

**Customary and Traditional Use Worksheet, Caribou,
Game Management Unit 18**

Prepared by

Jim Simon, Ph.D.

**Alaska Department of Fish and Game, Division of Subsistence
for the March 2016 Board of Game meeting**

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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 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	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 _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 ₀
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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GAME MANAGEMENT UNIT 18**

Prepared by

Jim Simon, Ph.D.

Alaska Department of Fish and Game Division of Subsistence, Fairbanks

Alaska Department of Fish and Game
Division of Subsistence
1300 College Road
Fairbanks, AK 99701

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The Division of Subsistence Technical Paper series was established in 1979 and represents the most complete collection of information about customary and traditional uses of fish and wildlife resources in Alaska. The papers cover all regions of the state. Some papers were written in response to specific fish and game management issues. Others provide detailed, basic information on the subsistence uses of particular communities which pertain to a large number of scientific and policy questions.

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Jim Simon

*Alaska Department of Fish and Game Division of Subsistence
1300 College Road, Fairbanks, Alaska 99701-1551 USA*

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INTRODUCTION

BACKGROUND

Proposal 134, submitted by the department as an Agenda Change Request for the March 18–28, 2016 Alaska Board of Game meeting, seeks to liberalize the bag limit for Mulchatna caribou throughout its range, including Game Management Unit (GMU) 18. Currently, the customary and traditional use determination for Mulchatna caribou does not include GMU 18 in 5 AAC 99.025(a)(4). Previously, the board made a positive customary and traditional use determination for caribou in GMU 18 associated with the Andreafsky and *Qauilnguut* (Kilbuck) caribou herds (appendices A-C). Because these 2 herds are no longer recognized by wildlife managers within GMU 18, the department has developed this new customary and traditional use worksheet for caribou in GMU 18 pursuant to AS 16.05.094 and AS 16.05.258.

This review of the 8 criteria associated with customary and traditional use determinations, as defined by the Joint Boards of Fisheries and Game in 5 AAC 99.010, depends upon an extensive review of the literature and recent research (2000–2013) conducted by the Division of Subsistence in GMU 18. The substantial quantity of new information assembled regarding the history of and contemporary uses of caribou in GMU 18 illustrate the continuing customary and traditional uses of caribou in the Yukon-Kuskokwim Delta area.

The current Alaska Board of Game finding related to the amount reasonably necessary for subsistence uses (ANS) of caribou in GMU 18 was made on November 12, 1992 and set at 350–500 caribou per year (5 AAC 99.025(a)(4)). This ANS finding, required under the subsistence statute (AS 16.05.258(b)), was based upon historical harvests of caribou from both the Andreafsky and Kilbuck caribou herds in GMU 18. Also in 1992, the Alaska Board of Game identified the Mulchatna caribou herd as being associated with customary and traditional subsistence uses; the current ANS found in regulation for the Mulchatna herd is 2,100–2,400 caribou¹. The ANS for the Mulchatna caribou herd, however, does not include the historical caribou harvest information from GMU 18, because the Mulchatna herd had not yet absorbed the Kilbuck herd at the time the Mulchatna ANS was established by the Board of Game (also on November 12, 1992).

Although this customary and traditional use worksheet provides recent caribou harvest estimates for 24 communities within or adjacent to GMU 18 in Table 1, ANS revision options are not provided at this time because of the relatively new registration permit requirement for caribou in GMU 18 adopted by the Alaska Board of Game beginning with the 2013–2014 regulatory year. ADF&G Division of Subsistence typically recommends that ANS findings be postponed until a reliable harvest data series is established: 3 to 5 years of data is the minimum needed to begin to understand patterns and trends.² Although recent household survey data exist, they are limited by the fact that only a sample of community caribou harvest estimates have been documented, and inter-annual and inter-community harvest patterns vary considerably due to a variety of factors, including, but not limited to, variable distances from communities to where caribou are located and variable travel and access conditions. Although household surveys do not inquire from which herd a harvested caribou originated, the mapping of caribou search and harvest areas clearly identifies that these harvests were of Mulchatna caribou (Appendix D).

Most of the research summarized in Table 1 was conducted by ADF&G Division of Subsistence in partnership with participating tribal councils and other community organizations, with the exception of the research conducted by Weekley et al. (2011). Funding for these various research projects came primarily

1. See Alaska Board of Game findings #2011-188-BOG

<http://webdev.dfg.alaska.local/static/regulations/regprocess/gameboard/pdfs/findings/11-188-bog.pdf> and #2012-197-BOG

<http://webdev.dfg.alaska.local/static/regulations/regprocess/gameboard/pdfs/findings/12-197-bog.pdf>

2. Fall, J. 2009. Steps to follow in preparing background information and options for Board of Fisheries and Board of Game “Amount Reasonably Necessary for Subsistence” (ANS) findings (implementing AS 16.05.258(b)). These steps are a synopsis of a more detailed set of ANS development guidelines prepared by the Division of Subsistence, ADF&G, as part of its “Subsistence Research Handbook.”

Table 1.—Harvest and use of caribou in GMU 18, Yukon River, Kuskokwim River, Bering Sea, and Bristol Bay communities, 2000–2013.

Community	Study year	Percentage of households					Estimated pounds harvested			Total estimated amount harvested by community	95% conf. limit	Source	Map
		Using	Attempting harvest	Harvesting	Receiving	Giving away	Total for community	Mean per household	Mean per capita				
Yukon River communities													
Alakanuk	2009	4.7%	0.0%	0.0%	4.7%	0.0%	0.0 lb	0.0 lb	0.0 lb	0.0 ind	–	Weekley et al. 2011	No map
Emmonak	2008	7.3%	0.9%	0.0%	7.3%	0.9%	0.0 lb	0.0 lb	0.0 lb	0.0 ind	–	Fall et al. 2012 (TP 371)	No map
Kotlik	2009	10.2%	2.0%	2.0%	10.2%	4.1%	260.0 lb	2.6 lb	0.0 lb	2.0 ind	1–18 ind	Weekley et al. 2011	No map
Marshall	2009	16.3%	6.1%	4.1%	12.2%	6.1%	780.0 lb	10.4 lb	2.6 lb	6.0 ind	4–16 ind	Weekley et al. 2011	No map
Marshall	2010	6.5%	2.2%	2.2%	4.3%	2.2%	720.7 lb	8.5 lb	2.1 lb	5.5 ind	±136.4%	Brown et al. 2015 (TP 410)	No map
Mountain Village	2009	7.9%	1.6%	1.6%	7.9%	1.6%	1,170.0 lb	7.8 lb	1.3 lb	9.0 ind	4–28 ind	Weekley et al. 2011	No map
Mountain Village	2010	6.1%	0.9%	0.0%	6.1%	0.0%	0.0 lb	0.0 lb	0.0 lb	0.0 ind	±0%	Brown et al. 2015 (TP 410)	No map
Pilot Station	2013	6.4%	1.1%	1.1%	5.3%	1.1%	354.0 lb	2.8 lb	0.6 lb	2.7 ind	±102.3%	Ikuta et al. <i>In Prep</i> ^a	Figure D-16-1
Russian Mission	2009	27.9%	4.7%	0.0%	23.3%	9.3%	0.0 lb	0.0 lb	0.0 lb	0.0 ind	–	Weekley et al. 2011	No map
Russian Mission	2011	10.9%	4.3%	4.3%	6.5%	4.3%	726.5 lb	9.2 lb	1.8 lb	5.2 ind	±96%	Ikuta et al. 2014 (TP 396)	Figure D-12
Kuskokwim River communities													
Akiak	2010	78.0%	52.0%	37.0%	56.0%	33.0%	7,162.4 lb	80.5 lb	18.6 lb	55.1 ind	±21%	Brown et al. 2013 (TP 379)	Figure D-6
Aniak	2009	8.0%	11.0%	1.0%	6.0%	2.0%	470.0 lb	2.8 lb	1.0 lb	4.0 ind	±61%	Brown et al. 2012 (TP 365)	Figure D-3
Bethel	2011	54.5%	22.0%	16.3%	22.2%	41.0%	57,963.0 lb	30.8 lb	9.4 lb	445.9 ind	±20%	Runfola et al. 2014 (SP 2014-01)	Figure D-10
Bethel	2012	55.1%	19.5%	13.1%	44.7%	15.1%	48,644.0 lb	29.6 lb	8.6 lb	374.2 ind	±27%	Ikuta et al. <i>In Prep</i> ^b	Figure D-13
Eek	2013	60.9%	37.5%	26.6%	34.4%	26.6%	6,064.4 lb	67.4 lb	17.5 lb	46.6 ind	±27.7%	Ikuta et al. <i>In Prep</i> ^a	Figure D-15
Kalskag, Lower ^c	2003	35.3%	38.2%	29.4%	17.6%	20.6%	6,056.0 lb	84.1 lb	20.0 lb	46.6 ind	±67%	Krauthoefer et al. 2015 (TP 310)	No map
Kalskag, Lower	2009	22.0%	11.0%	3.0%	19.0%	5.0%	464.0 lb	6.2 lb	1.6 lb	4.0 ind	±59%	Brown et al. 2012 (TP 365)	Figure D-4
Kalskag, Upper	2009	15.0%	17.0%	2.0%	13.0%	4.0%	163.0 lb	2.7 lb	0.8 lb	1.0 ind	±605%	Brown et al. 2012 (TP 365)	Figure D-5
Kwethluk	2010	87.0%	49.0%	39.0%	65.0%	32.0%	14,403.2 lb	92.9 lb	20.2 lb	110.8 ind	±21%	Brown et al. 2013 (TP 379)	Figure D-7
Napakiak	2011	75.0%	35.7%	32.1%	44.6%	30.4%	6,274.5 lb	70.5 lb	19.8 lb	44.5 ind	±27%	Ikuta et al. 2014 (TP 396)	Figure D-11
Napaskiak	2011	85.7%	50.0%	41.1%	51.8%	40.0%	8,510.7 lb	88.7 lb	17.7 lb	60.4 ind	±24%	Ikuta et al. 2014 (TP 396)	No caribou map
Nunapitchuk	2012	42.0%	6.0%	4.0%	11.0%	41.0%	1,901.3 lb	16.3 lb	3.5 lb	14.6 ind	±48%	Simon et al. 2016 (SP 2016-01)	Figure D-14
Oscarville	2010	92.0%	58.0%	50.0%	42.0%	50.0%	1,365.0 lb	97.5 lb	21.7 lb	10.5 ind	±28%	Brown et al. 2013 (TP 379)	Figure D-8
Tuluksak	2010	68.0%	35.0%	22.0%	51.0%	24.0%	3,800.1 lb	44.2 lb	8.3 lb	29.2 ind	±26%	Brown et al. 2013 (TP 379)	Figure D-9
Tuntutuliak	2013	19.4%	9.0%	7.5%	13.4%	6.0%	1,614.3 lb	15.5 lb	3.9 lb	12.4 ind	±54.2%	Ikuta et al. <i>In Prep</i> ^a	Figure D-19
Bering Sea coastal communities													
Chevak	2009	1.6%	3.1%	3.1%	18.8%	7.8%	1,040.0 lb	6.5 lb	1.3 lb	8.0 ind	3–23 ind	Weekley et al. 2011	No map
Quinhagak	2013	65.1%	40.7%	29.4%	43.1%	23.1%	16,229.7 lb	100.2 lb	22.2 lb	124.8 ind	±21%	Ikuta et al. <i>In Prep</i> ^a	Figure D-17
Scammon Bay	2009	12.8%	0.0%	0.0%	12.8%	10.6%	0.0 lb	0.0 lb	0.0 lb	0.0 ind	–	Weekley et al. 2011	No map
Scammon Bay	2013	20.0%	3.5%	3.5%	16.5%	5.9%	1,301.5 lb	10.6 lb	2.1 lb	10.0 ind	±64%	Ikuta et al. <i>In Prep</i> ^a	Figure D-18
Bristol Bay communities													
Togiak ^d	1999–2000	70.6%	55.6%	47.4%	45.0%	40.6%	26,635.0 lb	151.3 lb	36.6 lb	177.6 ind	±23.2%	Coiley-Kenner et al. 2003 (TP 275)	Figure D-1
Togiak ^d	2008	82.5%	38.8%	30.0%	65.0%	36.3%	20,445.0 lb	108.8 lb	25.5 lb	136.3 ind	±23.3%	Fall et al. 2012 (TP 371)	Figure D-2

a. Ikuta, Hiroko et al. *In Prep*. Subsistence harvests in 6 communities in the Bering Sea, Kuskokwim River Drainage, and Yukon River, 2013. ADF&G Division of Subsistence. Fairbanks.

b. Ikuta, Hiroko et al. *In Prep*. Subsistence harvests and uses in Bethel, 2012. ADF&G Division of Subsistence. Fairbanks.

c. Of the 46.6 estimated total caribou taken by residents of Lower Kalskag in 2003, only 14.8 were taken from GMU 18.

from Donlin Gold³ (Brown et al. 2012, 2013; Ikuta et al. 2014), state general funds⁴ (Brown et al. 2015; Runfola et al. 2014; Simon et al. 2016), the North Pacific Research Board (Fall et al. 2012), and the federal Office of Subsistence Management (Coiley-Kenner et al. 2003; Krauthoefer et al. 2015; Weekley et al. 2011). Table 2 presents caribou harvest information from those communities listed in Table 1 that include comprehensive subsistence harvest information from household surveys of all fish, wildlife, and plant resources. Table 2 includes the estimated total pounds of caribou harvested in each community, as well as the total big game harvested (in edible pounds) and total subsistence resources harvested. From this data set, the proportions of caribou harvested relative to the total big game harvested and the estimated total of all resources harvested are presented by dividing the edible pounds of caribou by the total big game harvested (lb) and the total subsistence harvest (lb), respectively. Table 2 will be discussed in more detail under Criterion 8.

Contemporary customary and traditional uses of caribou include use of caribou meat for food and use of the nonedible byproducts of caribou for ceremonial and cultural purposes such as the iconic Yup'ik dance fans, which often incorporate caribou beard hairs. Caribou hunting features in some Yup'ik oral traditions, which, as represented in John (1981) and discussed in more detail under Criterion 7 below, may also suggest that traditional caribou management approaches that avoided overharvesting caribou in the Yukon-Kuskokwim Delta were transmitted from generation to generation through storytelling.

3. Ikuta, Hiroko, et al. *In prep.* Subsistence harvests in 6 communities in the Bering Sea, Kuskokwim River drainage, and Yukon River, 2013. Alaska Department of Fish and Game Division of Subsistence. Fairbanks.

4. Ikuta, Hiroko, et al. *In prep.* The harvest and uses of wild resources in Bethel, Alaska, 2012. Alaska Department of Fish and Game Division of Subsistence. Fairbanks.

Table 2.—Caribou harvests as proportions of big game harvests and harvests of all resources, Yukon River, Kuskokwim River, Bering Sea and Bristol Bay communities, 2000–2013.

Community	Study year	Estimated total community harvest						Caribou harvest as proportion of:		Source
		Caribou	95% conf. limit	Big game	95% conf. limit	All resources	95% conf. limit	Big game harvest	All resources harvest	
Yukon River communities										
Marshall	2010	720.7 lb	±136.4%	24,594.6 lb	±22.9%	134,426.5 lb	±21.0%	2.9 %	0.5 %	Brown et al. 2015 (TP 410)
Pilot Station	2013	354.0 lb	±102.3%	38,209.4 lb	±14.5%	97,450.8 lb	±14.5%	0.9 %	0.4 %	Ikuta et al. <i>In Prep</i> ^a
Russian Mission	2011	726.5 lb	±96%	43,186.8 lb	±19%	132,289.3 lb	±18%	1.7 %	0.5 %	Ikuta et al. 2014 (TP 396)
Kuskokwim River communities										
Akiak	2010	7,162.4 lb	±21%	22,080.5 lb	±19%	237,441.0 lb	±30%	32.4 %	3.0 %	Brown et al. 2013 (TP 379)
Aniak	2009	470.0 lb	±61%	20,655.0 lb	±14%	147,316.0 lb	±27%	2.3 %	0.3 %	Brown et al. 2012 (TP 365)
Bethel	2012	48,644.0 lb	±27%	245,892.2 lb	±17%	940,425.6 lb	±15%	19.8 %	5.2 %	Ikuta et al. <i>In Prep</i> ^b
Eek	2013	6,064.4 lb	±28%	13,658.1 lb	±23.3%	88,004.4 lb	±13.2%	44.4 %	6.9 %	Ikuta et al. <i>In Prep</i> ^a
Kalskag, Lower	2003	6,056.0 lb	±67%	22,278.0 lb	±58%	N/A	N/A	27.2 %	N/A	Krauthoefer et al. 2015 (TP 310)
Kalskag, Lower	2009	464.0 lb	±59%	10,562.0 lb	±17%	55,793.0 lb	±12%	4.4 %	0.8 %	Brown et al. 2012 (TP 365)
Kalskag, Upper	2009	163.0 lb	±605%	9,388.0 lb	±28%	69,880.0 lb	±25%	1.7 %	0.2 %	Brown et al. 2012 (TP 365)
Kwethluk	2010	14,403.2 lb	±21%	34,176.6 lb	±18%	259,698.5 lb	±17%	42.1 %	5.5 %	Brown et al. 2013 (TP 379)
Napakiak	2011	6,274.5 lb	±27%	15,834.1 lb	±27%	154,784.6 lb	±21%	39.6 %	4.1 %	Ikuta et al. 2014 (TP 396)
Napaskiak	2011	8,510.7 lb	±24%	29,347.8 lb	±23%	196,762.9 lb	±21%	29.0 %	4.3 %	Ikuta et al. 2014 (TP 396)
Oscarville	2010	1,365.0 lb	±28%	2,625.0 lb	±35%	32,796.1 lb	±21%	52.0 %	4.2 %	Brown et al. 2013 (TP 379)
Tuluksak	2010	3,800.1 lb	±26%	15,664.0 lb	±18%	163,606.3 lb	±14%	24.3 %	2.3 %	Brown et al. 2013 (TP 379)
Tuntutuliak	2013	1,614.3 lb	±54%	10,834.6 lb	±31.9%	157,818.2 lb	±15.2%	14.9 %	1.0 %	Ikuta et al. <i>In Prep</i> ^a
Bering Sea coastal communities										
Quinhagak	2013	16,229.7 lb	±21%	38,701.7 lb	±21.8%	224,113.0 lb	±13.7%	41.9 %	7.2 %	Ikuta et al. <i>In Prep</i> ^a
Scammon Bay	2013	1,301.5 lb	±64%	51,302.4 lb	±13.5%	292,322.3 lb	±11.5%	2.5 %	0.4 %	Ikuta et al. <i>In Prep</i> ^a
Bristol Bay communities										
Togiak ^c	1999–2000	26,635.0 lb	±23.2%	53,139.3 lb	±21.6%	179,004.7 lb	±16.8%	50.1 %	14.9 %	Coiley-Kenner et al. 2003 (TP 275)
Togiak ^c	2008	20,445.0 lb	±23%	40,279.0 lb	±20.9%	243,207.9 lb	±13.2%	50.8 %	8.4 %	Fall et al. 2012 (TP 371)

a. Ikuta, Hiroko et al. *In Prep*. Subsistence harvests in 6 communities in the Bering Sea, Kuskokwim River Drainage, and Yukon River, 2013. ADF&G Division of Subsistence. Fairbanks.

b. Ikuta, Hiroko et al. *In Prep*. Subsistence harvests and uses in Bethel, 2012. ADF&G Division of Subsistence. Fairbanks.

c. A relatively small proportion of Togiak residents' total caribou harvest was taken from southern GMU 18 in 1999–2000 and 2008.

THE EIGHT CRITERIA

CRITERION 1: LENGTH AND CONSISTENCY OF USE

A long-term consistent pattern of noncommercial taking, use, and reliance on the fish stock or game population that has been established over a reasonable period of time of not less than one generation, excluding interruption by circumstances beyond the user's control, such as unavailability of the fish or game caused by migratory patterns.

