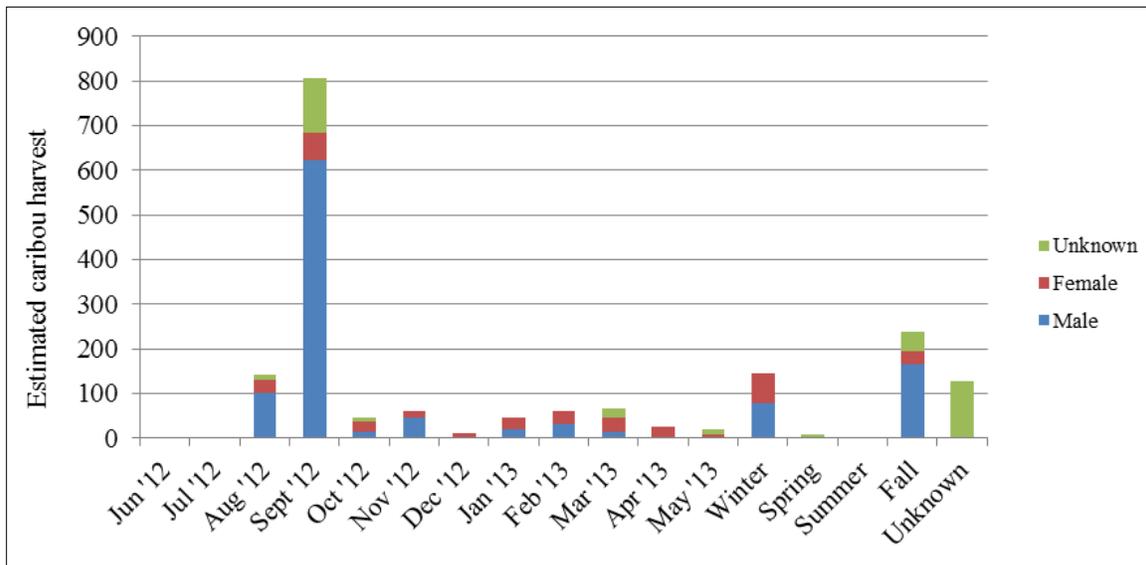


Figure 2.—Estimated caribou harvest by month, Kotzebue, 2012–2013.

Uncertainty about month of harvest can be attributed to a number of factors, including: the length of the study period, the time between harvest of animals and survey administration, the sheer number of animals harvested by a particular hunter or household (in the case of caribou), and which member of the household answers the survey questions. While surveyors attempt to speak to the hunters, they are at times unavailable, and another household head may respond to the survey questions. A hunter may be out of town, for example, and while the spouse can provide the number of caribou harvested, he or she may not be able to recall the sex or the exact month the caribou was harvested. Often, the season of harvest (for example, fall) is all the detail that can be obtained. Kotzebue’s caribou harvest took place in at least 19 UCUs in 2012–2013 (Figure 3). Harvest by location is broken down in tabular form in Appendix D. The survey did not ask where caribou were hunted, but rather where they were killed. A limitation to this approach is that the data cannot be assumed to represent the totality of areas searched. Rather, the UCU data provide an indication of the most common harvest areas; another is its very rough, generalized approach to location. In any year, hunters may use a vastly larger (or smaller) area than reflected in the map.

Nearly 50% of Kotzebue’s caribou harvest (an estimated 853 animals) came from 2 UCUs along the mainstem of the Kobuk River. More than half of those (25% of the total, about 447 animals) came from the unit that includes Onion Portage, where caribou migrations have crossed the Kobuk River for thousands of years. Six units that comprise northern tributaries to the Kobuk River each supplied 1–2% of the harvest, about 147 animals total, or 8% of the harvest. About 249 animals (14%) came from the lower Noatak River, immediately north of Kotzebue. Some 121 additional caribou were taken farther up the Noatak drainage, up to 300 trail-miles away from Kotzebue, or from areas west of the Noatak (such as the Situkvok River and the Igichuk Hills). About 124 caribou (7%) were taken on the Baldwin Peninsula, and 79 (5%) were taken from 2 units on the northern Seward Peninsula (the Kugrug River and Kiwalik River drainages). Harvest location information was unavailable for 227 caribou, 13% of the harvest.

Several respondents in Kotzebue reported that it has been more difficult to access the WAH in recent years, as more fully described in the Summary of Respondent Comments section of the report. A complete list of comments is presented in Appendix E.