Archaeological evidence suggests that caribou, or *tuntu* in Central Yup'ik, have been hunted in the mountain areas north and south of the Yukon River and southeast of the Kuskokwim River since prehistoric times (Ackerman 1979, 1980, 1996a–c, 2001; Britton et al. 2013)¹. In 2014, excavations near Quinhagak at the old winter village now referred to as *Nunalleq*, “the old village,” which dates back at least 700 years, uncovered a piece of caribou antler upon which a caribou figure had been carved (Plate 1). Recent archaeological research and stable isotope analysis of human hair excavated from *Nunalleq* demonstrates the long-standing importance of caribou and other terrestrial mammals as a subsistence resource for both food and material for tool-making (Britton et al. 2013).²

Oral histories, explorer accounts, and traditional knowledge also document a historical pattern of caribou use in the Yukon-Kuskokwim Delta region despite their general absence from the region during the late 19th century and first half of the 20th century.³ However, Ray (1975:174) stated, “Charles W. Raymond also observed in 1869 that back of the coast between the mouth of the Yukon and Saint Michael the valleys swarmed with caribou, ‘herds of which are seen feeding on almost every hill.’” Similarly, during his travels through the Yukon-Kuskokwim Delta region in 1882 and 1883, Norwegian explorer Johan Adrian Jacobsen noted that people from the lower Yukon River still hunted caribou (Fienup-Riordan 2005a:222).⁴

Prior to establishing the permanent communities known today, people lived throughout the delta and surrounding uplands in scattered settlements and seasonal camps from which they trapped, fished, and hunted animals, including caribou (Brown 1983:87; Fienup-Riordan and Rearden 2015:13,15,16; Fienup-Riordan et al. 2000; Carl Kawagley quoted in Lenz and Barker 1985:62).

Of the land animals sought the most important was the wild reindeer [i.e., caribou], which formerly ranged in seeming abundance throughout the tundra lands of the Alaska coastal mainland north of the Alaska Range. These animals were used for food, and their skins were made into parkas, pants, footwear, bed coverings, tents, and boat sails. They were the only large land animal used for food which the country offered the Eskimos in sufficient quantities to be considered an essential part of the food supply. (Anderson and Eells 1935:78)

1. Ackerman, Robert E. 1982. *The Archeology of the Central Kuskokwim Region: A Final Research Report to the National Geographic Society*, unpublished report.

2. Nunalleq 2015: An archaeological adventure by the Bering Sea. <https://nunalleq.wordpress.com/>. (Accessed October 21, 2015) See also: Denner, L. *Archaeologists rush to save Yup'ik treasures threatened by vanishing shoreline*. Alaska Daily News, August 30, 2014. <http://www.adn.com/article/20140830/archaeologists-rush-save-ancient-yupik-treasures-threatened-melting-permafrost> (Accessed October 21, 2015)

3. Barker and Barker 1993; Black 1984; Coffing 1991; Coffing et al. 2001; Fienup-Riordan and Rearden 2015:13,15,16; Fienup-Riordan 1986:20,32, 2005a:189, 2007:7,245; Fienup-Riordan et al. 2000; John 1981; Nelson and True 1887:285–286; Nelson 1983rev.:118–120; Oswalt 1979:254,258,264; Ray 1975:73,125,128; VanStone 1984; Zagoskin 1967:91,93,94,101

4. “Jacobsen candidly wrote: ‘I obtained this figure [of a wooden human figure of a house's helping spirit] in a house whose inhabitants had gone on a reindeer [caribou] hunt; the protective god was left behind. This gave me the opportunity to obtain the seemingly unattainable figure, something I had tried for months.’” (Fienup-Riordan 2005a:222)



Photo reprinted by permission of Dr. Richard Knecht, Department of Archaeology, University of Aberdeen
Plate 1.—Caribou figure carved on a piece of caribou antler, Nunalleq.

It will be remembered that wild reindeer were an important part of the Eskimo food supply before the coming of the whites but that the introduction of firearms quickly decimated them, rendering the Eskimos almost destitute. (Anderson and Eells 1935:195)

During this increasing scarcity of wild reindeer in the regions plentifully supplied with firearms, the Eskimos were more and more dependent upon trade with the Siberian natives, who secured tame reindeer skins from the deer-herding people of Siberia. Deerskins continued to be the principal material used in making clothing, as no adequate substitute existed. (Anderson and Eells 1935:78)

Although caribou have not always been abundant in the Yukon-Kuskokwim Delta area, people have continued to harvest and use them when the animals have been available or otherwise traded for caribou products, especially the hides (e.g., Black 1984:30; Ray 1975:73,125,128; Zagoskin 1967:100). Harvest efforts and harvest success fluctuated year to year due to variations in overall caribou population levels, seasonal movements, and geographic distribution patterns. During historical times when caribou were not locally available, Kuskokwim area residents trapped Arctic ground (or “parkie”) squirrels, marmots, and other furbearers, which they then traded to Bering Strait traders north of the Yukon River for caribou and reindeer hides from the Russian Far East.⁵ Reindeer were introduced into the Bering Strait region in the late 19th century and into the Yukon-Kuskokwim Delta region in the early 20th century, in part to supplement the local economy due to the absence of the previous caribou migrations through the region. Zagoskin (1967:212) noted that, “As they lack the leg hide of the deer, the Kuskokwim and Yukon natives make their boots very skillfully of once-frozen king salmon skins, with soles of the same.” However, Zagoskin (1967:289) also noted that in 1842, the hunter he sent out from the fort at Saint Michael returned with 5 caribou in 2 weeks, and in 1844, 10 caribou in 3 weeks, which more than paid for the costs of assigning men

5. Adams 1982:117; Anderson and Eells 1935:78; Black 1984:30; Fienup-Riordan 2005a; Lenz and Barker 1985:52; Ray 1975:73,124–125,128; Schwatka 1983rep.:323–324; Whympers 1966rep.:136–138; Wolfe 1984:164; Wolfe et al. 1984:320; Zagoskin 1967:100–102. See Simon (1998:75–92) for a discussion of the intercontinental trade in reindeer products throughout the Bering Strait region.

the job of caribou hunting to support the fort due to the high costs in trade value with Alaska Natives, who would trade furs for caribou hides.

However, despite the interruptions in accessibility to caribou during the late 19th and early 20th centuries, caribou continued to be important subsistence resources for residents of GMU 18 during the late 20th and early 21st centuries as documented by the data below.

Table 1 presents a variety of community subsistence caribou harvest and use information from the past 13 years of household survey research conducted in 24 communities located within or adjacent to GMU 18. This table is arranged alphabetically by Yukon River drainage, Kuskokwim River drainage, Bering Sea Coast, and Bristol Bay communities. Information includes reported community household participation rates in using caribou, attempting to harvest caribou, successfully harvesting caribou, receiving caribou from others, and giving away caribou to others. Table 1 also shows the estimated total numbers of caribou harvested, the estimated total pounds of caribou meat harvested by the community, the mean caribou harvests per household, and the mean caribou harvests per person. Most of these estimates are bounded by 95% confidence intervals. Table 1 also includes the reference source documents from which these data were extracted, as well as the figure number of the associated caribou search and harvest area within GMU 18 in cases where this information is available (see Appendix D and discussion in Criterion 4). It should be noted, however, that none of these data represent complete coverage of community caribou hunting and harvest information, because research was not conducted in many other GMU 18 communities, and in no cases were 100% of a community's households surveyed and subsistence resource and land use information mapped. As a result, caribou hunting and harvest could have also occurred in areas and at other levels than those reported here.

Seven Yukon River communities are represented in this data set, including Alakanuk (2009), Emmonak (2008), Kotlik (2009), Marshall (2009, 2010), Mountain Village (2009, 2010), Pilot Station (2013), and Russian Mission (2009, 2011). Although no caribou harvest was documented in Alakanuk in 2009, Emmonak in 2008, Mountain Village in 2010, or Russian Mission in 2009, households within these communities reported using caribou during the study year, demonstrating a consistent pattern of sharing resources that typifies customary and traditional community patterns of use.

Thirteen Kuskokwim River communities are represented in Table 1, including Akiak (2010), Aniak (2009), Bethel (2011, 2012), Eek (2013), Lower Kalskag (2003, 2009), (Upper) Kalskag (2009), Kwethluk (2010), Napakiak (2011), Napaskiak (2011), Nunapitchuk (2012), Oscarville (2010), Tuluksak (2010), and Tuntutuliak (2013). Although estimated caribou harvests from Kuskokwim River communities ranged from 1 caribou to 446 caribou, the mean annual caribou harvest of all 13 communities was 84 caribou. Reported proportions of households that used caribou ranged from 8% in Aniak to 92% in Oscarville.

Three Bering Sea Coast communities are represented in Table 1, including Chevak (2009), Quinhagak (2013), and Scammon Bay (2009, 2013). Although no caribou harvests or attempted harvests were documented in Scammon Bay in 2009, 13% of households reported using caribou that year. In 2013, although only 3.5% of Scammon Bay households reported harvesting 10 caribou, 20% of Scammon Bay households reported using caribou in 2013, again reflecting a community pattern of use. Chevak residents harvested an estimated 8 caribou in 2009, while Quinhagak harvested an estimated 125 caribou in 2013 representing a mean harvest of 100 lb of caribou meat per household. Finally, Table 1 provides caribou harvest estimates for Togiak residents in 2000 and 2008; however, only a small proportion of the 178 and 136 caribou, respectively, were harvested from GMU 18.

CRITERION 2: SEASONALITY

A use pattern recurring in specific seasons of each year.

Relatively little historical information has been documented about the various seasons associated with caribou hunting on the Yukon-Kuskokwim Delta. However, in June 1868, William H. Dall (1897:230) saw nearly 4,300 freshly harvested caribou fawn skins (for parkas) hanging to dry in a village between Russian Mission and Saint Mary's on the Lower Yukon River (see also Burch Jr. 2013:182,194). Burch (2013:182)

reported that Charles W. Raymond reported caribou to be abundant in the hills between the Lower Yukon River and the coast in the summer of 1869.

In the middle to late 19th century, European explorers observed that caribou were abundant in the hills and valleys bordering Norton Sound and that seasonally large numbers of caribou crossed the Yukon River at various places downriver of Nulato, including migrating right past the village of Saint Michael, where hundreds were killed for their hides to be used for clothing and other necessities (Nelson and True 1887:285; Skoog 1968:228). A common migration corridor extended southward from the Norton Sound region, across the Yukon River near Andreafsky, across the Kuskokwim River between the present locations of Aniak and Bethel, and into the Kilbuck Mountains; a northward migration took place each fall past Saint Michael (Murie 1935:60–61; Skoog 1968:228). Zagoskin (1967:94,289) reported that in addition to hunting caribou during spring and fall migrations, people harvested caribou in summer months out of Saint Michael in the 1840s and that the residents of the Russian fort at Saint Michael harvested around 100 caribou annually. Nelson and True (1887:285) reported:

Eskimo from over a hundred miles along the coast in each direction went to Nunevak [sic] in summer, and, in company with the natives resident on the island, took thousands of adult skins for several seasons, until they suddenly found that Reindeer were not left in sufficient numbers to pay for hunting.

While these historical sources are not definitive regarding seasonal migration timing throughout the Yukon-Kuskokwim Delta area, there is some suggestion that caribou were available more widely throughout the year rather than just during spring and fall migrations. However, more recent oral histories focus mostly on taking caribou during the spring and fall seasons. For example, Kuskokwim River resident Carl Kawagley, who was born and raised in Akiak, spoke of the importance of spring camp in the 1930s to obtain caribou, among other resources.

When they see these snow birds starting to come around, they get ready to go.... Early April was the time we'd go.... The women would start setting the traps and get lots of [ground] squirrels, and they'd take care of the squirrel meat and take care of the squirrel furs. They'd hang them out, dry them, and dry the meat. The men would go out and get their beaver meat, their bear meat, their caribou. (Kawagley, quoted in Lenz and Barker 1985:62; see also Barker and Barker 1993:46–47)

Ann Fienup-Riordan further explained the importance of spring camp in the early 20th century:

As days grew longer in late March and early April along the Kuskokwim, hunters traveled up the river's fast-moving tributaries—including the Kwethluk, Kisaralik, Tuluksak, and Aniak rivers—to headwater lakes and streams. They traveled by dogsled, following overland trails running parallel to these major tributaries and up into the Kilbuck and Kuskokwim mountains. While coastal people focused on sea-mammal hunting, these families remained in the mountains through breakup in May, trapping squirrels and hunting for moose, bear, and caribou before returning downriver.... The craft that made the downriver journey possible was the little-known shallow-draft bearskin boat. Meant for one-time use, this broad raftlike craft was as well suited for shallow, fast-moving streams as the kayak was for coastal waters. (Fienup-Riordan 2007:159)

In addition to spring hunting for caribou, 20th century Kuskokwim area residents also hunted for caribou during the fall and through the winter. Fall-time caribou hunting was significant enough that the lower Kuskokwim coastal area Yupiit identified both the months October and November by terms related to caribou: October as the time that antler velvet began to dry and become thin, and November as the month when the antler velvet would shed (Fienup-Riordan and Rearden 2015:74) Interestingly, Andrews (Andrews 1989:255,263, 1994:73) reported that the *Akulmiut* of the tundra region south of the Yukon River and north of the Kuskokwim identified August as *Amirairun*, “the time they (caribou) take off the outer covering” and September as *Amiraayaaq*, “the time they (caribou) take off the outer covering (little one).”

During the 1980s, caribou were harvested from mid-August through mid-May with principal harvesting occurring mid-August through September and mid-December through April. During both April and August, families returned to hunting camps located in the upper Kwethluk and Kisaralik River valleys or in the vicinity of Heart Lake.... In the past, hunters traveled to the mountain areas by dogteam or on foot. During the 1980s, snowmachines and small charter aircraft were used to move hunters to mountain camps. In spring, hunters at mountain camps sometimes returned to Kwethluk using skin boats which they built using hides of caribou, brown bear, or moose. This mode of transportation, which has been used by people hunting in the mountains for many years, was still sometimes used from 1986 to 1991.... During August and September, families returned to Kwethluk from mountain camps via small charter aircraft. (Coffing 1991:158)

Similar to the seasonal pattern of caribou hunting by residents of Kwethluk discussed by Coffing (1991), caribou hunting by residents of Quinhagak in the 1980s was limited primarily to the months of February and March, when groups of hunters would travel long distances for several days or weeks by snowmachines to the mountain valleys at the headwaters of the Kisaralik, Kanektok, Arolik, and Togiak rivers. However, Quinhagak residents also hunted caribou in the fall: after the Kanektok River froze, it would be used as a travel corridor to access the mountains (Wolfe et al. 1984:316,342,326). Also in the 1980s, Togiak hunters would harvest caribou in the last half of August through the middle of November and then also from January through May in the Kisaralik drainage, Kilbuck Mountains, and the Aniak River drainage (Wolfe et al. 1984:327,331).

Recent research demonstrates that caribou hunting begins in the fall and continues through the winter until spring (Brown et al. 2013:37,269,270; Ikuta et al. 2014:77,125).

CRITERION 3: MEANS AND METHODS OF HARVEST

A pattern of taking or use consisting of methods and means of harvest which are characterized by efficiency and economy of effort and cost.

Prior to the arrival of firearms into the Yukon-Kuskokwim Delta region, caribou were hunted with bow and arrow and also snared, lanced, and speared with the aid of caribou fences to direct the animals into snares or towards awaiting hunters (Fienup-Riordan 2005a:74,79,86–87,101,162, 2007:149,169; Michael 1967:94,99,289; Nelson and True 1887:286; Nelson 1983:118–120). For example, Ackerman (1979) documented the remains of a fence designed to corral and assist in the harvest of caribou in the Ahklun Mountains up the Kanektok River drainage.

Strong fences are sometimes built across the lower end of a rocky gorge which opens into a valley above, and then a drive is made when a herd wanders into the valley. In this way several hundred are known to have been taken at once.... They are also snared by strong rawhide nooses which are set among clumps of bushes frequented by them so that their antlers become entangled while browsing, and they are held until the hunter comes. (Nelson and True 1887:286)

Sinew-backed bows were used to hunt large land animals and also served as weapons of war to kill people in the past (Funk 2010:523–569). These forceful weapons could drive an arrow all the way through a caribou (Fienup-Riordan 2007:169,173).

One ingenious method the Eskimo practice in hunting them is as follows: When two natives find a herd of Reindeer they get to the leeward of them, and then if no cover offers a good opportunity for stalking the game, the hunters start off directly for the deer, and in plain sight, except that one hunter walks as close behind the other as possible, keeping step with him. The deer soon spy them and start to make a wide circuit about the hunters. The latter now swerve from their course just enough to appear to be continually heading off the deer. The latter soon change their walk to a trot and from this to a run, as

the hunters still appear to be heading them off. As soon as the deer start to run the rear hunter drops behind the first knoll, and the one in front runs to head the deer off, but they soon pass him, and are almost certain to pass within gunshot of the concealed hunter, and sometimes almost run over him before they see him, they are watching the other one so closely. The concealed hunter now fires into them and the other hunter hides himself at once, and the chances are greatly in favor of the frightened herd running within gunshot of him. Several deer are frequently killed in this way out of a small herd. (Nelson and True 1887:286)

Caribou were also taken in the fall from kayaks (Andrew 2008:315; Fienup-Riordan 2007:114). People intercepted caribou during spring and fall migrations when crossing the Yukon River near Andreafsky and the Kuskokwim River between Aniak and Bethel (Murie 1935:60–61; Skoog 1968:228). During spring and fall migrations, people also camped around interior lakes and overlooks situated near valleys that served as migration corridors for caribou (Ackerman 2001; Buzzell and Russell 2010:23).

In the past, hunters traveled to the mountain areas by dogteam or on foot. During the 1980s, snowmachines and smaller charter aircraft were used to move hunters to mountain camps.... Hunters also harvested caribou when traveling by boat in fall. (Coffing 1991:158,161)

Today, hunters take caribou with high-powered rifles, most often accessing animals by snowmachines in the uplands during the winter and by boat in the fall (Barker and Barker 1993:115; Coffing et al. 2001:89–90; Fienup-Riordan and Rearden 2015:211). Coffing (1991:161) reported that rifles such as .222, .223, .22-250, .270, and .30-06 are used to harvest caribou and that many hunters preferred smaller caliber rifles because less meat is damaged.

CRITERION 4: GEOGRAPHIC AREAS

The area in which the noncommercial long term and consistent pattern of taking, use, and reliance upon the fish stock or game population has been established.

Skoog (1968) summarized the history of caribou distribution in Game Management Unit (GMU) 18 as follows:

A large caribou population occurred along the Bering Sea coast from Bristol Bay to Norton Sound. It probably was on the increase during the 1830's (based on the Russians' lack of mention of large migrations, yet the presence of caribou on the Innoko River, which is rather poor caribou habitat); reached a peak by the 1860's, or perhaps earlier; and was starting to decline in numbers by the early 1870's. During the peak, this apparently huge population ranged over a wide area, including the Kuskokwim-Yukon lowlands and even Nunivak Island (reached no doubt, via the ice-pack). The main movement pattern was north-south across the Yukon and Kuskokwim Rivers: extending probably north to the Seward Peninsula, definitely south to the Kilbuck Mountains, possibly southeast to the Alaska Peninsula, and probably east to the Alaska Range. Quite likely the animals ranged into the upper Kuskokwim River area as well. (Skoog 1968:230)

In the Kilbuck Mountains, however, as far as Aniak, large numbers of caribou were still present during the 1880's.... No major movements of caribou across the lower Yukon River (i.e., below the Koyukuk River) are known since the 1870's, and across the Kvichak River, since the 1880's. (Skoog 1968:231,233)

GMU 18 ADF&G Area Biologist Phillip Perry (2011) also discussed briefly the history of caribou presence in the lower Kuskokwim and Yukon river regions. Following the collapse of reindeer herding in the area in the 1930s and 1940s,

...the abundant caribou habitat throughout Unit 18 was only lightly used until 1994, when large numbers of Mulchatna caribou herd (MCH) animals began regular, seasonal use of the Kilbuck Mountains. In more recent years, a larger portion of the Mulchatna herd has spent most of the year in Unit 18 and harvest in Unit 18 has become a larger proportion of the overall harvest. (Perry 2011)

The Andreafsky caribou herd existed in GMU 18 north of the Yukon River until the mid-1980s. The history of this small herd is relatively unknown, and there were differing opinions as to whether this herd consisted of caribou, reindeer, or both (Burch Jr. 2013; Perry 2011; Wolfe and Pete 1984). Perry (2011) speculates that poor compliance with hunting regulations probably contributed to the Andreafsky caribou herd's disappearance. However, recent research conducted by the division in Stebbins in March 2014 documents that 3 reindeer herds continue to exist in southern Norton Sound, all of which are reportedly intermixed. One herd is owned by a private individual; the other 2 are owned by the village councils of Stebbins and St. Michael.⁶ Wolfe and Pete (1984) reported that the Stebbins reindeer herd in the 1980s was descended from the original reindeer that were brought into the area in the early 20th century.⁷

The Kilbuck caribou herd⁸ existed in GMU 18 south of the Kuskokwim River until the mid-1990s, when the herd was thought to have been absorbed by the Mulchatna herd to the south.

The Kilbuck caribou herd (KCH), or *Qauilnguut* herd, was located in the Kilbuck and Kuskokwim Mountains southeast of Bethel. Their range included the eastern portion of Unit 18, encompassing the edge of the lowlands of the Delta and the montane western border of Units 17B and 19B. Conservative management techniques were used to protect this small, discrete, resident herd, but since 1994 large numbers of MCH [Mulchatna] caribou have used the entire range of the KCH. Our current interpretation is that the KCH has been assimilated by the MCH, and caribou hunting regulations in Unit 18 reflect that interpretation. (Perry 2011:109–110)

Caribou from the Western Arctic caribou herd, the largest caribou herd in Alaska, sometimes seasonally migrate into the northern part of GMU 18. Hunting regulations north of the Yukon River were liberal to allow hunters to take advantage of these infrequent hunting opportunities; however, due to the presence of the Mulchatna herd in GMU 18 now, caribou management throughout GMU 18 is based upon Mulchatna caribou management considerations (Perry 2011).

Figures D-1 through D-19 illustrate the search and harvest area locations of caribou from 18 communities located within or adjacent to GMU 18 from 2000–2013. Among Yukon River communities listed in Table 1, caribou hunting search and harvest area information was documented only for Pilot Station in 2013 (Figure D-16) and Russian Mission in 2011 (Figure D-12); however, both maps demonstrate that only a small number of households traveled to areas south of the Kuskokwim River to hunt for caribou, mainly along the Kwethluk River drainage south of Kwethluk and south of the Kisaralik River, respectively. Among Kuskokwim River communities, caribou hunting search and harvest area information was documented in all 13 Kuskokwim River communities except Napaskiak, where the estimated harvest for 2011 was 60 caribou. With the exception of Bethel, Kwethluk, and Tuluksak, all documented caribou hunting and harvesting areas were south and east of the Kuskokwim River. In 2011, in addition to caribou hunting south and east of the Kuskokwim River, Bethel residents reported harvesting caribou in GMU 21E along the Yukon River

6. Beth Mikow and Odin Miller, ADF&G Division of Subsistence, personal communication, April 2015.

7. See Lantis 1950; Olson 1969; Simon 1998; Stern 1980; Stern et al. 1980 for detailed discussions of the history of Alaska reindeer herding and its role in Alaska Native subsistence economies and ways of life.

8. The development of the Kilbuck (or *Qauilnguut*) Caribou Herd Cooperative Management Plan is discussed elsewhere (e.g., Spaeder 2005), so is not discussed here with the exception of noting that local community representatives wanted liberalized caribou hunting opportunities when the more abundant Mulchatna caribou herd entered GMU 18. See also Alaska Board of Game findings #91-54A-BOG located at <http://webdev.dfg.alaska.local/static/regulations/regprocess/gameboard/pdfs/findings/9154Abog.pdf> and #90-49-GB located at <http://webdev.dfg.alaska.local/static/regulations/regprocess/gameboard/pdfs/findings/9049bog.pdf>

drainage (Figure D-10). In addition to hunting caribou south and east of the Kuskokwim River mainstem, Kwethluk residents hunted for and harvested caribou north of the Kuskokwim mainstem and west of the Johnson River drainage (Figure D-7), and Tuluksak residents hunted for and harvested caribou in the lower Johnson River drainage, and northwest of the Kuskokwim mainstem from approximately 10 miles below Tuluksak to approximately 20 miles upriver from the community (Figure D-9). In 2013, 3.5% of Scammon Bay households reported hunting for and harvesting caribou far from their community: between Bethel and Kwethluk south of the Kuskokwim River mainstem and along the Kwethluk River drainage (Figure D-18). In 2013, Quinhagak residents reported hunting for and harvesting caribou along the Goodnews, Arolik, Kanektok, and Eek river drainages (Figure D-17). Finally, in 2000 and 2008, Togiak residents reported hunting for and harvesting caribou in GMU 18, although in relatively small numbers, because most Togiak caribou harvests occur in GMU 17 (Coiley-Kenner et al. 2003; Fall et al. 2012). However, Togiak residents who reported hunting for and harvesting caribou in GMU 18 used the areas from the Goodnews River drainage south and westward to Cape Newenham (figures D-1 and D-2).

Ethnohistorical literature, oral history, and the results of recent subsistence research in a number of Yukon-Kuskokwim Delta communities demonstrate that caribou are widely shared and even used by GMU 18 households and communities where residents do not currently engage in caribou hunting activities. However, recent data indicate that some residents of GMU 18 will travel great distances to access available caribou (e.g., Yukon River residents traveling south of the Kuskokwim River to hunt caribou) because caribou continue to be highly regarded as a subsistence resource. Among Yukon River communities, for example, from 5% to 28% of households reported using caribou from south of the Kuskokwim River since 2008. Among communities that are located closer to the Mulchatna caribou herd, households reported more widespread use of caribou, ranging from 19% of households in Tuntutuliak in 2013 to 92% of Oscarville households in 2010.

Figures D1 through D19 demonstrate a consistent geographic pattern of use in the lowlands and uplands south of the Kuskokwim River for caribou hunting. Because of the limited geographic availability of caribou in GMU 18, more distant communities tend to report using less caribou than those communities in closer proximity to where the animals are located; however, extensive patterns of sharing among households result in caribou being used by at least some households in all 24 communities where information is available (Table 1).

CRITERION 5: MEANS OF HANDLING, PREPARING, PRESERVING, AND STORING

The means of handling, preparing, preserving, and storing fish or game that has been traditionally used by past generations, but not excluding recent technological advances where appropriate.

Caribou are used for a variety of purposes today, as they were in the past. Historically, caribou hides were important for parkas due to the natural insulating characteristics of caribou hair. Summer hides from adult caribou were used extensively. Hides from young caribou from the end of summer were highly prized for the inside of parkas, especially those for children, or the inside of parkas used by women to carry their young children.⁹ During times when caribou were not locally available, reindeer and caribou hides were traded into Yukon-Kuskokwim Delta communities in exchange for locally harvested mink and fox, as well as ground squirrels and marmots (Lenz and Barker 1985:52; Michael 1967:100–102; Wolfe et al. 1984:320).

Women sewed beautiful parkas with the skins of *nurat* (yearling caribou) and *pukit* (light-colored caribou belly skin). Women valued their *qaliluut* (old caribou parkas). Fancy caribou- and squirrel-skin parkas were made fur-side out, but some parkas, such as women's fox-skin parkas, were also made fur-side in. (Fienup-Riordan 2007:259)

However, when discussing bird skin parkas, Yup'ik elder Frank John stated, "The young caribou weren't good for parkas for us; they were cold. Even though they were nice, we hardly used them, but the small

9. Andrew 2008:217; Dall 1897:230; Fienup-Riordan 2005a:258–259, b:plates, 2007:259,305,312–313; Ray 1975:118; Simon 1998; Zagoskin 1967:101,290–291

birds were good as parkas” (cited in Fienup-Riordan 2007:206). Frank Andrew, Sr., (2008:167), a Yup’ik elder from Kwigillingok, shared this sentiment.

Caribou hides were also used to make boots. For example,

Boots made of caribou-leg skins were sewn using the front of the caribou’s back leg on the boot’s front and the back of its front leg on the boot’s back; this avoided the skin that was worn thin by the animal’s habit of kneeling to forage. (Fienup-Riordan 2007:317)

Yup’ik elder Paul John described how temporary boats, or *angyaqatiit*, which were skinned with the hides of caribou or bears, were instrumental to the annual subsistence cycle by providing a means of transporting food and supplies acquired at spring camps in the mountains back to the community.

They call it *angyaqatak* [from *angyaq*, ‘open skin boat,’ plus *qatak*, ‘about to be’] because they were building them only to return home. They went up to the mountains in spring without boats, but their plan was to come back down after breakup. While they were up there hunting, they tried to catch enough caribou or bears to make a boat with their skins. (Paul John quoted in Fienup-Riordan 2007:159)

In addition to the use of caribou hides in the construction of skin boats, or *angyaqatiit*, discussed by Kawagley, Paul John, and others (Coffing 1991; Fienup-Riordan 2007:159–163), caribou provided raw materials such as skins, bones, antlers, beard or throat hairs, sinew, and hooves for the manufacturing of a variety of utilitarian objects, including clothing (caribou hides and hair); hoods and caps (caribou ears, caribou hides with fur and without); women’s belts (caribou mandibular incisors); gloves and mittens (caribou leather); waterproof footwear (hides); padded boot outsoles (hides with hair on, usually throat hairs); snowshoe webbing (hides); sleeping bags and mattresses (hides); small- and large-mesh gillnets (caribou sinew); net gauges (caribou antler); net sinkers (antler); fishing hooks (antler); fishing line (sinew); tools such as skin scrapers and knife handles (bone, antler, and hooves); shovels (caribou shoulder blades); bow support (sinew); rifle or arrow supports (bone and antler); harpoon heads, lances, and spear points (bone and antler); sinew- or grass-shredders, prying tools, and wood-splitting wedges (bone and antler); hammers (antler); nails and pegs (antler); spoons and dippers (antler); story knives (*cirunqaaraat*; antler); hair combs and parka cleaning combs (hooves and antler); parts of bentwood hunting hats and visors (antler); dolls and amulets (antler and sinew) dance fans, headdresses, and other decorations (caribou beard or throat hairs, hides); small storage containers (caribou bladder and hides); black powder measures (antler); and candles (caribou fat).¹⁰

Caribou sinew continues to be a valuable resource today in various parts of Alaska, including the Yukon-Kuskokwim Delta (Fienup-Riordan 2005a:54,76, 2007:309). Frank Andrew, quoted in Fienup-Riordan (2007:308,309) observed:

Caribou *uliutet* [sinews] are attached up near their shoulder blades, and their ends go into the meat and are attached to their spines. They tried not to cut the *uliutet* and removed the ones that were attached, even though there was meat on them. Then they scraped the meat off.

Some men even split the sinew and then twist it. When we twisted sinew, we continually added more [strands]. They would only twist two [strands]. The ones who were good at twisting sinew would make them all the same thickness.

10. Andrew 2008:107,169,233,237,315,369,391; Barker and Barker 1993:132; Barker et al. 2010:10,13,82,90–91; Coffing et al. 2001; Dall 1897:228,230; Fienup-Riordan and Rearden 2015:202; Fienup-Riordan 2005a:45,66–67,86,97–98,101,106,107,111,113–114,129,130,141,150–151,152,154,155–156,159,170–171,181–182,188–190,193,201–202,205,213–214,215,227,238,254,258–259,169–270,271,272, b:plates L2360, 2007:42–43,44,67,137,163,179,180,210,233,237–238,248,254,258–259,274,292,293,305,307,310,312–313,316,317,319,320,335; Himmelheber 2000:37; Lenz and Barker 1985:52; Morrow 1984:130,131; Ray 1975:118

Historically, caribou sinew, along with that of beluga whales and seals, was used to manufacture both small and large mesh gillnets to harvest salmon (Fienup-Riordan 2007:177), as well as many of the clothing and utilitarian objects listed above.

Even caribou ears were put to good use by Yup'ik people, who sewed them to be used as small storage bags or containers (Fienup-Riordan 2007:317). Caribou teeth, specifically incisors, also were commonly sewn onto women's belts, sometimes as many as 300 incisors in one belt, which represented an important item of prestige and continued good luck in caribou hunting (Fienup-Riordan 2005a:201–202, 2007:238).

The process of acquiring materials for these belts was not easy. When other people saw women wearing belts like these, they knew that their husbands were excellent hunters. In those days, since people knew that men clothed their women, they would recognize what type of man a woman had married. Someone evidently caught over one hundred caribou and provided their teeth for his wife's belt. (Paul John, quoted in Fienup-Riordan 2007:320)

Belts were self-fulfilling prophecies—if a woman wore one, she protected her male relatives from her harmful debris, allowing them to be good hunters, and as good hunters, they were able to bring home the animals to make her an elaborate belt. (Fienup-Riordan 2007:320)

In addition to evidence of a variety of uses of the products of caribou hunting, the oral history and the contemporary cultural literature of the Yukon-Kuskokwim Delta also cite many other traditional pieces of technology that were associated with caribou uses. For example, Yup'ik elder Wassilie Berlin “recalled grass backpacks with evenly spaced holes twined into their upper edges so that they could be attached to wooden carrying yokes for hauling heavy loads of caribou meat out of the mountains” (Fienup-Riordan 2007:228).

Caribou meat is eaten raw, cooked, or frozen, and some people continue to thinly cut caribou meat and air dry it for later use (Coffing 1991:161–163; Fienup-Riordan and Rearden 2015:13,15). Intestinal fat is also saved and used, leg bones are cooked and cracked to extract marrow, and caribou feet are boiled and eaten, as is the tongue (Coffing et al. 2001:90–93). Yup'ik elder Frank Andrew stated: “And they never spilled caribou blood on the ground but drank it for juice. That prevented us from getting cold during winter and tasted salty. It didn't taste like blood but tasted good” (Fienup-Riordan 2007:296). Caribou meat is also sometimes eaten with seal oil (Wolfe et al. 1984:331). Caribou fat is also used as an ingredient to make *akutaq* (commonly referred to in English as “Eskimo ice cream”) by mixing with seal oil, boned fish, berries, greens, or a variety of other ingredients (Fienup-Riordan and Rearden 2015:190; Fienup-Riordan 2005a:236). Frank Andrew recalled *akutaq* made from a mixture of salmonberries and the contents of caribou stomachs (cited in Fienup-Riordan 2007:297; see also Coffing 1991:163; Fienup-Riordan 2007:239).

CRITERION 6: INTERGENERATIONAL TRANSMISSION OF KNOWLEDGE, SKILLS, VALUES, AND LORE

A pattern of taking or use that includes the handing down of knowledge of fishing or hunting skills, values, and lore from generation to generation.

As discussed above, caribou hunting was and continues to be an important part of the annual seasonal round of subsistence activities for many Yupiit living along the Kuskokwim River and throughout the rest of the Yukon-Kuskokwim Delta area. Equally important to the economic benefits of caribou hunting traditions discussed above is the transmission of knowledge and skills associated with caribou hunting, lessons, lore, and values on how to behave properly so that animals will continue to give themselves to hunters, thus equipping the next generation with the necessary knowledge and skills to be able to continue a subsistence way of life in the future. Anthropologists, oral historians, linguistic experts, Yup'ik language and interpretation specialists, and school teachers, among many others, have documented much of the traditional knowledge learned by Yup'ik elders of the late 20th and early 21st centuries from the elders

that came before them. Today, many of these traditions and stories are published in books, most of which are published in both Yup'ik and English languages, so that they may be used by teachers, students, researchers, and individuals to continue passing this Yup'ik knowledge from generation to generation. A Yup'ik language immersion school in Bethel, as well as a bachelor's degree program in Yup'ik culture at the Yukon-Kuskokwim campus of the University of Alaska Fairbanks both serve as testimonies as to how the Yupiit of the Yukon-Kuskokwim Delta area are using innovative and modern ways to share and pass traditional cultural knowledge from one generation to the next. Many of the elders quoted in this report spent innumerable hours telling stories and working to document their oral traditions and stories in books so that their knowledge would not be lost. Many of these experiences directly involved elders speaking with school children and sharing traditional knowledge and stories to ensure that children learned what they needed to know to become successful adults.

For example, Yup'ik elder Carl Kawagley discussed the end of spring camping and the process of heading back to the river and the skillful use of caribou to make *angyaqatiit*, the caribou or bear hide-covered boats used to transport people and supplies from hunting, fishing, and trapping at spring camps in the mountains back to the Kuskokwim River after breakup,

We'd go to the head of Kisaralik, where our ancestors, they'd make the skin boats, just below the lake. They'd assemble the framework and then they'd soak the skins and they'd start sewing the skins together. And they'd go out and get lots of grass, burn the grass and then the tallow from caribou would be mixed with the burned grass and it's just like tar. Then they lash the skins onto the frames and then they put this burned grass tallow mixture on all the seams. It'd take four or five days to make the boat, at the most. If you have taken up reindeer skins, caribou skins, then you have to soak them, then they sew them. If we have to use skins that we just got, then we try to sun dry them as much as possible. In the sun, the skins get pretty hot. Then we take the skins back to where we're going to make a boat at the head of the Kisaralik, then soak them again after they dry them, sew them together. (Kawagley, quoted in Lenz and Barker 1985:63)

In addition to the skills of making manufactured items from caribou products, caribou hunting knowledge and lore continues to be part of Yup'ik oral traditions and songs in the Yukon-Kuskokwim Delta (Andrew 2008:323,343,351,353; Fienup-Riordan 2005b:97). For example, Yup'ik elder Nick Andrew noted that the constellation commonly referred to in English as "The Big Dipper" is called *Tunturyuk* in Yup'ik because it resembles a caribou (*tuntu*) (Fienup-Riordan 2007:265, see also 2005a:274). This constellation, along with others, was an important source of navigational knowledge used during the annual round of subsistence activities. While modern technology provides alternative methods of navigation, elders are quick to point out that equipment breaks and then one needs to rely on traditional knowledge to navigate home safely.

As previously mentioned, in the lower Kuskokwim coastal area, caribou feature in the names of 2 months of the year. As reported by Yup'ik elder Frank Andrew from Kwigillingok, October is called *Amiraayaaq*, which means "little shedding," referring to the fact that the thin skin on caribou antlers quits growing and begins to shed, and November is called *Amirairun*, which means "shedding of velvet," referring to the time period when caribou antlers lose their velvet skin. Elsewhere, other areas had different names for the months (Fienup-Riordan and Rearden 2015:74). For example, the terms used by the *Akulmiut* (tundra communities) for the months of August (*Amirairun*) and September (*Amiraayaaq*) refer to the time when caribou begin shedding their antler velvet (August) and the time when there is little shedding of velvet because most of it is already shed (September) (Andrews 1989:255, 263, 1994:73). It is unclear whether these differences were related to different seasons among varying caribou groups or to the differences among specific Yup'ik-speaking groups.

Caribou also featured in the spiritual life of Yukon-Kuskokwim Delta Yupiit and continue to be significant sources of Yup'ik identity maintenance and cultural wellbeing. For example, in the late 19th century, Norwegian adventurer Johan Adrian Jacobsen collected a fish-shaped drum handle of a shaman with caribou teeth inlaid into the open belly of the fish (Fienup-Riordan 2005a:223–224). Jacobsen also collected a shaman's drum with images of a hunter surrounded by caribou painted on the drum skin (Fienup-Riordan

2005a:224–225). Caribou hunting images were also sometimes used to decorate the inside of men’s bowls, which “gave hunters a chance to be more successful in hunting” (Wassilie Berlin, cited in Fienup-Riordan 2005a:131–132). Caribou designs were also sometimes used to decorate hunting bows for similar purposes (Fienup-Riordan 2005a:75,79). Fienup-Riordan (2005a:229–233) reported that shamans also used a variety of masks to save people from starvation, including an “imitation caribou mask” that was used to ensure an abundance of caribou in the coming season. These and other cultural artifacts from the past continue to be highly regarded by Yup’ik peoples and often inspire modern day artists, singers, dancers, and storytellers. Bogeyaktuk and Steve (2004:65–66), for example, reported that a particular woman’s ancestral story dance was about going caribou hunting, a story which belonged to her family and was passed on to children through the mother; “through her motions, she would tell a story as if she were actually talking.”

The bladders of caribou used to feature in the ceremonial round of the Yup’ik in the Bladder Festival (Andrew 2008:427; Fienup-Riordan 2007:198; Himmelheber 2000:125,133–135). *Nakaciuryaraq* was a major fall ceremony of the tundra communities, “during which the bladders of both caribou and bearded seals were ‘sent off’ through a hole in the ice to return the following season” (Fienup-Riordan 2005a:274).

Some Kuskokwim hunters, when caribou hunting, carried a small wooden doll if their wife was pregnant. Others wore or carried a woman’s belt. A man might be given the cloth parka cover of a particularly long-lived woman as a talisman for luck in hunting.... In addition to the careful placement on the open tundra of caribou and bear heads, the hunter would also try to capture the breath (*anerneq*) of the first land mammal he took each year. Before severing the head and placing it where it could view the rising sun, he held *ayuuq* (Labrador tea) under its nose until the animal died, then kept the plant’s leaves as a charm to guarantee future luck in hunting. (Fienup-Riordan 1994:114)

Offerings of food and water made to a human figurine, which would subsequently disappear, signified that the people were going to catch a lot of caribou in the coming season (Fienup-Riordan 2005a:189). *Akutaq*, often made with caribou back fat (tallow), is a culturally important delicacy that also served important roles in the Yup’ik ceremonial calendar.

Caribou also sometimes featured in the inherited family designs and ownership marks used to decorate hunting tools and equipment, bowls, ladles, and other items.