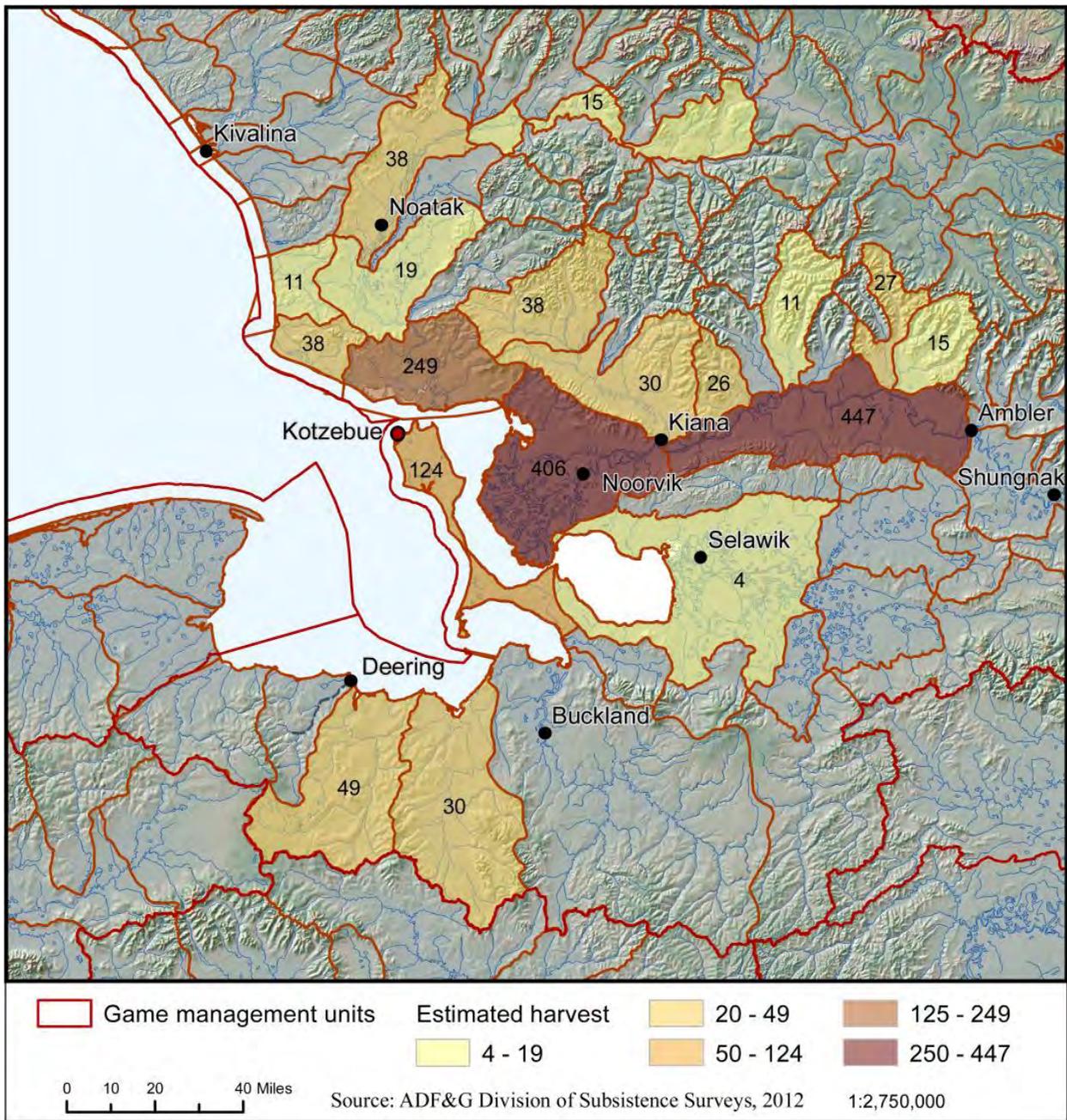


Figure 3.—Estimated caribou harvest by UCU, Kotzebue, June 2012–May 2013.

## MOOSE AND OTHER BIG GAME

Moose were not as widely harvested, shared, or used as caribou in Kotzebue during the study year. A much lower percentage of households reported moose hunting (18%) than caribou hunting, and their success rate was lower as well: more than half of those who hunted moose shot one, but some of the hunters who did not shoot a moose were part of a successful hunt with another household. Harvest was attributed to the household of the hunter who shot the moose. An estimated 72 moose were harvested by 9% of Kotzebue households in the study year. This harvest contributed an estimated 38,569 lb, or 12.5 lb per capita, to local diets. Lesser use of moose was reported than for caribou, 37%; 12% of households gave away moose and 30% received it (Table 3).

Table 3.—Estimated harvest and use of moose, Kotzebue, 2012–2013.

Community	Percentage of households reporting					Estimated harvest			
	Use	Attempt	Harvest	Give	Receive	Total amount	Mean household amount	Per capita pounds	95% CI harvest
Kotzebue	37.3%	17.5%	9.2%	12.4%	29.5%	71.7	0.1	12.5	36.9%

Source ADF&G Division of Subsistence household surveys, 2013.