A man painted the inside of bowls, buckets, and ladles he carved with his inherited family design, which often related to a particular experience with an animal or spirit. Many of these designs were recognizable paintings of otters, caribou, seals, or other animals, or representations of extraordinary being such as *amikuut* (underground creatures), *qununit* (seal persons), or *amllit* (monster fish). (Fienup-Riordan 2007:80)

Caribou are also mentioned in the “well-known story of the tiny blackfish that traveled upriver examining the fish traps as it passed, rejecting those that were sloppily set and only entering those that were obviously clean and well cared for” (Fienup-Riordan 2007:279, see also 2005a:115). As the blackfish traveled, it sang its own song, as recited by Elena Charles of Bethel:

Over there, over there, just over there, just right here. When we put our fish trap in, when we set our fish trap, my stomach is being rubbed, my kidneys are being rubbed. *Ay aluqi, aluqi, aluqii-i*. Behind the mountain the sour dock grows. Caribou are wandering. My father is butchering a caribou. *Ah’rar* his daughter has a big buttocks! They have some items, they have oil, they have animal back fat.... This is the song for the blackfish. All things have a song, even very small fish. (Charles, quoted in Fienup-Riordan 2007:279–280)

Caribou hunting and the transport of caribou meat in kayaks also feature in some Yup’ik oral traditions concerning the times of the bow and arrow wars (Fienup-Riordan 2005a:88–89, b:235; Funk 2010) as well as other traditional stories from elders such as Nuratar Andrew Noatak from Mekoryuk, entitled “Sibling Brothers” (Noatak et al. 2007); Frank Andrew from Kwigillingok, entitled “I Have Eaten My Mother” (Andrew and Rearden 2007); Mike Angaiak from Tununak, entitled “The Abandoned Boy”

(Angaiak 1995a), “*Apaqassugaq*” (Angaiak 1995b:131–137), and “The Bear Woman” (Angaiak 1995c); Theresa Hooper from Tununak, entitled “The Lying Raven” (Hooper 1995); Joseph Oscar from Tununak, entitled “The Stolen Wife” (Oscar 1995); and George Kanrilak from Tununak, entitled “The Couple That Became Bearded Seals” (Kanrilak 1995). Despite recent absence of caribou in the Nelson Island area, oral traditions from Nelson Island “mention caribou hunting as an important activity in a young man’s hunting apprenticeship and rite of passage into manhood...” (Orr 1995:xiii, see also Himmelheber 2000:9,37,42–44,46,51–52,69,73,74,85,89,91 regarding similar findings on Nunivak Island). Orr continued,

As mentioned earlier, caribou have been extinct in the region [Nelson Island area] for eighty years, but even so, caribou hunting still figures importantly in the stories, thus completing the sea-flesh/land-flesh dyad of the Eskimo subsistence economy. Curiously, fishing, which certainly comprises a far greater proportion of the protein needs of the traditional diet and is by far the most stable source of nutrition in the region, is never mentioned in these maturational scripts. (Orr 1995:xxvi)

Finally, caribou hunting features prominently in the traditional story entitled “The Forbidden Mountain” as told by Michael John of Newtok in the book *Yupik Lore: Oral Traditions of an Eskimo People (Yuut Qanemciit: Yupiit Cayaraita Qanrutkumallrit)*, published by the Lower Kuskokwim School District in Yup’ik and English in 1981 (John 1981). This story is very similar to “The Bear Woman,” mentioned above, as told by Mike Angaiak of Tununak (Angaiak 1995c). Such stories contain abundant lessons on Yup’ik cultural values, beliefs, and customs which can only be understood within the proper cultural context.

In “The Forbidden Mountain,” a mountain nearby a community located near the mouth of a river had a peak that was always in the fog. The mountain always had caribou on it, but the mountain was to be avoided. Sometimes some of men of the village would go out hunting and never return. This story explains why hunting caribou on the mountain was dangerous and why hunters were supposed to limit their caribou hunting trips to the uplands near the mountain, instead of hunting on the mountain. The following is a summary of the story with specific excerpts of quotations from the published text to highlight the importance of caribou within the oral traditions of the Yukon-Kuskokwim Delta region. The excerpts pertain to caribou hunting methods and skills and various uses of caribou products (e.g., food, parkas). They may also speak to Yup’ik caribou conservation values by reinforcing a prohibition of caribou hunting in a particular area important to the herd’s health.

One successful and fortunate hunter warned his son that

...if he went out hunting caribou, he should never go to the mountain, even though the caribou were plentiful there.... When the men of the village went hunting caribou, they caught many. No matter how many were caught, however, this man [the father] always caught the largest number.... One day, just before he [the son] got married, the man’s son went hunting caribou and took a young calf. The calf had very fine fur, just right for a parka. His future wife, he thought, could have this fur for her parka. His mother took great care when she cleaned and cured the skin and did a thorough job. He had caught the calf in the summer. After that he kept hunting for another calf just like it. They woke up one morning and the weather was fine and pleasant. So the son went caribou hunting again on the outskirts of the village where the hills were. He climbed the hills and then, on the other side of the valley, he saw a caribou calf. It was on the side where the mountain was. He headed toward the calf. When he was in full view of it, he noticed that its fur was good and short and very fine. But before he could shoot it with his arrow the calf ran away.... And that is the way it continued. Each time he was ready to shoot, the calf would run away. He kept following the calf without watching where he was going. At last it stopped beyond a little valley. He approached it stealthily, trying not to make any noise. He came upon it over a little rise and saw it eating. He shot it. It went down when he shot it. When he walked over to it, he saw that it was already dead. After pulling out his arrow, he noticed that he was already high up on the mountain, where his father had warned him not to go. He had already gone up high when he finally reached the calf.

When he realized where he was, he was filled with regret. Nonetheless, he dismissed the thought and proceeded to butcher his catch. He did wonder though whether he should perhaps leave it behind. (John 1981:191,192)

After unsuccessfully trying to pack out the caribou calf, he encountered a young woman, who was the reason he could not lift his pack due to her supernatural power.

I am the reason your father gave you the warning and forbade you to come to this mountain.... I am determined to have you for my husband. Let us go inside my house. (John 1981:195)

Michael John's traditional story of "The Forbidden Mountain" highlights the importance of caribou within the oral traditions of the Yukon-Kuskokwim Delta region and suggests that such stories included Yup'ik lessons not only on how to hunt caribou, but how individual actions could affect one's future success in hunting. They also teach young people about certain prohibitions designed to keep people safe and, in this case, perhaps also to instill Yup'ik caribou conservation values to those of subsequent generations by reinforcing a prohibition of caribou hunting in a particular area important to the herd's long term health as a refugium where animals would not be subject to human predation. The consequence of not adhering to this prohibition was the likelihood of the hunter's death on the mountain.

CRITERION 7: DISTRIBUTION AND EXCHANGE

A pattern of taking, use, and reliance where the harvest effort or products of that harvest are distributed or shared, including customary trade, barter, and gift-giving.

As discussed previously, Zagoskin reported that in the 1840s, in the area of the fort of Saint Michael, the coastal Alaska Natives of southern Norton Sound supplied Yukon River residents with seal oil, caribou hides, caribou parkas, skin kayaks and boats, marine mammal hides, caribou hide rope and sinew thread, tobacco, and European copper and iron products in exchange for wooden utensils and furs of beavers, river otters, mink, gray wolves, wolverines, and various types of foxes (Michael 1967:101,102). Zagoskin also provided a discussion of the prices for various furs and trade items in units of caribou skins of various types, ca. 1842¹¹:

All kinds of deerskins which reach the Yukon from Unalaklik, Kikkhtaguk, and Pashtolik, on an average 1,000 skins, originate with the Maleygyut. Here are the prices paid by the Maleygyut for furs and for European products. For a prime black fox, 12 winter deerskins and 10 *vyporotki* [prematurely born fawns] or 3 *papushki* [about one pound] of tobacco and the hide cover for an umiak. For an Arctic red fox [*sivodushka* in the original], 6 winter deerskins and 8 *vyporotki*. For a red fox, simple or black-tipped, 1 winter deerskin. For a wolverine, from 10 to 15 winter deerskins and 2 fall deerskins of one- or two-year-old animals. For 22 sables, 11 deerskins. For a wolf, the same as for a wolverine. For a first-class beaver, 2 deerskins. For a prime otter skin, 3 or 4 deerskins. For a kettle, depending on its size, from 5 to 15 deerskins. For two matched, clear, flawless greenish-blue beads, 3 or 4 deerskins.

The coastal traders sell deerskins to the people from the Yukon at the following prices, always adding one or more leaves of tobacco to each hide of a fur-bearing animal: one doe hide or winter buck hide for 2 prime beaver pelts; two fall skins of young deer for 6 beaver; one buck or doeskin for a prime otter; one spring buck or doeskin, depending on the whiteness of the feet, for 1 or 2 beaver; six winter deer and two fall skins of young deer for a *tulun* (22 pieces) of sable; one winter buckskin (from Chukchi tent covering) for a red fox; four winter deerskins for one Arctic red fox; 6, 8, or 10 deerskins for a dark brown or black one.

11. Zagoskin's 19th century terminology used the word "deer," as did most visitors to Alaska of the time, instead of the more common term used in English today of "caribou."

The value of deerskins in terms of river beaver on the Kuskokwim and the Yukon as far as Nulato is as follows: the best fall doeskins, 3 beaver of the first quality; the best buck, 4 beaver; pair of fine fall skins of young deer, 8 or 10 beaver; winter buck and a female, 2 or 3 beaver, depending on the quality of the skins. (Michael 1967:101)

Research conducted in 24 GMU 18 communities from 2000–2013 demonstrates the widespread sharing of caribou harvests with other community households. Table 1 summarizes the percentage of GMU 18 community households that reported using caribou. Many households also reported receiving caribou products from another household or another community, just as many households reported giving caribou products to others (Table 1). This is a common pattern among subsistence-dependent communities where extensive social and kinship relationships among households and communities result in sharing of resources important for subsistence uses with those who would otherwise do without. For example, Yukon River community households reported using caribou in greater amounts (5–28% of households) than those households that actually reported harvesting caribou (0–4%; Table 1). Although no households from Russian Mission reported harvesting caribou in 2009, 28% of households used caribou and 23% of Russian Mission households shared caribou they received from elsewhere with others (Table 1). Similarly, Kuskokwim River community households reported using caribou, ranging from a low of 8% of Aniak households in 2009 to a high of 92% of Oscarville households in 2010; whereas the proportion of households that reported harvesting caribou ranged from a low of 1% of households in Aniak in 2009 to 50% of households in Oscarville in 2010. Furthermore, although 87% of Kwethluk households reported using caribou in 2010, only 39% of households actually harvested a caribou; however, 65% of household reported receiving caribou from other households and 32% reported giving caribou to other households.

CRITERION 8: DIVERSITY OF RESOURCES IN AN AREA; ECONOMIC, CULTURAL, SOCIAL, AND NUTRITIONAL ELEMENTS

A pattern that includes taking, use, and reliance for subsistence purposes upon a wide diversity of the fish and game resources and that provides substantial economic, cultural, social, and nutritional elements of the subsistence way of life.

Yup'ik, Athabascan, and non-Native residents of GMU 18 communities hunt, fish, trap, and gather a variety of natural resources for subsistence uses each year, as demonstrated in recent research conducted by the Division of Subsistence (Brown et al. 2012, 2013, 2015; Fall et al. 2012; Ikuta et al. 2014). Table 2 summarizes the usable pounds of caribou harvested by 18 communities located within GMU 18 or adjacent to GMU 18. Additionally, the table shows caribou harvests as a proportion of total big game animal harvests and total subsistence harvests for each community.

Caribou harvested from GMU 18 contribute variably to the overall wild fish and wildlife resources harvested by local residents. For example, among Yukon River communities in GMU 18, caribou represented from 1% to 3% of the total big game harvest, or about 3–10 pounds per household, and 0.5% of the total wild food harvest (Table 2). In contrast, some Kuskokwim River communities' harvests of caribou contribute as much as 20% to 44% of the big game harvest, or about 3–97 pounds per household, and up to 4% to 7% of the total wild food harvests. The relative contributions of caribou to the subsistence economies of Kuskokwim River communities likely are variable due to the different years in which subsistence research was carried out as well as variation in the geographical proximity of a particular community to the caribou in GMU 18. The data presented in Table 2 demonstrate that caribou is only one resource among many upon which GMU 18 community residents rely for subsistence uses.

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**APPENDIX A–EIGHT CRITERIA WORKSHEET,
BOARD OF GAME 1989**

EIGHT CRITERIA WORKSHEET, BOARD OF GAME 1989

PROPOSAL NO.: 141
GMU: 17A, 17B, 18, 19A, 19B
SPECIES: CARIBOU

RURAL COMMUNITIES USING THE SPECIES

Kwethluk

1. LENGTH AND CONSISTENCY OF USE (long-term, consistent, excluding interruptions by circumstances beyond the user's control)

Archaeological evidence suggests that caribou have been hunted in the mountain areas southeast of Kwethluk since prehistoric times. Information gathered by the Division of Subsistence while conducting research in Kwethluk during 1986 and 1987 indicates a pattern of long term consistent use. Residents report that they have hunted caribou in the mountain areas of Game Management Units 17B, 18 and 19B as long as they can remember. During the early part of this century, residents report that caribou were relatively scarce near the mountains southeast of Kwethluk. Animals were occasionally encountered and harvested in the upper Holitna River drainage and along the King Salmon River and Tikchik Lakes area. Families having spring and fall camps located near where the boundaries of Game Management Units 17, 18 and 19 converge, travelled extensively throughout the area harvesting caribou as well as a variety of other resources. During winter, hunters would travel from Kwethluk to these hunting areas and during spring would travel through the mountain passes to hunt in areas east of the Tikchik Lakes. In the late 1930s and early 1940s, hunters travelled up the Kuskokwim River by boat with outboard motors as far as the Holokuk and Oskawalik rivers, hunting the tributaries along the way hunting areas in Game Management Unit 19A. By the late 1940s and early 1950s, Kwethluk hunters were using boats to access the Holitna River area.

Since the early 1960s, sightings of caribou in the upper drainages of the Kwethluk, Kisaralik, Aniak and Holitna rivers became more common place and hunters have come to expect to find caribou when hunting in these areas. Starting in 1985, the caribou season in Game Management Unit 18, south of the Yukon River has been closed, therefore harvest efforts have been concentrated in Units 17B, 19A and 19B. Hunters report that in the past they have harvested caribou in the vicinity of Whitefish Lake, west of Aniak, in Unit 19A. During late November 1988, caribou once again returned to that area and were harvested by hunters from several communities including Kwethluk.

2. SEASONALITY (recurring in specific seasons of each year)

Depending on the specific Game Management Unit in question, caribou are harvested periodically from late August through mid-May. The Holitna River and the middle Kuskokwim River area are hunted primarily during September. Hunters that use spring or fall camps near the mountains harvest caribou from early April through late May and mid-August through September. Caribou are also harvested between early December and late March by hunters who travel to Game Management Units 19 and 17 by snowmachine.

3. MEANS AND METHODS OF HARVEST (efficient, economic, conditioned by local circumstances)

During August and September, caribou in Game Management Unit 19 are harvested by hunters using boats. Hunters may find caribou near river crossings or may hike back from a river to areas where they can climb a hill and watch for animals. When hunting during August and September from camps in the mountains near Heart Lake and along the upper Kwethluk River, in GMUs 17 and 18, hunters travel on foot several miles from their camp taking advantage of the hills and lookouts from where they scan the surrounding country watching for animals.

After freeze-up, provided that there is adequate snowcover, hunters use snowmachines to move about looking for a variety of game including caribou, furbearers, moose and small game. In April and May people again return to their camps in the mountains near the boundary of Game Management Units 17 and 18. These camps serve as a hub for a variety of hunting, trapping and fishing activities. As in the fall, the men travel extensively on foot in search of caribou, bear and moose while the women hunt, trap, and fish in the areas more immediate to the camp.

Some individuals have lived much of the year in the mountains, returning to Kwethluk for a few brief weeks during Christmas. Traditionally, people used dogteams or simply walked from Kwethluk to their mountain camps. Today, hunters and other family members are shuttled from Kwethluk to their spring or fall camps by small charter aircraft. Flying costs, like the subsistence resources that are harvested, are shared among several people. In the spring, following breakup, people customarily float downstream to Kwethluk in skin-covered boats or are picked up with small charter aircraft.

4. GEOGRAPHIC AREAS (near or reasonably accessible from the user's residence)

Caribou are harvested in headwaters of the Aniak, Eek, Holitna, Kisaralik, Kwethluk, and King Salmon Rivers and in the Tikchik Lakes area. Caribou are also harvested on an opportunistic basis while fall moose hunting and some hunters travel to the upper Holitna River to harvest caribou. In GMU 19A, caribou are harvested south and east of Whitefish Lake during the winter and spring, and in the Holokuk, Kolmakof, and George rivers, and along the mainstem Kuskokwim between Sleetmute and Stony River during September.

5. MEANS OF HANDLING, PREPARING, PRESERVING, AND STORING
(traditionally used by past generations, but not excluding recent technological advances)

Caribou meat may be cut into strips, dried and prepared as jerky when hunters are on foot in the mountains and immediate transportation back to Kwethluk is not possible. Animals that are harvested several miles from camp are sometimes cut and hung for jerky near the harvest site before being packed back to the main camp. Drying the meat this way not only preserves the meat but also greatly reduces the weight that must be packed to camp. When hunting in GMU 19 using a boat, animals are usually cut into portions that are easily packed and then hung near camp until the hunters are ready to return home. Caribou harvested in winter are cut into portions which can be easily managed before being loaded into a sled and hauled home.

Most of the animal is utilized including the marrow from the leg bones, the heads, and the greens in the stomach. Caribou meat is preserved by drying and freezing and cooked in a variety of ways such as roasting, boiling and in soups and stews. The hides are dried for use as sleeping pads and are also used by hunters in the mountains for building skin boats used to transport them downstream to Kwethluk. Antlers are used for making fishing lures, small tools and crafts.

6. INTERGENERATIONAL TRANSMISSION OF KNOWLEDGE, SKILLS, VALUES AND LORE (handed down between generations)

Knowledge and skills associated with all aspects of hunting caribou, butchering, preservation and preparation of the meat are learned largely through participant observation. Family members are taken along on hunting trips beginning at an early age and are shown, by example and by helping, the proper ways to care for and prepare the meat and hide.

7. DISTRIBUTION AND EXCHANGE (customary trade, barter, sharing, and gift giving within a definable community of persons)

Caribou meat is shared with other households in Kwethluk, with relatives in other communities and may be exchanged for other kinds of fish or game not locally available, such as seal. In 1985, 30 percent of households reported receiving caribou from other households.

8. DIVERSITY OF RESOURCES IN AN AREA; ECONOMIC, CULTURAL, SOCIAL, AND NUTRITIONAL ELEMENTS (wide diversity, substantial elements in a subsistence user's life)

A wide variety of fish and game resources are harvested by residents of Kwethluk. In 1985, two percent of Kwethluk households were successful harvesting caribou.

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**APPENDIX B–EIGHT CRITERIA WORKSHEET,
BOARD OF GAME 1991**

EIGHT CRITERIA WORKSHEET, BOARD OF GAME 1991

GMU: 18, Andreafsky Mountains

Positive C & T Findings: 1989
(entire GMU 18)

SPECIES: Caribou

ALASKA RESIDENTS USING THE SPECIES:

Alakanuk, Andreafsky, Emmonak, Kotlik, Marshall, Mountain Village, Pilot Station, Pitka's Point, Russian Mission, St. Mary's, St. Michael, Sheldon Point, and Stebbins.

1. LENGTH AND CONSISTENCY OF USE (long-term, consistent, excluding interruptions by circumstances beyond the user's control):

Caribou populations in the Andreafsky Mountains have fluctuated widely within historic time (Burch 1972; Ray 1975; Nelson 1979; Wolfe 1979; Sheppard 1983) and these changes have affected human uses of them in the area. Residents of southern Norton Sound and the lower Yukon River and delta have changed their uses of the herds depending on the caribou populations and their range. Although, early historic sources (Zagoskin 1967; Nelson 1979) report that lower Yukon River residents obtained much of their caribou products by trade with Inupiaq-speaking people from the Seward Peninsula, they produced their own caribou when herds expanded to nearby areas in the southern Andreafsky Mountains (Wolfe 1979). Early historic sources report Athabaskan Indians from Anvik hunting caribou in the mountains in the fall. Since the early 1900s, caribou in the areas have mixed with domestic reindeer. Hunting of caribou or feral reindeer in the Andreafsky Mountains by residents of southern Norton Sound and the Yukon River delta has continued to the present (Ray 1975; Wolfe 1979; Koutsky 1982; Sheppard 1983; Wolfe and Pete 1984).

2. SEASONALITY (recurring in specific seasons of each year):

Traditionally, caribou were harvested year-round by residents of southern Norton Sound when encountered throughout their migratory pattern (Wolfe 1979). Lower Yukon residents primarily hunted caribou in the spring and fall from camps. More recently, caribou hunting in the Andreafsky Mountains occurs in conjunction with moose and bear hunting in the fall and multipurpose large and small game hunting and furbearer hunting and trapping trips in the late winter (Wolfe and Pete 1984; Fienup-Riordan 1986). Late winter is commonly a difficult time of year, when food stores are running low and any fresh meat, such as caribou is a welcome addition and change from a diet consisting predominantly of dried food (Wolfe 1979).

3. MEANS AND METHODS OF HARVEST (efficient, economic, conditioned by local circumstances):

Small parties of men travel together in boats in the fall or snowmachines in the winter to hunt large game, including caribou. These trips often last over a week spent in tents, and require considerable outlays of cash for gasoline. Rifles (30.06, .270, and .223 caliber) are used to shoot caribou. Caribou are reported to be difficult to catch, as they occur in small numbers in this area. In the winter, hunting parties attempt to herd the animal(s) into cul-de-sacs or brush lines before shooting at them. If a hunter is alone, he may try to approach the caribou on foot until he gains a vantage point from which to shoot at the caribou (Wolfe and Pete 1984). Caribou are gutted, skinned and quartered in the field.

4. GEOGRAPHIC AREAS (near or reasonably accessible for the user's residence):

Access to the Andreafsky Mountains occurs along networks of river, many of which are historic travel routes for hunting, trapping, and trading among communities in Norton Sound and along the Yukon River (Wolfe 1979; Zagoskin 1967; Koutsky 1982). Hunters from Stebbins and St. Michael travel up the Nunakogok, Pikmiktalik, and Golsovia rivers the headwaters of the Andreafsky River. Kotlik hunters reach the area via Pikmiktalik River, and by traveling up the Pastolik and Kotlik River drainages. Emmonak, Alakanuk, and Sheldon Point hunters travel to the Andreafsky Mountains through a pass above Fish Village on the Yukon River, then travel down Allen Creek to the Andreafsky River (Wolfe and Pete 1984).

The Stebbins Indian Reorganization Act Council owns a herd of reindeer that primarily forage in the northwestern portion of the Andreafsky Mountains and Stuart Island (Wolfe and Pete 1984). Recent intensive herding and tagging attempts have documented a herd size of about 1,000 head (F. Pete, pers. comm. 1990). Further, intensified herding and monitoring of reindeer has effected a more pronounced differentiation of the locally-owned reindeer from the caribou/feral reindeer herds which are reported to forage further south and east relative to the reindeer herd.

5. MEANS OF HANDLING, PREPARING, AND STORING (traditionally used by past generations, but not excluding recent technological advances):

Caribou meat is prized for its taste and is shared widely. It is cooked in stews and soups, fried, roasted, and eaten frozen dipped in seal oil. Rarely is enough caught to preserve for later use, but in the unlikely event that many are caught, they can be preserved by drying and freezing. Organs, such as tongue, the head and brain, heart, and marrow are considered delicacies. The back fat rendered usually by frying, is used to make an especially favored type of *akutaq* (local ice cream with berries).

Caribou skins were traditionally an important trade item for many purposes, but especially to make clothing, particularly parkas and leggings of mukluks. Skins were dried on sides of structures or hung over racks. Currently caribou skins are still important as mattresses, leggings for mukluks, as well as for dance fans, and in mask making. Antlers were and are still used to make tools and handicrafts, such as *uluaq* (semi-lunar knife) handles, earrings, belt buckles, bag handles, and decorations.

6. INTERGENERATIONAL TRANSMISSION OF KNOWLEDGE, SKILLS, VALUES, AND LORE (handed down between generations):

Participant observation by young people of the productive areas, methods of tracking, hunting, butchering, and processing caribou meat, skins, and antler products is the primary means of transmitting this knowledge. Most subsistence activities are done by family-based groups, so that learning and skills acquired by younger members is monitored.

7. DISTRIBUTION AND EXCHANGE (customary trade, barter, sharing, and gift giving within a definable community of persons):

As mentioned, caribou meat is widely shared within and outside the community, primarily along kinship networks. First kills are completely distributed, especially to elders to ensure future good luck for the hunter. Caribou meat is a popular contribution to community feasts by households who have it. Caribou manes (*ungat*, in Yup'ik Eskimo, meaning "beard") are common trade items or gifts for elder female relatives, particularly those active in Eskimo dancing, for making dance fans.

8. DIVERSITY OF RESOURCES IN AN AREA; ECONOMIC, CULTURAL, SOCIAL, AND NUTRITIONAL ELEMENTS (wide diversity, substantial elements in a subsistence user's life):

Residents of these communities harvest and use considerable amounts of a wide variety of locally available resources. Fish species, including salmon, herring, and many fresh water fish, comprised the majority of pounds harvested, with fluctuating contributions depending on locale from harvest of marine mammals, small and large game, waterfowl, furbearers, and plants and berries. According to one study, per capita harvests of subsistence resources by residents of five lower Yukon River communities and Stebbins ranged between 510 to 1,397 pounds (Wolfe 1981).

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**APPENDIX C-EIGHT CRITERIA WORKSHEET,
BOARD OF GAME 1991**

EIGHT CRITERIA WORKSHEET, BOARD OF GAME 1991

GMU: 18 Kilbuck Mountains

Positive C & T Findings: 1989
(entire GMU 18)

SPECIES: Caribou

ALASKA RESIDENTS USING THE SPECIES:

Platinum, Goodnews Bay, Quinhagak, Eek, Napakiak, Napaskiak, Bethel, Kwethluk, Akiachak, Akiak, Tuluksak, Togiak, Twin Hills.

1. LENGTH AND CONSISTENCY OF USE (long-term, consistent, excluding interruptions by circumstances beyond the user's control):

Archeological evidence suggests that caribou have been hunted in the region within and adjacent to the Kilbuck Mountains since prehistoric times. Prior to moving their permanent residence to villages, people lived in scattered settlements and seasonal camps from which they hunted caribou. Many of these settlement and camp locations were selected based on the availability of wildlife resources. Today, hunters and their families continue to use the camps and harvest areas on a seasonal basis to harvest caribou and other wildlife resources. Although caribou have not always been abundant in the area, people have continued to harvest and use them when animals have been available. Harvest efforts and harvest success have fluctuated year to year due to variations in overall caribou population levels, seasonal abundance, and distribution patterns over time. Some families may have harvested caribou and other wildlife resources when involved in reindeer herding activities in the mountain areas between Bethel and Dillingham from 1901 to the 1940s.

2. SEASONALITY (recurring in specific seasons of each year):

Caribou are harvested between mid-August and mid-May. Primary harvest effort occurs from mid-August through early October and from early December through mid-April, depending on snow conditions.

3. MEANS AND METHODS OF HARVEST (efficient, economic, conditioned by local circumstances):

During periods of adequate snow cover, caribou hunting areas are accessed by snowmachine. Hunters generally carry enough gear to make a tent camp from which they base subsistence activities aimed at harvesting caribou as well as a variety of wildlife resources such as moose, bear, furbearers, ground squirrels, small game, and fish.

During August, September, and April, hunters hunt on foot from camps situated in the mountain areas. Prior to the 1960s, hunters accessed these spring and fall camps either on foot, by dog team, or a combination of boating and walking. Since the 1960s, families have pooled their moneys in order to pay for small-aircraft charters from Bethel to get them to camp.

4. GEOGRAPHIC AREAS (near or reasonably accessible for the user's residence):

Caribou are harvested in the mountain and foothill areas of Game Management Unit 18 and western GMU 17 where they are found. Hunting activities and harvests are not confined to the Kilbuck Mountain

area but extends southward to the Kuskokwim Mountains, Eek Mountains, Ahklun Mountains, and Wood River Mountains.

5. MEANS OF HANDLING, PREPARING, AND STORING (traditionally used by past generations, but not excluding recent technological advances):

During winter when caribou can be easily preserved by freezing, the animals are processed into 6 to 8 manageable pieces, depending on the size of the animal, before being transported to the community where further processing takes place. During the spring and fall when the temperatures are above freezing, animals are cut into pieces that can be packed to camp. There the pieces are hung from racks constructed for hanging meat and protected from the rain and sun and allowed to cool and "crust over." The meat is kept in this manner until it can be taken home. Hunters who plan to stay in the field for an extended period of time usually cut the meat into thin strips and dry the meat into jerky.

Most of the animal is used including the hooves, bones, head, internal organs, stomach contents, and hides. The hides are used for sleeping pads to cover tent floors, for making mukluk leggings, and for making covers for skin boats used to carry hunters home in the spring.

6. INTERGENERATIONAL TRANSMISSION OF KNOWLEDGE, SKILLS, VALUES, AND LORE (handed down between generations):

Knowledge and skills associated with all aspects of hunting caribou, butchering, preservation, and preparation of the meat are learned largely through participant observation. Family members are taken along on hunting trips beginning at an early age and are shown, by example and by helping, the proper ways to care for and prepare the meat and hide.

7. DISTRIBUTION AND EXCHANGE (customary trade, barter, sharing, and gift giving within a definable community of persons):

Caribou meat is shared widely with other households and relatives in the community where the hunter resides and with relatives in other communities. It is not unusual for a hunter to give another household an entire animal.

8. DIVERSITY OF RESOURCES IN AN AREA; ECONOMIC, CULTURAL, SOCIAL, AND NUTRITIONAL ELEMENTS (wide diversity, substantial elements in a subsistence user's life):

Residents in the above communities that hunt caribou harvest a wide variety of wildlife resources. Several of the traditional spring and fall camps used by hunters are directly associated with caribou hunting.

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**APPENDIX D–CARIBOU SEARCH AND
HARVEST AREAS**

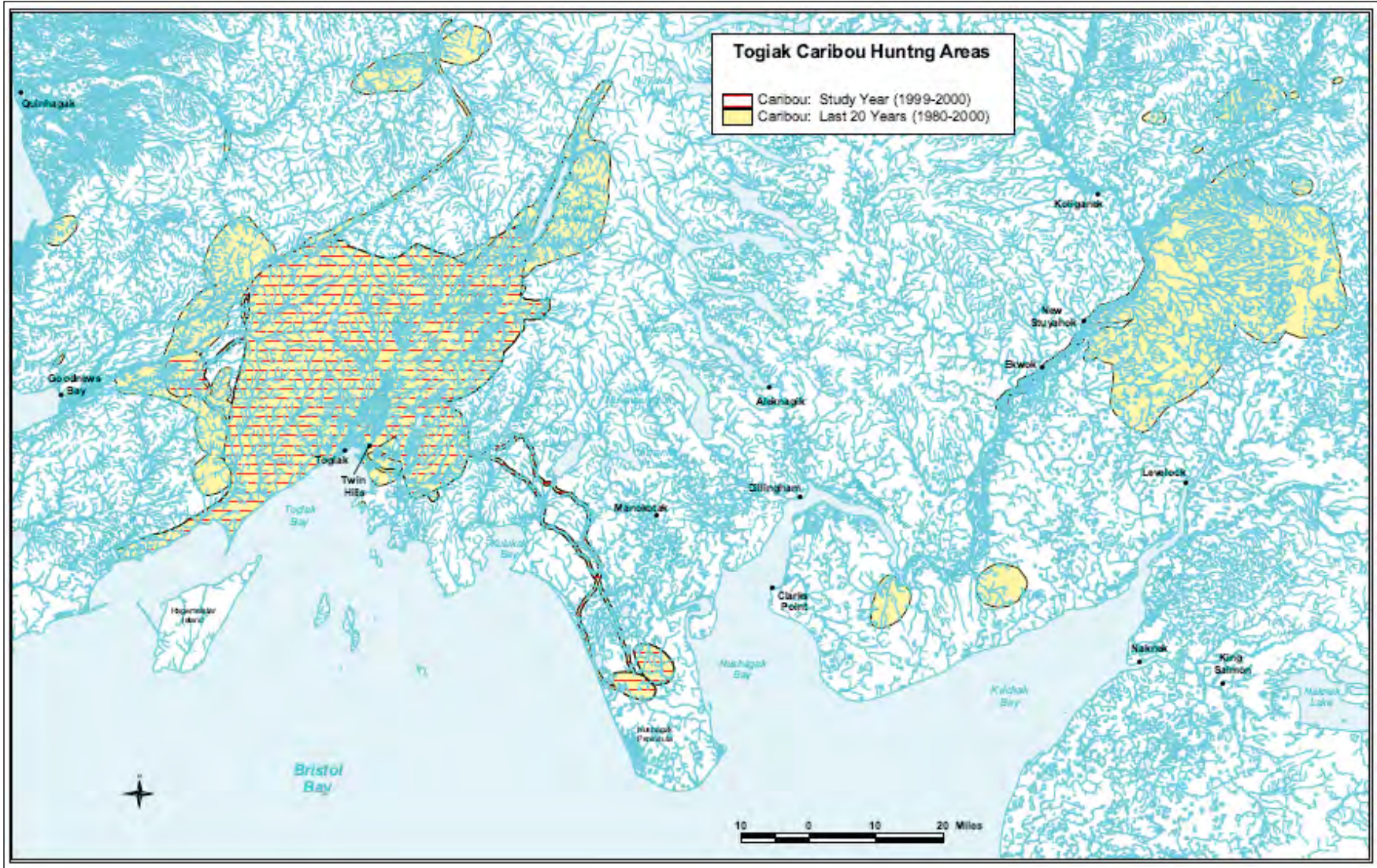


Figure D-1.—Caribou search and harvest areas, Togiak, 1999–2000.

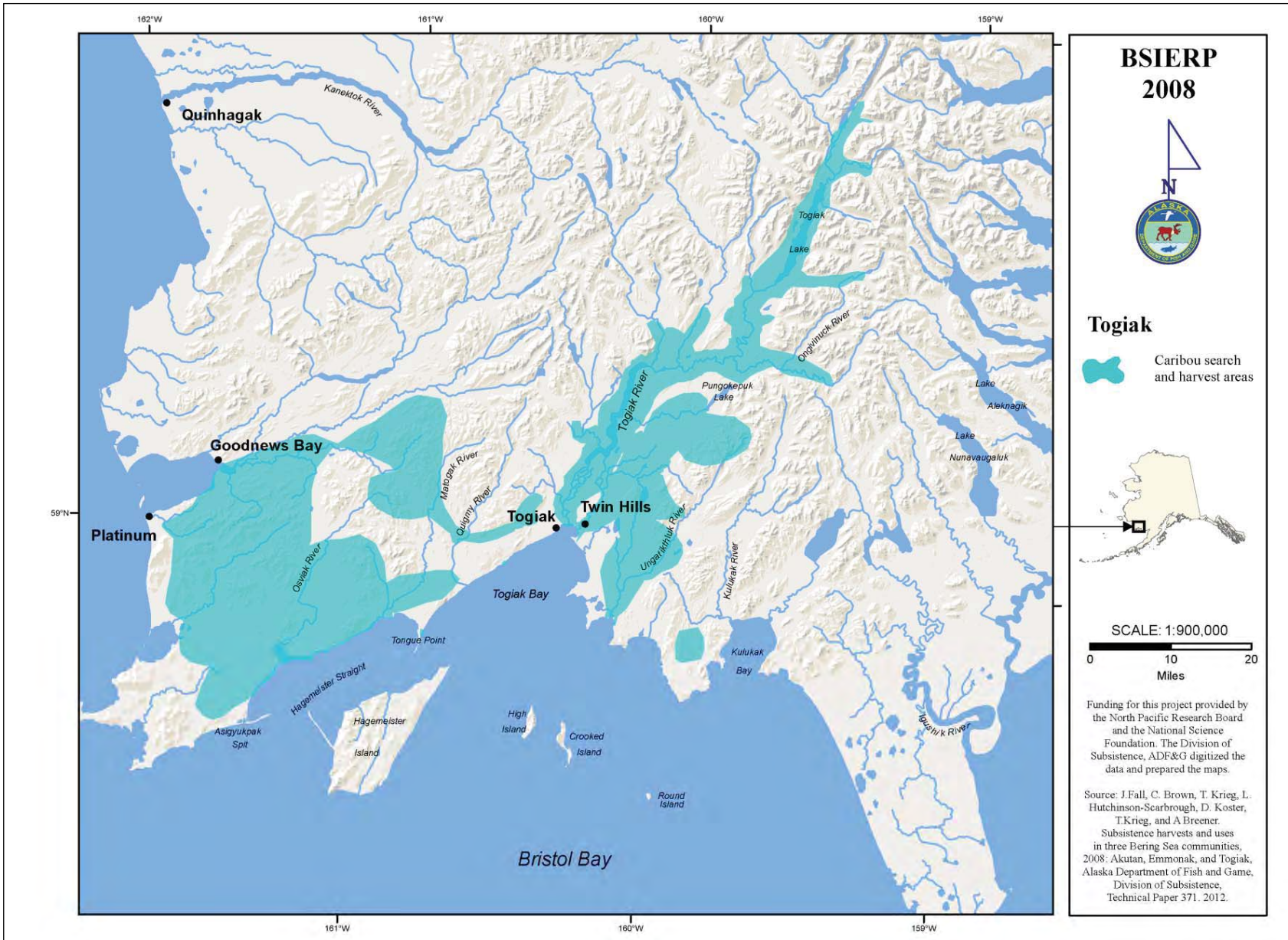


Figure D-2.—Caribou search and harvest areas, Togiak, 2008.

Division of Subsistence - Alaska Department of Fish and Game

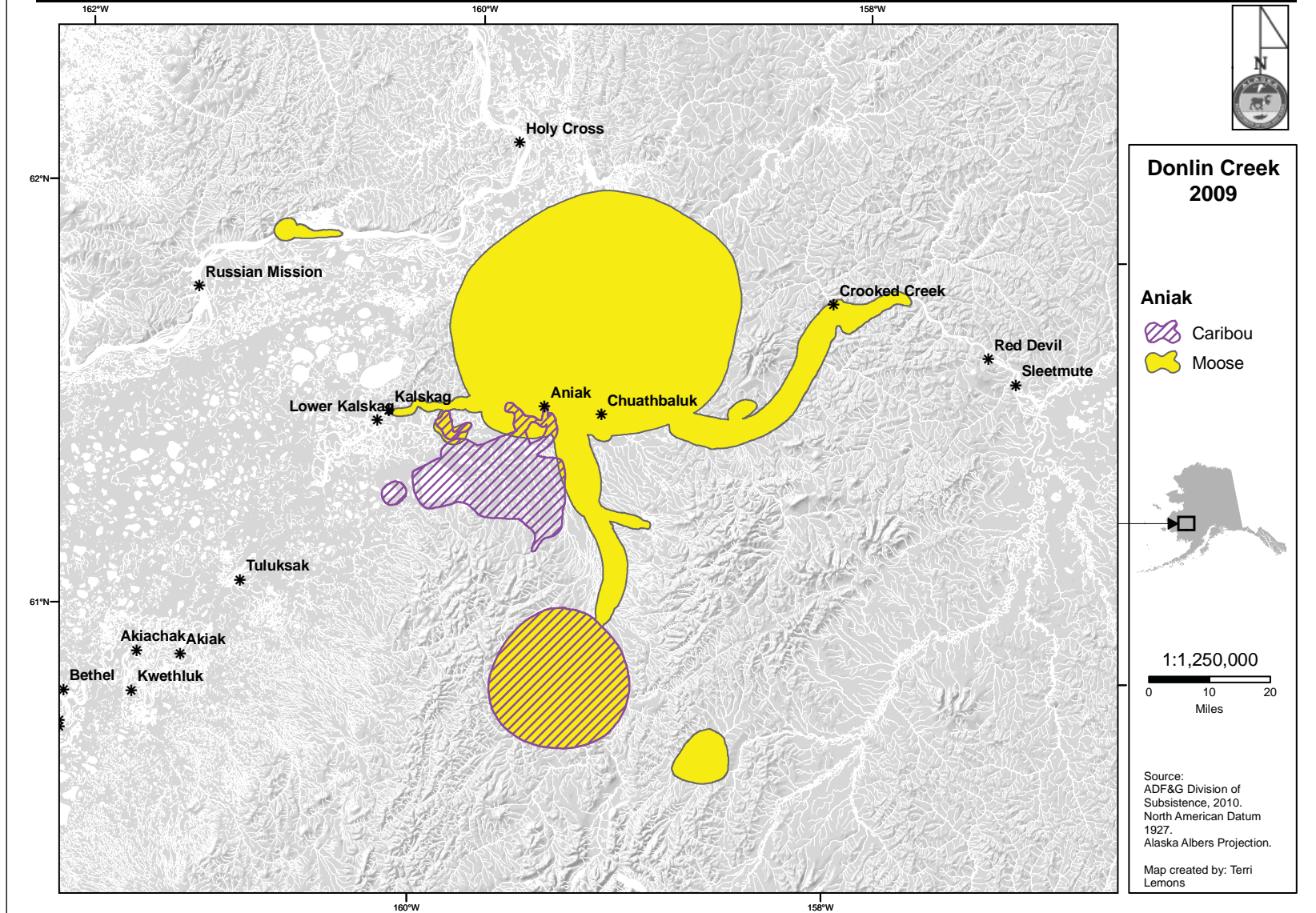


Figure D-3.—Caribou search and harvest areas, Aniak, 2009.