Most moose (95%) were harvested in the fall (August–October). Of all moose taken, 79% were bulls, 10% were cows, and 11% were of unknown sex.

Moose were harvested in many of the same UCUs as caribou. Just over half of the moose were taken in the 2 coastal-delta units of the Kobuk and Noatak Rivers (19 animals, 26%, each). Five additional units supplied about 4 moose each: the Baldwin Peninsula, the middle Noatak River, the upper Squirrel River, the Onion Portage unit of the Kobuk River, and the Kiwalik River drainage on the Seward Peninsula. Harvest location information was unavailable for 16 moose, or 22% of the harvest. Detailed information about the sex, month, and location of moose harvests can be found in Appendix F.

An estimated 11 brown bears were harvested during the study year, for approximately 969 edible lb, or 0.3 lb per capita. About 2% of households attempted to hunt brown bear, and 1% were successful. The meat was shared so that 1.8% of households used it. There were no reports of black bear harvest, but 1% of households hunted for it, 1% received it, and 1% gave it away. A complete summary of big game harvest data appears in in Appendix B.

## FURBEARERS

The survey asked about the harvest and use of 2 big game furbearers, wolf and wolverine, the taking of which is allowed by regulation. An estimated 45 wolves were harvested by the 3% of households that hunted or trapped wolf (Appendix B). Likewise, all households that hunted or trapped for wolverine were successful, and took about 8 (Appendix B).

## SUMMARY OF RESPONDENT COMMENTS

Survey respondents made many comments about the regulation and management of hunting. The most common comments received were about transporter and guided hunts flying too low, disrupting the fall caribou migration, and wasting meat. Others said that the requirement to obtain permits at a local vendor helps ensure that local residents have hunting opportunities. Some stated that the State of Alaska is not doing enough to protect subsistence uses of wild game—and at least one suggested that (presumably non-local) sport hunting should be delayed because of its disruption of caribou migratory patterns.<sup>5</sup>

5. In the Noatak Controlled Use Area, a popular destination for non-local, transporter-based hunting, there is a delay in the fall season for that type of hunting in order to provide opportunity for local hunters. It is unclear if the respondent wanted a similar closure throughout Unit 23 and for what time period.

Several comments were received on existing or proposed development. One respondent said that the Red Dog mine road may already be disrupting the herd's migration. Others were concerned about new development and the need for strong environmental protection. One comment reflected concerns about increased access to alcohol and incidences of driving under the influence if there were a new road; the respondent preferred the thought of a railroad. Several comments were received about the changes in the marine environment, climate change, and fears of the impact from offshore drilling on marine mammals. Some respondents reported decreased caribou sightings in recent years, and others said caribou appeared to be healthy and well-fed in the study year.

Many survey respondents said they had not been able to hunt in the study year, most commonly because they did not have transportation. The high price of gas and the distance required were also cited as a hindrance to hunting. Many households said that caribou received from relatives and neighbors was critical. There were at least 2 comments about the survey itself. One respondent said she was not sure that harvest surveys do any good; another said that how much effort people have to put toward hunting should be taken into account.

### COMPARING THE 2012–2013 RESULTS WITH PREVIOUS SURVEY DATA

Because both community size and harvest volumes vary from year to year, per capita harvest (pounds per person) is a useful analytical measure for comparison (although most individuals actually use more or less.) For Kotzebue, per capita calculations reflect these variations, and also show a consistent reliance on the WAH (Figure 4). Here we make comparisons based on edible pounds of caribou and moose harvested per capita.

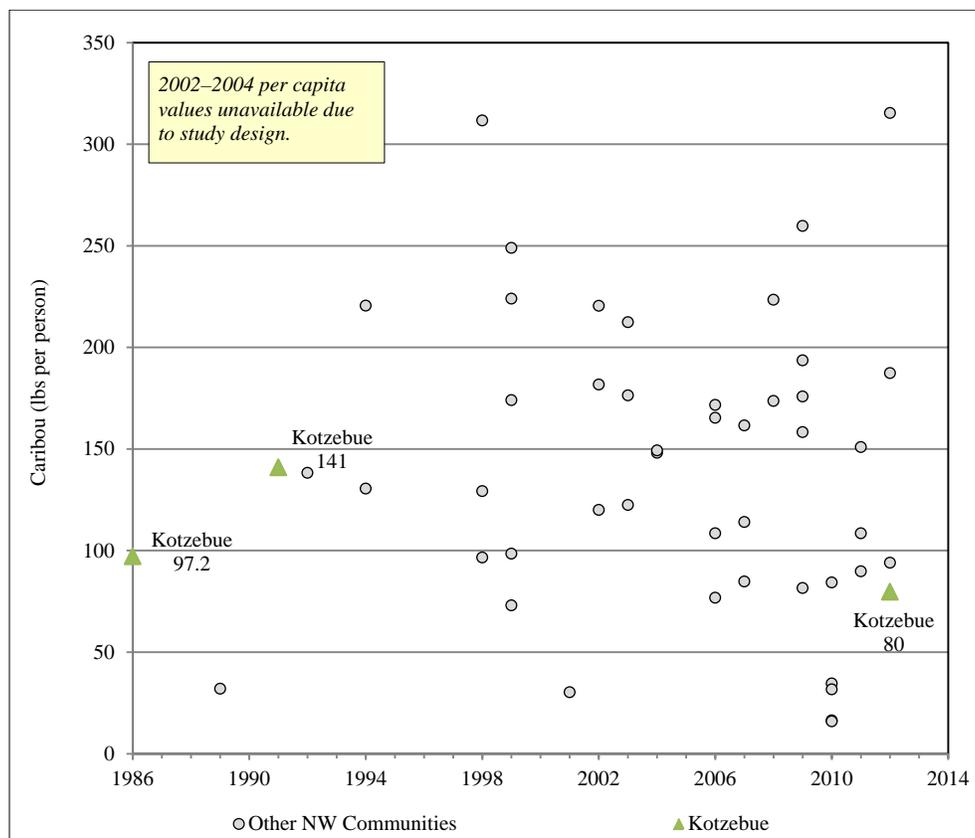


Figure 4.—Per person caribou harvests (edible pounds), Kotzebue and other Northwest Alaska communities, 1986–2012.

This survey was the sixth documenting Kotzebue's caribou harvest since 1980. The Division of Subsistence conducted comprehensive harvest surveys for Kotzebue in 1986 and 1991 (Fall and Utermohle 1995; Georgette and Loon 1993). The 1991 harvest estimate of 3,782 caribou is considered an overestimate because the survey was administered only to households that had been surveyed for the 1986 study year—thus creating a bias toward long term residents who tend to have higher harvests than shorter term residents. The Native Village of Kotzebue, the local Indian Reorganization Act (IRA) council, completed surveys in 2002, 2003, and 2004 with tribal members (Whiting 2006). While the 2002–2004 data may not be directly comparable because of the different scope in that study, the results are consistent with this study, estimating the average caribou harvest by tribal members for those years at 2,003 animals (Whiting 2006). Per capita harvest values are not available because that study did not calculate a population estimate based on its sample. For these reasons, this comparison is focused on the 1986 and 2012 study years with some reference to 1991 and 2002–2004.

In all six studies, caribou represented the vast majority of the reported (edible) big game harvest (86% to 95%). About 45% of households harvested caribou in 1986, compared with 44% in 2012–2013. High rates of sharing persisted between study years, with the percentage of households using caribou nearly double the percentage harvesting (88% in 1986 and 82% in 2012). The estimated 1986 harvest of 1,917 caribou comprised about 24% of the total subsistence harvest and provided about 97 edible pounds of caribou per capita for the estimated population of 2,681, as compared to this study's estimates of 80 lb per capita among a population of 3,076 (Figure 4). The estimate of 141 pounds per capita for the 1991 study year is not directly comparable because of the bias identified above. It should be noted that the population estimate for the total village was substantially higher in 1991 (3,649 people compared to 2,681 in 1986 and 3,076 in 2012), although this may also be a product of sampling bias because longer resident households are likely to also be larger.

An estimated 65 moose were harvested in 1986 by Kotzebue residents, which is again in line with the estimated 72 moose by the larger community population in 2012–2013. In 1986, 27% of households hunted for moose and 8% harvested moose, which was shared so that 42% of households used it. In 2012–2013, about 18% hunted, 9% harvested, and 37% of households used moose. The 1986 moose harvest provided about 34,721 edible pounds, or about 13 lb per capita for the estimated population of 2,681 people. Those results are similar to the 2012–2013 estimates of 38,569 lb, or 12.5 lb per capita. Moose harvest estimates in the survey of tribal households (2002–2004) ranged between 94 and 102 (Whiting 2006). Several other land mammal species (e.g., sheep, hare, lynx, etc.) were reported in the 1986 survey, which was comprehensive, but, in the interest of brevity, those species were not asked about in the 2012–2013 study. A table summarizing selected results, from this and prior studies documenting big game and furbearer harvests, appears in Appendix G.

Given the complexity of monitoring harvests from a caribou herd that spans hundreds of miles and at least 5 Game Management Units, and passes or lingers within reasonable proximity to dozens of villages (and practical limits to the number of surveys that can be done each year), a model has been developed to predict harvests of the WAH (Sutherland 2005). The model allows the prediction of each community's harvest depending on the size of the village (population) and the herd's proximity to the village (availability) in a given year. These estimates are summed for an annual estimate of the total subsistence harvest. The model predicted a total local resident harvest from the WAH at 14,700 animals, with a 95% confidence interval of 30%, meaning high certainty that the total harvest is between 10,100 and 19,700 animals annually. Continued focus on the production of comparable harvest survey results is vital to the continued reliability and improvement of the model. Given recent declines in the WAH, these predictions will be of critical importance for management decisions related to allowable harvests.