Division of Subsistence - Alaska Department of Fish and Game

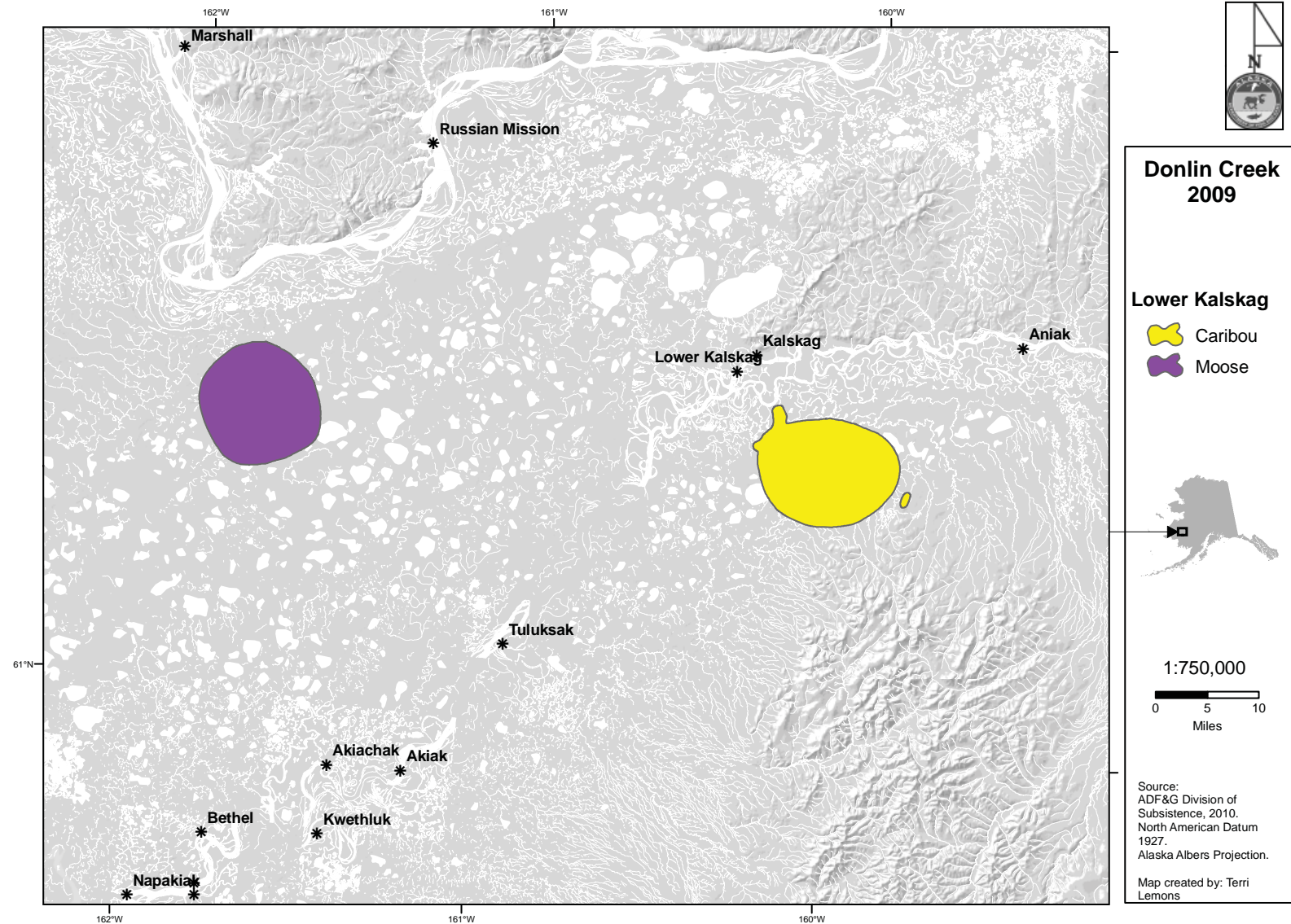


Figure D-4.—Caribou search and harvest areas, Lower Kalskag, 2009.

Division of Subsistence - Alaska Department of Fish and Game

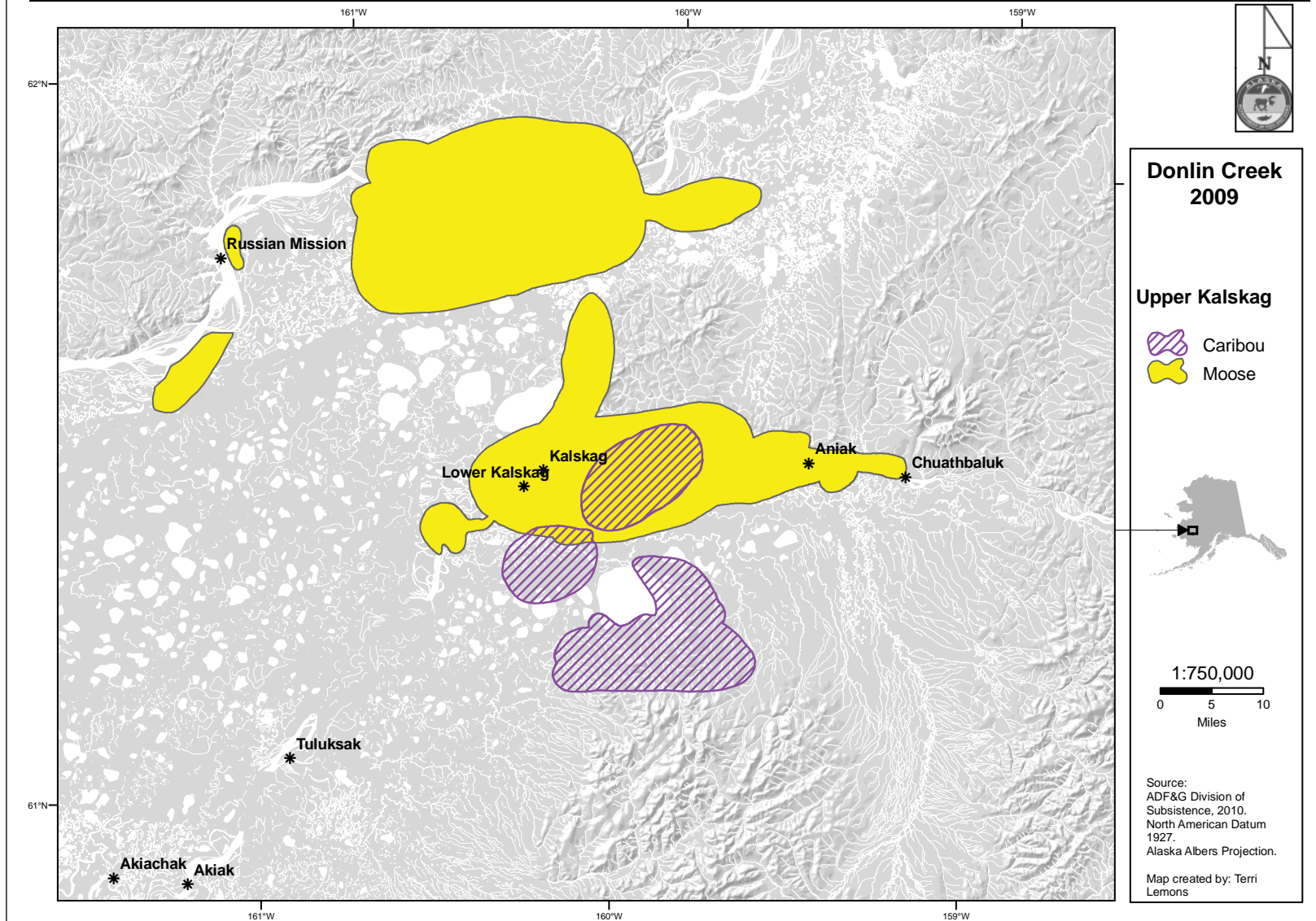


Figure D-5.—Caribou search and harvest areas, Upper Kalskag, 2009.

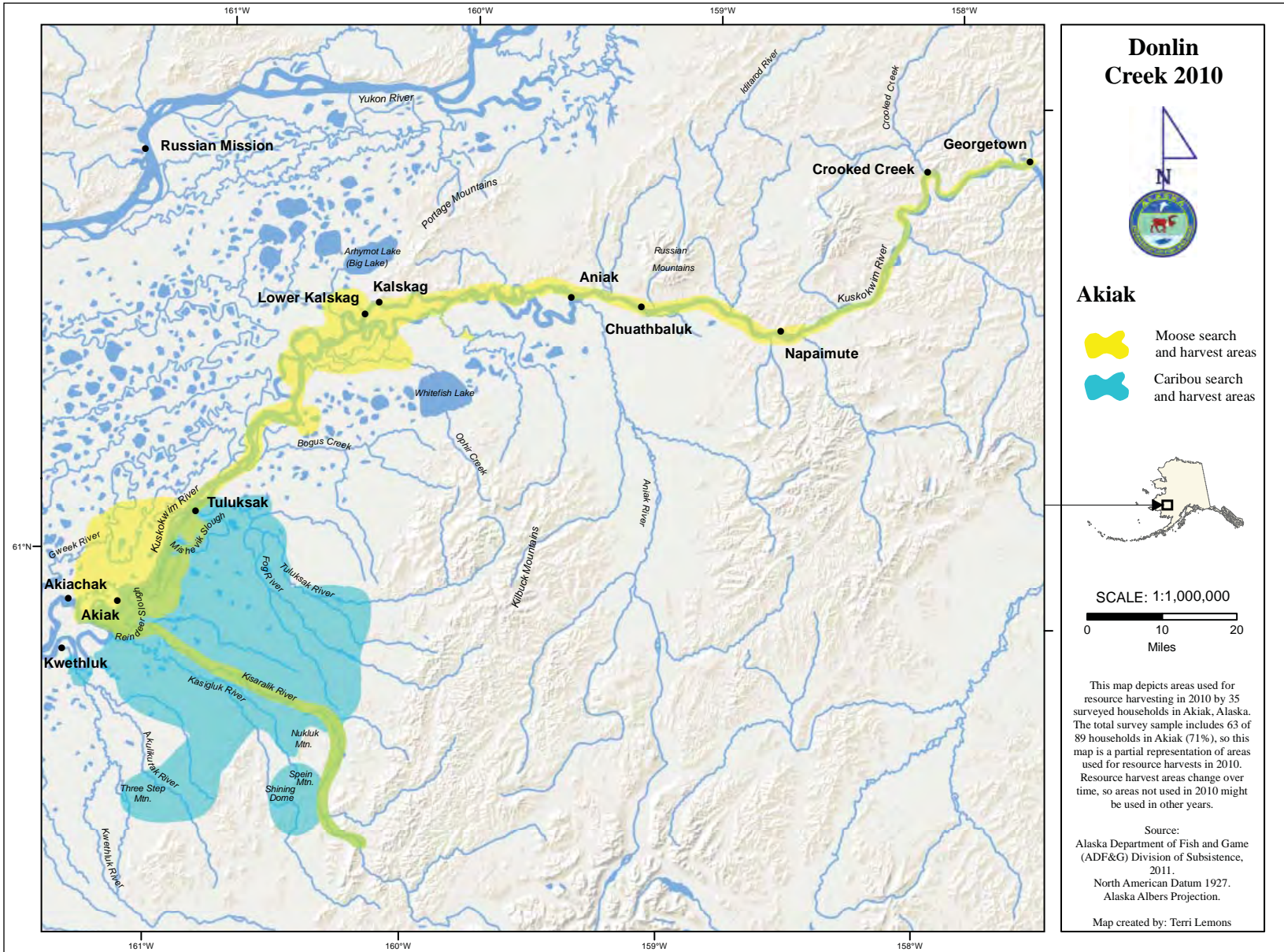


Figure D-6.—Caribou search and harvest areas, Akiak, 2010.

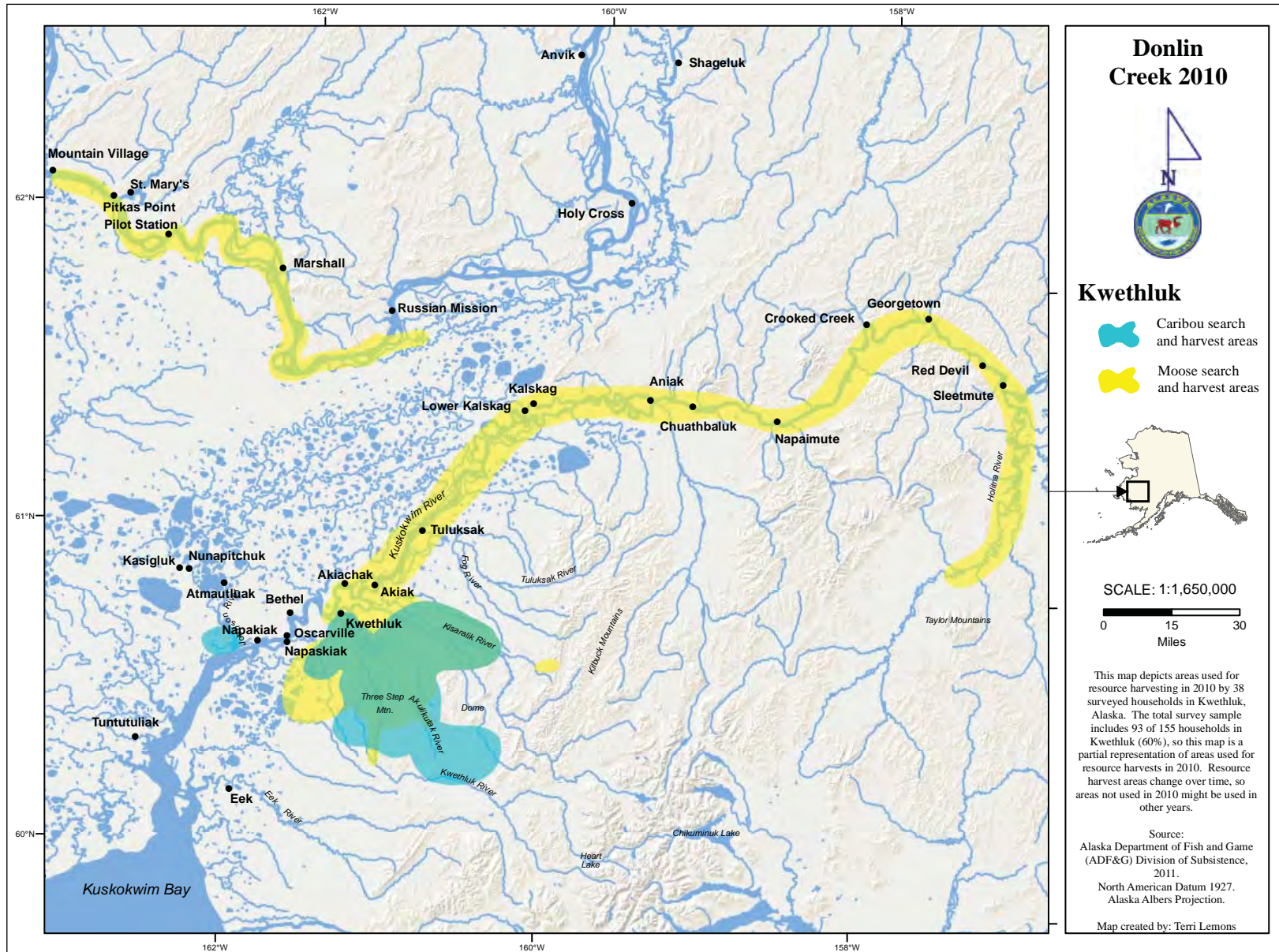


Figure D-7.—Caribou search and harvest areas, Kwethluk, 2010.

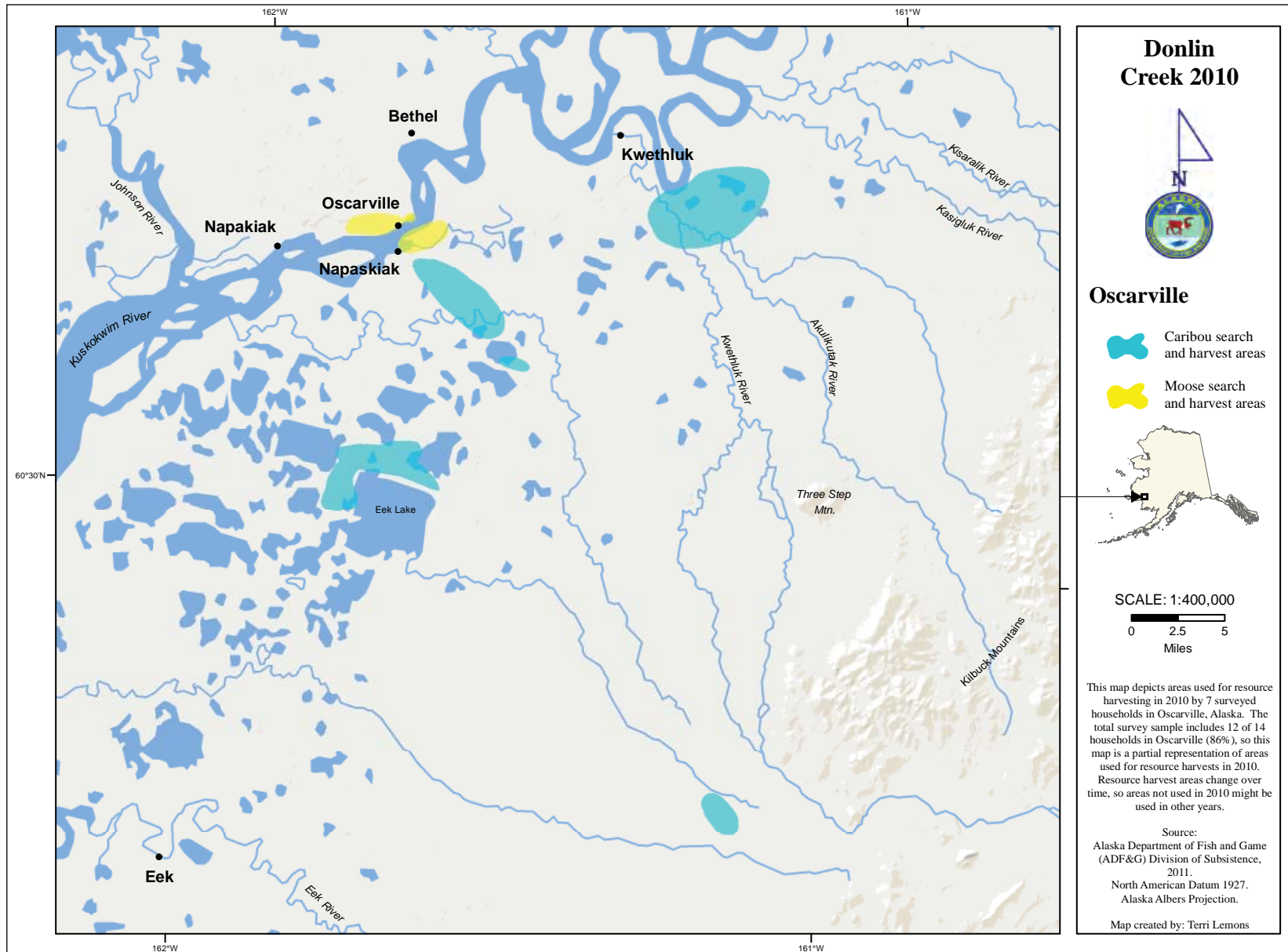


Figure D-8.—Caribou search and harvest areas, Oscarville, 2010.