## **ACKNOWLEDGEMENTS**

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**WESTERN ARCTIC CARIBOU HERD SUBSISTENCE SURVEY**  
**KOTZEBUE, ALASKA**  
 JUNE 2012 to MAY 2013

**COOPERATING ORGANIZATIONS**

DIVISION OF SUBSISTENCE  
 ALASKA DEPT OF FISH & GAME  
 1300 COLLEGE RD  
 FAIRBANKS, AK 99701

(877) 646-7320

NATIVE VILLAGE OF KOTZEBUE

BOX 296  
 KOTZEBUE, AK 99752

(907) 485-2137



We are doing this survey to better understand subsistence in Alaska. Similar surveys have been conducted in more than 100 Alaska communities, including Deering, Buckland, Kotzebue, Kivalina, Noatak, Shungnak, Shishmaref, and Wales. Surveys help us estimate subsistence harvests. Surveys also help us describe the role of subsistence in Alaska's economy.

The survey asks how much game your household harvested last year, where you caught it, and the sex of the animal.

It also asks about how many people lived in your household and their age(s). We will NOT identify your household. We will NOT use this information for enforcement. Participation in this survey is voluntary. If you start a survey, you may stop at any time.

<b>HOUSEHOLD ID:</b>		
<b>COMMUNITY ID:</b>	KOTZEBUE	<b>203</b>
<b>RESPONDENT ID:</b>		
<b>INTERVIEWER:</b>		
<b>INTERVIEW DATE:</b>		
<b>START TIME:</b>		
<b>STOP TIME:</b>		
DATA CODED BY:		
DATA ENTERED BY:		
SUPERVISOR:		

**HOUSEHOLD MEMBERS**

HOUSEHOLD ID

First, I would like to know a few things about the people in your household. I want to know only about permanent members of your household, including college or high school students who return home every summer. I am NOT interested in people who lived with you temporarily, even if they stayed several months.

Between JUNE 2012 to MAY 2013...  
... who lived in your household?

ID#	How is this person related to head 1? <i>relation</i>	Is this person MALE or FEMALE? <i>circle</i>	How old is this person? <i>age</i>	Is this person Alaska Native? <i>circle</i>	Is this person answering questions on this survey? <i>circle</i>	Comments <i>enter text</i>
HEAD 1	SELF	M F		Y N	Y N	
01	1					

*NEXT, enter spouse or partner (including "play wife" or "play husband"). If household has a SINGLE HEAD, leave HEAD 2 blank.*

HEAD 2	SPOUSE	M F		Y N	Y N	
02	2					

*BELOW, enter children (oldest to youngest), grandchildren, grandparents, brothers, sisters, and other household members.*

03		M F		Y N	Y N	
04		M F		Y N	Y N	
05		M F		Y N	Y N	
06		M F		Y N	Y N	
07		M F		Y N	Y N	
08		M F		Y N	Y N	
09		M F		Y N	Y N	
10		M F		Y N	Y N	
11		M F		Y N	Y N	
12		M F		Y N	Y N	
13		M F		Y N	Y N	
14		M F		Y N	Y N	
15		M F		Y N	Y N	

PERMANENT HH MEMBERS: 01

KOTZEBUE: 203



**HARVESTS: LARGE LAND MAMMALS (continued)**

HOUSEHOLD ID

In the last 12 months... did your household...			
Use?	Try to Harvest?	Give Away?	Receive?
circle one			

In the last 12 months, where did members of your HH catch ____?			
Each line is for 1 area, 1 sex, 1 amount, and 1 month. Four bulls killed in the same area in September should be on the same line. A cow killed in the same area would be on a new line. Do not enter the same animal in two lines!			
WHERE were they harvested? enter UCU	Were these MALE or FEMALE? circle one	HOW MANY animals were killed? enter number	In what MONTH were these animals harvested? enter one month

MOOSE <i>Tinniikaq</i>	Y	N	Y	N	Y	N	Y	N
211800000								

	BULL	COW	?		
	BULL	COW	?		
	BULL	COW	?		
	BULL	COW	?		

BROWN BEAR <i>Akjaq</i>	Y	N	Y	N	Y	N	Y	N
210800000								

	BOAR	SOW	?		
	BOAR	SOW	?		
	BOAR	SOW	?		

BLACK BEAR <i>Iyyagriq</i>	Y	N	Y	N	Y	N	Y	N
210600000								

	BOAR	SOW	?		
	BOAR	SOW	?		
	BOAR	SOW	?		

**HARVESTS: FURBEARERS**

WOLF <i>Amaguq</i>	Y	N	Y	N	Y	N	Y	N
223200000								

	n/a				
--	-----	--	--	--	--

WOLVERINE <i>Qavik</i>	Y	N	Y	N	Y	N	Y	N
223400000								

	n/a				
--	-----	--	--	--	--

❖ If month of harvest is 'unknown', ask if respondent knows the season of harvest and write that in instead.

LAND MAMMALS: 10

KOTZEBUE: 203



Appendix B.–Harvests and uses of wild resources, Kotzebue, 2012–2013.

Resource	Percentage of households					Harvest weight (lb) <sup>a</sup>			Harvest quantity (individual)		
	Using	Attempting harvest	Harvesting	Giving	Receiving	Total	Per household	Per capita	Total	Per household	95% CI (±%)
Land mammals	85.3%	45.6%	40.1%	51.6%	68.7%	284,825.0	349.5	92.6	1,939.1	2.4	22.2%
Large land mammals	85.3%	45.6%	40.1%	51.2%	68.7%	284,825.0	349.5	92.6	1,886.5	2.3	21.8%
Black bear	1.4%	0.9%	0.0%	0.5%	1.4%	0.0	0.0	0.0	0.0	0.0	0.0%
Brown bear	1.8%	1.8%	1.4%	0.5%	0.9%	969.0	1.2	0.3	11.3	0.0	97.0%
Caribou	82.0%	43.8%	38.7%	48.8%	59.4%	245,286.9	301.0	79.7	1,803.6	2.2	22.4%
Moose	37.3%	17.5%	9.2%	12.4%	29.5%	38,569.1	47.3	12.5	71.7	0.1	36.9%
Small land mammals	3.7%	3.7%	3.7%	0.9%	0.0%	0.0	0.0	0.0	52.6	0.1	67.4%
Wolf	3.2%	3.2%	3.2%	0.9%	0.0%	0.0	0.0	0.0	45.1	0.1	68.1%
Wolverine	0.9%	0.9%	0.9%	0.0%	0.0%	0.0	0.0	0.0	7.5	0.0	119.1%

Source ADF&G Division of Subsistence household surveys, 2013.

Appendix C.–Harvests of caribou by sex and month of harvest, Kotzebue, 2012–2013.

Community	Sex	2012							2013					Season				Unknown	Total
		June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Winter	Spring	Summer	Fall		
	Male	0.0	0.0	101.4	623.5	15.0	45.1	0.0	18.8	30.0	15.0	3.8	0.0	78.9	0.0	0.0	165.3	0.0	1,096.7
Kotzebue	Female	0.0	0.0	30.0	60.1	22.5	15.0	11.3	26.3	30.0	30.0	22.5	7.5	67.6	0.0	0.0	30.0	0.0	353.0
	Unknown	0.0	0.0	11.3	121.7	8.3	0.0	0.0	0.0	0.0	22.5	0.0	11.3	0.0	8.3	0.0	42.1	128.5	353.9

Source ADF&G Division of Subsistence household surveys, 2013.

Appendix D.–Harvests of caribou by sex, month, and location of harvest, Kotzebue, 2012–2013.

Polygon	Sex	2012								2013					Season				Unknown	Total
		June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Winter	Spring	Summer	Fall			
23ZA003101	Male	0.0	0.0	7.5	60.1	0.0	15.0	0.0	0.0	3.8	0.0	3.8	0.0	0.0	0.0	0.0	30.0	0.0	120.2	
	Female	0.0	0.0	0.0	15.0	0.0	0.0	0.0	15.0	18.8	3.8	7.5	0.0	0.0	0.0	0.0	7.5	0.0	67.6	
	Unknown	0.0	0.0	0.0	8.3	8.3	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	37.6	61.6	
23ZA003102	Male	0.0	0.0	0.0	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23ZA003103	Male	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	
	Female	0.0	0.0	0.0	22.5	0.0	0.0	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.8	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23ZA003501	Male	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23ZA006101	Male	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	7.5	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23ZA008101	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Unknown	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	

-continued-

Polygon	Sex	2012								2013					Season				Unknown	Total
		June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Winter	Spring	Summer	Fall			
23ZB001101	Male	0.0	0.0	0.0	41.3	3.8	0.0	0.0	0.0	22.5	3.8	0.0	0.0	18.8	0.0	0.0	37.6	0.0	127.7	
	Female	0.0	0.0	26.3	0.0	0.0	0.0	0.0	0.0	11.3	26.3	7.5	0.0	67.6	0.0	0.0	3.8	0.0	142.7	
	Unknown	0.0	0.0	0.0	86.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	37.6	136.0	
23ZB001201	Male	0.0	0.0	67.6	221.6	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.4	0.0	371.8	
	Female	0.0	0.0	0.0	22.5	11.3	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.1	
	Unknown	0.0	0.0	11.3	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	
23ZB001301	Male	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23ZB001303	Male	0.0	0.0	0.0	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	18.8	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8	0.0	18.8	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23ZB001401	Male	0.0	0.0	0.0	26.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.3	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23ZB001801	Male	0.0	0.0	0.0	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