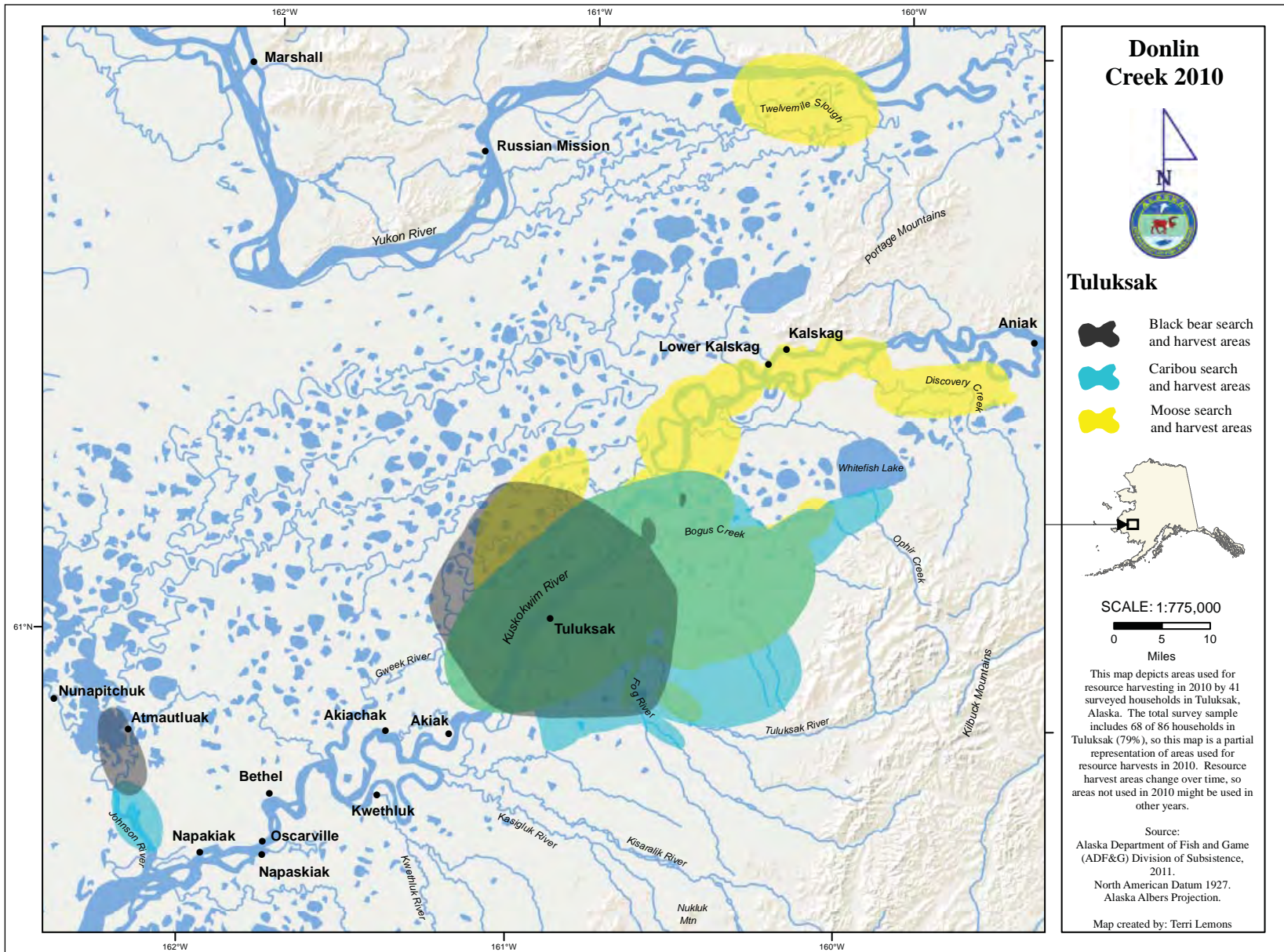


Figure D-9.—Caribou search and harvest areas, Tuluksak, 2010.

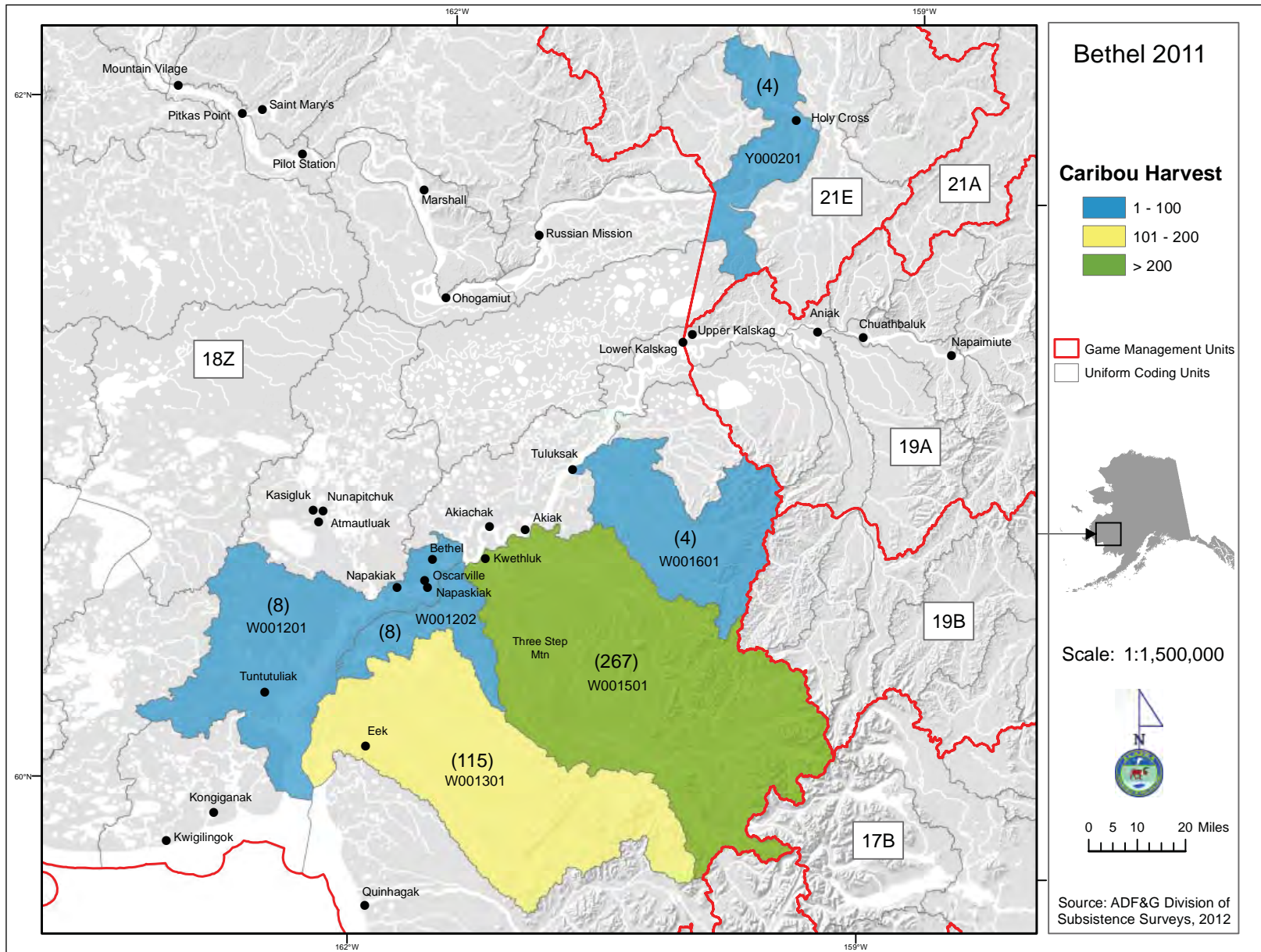


Figure D-10.—Caribou search and harvest areas, Bethel, 2011.

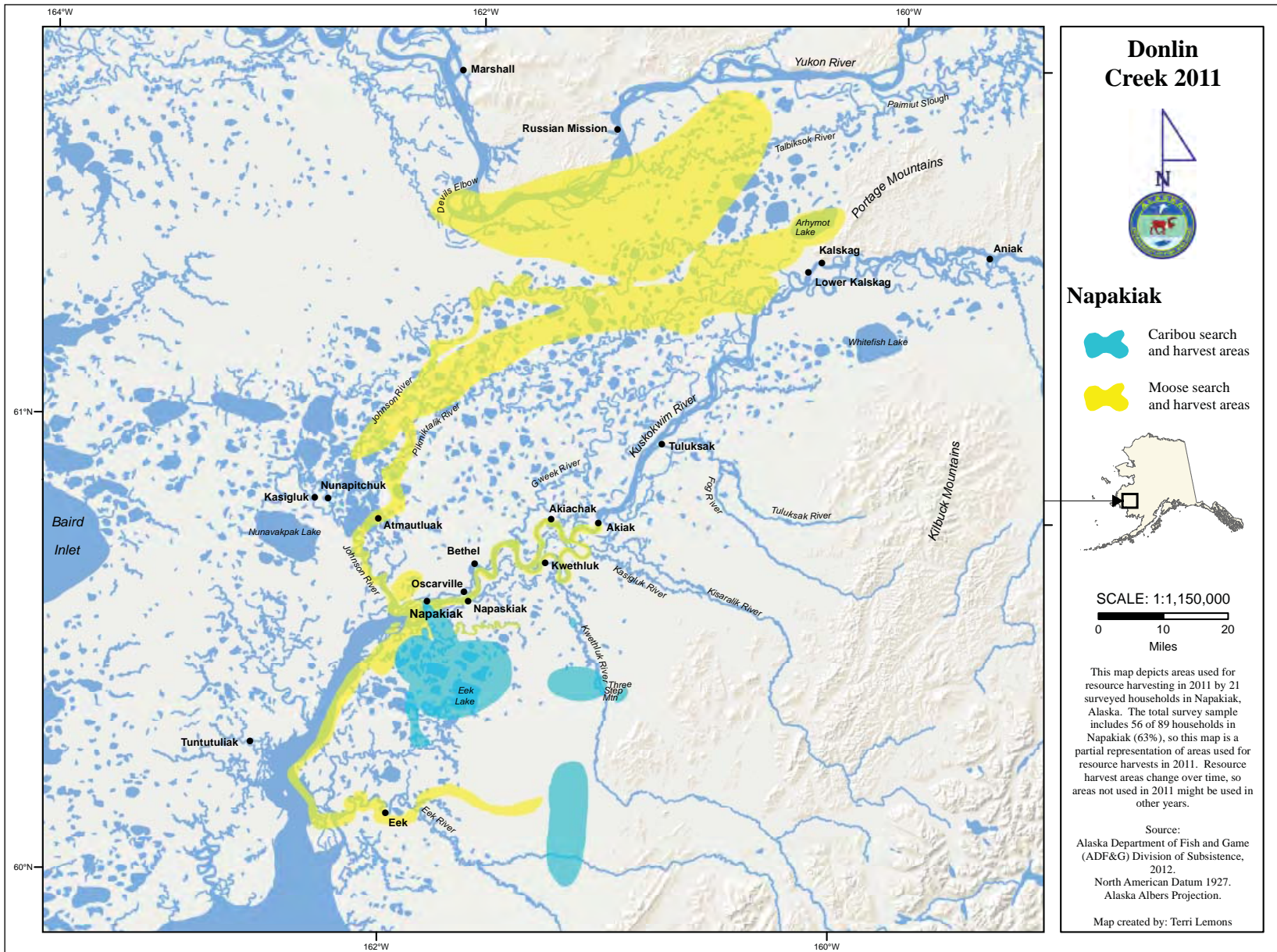


Figure D-11.—Caribou search and harvest areas, Napakiak, 2011.

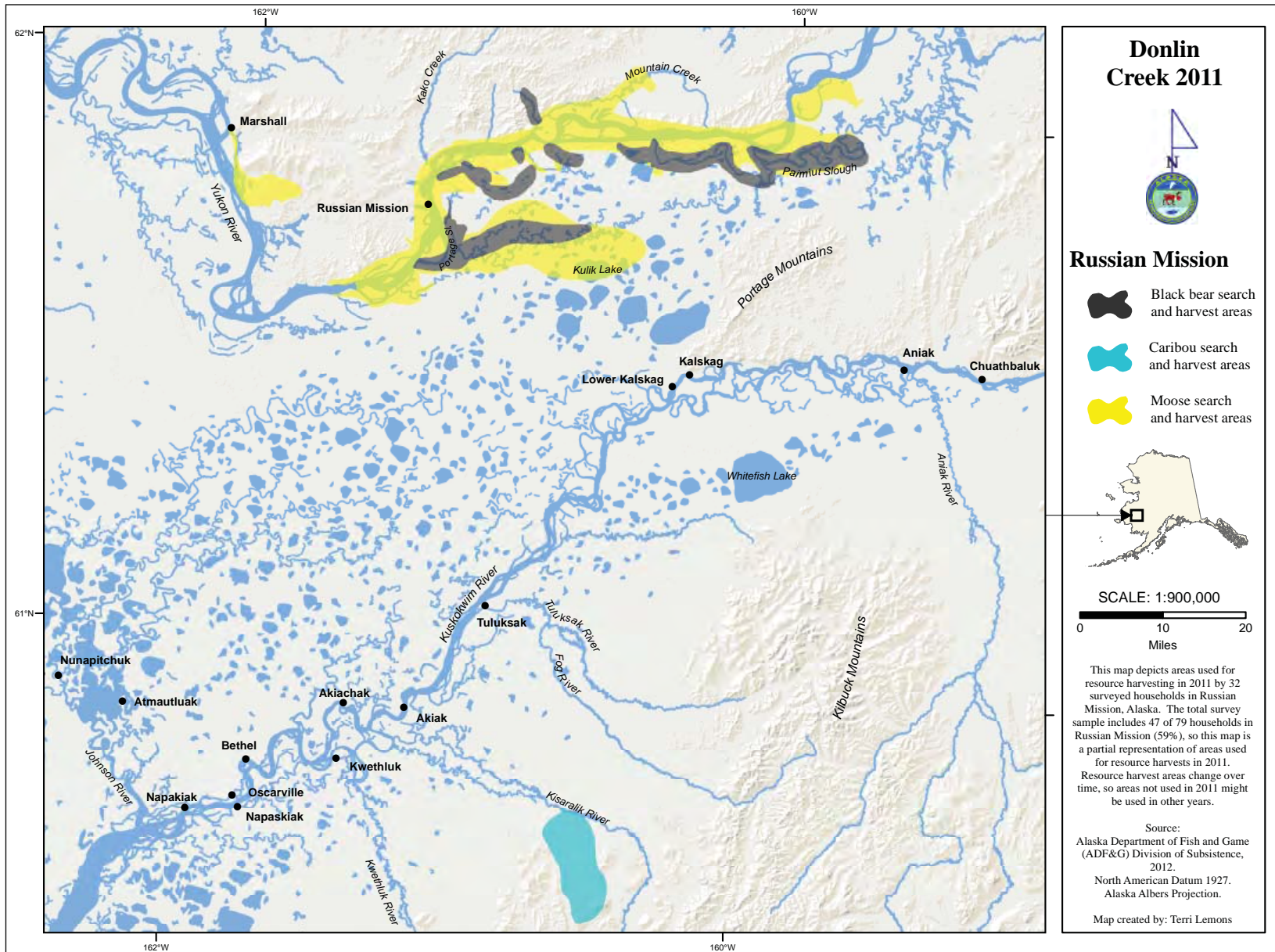


Figure D-12.—Caribou search and harvest areas, Russian Mission, 2011.

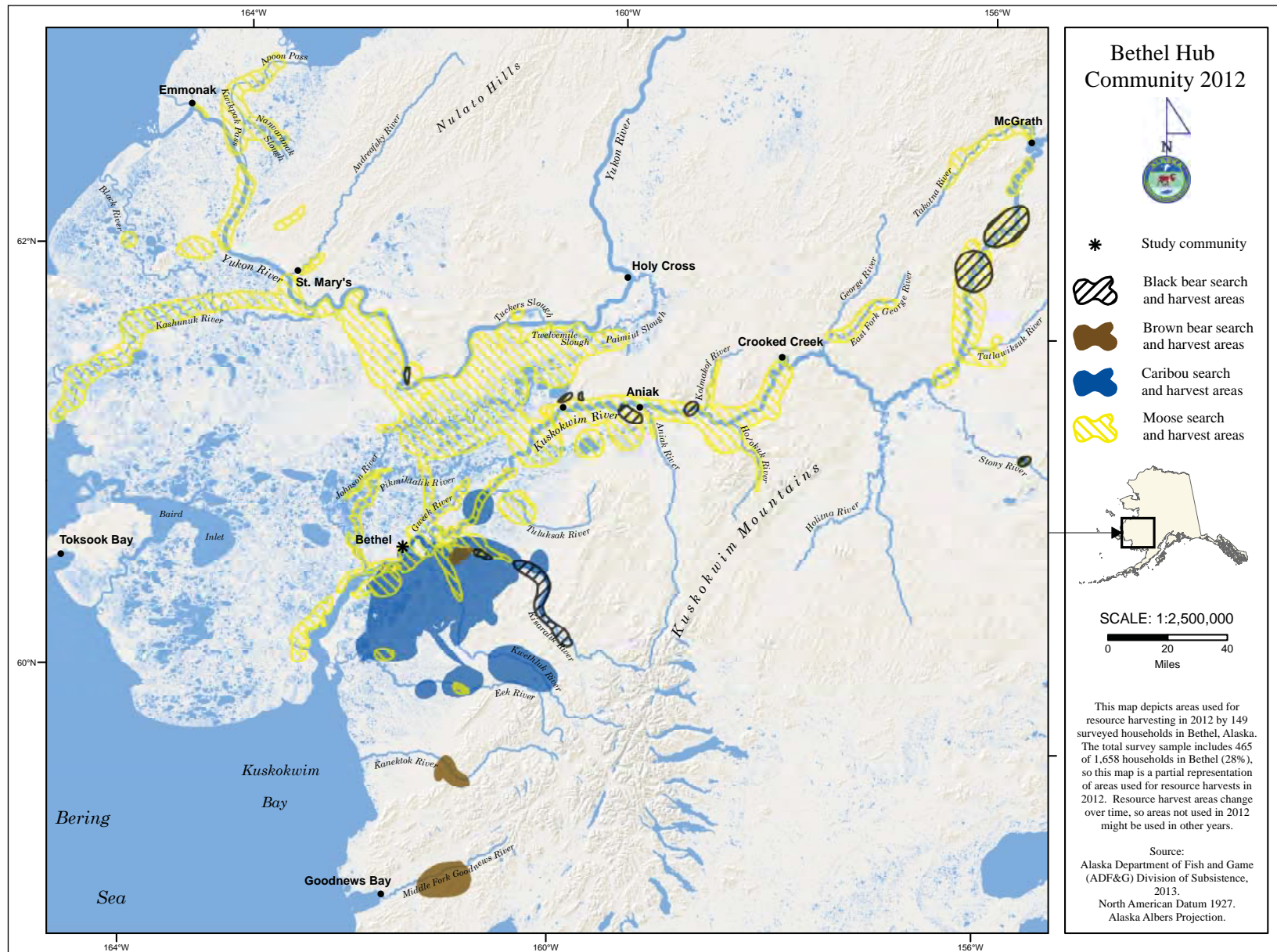


Figure D-13.—Caribou search and harvest areas, Bethel, 2012.

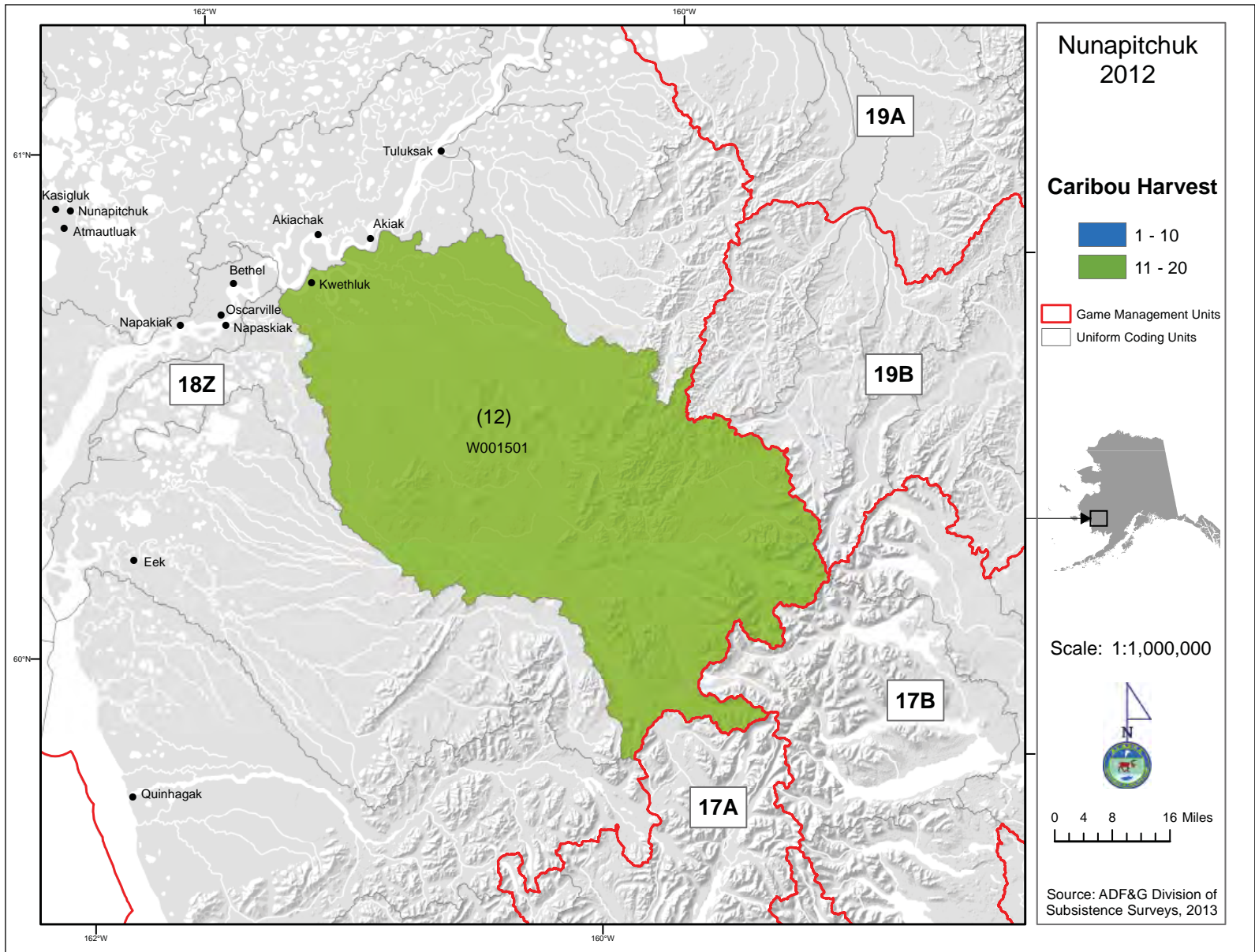


Figure D-14.—Caribou search and harvest areas, Nunapitchuk, 2012.