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Polygon	Sex	2012								2013					Season				Unknown	Total			
		June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Winter	Spring	Summer	Fall						
23ZB001802	Male	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0		
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23ZH000301	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.8	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	
23ZH000401	Male	0.0	0.0	0.0	0.0	0.0	18.8	0.0	0.0	0.0	0.0	0.0	0.0	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23ZH000601	Male	0.0	0.0	0.0	7.5	0.0	7.5	0.0	11.3	3.8	11.3	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.8	
	Female	0.0	0.0	3.8	0.0	11.3	3.8	0.0	11.3	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.6	
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.6	37.6	
23ZH004801	Male	0.0	0.0	0.0	30.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.6	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23ZH004901	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3	

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Polygon	Sex	2012							2013					Season				Unknown	Total		
		June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Winter	Spring	Summer	Fall				
23ZL000701	Male	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Missing	Male	0.0	0.0	22.5	120.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	142.7
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	8.3
Unknown	Male	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.3	0.0	0.0	30.0	
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.0	30.0	7.5	45.8		

Source ADF&G Division of Subsistence household surveys, 2013.

Appendix E.–Local comments and concerns, Kotzebue, 2012–2013.

Appendix E-1.–Questions, comments, or concerns

Household ID number	Questions, comments, or concerns
41	Meat on bone regulation is overkill. Should be figured by weight, without bone. Flying out with meat on bone is awkward/difficult.
82	Thanks for the flashlight!
83	Gun rights regulations for felons should match between the State and Federal government.
105	Concerns about what will happen to polar bear. Elders say that Kotzebue used to be the world capital of polar bear, but now [we] don't see them this far south anymore. Respondent is worried about the melt of ice.
229	Not sure that those surveys do any good!
241	What are they doing about the decline of caribou? What are they doing about the migration patterns disturbed by plane traffic (non-local hunters, we see that happening all the time - cost of hunting trip is about \$500 so we can't afford that.), especially on the Noatak? People there start to go to Kobuk to get caribou because couldn't find any last year. When younger, not much caribou - went up but now are decline again. Last year, not many caribou. There has been a steady decline in sighting the past 3 years - because of weather, they start migrating later.
313	RM80 Tag - possibility that it may be opened up to everybody. Shouldn't be opened, part of the reason we live. People are wasting meat, leaving them outside. There are conflicts between Natives/non-Native.
362	Sport hunters should start later - they disrupt the leaders; spread them all around. A lot of people don't get any because of it. We don't mind sharing, but residents' need should be considered first.
438	One male in household was bedridden due to cancer. He said his family received a lot of donations of meat from hunters, but because he was sick he couldn't go hunting anymore.
456	Don't know if it's counting [?] or hunters, but some years they take different routes - Road may be disrupting migration. Not against development, but should look at all the issues first. Price of fuel, or trageons [?] gotta be working to get out there. Concerns regarding road and alcohol. Taps helped. Railroad would (might) be better than road. Mining okay - needs to be done right. Same with oil offshore dangerous! Don't know what we'd do without <i>ugruk</i> . Look at all the angles.
466	I don't think the State is sincere about subsistence at all. Use constitution to try to choke things off. (Use berries, plants, fish)
483	This man said he was unable to hunt this past year because he got pneumonia and was in the hospital. He relied on friends and family sharing with him since he was unable to catch anything himself.
562	Caribou starting to get pus and little white things in them. One time big blob of green liquid when cut into joint. She knows Jim Dau and [surveyor] said he was definitely the one to talk to.
623	I need a new ride so I can go hunting.

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Household ID number	Questions, comments, or concerns
692	A couple of times, 2 troopers have gone down to Deering and shot a muskox after season was closed (on the same day) fly and hunt. This year, not really bad weather so animals caught were healthy, well-fed.
738	Where we hunt, there are bow 'n arrows; they wound the caribou so the animals go die in the mountains (they are non-local hunters). They hunt on the other side of the mountain and don't get their wounded animals, but we do. Caribou are wasted by those hunters. Tundra planes fly low to look at caribou, but delay and change the migration route - non-local hunters (guided hunts). There are illegal guided hunts upriver (on Federal land, NANA land). There are no more caribou around the Noaktak River, so we have to go further east. The tundra hunters disturb the herd and waste the meat. They throw away the meat and only keep the trophy. They don't take care of the meat so it ends up being wasted, people should shoot in the head of caribou instead of the chest not to spoil the meat.
784	Free fishing license at 60 or 65?
895	Vegetarian family
932	Transporters should be delayed by 2 weeks after Labor Day weekend because residents have to go 2-300 miles. Noatak residents had to go past Kiana. Residents should have the first shot; we let first migrators go by.
989	Should take into account effort
1029	Caribou herd seems to be healthy
1062	[We are] fish people

Appendix E-2.–Interview summary.

Household ID number	Interview summary
83	Respondent used to hunt but lost his gun rights because of a felony.
87	Said the mostly go fishing. They didn't have transportation to go hunting and stopped hunting when their parents passed away and they stopped going to camp.
96	Snowmachining broken so couldn't go hunt.
114	Agreed to take survey and said they didn't subsistence hunt for large mammals nor birds. Withheld further household information.
188	Usually go hunting but was busy with work this year.
278	No boat, so no way to go out hunting.
285	No boat to go hunting.
358	Sons did the hunting, usually with father who is not a member of the household.
406	Elder pilot, says sometimes he takes his friends out during hunting season.
414	Talked to spouse of head of household. She said lots of meat (caribou) they ate was from previous year or given to them. They also gave some meat away from meat that was given to them. Lots of sharing.
419	Talked to oldest son and teen son (about 16 years old). Both hunt and go to camp with dad, but teen son is not a permanent resident of Kotzebue.
421	Got meat and furs often from son-in-laws.
422	Only one in household. Did not harvest, but did receive some caribou meat.
426	Shared additional information on birds such as when they have <i>kumaks</i> or bugs; don't hunt in the summer when they are raising their young or birds are too young to harvest. Said main reason he did not go out this year was because he did not want to break down on his snowmobile.
430	Unsuccessful moose hunt but had meat from previous year and received and shared meat.
437	Only received some moose meat this year.
447	Said it has been a few years since the family has been out harvesting. Did receive some birds from someone, though.
451	Wife answered; husband was out at camp and looking for birds.
470	Said bad winter weather conditions for hunting. Not much snow this year.
486	Son who lives out of household does most of the hunting.
677	Respondent was not aware of the exact location where his grandpa and cousin went hunting for caribou last year. He was not sure of the month either (fall hunt).
813	Respondent has no transportation to go hunting.
842	Old man lives by himself. Doesn't have snowmachine anymore to go out hunting.
899	Unsure about details of harvest, but had general knowledge. BHM inadvertently surveyed hunter who hadn't realized the wife had been surveyed. Corrected answers to reflect what hunter explained to me.
997	It was over email.
1033	Respondent was leaving and answered the questions quickly. Said she, her husband, and son lived there and were all Alaska Native. Did not take the time to give ages - said they don't hunt birds or large game, but receive caribou.
1038	Usually gets caribou/moose from parents or relatives.
1070	Agreed, withheld further household info.

Appendix F.—Harvests of moose by sex, month, and location of harvest, Kotzebue, May 2011–April 2012.

Polygon	Sex	2012							2013					Season				Unknown	Total		
		June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Winter	Spring	Summer	Fall				
23ZA003101	Male	0.0	0.0	0.0	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3
	Female	0.0	0.0	3.8	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23ZA003103	Male	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23ZB001101	Male	0.0	0.0	0.0	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23ZB001201	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8
23ZB001303	Male	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23ZH000401	Male	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Polygon	Sex	2012								2013					Season				Unknown	Total
		June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Winter	Spring	Summer	Fall			
23ZH000601	Male	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23ZH004901	Male	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Missing	Male	0.0	0.0	0.0	3.8	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unknown	Male	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8
	Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0	4.1

Source ADF&G Division of Subsistence household surveys, 2013.

Note Survey period May 2012-April 2013.

Appendix G.—Comparison of 2012 estimates with previous survey results, Kotzebue.

Kotzebue Resource	Estimated number harvested						Per capita pounds harvested					
	1986 <sup>a</sup>	1991 <sup>b</sup>	2002 <sup>c</sup>	2003 <sup>c</sup>	2004 <sup>c</sup>	2012 <sup>d</sup>	1986	1991	2002 <sup>e</sup>	2003 <sup>e</sup>	2004 <sup>e</sup>	2012
Black bear	20	32	1	0	3	0	0.7	0.8	–	–	–	0.0
Brown bear	9	8	8	1	1	11	0.3	0.2	–	–	–	0.3
Caribou	1917	3782	2376	1719	1915	1804	97.2	141.0	–	–	–	79.7
Moose	65	235	102	94	95	72	13.0	34.6	–	–	–	12.5
Wolf	22	24	16	12	22	45	0.0	0.0	–	–	–	0.0
Wolverine	20	49	11	13	20	8	0.0	0.0	–	–	–	0.0

a. *Source* Georgette and Loon 1993.

b. *Source* Fall and Utermohle 1995.

c. *Source* Whiting 2006.

d. *Source* ADF&G Division of Subsistence household surveys, 2013.

e. The study did not calculate a population estimate.