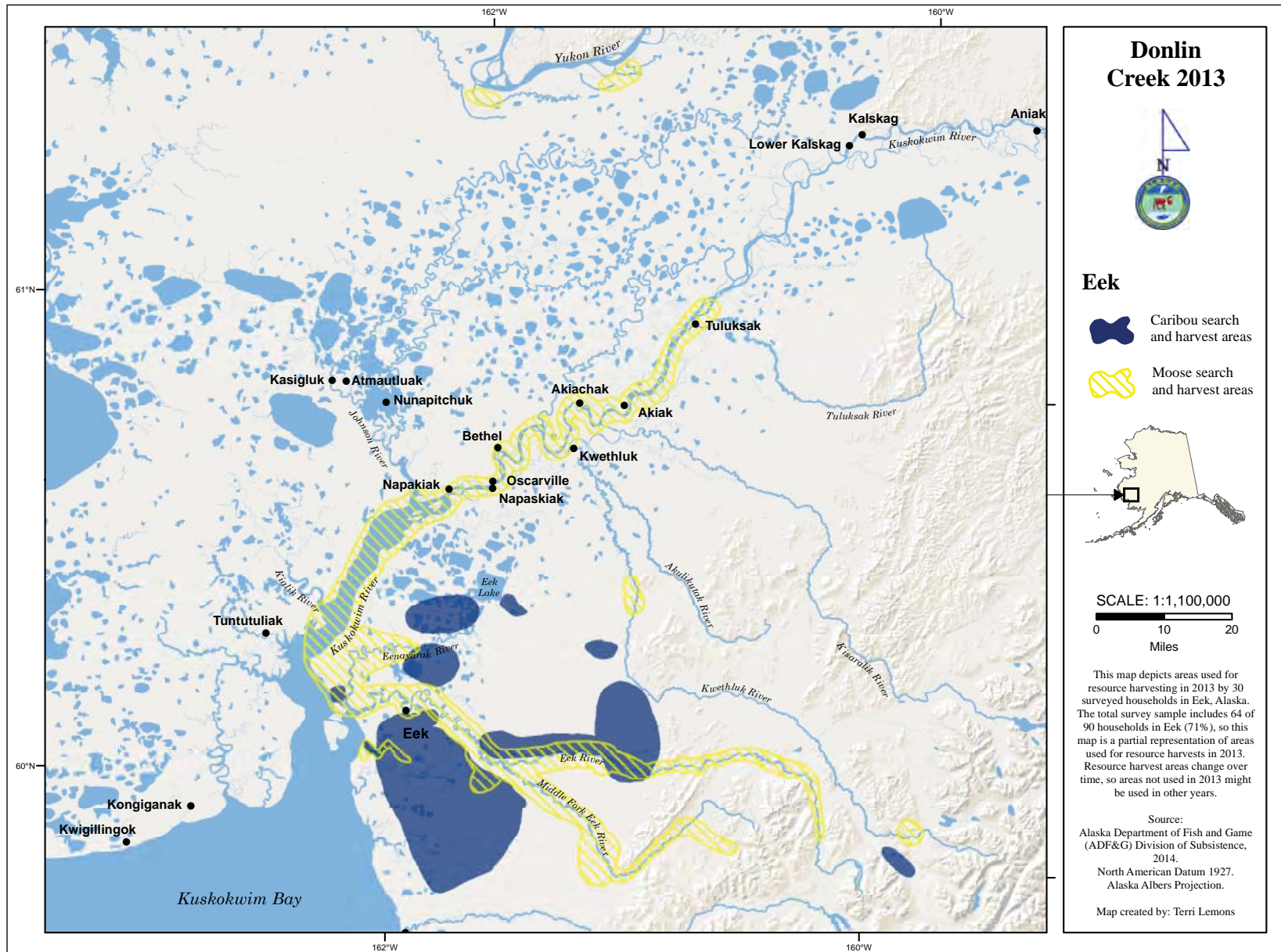


Figure D-15.—Caribou search and harvest areas, Eek, 2013.

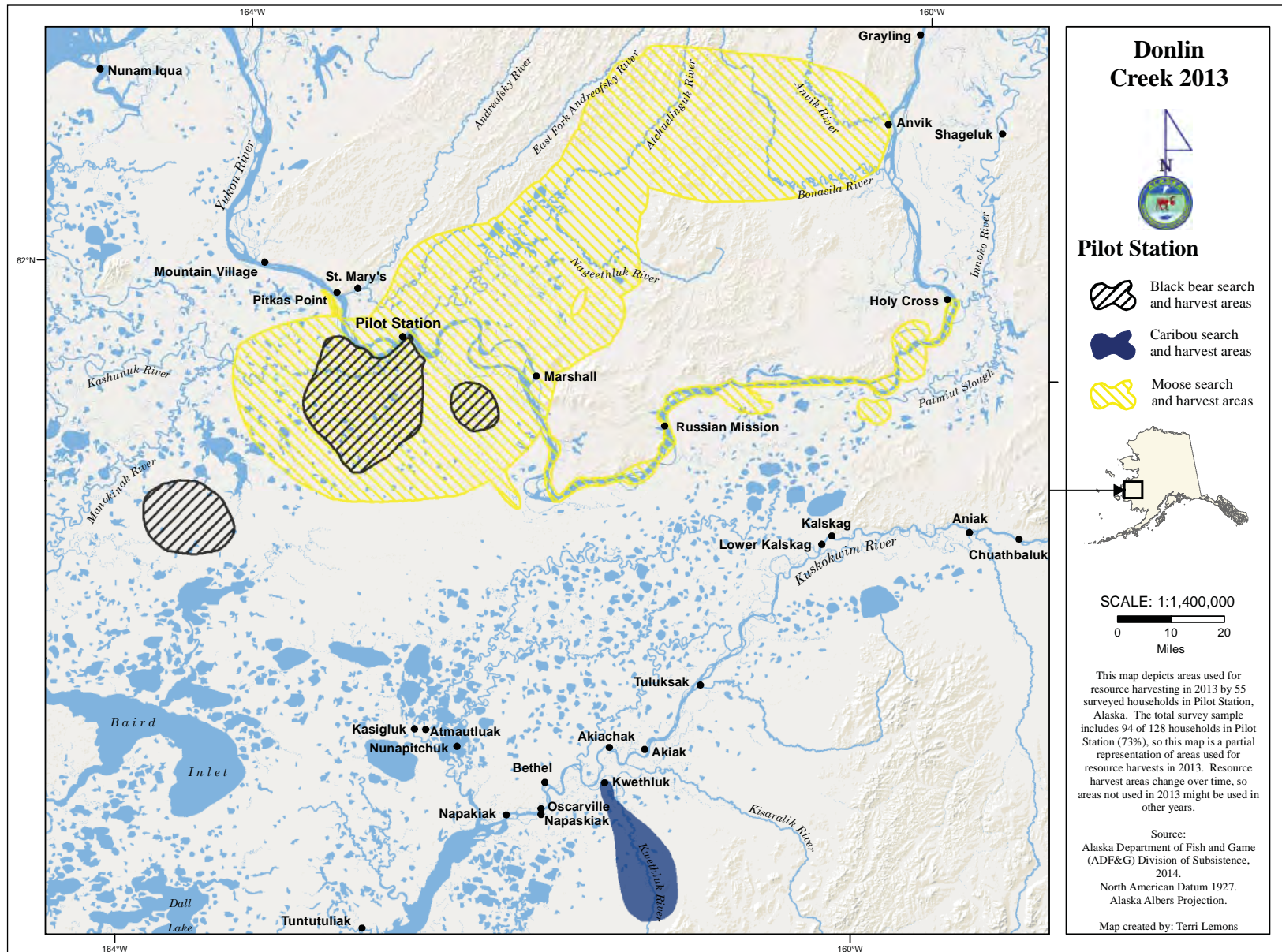


Figure D-16.—Caribou search and havest areas, Pilot Station, 2013.

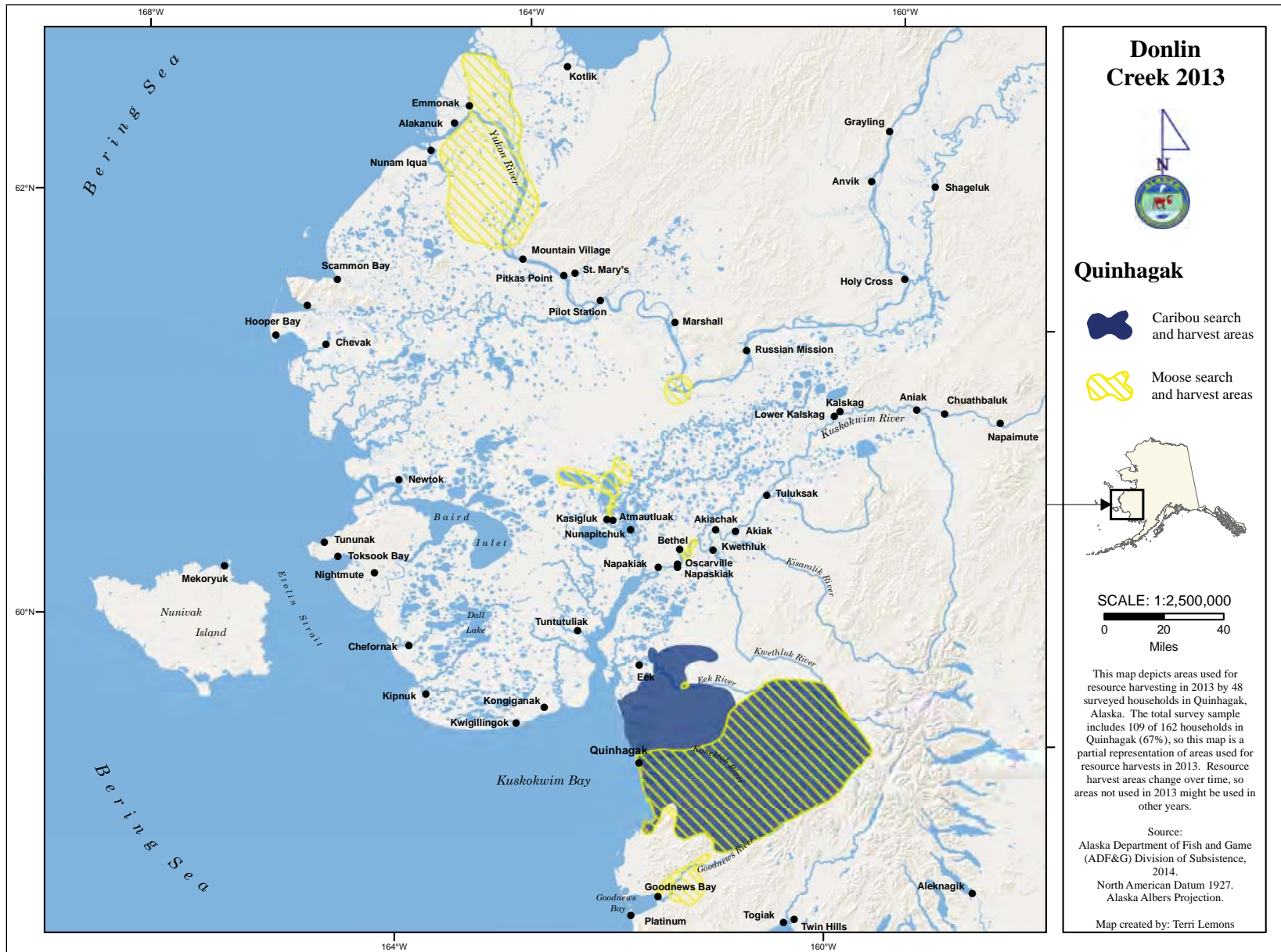


Figure D-17.—Caribou search and harvest areas, Quinhagak, 2013.

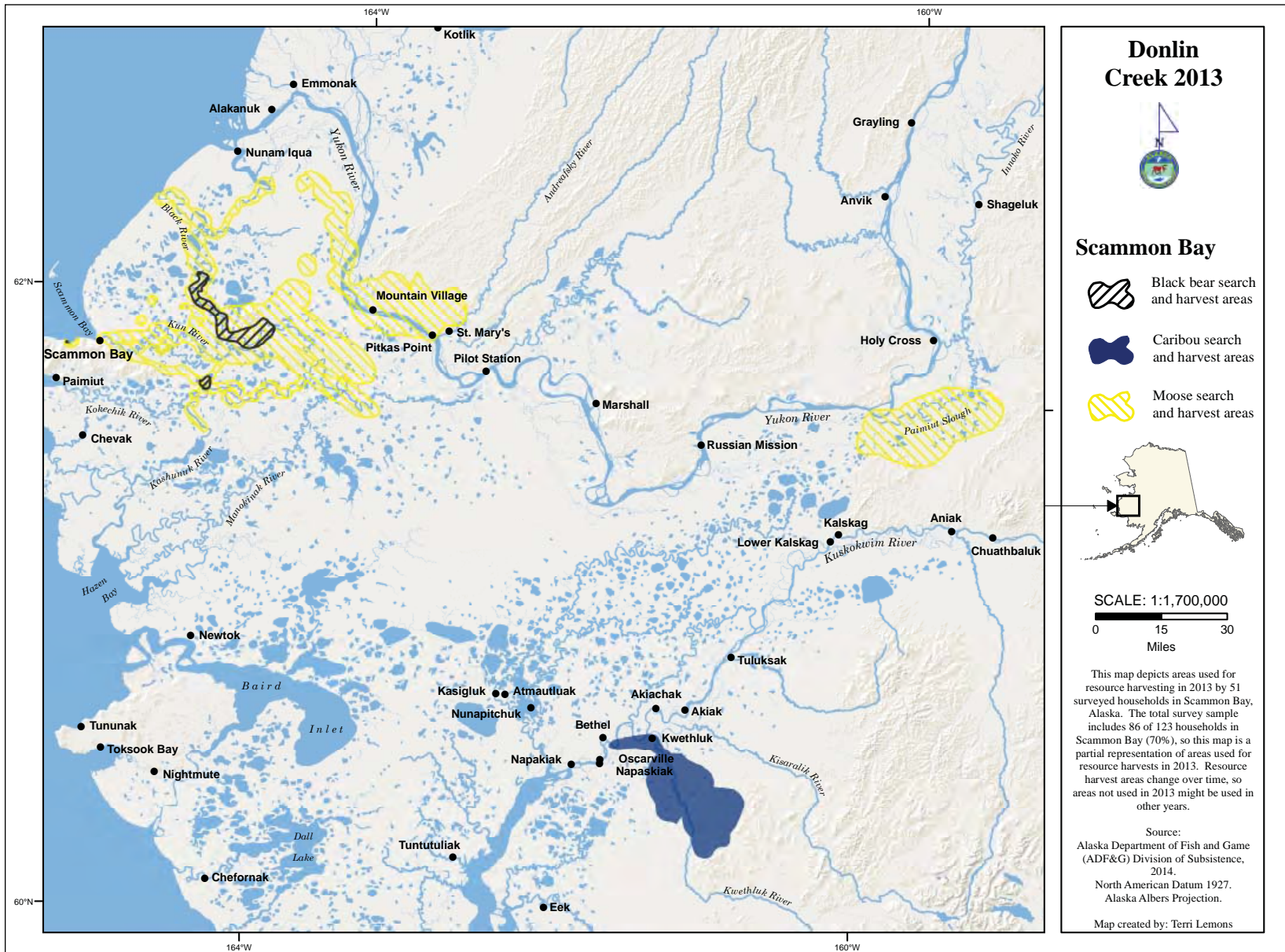


Figure D-18.—Caribou search and harvest areas, Scammon Bay, 2013.

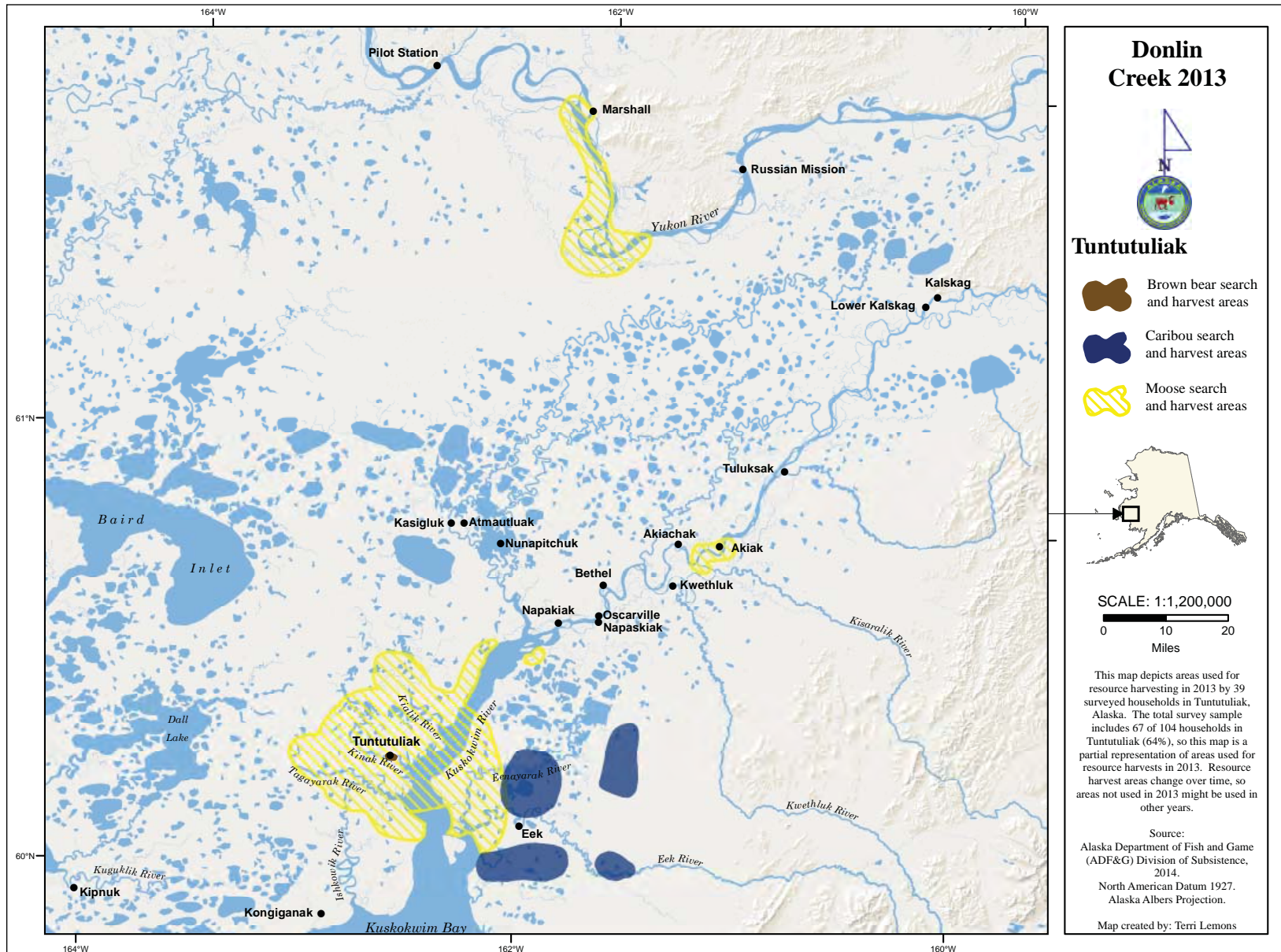


Figure D-19.—Caribou search and harvest areas, Tuntutuliak, 2013.